ICT IN MY HAND

FOR A' LEVEL

BY SOLOMON

ATWINE

TELL:+256775045337 /+256706449995

Email:atwinesolomon@gmail.com

Website: www.solomonatwine.net

DEDICATION

To my beloved dad Mr. **Arthur muhereeza makubee** and my younger sister **Atumanya prossy mercy.**

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About the author.

Solomon Atwine is an IT Practioner born in January 16th 1994 in the lands of Ntungamo district located in the shadows of western Uganda. He attended primary school from Mother care primary school, later went to Muntuyera High school for His O'Level and turned to Nsambya hillsides school for A'level,

He is currently pursuing Bachelor's degree in Business computing at Makerere University Business School and dreaming of pursuing Masters in Software Engineering at Makerere University. He has worked at Nsambya hillsides Schools as Head of ICT department since 2015, and currently working with AMBAR (U) LIMITED.

He has participated in different IT related fields where he has acquired a lot of skills and which are not only theoretical but also practical.

BOOKS OF SAME AUTHOR

1. ICT REVISON QUESTIONS & ANSWERS
2. INTRODUCTION TO ICT PAPER2 /3
3. HTML CLASS FOR DEVELOPERS

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HOW TO CONTACT THE AUTHOR

I welcome the feedback from you about this book or about the books you would like to see from me in the future. You can reach me by writing to me on atwinesolomon@gmail.om for more information and inquiries about anything concerning trends of IT in terms of hardware and soft wares you can reach me on **+256775045337/ +256706449995**

Solomon Atwine strives to always be a wake to supply you with tools and in formation you fill you need for your work. Please always check on my website; www.Solomonatwine.net, where I will always upload additional contents, errata, and updates that supplement this book if the need arises

ACRONYMS

ALU	Arithmetic Logic Unit	GUI	Graphical User Interface
ASCII	American Standard Code for Information Interchange	GW	Gateway
BIOS	Basic Input Output System		HCI-Human Computer Interaction
bps	Bits per Second	HTML	Hyper Text Mark-up Language
Bps	Bytes per Second	HTTP	Hyper Text Transfer Protocol
CAD/M	Computer Aided Design/ Manufacturing	IC	Integrated Circuit
CAL	Computer Aided Learning	ICT	Information and Communication Technology
CAT 5	'Category 5' cable		
CD	Compact Disc	IP	Internet Protocol
CD-R	Compact Disc Recordable	IRC	Internet Relay Chat
CD-ROM	Compact Disc Read Only Memory	ISDN	Integrated Services Digital Network
CD-RW	Compact Disc Re-Writable	ISP	Internet Service Provider
CPU	Central Processing Unit	JPEG	Joint Photographic Experts Group
CRT	Cathode Ray Tube	Kb	Kilobyte
DBMS	Data Base Management System	KH	Kilohertz
DDR	Double Data Rate Data	LAN	Local area network
DFD	Flow Diagrams Disc	LCD	Liquid Crystal Display
DOS	Operating System	LED	Light Emitting Diode
DSL	Digital Subscriber Line	LIFO	Last in First Out
DTP	Desktop publishing	MAN	Metropolitan Area Network
DVD	Digital Versatile Disc	MICR	Magnetic Ink Character Recognition
EFT	Electronic Funds Transfer	MP3	MPEG Layer 3
EULA	End User License Agreement	NIC	Network Interface Card
FAQ	Frequently Asked Questions	NOS	Network Operating System
FIFO	First in First out	OCR	Optical Character Recognition
FNF	First Normal Form	OMR	Optical Mark Recognition
FTP	File Transfer Protocol	OMR	Optical Mark Reader
GB	Gigabyte	OOPL	Object Oriented Programming

			Language
GIF	Graphic Interchange Format	OSI	Open Systems Interconnection
GIGO	Garbage in Garbage out	PCI	Peripheral Component Interconnect
GPS	Global Positioning System	PDA	Personal Data Assistant
POS	Point of Sale Pages per	URL	Uniform Resource Locator
PPM	Minute Random Access	USB	Universal Serial Bus
RAM	Memory Read Only	VGA	Video Graphics Array
ROM	Memory	WAN	Wide Area Network
SCSI	Small Computer Systems Interface	WAP	Wireless Application Protocol
SQL	Structured Query Language	TFTP	Trivial File Transfer Protocol
TCP	Transmission Control Protocol	TNF	Third Normal Form

ICT IN MY HAND FOR A' LEVEL

INTRODUCTION.

ICT can best be described as the interaction of hardware, software, telecommunications, database management, and other information processing technologies used in computer-based information systems.

With the series of dramatic advancements in information, communication, technology, computers have seemed to be on a fast growing rate with their speed increasing, size reducing and has come with the introduction of new hand held gargets such as mac books, iPhone, telephones, laptops etc. so Many ICT firms have come up to enhance the advancements in technology to make the world a better place to live in.

A computer refers to a general purpose machine that is used to input data, process, and store and output/retrieve information either on hard copy or softcopy.

A computer is a device which is faster to the extent that it can process millions of instructions within a shortest time.

Data refers to unorganized facts ***whereas*** information refers to organized information which has already been processed to make a meaningful information.

An example, of data can be number of people in Ntungamo who are to vote during the fourth coming election process. This data can be fed into the computer using the input devices and this process can be termed as input process and it will be processed by either arranging them in their alphabetical order with their corresponding ages and constituencies which will give out a clear meaning to the electoral commission. This termed as data manipulation.

Characteristics of modern computers

1. **Speed.**

. Currently computers are growing more speed compared to the past generations. Computers are faster in that their speed is measured in millions of instructions of per second (MIPS).

. It is capable of performing calculation of very large amount of data.

. The computer has units of speed in microsecond, nanosecond, and even the picosecond.

. It can perform millions of calculations in a few seconds as compared to man who will spend many months to perform the same task.

2. **Accuracy.** Today's computers are more accurate in that they hardly make any mistake. They are designed in that the errors made a specifically not for the computers but the users themselves. The computers also have a system which also checks for the errors. This is what we shall term as GIGO (Garbage in garbage out) which literally means that what is fed in the computer is what is finally output.
3. **Automation**

. Automation is the ability to perform a given task automatically. Once the computer receives a program i.e., the program is stored in the computer memory, then the program and instruction can control the program execution without human interaction.

4. **Deligence.** Computers can work deligently as they are able to do the same task over and over again without getting tired.
5. **Artificial intelligence.** Computers are artificially intelligent because they can be given instructions and produce results. Computers can think and reason like human beings but however their intelligence is artificial because it is only imbedded within the programs installed in them.
6. **Versatility.** Computers are versatile in that they can do different tasks at the same time.ie playing music at the same time typing document.
7. **Storage.** Memory is a very important characteristic of computers.

. A computer has much more storage capacity than human beings.

. It can store large amount of data.

. It can store any type of data such as images, videos, text, audio, etc.

8. **Reliability**

. A computer is a reliable machine.

. Modern electronic components have long lives.

. Computers are designed to make maintenance easy.

Disadvantages of Computers

Following are certain disadvantages of computers.

No I.Q.

- A computer is a machine that has no intelligence to perform any task.
- Each instruction has to be given to the computer.
- A computer cannot take any decision on its own.

Dependency

- It functions as per the user's instruction, thus it is fully dependent on humans.

Environment

- The operating environment of the computer should be dust free and suitable.

No Feeling

- Computers have no feelings or emotions.
- It cannot make judgment based on feeling, taste, experience, and knowledge unlike humans.

APPLICATIONS OF ICT

In this chapter, we will discuss the application of computers in various fields.

1. **Business**

A computer has high speed of calculation, diligence, accuracy, reliability, or versatility which has made it an integrated part in all business organizations.

Computer is used in business organizations for −

- Payroll calculations

- Budgeting
- Sales analysis
- Financial forecasting
- Managing employee database
- Maintenance of stocks, etc.

2. Banking

Today, banking is almost totally dependent on computers.

Banks provide the following facilities −

- Online accounting facility, which includes checking current balance, making deposits and overdrafts, checking interest charges, shares, and trustee records.
- ATM machines which are completely automated are making it even easier for customers to deal with banks.

3. Insurance

Insurance companies are keeping all records up-to-date with the help of computers. Insurance companies, finance houses, and stock broking firms are widely using computers for their concerns.

Insurance companies are maintaining a database of all clients with information showing −

- Procedure to continue with policies
- Starting date of the policies
- Next due installment of a policy
- Maturity date
- Interests due
- Survival benefits
- Bonus

Education

The computer helps in providing a lot of facilities in the education system.

- The computer provides a tool in the education system known as CBE (Computer Based Education).
- CBE involves control, delivery, and evaluation of learning.
- Computer education is rapidly increasing the graph of number of computer students.
- There are a number of methods in which educational institutions can use a computer to educate the students.
- It is used to prepare a database about performance of a student and analysis is carried out on this basis.

4. Marketing

In marketing, uses of the computer are following −

- **Advertising** − With computers, advertising professionals create art and graphics, write and revise copy, and print and disseminate ads with the goal of selling more products.
- **Home Shopping** − Home shopping has been made possible through the use of computerized catalogues that provide access to product information and permit direct entry of orders to be filled by the customers.

5. Healthcare

Computers have become an important part in hospitals, labs, and dispensaries. They are being used in hospitals to keep the record of patients and medicines. It is also used in scanning and diagnosing different diseases. ECG, EEG, ultrasounds and CT scans, etc. are also done by computerized machines.

Following are some major fields of health care in which computers are used.

- **Diagnostic System** − Computers are used to collect data and identify the cause of illness.
- **Lab-diagnostic System** − All tests can be done and the reports are prepared by computer.
- **Patient Monitoring System** − These are used to check the patient's signs for abnormality such as in Cardiac Arrest, ECG, etc.
- **Pharma Information System** − Computer is used to check drug labels, expiry dates, harmful side effects, etc.
- **Surgery** − Nowadays, computers are also used in performing surgery.

6. Engineering Design

Computers are widely used for Engineering purpose.

One of the major areas is CAD (Computer Aided Design) that provides creation and modification of images. Some of the fields are −

- **Structural Engineering** − Requires stress and strain analysis for design of ships, buildings, budgets, airplanes, etc.
- **Industrial Engineering** − Computers deal with design, implementation, and improvement of integrated systems of people, materials, and equipment.
- **Architectural Engineering** − Computers help in planning towns, designing buildings, determining a range of buildings on a site using both 2D and 3D drawings.

Military

Computers are largely used in defence. Modern tanks, missiles, weapons, etc. Military also employs computerized control systems. Some military areas where a computer has been used are −

- Missile Control
- Military Communication
- Military Operation and Planning

- Smart Weapons

7. Communication

Communication is a way to convey a message, an idea, a picture, or speech that is received and understood clearly and correctly by the person for whom it is meant. Some main areas in this category are −

- E-mail
- Chatting
- Usenet
- FTP
- Telnet
- Video-conferencing

8. Government

Computers play an important role in government services. Some major fields in this category are −

- Budgets
- Sales tax department
- Income tax department
- Computation of male/female ratio
- Computerization of voters lists

- Computerization of PAN card
- Weather forecasting

CLASIFICATION OF COMPUTERS

Computers are classified into broad classifications i.e.

1. By size
2. By purpose
3. By function
4. By processor power.

By size

1. The classification of computers by size is based on how computers are big or small the computer are. Under this classification there are 4 basic categories & these include.
2. Computers can be broadly classified by their speed and computing power.

S.No.	Type	Specifications
1	PC (Personal Computer)	It is a single user computer system having moderately powerful microprocessor
2	Workstation	It is also a single user computer system, similar to personal computer however has a more powerful microprocessor.
3	Mini Computer	It is a multi-user computer system, capable of supporting hundreds of users simultaneously.
4	Main Frame	It is a multi-user computer system, capable of supporting hundreds of users simultaneously. Software technology is different from minicomputer.

5	Supercomputer	It is an extremely fast computer, which can execute hundreds of millions of instructions per second.

Supercomputer/ monster,

These are the largest, faster and the most expensive and powerful computer with big extended memory capacity.

They are described as giant computers because they perform complex calculation at extremely high speed because of extreme weight. A single super computer is kept in its special room.

Due to their high processing power, super computers generate a lot of heat. They are mainly used for big scientific research which involve big calculation, launching missiles, petroleum research and other mineral explorations, controlling space air crafts and determining weather forecasts.

Super computers are mainly found in developed countries such as USA, France where they are used for advanced scientific research such as nuclear physics.

Super computers require specialists to operate them.

Mainframe

These are said to be big in size next to super computers. They have a large storage capacity and there4 can hold large amounts of data. This is why they are preferable used by multi-national corporations such as banks, insurance companies, electricity boards, large hotels manufacturing firms etc.

Main frame computers have got large information processing speed.

They have got extended input and output capabilities because they can support any of the peripherals.

They are multi user computers which are capable of supporting many user of about 500-100people at once.

Each user can have his or her separate facilities (monitor, keyboard, and mouse) but connected to one systems unit as a server.

They can handle many tasks at the same time.

They support resource sharing such as a single file on the server (system unit) can be shared among many users on the system at the same time.

1. Minicomputer

These are slightly smaller than main frame computers and there4, they can be termed as medium sized/ small scale mainframe computers.

They are less powerful and slower as compared to main frame computers. They have also got a large storage capacity but not as large as that of the mainframe.

They have high processing speed which is relatively slower than that of mainframe computers.

They have also got extended input and output capabilities that can support any of the peripheral devices fewer than that of mainframe can support.

They are ther4 multi user computers which are capable of supporting people of about 50-500 users at the same time. Because they have medium size than that of mainframe computers, they are used by moderate organizations such as institutions, government departments and business research firms etc.

Mini computers are flexible to run commercially developed packages such as such as accounting, word processing, data base and management and other functions.

3. Workstation

Workstation is a computer used for engineering applications (CAD/CAM), desktop publishing, software development, and other such types of applications which require a moderate amount of computing power and relatively high quality graphics capabilities.

Workstations generally come with a large, high-resolution graphics screen, large amount of RAM, inbuilt network support, and a graphical user interface. Most workstations also have mass storage device such as a disk drive, but a special type of workstation, called diskless workstation, comes without a disk drive.

Common operating systems for workstations are UNIX and Windows NT. Like PC, workstations are also single-user computers like PC but are typically linked together to form a local-area network, although they can also be used as stand-alone systems.

4. Microcomputers.

PC (Personal Computer)

A PC can be defined as a small, relatively inexpensive computer designed for an individual user. PCs are based on the microprocessor technology that enables manufacturers to put an entire CPU on one chip. Businesses use personal computers for word processing, accounting, desktop publishing, and for running spreadsheet and database management applications. At home, the most popular use for personal computers is playing games and surfing the Internet.

Although personal computers are designed as single-user systems, these systems are normally linked together to form a network. In terms of power, now-a-days high-end models of the Macintosh and PC offer the same computing power and graphics capability as low-end workstations by Sun Microsystems, Hewlett-Packard, and Dell.

There are various types of microcomputers which include;

- Tower computers. This has a tall system unit which is either placed besides or under the desk. Its monitor is always placed besides the system unit.
  They are usually used in training, learning institutions, banks, offices etc.
- Desktop computers. These are under microcomputers which have got a flat shaped system unit that rests horizontally on the table. The monitor of Desktop computer is usually placed on top of the system unit and other components such as keyboard are usually placed in front of the system unit.

Desktop computers were the first microcomputers to be manufactured. They are commonly used in schools and banks etc.

- Laptops. This a portable personal computer which is small enough to fit in one's brief case. It is also light that it can be placed on users lap when he or she is doing some work on it. It can even go ahead to be working even when the user is in the bus or train because of their internal battery which saves power.

  The rest of its components are in the lower parts.

  NB; earlier laptops used track ball but todays laptops use touch pads which work as their mouse on the desk.

  A click on a laptop and a note book computer is done by pressing the enter button or using the clicking button on modern laptops

  Moving the cursor on the screen of the laptop or note book is simply by sliding the finger on the blob
- Note book computers.

  These are smaller than laptops but more executive.

  They fit easily in hand bags and brief cases

  They have the same features as those of laptops. They are commonly used by high travelers for taking fewer notes of their interests.

  All note book computers use the touch pad mouse as the pointing device to use the cursor on the screen and other operations.
- Palm top computers

  It is a hand held computer that is small, portable and fits in the hand of the user. It is small enough to fit in a shirt's pocket.

  A palm top computer has all its parts integrated into one unit like that of a mobile phone. Palm top computer don't possess all the features of a desktop computer and so they are used to take a few notes such as appointments schedules, email addresses, etc.

  Examples are; PDAs, tablets, digital diaries etc.

  NB. Some of these hand held pcs have the capability of connecting to the internet and are termed as internet appliances.

Dfn; Internet appliance refers to a hand held computer with limited functionality whose main function is to connect to the internet from any place.

By purpose.

Under purpose, computers are categorized depending on their works and their use i.e. some computers are used to carry a variety of tasks while others are specialized and limited to a single function.

Computers under this classification are categorized into two major groups;

a) Special purpose computers

A special computer is one which is designed to perform only a particular task. It is dedicated to perform a particular purpose for which it was designed for.eg digital watches, pocket calculators

More examples are;

- Computers which are designed to control the lift which moves up and down from floors of the buildings.
- Computers which are used for controlling air craft spaces.

The good advantage with special purpose computers is that they can perform their tasks quickly and efficiently.

b) General purpose computers.

- A general purpose computer is one designed to perform a wide range of tasks.
- General purpose computers can be only adopted to perform a particular task or to solve a specific problem using specific programs which could have been designed for that particular program. They can be used to carry out calculations, keep databases, prepare electronic presentations, play computerized games, play music and also connect to the internet. Example include, all computers studied under size can work.

By process/ function

In this classification, computers are categorized basing on how processed data is represented. The processed data can be represented into two;

- **Analog computers.**
- These are computer that represents information by variable quantities/continuous form e.g., positions, temperature, voltages, atmospheric pressure, weight, speed.

  These quantities can only be measured by comparing them to other specific units. The uses of such quantities are based on scientific work. Examples are thermometer, barometer, ammeter, speed meter, beam balance, hydrometer, etc. These devices are not accurately computers and there4 they don't give exact results but just estimate to the nearest units

  Analog devices are usually special purpose devices which are basically dedicated to a single task areas such as weather stations, laboratories, and in missile launching places
- **Digital computers**

  These are computer that represents information in numerical (binary) form. This form is represented by 0 and 1's which are referred as discreet values that don't have further transitional stages.

  In simplicity, analog data processing involves measurement of data while digital data involves counting/ processing

  Examples can be; digital watches, pocket calculators, remote controllers etc.

- Hybrid computers.

  These are ones which have combined features of both digital and analog computers. They process both analog and digital data. Example are; all micro computers

By processor power

In this classification, there is no clear categorization of computers instead computers differ from one another in terms of processor technology which embeds computer processing power and speed.
The processor technology has been increasing with rapid advancements over the years. This has resulted into high increase in processor power and speed. Earlier processors which were used in computers of 1940's had the processing power and speed of less than 0.4mips but due to advancements in processor technology, a modern computer today has a minimum average processing speed of 15mips and this is not the limit.

Processors arranged from the least to the most powerful

a) 80286
b) 80386
c) 80486
d) 80586 (first processor to be named as pentium1)
e) Pentium II
f) Pentium III
g) Pentium IV
h) Celeron
i) Duo core3467
j) Intel core M[1]
k) Intel core™ i3
l) Intel core™ i5
m) Intel core™ i7 (current)

COMPUTER LABORATORY CARE AND MAINTENANCE.

- A computer laboratory is a room that is specially designed and prepared to facilitate the installation of computers and to provide a safe and conducive environment for using the computers.

Factors to consider when preparing a computer laboratory

- Security of computers, programs and other resources
- Reliability of the power source
- The number of computers to be installed and the available floor space
- The maximum number of users that the computer laboratory can accommodate

Why must there be safety rules and precautions in the computer laboratory?

- To avoid accidental injuries to the users
- To avoid damage of computers
- To provide a conducive and safe environment for computer use.

Factors to consider when buying computers

- Needs of the organization/volume of transactions
- System specifications like capacity of hard disks, RAM, processor speeds
- Costs of system components and development
- Source of system components
- Environmental concerns
- Available employee skills

COMPUTER LITERACY

- Computer literacy refers to the ability and knowledge to use computers and related technology efficiently
- Computer literacy refers to having the basic understanding of what a computer is and how it can be used as a resource.

Importance of computer literacy

- ✓ It enables individuals, schools and businesses through equipping them with the future
- ✓ It helps in carrying out research.
- ✓ It is used in schools to enhance education
- ✓ It enhances the e- commerce
- ✓ It enhances communication etc.

Disadvantages of computer literacy

- Over dependency
- Moral decay
- Wide spread of viruses
- Increased loss of information due to hackers
- Loss of sight**.**

Ways of improving computer literacy in the society

- Through eradicating people on advantages of computers
- Embracing many of ICT related projects
- Creating awareness of ICT

Computer laboratory rules and regulations

- ✓ Avoid smoking and exposing computers to dust since they contain small abrasive particles that can damage computer components and cause wearing of moving parts.
- ✓ Avoid carrying food and beverages to the computer room since these may fall into moving parts causing rusting or electrical faults.
- ✓ Avoid unnecessary movements because you may accidentally knock down peripheral devices.
- ✓ At all times follow the right procedures while starting and shutting down the computer therefore abrupt switching on and off the computer should be avoided since this can lead to damaging the computer.

- ✓ Do not open up the metallic covers of computers or peripherals without permission and particularly when the computer power is still on.
- ✓ Any repairs to the computer should be done by someone who has knowledge regarding computer repairs.
- ✓ Any connections (keyboard, mouse, printer and monitor) to the computer should be done when the computer power has been switched off.
- ✓ Computers should be regularly serviced and keep a regular record of computer servicing and repair to establish maintenance costs and common problems to your computer.
- ✓ Guard your computer against new users who might spoil the computer and data corruption by unauthorized parties
- ✓ Cover the computers after using them or when not in use. Let the computers cool down before being covered to avoid trapping heat.
- ✓ The computers should be cleaned on a regular basis to remove dust from the keyboard, mouse and other parts.
- ✓ Keep computers away from excessive dust and fit special curtains that would reduce entry of dust particles and computers should not be exposed to direct sunshine.

Basic requirements for setting up a computer laboratory

UPS- Uninterruptible Power Supply

- If the power goes off, computer equipment must keep running. Even home computers need the time to shut down properly. Damage to devices and data can occur when there is sudden power loss or fluctuation.
- **UPS**, or **Uninterruptible Power Supplies**, provide power for devices in the event of a failure or other electrical problems.
- A UPS is essentially a small battery that keeps
  The power supply on for long enough for
  You to switch off the computer safely,
  When there is a sudden blackout.

Air conditioner

- Air conditioning units monitor and maintain the temperature, air distribution and humidity in a computer room.
- An Air conditioning unit is a device used for cooling and controlling the humidity and purity of the air circulating in a space.

Fire extinguisher

- Fire extinguishers are a critical component of saving property and lives in the case of a fire emergency.
- Owning a fire extinguisher is a form of ensuring safety.
- All computer rooms need it just in case a fire starts.
- It can save our property from burning because the use of the device will help prevent it from spreading and can even stop the flame in no time.

Security camera

- Security cameras act as a deterrent to theft and other crimes. Cameras monitor data centers or blind spots outside of doors.

- **Blower**

  Used to blow/remove dust that may

  Have entered inside the computer

- **Antiglare screens**

  Regulate excess light from monitors

  Especially CRT monitors.

- **Water proof covers**

  Protect computers from moisture,

  Water and liquids.

  First aid box

  A first aid kit is a box or bag that contains the necessary items for providing emergency care. It is important to have first aid kits, because they allow someone who is injured, to be rapidly treated with basic first aid, before they can be properly treated at the local hospital.

- **Reasons to keep a first aid kit:** Prevent infection, Prevent excessive blood loss, Prevent scarring, Prevent an acute injury from becoming a chronic problem and Prevent death.

- **Wool carpet**

  The wool carpet is used to trap dust that

  Enters in the computer laboratory.

- **Internet gateway**

  An internet gateway is your modem or router or any other peripheral which allows you to access the internet.

  Burglar proofing

- Burglar proofing provides protection

  Against any forced physical entry into the

  Computer laboratory. Burglar proofing

  Involves fitting metal grills in windows

  And doors.

  How Secure computer laboratory environment

  Protection against fire

Have gaseous fire extinguishers like those filled with carbon dioxide. Water based or powder extinguishers should be avoided since they can cause damage to computer components.

- Computers should not share the same power line with other office machines to avoid overloading the power units.


. Cable insulation

- All power cables must be properly insulated and laid away from pathways in the room.

- Lay them along the walls in trunks. This prevents electric shock and power disconnections caused by stumbling on cables.

Stable power supply

- Protect computers from being damaged and data loss due to power instabilities by having:
- Uninterruptible power supply (UPS)
- Power stabilizers maintain power at required voltages
- A surge protector can be used to protect computer equipment against under voltage and over voltage.


Burglar proofing

- Consider installing security alarms at strategic access points that would alert the security personnel in case of a break-in.
- Fit strong metallic grills and locks on doors, windows and strengthen the roof incase the roofing is weak.
- Use Desktop locks, system unit enclosures and laptop locks.




AIR CIRCULATION

- Have good air circulation in the computer room since users and computers emit heat energy.
- This is possible through having enough ventilation points like windows, installing an air conditioning system.
- Avoid overcrowding of machines and users.
- All the above prevent suffocation and overheating.

Lighting

A computer laboratory must be well lit with appropriate

Wall paints to avoid eye strain, headaches, stress and

Fatigue and always fit radiation filter screens to reduce

Light that reaches the eyes

Standard furniture

Have standard furniture so that the tables are wide enough and strong to bear the weight of the computers and accommodate all peripherals.

The seat for the user must be comfortable and have a straight backrest that allows someone to sit upright.

Physical security

- Employ security guards to keep watch over data and information centers.
- Apply burglar proof for the computer laboratory by reinforcing weak access points like windows, doors, roofing with metal grills and strong padlocks.
- Set up alarms to alert you in case of break-ins.
- Use system locks (locked key systems) to make it difficult to access internal components like hard disks and memory sticks.
- Use cables to lock the equipment to desk, cabinet or floor.
- Electronic locking mechanism with keys, swipe cards, finger print recognition.
- CCTV Cameras to keep watch over computer systems and centers.

Software security measures

- Computers shared by multiple users in a computer center should have security software installed to limit and block certain activities for example deep freeze.

- Remote administration software should be considered with high number of computers in a computer center.
- Computer management software to monitor and limit web browsing should be installed for example K9 web protection.
- Group policy or security software to prevent malicious software from being executed and installed.
- Assigning unique authorized log-in for authentication before granting network access.

Study questions

1. Define the term computer laboratory
2. Mention four factors to consider when preparing a computer laboratory.
3. Why must there be safety rules and precautions in a computer laboratory? List any three reasons.
4. List down two reasons as to why power cables in the computer laboratory need to be properly insulated.
5. Mention two reasons as to why computers need a stable power supply.
6. Suggest two ways through which good air circulation can be achieved in a computer laboratory.
7. Suggest two reasons why standard furniture must be provided for a computer laboratory.
8. Mention five ways through which computers can be kept safe.
9. Define the following terms

a) Computer literacy

b) Computer competency

Solution

Computer competency refers to a process where a student demonstrates his or her ability to perform his /her college level basic computing work. This process involves fully completion of computer competency examination or completion of specified computer course

c) Computer professional

Solution

A computer professional is a person who works in the field of information technology.

d) Suggest any ten rules and regulations that must be followed when in a computer laboratory.

e) Your school headmaster wants to setup a new computer laboratory. Explain the requirements needed to setup the laboratory.

f) Suggest any five factors to be considered when buying computers.

g) Identify any five devices used in computer laboratory maintenance and safety.

h) How can physical security be achieved so that access to computers and data centers is regulated?

i) Explain any four software security measures that can be enforced in the computer Laboratory

COMPUTER MANAGEMENT

TERMS TO NOTE

Computer maintenance is the practice of keeping computers in a good state of repair.

Computer repair is the process of identifying, troubleshooting and resolving problems and issues in a faulty computer

Computer servicing is the periodic routine inspection and maintenance of a computer to prevent its breakdown. It includes; updating and upgrading of software and hardware, defragmenting disks, cleaning the computer, cleaning the registry, among others

Software upgrading is the replacement of software with a newer and better version in order to bring the system up to date and improve its functionality

Software updating is the process of installing the latest up-to-date codes and fixes of software to correct software bugs and to address security weaknesses

System fine-tuning refers to making adjustments to the computer system in order to obtain optimum performance. It includes; adjusting BIOS settings to improve CPU speed, increasing operating system performance, defragmenting disks and closing all idle background applications

Computer Booting

For the computer to run it needs an OS, because the OS is the software that manages all the activities and devices attached to the computer.

However, when the computer is off, the OS is not running, and is simply stored on the hard disk inside the computer.

Therefore when a user presses the power button when the computer is off, the OS cannot get itself out of the hard drive since is it off. So how does the computer start up without the OS?

Definition of Booting

Booting is the process of loading the operating system (OS) from disk into working memory(RAM)

Booting (also known as booting up) is the initial set of operations that a computer system performs when electrical power is switched on.

The process begins when a computer that has been turned off is re-energized, and ends when the computer is ready to perform its normal operations.

BOOT SEQUENCE

Is the set of actions as well as the sequence of the actions that take place when the computer is started from a power off status or restarted with the power still on. The boot sequence is as described below.

When a computer is turned on, the cooler fan starts running and lines of text start scrolling on the screen. This process is called **POST** (Power on Self Test) performed by BIOS (Basic Input Output System). It checks for existence and functionality of the drives, basic input and output devices such as the keyboard, monitor & mouse

If a problem is encountered, the process is halted and an error message is displayed on the screen, otherwise, the operating system is loaded into RAM which provides a desktop for the user to interact with their computer.

TYPES OF BOOTING

There are basically two types of booting:

1. **Cold booting.**

This is the process of turning on a computer after it had been powered off completely.

Steps for Cold Booting a Computer

1. First check to ensure that all the computer parts are well connected and check whether power is on
2. Turn on the wall switch
3. Turn on the UPS/power regulator and extension cable
4. Turn on the system unit and the monitor
5. Turn on the secondary devices such as printer, speakers, etc

2. Warm booting.

This is the process of restarting a computer that already is powered on.

Steps for Warm Booting a Computer

1. Press **RESET** button on the system unit.
2. Press **CTRL+ALT+DELETE** at once but twice.
3. Click **START** button, click **SHUTDOWN**, select **RESTART** and click **OK.**

Reasons for warm booting (Conditions under Which a Warm-Boot is Performed)

1. When the computer freezes, i.e, stuck by refusing to respond to any command. This may be due to hardware or software failure, when RAM is over strained.
2. When new settings have been added to the computer, e.g. network settings
3. When installing a new software.

4. When installing new hardware
5. When there is need to scan the boot sector for viruses.

SHUTTING DOWN A COMPUTER

Procedure for Shutting Down a Computer

1. Ensure that all the work is properly saved
2. Close all currently running programs
3. Click on the **start** button
4. On the start **menu**, click **Turn off computer**
5. From the message box that appears, click **Turn off**. The computer now starts the shutting down process.
6. Switch off the monitor and other peripheral devices like printers, scanners if any.
7. Switch off the UPS and the wall sockets if any

Log off: This refers to switching to a new user, i.e. switches off the current user completely

STEPS INVOLVED IN THE BOOT PROCESS

1. The power supply sends a signal to the components in the system unit.
2. The processor finds the ROM chip(s) that contain the BIOS (Basic input/output system).
3. The BIOS performs the POST (Power-On Self Test) which checks components such as the mouse, keyboard and adapter cards. A series of messages may display.
4. The results of the POST are compared with data in a CMOS chip
5. The BIOS looks for system files on the Hard disk (C:)
6. The system files and the kernel of the Operating System load into RAM from the Hard Disk.
7. The OS loads configuration information and displays the welcome screen.
8. On start up, the OS may verify that the person attempting to use the computer is a legitimate user through use of a password.
9. After the user logs on, the desktop and icons are displayed on the screen.
10. Finally, the operating system also executes programs in the Startup folder, which contains a list of programs that open automatically when you boot the computer.

Further Definitions.

A boot loader is a computer program that loads the main operating system or runtime environment for the computer after completion of self-tests. Examples of boot loaders include NTLDR, BOOTMGR, GNU GRUB, Syslinux, e.t.c.

A boot drive is the drive from which your personal computer boots (starts).

NB : In most cases, drive C (the hard disk) is the boot drive.

THE DESKTOP

A desktop is the large coloured area you see in the screen background, which shows the icons of the programs, folders and files that can be used, windows, and the taskbar.

You can customize the desktop by adding shortcuts to your favourite programs, documents, printers and by changing its appearance to fit your mood and personality. The desktop can contain windows, icons, and taskbar.

AN ICON

This is a graphical representation of an item like a: command, file, folder or program.

Typical Icons on The Desktop

My Computer: This gives access to, and information about, the disk drives, cameras, scanners and other hardware connected to your computer. It also provides access to the control panel.

Recycle Bin: This contains files and folders that have been deleted. You can dump unwanted documents and programs in here either by dragging and dropping them with the mouse or by selecting them and pressing the ***Delete* (*or DEL*)** key on the keyboard. You can also retrieve the contents of the recycle bin by clicking ***restore***.

My Network Places: This provides access to the computers and other devices connected to the network.

Taskbar: This is the long blue or grey strip at the bottom of the screen which contains the **start** button, quick launch bar and notification area. The taskbar lets you to quickly switch between open programs.

CONTENTS OF THE TASKBAR

1. **The start button**. This is where everything springs from. Click this button to display the start menu.
2. **Start menu**. It provides access to all programs and windows settings, a help and support guide, etc.
3. **Notification Area**. This section of the taskbar not only houses the time; it also contains icons for handy little programs, which run all the time your computer is on. It is also known as system tray or systray.

4. **The quick launch bar**. This provides a quick and easy way to start programs you use frequently, such as your web browser and email program. You can drag shortcuts to other programs into the quick launch bar.
5. **The task manager**. This is the part of the taskbar that shows all the programs and processes currently running, the users currently logged on, networking, and the general performance of the computer system.

CONTENTS OF THE START MENU

1. **Control panel**: This provides options for the user to customise the appearance and functionality of their computer, add or remove programs and set-up network connections and user accounts
2. **Search facility**: For locating documents and other items on your computer or on the internet.
3. **All programs**: Displays all the programs installed on your computer
4. **Printers and faxes**: This shows installed printers and faxes and helps you to add new ones
5. **Set program access and defaults**: Chooses default programs for certain activities, such as web browsing, or sending e-mail and specifies which programs are accessible from the start menu, desktop and other locations
6. **Others** are: my computer, my network places, my music, my pictures, my recent documents, my documents

THE WINDOW

A window is a framed work area on the screen in which the user interacts with their computer. There are two types of windows, namely:

1. **Application window**. This is a window in which an application program like MS Word opens and runs. This window is also known as a program window
2. **Document window**. This is a window found within an application window. They contain the application's workspace. They are also known as group windows.

PARTS OF A WINDOW

1. **Title bar**. Displays the name of the window or program running, e.g. my computer, MS word, control panel
2. **Control menu box**. This is located in the top left corner of the window. it contains the control menu, which is activated by clicking on this box

3. **System buttons**. These are three buttons in the upper right corner of the window and they include:
    - *Minimize*. Reduces the window to an icon on the taskbar. The window is hidden but not closed
    - *Maximise & Restore*. The maximise option expands the window's workspace to fill the entire desktop. The restore option restores the maximised window to its previous size and location.
    - *Close*. This button terminates the entire window.
4. **Menu-bar**. This stretches across the window, just below the title bar. It contains the available menus which one can work with in that particular application.
5. **Toolbar**. A set of icons below the menu-bar, used to provide shortcuts to commands on the menu-bar.
6. **Window borders**. This is the perimeter, which defines the window's work area.
7. **Work space**. The inside part of the window where you can type, edit, view and store the data
8. **Scroll bars**. Appear on the right and bottom borders of the window if the window contains more items than can fit in the visible work area. Scrolling the window using scroll bars brings the hidden items into view.

DIALOG BOX CONTROLS

This is a framed region in which the user specifies to the computer how a command should be executed. Examples of dialog boxes include the following;

- **Command buttons**. These initiate an action in progress such as cancelling or confirming a command.
- **Text boxes**. These offer a rectangular space for typing in additional information.
- **List boxes**. These offer a list of choices that can be selected from.
- **Drop down list boxes**. These offer options like the list boxes except that initially, they look like text boxes with an arrow pointing down on the right of the box. Clicking on this button opens the box to display a list of available options
- **Spin box**. This has the up and down incrementing buttons to a control.
- **Check boxes**. These offer non-exclusive options in a group of options. All check boxes can be selected or un-selected depending on what is desired.
- **Options buttons**. These offer a group of mutually exclusive options of which only one can be selected.

SYSTEM CONFIGURATION

PARTS OF A COMPUTER

These are the components that make-up a complete functioning computer.

System configuration refers to the connection and setup of hardware and software components to form a complete functioning computer.

NB The basic parts that make up a functioning personal computer are: the system unit, monitor, keyboard and mouse.

PERIPHERAL DEVICE INTERFACE

A *peripheral device* is any device that is connected to the computer system unit externally such as: mouse, keyboard, projector, printer, scanner, digital camera, monitor, graphics tablet, trackball, joystick, speakers. These devices are connected to the system unit using the ports.

A ***port*** is an external socket on the motherboard designed for attaching peripherals onto the system unit. Ports are described as *female* or *male* ports. The ***male ports*** consist of a pattern of pins that plug into the respective ***female ports*** with the corresponding pattern of holes. Therefore, if a port is male then the corresponding connector has to be a female.

The types of ports are:

1. **Serial ports**. These are serial communication physical interface through which information transfers in or out one bit at a time. They connect low transmission speed devices, e.g. mouse and keyboard.
2. **Parallel ports**. These are parallel communication physical interfaces through which information transfers in or out several bits at a time. Most printers connect to the system unit using a parallel port.
3. **Universal serial bus** (USB). A USB is an external data pathway. A USB port transmits data through a USB cable to a USB device. USB ports support ***port plugging*** and ***plug and play***. **Plug and play** is the ability to add a new hardware component to a computer & have it work automatically without physical configuration
4. **VGA (Video Graphics Array) port**. This is a female external port that allows a user to connect the system unit to the display unit, like the monitor.
5. **Audio ports**. These transfer audio data to and from the computer. They are female plug-in jacks usually two in number. These include one for audio input, e.g. microphone connection, and the other for audio output, e.g. to a speaker

6. **Personal system (PS/2) ports**. These are small circular female ports for connecting the keyboard and mouse to PCs. Communication is serial, synchronous and bi-directional.
7. **Power port**. Connects the power cable to the power supply to tap power from the source to the system unit
8. **Network port**. It is also called LAN port or Ethernet port. This is a port that facilitates network cables to connect to a computer system.

SYSTEM SPECIFICATIONS

This is a detailed description of the hardware and software components of a complete functioning computer. i.e. their: model name, manufacturer, appearance, performance. When determining system specifications, the important information to record include;

1. Operating system (e.g. Windows XP, Windows 7, Windows 8)
2. Processor and its speed (e.g. Pentium 4, 3.4 GHz)
3. RAM size (e.g. 512 MB), Hard disk space (e.g. 80 GB)
4. I/O ports (i.e USB, parallel, serial, SCSI, VGA and Network ports)
5. Mouse and Keyboard type, Monitor type (14", 17")
6. Application software

***Assignment**: Determine and interpret the specifications of a computer; assemble and disassemble a computer.*

FILE MANAGEMENT

A computer file, (or a file), is a named collection of logically related information or data stored on storage media like a disk.

DEFINITION OF TERMINOLOGIES

- **File name**; is an identifying name given to a computer file by the user. It should conform to limitations imposed by the operating system, as in length or restricted choice of characters.
- **File extension**; is a group of characters after a period in a file specification, indicating the type of the file.
- **A folder**; is a named storage area in a windows operating system for storing files and sub-folders
- **A sub-folder;** is a folder located inside another folder
- **A directory**; is named storage area having files & sub-directories in a non-windows operating system like MS DOS, LINUX, UNIX
- **File attributes**: this refers to the characteristics of a given file, e.g. file name, file type, file location, file size, owner, time and date created/modified, file protection (who can read, write, archive, etc)
- **A File Path**; is the route taken to a particular location on a storage device where a given file is stored. A path statement may include a drive letter, a folder and any sub-folders and finally the file name.

  e.g. C:\Class work \ ICT \ marks.doc. This path statement means that: a file named **marks.doc** is in a sub-folder named **ICT** and in a folder named **Class work** on drive **C:**
- **Path Delimiter**; is a symbol (/ or \) that separates one directory from another in a file path

RULES TO CONSIDER WHEN NAMING FILES

1. A file specification consists of two parts, that is, file name and file extension
2. A file name can have 1 to 255 characters (in windows operating system) or 1 to 8 characters (in DOS)
3. The file extension may have 1 to 4 characters
4. In a file specification, a file name is separated from the file extension by a period (.) or a full stop

5. Some special characters like; +, =, additional period, space, [,], may not be accepted in a file specification
6. Files under the same directory/folder cannot have the same file specification

OPERATIONS THAT CAN BE PERFORMED ON A FILE

1. Creating a file, opening a file, closing a file, and renaming a file
2. Copying a file. To duplicate or replicate a file or folder to get as many similar copies as possible
3. Cutting (moving) file. Transferring a file from one location to another without leaving another copy behind
4. Pasting. Is the process of inserting clipboard contents in the required place
5. Deleting a file. Is the erasing of a file from the computer storage
6. Printing a file. Is the process of generating a hardcopy of a file using a printer connected to the computer
7. Editing a file. Correcting errors or adding more information to your file
8. Saving a file. The storing of a file on a storage media for future use or reference.

FILE TYPES

A file type refers to the kind of data stored in a computer file. Most modern operating systems use the file extension to determine the file type. Below are some file extensions with their associated programs.

Note pad file	.txt
Microsoft PowerPoint Presentation	.ppt
Microsoft Word document	.doc
Microsoft Excel work book	.xls
Microsoft Publisher file	.pub
Microsoft Access Database file	.mdb
Batch file having DOS commands	.bat
Adobe illustrator file	.ai
Video file	.AVI/.mp4/.DAT
Compressed audio file	.mp3/.wav/.amr
Portable document format file	.pdf
Image file	.gif/.jpg/.jpeg/.tif/.png/.bmp
System file	.sys
Web page/document	.html

COMPUTER SYSTEM

This refers to coordination of all hard ware software human ware (live ware) and data to enable the computers to accomplish a certain task.

This is categorized into;

- Hardware
- Human ware
- software
- Data
- Live ware (human ware)

Note Live ware (human ware) refers to computer user who provides data and commands to the computer.

Data refers to raw facts or unprocessed information.

Un organized facts

Forms of data include;

- Texts
- Graphics
- Pictures

DATA CAPTURE

Data capture refers to the identification and acquisition of new data.

It is always best to capture the data as soon as possible after it origination. Historically, special paper forms called source documents were used.

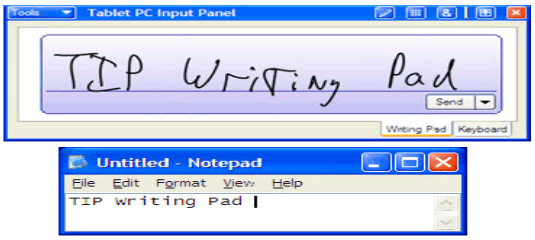
Methods of data capture

1. **Manual input.** This method involves the movement of the hand and involves the use of the keyboard, mouse,

   Tracker ball,

   Graphical tablet,

   Touch screen e.g. PDA



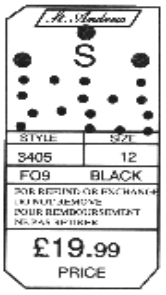
Advantage

- There is no much training as many people have the skill
- No need of specialized data collection sheets as ICT sheets are similar to manual sheets.

Disadvantages

- It is slower to enter data
- Transcription(data entry errors) normally occur
- Hand writing recognition can be unreliable

2. **Optical methods**. These are ones which read data optically



These include;

Optical marker readers

Optical character recognition (OCR)

Punched cards, paper tape and Kimball tags

Barcodes

Advantages

- Large amounts of data can be read quickly
- Data can be read without human intervention
- Easy for staff to use Kimball tags or barcodes – no specialist knowledge needed

Disadvantages

- often Specialist equipment is needed to prepare the data for entry – e.g. tags or forms
- Only good for a limited range of data – closed questions
- Medium is paper – easily damaged

Optical character recognition

Text is scanned then converted into real, editable text

Advantages

- No special data-preparation equipment required – it just uses text on ordinary paper

- Data is easily read by humans as well as the computer

Disadvantages

- Recognition is not 100% accurate
- Converted documents will need to be checked
- Dirty or damaged documents are difficult to read

Voice recognition equipment

Voice recognition can be used for;

- Controlling devices (small vocabulary systems)
- Dictation (large vocabulary systems)
- Small vocabulary systems are usually more reliable and may not need training.

Advantages

- No special data-preparation equipment required – you just say the data
- Data is easily understood by humans as well as the computer
- Little training is required

Disadvantages

- Recognition is not 100% accurate
- Dictation systems need to be trained
- Not everything – e.g. mathematical formulae – are easy to describe in words

Card input

Cards can contain data on:

- Magnetic strips – e.g. bank cards and train tickets – these contain little data and are easily damaged

- Chips (Smart Cards) – such as the new "Chip and Pin" credit cards and some loyalty cards. These contain more data and are harder to copy/forge

Magnetic Ink Character Recognition

The characters are printed in magnetic ink at the bottom of cheques:

Advantages

- Data is easily read by humans as well as the computer
- Little training is required – you just feed the cheques into the machine
- It's difficult for forgers to change details

Disadvantages

- Specialist high-quality printing equipment is required – this obviously costs more!

Encoding information

- Sometimes the user might want to turn information into data – i.e. to store it – this is called encoding
- The data capture methods will form part of the encoding process

Activities incurred while carrying out data capture

- Design source documents
- Input screens,
- Methods and procedures for getting the data into the computer

Errors encountered in data capture

There are only two types of errors incurred in data capture and these include

1. Transcription errors
2. Transposition errors

Transcription errors. This is a type data entry error that is commonly made by the human operators or by optical character recognition programs (OCR). Human transcription errors are as the result of typographical mistakes i.e.; putting one's finger in the wrong place while touch typing is the easiest way to make the error.

Examples of these include

Joseph miscat instead of joseph muscat

23 auguat instead of 23 august

Jishua instead of Joshua.

However these are common mistakes especially while typing but however there are also electronic transcription errors which occur when the scan of some printed material is compromised in unusual font. For example the paper is crumpled, or the ink is smudged, the OCR may make transcription errors.

Transposition error.

These are errors which occur when the character have been interchanged (transposed).

The most common way of making transposition errors is when the user typing at a high speed and presses a certain character before the other.

These include

Gergory instead of Gregory

23 auguts instead of 23 august

Johsua instead of Joshua

How to overcome them

- ✓ By over watching on the screen during typing.
- ✓ Through use of grammar and spell checkers
- ✓ Carrying out double entry

Note; **Data entry** is the process of translating the source data or document into a computer readable format.

Entered data must subsequently be processed – data processing.

DATA PROCESSING

Data processing can be best described as the process of producing meaningful information by collecting all items of data together and performing operation on them to extract the required information about them.

Methods of data processing

There are 3 major methods of data processing i.e. Manual method, mechanical method and lastly the electronic method.

Manual method involves the use of the brain and the physical body to carry out data processing. This method is termed to be cheap because it requires less hardware however the major advantage with it is that a lot of effort is used.

Mechanical method. This refers to one where simple tools of in putting data are used such as calculators. It is relatively cheap compared to manual data processing method.

Electronic method. This is the one which uses modern methods of processing data such as computers. This is method is easy and saves time however is seen as much expensive as a lot of hardware are required.

Modes of data processing

The major types of data processing modes today are batch processing, distributed, centralized and real-time or online processing modes.

Batch Processing. This refers to process of updating of master files regularly to represent transactions carried out in the period. For example, updating payrolls.

Advantages of batch processing

- ✓ Relatively easy to develop.
- ✓ Timing of the reports is not necessary.
- ✓ Less processing power is required as it deals with similar updates.
- ✓ Checks in place as part of the system is being run.
- ✓ It's cheaper since less hardware may be required.

Disadvantages

- ✓ They operate inefficiently and unreliably.
- ✓ They are inflexible and difficult to modify to meet changing business needs.
- ✓ They cannot provide rapid access to key information.
- ✓ Management information is often incomplete due to out of date data.
- ✓ Often master access may not always be available.

On-line Processing. This is a processing mode where the results of data are processed are made available after inputting. Under this mode of data processing, all computers and peripherals are under direct control of the CPU and as soon as transactions take place, they are input and information is availed immediately. These are in most cases connected to a network such as internet or LAN. A dialog is established between the user or operator and the computer o/s. an example of on line processing mode includes banking where customers are notified of the status of their accounts in response to the inquiry.

Advantages of online

- ✓ The files are maintained up-to-date.
- ✓ Information is readily available for current decisions.
- ✓ File inquiries possible through the terminals (work-stations).
- ✓ More accurate than batch processing mode because the system can refuse incomplete or erroneous entries
- ✓ Positive image because of faster service delivery.

Disadvantages

- ✓ However, online systems are complex to develop and maintain.
- ✓ They are costly in terms of hardware, software, storage media, operating system communication facilities, etc.
- ✓ Fraudulent transactions e.g. banking
- ✓ Redundancy in case of break down.
- ✓ Un reliable because of consistent network breakdown

Time Sharing Processing. This is a processing mode in which case the central processor serves two or more users with different processing tasks or requirements. Mention where it is more applicable in day-to-day life.

Real-Time Processing. Real-time processing mode. This is the mode where time interval to process and respond to input is so small that the response/ information can be availed to the customer there and then. It provides immediate transaction capability from all input originating stations. Files are updated and inquiries are answered immediately. It is distinguished from other modes by promptness of the response. This system uses real time operating system. An example is airline reservation system where an individual cannot book before prior enquiry whether the seat is available or not. Such information is required and should be provided before the next transaction can be processed.

Advantages

- Information is readily available for instant messaging.
- Provides better services to users and customer since the information is made available without delays.
- It is a fast and reliable mode of data processing.
- Ensures that the information in master file is always current.

Disadvantages

- They use complex operating system which make it hard to operate.
- The device used in real time processing are hard to develop.
- They require excess facilities like front end processor to handle communication and reduce the workload which makes it expensive.

Distributed Processing. This is a data processing mode where the system includes multiple computers linked by a communication network, allowing the processing to be "distributed" around the system. Or it is where computers that are located in different geographic locations, department or sites are connected to the central computer for data processing. These computers are connected using tel-communication links.

Typical example is a bank with its branches where they have intelligent terminals that link to big central computer at the head offices and data from those branches is sent to master computer at the head office for processing.

Centralized Processing. This involves all data or information being processed in a central place, such as a computer center at Head Office. Many users are able to access the central computer at the same time and process data simultaneously.

FACTORS UNDERTAKEN WHEN CHOOSING THE BEST MODE OF DATA PROCESSING

1. The ability to have updates.
2. Usage of the Computer.
3. Organizational needs & Quality of Output.
4. Cost / financial ability.
5. The Scale of Operation.
6. Accuracy Concerns and Reliability.
7. Business Size and Nature.
8. Urgency in Feedback.
9. Link between applications.

Hardware devices. These refer to tangible components of a computer which can be touched and felt. These include;

- Input devices
- Processing devices
- Output devices
- Storage devices.

Input devices**.** These are ones which feed data into the computer for further processing to make meaningful information. **These are**;

- ✓ **Keyboard**. An electronic device that is used to enter alpha numeric data by pressing keys. Keyboard is the most common and very popular input device which helps to input data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing additional functions.

Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.

It consists of the following parts as follows

S.No	Keys & Description
1	**Typing Keys** These keys include the letter keys (A-Z) and digit keys (09) which generally give the same layout as that of typewriters.
2	**Numeric Keypad** It is used to enter the numeric data or cursor movement. Generally, it consists of a set of 17 keys that are laid out in the same configuration used by most adding machines and calculators.
3	**Function Keys** The twelve function keys are present on the keyboard which are arranged in a row at the top of the keyboard. Each function key has a unique meaning and is used for some specific purpose.

4	**Control keys** These keys provide cursor and screen control. It includes four directional arrow keys. Control keys also include Home, End, Insert, Delete, Page Up, Page Down, Control(Ctrl), Alternate(Alt), Escape(Esc).
5	**Special Purpose Keys** Keyboard also contains some special purpose keys such as Enter, Shift, Caps Lock, Num Lock, Space bar, Tab, and Print Screen.

QN. **Give the function of each part of the keyboard as mentioned above.**

- ✓ **Mouse.** Hand-operated electronic pointing device that controls the coordinates a cursor on a computer screen as one moves it around on a pad; on the bottom of the device is a ball that rolls on the surface of the pad.
  The basic function of a mouse are;
  Pointing, selecting objects, moving objects through dragging, scrolling pages up and down, drawing diagrams, giving commands etc.

Mouse operations include;

Clicking. This refers to pressing the left button and releasing it quickly

Double clicking. This is the pressing the left mouse button twice and realizing it quickly.

Right clicking. This refers to the pressing the right mouse button once and releasing it.

Scrolling. This is the act of moving pages of a document up and down on the computer screen. It is done by rolling the ball.

Advantages

- Easy to use
- Not very expensive
- Moves the cursor faster than the arrow keys of the keyboard.

QN. **Mention any three types of Mice as used in computers**

Desktop mouse. This is known as mechanical mouse commonly used o desktop and tower computers. It has got 2or 3 push buttons plus a ball on its underside and the rollers inside.

How it works is that; when a mouse is moved, the ball is made to move and the signal is sent to the CPU through the cord/ wire and the pointer is made to move accordingly

Limitation: however it is normally affected by dust which slows down the speed of the ball's movement and hence the rollers eventually the pointer's movement is affected. But this can be solved by cleaning the dust around the ball, the roller after the opening the underside parts.

Optical mouse. This uses a laser beam of light to send signals to the CPU so as to move the pointer on the screen. An optical mouse resembles and works like desktop mouse but however it has no balls and rollers but has 3 push buttons like those of desktop mouse.

Cordless mouse. This is the recent invention in mouse technology. It is termed as wireless mouse because it doesn't have the cord/ physical wire. This mouse works on the basis of an installed program in the computer which make it to sense it as it is brought closer to the computer.

Track ball mouse. This is a small pointing device normally seen on laptops. It is embedded within the systems unit with the keyboard of a laptop. It has a free small rolling ball fixed on its top which is rolled with the index fixed finger to move the pointer on the screen.

Touch pad mouse. This appointing device found on modern laptops just like a track ball, it is also embedded within the systems unit. It has got a glass-like pad just below the keys.

- ✓ **Scanners**.

  Scanner is an input device, which works more like a photocopy machine. It is used when some information is available on paper and it is to be transferred to the hard disk of the computer for further manipulation.

  Scanner captures images from the source which are then converted into a digital form that can be stored on the disk. These images can be edited before they are printed. Pen pocket readers also use this scanner principle to read lines of texts which are displayed on screen.

- ✓ Light pens. Light pen is a pointing device similar to a pen. It is used to select a displayed menu item or draw pictures on the monitor screen. It consists of a photocell and an optical system placed in a small tube.

  When the tip of a light pen is moved over the monitor screen and the pen button is pressed, its photocell sensing element detects the screen location and sends the corresponding signal to the CPU.

  NOTE. Light pens are used in PDAs

Digitizer

Digitizer is an input device which converts analog information into digital form. Digitizer can convert a signal from the television or camera into a series of numbers that could be stored in a computer. They can be used by the computer to create a picture of whatever the camera had been pointed at.

Digitizer is also known as Tablet or Graphics Tablet as it converts graphics and pictorial data into binary inputs. A graphic tablet as digitizer is used for fine works of drawing and image manipulation applications.

- ✓ **Barcode readers.** This one of the electronic technologies developed with the help of scanning barcodes and identifying optical characters on the products which are in most cases in form of bars and with the help of light containing much sensitive detector identifies and recognizes bars in form of texts which are later fed in the computer for further manipulation.

Barcode readers can be seen in extensive supermarkets to identify certain items and their prices.

- ✓ **Voice recognition equipment**. These refer to all types of micro phones which are used to record and capture sound. Most of multimedia computers have this capability. These are mostly used by musicians to record and editing sound.

- ✓ **Joysticks.** This a pointing device which is operated by tilting its vertical hand sideways, forward and backwards to control the position of the cursor on the screen. This looks as the jeer leaver of the car.

- ✓ It employs the same principle of the mouse but this is bit more free than a mouse. It has got a button which is used for selecting objects on the screen. The function of the joystick is similar to that of a mouse. It is mainly used in Computer Aided Designing (CAD) and playing computer games.

PROCESSING DEVICES.

Processor. The processor is the main "brain" of a computer system. It performs all of the instructions and calculations that are needed and manages the flow of information through a computer. It is mostly called the CPU (central processing unit), although this term can also be used to describe a computer case along with all of the hardware found inside it.

Another name for the processor is a computer "chip" although this term can refer to other lesser processors (such as the BIOS). Processors are continually evolving and becoming faster and more powerful. The speed of a processor is measured in megahertz (MHz) or gigahertz (GHz). An older computer might have a processor with a speed of 1000 MHz (equivalent to 1 GHz) or lower, but processors with speeds of over 2 GHz are now common. One processor company, Intel, made a popular series of processors called Pentium. Many reconditioned computers contain Pentium II, Pentium III, Pentium IV, duo core processors and core I processors such as i3, i5 and recent invention of core i7 which is the fastest on the market.

Features of the cpu

- CPU is considered as the brain of the computer.
- CPU performs all types of data processing operations.
- It stores data, intermediate results, and instructions (program).
- It controls the operation of all parts of the computer.

. It is classified into 3 parts i.e.

- **The register**. This is a special high speed storage area within the CPU. All the data must be presented to the register before being processed. For example if 2 numbers are to be added both have to be first be registered and the result has to be plugged in the register. (the register can contain address of a memory location where data is stored rather than the actual data if set)

- **NOTE:** The number of registers the CPU has and the size of each determine s the power and speed of the CPU e.g., 32bit CPU is one which registers 32 bit wide there4 each CPU instruction can manipulate32 bits of data.
- The clock speed or clock rate of a CPU is defined as the frequency at which a processor executes instructions or processes data.
- The system clock. is an internal clock that generates a signal that is used to synchronize the operation of the CPU and the movement of data around the other components of the computer
- Register holds a piece of data at a time and inside the CPU.

Examples of registers are;

- Accumulator register. This temporarily holds the results of the last step of ALU.
- Instruction register. This temporally holds an instruction in it before it is interpreted into a form that the CPU can understand it.
- An address register. This temporarily holds the next piece of data waiting to be processed.
- Storage register. This temporary holds a piece of data that it is on in its way to and from the CPU and main memory.

- **The arithmetic logic unit (ALU**). This part of the CPU held responsible for carrying out arithmetic and logic operations such as addition, subtraction, division, multiplication etc.

  The ALU carries all the logical and arithmetic processing. It records all the instructions and processes data.

This unit consists of two subsections namely,

- Arithmetic Section
- Logic Section

Arithmetic Section

Function of arithmetic section is to perform arithmetic operations like addition, subtraction, multiplication, and division. All complex operations are done by making repetitive use of the above operations.

Logic Section

Function of logic section is to perform logic operations such as comparing, selecting, matching, and merging of data.

Logic operation refers to the ability to compare all the 2 quantities or numbers to determine which is greater or equal or less or than the other. It also measures, tests the existence of the condition encounter during the processing of an application understanding the instructions accordingly.

The control unit (brain).

This unit controls the operations of all parts of the computer but does not carry out any actual data processing operations.

Functions of this unit are −

- It is responsible for controlling the transfer of data and instructions among other units of a computer.
- It manages and coordinates all the units of the computer.
- It obtains the instructions from the memory, interprets them, and directs the operation of the computer.
- It communicates with Input/Output devices for transfer of data or results from storage.
- It does not process or store data.
- **NOTE;** Peripheral devices are called so because they operate outside the CPU and the main memory.

The control unit also determines where instructions are to be executed and operation to be performed and where the instruction is to be located.

It fetches data from the main memory and puts it in proper order for the processor and also sends the processed results back to the main memory.

It extracts instructions from the main memory and decides and exerts them calling on ALU when necessary.

SPECIAL PURPOSE MEMORIES.

A part from the RAM and ROM, There are other several types of special memories found within the systems unit. These memories are very vital because they generally increase the performance of data and instructions moving in and out of the CPU. These memories include;

Buffer. This is a temporary holding place that may be put in the CPU or built input and output devices. This is because the CPU is very fast compared to the input devices.

Buffer provides temporary storage so that the CPU is set free from doing other activities instead to wait for all data to be entered or information to be output. .e.g. since a printer cannot work at the speed of the CPU, the printer buffers temporarily, holds the output to be printed hence forcing the CPU to perform other functions. Buffer can hold more than one piece of data at a time.

Cache Memory

Cache memory is a very high speed semiconductor memory which can speed up the CPU. It acts as a buffer between the CPU and the main memory. It is used to hold those parts of data and program which are most frequently used by the CPU. The parts of data and programs are transferred from the disk to cache memory by the operating system, from where the CPU can access them.

Advantages

- Cache memory is faster than main memory.
- It consumes less access time as compared to main memory.
- It stores the program that can be executed within a short period of time.
- It stores data for temporary use.

Disadvantages

- Cache memory has limited capacity.
- It is very expensive.

1. **Expansion slots.** These are empty sockets connections found on the mother board where other components are plugged to allow an extended life/ service of the computer e.g. You can plug in sound card, video cards, memory chips, network cards etc. these are connected to the buses which carry data to and from the processor.

   Peripheral hardware. Peripheral hardware is the name for the computer components that are not found within the computer case. This includes input devices such as a **mouse, microphone** and **keyboard**, which carry information from the computer user to the processor, and output devices such as a **monitor, printer** and **speakers**, which display or transmit information from the computer back to the user**.**

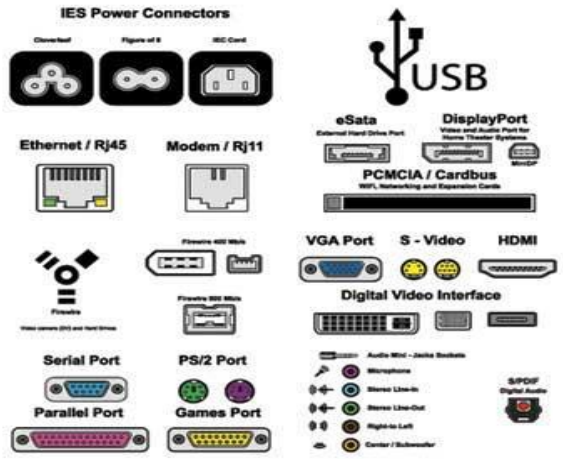
Ports

A port is a physical docking point using which an external device can be connected to the computer. It can also be programmatic docking point through which information flows from a program to the computer or over the Internet.

Characteristics of Ports

A port has the following characteristics −

- External devices are connected to a computer using cables and ports.
- Ports are slots on the motherboard into which a cable of external device is plugged in.
- Examples of external devices attached via ports are the mouse, keyboard, monitor, microphone, speakers, etc.



Let us now discuss a few important types of ports −

Universal Serial Bus (or USB) Port

- It can connect all kinds of external USB devices such as external hard disk, printer, scanner, mouse, keyboard, etc.
- It was introduced in 1997.
- Most of the computers provide two USB ports as minimum.
- Data travels at 12 megabits per seconds.
- USB compliant devices can get power from a USB port.

Parallel Port. This long and slender port is also no longer commonly used, but was the most common way of attaching a printer to a computer until the introduction of USB ports (see below). The most common parallel port has holes for 25 pins, but other models were also manufactured.

VGA Port

- It is termed as video graphic array

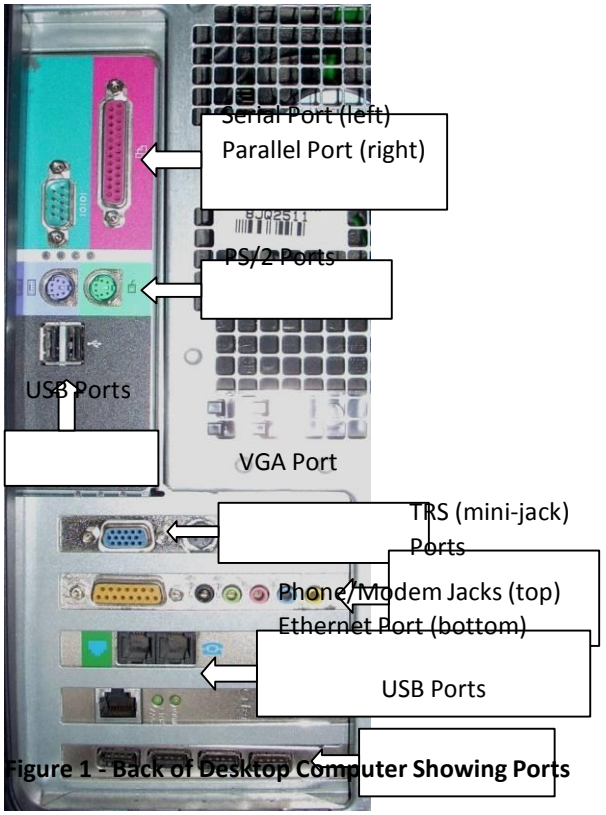


Figure 1 - Back of Desktop Computer Showing Ports

- Connects monitor to a computer's video card.
- It has 15 holes.
- Similar to the serial port connector. However, serial port connector has pins, VGA port has holes.

PS/2 Port

- Used for old computer keyboard and mouse
- Also called mouse port
- Most of the old computers provide two PS/2 port, each for the mouse and keyboard

Firewire Port

- Transfers large amount of data at very fast speed.
- Connects camcorders and video equipment to the computer.
- Data travels at 400 to 800 megabits per seconds.
- Invented by Apple.
- It has three variants: 4-Pin FireWire 400 connector, 6-Pin FireWire 400 connector, and 9-Pin FireWire 800 connector.
- **Ethernet.** Connects to a network and high speed Internet.
- Connects the network cable to a computer.
- This port resides on an Ethernet Card.
- Data travels at 10 megabits to 1000 megabits per seconds depending upon the network bandwidth.

Digital Video Interface, DVI port

- Connects Flat panel LCD monitor to the computer's high-end video graphic cards.
- Very popular among video card manufacturers.

Output devices.

As the name sounds, these are devices which bring out computer held information either on a soft copy or hardcopy form.

NOTE; The difference between soft copy and hard copy forms of output.

- Soft copy refers to computer held information in intangible form. This form of output is neither touched nor felt but is visible.
- Main examples are; monitors, loud speakers and the projectors
- While hard copy refers to output that is in physical form i.e. touched and felt.

The following are output devices

Printers.

These are devices which bring out computer held information on hard copy form. The printer is the most convenient device which can bring out computer held information on a hard copy form

However, printers are categorized depending on the way how they bring computer held information i.e. touching the print medium or not. These are;

Impact printers. These are printers whose print head touch the print medium during the process of printing. They have print head which strike ink on the media to produce an image or text on the paper. These among others include daisy wheel, dot matrix character, line printers etc.

i. Dot matrix printers are capable of printing 40-300 characters per second and can also be used to produce graphics though they are of poor quality.

ii. Character printers. These are ones which print a single character per second. These printers are not so commonly used because they are very slow compared to other impact printers.

The advantage with them is that they can with stand dusty environment though however they have a poor quality output and worst of it all they are noisy during the operation.

iii. **Daisy wheel printers.** These are ones which use a wheel as a print head which rotates the hammer and strikes the back side of the spoke and presses it against the paper to print a character. Daisy wheels can be best for printing letters. Daisy wheels have become much more obsolete due to changes in technology as they cannot be used to print graphics, very slow during the process of printing and producing a lot of noise.

iv. **Line printers.** As the name sounds, these print about 300 lines per minute and are much faster compared to character printer. However, their disadvantage is that due to their poor quality output, they are not good for printing graphics .

Evaluation of impact printers

- ✓ They are relatively cheap compared to non-impact printers
- ✓ They are can be used for different sizes of papers such as A4s, A5s etc.
- ✓ However, they produce a lot of noise, they are poor quality.

- ✓ They are very low processing speed compared to non-impact printers.

Non-impact printers. These are ones whose print head doesn't touch the print medium during the process of printing. They have a high light intensity known as laser which strike the paper thus creating an in image. They are the most commonly used printers because of their good quality output.

Examples include;

i. **Laser jet printer.** This is the most common printer which is largely used in in institutions, government and in businesses to print out documents. This is because they have high quality printing output.

Laser jet have high light intensity which strike it on the paper thus creating an image.

The advantage of it is that they have high printing quality output even on an ordinary paper, they are generally quiet and faster though however they are the most expensive and their tonner is so much hazardous to the environment once exposed to it.

Inkjet Printers

Inkjet printers are non-impact character printers based on a relatively new technology. They print characters by spraying small drops of ink onto paper. Inkjet printers produce high quality output with presentable features.

They make less noise because no hammering is done and these have many styles of printing modes available. Color printing is also possible. Some models of Inkjet printers can produce multiple copies of printing also.

Advantages

They are relatively cheap compared to laser printers

They produce less noise

They produce high quality colored output

Disadvantages

They have a low printing speed unlike the laser jet.

They require specific papers (customized)

ii. **Thermal jet printers**. These are non- impact printers which use the thermal technology to print characters on the paper. They use print heads which contain a hitting element called dot heaters. These dot heaters cause dots to appear on special papers. These dots are created on papers in form of characters

Advantages

- Consume less power
- Produce clear image
- Generally quiet as they don't have any moving parts

However, they use specialized papers since ordinary ones would be burnt.

-they are expensive since their print heads can't be serviced once a single dot heater fails.

- Their printing media have are short life span.

iv. **Bubble jet printers**. These are also known thermal ink jet printers which work by spraying tiny dots of ink on the print surface. These droplets of ink are forced out inform of bubbles. The bubbles are formed because of hitting of the ink pump which makes the ink to form a bubble and this bubble is forced out as it grows larger. These tiny holes of the print head where ink passes are known as nozzles.

Examples are; CanonBJC200

Evaluation of non- impact printers

- ✓ Non-impact printers are very fast in printing.
- ✓ They have a high quality output unlike the impact printers
- ✓ They produce less noise
- ✓ **However,** they are very expensive to purchase and their maintenance cost is so high
- ✓ They are fit for specific papers which make them not compatible.

Differences between impact and non- impact printers

Impact printers	**Non-impact printers**
Noisy during operation	Quiet during operation
Heads touch the print medium	Don't touch the print medium

Relatively cheap	Expensive
Relatively slower	More faster
With stand dusty environment	Cant with stand dusty environment

Plotters.

These are ones that are used to produce heavy graphics such as maps, images etc. used by engineers in architectural works accurately and thin or meandering lines for relative drawings. They can be compared too much more as the printer though for it has a pen like print head that can be accurately drawn bot

Loud Speakers.

Speakers are the most common devices that are used to produce sound on the computers with the help of sound cards. The quality of output produced by a loud speaker is measured in watts of power per output.

Monitors.

Monitors, commonly called as **Visual Display Unit** (VDU), are the main output device of a computer. It forms images from tiny dots, called pixels that are arranged in a rectangular form. The sharpness of the image depends upon the number of pixels.

There are two kinds of viewing screen used for monitors.

- Cathode-Ray Tube (CRT)
- Flat-Panel Display

Cathode ray tube monitors. The CRT display is made up of small picture elements called pixels. The smaller the pixels, the better the image clarity or resolution. It takes more than one illuminated pixel to form a whole character, such as the letter ‘e’ in the word help.

A finite number of characters can be displayed on a screen at once. The screen can be divided into a series of character boxes - fixed location on the screen where a standard character can be placed. Most screens are capable of displaying 80 characters of data horizontally and 25 lines vertically.

Advantages of CRTs

- They produce a fast and rich color output.
- Can be viewed from a wide angle.
- They are cheaper than LCD monitors

Disadvantages of CRTs

- They emit high electromagnetic radiation.
- They consume a lot of power.

Liquid crystal displays (LCDs). These use liquid crystals to create images on the screen. They have flat panel technology. LCDs are the most commonly used now days because of their best quality resolutions, consumption rate of power is low compared CRTs and their portability however they are much more expensive compared to CRTs.

Advantages of LCDs over CRTs

- They are more portable than CRTs
- They emit less little electromagnetic radiation
- They occupy a small space compared to CRTs.
- They emit less light.

- They consume less power.

Disadvantages of LCDs compared to CRTs

- They have a narrow viewing angle.
- They are more expensive.
- They don't have a clear resolution than those of CRTs.

Characteristics of monitors

- ✓ Size. This refer to the screen size which is measured in inches such as 16 inch or size is also measured basing on portrait or land scape.
- ✓ Resolution. This refer to how densely the dots on the screen are packed. The dots are called picture elements (pixels). The pixels on the screen make pictures. The higher the pixels, the higher the resolution

NOTE: a pixel refers to dots in a graphic image

Chrome refer to color and poly means one and there4 poly chrome means many colors i.e. something displayed in a way it appears in real sense

Projectors. These are softcopy outputs which are used to display information on a wide screen. The projectors are connected to the computer and the projected to a white wall especially for the audience prsentaion, home cinemas etc..

QN : Define the following terms as used in display devices

I. Refresh rate
II. Video adapter (video card)
III. resolution

Note: Refresh list refers to the number of times a display hardware updates its buffer.
This is measured in seconds.

STORAGE DEVICES.

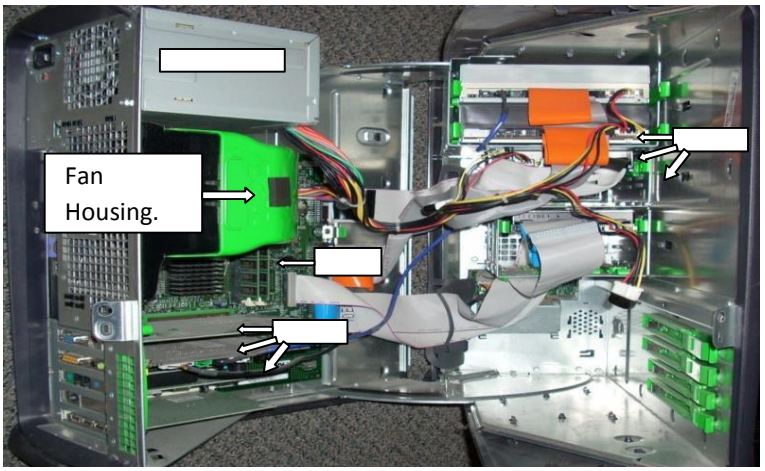


Figure 2 - Inside a Desktop Computer Case

These are ones which store data and information which has been fed in the computer. They are sometimes called back up devices. The storage of information on medias is called **saving**. There are two kinds of storage i.e. primary and permanent storage.

Primary storage devices. Are ones which store data temporarily as it is being entered in the computer. These are often termed as called **main memories**. These store data and instructions that are accessed by the central processing unit (CPU). There are two kinds of primary storage devices i.e. RAM and ROM

RAM (random access memory)

The RAM well known as the heart of the computer. It is used to store data and instructions that one is currently working on. It is also used to store programs which are being used at that particular time. It acts as work space where all other activities are carried out.

This means that when so many programs are opened at the same time, the computer will tend to be slow as if one had so many files on the working table.

NOTE; the speed of the computer depends largely depends on the size of the RAM. The higher the size of the RAM, the faster the speed of the computer.

Characteristics of RAM

- It takes the 70% of the main memory
- It is a temporary storage and there4 its contents can be erased when power goes off.

- The contents of the RAM can be changed or removed.
- It is volatile i.e. loose data when power goes off.
- The contents of the RAM are user defined.
- It is measured in **bytes.**

RAM is of two types −

- Static RAM (SRAM)
- Dynamic RAM (DRAM)

Static RAM (SRAM)

The word **static** indicates that the memory retains its contents as long as power is being supplied. However, data is lost when the power gets down due to volatile nature. SRAM chips use a matrix of 6-transistors and no capacitors. Transistors do not require power to prevent leakage, so SRAM need not be refreshed on a regular basis.

There is extra space in the matrix, hence SRAM uses more chips than DRAM for the same amount of storage space, making the manufacturing costs higher. SRAM is thus used as cache memory and has very fast access.

Characteristic of Static RAM

- Long life
- No need to refresh
- Faster
- Used as cache memory
- Large size
- Expensive
- High power consumption

Dynamic RAM (DRAM)

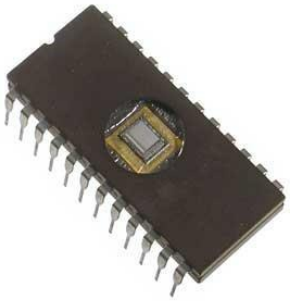
DRAM, unlike SRAM, must be continually **refreshed** in order to maintain the data. This is done by placing the memory on a refresh circuit that rewrites the data several hundred times per second. DRAM is used for most system memory as it is cheap and small. All DRAMs are made up of memory cells, which are composed of one capacitor and one transistor.

Characteristics of Dynamic RAM

- Short data lifetime
- Needs to be refreshed continuously
- Slower as compared to SRAM
- Used as RAM
- Smaller in size
- Less expensive
- Less power consumption

ROM (Read only memory).

The ROM is also another primary storage however it can never be erased or edited. It contains set of instructions that guide the operation of the computer i.e. booting files and others which enable the proper running of the computer. These sets of instructions are written on during the manufacturer's time and are embedded within the computer system and there4 they are kept permanent even when power is off. The computer and the user read these instructions and can't neither write nor change them



Characteristics of ROM

- Its contents can be read but can't be written to; that is why it is called read only memory. However there are specific ROM which have been manufactured and can be written to after its contents have been deleted.
- It is nonvolatile and there4 can't lose power when power goes off.
- It stores instructions permanently. These are called firmware.
- Its contents are permanent and ther4 cannot be changed
- It occupies the least percentage of the memory i.e. 30%

Types of ROM

MROM (Masked ROM)

The very first ROMs were hard-wired devices that contained a pre-programmed set of data or instructions. These kind of ROMs are known as masked ROMs, which are inexpensive.

PROM (Programmable Read Only Memory)

PROM is read-only memory that can be modified only once by a user. The user buys a blank PROM and enters the desired contents using a PROM program. Inside the PROM chip, there are small fuses which are burnt open during programming. It can be programmed only once and is not erasable.

EPROM (Erasable and Programmable Read Only Memory)

EPROM can be erased by exposing it to ultra-violet light for a duration of up to 40 minutes. Usually, an EPROM eraser achieves this function. During programming, an electrical charge is trapped in an insulated gate region. The charge is retained for more than 10 years because the charge has no leakage path. For erasing this charge, ultra-violet light is passed through a quartz crystal window (lid). This exposure to ultra-violet light dissipates the charge. During normal use, the quartz lid is sealed with a sticker.

EEPROM (Electrically Erasable and Programmable Read Only Memory)

EEPROM is programmed and erased electrically. It can be erased and reprogrammed about ten thousand times. Both erasing and programming take about 4 to 10 ms (millisecond). In EEPROM, any location can be selectively erased and programmed. EEPROMs can be erased one byte at a time, rather than erasing the entire chip. Hence, the process of reprogramming is flexible but slow.

Advantages of ROM

The advantages of ROM are as follows −

- Non-volatile in nature
- Cannot be accidentally changed
- Cheaper than RAMs
- Easy to test
- More reliable than RAMs

- Static and do not require refreshing
- Contents are always known and can be verified

Over view of RAM and ROM

RAM	**ROM**
✓ Random access memory	✓ Read only memory
✓ Can be erased	✓ Can't be erased
✓ It is volatile	✓ Non volatile
Its size can be changed or increased.	Its size can't be changed or increased.
Stores data temporary	Stores data and instructions permanently.

Permanent storage; these are ones which seemingly store information permanently so as to be used for further references. Frequently external devices are commonly used because of their reliability i.e. anything may happen to the computer such as system crashing. This process of storing on external disks is called **backing.**

These are;

1. **Hard disk**.

This is the main computers storage where documents and files are stored before being output. They a rigid magnetic tapes which are mounted permanently within the drive. These have a high storage capacity which range from kilo bytes (KB), megabytes (MB), gigabytes (GB), terra bytes (TB), and petabytes (TB).

Advantages

- They store vast amounts of information compared to any storage device. Though they vary in size .i.e. 20GB, 40GB, 80GB, 160GB and up to 500GB.
- Information on hard disk can survive for a very long time since they are always in use though however some of them fail to work due to over long period of time without being used.
- Hard disks are secure as they reside inside the computer system.

Disadvantages

- They may fail to work due to violent shaking and vibrations. This is why it is advised not to move system unit when the power is on.
- They are easily attacked by viruses which makes data loss especially if the system is unprotected.
- Information on hard disc is easily hacked once hackers invade the computer
- They are expensive in terms of costs.
- They are difficult to carry as they reside inside the computer. This has made the transfer of information difficult. With the recent changes in technology, external hard discs have been introduced on the world market which has eased the transfer of heavy files from one pc to another.

Units of the computer held information

Information kept in computer memory in form of binary digits. These are represented by 0 and 1's
Every word or character is stored in the computer as binary digit i.e. 0 or 1. These binary digits are abbreviated as **BITS**

Bit. This refers the standard unit of a computer memory.

A sequence of 8bits is called a **BYTE**

Byte refers to the smallest unit of the computer memory/ storage capacity.

A nibble. This refer to a collection of four characters.

There4; 1nibble=4characters

1byte =8bits

The following table lists some higher storage units −

S.No.	Unit & Description
1	**Kilobyte (KB)** 1 KB = 1024 Bytes
2	**Megabyte (MB)** 1 MB = 1024 KB
3	**GigaByte (GB)** 1 GB = 1024 MB
4	**TeraByte (TB)** 1 TB = 1024 GB
5	**PetaByte (PB)** 1 PB = 1024 TB

QN. How many bits are the word "**topologies**?"

2. Compact disks (CD-ROM), Digital versatile disks (DVD-ROM) etc.

Compact discs well known as CDs have come up with high storage and have replaced the floppy disks. They are optical in nature used to hold pre- recorded texts, graphics and sound. They are external devices which store large amounts data which is about 700mbs and new

discs well known as DVDs have backed the size of CDs thus the size increasing to Gigabytes. These have the capacity of transferring large files.

Advantages.

- They are portable thus transfer of information from one computer to another is possible.
- They are reliable
- Information on them can last for over 100years.
- They store large amounts of information on a relatively small space.
- They are relatively cheap compared to hard discs

Demerits.

- Their destruction rate is so high since a single scratch on the disc can lead to data loss.
- They store less information compared to hard discs.
- In case of any theft, information can't be regained back.
- They are most cases affected by viruses
- CDs and DVD ROMS are read only and this in long run affects editing.
- Some CD types may not be round by all computer e.g. for a computer to read DVD's. It must have a DVD drive which is not common in most computers today.

Types of CDs and DVDs

CD-ROM & DVD ROM.

No data can be written to these but they are only read. Data on these can be hardware. The user cannot change these instructions on CD but just read them. This is why they are known as read only memory.

CD-R & DVD-R

Both of these accept recording only once and the information written on them can never be edited or deleted. This means a single reading means they automatically becomes a CD-ROM and DVD-ROM automatically.

CD-RW & DVD- RW

These are ones which accept and allow one to delete information on them and re use them. This why they are called re-writable.

However they are very much expensive and very scarce in current market.

3. **Floppy disks**. These are small plastic magnetic disks enclosed in a stiff envelope with a radial slit; used to store data and information for a microcomputer. Floppy disks have a small size of 3.1 inch and have a low storage capacity of about 32KBs where less information such as word processing, spread sheets etc. Cn be stored. They are noted for their slow speed and their cheap price. The floppy disks are inserted in a mechanism called **floppy disk drive.** This drive spins on a high speed as data is being written or read. They are found in 3 basic sizes;

   8 inches, 3.5 inches and 2 inches. These might be either double density (DD) or high density diskettes (HDD) which are cross all the 3sizes. However, the first 2sizes i.e. 2inch and 3.5 inch diskette are slower and slowly disappearing from the market. The 3.5 hdd are now common ones with the capacity of 1.44s

   Advantages of floppy

- ✓ They are portable hence the transfer of information from one computer to another is possible.
- ✓ They carry numerous sizes of data compared to their size. The floppy disk is 3.5 inch in diameter and it can fit in a shirt pocket but can carry a whole rim of texts.
- ✓ Data on floppy can be accessed within a short time.

   Disadvantages

- ✓ It can lose data so quickly once the magnetic media is exposed to magnetic field.
- ✓ They store less information compared to other devices.
- ✓ They are so expensive since their destruction rate is so high. Thus resulting into purchasing new ones.

   How to care and maintain disks

- ➢ Don't fold or spindle them.
- ➢ Don't put them near magnetic field such as radios, speakers, CPU etc.
- ➢ Don't drop it on hard surfaces such as floors.
- ➢ Keep them from intensive heat.
- ➢ Remove them from the drive be4 turning off the computer.
- ➢ Never expose them to direct sunlight for a long period of time.

4. **Flash discs**. These are of recent technology which are being used to store and ease the transfer of large files from one computer to another. They are much more like hard disks but for them are external. Unlike the floppy discs, the flash disks have a high storage capacity ranging from 1GB to 64GB thus easing the transfer of files. However, flash discs have been blamed for their major spread of viruses via computers. This is because viruses do attach themselves on files being transferred from one computer to another.

5. **ZIP disks**. These are related to hard disks that can be removed from their drives. They are medium storage devices which are similar to a floppy disk drive but using disks with a much larger capacity. (100, 250, or 750 MB, compared to a normal floppy disk capacity of 1.44 MB). These are most commonly used for storage of files on the internet and have eased the sharing of the files by the same users connected via the same network.
6. **Punched cards**. These are among the first forms of storage devices in computer. They were mainly used in the 1st and 2nd generation of computers. They are flat consisting of rows and columns. For storage, the card would be put in the computer and would punch rows into rows of characters to show data stored. To read the word, the computer would just put a hole together to make a word.

Disadvantages of punched cards

- Due to the fact that they were made of paper, they would be easily get destroyed by moisture, cockroaches etc.
- Their storage capacities were very small .i.e. just for few sentences made of 24 characters long.
- Storing punched cards was very bulky as few sentences would only be stored.

Storage media drives

A **drive** refers to a slot of opening where a disk is inserted in the computer system.

Drives are hardware components which enable the computer user to read and write on storage Medias. They enable the computer users to back up files and programs for future use.

QN; distinguish between saving and backing up

During the write process, the drive rotates or spins the media and in the process the drive converts electric signals that represent data into magnetic field on the media.

When reading data from the disk, the drive spins the disk and magnetic field that represent data are backed into electric signals.

Various medias for storage have got their respective drives in which they are contained during their real write process. The drives are represented by letters of alphabets plus a colon;

DRIVE TYPE	DRIVE LETTER
3.2 Floppy disk drive (FDD)	(A :)
5.2 Floppy drive	(B :)
Hard disk drive (HDD)	(C :)
CD	(D :)

Flash (E-Z)

Communication devices

- **Cards.** This term is used to describe important tools that allow your computer to connect and communicate with various input and output devices. The term "card" is used because these items are relatively flat in order to fit into the slots provided in the computer case. A computer will probably have a **sound card, a video card, a network card and a modem.**
- **Data buses.** These are highway on which data travels to different ports of the computer using data buses. Data can move from the keyboard to the main memory and to the monitor so that it can be observed by a user.

Computer evolutions (generations)

Computer evolutions refer to the dramatic improvements over the technology used in computers in computers. Computer generations set in as far as 1945 after the completion of World War II. They have developed through five stages with now more development witnessed in the fifth stage but the evolution is continuing and each generation has its own different characteristics by dramatic improvement in;

- Technology used to develop the computer.
- Programming languages used.
- Internal organization of the computer.
- Reduction in size.
- Increase in performance capabilities

However, most authors suggest different timelines.

First generation computers

Second generation computers

Third generation computers

Fourth generation computers

Fifth generation computers

First generation. These set in after World War II with the need for the war veterans to always exchange information and stretched up to 1959. They had the following characteristics.

- 1GCs used hundreds or thousands of vacuum tubes for their processing.
- Used magnetic drums for data storage.
- Generated a lot of heat.

- Limited storage capability of 2kb
- Very slow in their processing.
- Difficulty in programming 1GCs
- Used machine language.
- Consumed a lot of power.
- Were very expensive.
- They were very big in size i.e. one computer covering one room. Examples are; UNIVAC, EDVAC, ENIAC

Second generation. These generation of computers began right away f4om 1959 and stretched up to 1964 and had the following characteristics

- Used transistors for internal operation.
- Used less power compared to 1GCs.
- Had more speed compared to 1GCs.
- Magnetic core were used for memory
- Financial information was processed using these computers.
- Replaced machine language.
- Used HLLs (high level languages) such as FORTRAN, COBOL
- Primary memory capacity expanded to 32KB in RAM.
- Examples are; LARC live more atomic research computer), IBM7030 series.

Third generations. Unlike the 1st and 2nd generations, 3rd generations had a high speed. These came in 1964-1972 and had the following characteristics.

- 3G was developed due to the weaknesses of 2G for generating a lot of heat which damaged the sensitive parts of the computer.
- 3G computers used integrated circuits (IC) for internal operations (semiconductor devices) several transistors built one physical component.
- Increased memory and processing speeds of several millions of instructions per second (MIPS) compared to 2G.
- The operating systems allowed the machines to run many different applications.
- There was development of time sharing e.g. Users at different terminals sharing the same computer at time and ability to process multiple programs at the same time (multi- tasking/ multiprogramming.
- Primary memory capacity increased to 32KB
- Introduction of simple programming languages like BASIC (beginners all symbolic instructions code).
- Introduction of operating system and software packages.
- Examples are IBM 360 series.

The forth generations. These came in 1973 up to present and had the following characteristics;

- 4GCs used large scale integration (LSI) and very large scale integration (VLSI) that ensured hundreds of thousands or millions of transistors and other circuit elements on a small chip.
- Development of various software.
- They are associated with increasing power, efficiency and reliability.
- The continued improvement allowed the networking of computers for the sharing of data.
- Led to development of microprocessors by team led by Me Teddy. Hoff of Intel corporation
- Development of mini and microcomputers. Development one easy programming language such as C, C+, C++, JAVA etc.
- Primary memory capacity increased to 128 and 256MBs of RAM etc.
- Examples are 8086, 80286, 80386, 80486, pentium1,2,3,4, dual core etc., apple and Macintosh computers

Fifth generation. Many of the scholars have argued whether the fifth generation is already in progress or not and if so a question still goes, how will the 6^{th} generation behave basing on the following characteristics

- 5GCs used superconductor circuits or other technologies to process & store information.
- Microprocessors have been made to perform faster by shrinking the distance between transistors thus increasing in speed of operation.
- There is also improvement in multimedia use.
- The features introduced in this generation include using newer high-definition discs, like Blu-Ray, utilized by the PlayStation 3, and HD-DVD, which has been embraced by Microsoft.
- Multimedia & Downsizing.
- Wireless communication is at highest peak by the mobile phones.
- They are able to mimic like humans.
- Robots are on demand in industries
- Development of powerful and intelligent computers with the ability to think, listen and talk have been introduced.

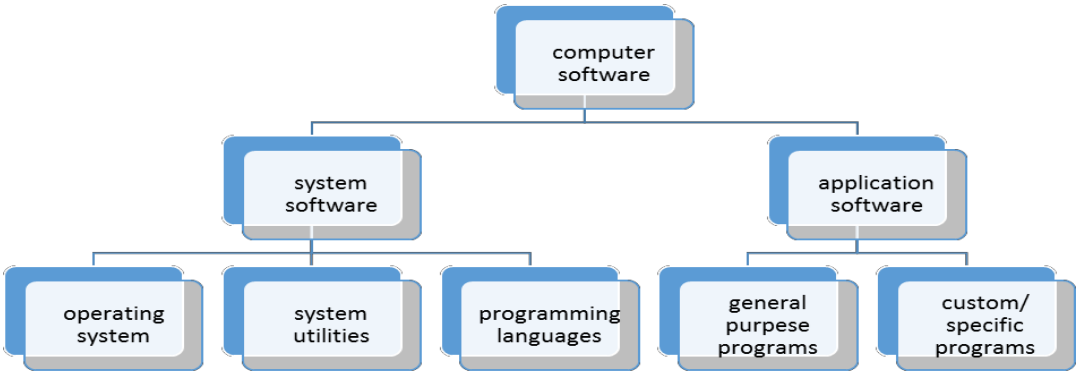
QN. Basing on the above evolutions, outline the main characteristics of the future generation?

COMPUTER SOFTWARE

A software refers to intangible components of the computer. Software can't neither be touched nor felt.

Defn: **software**is a collection of instructions that enable the user to interact with a computer, its hardware, or perform tasks.

It is classified into,



System software

This refers to programs that control the way the computer operates.

The system software are embedded within the computer system and these are well known as computer programs. The system software is classified into 3;

I. Operating system
II. System utilities
III. Programming languages.

OPERATING SYSTEM

The operating system refers to a system of programs that manages the operations of the CPU, controls the input/output and storage resources and activities of the computer system, and provides various support services such as scheduling, system accounting, debugging etc., as the computer executes the application programs of end users.

The software that supports a computer's basic functions, such as scheduling tasks, executing applications, and controlling peripherals. It manages the resources of a computer.

An operating system is a group of computer programs that coordinates all the activities among computer hardware devices.

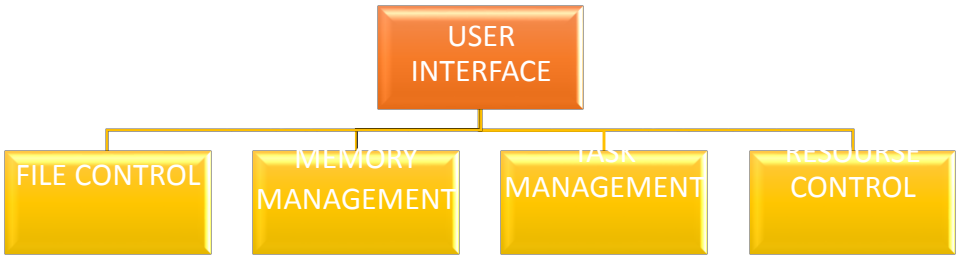
It is the first program loaded into the computer by a boot program and remains in memory at all times .

That is, a program that manages the computer hardware.

It is further divided into,

1. **The windows family**
   This the most common type of operating system which was developed by Microsoft and currently is the most commonly used. This is because of their good graphical user interface.
   They include from most recent to the oldest as follows: windows10, windows8.1, windows8 Windows 7, Windows Vista, Windows XP Professional Edition, Windows XP Home Edition, Windows 2000, Windows ME, Windows 98, Windows NT, Windows 95 and Microsoft DOS.
2. **Disk operating system (D.O.S).** This the command line based operating system which is a single multi user however it is difficult to use because of the commands.
3. **UNIX operating system.** UNIX family has been developed by a whole history of individuals, corporations and collaborators.
   It is a multitasking and multi-user system, network-managed operating system whose portability allows it to run on mainframes, midrange computers, and microcomputers.
   It is difficult to learn because it has command line interface. UNIX must normally run a computer made by the same company that produces the software.
4. **Linux operating system.** This the is the modern operating system which is also a multi- user operating system based on command line interface. However, we can say that UNIX is the parent of Linux which is also not easy to learn. It is best for network computers of big organization with the knowledge to use them.
5. **Macintosh operating system.** This is the latest operating system from Apple for the iMac and other Macintosh microcomputers, based on UNIX has advanced multitasking and multimedia capabilities, along with a new suite of Internet services called I tools.
   The greatest problem with these operating systems lies in the fact that, not as many application programs are written for them. Another drawback is that the system can only be run on Apple produced hardware.
6. **Network operating system**. These are designed to work on computers which exist on computers. Such as Novel net ware, Windows NT, Solaris.

The functions of the operating system



- The user interface is the part of the operating system that allows users to communicate with the computer. Through the interface, the end user has access to the resources such as resource management; file management; task management and utilities. (Error handling).
- Efficient resource management. It manages the computer memory for example memory allocation and loading of programs on the hard disk.(disc C for program files)
- File management for example maintenance of file for proper storage, opening and closing of files, checking on the file levels, etc. (storage files C) and partitioning if the need be.
- Task management. It checks whether the hardware (including peripheral devices such as printers) is functioning properly.(devices)
- Utilities and support services such as error detection and reporting for example display of a message on screen if a fault is detected within the hardware component.
- Security. Controlling system security for example monitoring the use of passwords.
- Initial start-up of the computer, when it's switched on. This is achieved by the boot program which is in-built in the ROM.
- Managing multitasking(INTERFACE)

NOTE; what is the difference between multi-tasking and multi programming?

Multitasking refers to a task management approach that allows the user to run two or more programs at the same time. Thus a user may be updating a spreadsheet while spell checking a document using a word processor **whereas Multiprogramming** is the ability to execute multiuser programs concurrently through a sharing of the computer's resources.
A multiprogramming operating system takes advantage of this fact by allowing another program to use the CPU when it would otherwise be idle.

THE USER INTERFACE.

- **Command line interface. (command driven)**

  These accept commands in form of special word letters.

  Examples are; DOS which contain commands like copy and rename for copying the file and changing the name for files respectively.

  The commands accept and execute by part of the O/S called command processor/ command line interpreter.

  Command driven software is more flexible than menu driver software but it is more difficult to learn. The user must be having the knowledge of available commands of what they do and the rules governing how they must be typed.

  There4 they are used by experienced user other than beginners and they tend to be used by technical people such as computer operators, programmers, and technicians.

- **Graphical user interface (GUI).** It is the one which allows the user to use menus and visual images such as icons, buttons, and other graphic objects to enter commands in the computer.

  Advantages of GUI.

- It is user friendly because it is easy to learn and use.
- There is no need to memorize/ type any command.
- It is similar for other application.

  Disadvantages

- It normally requires a larger memory and a faster processor.
- It also occupies more disk space to hold the file and different functions.

  NOTE: **Icons** refer to small pictures representing programs installed in the computer.

  Menu driver interface (MDI). This is the type of interface which provide the user with a list of options to choose from. The interface is suitable for beginners who may find difficulties in recalling commands.

  The known operating system that provides MDI is Ms. Dos.

SYSTEM UTILITIES.

These programs are specifically designed to maintain the performance. Unlike the operating system, system utilities work on foundation set by the operating system. Thus, one can say that a computer can work without system utilities but can't work without the operating system. This is because it is a platform for other programs to operate. These include;

1. Antivirus. This is one which detect and scan and remove viruses from the computer. These among others include, Avast, Smad vr, rising etc.
2. File sorting utility. This is a utility which is used to re-arrange files in the pre-determined sequence i.e. depending on the dates, ascending, descending, file size.
3. Copying utility. This is a utility which allows one to reproduce a document/file from one location to another.
4. Tracing & Debugging utility. This is a utility which eases the detection and removing of burgs in the computer. Burgs refer errors in a program.
5. Merging utility. This is the ones which allows one to combine different files into one.
6. Renaming utility. This the one which allows one to re-allocate another name to file.

QN. *Assess the functions of utility program as one of the system software programs?*

PROGRAMMING LANGUAGES

A programming language is a notation for writing computer programs which are specifications of a computation or algor

It can also be referred to as a software that allows a user to write a series of instructions to define a particular task, which will then be translated to a form that is understood by the computer. They are a means of communicating with the processor.

• A programming language is a language that a computer can understand

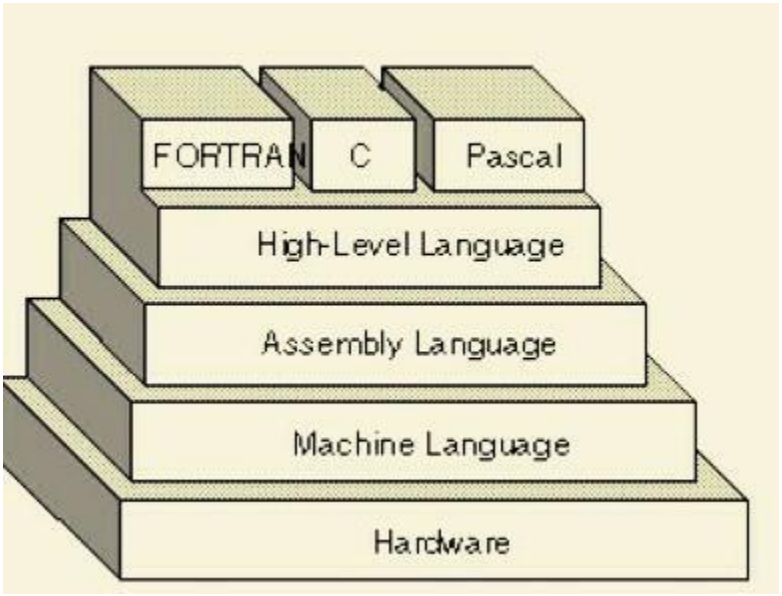
• It provides a programmer an environment to write and execute programs.

• A number of programming languages exist but the choice mainly depends on the nature of the problem at hand and the programmer's ability to use the language.

Programming Languages are broadly categorized into two i.e.

1. Low level language

2. High level language



Low Level language (LLL):

These are low-level languages because they are closely associated with processor than high-level language, which are near to the programmers.

For instance, programmers are required to write all program instructions in the 0s and 1s of binary code and to specify storage locations for every instruction and item of data used. There are two types of low-level language

1. Machine language/code
2. Assembly language/code

Machine Language

It is also referred to as 1st generation language and difficult to learn and not user friendly to humans. Programming in machine code is very tiresome and very many errors are likely to occur. Instructions are in 0s and 1s in binary format for example 16 byte machine = 1010000000001001.

VALUE	BINARY
A	01000001
B	01000010
C	01000011

Advantages of machine code language

- Programming in this particular language is done at the level which the computer understands thus no needs of using a language translators.

Disadvantages machine code language

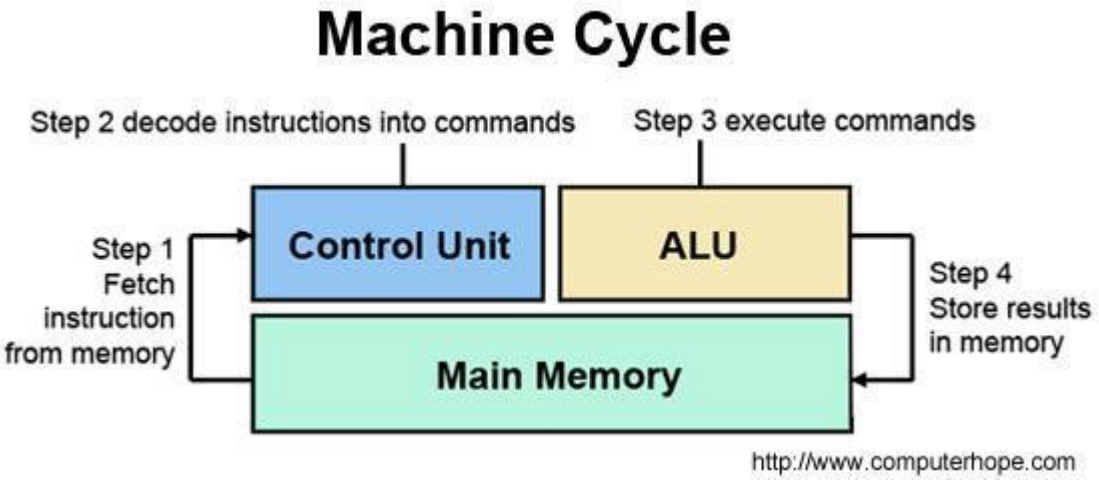
- Tiresome

- Subjected to a number of errors
- It is not easily understood by user
- High volume of work hence time consuming
- It is very difficult to transfer programs from one computer to another, since the language depends on a particular machine (processor), which has its own language code

QN: Define the term machine cycle?

Machine cycle

The steps performed by the computer processor for each machine language instruction received. The **machine cycle** is a 4 process cycle that includes reading and interpreting the machine language, executing the code and then storing that code.



Four steps of Machine cycle

1. **Fetch -** Retrieve an instruction from the memory.
2. **Decode -** Translate the retrieved instruction into a series of computer commands.
3. **Execute** - Execute the computer commands.
4. **Store** - Send and write the results back in memory.

Assembly language (2ND Generation). These are 2nd generation languages that were developed to overcome the difficulties of understanding and using machine languages.

They use English like tags called Mnemonics.

To make machine code language readable and show that they were a symbolic operation codes.

Mnemonics are basically shortened to 2 or 3 letter words such as;

- Add for addition.
- Sub for subtraction

Programs written in assembler language require an assembler to convert them into machine language that the computer can understand.

Like machine language, assembly language is also machine dependent and there4 a program written for one computer can't be used for another.

Advantages of assembly language

- Programs can't be written more easily than the machine language.
- It had a closer control over a computer hardware and executes efficiently.
- It is useful for writing operating systems ad game programs which require fast and efficient use of the CPU.

Disadvantages.

- They are designed for specific machines and specific processor.
- Programming using these languages is laborious.

High level languages.

These are ones which can be easily understood by the programmer and make programming easier simpler. This is because they can be easily be understand by the humans. These were a requirement of the assembly language. They have fewer instructions thus take less time. They are classified as 3rd, 4th 5th, html.

These languages are called problem oriented/ machine independent. Thus during coding a programmer focuses on coding a program rather than considering how a computer works.

These include;

- Third generation (3GLs)
- Fourth generation (4GLs)
- Object oriented language (OOPLS)
- Web scripting language (WSLs)

In high level language, fewer instructions are written and there4, a lot is done in less time.

3RD Generation Language

Third generation languages specify instructions as brief statements that are more like natural language than assembly language. Programming is done in brief English statements. They are used for specific

operations like business and science. Important third-generation languages include FORTRAN, COBOL, C, BASIC and PASCAL.

The question of which language is best is one that consumes a lot of anytime and energy among computer professionals. This is because every language has its strength and weaknesses. For example;

FORTRAN (Formula and Translator)

This is a programming language developed in 1956 for scientific and mathematical application. It good language for processing numerical data, it is widely acceptable and understood. writing scientific mathematical and engineering applications because of its simplicity but however it disadvantage is that it is not efficient to produce reports, difficult to use on other applications other than scientific and engineering.

Pascal

By Pascal Braise; a programming language used on PCs and used to teach sound programming practices in computer science courses.

It is very good for writing well-structured and readable programs, but it is not as flexible as the C program language.

C

It was developed at AT & T's bell labs in the early 1970s.It is used primarily by professional programmers to create operating system and application software, especially for PCs.

It is the most portable general purpose language in the business world. It has versions like C, C+, and C++

C+ +

C++ embodied powerful object-oriented features, originally developed to enhance the C language. C++ power major software like Firefox, win amp and adobe programs. It is used to develop system software, high performance server and client application soft wares and video games but however a complex and difficult to learn.

BASIC (Beginners all symbolic instructions code). This was developed as a means of introducing non science students to the fundamental of programming.

It is a general-purpose programming language used with PCs and for teaching programming

Advantages of BASIC

- It is so popular and basically for designing business applications
- It is the simplest and easiest of all programming languages.
- It has self-teaching menus I several books

Disadvantages

- BASIC is in different version with so little compatibility.
- It is not a standard language since it specializes in business applications.

COBOL (Common Business Oriented Language)

- Major programming language designed in the early 1960s for business applications. This was produced to enable efficient software to be designed for business applications. Example is payroll and accounting and stock control

Advantages of COBOL

- Enables easy production of reports to programmers.
- It is compatible on different types of computers.
- It is fairly easy to understand.

Disadvantage.

- It takes longer to learn and its coding is lengthy

Fourth Generation Language

These were designed to make programming easier with a variety of software tools that enable end users to develop software applications with minimal or no technical assistance. Examples include query languages, report generator, graphic language, and application generators. 4GLs can be easily written with the use of simple, sentence-like commands, such as SELECT NAME FROM RECORDS WHERE NAME="JOHN";

A fourth Generation language should have the following features:

- It should be easy to learn and use
- It should contain an online help facility to users.
- It should be usable interactively.
- It should be suitable for documentation design work
- It should be fault tolerant. (i.e. any mistake in data entry should be dealt with easily)

Advantages of fourth generation language

- It enhances the end user computing, so limiting the work of information system (IS) staff.
- It taps user creativity
- It diffuses IT throughout the organization
- It vastly increases programmer productivity, even though it uses more hardware resources

Disadvantages of fourth Generation language

- Over enthusiastic use by users might overload the main hardware resources.
- The information systems department get over loaded by training requirements

- Program written in 4th generation language makes less efficient use of computer processing power and memory. This can have the effect of slowing down the execution of a program to unacceptable levels.
- They are often very expensive to buy.

Python is also a high level server side scripting language for websites and mobile apps.it is considered a fairy easy language for beginners due to its readability and compact syntax, meaning developers can use fewer lines of code to express a concept than they would in other languages. It powers the web apps for Instagram, Pinterest and radio through its associated web frame works.

SQL, Structured query language is a special purpose language for managing data in relational data base management systems. It is most commonly used for its "Query" function, which searches informational databases. SQL was standardized by the American national standards institute (ANSI) and the international organizational for standardization (ISO) in the 1980s

JAVA is a class- based, object oriented programming language developed by sun micro systems in the 1990s. it is one of the most in demand programming languages, a standard for enterprise software, web based content, games and mobile apps as well as the android O/s. java is designed to work across multiple software programs, meaning a program written on mac o/s x could also be run on windows

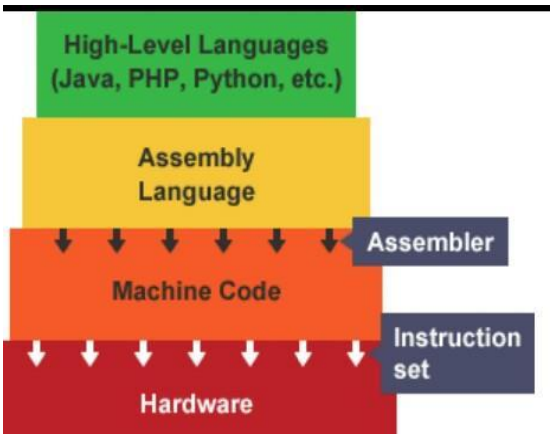
The choice of which language to use depends on the type of computer the program is to run on, what sort of program it is, and the expertise of the programmer.

Fifth Generation Language

These types of languages are normally used in intelligent knowledge based systems such as robots. These can manipulate various facts and rules to reach a conclusion, unlike the 4th generation language that manipulates numbers, or data. They generally think as humans and are extensively used in artificial intelligent projects like the recent mars exploration.

HTML (Hyper Text Mark-up Language)

This is one of the main programming languages used in creating web pages for the internet/intranet. This language allows programmers to compose text or data, pictures, sounds and videos etc. on the screen display. It also allows the programmers to add attachments, which enable linkage to different web pages on the Internet.



Language Processors

However, we shall know that the computer only understands ***machine language*.** It is difficult to write and maintain programs in machine level language. The programs written in the code of high level and low level language need to be converted into machine level language using **language processors**. These are programs that translate high-level language codes into low-level language codes that the processor can easily understand.

Language processors include;

1. Assemblers
2. Compilers
3. Interpreters
4. Linkers

Assemblers. These are ones which are used to convert the code of low level language (assembly language) into machine language. This is most commonly used in microprocessors. They are further divided into two types; one pass assembler is the assembler which assigns the memory address to the variables and translates the source code into machine code in the first pass simultaneously. A two pass assembler is the assembler which reads the source code twice. In the first pass it reads all variables and assigns them memory addresses. In the second pass, it reads the source code and translate the code into object code.

Interpreters.

An Interpreter refers to the program which translate statement/ line of a program into machine code at a time. It reads only one statement of a program, translate it and executes it. Then it reads the next statement of the program again and translate it and execute it. In this way it proceeds further till all the statements are translated and all the entire program into machine ode. However, the machine codes produced by interpreters are not saved. An interpreter is generally small program which occupies less memory space and there4 can be used for smaller systems which have limited memory

NOTE; interpreted code is slower to be execute than compiled code.

Interpreted languages include java script, PHP, python and ruby. Interpreted languages are also called scripting languages. These are ideal for using with dynamic web applications. They are used for

client- side and the server side coding, as they are small programs that are executed within the browser.

Compilers

A Compiler translate the whole program in high level language into machine code before the program is run. A compiler is more intelligent than an assembler. It checks all kinds of limits, ranges, errors etc. but its program run time is more and occupies a larger part of the memory. It has a slower speed because it undergoes the entire program and translates the entire program at once into machine code language. If a compiler runs on a computer and produces the machine codes for the same computer, then it is called self-compiler or resident compiler.

On the other hand, if a compiler runs on a computer and produces the machine codes for the other computer then it is known as cross compiler.

Linkers

Computer programs are usually developed in modules or sub routines which gives program segments meant to carry out the specific relevant tasks. Therefore, the Linker is service software that accepts the separately translated program modules as its input and logically combines them into one logical module known as the load module that has got all the required bits and pieces for the translated program to be obeyed by the computer hardware.

Loaders; loader is a program that loads machine codes of a program into the system memory. In computing, a loader is the part of the operating system that is that is responsible for loading the programs. It is one of the essential stages in the process of starting a program because it places programs into memory and prepares them for execution.

Loading a program involves reading the contents of executable files into the memory. Once loading is completed the operating system starts the program by passing control to the loader program code. All operating systems that support program loading have loaders. In many operating systems the loader is permanently resident in memory.

APPLICATION SOFTWARE

These refer to a set of programs which are designed to solve user's specific problems.

Application software is categorized into,

- Customized/specific/bespoke application software
- General purpose/ off shelf software application software.

CUSTOM SOFTWARE.

Custom (bespoke) software is tailor-made software, which is developed at a user's request to perform specific functions.

Such software can be contrasted with the use of software packages developed for the mass market such as commercial off the shelf (COST) software or existing free software. Since custom software is developed for single customers it can accommodate that customer's particular preferences and expectations. It may be designed in stage-by-stage processes allowing all nuances and possible hidden dangers to be taken into account including issues that were not mentioned in the specification. Especially the first phase in the software development process may involve many department including marketing, engineering research and development.

Large companies commonly use custom software for critical functions including content management, inventory management, custom management, human resource management or otherwise to fill the gaps present in the existing software packages. Often such software is legacy software developed before COST software packages offering the required functionality became available.

Advantages

- ✓ Custom software generally produces the most efficient systems as it can provide support for the specific needs of the business which might not be available in the off the shelf software and will provide greater efficiency or better customer service.
- ✓ It is more flexible to use than off shelf such as spreadsheets as it is constructed by software professionals that can implement functionality for wide range of business needs.

Disadvantages

- ✓ The main disadvantage of custom software are development time and cost. With spreadsheets or an off the self-software package, a user can get benefits quickly but with custom software the user needs to go through software development processes that may take a lot of time.
- ✓ Custom software is often several times the cost of other two options and will normally include an ongoing maintenance cost. This will often make custom software infeasible for smaller businesses. These higher costs can be insignificantly in larger businesses where smaller efficiency increases can relate to larger labor cost savings or where custom software offers larger boost.
- ✓ Some software that are designed specifically for certain businesses may not be compatible with other general software. This is something that can prove to be a major stumbling block to many business men.

General purpose application software.

A general purpose software application well known as "off the shelf" refers to software designed to solve a wide range of problems. It is largely used in homes, schools, etc. this type of software tries to be jack of all trades. It provides so many features that the majority of all users will want such as formatting, creating charts, creating tables etc.

Examples of general purpose include

- ❖ Word processors. This is an application that provides the user with tools needed to write and edit and format text and to send it to a printer. Examples of word processors include word pad, Microsoft word, word perfect, and word pro, etc.

WORD PROCESSING

It refers to the art of creating saving, editing, formatting and printing text and graphic documents using electronic word processors.

Examples are Microsoft word, Corel word perfect, lotus word pro, apple pages, open office.org writer etc.

NOTE: Text editors are mainly used to create small notes, memos, and programs. Examples of these include: Note pad, Note pad++, Gedit, etc.

NB: the major function of word processing are to write letters, reports, projects, books, essays, memos, resumes (CVS), etc.

BASIC TERMINOLOGIES

Type face. This refers to the shape of a character. These are sometimes known as font styles

Examples are Times new Roman, monotype Corsiva, Tahoma etc.

Line spacing. This refers to amount of vertical white space between two lines of text i.e. from base line to another base line.

NOTE: line space is measured in **points.**

Text alignment. This refers to the lines of texts are arranged relative to the edges of a block of text.

There are four kinds of text alignment which include; **left, right, center and Justify.**

Justification. Refers to the process of aligning texts in a document to both left and right margins at the same time. Justified texts may have extra spaces between letters within words, so that paragraphs appear as a block with an even right margin ending.

Indent. An indent is the mount of white space in between the margins and the beginning of a text.

Examples include; the first line indent, hanging indent, and right indent.

Formatting text. Text formatting is the process of changing the appearance of text in a document. Formatting text can involve using commands such as bold, italics, underline, changing font color, etc.

Editing text. This refers to the process of making changes to the content of existing document.

It involves commands such as; cut and paste, over write, undo, delete etc.

Copy. To place a selected text on a clipboard without being removed from its original position.

Cut- To move a selected text from its original position to the clipboard.

NOTE: Copy and paste duplicates a document whereas **cut and paste** moves a text/ a document to a new location.

The clip board. This refers to an area of a memory in which you can store copied or to cut text, graphics, or any other Item temporarily before being pasted into other locations.

Paste special. This a feature which enables one to a void pasting text with all its formatting. The paste special command prompts the user of the computer more controls of what to paste.

Header – this refers to a text which appear on the top margins of all pages of document.

Footer- this refers to a text which appear on the bottom margins of all pages of document.

Ruler. This is a feature which allows to determine the indent and margins and table markers.

Note: it should be noted that using the space bar to align text is **null and void.**

Tabs stops- tab stops are places where texts are made to align up. One can set a tab stop by clicking on the ruler bar at the desired position.

Hard copy- are document which is on paper form. /physical form.

Soft copy- a copy of a document which is stored on a disk or other computer storage devices.

Over type mode. This is sometimes noted as over write mode. This causes a character one types to replace the existing ("over type") characters at the cursor. You can switch between over type mode and insert mode by pressing the insert key.

Paragraph- it refers to text between one paragraph break and the next. A paragraph break is inserted by pressing the enter key.

Save. It is the process of writing the document's current state from RAM to a storage device.

Proofreading is the process of reviewing a document to ensure the accuracy of its content.

Proof reading tools include spelling grammar check (F7), thesaurus, etc.

COMMON FEATURES OF WORD PROCESSING APPLICATIONS

Microsoft word and other word processing software's have so many features which allows one to type a text edit format because of supporting feature such as;

- ✓ **Copy and paste.** This allows one to copy data from one location and paste it to another.
- ✓ **Mail merge.** A software product feature that uses a file (or database) of names and addresses, together with a template document, to produce multiple copies of a letter, each personally addressed to a different recipient.
- ✓ **Cut and paste.** This is the one which allows one to delete text or other data in one document and insert it in the same or different one.
- ✓ **Insert**. This allow you to add a picture or clip art or table on the existing document.
- ✓ **Clip arts**. These are computer pics which can be used to decorate document.
- ✓ **Save as**. It is a feature which allows one o save a file with a specific name.
- ✓ **Grammar checker**. this reports grammatical errors usually by wavy green lines and suggestions on how to correct them.
- ✓ **Thesaurus**. This feature suggests alternative words with the same meaning (synonyms) for use in the document.
- ✓ **Spell checker**. Allows the user to check spellings of the whole document at one time or to check and even correct the spellings of individual words as they are typed. (Auto-correct)
- ✓ **Automatic Page numbering**. Numbers the pages automatically in the document.
- ✓ **Drop cap.** This feature formats the first letter in a paragraph to be drop capped within 2 or more lines.
- ✓ **Clip art**. This refer to pre-made images about various subjects used to illustrate certain concepts within a document.
- ✓ **Printing.** This feature allows a user to obtain a hard copy of a document from the printer.
- ✓ **Templates**. Establishes the initial document layouts and formats for various document types.
- ✓ **Word count.** This establishes the number of words, characters, paragraphs, etc. in a document.
- ✓ **Headers and footers.** Used to insert texts in the top and bottom margins through the document.
- ✓ **Footnotes and endnotes**. These are used as reference that provide additional information about a word or phrase within a document.

- ✓ **Insert and delete**. This allows a user to add and remove portions of texts while editing a document.
- ✓ **Tables.** This allows the user to organize information into rows and columns.
- ✓ **Multi-columns**. This arranges text into two or more columns that look similar to newspapers or magazine.
- ✓ **Find**. This allow the user to locate all currencies of a particular character, word or phrase.
- ✓ **Replace**. This allow the user to substitute the existing word in a document with the new one.

COMMON PARTS OF A WORD PROCESSOR

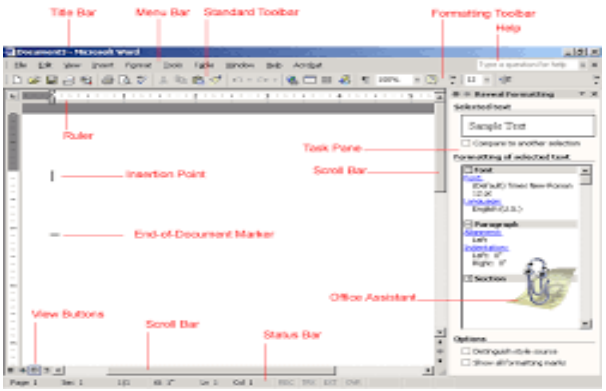
I. **Title bar-** this indicate the task and currently running.
On the right hand side of the title, are the minimize button, restore, and close button

II. **Menu bar**-this provides the user with a group of commands that are used to manipulate the document.

III. **Tool bars-** these consist of sets of command buttons for quick execution of frequently used groups of commands.

IV. **Document window-** this is the working area/ space where the document is created. This is sometimes known as typing area.

V. **Status bar**- displays information that the user may need to know such as the current position of the insertion point, progress, edit mode



etc.

Advantages of word processors

Reviewing of document for any errors before printing them out.

- It has got many text formatting features such as bold, underline font color etc. that can be used to create documents which look more professional and more appealing to the eye.
- Word processors can save copies for future reference.

- It is easy to correct mistakes made during the process of typing. This process is known as editing.
- Using word processors, it is easy to create graphics and insert pictures unlike the manual methods and type writers.
- Word processors have inbuilt word wrap feature which enables the user to continue typing a document even when he reaches the end of the line.
- A word processor can work on many pages at ago i.e. inserting headers, footers, and page numbers etc.
- Word processors have inbuilt in edit features such as copy, paste, cut which enhance the visualization of a document.
- With the help of word processors, user is able to create one document which can be sent to many people (mail merging).

Disadvantages of word processors

- ✓ With word processors, one can't use them when power is off.
- ✓ Word processors are expensive as it requires one o have a computer which is expensive to attain.
- ✓ Word processors have attributed to wide spread unemployment as much work can be done within a shortest time.
- ✓ Word processors require extra cost of printers so as to attain a hard copy form.
- ✓ Word processors are difficult to use for people who are illiterate (with no computing skill).
- ✓ Computers are associated with virus which attributes to loss of a lot of information created with word processors.

WORD PROCESSING KEYBOARD SHORTCUTS.

Shortcut	Description
Ctrl+0	Toggles 6pts of spacing before a paragraph.
Ctrl+A	Select all contents of the page.
Ctrl+B	Bold highlighted selection.
Ctrl+C	Copy selected text.

Ctrl+D	Open the font preferences window.
Ctrl+E	Aligns the line or selected text to the center of the screen.
Ctrl+F	Open find box.
Ctrl+I	Italic highlighted selection.
Ctrl+J	Aligns the selected text or line to justify the screen.
Ctrl+K	Insert a hyperlink.
Ctrl+L	Aligns the line or selected text to the left of the screen.
Ctrl+M	Indent the paragraph.
Ctrl+N	Opens new, blank document window.
Ctrl+O	Opens the dialog box or page for selecting a file to open.
Ctrl+P	Open the print window.
Ctrl+R	Aligns the line or selected text to the right of the screen.
Ctrl+S	Save the open document. Just like Shift+F12.
Ctrl+T	Create a hanging indent.
Ctrl+U	Underline the selected text.
Ctrl+V	Paste.
Ctrl+W	Close the currently open document.
Ctrl+X	Cut selected text.
Ctrl+Y	Redo the last action performed.
Ctrl+Z	Undo last action.
Ctrl+Shift+L	Quickly create a bullet point.
Ctrl+Shift+F	Change the font.
Ctrl+Shift+>	Increase selected font +1pts up to 12pt and then increase font +2pts.

Ctrl+]	Increase selected font +1pts.
Ctrl+Shift+<	Decrease selected font -1pts if 12pt or lower; if above 12, decreases font by +2pt.
Ctrl+[	Decrease selected font -1pts.
Ctrl+/+c	Insert a cent sign (¢).
Ctrl+'+<char>	Insert a character with an accent (grave) mark, where <char> is the character you want. For example, if you wanted an accented è you would use **Ctrl+'+e**as your shortcut key. To reverse the accent mark use the opposite accent mark, often on the tilde key.
Ctrl+Shift+*	View or hide non printing characters.
Ctrl+<left arrow>	Moves one word to the left.
Ctrl+<right arrow>	Moves one word to the right.
Ctrl+<up arrow>	Moves to the beginning of the line or paragraph.
Ctrl+<down arrow>	Moves to the end of the paragraph.
Ctrl+Del	Deletes word to right of cursor.
Ctrl+Backspace	Deletes word to left of cursor.
Ctrl+End	Moves the cursor to the end of the document.
Ctrl+Home	Moves the cursor to the beginning of the document.
Ctrl+Spacebar	Reset highlighted text to the default font.
Ctrl+1	Single-space lines.
Ctrl+2	Double-space lines.
Ctrl+5	1.5-line spacing.
Ctrl+Alt+1	Changes text to heading 1.
Ctrl+Alt+2	Changes text to heading 2.

Ctrl+Alt+3	Changes text to heading 3.
Alt+Ctrl+F2	Open new document.
Ctrl+F1	Open the Task Pane.
Ctrl+F2	Display the print preview.
Ctrl+Shift+>	Increases the selected text size by one font size.
Ctrl+Shift+<	Decreases the selected text size by one font size.
Ctrl+Shift+F6	Switches to another open Microsoft Word document.
Ctrl+Shift+F12	Prints the document.
F1	Open Help.
F4	Repeat the last action performed (Word 2000+)
F5	Open the Find, Replace, and Go To window in Microsoft Word.
F7	Spellcheck and grammar check selected text or document.
F12	Save As.
Shift+F3	Change the text in Microsoft Word from uppercase to lowercase or a capital letter at the beginning of every word.
Shift+F7	Runs a Thesaurus check on the selected word.
Shift+F12	Save the open document. Just like Ctrl+S.
Shift+Enter	Create a soft break instead of a new paragraph.
Shift+Insert	Paste.
Shift+Alt+D	Insert the current date.
Shift+Alt+T	Insert the current time.

You can also utilize the mouse to perform some common actions. The following section contains examples of mouse shortcuts.

Mouse shortcuts	Description
Click, hold, and drag	Selects text from where you click and hold to the point you drag and let go.
Double-click	If double-clicking a word, selects the complete word.
Double-click	Double-clicking on the left, center, or right of a blank line makes the alignment of the text left, center, or right aligned.
Double-click	Double-clicking anywhere after text on a line will set a tab stop.
Triple-click	Selects the line or paragraph of the text that the mouse triple-clicked on.
Ctrl+Mouse wheel	Zooms in and out of document.

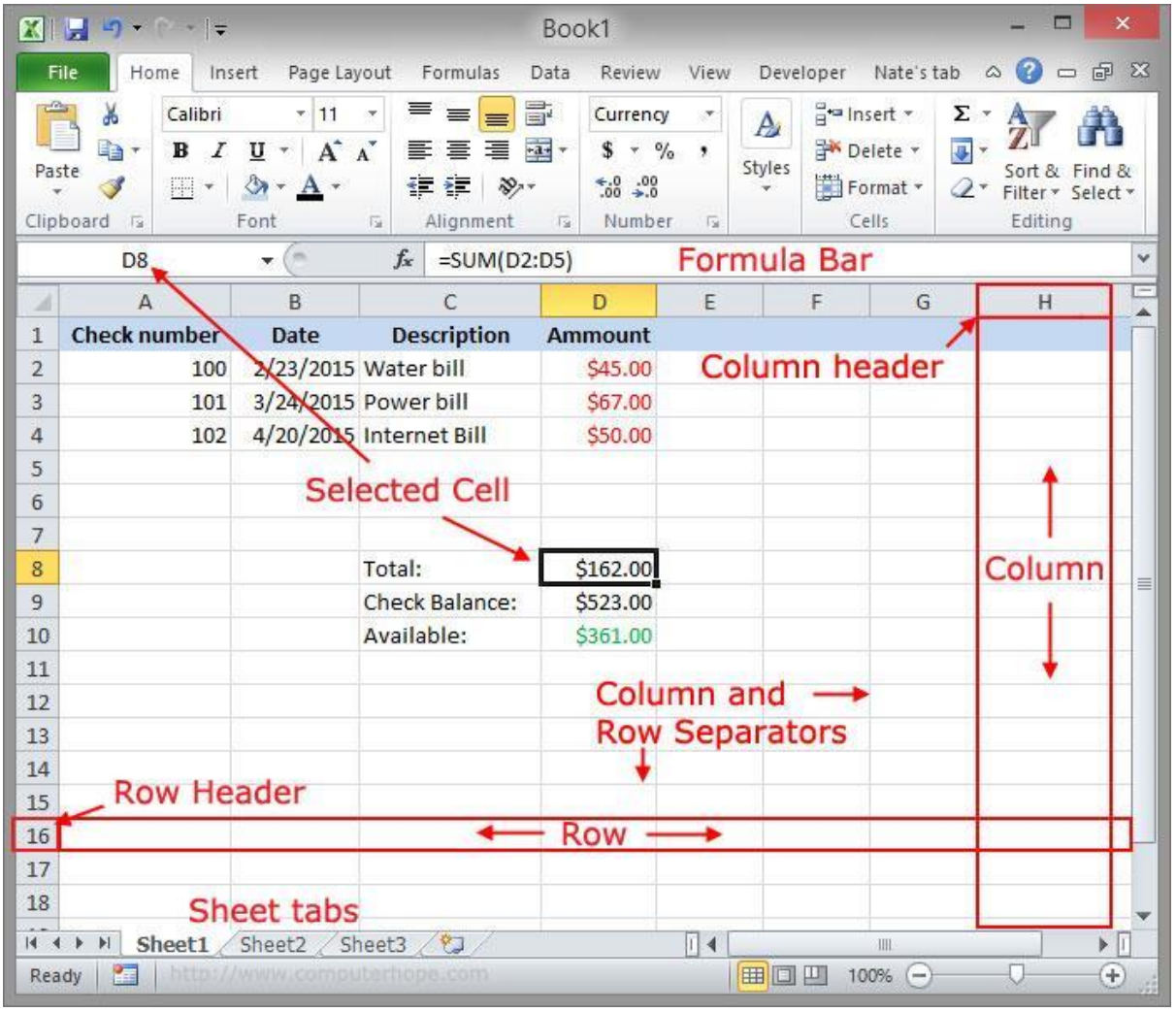
Qn: examine the advantages of using electronic word processors over type writers.

SPREAD SHEETS

Spread sheets. These are programs which are used in manipulation of numerical data, carrying calculations and creation of graphs.

A spreadsheet is a large sheet having data and information arranged in row s and columns.

Below is a basic example of what a Microsoft Excel spreadsheet looks like, as well as all the important features of a spreadsheet highlighted. Below is a basic example of what a Microsoft Excel spreadsheet looks like, as well as all the important features of a spreadsheet highlighted.



A spreadsheet is a large sheet having data and information arranged in row s and columns.

It involves use of many functions such as additions, subtractions. Division, multiplication, ranking, if, v-lookup, use of graphs etc. **examples include**,

1. Ms. excel

2. Lotus1-2-3
3. Quattro pro.
4. VisiCalc

There are three forms of data entered in spread sheets i.e.

1. Values
2. Labels
3. Formulas

Spread sheet are basically categorized basically into 3 types i.e.

1. **Manual spreadsheets**. This involves use of the brain and the physical body parts to carry out calculations.

Advantages

✓ Relatively cheap and easy to use.

Disadvantage.

✓ Wrong results as a result of tiredness.

2. **Mechanical spreadsheets**. This involves use of calculators and other simple calculating devices to carry out calculations. The advantage with this method is that it is relatively cheap and not tiresome like the manual spreadsheets.
3. **Electronic spreadsheets.**

With this method, involves the use of computers, to manipulate data and carry out calculations

Advantages of using electronic spread sheets

I. It offers large sheet of data entry in rows and columns.
II. It has got inbuilt formulas for data entry and manipulation of data mathematically.
III. Mistakes are easily traced with spreadsheets
IV. Easy to carry out analysis of the data by use of relative charts.
V. The can afford to handle many tasks such as financial planning and budgets.
VI. They can present data in graphical form since they have in built graph function.
VII. Work sheets can be saved for future reference.

Disadvantages of electronic spread sheets.

I. They can't be used by people with no computing knowledge.
II. Any mistake in a spreadsheet can make the entire results wrong
III. Difficult to use by illiterate people
IV. A single mistake in formula can make the entire answers in the work book wrong
V. Electronic spread sheets require specific software's which make them expensive to attain.
VI. They require electricity for usage

FEATURES OF ELECTRONIC SPREADSHEETS

NOTE: All spread sheets have most common features as those of word processors because they come in one embedded **application suite.**

There are a number of features that are available in Excel to make your task easier. Some of the main features are:

1. **AutoSum** - helps you to add the contents of a cluster of adjacent cells.
2. **List AutoFill** - automatically extends cell formatting when a new item is added to the end of a list.
3. **AutoFill** - allows you to quickly fill cells with repetitive or sequential data such as chronological dates or numbers, and repeated text. AutoFill can also be used to copy functions. You can also alter text and numbers with this feature.
4. **AutoShapes toolbar** will allow you to draw a number of geometrical shapes, arrows, flowchart elements, stars and more. With these shapes you can draw your own graphs.
5. **Wizard** - guides you to work effectively while you work by displaying various helpful tips and techniques based on what you are doing. 6. Drag and Drop - it will help you to reposition the data and text by simply dragging the data with the help of mouse.
6. **Charts** - it will help you in presenting a graphical representation of your data in the form of Pie, Bar, Line charts and more.
7. **PivotTable** - it flips and sums data in seconds and allows you to perform data analysis and generating reports like periodic financial statements, statistical reports, etc. You can also analyses complex data relationships graphically.
8. **Shortcut Menus** - the commands that are appropriate to the task that you are doing will appear by clicking the right mouse button.

Function and symbols used in spread sheet

Name	Symbol	Function
Addition	+	Sum
Subtraction	-	Min
Multiplication	*	Multiply
Division	/	Divide

Common terms as used in spread sheets

1. **Cell**. Refer to an intersection of rows and columns
2. **Active cell**. It refers to an active cell you are currently working on.
3. **Filter.** Refers to a feature which allows one to sort out data in the cells basing on the require procedures
4. **Work sheets.** Refer to the main page containing cells which you are currently using. This contains about 65,536 rows and 256 columns.
5. **Work book.** It refers to a collection of many work sheets.
6. **Cell address.** This is the one which easily identifies the location of cell i.e. b4, d9 etc.
7. **A formula.** This is an arithmetic function which is entered in a work sheet to carry out calculation and later display the result in the cell.
8. **Arrange.** Refers to a group of adjacent cells
9. **Function.** Refer to a pre- written or pre-determined formula that provides a short cut to perform calculation e.g. if function, rank etc.
10. **Relative cell referencing.** This is a cell which keep changing depending according to the location of the cell in which referencing takes place i.e. b2+c2 entire in cell d2 will be shift to b3+c3
11. **Mixed cell referencing.** This is the one which contains a single dollar $ sign which acts symbol for fixing and this one will show that only part of function was fixed and won't change if one goes to another i.e. c$4*d3.
12. **Absolute cell referencing**. This is the one which remains fixed even when jumped to another cell. However, for mixed cell it contains two dollar signs which fixes both the column and the row i.e. c2. This will remain the same when jumped to another cell.
13. **A value. A** number which can be entered into a cell.

14. **Grid lines**. The horizontal and vertical lines on the spread sheets
15. **Sheet tabs**. Tabs that identifies the worksheets in a workbook.

PRESENTATION SOFTWARE

This refers to the one which is used in preparation and creation of animated slides with transitions which help in the enhancement of the speakers' presentation.

Or

A **presentation program** is a software program that helps create a slideshow that addresses a topic. Presentation programs can be used in businesses and schools for discussing a topic or for teaching. Many times, the presenter uses a projector to project the slideshow up on to screen that everyone can see. Below is an example of Microsoft Power Point, a commonly used program that creates presentations.

The major example used are;

Microsoft power point.

Lotus Florence,

micro median director etc.

Common terms include

A slide. Is an individual page in a presentation.

Animation. This refers to the movement of put in the contents of the slide i.e. words and pictures

Slide show. This is the view mode where slides can cover the whole screen for the audience to see what is being presented.

A place holder. This is the structure on a slide which holds the contents on the slide.

A transition. This is the effect between two slides.

Slide layout. The way how place holders are organized in a slide.

Slide design. This is the predesigned background for the slide.

A handout. This is the combination of more than one slide on a page.

Speaker's note. This refers to the printout of each slide belonging to a speaker**.**

Template. This defines how the presentations will look like.

Auto features. These make it easy to perform tasks.

Custom show. A custom show is a group of slides selected from a larger presentation to present a smaller presentation.

Default design template. This is the plain white slide template in anew Microsoft PowerPoint.

Hyperlink. This allows the viewer to quickly access another location in the presentation or link to another file

Master slide. This is a design template used for the slides in the presentation.

Normal view. This is the main working window in the presentation.

Outline view. This vies all text of all slides in a lists on the left of the PowerPoint screen.

Summary slide. This is a slide that shows all the title of the slides in a presentation.

A watermark. This is a faded image or text used as a background of the slides.

Advantages

Power point presentation eases communication. This is through use of relevant graphics

It enhances communication skills.

Slide layout. This is arrangement of texts graphics on the slide.

Principles of a good PowerPoint presentation

1. Should have a title slide, content slide and conclusion slide.
2. Each slide has to address a specific topic only.
3. Each point on a slide has to begin with a bullet.
4. Points need to be short and straight forward.
5. Should have minimal animation for both text and graphics.
6. Always use simple background themes and colors.
7. Should have relevant graphics to either the title or content the slide.
8. Do not use many graphics on an individual slide.
9. For timings, always rehearse the timings.
10. A presentation should have a required number of slides.

DESKTOP PUBLISHING SOFTWARE.

This is a software that helps in creating and distributing the information that is inform of visual communication this form of visual communication includes; business cards, brochures, greeting cards, posters web pages etc.

It is also known as electronic publishing software / web publishing software. It helps electronically publish materials in formats other than prints. E.g.; websites, eBooks etc.

Examples of electronic publishing software include,

- Ms. Publisher.

- Adobe design.
- Adobe page maker etc.
- Scribus etc.

Advantages

- It provides abroad reach of customers.
- It enables a great deal of advertising e.g. through using brochures, flyers and posters**.**

Microsoft publisher is a desktop publishing software that allows you to make creative documents like brochures, calendars, newsletters, flyers, greeting cards etc.

WEBPAGE PUBLISHING

Web Design and Publishing is the process of planning, creating, manipulating, saving and uploading hyperlinked html documents (web pages) to a computer network so that they can be viewed via web browsers.

Web Design Software Examples

There are lots of good web design software on the market today.

- Note Pad
- Microsoft FrontPage 2003
- Adobe Dreamweaver CS4
- WebPlus X4 (Now owned by Microsoft)
- Microsoft Expression Web 3.0 & Studio 3
- Namo WebEditor 8 & Professional
- Sothink DHTML Menu 9 & Tree Menu 2
- Antenna Web Design Studio 3
- AllWebMenus PRO 5
- PhotonFX Easy Website Pro 4

Terminologies

These are brief definitions of some of the common terms used in web design and publishing

Bookmark: A bookmark is an anchor tag that defines and links to a specific location in an HTML document. Bookmarks are useful when you have long pages that are divided into logical sections, or when you want to jump from one central list of links to multiple locations' on a page.

- **File Transfer Protocol (FTP):** The protocol used for copying files to and from remote computer systems on a network using TCP/IP, such as the Internet.

- **HTML:(Hypertext Markup Language**) A tagging system used to code documents so that they can be published on the World Wide Web and viewed with a browser
  HTTP:(Hypertext Transfer Protocol) The client/server protocol used to access information on the World Wide Web.
- **HTTPS:(Hypertext Transfer Protocol Secure)** is a combination of HTTP with the SSL/TLS
  protocol to provide encrypted communication and secure identification of a network web server. HTTPS connections are often used for payment transactions on the World Wide Web and for sensitive transactions in corporate information systems.
- **HYPERLINK:** The text or graphic that users click on to go to a file, a location in a file, an Internet or intranet site, page, location, and so on. Hypertext is text with hyperlinks.
  INDEX PAGE: The home page or URL of a website, usually serving as an introduction and having links to other pages in the website.
- **DOMAIN NAME:** The unique name that identifies an Internet site. A domain name is an identification label that defines a dominion of control on the Internet, based on the Domain Name System (DNS).
- **IP ADDRESS**: An (Internet Protocol address) is a numerical label that is assigned to any device participating in a computer network that uses the Internet Protocol for communication between its nodes.
- **JPEG / JPG:(**Joint Photographic Experts Group) A graphics formal used for photos and other graphics with more than 256 colors.
- **PAGE TITLE:** The text that is displayed on the page banner of a Web page and in the title
- bar of a Web browser.,
- **URL:(Uniform resource locator)** The alphanumeric address that Web visitors use to locate your Web site on the World Wide Web.
- **TAGS:**HTML tags are codes, of keyword elements enclosed by the lesser than (<) and
- greater than (>) brackets, which give commands to a browser, e.g. <u> is an HTML tag that tells the browser to underline text on the webpage.
- **WEB AUTHORING SOFTWARE:** A Web site development program that allows Web pages to be visually created like a desktop publishing program. It generates the required HTML code for the pages and is able to switch back and forth (in varying degrees) between the page layout and the HTML.

- **Web Browser:** Is application software which enables a user to display and interact with text, images, and other information on a Web page (Examples: Opera, Google Chrome, Mozilla Firefox, Internet Explorer, Netscape, etc.)
- **WEB MAILPROVIDER:** A hosting company that primarily provides end users access to internet services such as e-mail.
- **WEB SERVER**: A computer that stores and delivers (serves up) websites and their related fi les for viewing on the Internet.
- **WEBMASTER**: A person who creates and manages the information and content, organizes and maintains of a Web site
- **WEBSITE:** A collection of related or hyperlinked web pages
- **WYSIWYG**: (What You See is What You Get) implies a user interface that allows the user to view something very similar to the end result while the document is being created.

Features of web authoring software

These are the basic features common to the working environment of most popular web authoring software programs.

1. **Views**

Most web authoring software provides multiple views of the web page you're working on.

• Standard, normal, or design view - This is typically the default view, which is a blank screen on which you type, paste, or insert content. It uses the WYSIWYG principle. This is very similar to a word processor screen.

• **Code view** - Allows you to view and work directly with the "HTML code created for you by the web authoring software.

• Split - Both of the above views are displayed simultaneously in separate windows.

2. **Creating Headings and Subheadings**

In Normal or Design View, Web authoring software. A text formatting toolbar typically includes buttons for bolding and italicizing text, and probably additionally includes some means of identifying a heading or subheading.

3. **Inserting Links**

In web authoring software products, you add a link to a document by selecting Insert from the menu, then Link or Hyperlink. Most web authoring software tools additionally provide a button or icon that allows you to quickly insert a link.

4. Inserting Images.

In many web authoring software products, you add an image to a document by selecting Insert from the menu, then Image or Picture.

After you have inserted the image into your webpage, you can edit its attributes in a Properties dialog box or panel. You can change the image's height and width, put a border around it, make it into a link, and add alternate text for users who can't see the image

Other Features

5. Some web authoring packages use built-in file transfer protocol (FTP) capabilities to publish the designed pages to a web server and allow the user to edit publish files while making real-time changes.

6. Web authoring software also allows users to create cascading style sheets (CSS) and web design templates, create and add specialized scripts (including JavaScript applications) and even automatically fix file properties like create date, author information, and copyright data.

7. Themes: This feature provides a ways to accomplish a consistent look and feel for all pages on web site at once

8. Task panes. A dropdown arrow allows you to switch between various Panes offering options to work of different items.

9. Help Feature Most web authoring software also have a help area which users can use to find information about the software.

Demerit of web authoring software

• Web authoring software is detrimental to a designer's HTML programming skills, as users rarely need to actually apply those skills to their design projects.

o Instead, web authoring software users simply design web pages much like they would design a word processing or desktop publishing document, dragging items into the desired location instead of using HTML commands to properly position the image,

o For this reason, seasoned web design professionals insist on designing their pages and sites exclusively in text-based HTML, some using simple word processing applications, rather than building a reliance on a graphical interface.

Features and Qualities of a Good Website

- The web must have a home page. This means a page at the top of any tiered structure or at the center of a web you design on paper.
- You should name the home page Index.htm (or Index.html) in line with web server protocol.

- Should not have too much on one page. It's better to use lots of pages with a small amount of information on each.
- Should have links to other areas on all pages for easy navigation through the website
- Should load quickly

DATABASE MANAGEMENT

❖ Database can be defined as a collection of data organized in a way that allows access, retrieval and use of the data.

❖ Access, retrieval can be done with the help of queries.

❖ A database consists of a collection of tables organized in rows and columns. Other objects that can be formed in a database include; queries, forms, reports and relationships.
A software/ program designed to manage databases (to store, modify and extract information from a database) is called a database management system (DBMS).

ADVANTAGES OF A DBMS

❖ Improved availability: One of the principle advantages of a DBMS is that the same information can be made available to different users.

❖ ' Minimized redundancy: The data in a DBMS is more concise because, as a general rule, the information in it appears just once. This reduces data redundancy, or in other words, the need to repeat the same data over and over again. Minimizing redundancy can therefore

❖ significantly reduce the cost of storing information on hard drives and other storage devices. In contrast, data fields are commonly repeated in multiple files when a file management system is used.

❖ Accuracy: Accurate, consistent, and up-to-date data is a sign of data integrity. DBMSs foster data integrity because updates and changes to the data only have to be made in one place. The chances of making a mistake are higher if you are required to change the same data in several different places than if you only have to make the change in one place.

❖ **Program and file consistency.**

❖ Using database management system, file formats system programs are standardized. This makes the data files easier to maintain because the same rules and guidelines apply across all types of data. The level of consistency across files and programs also makes it easier to manage data when multiple programmers are involved.

❖

❖ **User-friendly:** Data is easier to access and manipulate with a DBMS than without it. In most

❖ cases. DBMSs also reduce the reliance of individual users on computer specialists to meet

- their data needs.
- **Improved security:** As stated earlier, DBMSs allow multiple users to access the same data resources. This capability is generally viewed as a benefit, but there are potential risks for the organization. Some sources of information should be protected or secured ^d only viewed by select individuals. Through the use of passwords, database management systems can be used to restrict data access to only those who should see it.

DISADVANTAGES OF A DBMS

There are basically two major downsides to using DBMSs. One of these is cost, and the other the threat to data security.

Cost: Implementing a DBMS system can be expensive and time-consuming, especially in large organizations. Training requirements alone can be quite costly.

Security: Even with safeguards in place, it may be possible for some unauthorized users to access the database. In general, database access is an all or nothing proposition. Once an unauthorized user gets into the database, they have access to all the files, not just a few. Depending on the nature of the data involved, these breaches in security can also pose a threat to individual privacy. Steps should also be taken to regularly make backup copies of the database files and store them because of the possibility of fires and earthquakes that might destroy the system.

TYPES OF DATABASE

1. Flat files databases. (FFD)

These are basically used for simple lists and may have duplications of data much like a simple record card system.

A flat file database is made up of only one table

2. Relational Databases (RDS)

Can take information from two or more database tables and combine them into a new table or report

Are those where the data is held in a number of cross referenced files in order to reduce duplication.

They make it easier to find, analyses, maintain and protect your data because it is held in one place.

Some of the database software includes;

Microsoft access

1. Mysql
2. SQL server
3. Oracle
4. PostgreSQL
5. RDMS
6. File makerpro
7. FoxPro
8. Clipper Dbase
9. Paradox
10. Sybase
11. Lotus Approach

Common terms used in databases

Primary key/database key

This is a column (field) in the table that uniquely identifies a record.

Foreign key

This is a column in a table that contains data of a primary key in another table.

Table

This is an object defined and used to store data. Each table contains information about a particular subject, such as customers or orders.

A table contains Fields (columns) that store different kinds of data, such as a name or an Address, and. Records (rows) that collect all the information about a particular instance of the subject such as customers, students, etc.

A table is a collection of fields and records. A data base may contain one or more tables.

Tables are most important objects in database and are used for data entry.

In a table each record is displayed as a row and each field is displaced a column.

You can define a primary key (a field that have a unique value for each record) and others fields to help you retrieve your data easily.

Record

This is a row in a table that contains information about a given personal product or event or object. (An individual entry in a table).

Or is a complete set of fields relating to the same item e.g. a record can contain name and address of one client.

Field

This is a column in a table that contain a specific piece of information within a record or is a piece of information in record.

Attribute

Is a single data item related to a database object.

Field name: is the title of a particular column. Afield name is assigned to each field to identify the different fields.

Field length: is the maximum number of characters that can be sorted for data in a particular field.

Table structure; Refers to the number of fields, the field names, the field length, and data types in the database table

Filter; a filter restricts the display of database information to records and fields that match criteria that you can specify

Filtering; is the process of recording amount of information displayed by access; either fever fields in each record or by showing only those records that match criteria filters are helpful.

Data type

This specifies the type of data that the field can contain or data type determines the way of data you can store in a field and tells access how to handle it.

Data types are determined in the design view of the table;

1. Design view: is a view in which you can change the organized structure of your table. All fields (e.g. field names, field length) are organized using designed view.
2. Datasheet view: is a view of database table where you can see information presented in rows and columns with several records visible at the same time.

Common data types

a) **Text**: Holds Letters, Numbers or special characters. Or

It is used for any sort of alphabetic or numeric data. If the data is numeric, it cannot be used in calculations

b) **Numeric type:** hold number s only; it is for numeric data that may be used in calculations

c) **Currency;** hold dollar and cents amount .it is used for money values or other numeric data used in calculations involving data with one to four decimal places.

d) **Date/time:** hold month, day and year information, it is used for data or time data.

e) Memo: contain text of any type or length. Is used for any sort of alphabetic or numeric data e.g. description, notes.

I) **Boolean type;** hold values that are either true or false.

g) **OLEB Objects;** (object linking and embedding) objects, graphics, or other binary data. Field capacity is up to gigabyte (GB) or limited by available disk space,

fi) **Look up wizard;** when the values that you need exists in another table or form list of Static values you use the look up wizard to help you to establish column Co the Cable or to define the combo box that will display the list of values on a form of report.

Field properties

Field properties are special characteristics of a Particular field

Field properties are specialized from the general tab on the table structure in the design view. They include field characteristic like size caption, format, dermal place, validation rule, text and these change depending on the type of data type specified.

a) **Field size:** Specifies the maximum length of characters including spaces) any data item should have. Default field size in 200+255 2003(50)

b) **Format:** Specifies the appearance of any data entered in that particular file.

Samples of the supported formats are normally on the drop down list but appear when you check in the format box e.g. fixed format etc.

Caption; Specifies a different name to be used as a field label instead of the specified field name e.g. student ID student identity.

Decimal places: Specifies the number of decimal places the figure should have.

Validation Rule: Helps to specify a condition to be met before data can be accepted in the field e.g. You may limit a field to "m "or "F" etc.

Validation text: Specifies the text is to be displayed in case the condition specified „ in the validation rule is not met.

Default value: Specifies the data entry value to be entered automatically for each field unless changed.

Indexed: Specifies whether the data in this field should be listed chronologically and also whether to allow duplicate data items.

Allow zero length: If set to yes even an empty string will be accepted as a valid entry in that field.

Required: if set yes, this field cannot be left blank during data entry.

Input mask; Specifies specific pattern or mask for entering data items in a particular field.

Features of database

Table.

A table is a primary database structure where data is stored.

forms

These are screens of data entry by displaying a record at a time. It provides alternatives to i for data entry and viewing records.

Query

A query is a request for specific data from a database.

Or queries are database tools used to request for database records that match specific criteria, match and display them in a specific order.

Queries are used to locate specific records within the table or ask questions to your database You may want to extract records that meet specific selection criteria e.g. All employees who earn above a certain amount of salary in accounts department

Reports

This a request for summarizing data in tables for easy reading and printing.

Qn. Distinguish between freeware and share ware

- **Free ware.** This is a copy righted software that is provided to users at no costs. This software is downloaded and is made free for end users to use.
- **Shareware.** This is copy righted software that is distributed freely for trial period and payment is required at a later time when atrial period expires.

Advantages of general purpose software

- They are relatively cheap since they are available at any time.
- It is tested by so many people thus has less effect to users.
- Used by many users

Disadvantages

General purpose software which is shared online carries a very real threat of infection by computer viruses or threat of malicious code.

QN; *what is an application suite?*

A software suite or application suite is a collection of computer application software or Programming software— of related functionality, often sharing a more-or-less common

user interface and some ability to smoothly exchange data with each other.

Advantages

- Less cost than buying individual packages
- All have similar GUI
- Work well together
- Extend learning curves of user

Disadvantages

All features not used takes a lot of disk space (bloatware)

Lots of work to maintain.

ii) **With examples, state any two types of popular software suites.**

- office suite
- Apple works
- Adobe master collection
- Lotus smart suite
- Internet suite
- Graphics suite

QN*: what is a trial version of software?*

Trial version of software refers to **software** which consumers can try before they buy. **Trial** versions of **software** usually contain all the functionality of the regular **version**, but can only be used for a limited time.

Software versioning is the process of assigning either unique *version names* or unique *version numbers* to unique states of computer software.
Freeware refers copyrighted software provided at no cost,
Shareware refers to copyrighted software provided on a trial basis but later the user has to pay to use of all the functions provided.
Adware refers to software that contains commercial advertisements of the company embedded in the application that constantly displays when the user open the application**..**
Beta software is a type of software provided to people for testing purposes.

INTERNET

An internet refers to a world wide web that is capable of linking millions and potentially billions of computers on a network

OR

It can be termed as a global connection of computers on a network.

OR

It is a worldwide/global system of interconnected computer networks. It uses the standard Internet Protocol (TCP/IP). Every computer in Internet is identified by a unique IP address. IP Address is a unique set of numbers (such as 110.22.33.114) which identifies a computer's location.

A special computer DNS (Domain Name Server) is used to provide a name to the IP Address so that the user can locate a computer by a name. For example, a DNS server will resolve a name https://www.tutorialspoint.com to a particular IP address to uniquely identify the computer on which this website is hosted.

HISTORY OF INTERNET.

The internet was established by ARPANET a network project that was started by pentagon's Advanced Research Project agency (ARPA). The main intension of setting up this network was to build a network that allowed scientists at different locations to share information and work together on military and scientific projects and as well as function even if part of the network was disabled or destroyed by disaster such as nuclear attack. The network consisted of four sites which included the University of California at Los Angeles, university of California at Barbara, Stanford Research Institute and university of Utah. The four had computer centers that were doing research.

The first network had been successful and as result other networks were connected to it. By 1972, 37 sites had been connected to the network. Although the network had been set for research purposes, users started exchanging messages using the same network and it was so convenient. Other features were there after added to service provided by the network to make it more efficient. Such include the distribution of the World Wide Web client software from CERN in Geneva, Switzerland. The concept was designed and implemented by Tim Berners Lec and Sir Sam walker from United Kingdom and Robert cailliau from Belgium. Since then, Berners-Lees played an active role in guiding the development of web standards such as markup languages in which web pages are composed and in recent years has a advocated his version of semantic web.

Key internet terminologies

Www.

The World Wide Web (www) refers to a system of interlinked, hypertext documents accessed via the internet using a web browser. A user views web pages that may contain text, images, videos and other multimedia and navigate between them using hyperlinks.

Web browser. It refers to a software that allows one to view and interact with others on a website.

Some of the web browsers available for personal computers include internet explorer, Mozilla Firefox, safari, opera, and Netscape. Web browsers are the most commonly used type of Hypertext Transfer Protocol (HTTP) user agent. Although browsers are typically used to access the www, they can also be used to access the information provided by the webservers in private networks or contents in file system.

Note; appearances of a web pages may differ between browsers.

Home page. This refers to the first page on a website

Website. It refers to the location of the web domain name on the internet

Or

Collection of related web pages on the internet

Web page. Refers document connected to the World Wide Web and viewable by anyone connected to the internet who has a web browser

Search engine.

It is a program that searches documents for specified keywords and returns a list of the documents where the key words were found. Although search engine is really a general class of programs, the term is often used to specifically describe systems like Google, yahoo, Ultra vista and excite that enables users search for documents on the www and USENET newsgroup.

Typically, a search engine works by sending out a spider to fetch as many documents as possible. Another program called an *indexer*, the reads these documents and creates an index based on the words contained in each document. Each search engine uses a proprietary algorithm to create is indices such that, ideally only meaningful results are returned for each query.

Protocol.

It refers to a set of rules that govern the exchange of information. A protocol is a standard that controls or enables the connection, communication and data transfer between two computing end

points. A protocol contains guidelines or rules that help in governing an operation on the internet and communications over it. There are many such types such as FTP (File Transfer Protocol), HTTP (Hypertext Transfer Protocol), TCP/IP (Transmission Control Protocol/ Internet Protocol), Telnet (Telecommunication networks) etc.

Domain name.

It is the identifier of computer connected to the internet. A domain name always contain two or more parts separated by periods called "dots". Example of domain name can be *nsambya.ac, Microsoft.com muntuyera.com etc. t*he major categories of top level domain include; Edu- education, com- commercial entity, co – companies, ac – academic institutions, org – organizations usually nonprofit making, mil - military, Gov. – government entity.

A ROUTER/ GATEWAY

It is the one which enables one to connect to an outside system

This is sometimes as a **gateway**

URL

Refers to "uniform resource locator". It identifies a particular internet resource for example it can identify a web page, gopher server, text file etc. URL represents a standardized addressing scheme for internet resource and helps the user to locate these resources. Every resource or service that is Available on the internet has a unique URL.

The structure of a URL

Protocol://servername.domainname.toplevel domain/file name

Examples; Http://www.google.com/

ftp://ftp.abcc.com/

Http://www.lib.berkeley.edu/teachinglib/guides

Bandwidth is the amount of data that can be transmitted on a network in a particular amount of time. Video- and graphic-intensive applications require higher bandwidth than simple text-based programs. Bandwidth management software helps identify and alleviate network bottlenecks. Network administrators also use load balancing to allocate network bandwidth to compute-intensive applications so they won't bring down overall network performance.
A router/ gateway is a system that enables to connect to an outside system.

Internet uses.

Scientists and scholars use the internet to;

- Communicate with colleagues
- Perform research
- Distribute lecture notes and course materials to students
- Publish articles and papers.

Individual use of the internet

- Communication
- Entertainment
- Finding relevant information
- Buying and selling goods and services (e-business)

Internet applications

1. **Email**

Email (Electronic mail) is a method of transmitting data, text files digital photo, audio and video files from one computer to another over the internet or intranet. Email enables computer users to send messages and data quickly through the local area network (LAN) through the internet. Email came into wide spread use in the 1990's and has become a major development in business and personal.

HOW EMAIL WORKS

Email users to create and send messages from individually computer using commercial e-mail program or mail-user agents (MAUs). Most of these programs have text editor for composing messages. The user sends a messages to one or more recipients by specifying destination addresses. When the user sends an e-mail messages to several recipients at once, it is sometimes called broadcasting.

The address of an email refers to the source and destination of an email messages. Different addressing conventions are used depending upon the email destination. An interoffice message distributed over an intranet or internal computer network, may have a simple scheme such as the employee's name, for the email address.

Email messages sent outside of an intranet are addressed following convention. The first part of the address contain the user's name, followed by the symbol @, the domain name of institution's or organization's type AND FINALLY THE COUNTRY NAME e.g. atwinesolomon@mubs.ac.ug.

An email message that originates outside the United States or sent from United States to other countries has a supplementary suffix that indicates the country of origin or destination. Example include; Uk- united kingdom, FR- France, NZ- Newzland, TZ-Tanzania, UG-Uganda, etc.

Email data travels from the sender's computer to a network tool called message transfer agent (MTA) that depends on the address either delivers the message within that network of computers or sends it to other MTA for distribution over the internet.

The data file is eventually delivered to the private mail box of the recipient, who retrieves and reads it using an email program or MAU (Mail User Agent). The recipient may delete the message, store, reply to it, or forward it to others etc.

Email messages display technical information called Headers and footer above and below the message body. In part, headers and footers record the sender's and recipient names and email addresses, the time and date of message transmission and receipt, and the subject of the message.

In addition, to the plain text contained in the body of regular email messages, most email programs allow the user to send separate files attached to email transmissions.

This enables the user to append large text or graphic files including audios, videos and digital photographs to email messages.

PARTS OF AN EMAIL

1. **Username**

   The first part of an email address is the username. This is the unique name that you or your ISP select. This can be your real name or a nickname. Businesses may use themed usernames or their company's legal name. The username must be unique -- no two people or organizations can have the same username with the same provider -- so your provider must first verify that no one else is using it before it allows you to use it.

2. **@ Symbol**

   An "at," or "@," symbol is the second part of an email address. This fits in between the username and the domain of your email address. When you insert the symbol, your email program recognizes the character and sends the email to the domain name that follows it.

3. **Domain**

   The last part of an email address is the domain, which can be broken down into two portions: the mail server and the top-level domain. The mail server is the server hosting the email account. For example, Yahoo email accounts use "yahoo" as the server name, while Gmail uses "Gmail" as the server name. The top-level domain is the extension, such as .com, .net or .info. Emails from educational institutions often have the .edu extension, while employees of a government agency use a .gov extension.

EMAIL MESSAGES

Fast, cheap, and easy to use, email is quickly becoming popular form of business communication particularly for messages sent within a company. Aside from the convenience of the writing email

messages, many people prefer mails over letters and memos because of its formality. A loose, friendly tone and approach is not only acceptable but usually preferred in the email correspondence.

Keep in mind, though the informal nature of the email should not be an excuse for careless work. Particularly when sending a messages to a superior within your company or to a new contact client outside of it you should choose your language precisely and structure your email correspondence to give your message the greatest impact. As with any correspondence you should always proof-read all email messages for spelling, punctuation, grammatical mistakes before sending them.

WRITING ASHORT EMAIL MESSAGE.

- The most effective email messages are brief and focus on only one subject. Ideally, an email message should short enough to be read on screen without scrolling.
- If you is writing an email message, to pause a question or make a request, note this in the first line of the message or even in the subject line to ensure a quick response. If possible, phrase the question so that they can be answered with "yes", "no" or similarly simple reply. For instance "Will we be able to make this schedule?" invites are more immediate and direct response than "How does this schedule look to you?"

Writing a long email message.

- In businesses correspondence, brevity is not always a virtue. Although email is based for quick questions and replies, do not be so concerned with creating a terse message that you neglect to include important background information rather than trying always to write the shortest possible messages, craft your email messages so that they are long enough to cover your subject fully but not a word wrong.
- If you need to write a lengthy email message, consider beginning it with a brief table of contents or a summary of the material so that those who receive it can quickly locate the information most relevant to them. If you are asking for a response, include your request in the first screen of text so that casual readers will not miss it.

Attachments.

. Instead of drafting along email, message, consider sending a brief message with an attachment a file already stored in your computer that was written using a word processing machine, spread sheets, or other software program. When sending an attachment, your email message itself can function as a cover note in which you describe the attached document, its relevance to the recipient and what action if any, you want that person to take after reading it.

. In order to read the attachment, the recipient, will need to download the file and open the appropriate software to bring it up on –screen. Because opening an attachment can take several minutes, send one only if the information in it is of real importance to other person.

. Remember too, that people you write to may have trouble opening your attachment if their email system is different from yours. Before sending a large number of attached files to someone, for the first time, either send a test email message with an attachment or call them to check whether your systems is compatible.

Impact of e-mail

- E-mail has a great impact on the amount of information sent worldwide. It has become an important method of transmitting information previously relayed via regular mail, telephone, couturier, fax, television, or radio.
- E-Mail, however has also been abused by certain business that send unsolicited commercial e-mail message known as spam.

2. Internet chatting

Online chat is simultaneous text communication between two or more people via computer. Chat is synchronous (occurring in the same time) one person types a message on their keyboard and the people with whom they are chatting see the message appear on their monitors and can respond almost immediately. Other kinds of computer communication are synchronous (not occurring at the same time). Email for example may not be delivered or read until minutes or hours after it is sent, and any response need not be immediate

Chat require each user to have a computer connected to an electronic network. The network might be LAN within a business, or it might be the internet. User also need a chat system software that controls the connection between the computers of the people who are chatting. Many chat systems are free.

How chat systems work

There are many chat systems including Internet Relay Chat (IRC), America Online (AOL) chat, and Microsoft chat. The different systems are very similar but users can generally only chat with other people who are using the same system.

Chart rooms

The term chart room or chartroom is primarily used by mass media to describe any form of synchronous conferencing. The term can thus mean any technology ranging from real –time online chart over instant messaging and online forums to fully immersive graphical social environments.

- Each chat system may have thousands of users spread through hundreds of chart rooms. Chart rooms are a feature of the system's software that allows people with similar interests to send messages to one another without receiving messages from all of other people using the system. Chartrooms vary in

topic and levels of conversation. Usually a chart room's name describes the topic people in it are supposed to discuss.

- Most chart systems have both pre-defined and user created chart rooms. When people connect to chart system, they can choose to participate in the rooms they find interesting or useful. Many systems have chartroom operators who may remove people from the chart room if they do not obey the chartroom rules.
- Chart rooms are usually dedicated to a particular group of people such as teens or to discussions limited to a single subject area such as politics. Some chart rooms cover technical topics (e.g. computer programming languages and website design) and other focus on the aspects of popular culture (e.g. Television show star trek). Chat rooms dedicate to the topics such as computer trouble shooting can be useful source of information, because many people with expert knowledge enjoy helping others online.
- Some chat systems provide special moderated chat rooms, particularly for chat with celebrities. A chat room may have hundreds of people talking at once. A moderator and a set of rules control who receives messages from whom in order to prevent a flood of messages flowing across people's screens too fast to read. The moderator controls who may ask question of the guest of honor. In some of these special chat rooms, participants are organized into virtue "rows" s if they were in an auditorium. Users may chat free with others in the same row, but not with people in other rows. Everyone in all rows hear the presentation given by the featured speakers on the "stage"

Web chat

A web chat is a system that allows users to communicate in real time using easily accessible web interface. It is a type of internet online chat distinguished by its simplicity and accessibility to users who do not wish to take the time to install and learn to use specialized chart software. This trait allows users instantaneously access and only a web browser is required to chat.

History of web chatting

The history of web chatting is characterized by trends by trends in underlying web technologies. The first chat sites featured simple interface made from dynamically generated hypertext Markup languages (HTML) pages. The user of HTML allowed sites to incorporate fonts, colors, links and images into their interface giving them a more modern hypermedia feel, which was an advantage over older but more established text based chat service like IRC.

The biggest downside to HTML chat was in its interactivity. Every message sent to an HTML chat require d a form submission and subsequent page load, which meant that there was a waiting period between the time a user could send one message and the time they could begin to type the next one.

Receiving messages also required frequent page loads and could lead to delays, page flickers and distracting flickers and distracting browser activity. For these reason HTML chat s have largely fallen out of use today, although some of the older HTML chat sites still remain active.

In 1995, java applet technology was introduced into web browsers. Java's well developed network and graphical capabilities made it an idea platform for the creating chat interface, some of which are in use on the popular web chat sites today. Commonly used java chat interface include chat space and PJIRC. While there are some draw backs associated with java chats such as long initial page loading times, the technology has worked well and scaled well.

In 2005, newer web technologies such an Ajax and Flash have been used as the basis for some new chart systems. Commonly used software include Pie-chat. There are some disadvantages such as incorporate support for networking in the underlying Java script and action script programming languages. However, the trendiness of these technologies as well as their strong support for graphical and usability features mean it likely that these types of chats will become more widespread.

Comparisons with other chat services

. Web chatting is only small part of the world of online chat. Web chats do not have the same network effects ass the chat service like instant messenger, which become more useful as they became more popular. Smaller, less busy chats an actually have more appeal to users than crowded, popular ones. Really the only unique feature web chat sites offer instant accessibility. And in an internet where there are so many other choices of social interaction: Internet relay chat (IRC) networks, instant messengers (IM) service, online games, and virtual worlds. Web sites devoted to simple text based chat remain small but singular phenomenon.

. There are hundreds of web chats sites which actively compete with each other to the point where some of more popular ones actually censor the names of other chat sites, preventing users from referring each other to competing chats. The simple accessibility generates an extremely high level of competition between chat sites, as it allows users to switch between them with ease.

Text based chats

Online chat is a way of communicating by sending text messages to people in the same chat room in real time. Some chat rooms such as yahoo Use both texts and voice simultaneously. The oldest form of true chat room is the text based variety. Talkomatic developed on the PLATO system around 1974, has a strong claim to have been the prototype of the text only chat-room. The most popular of this kind is internet relay chat (IRC)

The popular of these kinds of chat rooms has waned over the years, and the IRC's popularity has rapidly given way to instant messaging. Also a notable number of people were introduced to chat rooms from AOL and web chat sites.

There is graphical user interface (GUI) text based chat rooms which allow users to select an identifying icon and modify the look of their chat environment.

Graphical multi- user environments

Visual chart rooms add graphics to the chat experience, in either 2D or 3D (Employing a virtue technology). these are characterized by using graphical representation of the user (avatar) that can be moved about graphical background or in the graphical technology. These virtual worlds are capable of incorporating elements such as games (in particular massive multiplayer on line games) and educational materials most often developed by individual site owners, who are in general are simply more advanced users of the systems. The most popular environments also allow to create or build their own spaces.

Some visual chat rooms also incorporate audio and video communications so that users may actually see and hear each other. However, some find these types of environment cumbersome to use and actually an impediment to chatting.

Rules of behavior

. Chat rooms usually have stringent rules that they require users to follow in order to maintain integrity and safety for their users particularly in rooms for children, rules usually do not allow users to use offensive language, or to promote hate mail, violence and other negative issues.
. Also chat rooms often do not allow advertising in their rooms or flooding, (continually filling the screen with repetitive text)
. Typing with caps lock on is usually considered shouting and I usually discouraged.
. Sometimes chat room venues are moderated either by limiting who is allowed to speak (not common) or by having modulation volunteers to patrol the venue watching for disruptive or otherwise undesirable behavior.

NOTE: yet, most commonly used chat rooms are not moderated and users may type what they personally choose to send.

. Language issues
. Even today relatively little is known about the discourse produced in online communication context while there is a growing body of literature on social linguistic variation in French chat for example other forms of computer mediated communication (e.g. discussion for a, web logs etc.) have received less attention.

Chat application.

- The primary use of chat rooms is to share information via text with a group of other users, new technology has enabled the use of file sharing and web cams to be included in some programs and almost all internet chat or messaging services allow users to display or send to each other photos of themselves.
- Chat is the most common used for social interaction for example, people must use chats to discuss topics of shared interest or to meet other people of shared interests.
- Business are increasingly using cha as well. Some companies hold large online cha meetings to tell employees about new business developments. Such meetings are particularly useful for companies whose employees are spread out geographically companies with large sales forces; for example,.
- Small work groups within a company may use chat to coordinate their work.
- In education, teachers use chat to help students practice language skills and to provide mentoring to students. History students may chat with elders who lived through the period of history the students re studying. Science students may chat with the professional scientists.
- Games are also often played in chat rooms. Historic examples are initgame or hunt the wumpus on IRC.
- Some people who visit chat rooms use them as a place to experience online sex, also known as "cybersex" for many reasons, it is also true that sexual predators use cybersex conversations as a means of identifying potential victims.

Precautions for using Chat

- People chatting cannot see one another, and they often do not know one another. As a result of this anonymity, some people are not always truthful while chatting. People on chat channels may lie about almost anything: their age, sex, where they live, what they look like. Some people think this deception is acceptable and fun. They want to find out whether people will treat them differently if they pretend to be older of the opposite gender. Other people feel that this deception is unethical. Chat rooms should never assume that the people with whom they are chatting are who they say they are?
- Most people who use chat are friendly and well meaning, but there are a small number of criminals who use chat to take advantage of others. Because chat users do not often know the people they are talking while chatting, it is important that users do not never tell anyone their full name, address, full phone numbers or other information that might allow another chat user to find them.
- Most important, people should be very careful about arranging to meet in person someone they do not know. Teenagers and children who wish to exchange personal information with someone they meet on line should always do so under the supervision of the parent or guardian.

- As chat rooms are often frequented by miners, they can facilitate illegal sexual activities though studies have shown that this is not common, with American psychologist journal calling many of the fears myth.

3. Net meetings.

   This feature is included with Microsoft internet explorer and enables groups to tel-conference using the internet as the transmission media. One of its feature is the Microsoft internet locator server (ILS) formally known as ULS, which can be deployed on the internet to facilitate findings and connecting other users around the world or can be deployed on accompanies intranet making it easy to find and connect to users within the company.

   Applications include;

- Voice on the net
- Chat sessions
- White board
- Application sharing.

Web conferencing is used to conduct live meetings or presentations over the internet. In a web conference each participant sits on his or her computer and is connected to other [participants via the internet. This can be either a downloaded application on each of the attendee's computers or a web based application where the attendees will simply enter a URL (website address) to enter the conference.

In the earliers of the internet, the terms "web conferencing" was often used to describe a group of discussion in a message board and therefore not live. The term has evolved to refer to specifically to live or "synchronous" meetings

Web conferencing is often sod a service, hosted on a website controlled by the vendor offerings vary per vendor but most hosted services provide a cost per user per minute model, a monthly flat fee model and a scat model. Some vendors also provide a server side solution which allows a customer to host their own web conferencing service on their own servers.

Other typical features of a web conference include;

- Slide presentation – often created through power point or key note on a mac.
- Live video- via web cam or digital video camera
- VOIP (Voice over internet protocol)
- Real Time audio communication through the computer via use of the head phones and speakers.
- Web tours – where URL, that from forms, cookies, scripts and session data can be pushed to other participants enabling them to be pushed through web based log ones, clicks etc. this type of feature works well when demonstrating websites where user themselves can also participate.

- Recording- for viewing at a later time anyone using a unique web address.

White board – allows the presenter or the attendees to highlights or mark items on the slide presentation or simply make notice on a blank white board.

Text chat – for live question and answer session, limited to the people connected to the meeting, text chat may be public, (echoed to all participants) or private (between two participants)

Polls and surveys. Allows the presenter to conduct questions with multiple choice answers directed to the audience.

Screen/ desktop/application sharing- where participants can view anything the presenter currently has shown on their screen. Some screen sharing application allow for remote desktop control allowing participants to manipulate the presenters screen, although this is not widely used. It is the ability for one party in a conference to share an application such as a web browser, spread sheet etc., from their desktop with everyone else in the meeting and pass the control of the application to someone else in the meeting.

Standards.

Web conferencing technologies are not standardized, which has been a significant factor in the lack of interoperability, platform dependence, security issues, and cost and market segmentation. In 2003, the IETF established a working group to establish a standard for web conferencing called "centralized conferencing (xcon)" the planned deliverables of xcon include:

. A basic floor control protocol. Binary floor control protocol (BFCP) published as RFC 4582
. A mechanism for membership and authorization control.
. A mechanism to manipulate and describe media "mixing" or "topology" for multiple media types (audio, video, text)
. A mechanism for notification of conferencing related events/ changes (for example a floor change)

History.

. Real – time text chat facilities such as IRC appeared early in the internet's history in the ends of - 1980s. Web based chat and instant messaging software appeared in the mid – 1990's. In the late 1990's, the first true web conferencing capability became available and dozens of other web conferencing web venues followed thereafter.
. A trade mark for the term "webinar" has been registered in 1998 by Eric R.Korb (serial number 75478683, USPTO) but was difficult to defend; it is currently assigned to intercall.

Advantages of internet

- ✓ Communication. The foremost target of internet has always been the communication. And internet has excelled beyond the expectations. Still innovations are going onto make it faster, more reliable. By the advert of computers internet, our earth has reduced and has attained the form of a global village. Now we can communicate in a fraction of seconds with a person who is sitting in the other part of the world. Today for better communication, we can avail the facilities of e-mail, we can chat.
- ✓ Information. Information is probably the biggest advantage is offering. The internet is a virtual treasure trove of information. On any topic under the sun is available on the internet. The search engines like yahoo, Google, Msn, is at your service on the internet. You can almost find any type of data on almost any kind of subject that you are looking for.
- ✓ Entertainment. This is another popular reason why many people prefer to surf the internet. In fact, media of internet has become quite successful in trapping multifaceted entertainment factor. Down loading games, visiting chat rooms or just surfing the web are some of the uses people have discovered.
- ✓ There are numerous games that may be down loaded from the internet for free. Chat rooms are popular because users can meet new and interesting people. When people surf the web, there are numerous things that can be found like music, hobbies, news and more can be found and shared on the internet.
- ✓ Services. Many services are now provided on the internet such as online banking, job seeking, purchasing tickets for your favorite movies, guidance services on array of topics engulfing the every aspect of life and hotel reservations, airline booking etc.
- ✓ E-commerce. This is the concept used for only type of commercial maneuvering or business, deals that involves the transfer of information across the globe via internet. It has become a phenomenon associated with any kind of shopping, almost anything you name it and E-commerce with its giant tentacles. Engulfing every single product and service will make it available at your doorstep. It has got a real amazing and wide range of products from household needs, technology to entertainment.
- ✓ Eases research. Most people do rely on internet to carry out research in many fields stretching from political, social and economic aspects.
- ✓ Downloading files. People do use the internet to down load files such as videos and music from the internet

Note: downloading refers to the transfer of files from a remote computer to a local computer

- ✓ It has contributed to globalization production and capital markets by reducing the cost of communication and information.

Disadvantages

- ✓ Theft of personal information. If you use the internet, you may be facing grave danger as your personal information such as name, address, credit card number etc. can be accessed by other culprits to make your problems worse.
- ✓ Spamming: Spamming refers to sending unwanted e-mails in bulk, which provide no purpose and needlessly obstruct the entire system. Such illegal activities can be very frustrating for you and so instead of just ignoring it, you should make an effort to try and stop these activities so that using the internet can become that much safer.
- ✓ Virus threat. Virus is a program which disrupts the normal functioning of your computer system. Computers attached to internet are more prone to virus attacks and they can end up into crashing your whole hard disk.
- ✓ Pornography

  This is perhaps the biggest threat related to your children's healthy mental life. A very serious issue concerning the internet. There are thousands of pornographic sites on the internet that can be easily found and can be a detrimental factor to letting children use the internet hence increase in moral decay.
- ✓ It is costly to set up.
- ✓ Negatively the internet has seemed to be a turning venture for the youth and this has created over dependency due to relying on the network for so long.
- ✓ The internet is associated with hackers who carry out hacking and this in long run leads to loss of personal information such as money.
- ✓ Harmful content is displayed that same users may consider inappropriate.
- ✓ Cost and complications in installations. Networks are expensive in setting them up through purchasing equipment such as hubs, modems etc.

COMPUTER NETWORKS

It is the connection of computers and other hardware devices together using transmission media for purpose of communication and resource sharing

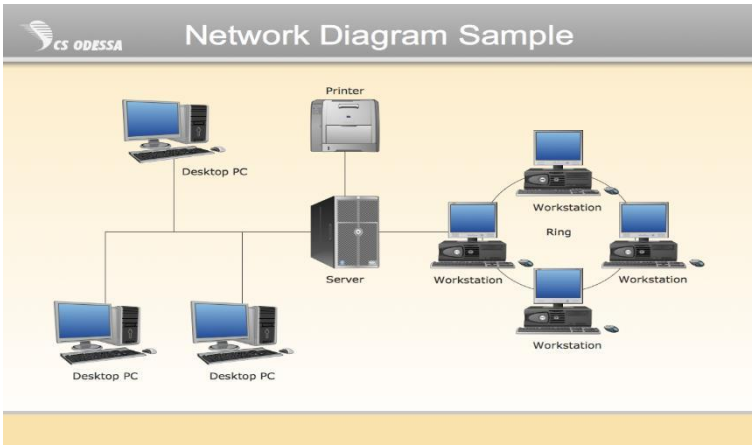
OR

A **computer network** is a system in which multiple computers are connected to each other to share information and resources.

These resources include;

- Data
- Printers
- Scanners etc.

-



Purposes for networking.

- Enables cost effectiveness and reliability
- Enables remote communication via e-mails telephones, chat rooms etc.
- Enables distributed processing.
- Enable sharing of data.

Requirements for setting a computer network

- Hub/ switch
- Modem
- Network interface card (NIC)
- Computers
- Transmission medias
- Network software.
- Network Cables
- Distributors
- Routers
- External Network Cards

Network Cables

Network cables are used to connect computers. The most commonly used cable is Category 5 cable RJ-45.

Distributors

A computer can be connected to another one via a serial port but if we need to connect many computers to produce a network, this serial connection will not work.

The solution is to use a central body to which other computers, printers, scanners, etc. can be connected and then this body will manage or distribute network traffic.

Router

A router is a type of device which acts as the central point among computers and other devices that are a part of the network. It is equipped with holes called ports. Computers and other devices are connected to a router using network cables. Now-a-days router comes in wireless modes using which computers can be connected without any physical cable.

Network Card

Network card is a necessary component of a computer without which a computer cannot be connected over a network. It is also known as the network adapter or Network Interface Card (NIC). Most branded computers have network card pre-installed. Network cards are of two types: Internal and External Network Cards.

Internal Network Cards

Motherboard has a slot for internal network card where it is to be inserted. Internal network cards are of two types in which the first type uses Peripheral Component Interconnect (PCI) connection, while the second type uses Industry Standard Architecture (ISA). Network cables are required to provide network access.

External Network Cards

External network cards are of two types: Wireless and USB based. Wireless network card needs to be inserted into the motherboard, however no network cable is required to connect to the network.

Universal Serial Bus (USB)

USB card is easy to use and connects via USB port. Computers automatically detect USB card and can install the drivers required to support the USB network card automatically.

Positive implication of networking

- Cost reduction. This is the using a central repository which allows access through approved user names hence paper file storage reduced.
- Eases communication. Through support of access to digital information by the use of many applications including World Wide Web.

- ❖ Improved security through enabling centralized server which is run by an administrator and governs company's data.
- ❖ Increased opportunities e.g. wide area network enables advertising electronic banking career through e-learning etc.
- ❖ It has contributed to globalization production ad capital markets by reducing the cost of communication and information.

Negative implication of networks

- ❖ Harmful content is displayed that same users may consider inappropriate.
- ❖ Cost and complications in installations. Networks are expensive in setting them up through purchasing equipment such as hubs, modems etc.
- ❖ Virus issues and issue threats. Computer networks are more vulnerable to viruses spreading quickly once one computer is infected.
- ❖ Over dependency. Once the network server, switch, router or any device breaks down, the entire network will be impacted down.

Types of networks

Computer network types differ depending on the hardware and software requirements as well as the intended degree of coverage. These include;

1. **Local Area network (LAN).** This is the type of network which covers a small geographical area such as building, office, computer laboratory. The computers/ nodes are interconnected using cables. Wireless LAN is one which doesn't use the physical however uses wireless media such as radio waves. There are two kinds of LAN which include,

- **Peer to peer network.** This is a type of network where each computer can share the hardware, data and information located on other computer on the network. Each computer acts as storage for its own files. Each computer on this network has its own network operating system and application software. It can either be a point to point or multi point connection i.e. one in which many specific devices share a single link.

Advantages of peer to peer network

- It is very simple to set up.
- It doesn't require a dedicated server to control the network.
- It is less expensive compared to the rest of other networks.
- It is perfect for small businesses and home use.
- Disadvantages
- The system is not centralized making administration difficult.

- There is limited security since files can be accessed by any one on the network.

- Client server network. It is the one which has a separate computer acting as a server and other computers as clients which requests services from the server.

  Note; A server refers to a computer which serves the requests of other computers known as clients. A client refers to a computer which seeks information from the server. It accesses all the resources from the main sever.

  A server provides a centralized storage area for programs data and information.

  NB; most of the client server networks always require a network administrator to manage the network.

  Advantages of client server network.

- All resources are centralized making it easy to access.
- Easy management and administration of the network.
- There is more data security since all network access is controlled through the server.
- It is easier to modify/ flexible
- It is much faster than point to point since all information are handled by a dedicated server.
- It supports many computers than peer to peer.

  Disadvantage

- It is much expensive to set up than peer to peer network.
- There is over dependency i.e. when the server breaks down, the network goes down.
- Maintenance costs are high because it requires an administrator to ensure efficient operation.
- The server can get overloaded since all the processing is controlled at one point.

2. **Metropolitan Area Network (MAN).** This refers to a large computer network that usually connect across a city or targets a campus. MAN usually interconnects two or more LANs using a high capacity back bone technology such as fiber optical links or other digital media.

   NOTE; MAN covers a smaller geographic area than WAN.

3. **Personal Area Network (PAN).** This is the type of network which interconnects computers within the range of individual person, single building. A PAN includes one or more computer, peripheral devices, telephones and other personal entertainment devices. If a multiple individual within the same residence use the same type of network, then it is referred to as Home Area Network (HAN). This network is normally managed from a single computer but can be accessed from any device. This type of network allows sending of a document to a printer, uploading of photos from the phone to the computer, watching of movies on line etc.
4. **Campus Area Network**. This is the one which connects two or more LANs but in limited to a specific geographic Area such as Colleges, industrial complex and military bases.

5. **Wide Area Network (WAN).** This is the type of network which covers a large geographic area such as continent. For example, Network that connect the district offices to the company across the country/ countries in the world. Computers are often connected to WAN via public networks such as; telephone system, dedicated lines or satellites.

Methods of protecting a network access/ network access control measures

- Packet filters. This is a program that monitors that monitors the movement of data packets.
- Firewalls
- Proxy servers. Proxy servers interact with outside network on behalf of protected networks
- Isolation of network. This is done by setting up an isolated unique network but within the same organization.

INTRANET

It refers to a connection for private computer within an organization. An intranet has tools to facilitate communication between organization, employees, work groups to improve the knowledge and data sharing capability.

Many schools and nonprofit groups have deployed intranet.

A simple intranet consists of an internal e-mail system. More complicated intranets include websites and data bases containing company news, forms and personal information.

An example of an intranet is a school network.

ADVANTAGES OF INTRANET

- ✓ Work force productivity. Intranets can help employees to quickly find and view information and applications relevant to their roles and responsibilities.
- ✓ Time. With intranets, organizations can make more information available to employees on a 'pull' (i.e. employees can link to relevant information a time which suits them) rather than being deluged indiscrimated by e-mails. Hence, it has timely and accurate information.
- ✓ Communication. Intranets can serve as powerful tools for communication within an organization, vertically and horizontally.
- ✓ Easy to learn and use.
- ✓ Fast, easy, low cost to implement.
- ✓ Increases collaboration and coordination.
- ✓ Supports links with customers and partners.
- ✓ Can capture and share knowledge.
- ✓ Reduced margin of errors
- ✓ Increased productivity

Disadvantages

- ✓ Can be expensive to maintain within an organization
- ✓ Can reduce face to face meetings with clients or business partners.
- ✓ Overabundance of information
- ✓ Users set up own web pages
- ✓ Denial of service (unauthorized access)
- ✓ Management fears loss of control
- ✓ Potential for chaos
- ✓ Hidden or unknown complexity and costs

Similarities between Internet and Intranet

- Intranet uses the internet protocols such as TCP/IP and FTP.
- Intranet sites are accessible via the web browser in a similar way as websites in the internet. However, only members of Intranet network can access intranet hosted sites.
- In Intranet, own instant messengers can be used as similar to yahoo messenger/gtalk over the internet.

Differences between Internet and Intranet

- Internet is general to PCs all over the world whereas Intranet is specific to few PCs.
- Internet provides a wider and better access to websites to a large population, whereas Intranet is restricted.
- Internet is not as safe as Intranet. Intranet can be safely privatized as per the need.

Advantages of installing a school network

- ➢ Speed. Networks provide a very rapid method for sharing and transferring files.
- ➢ Cost. Networkable versions of many popular software programs are available at a considerable savings when compared buying individually licensed copies.

- Security. Files and programs on network can be safe i.e. passwords can be established for specific directories to restrict access to authorized users.
- Sharing resources such as a printer, modems, fax machines, scanners etc. is simplified.
- Electronic mail. Electronic mail on LAN can enable students to communicate with teachers and peers at their own school.
- Flexible access. School network allow students to access their files from computers throughout the school. Students can also work cooperatively through the network

Disadvantages of installing a school network

- Expensive to install. Although network will save money over time, the initial costs of installation can be prohibitive.
- Requires administrative time. Proper maintenance of a network requires a considerable time and expert. Must monitor security issues. Wireless networks are becoming increasingly common, however, security can be an issue with a wireless network.

EXTRANET

An extranet is a computer network that allows controlled access from outside for specific business or educational purposes.

Extranets are extensions to or segments of, private intranet networks that have been built in many co-operation for information sharing.

More extranets use internet as the entry point for outsiders, a firewall configuration to limit and a secure protocol for authenticating users.

ADVANTAGES OF EXTRANET

Exchange of large volumes of data using electronic data interchange (EDI)

- Share product catalogs exclusively with trade partners.
- Collaborate with other companies on a joint development efforts.
- Jointly develop and use training programs with other companies
- Provide or access services provided by one company to a group of other companies. Such as an online banking application managed by one company on behalf affiliated banks
- Share news of common interest exclusively.

Disadvantages of extranet

- Extranet can be expensive to implement and maintain within an organization (e.g. hardware, software, employee training costs)
- Security of extranets can be a concern when hosting a variable or proprietary information

QN. Distinguish between intranet, extranet, and internet

- Intranet is used within an organization.
- Extranet is an extension of an intranet- used outside the organization or by two or more organizations
- Internet is more global

DATA TRANSMISSION

Telecommunications involves the transmission of data, information, and instructions among computers.

Any transmissions sent during these communications can be categorized by a number of characteristics including the signal type, transmission mode, transmission direction, and transmission rate.

SIGNAL TYPE

Analog Signals

An analog signal uses variations which are represented by a continuous waveform to convey information.

It is particularly useful for wave data like sound waves.

Analog signals are what normal phone line and sound speakers use.

Digital Signals

A digital signal is a series of discrete (discontinuous) bits which are simply the presence or absence of an electric pulse. The state of being on or off represents the binary digit of 1 or 0, respectively.

Advantages of digital signals include:

- Digital signals can be copied exactly without any loss of quality
- Digital signals can be further processed by computer.

Transmission Modes

When two devices exchange data, the data flows between the devices as a continuous stream of bits.

There are two basic transmission techniques for separating the groups of bits: asynchronous transmission and synchronous transmission

Asynchronous transmission

Asynchronous transmission transmits one byte at a time over a line at random intervals.

Each byte is framed by controls—a start bit for marking the beginning of the byte, a stop bit for marking the end of the byte, and a parity bit for error checking.

Asynchronous transmission is relatively slow and used for low-speed transmission.

Synchronous transmission

Synchronous transmission transmits groups of bytes simultaneously at regular intervals.

The beginning and ending of a block of bytes is determined by the timing of the sending device and receiving devices.

Although synchronous transmission requires more complicated and expensive communications devices, it provides much higher speeds and greater accuracy than asynchronous transmission.

Transmission Direction

The direction in which data flows along transmission media is characterized as

1. simplex,
2. half-duplex,
3. full-duplex or
4. multiplex

Simplex transmission

Simplex transmission sends data in one direction only. It is also called unidirectional because the signal travels in only one direction.

Simplex transmission is used only when the sending device does not require a response from the receiving device. One example of simplex transmission is television broadcasting.

Half-duplex transmission

Half-duplex transmission allows data transmission in either direction, but only one way at a time.

Many fax machines, police radio calls, credit card verification systems and automatic teller machines use half-duplex transmission.

Full-duplex transmission

In *full-duplex transmission, data can flow in both* directions at the same time. A regular telephone line, for example, supports full-duplex transmission, allowing both parties to talk at same time.

NOTE: Full-duplex transmission operates like a two-way, two-lane street. Traffic can travel in both directions at the same time.

Multiplex transmission

In *multiplex transmission, several different types of signals can be carried at once through the same line. E.g. During Video calls where Images*

Networking hardware

Networking hardware are Communications devices that enable two or more computers to exchange items such as data, instructions, and information with each other.

Examples include: a server computer, clients/work stations, network interface card, modems, Hub/Switch, repeater, Router, etc.

1. **SERVER**

A server is the host or central computer that manages the resources on a network.

A server provides a centralized storage area for programs, data, and information.

This is a very fast processor computer dedicated to providing specific services for other computers connected in a network.

A dedicated server is a server that performs a specific task. Examples of dedicated Servers include: file server, print server, database server, and a network server

Roles of Dedicated Servers

- ✓ A file server stores and manages files on a network
- ✓ A print server manages printers and print jobs.
- ✓ A database server stores and provides access to a database
- ✓ A network server (e.g., a DNS) manages network traffic.

Requirements of a server computer

- It needs a computer with very high processing speed
- It needs large amounts of RAM
- It needs a very big storage capacity
- It needs a very fast Network interface card
- It needs network operating system such as Novell Netware, Windows NT Server or Apple Share
- Expansion abilities.

Functions of a Server

- ✓ Administration of client computers.
- ✓ Security of files and applications.
- ✓ Managing printer Jobs.
- ✓ Data bank.
- ✓ Software and Applications handling.

2. Client computers

These are computers sharing resources and capable of sending and receiving data signals to and from the server.

A **Client** is a computer that accesses remote service on another computer (server). All of the computers connected to the file server on a network are called workstations

3. NETWORK INTERFACE CARD

The network interface card (NIC) provides the physical connection between the network and the computer workstation.

A network card, also called network interface card (NIC), is a device that enables the computer or device that does not have built-in networking capability to access a network.

Examples include
adapter card, PC Card,
USB network adapter, flash card e.t.c

4. MODEMS (signal converters)

It is a device which converts computer data to a signal than can be transmitted over a telephone line.

The modem, is a device which Modulates a digital signal from computers into an analog one to send data out over the phone line. Then for an incoming signal it Demodulates, the analog signal into a digital one.

This is a hardware device which transforms digital signals into analog signals (Modulation) to facilitates their transmission into air space, and vice versa (demodulation)

5. HUBS and SWITCHES

These are devices that provide a central connection point for cables from workstations, servers, and peripherals.

A hub, (also called a multi-station access unit (MAU)) is a device that provides a central point for cables in a network.

Unlike the hubs, a switch does not broadcast the data to all the computers, it sends the data packets only to the destined computer.

6. REPEATER

This is a device which accepts transmitted signals, amplifies them, and rebroadcasts them back on the network media.

A repeater is a device that accepts a signal from a transmission medium, amplifies it, and retransmits it over the medium.

As a signal travels over a long distance, it undergoes a reduction in strength, an occurrence called attenuation.

7. A ROUTER

This is a device used to link more than two different network configurations to communication to one another.

A Router connects multiple networks and routs communications traffic to the appropriate network using the fastest available path.

A router allows multiple computers to share a single high-speed Internet connection such as through a cable modem

A router translates information from one network to another.

8. NETWORK BRIDGE

A *bridge connects two pieces of land together offering a path from one to another*.

A network bridge is device that connects two networks making each accessible to the other.

A bridge knows all of the addresses on each side of the bridge and can send information accordingly.

9. MULTIPLEXER

This is a hardware device which merges several low speed transmissions into one high-speed transmission.

A *multiplexer is a* device that combines two or more input signals from various devices into a single stream of data and then transmits it over a single transmission medium.

By combining the separate data streams into one, a multiplexer increases the efficiency of communications and reduces the need for using multiple separate transmission media.

10. Transmission/Communication Media e.g. cables

This consists of materials or techniques capable of carrying one or more signals. This is the medium through which information moves from one network device to another.

11. Concentrator

This is a network device which enables several client computers to share a single line.

12. Gateway

This is a device (interface) used to link two different networks to communicate with one another.

13. Bridge:

This is a device used to link two similar networks to communicate to one another.

This is a device that connects two networks making each accessible to the other.

NOTE: To Connect to or create a home or small office (SOHO) network, you need the following components:

- ✓ Computers
- ✓ Network Adapter/Network Interface Card
- ✓ Hub/Switch
- ✓ Cables
- ✓ Modem
- ✓ Internet Service Provider (ISP)

Qn. Distinguish between firewall and a password?

A firewall is a network security system, either hardware- or software-based, that controls incoming and outgoing network traffic based on a set of rules

Firewall largely secures the entire devices and information on a network from being hacked and accessed by unlawful people.

Firewall can either be in software form or hard ware form. This is in most cases placed in the router, network boundary, proxy server etc.

The choice of firewall largely depends on the kind of information to secure i.e. big companies such as banks, examination centers such as UNEB have strong firewalls

Firewall contains set of rules that packet filters of data obey before sending information to another computer.

Types of fire wall

4. Proxy firewall

Firewall proxy servers also operate at the firewall's application layer, acting as an intermediary for requests from one network to another for a specific network application.

A proxy firewall prevents direct connections between either sides of the firewall; both sides are forced to conduct the session through the proxy, which can block or allow traffic based on its rule set. A proxy service must be run for each type of Internet application the firewall will support, such as an HTTP proxy for Web services.

5. **Application-layer firewalls**

As attacks against Web servers became more common, so too did the need for a firewall that could protect servers and the applications running on them, not merely the network resources behind them. Application-layer firewall technology first emerged in 1999, enabling firewalls to inspect and filter packets on any OSI layer up to the application layer.

The key benefit of application-layer filtering is the ability to block specific content, such as known malware or certain websites, and recognize when certain applications and protocols -- such as HTTP, FTP and DNS -- are being misused.

Firewall technology is now incorporated into a variety of devices; many routers that pass data between networks contain firewall components and most home computer operating systems include software-based firewalls. Many hardware-based firewalls also provide additional functionality like basic routing to the internal network they protect.

6. Stateful firewalls

In order to recognize a packet's connection state, a firewall needs to record all connections passing through it to ensure it has enough information to assess whether a packet is the start of a new connection, a part of an existing connection, or not part of any connection. This is what's called "Stateful packet inspection." Stateful inspection was first introduced in 1994 by Check Point Software in its FireWall-1 software firewall, and by the late 1990s, it was a common firewall product feature.

This additional information can be used to grant or reject access based on the packet's history in the state table, and to speed up packet processing; that way, packets that are part of an existing connection based on the firewall's state table can be allowed through without further analysis. If a packet does not match an existing connection, it's evaluated according to the rule set for new connections.

7. Packet firewalls

The earliest firewalls functioned as packet filters, inspecting the packets that are transferred between computers on the Internet. When a packet passes through a packet-filter firewall, its source and destination address, protocol, and destination port number are checked against the firewall's rule set. Any packets that aren't specifically allowed onto the network are dropped (i.e., not forwarded to their destination). For example, if a firewall is configured with a rule to block Telnet access, then the firewall will drop packets destined for TCP port number 23, the port where a Telnet server application would be listening

Packet-filter firewalls work mainly on the first three layers of the OSI reference model (physical, data-link and network), although the transport layer is used to obtain the source and destination port numbers. While generally fast and efficient, they have no ability to tell whether a packet is part of an existing stream of traffic. Because they treat each packet in isolation, this makes them vulnerable to spoofing attacks and also limits their ability to make more complex decisions based on what stage communications between hosts are at.

Firewall services include

- NAT (Network Address Translation)

Every pc on network has a unique address and so NAT has to protect that pc from being identified. There4 NAT reefers to a service software in firewall e that is used to translate a unique address of a certain computer into another from being identified location.

- DHCP (Dynamic Host Configuration Protocol) communication from a network to a pc 193 as it reaches firewall the DHCP will configure it with a generated dynamic unique identifier such as 00193 so as not to protect the system.
- VPN (Virtual Private Network)

While

A password is one that only protects only a single computer system.

COMMUNICATIONS SOFTWARE

The principal functions of communications software are network control, access control, transmission control, error detection/correction, and network security.

Communications software consists of programs that :

1. *help* users establish a connection to another computer or network;
2. manage the transmission of data, instructions, and information;
3. provide an interface for users to communicate with one another.

The first two are system software and the third is application software.

Networking Operating System

Network Operating System (NOS) is a program (set of instructions) that controls and manages the basic network operations like data and file transmissions.

A network operating system (NOS) is the system software that organizes and coordinates the activities on a network. The principal functions of NOS include network control, access control, transmission control, error detection/correction, and network security.

- System maintenance tasks such as backup
- File management tasks
- Prioritizing print jobs on the network

Examples of NOSs include:

- Novell NetWare
- Microsoft Windows server 2003 and 2008.
- AppleShare
- Unix /NFS
- Sun Solaris
- Linux
- IBM OS/2 Wrap

- Mac OS
- Windows OS (Win NT, Win XP, Win 7, and Win 8 etc.)
- Client/Server Linux

Network Protocols

This refers to a set of rules and procedures governing transmission between components in a computer network.

The principal functions of protocol in a network include:

- identifying each device in the communication path;
- securing the attention of the other device;
- verifying correct receipt of the transmitted message;
- determining that a message requires retransmission if it is incomplete or has errors;
- performing recovery when errors occur.

Packets and Packet Switching

When a computer sends data over the Internet, the data is divided into small pieces called packets.

Each packet contains the data, as well as the recipient (destination), the origin (sender), and the sequence information used to reassemble the data at the destination.

Each packet travels along the fastest individual available path to the recipient's computer via communications devices called routers.

This technique of breaking a message into individual packets, sending the packets along the best route available, and then reassembling the data is called packet switching.

Common protocols

1. **Simple Mail Transfer Protocol (SMTP)** - an internet protocol for transferring of e-mails.
2. **File Transfer Protocol (FTP):** It allows files containing text, programs, graphics, numerical data, and so on to be downloaded off or uploaded onto a network.

3. **Internet Protocol (IP) -** does the packet forwarding and routing.
4. ***Transmission Control Protocol/Internet Protocol (TCP/IP)*** *is a network standard that defines how messages (data) are routed* from one end of a network to the other, ensuring the data arrives correctly.
5. **Transmission Control Protocol (TCP) -** responsible for delivery of data over the network.
6. **Hypertext Transfer Protocol (HTTP**): It allows Web browsers and servers to send and receive Web pages.
7. **Simple Network Management Protocol (SNMP**): It allows the management of networked nodes to be managed from a single point.
8. **Telnet Protocol:** It provides terminal emulation that allows a personal computer or workstation to act as a terminal, or access device, for a server.
9. **Sequential Packet Exchange (IPX/SPX) -** works with the Novell's internet work' packet / sequential exchange; responsible for delivery of sequential data over the network

Comminucations application software.

These are computer software programs that help to accomplish specific tasks related to telecommunications.

A variety of examples of application software for communications include:

- e-mail,
- FTP,
- Web browsers,
- newsgroup/message boards,
- chat rooms,
- instant messaging,
- video conferencing, and
- VoIP.

NETWORK TOPOLOGIES

A network topology is a description of the possible physical connections within a network.

In other words, a topology is the physical arrangement of the devices in a communications network.

Three commonly used network topologies are bus, ring, and star. However, Most computer networks are hybrids—combinations of these topologies.

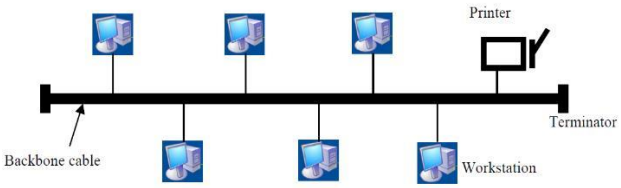
In a network topology, any network hardware component is also called a node.

Bus topology

A bus or linear network topology consists of a single central cable that connects all computers and devices together.

The physical cable that connects the computers and other devices is known as the bus or the backbone.

physical bus topology



Merits of BUS Topology

- Easy to implement and extend (quick setup)
- Cheaper than other topologies.
- Computers and devices can be attached and detached at any point on the bus without disturbing the rest of the network.
- Failure of one device usually does not affect the rest of the bus network.
- Data, instructions, and information in a bus network can be transmitted in both directions.
- Cable faults are easily identified.
- Weight reduction due to less wires

Demerits of BUS Topology

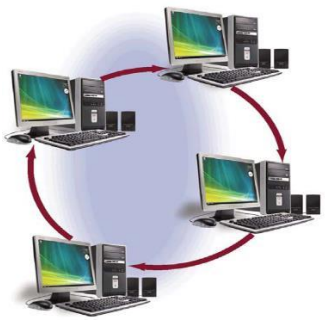
- If there is a problem with the cable, the entire network goes down.
- There is no central host computer to control the network.
- Only one device can transfer items at a time.
- If many computers are attached, the amount of data flowing along the cable increases, data collisions occur and the network slows down.
- Limited cable length and number of stations.
- Performance degrades as additional computers are added or on heavy traffic.(shared bandwidth)
- It is slower than the other topologies.

Ring Topology

Ring network consists of a cable forming a closed ring, or loop, with all the computers and devices in a network

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

The node examines any data that passes by to see if it is the addressee; if not, the data is passed on to the next node in the ring.



Advantages of Ring Topology

- Ring topology Can cover a larger distance as compared to a bus network and is commonly used in wide area networks (WAN)
- No collisions occur because data takes one direction only
- Very orderly network where every device has access to the token and the opportunity to transmit

- The speed of data transmission is faster than in a bus topology.

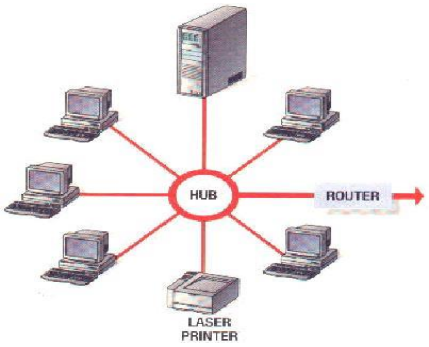
Demerits of a Ring Topology

- Ring Topology Network is More difficult to establish.
- If the cable fails, the whole network goes down.
- Data messages travel in only one direction from device to device around the entire ring
- If a node on a ring network fails, all nodes after the failed nodes cannot function.
- There is no central host computer to control the network.
- Moves, adds and changes of devices can affect the network

Star Topology

On a star network, all of the computers and devices (nodes) on the network connect to a central hub or switch.

All data that is transferred from one computer to another passes through the hub.



Merits of a Star Topology

- Easy to install and maintain.
- Better performance: The star topology prevents the passing of data packets through an excessive number of nodes.
- Computers and devices can be added to or removed from the network with little or no disruption to the network.
- Reliable because each device connects directly to the hub, if one device fails, only that device is affected.

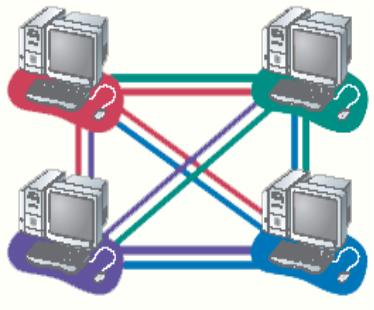
Demerits of a Star Topology

- If the hub fails, the entire network fails
- Lots of cable required so that the installation cost is expensive.
- Network size is limited by the number of connections that can be made to the hub.
- Performance for the entire network depends on the capabilities of the hub.
- Set up of the system can be very complex.

Mesh Topology

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

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



Merits of Mesh Topology

- Data will always be delivered.
- All of the data that is transmitted between nodes in the network takes the shortest path between nodes.
- In the case of a failure or break in one of the links, the data takes an alternate path to the destination.

Demerits of Mesh Topology

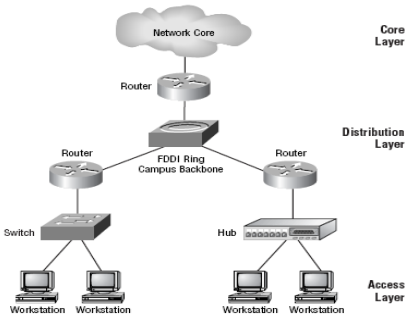
- Mesh topology is generally too costly and complex for practical networks, and very hard to setup.
- Lots of cable required so that the installation cost is expensive.

- Network size is limited by the number of interconnections that can be made between the computers.
- It requires that the nodes of the network possess some type of logical 'routing' algorithm to determine the correct path to use at any particular time.

Tree Topology

Tree network topology is also known as a the hierarchical network topology.

This is because it contains different levels of hierarchy.



- The type of network topology in which a central 'root' node (the top level of the hierarchy) is connected to one or more other nodes that are one level lower in the hierarchy (i.e., the second level),
- Each of the second level nodes will also have one or more other nodes that are one level lower in the hierarchy (i.e., the third level) connected to it.
- The hierarchy of the tree is symmetrical - Each node in the network having a specific fixed number, of nodes connected to it at the next lower level in the hierarchy.
- It usually has three layers: the core layer, the distribution layer and the Access layer.

Factors to consider When Choosing a Topology

- Cost.
- Future growth:
- Length of cable needed.
- Number of computers to be connected
- Level of security required

Factors that influence the speed access to the network

- Bandwidth
- Number of computers connected to the network
- Type of network media used
- Topology
- Location of your computers on the network
- The server – i.e. the amount of RAM and the speed of the hard disk.
- Capacity of hardware e.g. hubs, switches have their own maximum speeds

DATA COMMUNICATION IN COMPUTERS

i. Communication is the process of sharing a message. A conversation between two people is an example of communication.

ii. Data communication is the transmission of electronic data over some media.

iii. Communications between computers can be as simple as cabling two computers to the same printer.

Elements of Data Communication

i. **Sender**. The computer or device that is used for sending data is called sender, source or transmitter. In modern digital communication system, the source is usually a computer.

ii. **Medium**. The means through which data is sent from one location to another is called transmission medium. If the receiver and transmitter are within a building, a wire connects them. If they are located at different locations, they may be connected by telephone lines, fiber optics or microwaves.

iii. **Receiver**. The device or computer that receives the data is called receiver. The receiver can be a computer, printer or a fax machine.

iv. **Protocols**. There are rules under which data transmission takes place between sender and receiver. The data communication s/w are used to transfer data from one computer to another. The s/w follows same communication protocols can communicate and exchange data.

v. **Message:** this is the subject of communication. It the reason communication is initiated in the first place.

Data communication tools

- Computers
- Mobile phones
- internet

Definition of terminologies

Data Encryption

- This is Process of converting data into coded form (cypher text) to prevent it from being read or understood by unauthorized people.

- Encrypted data is difficult to decode without a secret key

Communications Software

- This refers to a set of instructions (software) needed by a computer before it starts sending and receiving data from other computers.

Encoding

- This is the process through which Information (e.g. data, text, voice or video) from the sending device is converted into signals which the communication medium can carry.

Decoding

- This is the process through which the signals are converted back into the information in its original form in the receiving device.

Downloading: To download is to transfer a file to your computer from another.

Uploading means to transfer a file from your computer to another.

Throughput

- Throughput refers to the rate of how much data is moved during a certain amount of time.
- The amount of signals that can travel over a communications channel sometimes is called the *Bandwidth*. The higher the bandwidth, the more data and information the channel can transmit.

Data Encryption

- This is Process of converting data into coded form (cypher text) to prevent it from being read or understood by unauthorized people.
- Encrypted data is difficult to decode without a secret key

DATA TRANSMISSION MEDIA

The means through which data is transformed from one place to another is called transmission or communication media

OR

A **transmission medium** (plural *transmission media*) is a material substance (solid, liquid, gas, or plasma) which can propagate energy waves. For example, the transmission medium for sound received by the ears is usually air, but solids and liquids may also act as transmission media for sound.

Transmission media are the physical pathways that connect computers, other devices, and people on a network. Each transmission medium requires specialized network hardware that is compatible with that medium, and most networks need to use combination of transmission media types selected based on the network's needs and prevailing conditions.

The term **transmission medium** can also refer to the technical device which employs the material substance to transmit or guide the waves. Thus an optical fiber or a copper cable can be referred to as a transmission medium

The absence of a material medium (the vacuum or empty space) can also be thought of as a transmission medium for electromagnetic waves such as light and radio waves. While material substance is not required for electromagnetic waves to propagate, such waves are usually affected by the transmission media through which they pass, for instance by absorption or by reflection or refraction at the interfaces between media.

Types of Transmission media:

The means through which data is transferred from one place to another is called transmission media or communication media. There are two categories of transmission media used in computer communications.

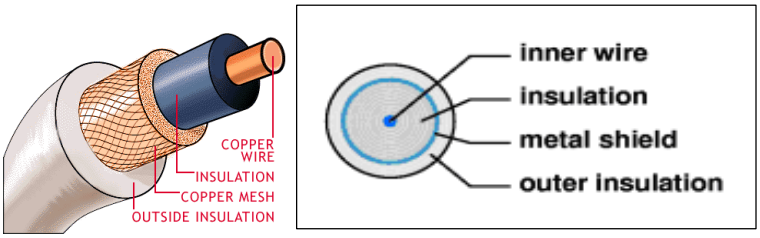
- **BOUNDED/GUIDED MEDIA**
- **UNBOUNDED/UNGUIDED MEDIA**

1. **BOUNDED MEDIA:**

Bounded media are the physical links through which signals are confined to narrow path. These are also called guided media. Bounded media are made up of an external conductor (Usually copper) bounded by jacket material. Bounded media are great for LABS because they offer high speed, good security and low cost. However, some time they cannot be used due long distance communication. Three common types of bounded media are used of the data transmission. These are

- Coaxial Cable.
- Twisted pair cable.
- Fiber optics

COAXIAL CABLE:



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Coaxial cable is very common & widely used commutation media. For example TV wire is usually coaxial.

Coaxial cable gets its name because it contains two conductors that are parallel to each other. The center conductor in the cable is usually copper. The copper can be either a solid wire or stranded material.

Outside this central Conductor is a non-conductive material. It is usually white, plastic material used to separate the inner Conductor form the outer Conductor. The other Conductor is a fine mesh made from Copper. It is used to help shield the cable from EMI.

Outside the copper mesh is the final protective cover. (As shown in Fig)

The actual data travels through the center conductor in the cable. EMI interference is caught by outer copper mesh. There are different types of coaxial cable vary by gauge & impedance.

Gauge is the measure of the cable thickness. It is measured by the Radio grade measurement, or RG number. The high the RG number, the thinner the central conductor core, the lower the number the thicker the core.

- Although coaxial cabling is difficult to install, it is highly resistant to signal interference.
- It can support greater cable lengths between network devices than twisted pair cable.
- **Note:** Most of today's networks, however, do not use coaxial cable because other transmission media such as fiber-optic cable transmit signals at faster rates.

Below, you will see how the coaxial cable connector looks:

CHARACTERISTICS OF COAXIAL CABLE

- Low cost
- Easy to install
- Up to 10Mbps capacity
- Medium immunity form EMI
- Medium of attenuation

ADVANTAGES COAXIAL CABLE

- Inexpensive
- Easy to wire
- Easy to expand
- Moderate level of EMI immunity

DISADVANTAGE COAXIAL CABLE

- Single cable failure can take down an entire network

TWISTED PAIR CABLE:

The most popular network cabling is twisted pair. It is light weight, easy to install, inexpensive and support many different types of network. It also supports the speed of **100 MPs.** Twisted pair cabling is made of pairs of solid or stranded copper twisted along each other. The number of pairs in the cable depends on the type. The copper core is usually **22-AWG or 24-AWG, as** measured on the American wire gauge standard.

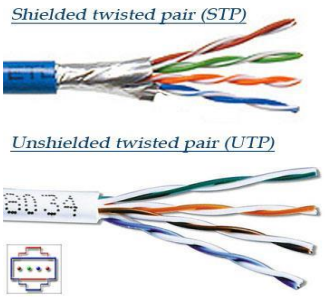


Fig.: Twisted pair wire

There are two types of twisted pairs cabling

1. Unshielded twisted pair (UTP)

2. Shielded twisted pair (STP)

Unshielded twisted pair (UTP)

UTP is more common. It can be either voice grade or data grade depending on the condition. UTP cable normally has an impedance of 100 ohm. UTP cost less than STP and easily available. There are five levels of data cabling

Category 1: These are used in telephone lines and are low speed data cable.

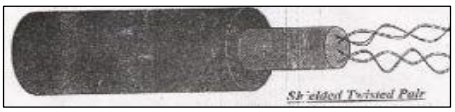
Category 2: These cables can support up to 4 MPs implementation.

Category 3: These cable supports up to 16 MPs and are mostly used in 10 MPs.

Category 4: These are used for large distance and high speed. It can support 20mps.

Category 5: This is the highest rating for UTP cable and can support up to 100mps.

UTP cables consist of 2 or 4 pairs of twisted cable. Cable with 2 pair use RJ-11 connector and 4 pair cable use RJ-45 connector.



UTP

Characteristics of UTP

- low cost
- easy to install
- High speed capacity
- High attenuation
- Effective to EMI
- 100 meter limit

Advantages of UTP

- Easy installation
- Capable of high speed for LAN
- Low cost

Disadvantages of UTP

- Short distance due to attenuation

Shielded twisted pair (STP)

It is similar to UTP but has a mesh shielding that's protects it from EMI which allows for higher transmission rate. IBM has defined category for STP cable.

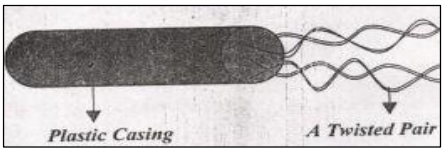
Type 1: STP features two pairs of 22-AWG

Type 2: This type include type 1 with 4 telephone pairs

Type 3: This type feature two pairs of standard shielded 26-AWG

Type 4: This type of STP consists of 1 pair of standard shielded 26-AWG

Type 5: This type consist of shielded 26-AWG wire



Characteristics of STP

- Medium cost
- Easy to install
- Higher capacity than UTP
- Higher attenuation, but same as UTP
- Medium immunity from EMI
- 100 meter limit

Advantages of STP:

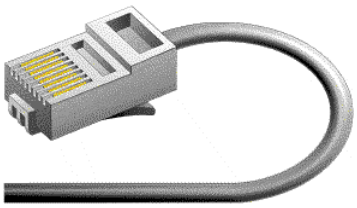
- Shielded
- Faster than UTP and coaxial

Disadvantages of STP:

- More expensive than UTP and coaxial
- More difficult installation
- High attenuation rate

NOTE: The wires are twisted together to reduce noise. **Noise** is an electrical disturbance that can degrade communications.

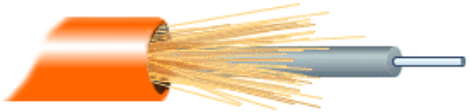
- The quality of UTP may vary from telephone-grade wire to extremely high-speed cable. The cable has four pairs of wires inside the jacket. Each pair is twisted with a different number of twists per inch to help eliminate interference from adjacent pairs and other electrical devices. The tighter the twisting, the higher the supported transmission rate and the greater the cost per foot.
- The standard connector for unshielded twisted pair cabling is an RJ-45 connector. This is a plastic connector that looks like a large telephone-style connector. A slot allows the RJ-45 to be inserted only one way. RJ stands for Registered Jack, implying that the connector follows a standard borrowed from the telephone industry. This standard designates which wire goes with each pin inside the connector.



- Although UTP cable is the least expensive cable, it may be susceptible to radio and electrical frequency interference (it should not be too close to electric motors, fluorescent lights, etc.). If you must place cable in environments with lots of potential interference, or if you must place cable in extremely sensitive environments that may be susceptible to the electrical current in the UTP, shielded twisted pair may be the solution.
- Shielded cables can also help to extend the maximum distance of the cables.
- Shielded twisted pair cable is available in three different configurations:

1. Each pair of wires is individually shielded with foil.
2. There is a foil or braid shield inside the jacket covering all wires (as a group).
3. There is a shield around each individual pair, as well as around the entire group of wires (referred to as double shield twisted pair).

FIBER OPTICS



- This is a cable that consists of dozens or hundreds of thin strands of glass or plastic that use lights to transmit signals. It transmits light rather than electronic signals eliminating the problem of electrical interference.
- Each strand is called an *optical fiber*, is as thin as a human hair inside the fiber optic cable, insulating glass cladding and a protective coating surround each optical fiber.

Advantages:

- Carry significantly more signals than other cables.
- Faster data transmission.
- Less vulnerable to electrical noise from other devices

- Better security for signals during transmission.
- Smaller size, and much thinner and lighter than other cables.

Disadvantages:

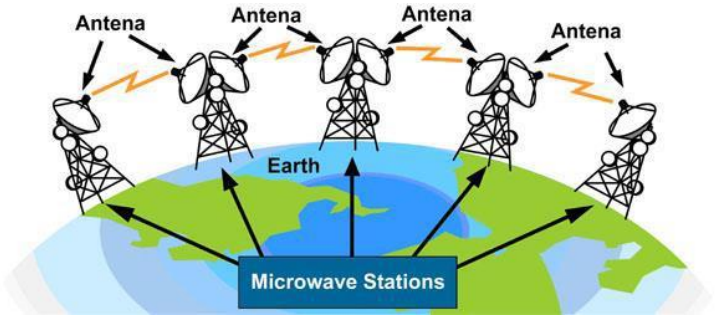
- Cost more than wire cables
- Difficult to install and modify. NOTE; Fiber optic cable has bandwidth more than **2 gbps (Gigabytes per Second).**

1. UN BOUNDED / UN GUIDED/ WIRELESS TRANSMISSION MEDIA

Unguided transmission media are methods that allow the transmission of data without the use of physical means to define the path it takes. Examples of this include microwave, radio or infrared. Unguided media provide a means for transmitting electromagnetic waves but do not guide them; examples are propagation through air

- Wireless Transmission media send communication signals through air or space using radio, microwave, and infrared signals.
- Any medium by which data transfer without any physical device like cable can be called as wireless transmission medium. Example can be wireless phone and wireless connection in laptops.
- Un Guided transmission media is more convenient than installing cables. It is appropriate and convenient for locations where installing cables are impossible.
- The two wireless/ unguided transmission media you are asked to focus on are satellite and microwaves.
  - Wireless transmission media used in communications include
    - Broadcast radio,
    - Cellular radio
    - Microwaves
    - Communications satellites,
    - Infrared & Bluetooth.

Microwave



Microwave

- *Microwaves are high-frequency radio waves that are sent through the atmosphere and space to* deliver telecommunications services, including TV distribution.
- It is dependent on line of sight.

A *microwave station* is an earth-based reflective dish that contains an antenna, transceiver, and other equipment necessary for microwave communication.

Microwaves use *line-of-sight* transmission. To avoid possible obstructions, such as buildings or mountains, microwave stations often sit on top of buildings, towers or mountains.

Microwave transmission typically is used in environments where installing physical transmission media is difficult or impossible, and where line-of-sight transmission is available.

Current users of microwave transmission include universities, hospitals, city governments, cable television providers and telephone companies.

ADVANTAGES:

- ✓ Speed of light
- ✓ No cables needed
- ✓ Microwave signals can carry thousands of channels at the same time
- ✓ Wide bandwidth

DISADVANTAGES:

- Line-of-sight will be disrupted if any obstacle, such as new buildings, are in the way
- Signal absorption by the atmosphere. Microwaves suffer from attenuation due to atmospheric conditions.
- Towers are expensive to build

Radio

Radio is the transmission of signals by modulation of electromagnetic waves with frequencies below those of visible light. Electromagnetic radiation travels by means of oscillating electromagnetic fields that pass through the air and the vacuum of space. Information is carried by systematically changing (modulating) some property of the radiated waves, such as amplitude, frequency, phase, or pulse width. When radio waves in pass an electrical conductor, the oscillating fields induce an alternating current in the conductor. This can be detected and transformed into sound or other signals that carry information.

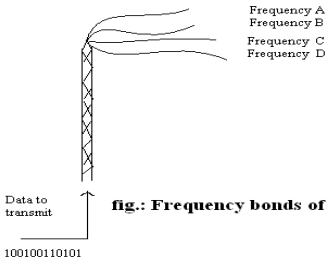


fig.: Frequency bonds of radio communication

CHARACTERISTICS:

1. Directed Waves
2. Noise Concurrency
3. Radio Wave's Directness
4. Unlimited Range
5. Interference

ADVANTAGES:

- Can carry a message instantaneously over a wide area.
- Aerials to receive them are simpler than for microwaves.
- Wires are not needed as they travel through air, thus, a cheaper form of communication.

DISADVANTAGES:

- The range of frequencies that can be accessed by existing technology is limited, so there is a lot of competition amongst companies for the use of the frequencies.
- Travel in a straight line, so repeater stations may be needed.

Infrared

Infrared

- Infrared (IR) is a wireless transmission media that sends signals using infrared light waves.
- IR transmission also requires a line-of-sight transmission as that required by microwaves.

IR wavelengths are longer than that of visible light, but shorter than that of terahertz radiation microwaves. Bright sunlight provides an irradiance of just over 1 kilowatt per square meter at sea level. Of this energy, 527 watts is infrared radiation, 445 watts is visible light, and 32 watts is ultraviolet radiation.

ADVANTAGES

Many things are controlled by infrared.

Sensors are invisible to the naked eye.

They are very reliable.

DISADVANTAGE

Most infrared sensors must be lined up or else they will not work

Satellite Transmission Media

A communication satellite is a space station that receives microwave signals from an earth-based station, amplifies (strengthens) the signals, and broadcasts the signals back over a wide area to any number of earth-based stations.

The earth-based stations are often microwave stations. Other devices, such as smart phones and GPS receivers, can also function as earth-based stations.

Communication satellite's transfer data rate is 1Gbps.

Uplink is the transmission from an earth-based station to a satellite.

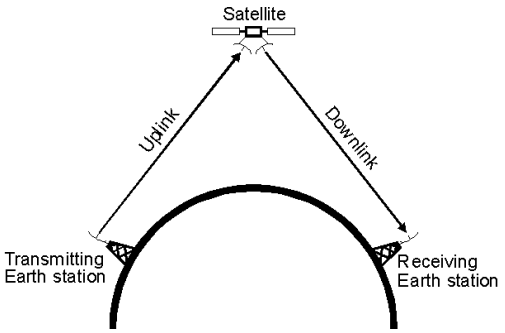
Downlink is the transmission from a satellite to an earth-based station.

Communication satellites are used by air navigation, television and radio broadcasts, weather forecasting, video conferencing, GPS and Internet connections.

> With the proper satellite dish and a satellite modem card, consumers can access the Internet using Satellite technology.

With satellite internet connections, uplink transmissions are usually slower than downlink transmissions. This is acceptable to most Internet satellite users, because they download much more than they upload.

`When used for communications, a satellite acts as a repeater. Its height above the Earth means that signals can be transmitted over distances that are very much greater than the line of sight. An earth station transmits the signal up to the satellite. This is called the up-link and is transmitted on one frequency. The satellite receives the signal and retransmits it on what is termed the down link which is on another frequency



Using a satellite for long distance communications

Advantages of satellite communication:

Availability

The biggest advantage of satellite Internet access is its availability compared to other Internet connection types. Satellite Internet access is a way for those who do not have access to terrestrial broadband connections such as cable or DSL to have access to high-speed Internet access. Satellite also is one of the only ways to receive Internet service in areas where telephone lines are not available.

Speed

Satellite Internet access is much faster than dial-up, with entry-level service tiers typically providing approximately 1 mbps download speeds--nearly 18 times faster than a dial-up modem. Faster speeds are generally available at higher service tiers. In general, the highest speeds available to home satellite Internet customers are slightly slower than the highest speeds offered by cable and DSL providers. Additionally, many satellite providers limit the amount of data that can be downloaded during short time periods to curb frequent large file transfers.

Latency

Satellite Internet connections are high-latency, meaning that a great deal of time is required for packets of information to travel to the satellite and back. The total delay can

amount to about one second from the time that you send a request to the Internet to the time that a reply is received. Satellite Internet providers use various technologies to make this delay less noticeable to the end user and create an acceptable experience for browsing the Web. However, the latency makes a satellite Internet connection unsuitable for high-speed gaming.

Reliability

Home-based satellite Internet connections are generally no less reliable than terrestrial broadband. However, all satellite communication is subject to interruption during periods of heavy snow or rainfall. Talk to other customers about their experiences if you live in an area where either of these are common. The likelihood of weather-related interruptions is lessened with a larger satellite dish, which some providers offer.

Cost

The cost of entry for a satellite Internet connection is quite high. The equipment costs several hundred dollars to purchase, and some types of installations incur additional fees. Additionally, the monthly cost for satellite Internet tends to be slightly higher than the cost of cable or DSL. There are ways of reducing the up-front cost. The equipment can be leased rather than purchased, and discounts or rebates may be available. Sometimes, installation fees are included in the lease price.

Disadvantages of Satellite communication

- Communication through satellite is highly costly.
- Security measures are required to prevent the unauthorized tapping of information

Bluetooth is a kind of short-range (about 10 meters) broadcast radio communications, which can transmit data at a rate of 1 Mbps among Bluetooth-enabled devices.

Many computers, peripherals, smart phones, PDAs, cars, and other consumer electronics are Bluetooth-enabled, which means they contain a small chip that allow them to communicate with other Bluetooth-enabled computers and devices.

FACTORS TO CONSIDER WHEN SELECTING A TRANSMISSION MEDIUM (TRANSMISSION IMPAIRMENTS)

There are many transmission media available and each media type has certain characteristics, so it’s necessary to aware about all the benefits and shortcomings of each one.

- Cost & Ease of installation

- Attenuation
- Delay Distortion
- Capacity (Bandwidth and throughput)
- Transmission delay
- Propagation delay
- Interference
- Noise
- Thermal/White Noise
- Intermodulation Noise
- Crosstalk
- Impulse Noise
- Cost & Ease of installation: Costing is an important factor, when selecting a media. Because absolute cost and ease of installation data are difficult to provide without referring to specific implementations, one can make relative judgments by comparing each medium to the others.
- Attenuation: Attenuation refers to the tendency of electromagnetic waves to weaken or become distorted during transmission. It is loss of energy as the signals propagates outwards. Attenuation increases with distance, as a wave passes through a medium, some of its energy is absorbed or scattered by the medium's physical properties. The loss is measured is decibels per kilometer (db./km). attenuation is higher at higher frequencies.
- Delay Distortion: one property of signal propagation is that the speed of travel of frequency is highest at the center of bandwidth and lowest at both the ends. Delay Distortion is caused by the fact that the signals of varying frequencies travel at different speeds along the medium.
- Capacity: the capacity of a transmission medium is often stated as bandwidth. Bandwidth is the range of cycle frequencies, measured in hertz (Hz) or cycle per second, which a transmission medium can physically accommodate.

Throughput is a measurement of the amount of data transmitted within a specified time period, usually measured in bits per second (bps).

- Transmission delay: it is the delay, which is present due to link capacity
- Propagation delay: Propagation delay is the time between the last bits transmitted at the head node of the link and the last bit received at the tail node.
- Interference: interference occurs when undesirable electromagnetic waves affect the signal. Interference can be caused by many factors, including

- Electromagnetic Interference (EMI)
- Radio wave interference (RFI)

Noise: Noise is unwanted energy from sources other than transmitter.

Thermal noise is caused by random motion of the electrons in a wire and is unavoidable.

Intermodulation Interference Occurs whenever signals of **different** frequencies **share** the same medium. Cross Talk is caused by inductive coupling between two wires. Impulse noise caused by spikes on the power line or other causes.

SYSTEM SECURITY, ICT ETHICAL ISSUES AND EMERGING TECHNOLOGIES

- As computers get involved in almost all aspects of our lives, there are quite a number of issues emerging that need extra attention. Such emerging issues range from computer system features, environmental concerns, legal and ethical issues, system security and user of computer applications. Therefore, it is increasingly becoming important that students & users of ICT learn how to safeguard their computer systems, uphold ethical values while using systems as they explore emerging technologies

COMPUTER SECURITY

Security is quality or state of being secure – to be free from danger. It applies to any vulnerable and valuable asset, such as a person, dwelling, community, nation, or organization.

Computer Security refers to techniques of ensuring that information /data stored in computers cannot be read or compromised by any individuals without authorization. A computer is secure if you can depend on it and its software to behave as intended.

This is also known as cyber security and it covers all processes and mechanisms by using computer based equipment.
Information and services are protected from unintended or unauthorized access, change or destruction.

Computer security also includes protection from unplanned events and natural disasters.

Note:
A computer security risk is any event or action that could cause a loss or damage to a computer hardware, software, data and information.
In order to understand the techniques of securing a computer system, it's important to first understand the various types of attacks that can be made against it.

Security deals with both guarding against external threats as well as authorized users as potential intruders. Both data and physical (hardware) security must be adequately secured.

Goals of Computer Security

Computer security therefore aims at achieving the following;

- **Privacy**: this involves keeping private documents private using encryption, password and access controls.
- **Integrity**: The data and applications should be safe from modification without owner's consent.
- **Authentication**: This ensures that people using the computer are authorized users of the computer system.
- **Availability**: the data and information should be available when needed by authorized users.
- **Confidentiality:** The information must just be accessible to the authorized people.
- **Reliability:** Computers should be able to work without having unexpected problems.

A computer crime is any illegal act involving a computer.
Cybercrime refers to online or internet-based illegal acts.

Computer security risks include;

- Internet and network attacks
- Unauthorized access and use of computer systems.
- Hardware and software theft
- Information theft and information piracy
- System failure.

1. Internet and network attacks

Information transmitted over networks has a higher degree of security risk than information kept on a company's premises. On a vast network such as the Internet with no central administrator, the risk is even greater. Below are the most common and most damaging forms of security threats to Internet users and site operators:

- Malicious code,
- Unwanted programs,
- Phishing and identity theft,
- Hacking and cyber vandalism
- Credit card fraud/theft,
- Spoofing (pharming) and spam (junk) Web sites,

- Denial of Service (DoS) and Distributed Denial of Service (DDoS) attacks,
- Sniffing, insider attacks,
- Poorly designed server and client software.

(a).Malicious Code:

Every unprotected computer is susceptible to the attack from malicious code. *Malicious code* (also called *malware*) includes a variety of threats such as;

- viruses,
- worms,
- Trojan horses,
- Bots, etc.

Viruses

A computer virus is a computer code or program specially designed to damage or cause irregular behavior in other programs in a computer.

Or

It is a program which attaches itself to the system and alters the normal functioning of a computer. Computer viruses are basically designed to carry out two tasks i.e.;

1. To be able to replicate themselves from one computer to another.
2. To be able to position themselves in a computer system and destroy software programs.

Each virus code works independently of the "Mother" virus.

Classification of viruses

Viruses are classified according to their way of hiding.

Some viruses are stealth because of the way they hide while others are polymorphic because they camouflage themselves to avoid virus removers (antivirus) from detecting them.

(i) *Boot Sector Viruses*

These execute when a computer starts up. These viruses alter the information in the boot sector of a diskette and this causes a computer to display messages like "Non System Diskette, please switch off and start again".

NB: A boot sector is the first sector on a floppy diskette which contains vital information about the diskette's logical setup.

(ii) *Partition Sector Viruses*

These attack the partition sector (first sector on a hard disk which contains information about the disk specifications) of the hard disk and causes the computer not to boot fully.

(iii) *File viruses*

These are viruses that attach themselves to program files and are loaded into memory whenever the infected program is rum.

(iv) *Overwriting Viruses*

These viruses infect files by overwriting the entire or part of a file thereby causing the file not to execute or work as it is supposed to do.

(v) *Macro viruses*

A macro virus uses the macro language of an application (e.g. Word processing, Spreadsheet) to hide the virus code.

They can cause some tool bar icons to work differently.

(vi) Companion viruses

Is a virus that works by creating a different file name with an extension .com.

(vii) Multipartite viruses

These are viruses that use a combination of techniques to infect the different executable files, boot sectors and or partition sectors.They are normally difficult to trap.

Worms

A worm is a computer program that sits in the computer's memory, rewrites itself continuously into the memory until the system runs out of memory and crushes.

It differs from a virus in that the "reproduced" segments keep communicating with the "mother" code to function.

Trojan Horse

It is a small program code hidden within legitimate software. Unlike a virus or a worm, a Trojan horse doesn't have the ability to replicate itself but it is often a way for viruses or other malicious code such as bots to be introduced into a computer system.

They continue to operate as legitimate software until at such a time that they are activated to cause trouble.

Bots

Are a type of malicious code that can be covertly (secretly) installed on your computer when attached to the Internet.

Once installed, the bot responds to external commands sent by the attacker, and your computer becomes a "*zombie*," and is able to be controlled by an external third party.

NB: A *Botnet* is a group of compromised computers connected to a networks such as the Internet that are used for malicious activities such as sending spam, participating in a Distributed Denial of Service attack, stealing information from computers, and storing network traffic for later analysis.

Other forms of malicious code include;

Time bomb

It is a program code that is activated when it detects a certain condition or event.

These events can be famous days like Valentine, Fools – day, etc.

Droppers

These are programs that have been written to perform useful tasks like compressing files, previewing video clips, etc. and in the process of performing those tasks, they introduce viruses in the system.

Failed viruses

These are viruses that have not met their would be goals.

This may be due to poor programming by the authors.

Packagers

These hide the existence of a virus from virus guards by masking some codes around the actual software programs.

It is only when the virus has been triggered off that you realize that the software had a virus.

Jokes

A joke is a harmless program that does amusing actions on the screen.

They can display messages like “Your computer is about to explode in five minutes. Please run away”.

Test viruses

These are viruses written to test some virus guards (antivirus software) •
They are not harmful, just for learning purposes only.

Bugs:

A bug is unintentional fault in a program that is normally misinterpreted as a real virus.

Moat complex software in computer systems normally contain bugs.

Minor bugs normally cause simple inconveniences while major bugs can cause loss of data.

How are viruses activated?

- ✓ By opening an infected file
- ✓ By running an infected program
- ✓ By starting up the computer with an infected floppy diskette.
- ✓ Sources of viruses
- ✓ Fake games
- ✓ Virus programmers utilize the ability of games spreading so fast to design fake games and attach viruses on them. These games keep infecting systems as they are installed.
- ✓ Such games are normally the irresistible like I LOVE YOU, HOTSEX.exe, JACKPOT.com, ROMANCE.exe etc.
- ✓ Through use of contaminated diskettes on several computers.
- ✓ Through using pirated software.
- ✓ Through using freeware and shareware from the internet.
- ✓ Since these are free, they are good grounds for distributing viruses.
- ✓ They also in most cases contain bugs which may turn into viruses unintentionally Through software updates most especially over the internet or other networks.
- ✓ Through sharing of data in a network.

Symptoms caused by viruses to software and hardware

- ✓ Unfamiliar messages appearing on the computer screen.
- ✓ Programs taking longer to load than usual.
- ✓ Unusual error messages occurring more frequently.
- ✓ Reduction in memory than usual
- ✓ Flickering of the screen.

Corrupted files

- File sizes becoming too big or too small than usual
- Computer system slows down.
- The whole computer system may fail to start up.

Precautions to prevent virus infection

- Do not start a computer with removable media inserted in the drives or plugged in the ports. CD and DVD drives should be empty, USB ports should not contain a USB flash drive, etc.
- Do not us media like diskettes, backup tapes, CDs from unknown sources.
- Scan all foreign media for viruses.
- Before using any removable media, use an antivirus scan program to check the media for infection.
- Isolate any media or computer suspected of having been attacked by viruses, disinfect it and investigate how it may have acquired the viruses.
- Install antivirus software;
- Ensure that reputable anti – virus software is installed on all computers.
- If employees use computers at home for business or to remotely access the network, these PCs should also have anti – virus software installed on them.
- Ensure that the anti – virus software is up to date;
- Every day, new computer viruses are being released and it is essential that business is protected from these viruses by keeping the anti – virus software up to date.
- Employ a firewall to protect networks;

- As computer viruses can spread by means other than email, it is important that unwanted traffic is blocked from entering the network by using a firewall.
- For users that use computers for business away from the protection of the company's network, such as home PCs or laptops, a personal firewall should be installed on them to ensure that the computer is protected.
- Filter all email traffic all incoming and outgoing email should be filtered for computer viruses.
- Emails with certain file attachments commonly used by computer viruses to spread themselves, such as .EXE, .Com and .SCR files, should also be prevented from entering the network.
- Educate all users to be careful of suspicious e-mails;
- Ensure that all users know to never open an email attachment they are not expecting. Even when the email is from a known source, caution should be exercised when opening attachments.
- Scan internet downloads;
- Ensure that all files downloaded from the internet are scanned for computer viruses before being used.
- Don't run programs of unknown origin;
- All users should be educated to never run a computer program unless the source is known or has originated from a person or company that is trusted and has been authorized by those responsible for managing the company's network.
- Make regular backups of critical data
- It is important to ensure that regular copies of important files are kept either on removable media such as CD-ROM discs or tape to ensure a trusted source for data in the event that the network is infected with a computer virus.

A backup: is a duplicate of a file, program or disk that can be used if the original is lost, damaged or destroyed.

(b).**Unwanted Programs:**

These are programs on the internet that install themselves on a computer without the user's consent. They include;

Adware

It is a program that displays an online advertisement in a banner or pop-up window on Web pages, email, or other Internet services.

Browser parasite

It is a program that can monitor and change the settings of a user's browser.

Spyware

It is a program placed on a computer without the user's knowledge that secretly collects information about the user e.g. email address, instant messages, etc.

(c**).Phishing and Identity Theft:**

Phishing is any deceptive (misleading/false), online attempt by a third party to obtain confidential information for financial gain.

Some phishing email messages ask you to reply with your information; others direct you to a phony Web site, or a pop-up window that looks like a Web site, that collects the information.

(d). Hacking and Cybervandalism:

A *hacker* is an individual who intends to gain unauthorized access to a computer system.

Some hackers are satisfied merely by breaking into the files of an e-commerce site. Others have more malicious intentions and commit *Cybervandalism,* intentionally disrupting, defacing, or even destroying the site.

(e**). Credit Card Fraud/Theft:**

Theft of credit card data is one of the most feared occurrences on the Internet.

Fear that credit card information will be stolen frequently prevents users from making online purchases.

(f). Spoofing (Pharming) and Spam (Junk) Web Sites:

Spoofing a Web site is also called "*pharming*,"

It involves redirecting a Web link to an address different from the Intended one, with the site masquerading as the intended destination.

Spoofing:

Spoofing is a technique intruders use to make their network or Internet transmission appear legitimate to a victim computer or network.

Types of spoofing

***E-mail spoofing*;**

This occurs when the sender's address or other components of the e-mail header are altered so that it appears the e-mail originated from a different sender.

***IP spoofing*;**

This occurs when an intruder computer fools a network into believing that its IP address is associated with a trusted source.

Perpetrators of IP spoofing trick their victims into interacting with the phony Web site. For example, the victim may provide confidential information or download files containing viruses, worms, or other malware.

Spam Web sites are the sites that promise to offer some product or service, but in fact are a collection of advertisements for other sites, some of which contain malicious code.

(g). **Denial of Service (DoS) and Distributed Denial of Service (DDoS) attacks**:

A *denial of service (DoS) attack* is an assault whose purpose is to disrupt computer access to an Internet service such as the Web or e-mail.

It may involve Perpetrators using an unsuspecting computer to send an influx of confusing data message or useless traffic to a computer network.

The victim computer network eventually jams, blocking legitimate visitors from accessing the network.

DoS attacks typically cause a Web site to shut down, making it impossible for users to access the site.

(h).**Sniffing:**

Sniffer is a type of eavesdropping (spying) program that monitors information traveling over a network.

When used legitimately, sniffers can help identify potential network trouble-spots, but when used for criminal purposes, they can be damaging and very difficult to detect.

Sniffers enable hackers to steal proprietary information from anywhere on a network, including email messages, company files, and confidential reports.

(i).Back Doors and Insider Attacks:

Back door is a program or set of instructions in a program that allow users to bypass security controls when accessing a program, computer, or network.

Once perpetrators gain access to unsecure computers, they often install a back door or modify an existing program to include a back door, which allows them to continue to access the computer remotely without the user's knowledge.

How backdoors are installed into the computers

Some warms leave back doors, which have been used to spread other worms.

Programmers often build back doors into programs during system development which help them save development time because the programmer can bypass security controls while writing and testing programs.

A computer repair technician may install a back door while troubleshooting problems on a computer. *Insider attacks*

We tend to think the security threats to a business originate from outside the organization.

In fact, the largest threats to business institutions come from insiders.

Normally organizations tend to allow employees access to privileged information, and in the presence of sloppy internal security procedures, they may cause severe damage.

(j). Poorly Designed Server and Client Software:

Many security threats prey on poorly designed server and client software, sometimes in the operating system and sometimes in the application software.

Given their complexity and design objectives, all operating systems and application software have vulnerabilities or (flaw) weaknesses that hackers can exploit.

Defense against Internet and network attacks

1. *Install a firewall;*

Firewall refers to either hardware or software that filters communication packets and prevents some packets from entering the network.

The firewall controls traffic to and from servers and clients, forbidding communications from untrustworthy sources, and allowing other communications from trusted sources to proceed.

2. *Route information through a proxy server*

Proxy servers are software servers that handle all communications originating from or being sent to the Internet, acting as a spokesperson or bodyguard for the organization. Large companies often route all their communications through a proxy server.

Proxies act primarily to limit access of internal clients to external Internet servers, although some proxy servers act as firewalls as well.

3. *Install intrusion detection software;*

To provide extra protection against hackers and other intruders, large companies may use intrusion detection software to identify possible security breaches.

Intrusion detection software automatically analyzes vulnerabilities, identifies any unauthorized intrusions, and notifies network administrators of suspicious behavior patterns or system breaches.

4. *Set of honey pots.*

A Honey pot is a vulnerable computer that is set up to entice an intruder to break into it.

Some large organizations such as Yahoo, AT&T *use honey pots* so that they can analyze any attack being perpetrated.

These computers, which appear real to the intruder, actually are separated safely from the organization's network.

Honeypots allow the organization to learn how intruders are exploiting their network and also attempt to catch perpetrators who have been doing damage elsewhere on their network.

(2). UNAUTHORIZED ACCESS AND USE OF COMPUTER SYSTEMS

Unauthorized access is the use of a computer or network without permission, e.g. an employee using a company computer to send a personal e – mail.

Unauthorized use is the use of a computer or its data for unapproved or possible illegal activities.

A hacker refers to someone who accesses a computer or network illegally. Some hackers claim the intent of their security breaches is to improve security.

A cracker:

Cracker accesses a computer or network illegally but has the intent of destroying data, stealing information, or other malicious action.

Both hackers and crackers have advanced computer and network
skills.

c) ***Script Kiddie*****:**

A script kiddie has the same intent as a cracker but does not have the technical skills and knowledge.

Script kiddies often are teenagers that use prewritten hacking and cracking programs to break into computers.

Corporate Spies:

They have excellent computer and network skills and are hired to break into a specific computer and steal its proprietary data and information.

Unethical Employees:

They break into their employers computers for a variety of reasons.

Some simply want to exploit a security weakness. Others seek financial gains from selling confidential information.

Disgruntled employees may want revenge.

Cyber-extortionist:

A Cyber-extortionist is someone who uses email as a vehicle for extortion.

These perpetrators send a company a threatening email message indicating they will expose confidential information, exploit a security flaw, or launch an attack that will compromise the company's network - if they are not paid a sum of money.

Cyber terrorist:

A Cyber terrorist is someone who uses the Internet or network to destroy or damage computers for political reasons.

The extensive damage might destroy the nation's air traffic control system, electricity generating companies, or a telecommunications infrastructure.

Cyber terrorism usually requires a team of highly skilled individuals, huge sums of money, and several years of planning.

Prevention of unauthorized access

Unauthorized access is prevented through use of *access controls*.

Definition

An Access control is a security measure that defines;

Who can access a computer

When the users can access the computer

What actions the users can take while accessing the computer.

Access control is normally implemented using a two phase process; i.e.

Identification

This is the phase which verifies whether the user is a valid one.

Authentication

This is the phase which verifies that the user is really the one he or she claims to be.

Methods of identification and authentication

i) *User names and passwords*

ii) *Possessed objects*

iii) *Biometric devices* iv)

Callback systems User

names and Passwords;

A *user name*, or *user ID*, is a unique combination of characters that identifies one specific user. A *password* is a private combination of characters associated with the user name that allows access to certain computer resources or to a network.

Most multiuser (networked) systems require that users correctly enter a *user name* and a *password* before they can access the data, computer, or a network.

NB: Some Web sites use a CAPTCHA *[Automated Public Turing test to tell Computers and Humans Apart (CAPTCHA)]* to further protect a user's password.

A CAPTCHA is a program to verify that user input is not computer generated.

A CAPTCHA displays a series of distorted characters and requires the user enter the characters correctly to continue using the Web site.

Characteristics of a good password

- ✓ Should be easy to remember but not too obvious.
- ✓ Should be longer, at least eight characters.
- ✓ Should have a combination of mixed case letters and digits.
- ✓ Should be easy to type without looking at the keyboard.

AVOID

1. Using your name, birthday, ID card number or telephone number.
2. A password of all digits or all the same letter.
3. Safeguarding your password
4. Do not share your password with others
5. Do not write down your password
6. Change your password frequently

Possessed Objects

A *possessed object* is any item that one must carry to gain access to a computer or computer facility.

Examples of possessed objects

1. Badges,
2. Cards,
3. Smart cards,
4. Key, etc.

These objects are often used in combination with Personal Identity Numbers (PINs)

A *personal identification number (PIN)* is a numeric password, either assigned by a company or selected by a user.

iii) ***Biometric devices***

A biometric device authenticates a person's identity by translating a personal characteristic, such as a fingerprint, into a digital code that is compared with a digital code stored in the computer verifying physical or behavioral characteristics.

Examples of biometric devices

- A finger print scanner .This captures curves and indentations of a finger print.
- A hand geometry system. .This measures the shape and size of a person's hand.
- A face recognition system. This captures a live face image and compares it with the stored image
- A voice recognition system. This device compares a person's live speech with their stored voice pattern.
- A signature verification system. This device recognizes the shape of a handwritten signature of a person.
- An iris recognition system .It reads patterns in the tiny blood vessels in the back of the eye, which are as unique as a fingerprint.

Advantages of biometric devices

- Personal characteristics are unique to persons hence give reliable information.
- These characteristics cannot be lost, forgotten or misplaced.
- They cannot be copied, duplicated or stolen as the case with possessed objects.

Disadvantages of biometric devices

- Most of the devices are too expensive.
- A finger print scanner might reject a legitimate user if the user cuts his or her finger.
- Hand geometry readers can transmit germs.
- A signature might not match the one on file when the person is nervous.
- A voice recognition system might reject a legitimate user with a sore throat.

Callback systems

A callback system connects a user to a computer only after the computer calls the user back at a previously established telephone number.

(3). HARDWARE AND SOFTWARE THEFT

Hardware theft

This is the act of stealing computer equipment.

Vandalism

This is the act of destroying computer equipment.

Prevention of hardware theft

- Use physical access controls such as locked doors and windows.
- Use cables to lock the equipment to desk, cabinet or floor.
- Install alarm systems to warn you in case of any intrusion
- Use passwords, possessed objects and biometric devices.
- Install surveillance cameras to help you in easy monitoring of the hardware.

Software theft

Forms of software theft;

Physical stealing of the media (e.g. floppy diskette, CD ROM e.t.c) that contains the software

• **Software piracy**

This is the unauthorized and illegal duplication of copyrighted software.

(4). SYSTEM FAILURE

This is a prolonged malfunctioning of a computer that can cause hardware, software, data or information loss.

Causes of system failure

1. Aging hardware
2. Natural disasters (such as fires, floods, storms or earthquakes etc)
3. Electrical power variations. These can cause loss of data or equipment (in case of fire outbreaks)
4. A single power disturbance can damage multiple systems in a computer network

Forms of power disturbances

a. Noise

This refers to any unwanted signal which is mixed with the normal voltage entering the computer.

b. Under voltage

This is a situation which occurs when the electrical supply drops below the normal value (e.g. Below 220V in Uganda)

Over voltage (power surge)

It is a situation which occurs when the incoming electrical power increases significantly above the normal voltage.

Brown out

Is a prolonged under voltage

Black out

Is a complete power failure

Spike

Is a momentary over voltage that occurs when the increase in power last for less than one millisecond.

NB: A surge protector such as Uninterruptible Power Supply is needed to protect the computer equipment against these disturbances.

COMPUTER ETHICS

Computer ethics are moral guidelines that govern the use of computers and information systems.

It encompasses the following areas;

Unauthorized access and use of computer systems.

Software piracy

Information privacy

Intellectual property rights

Codes of conduct

Unauthorized access and use of computer systems.

Definitions;

Unauthorized access is the use of a computer system or a network without permission of the owner.

Unauthorized use is the use of a computer or its data for unapproved or illegal activities.

These activities include;

An employee using a company's computer to send personal email without permission from the managers.

Gaining access to a bank's computer and perform unauthorized money transfer.

Software piracy

This refers to the unauthorized and illegal duplication of copyrighted software.

This may involve duplicating someone's movie, song, book, etc, without his/her permission.

NB:

Whenever a consumer purchases a software, he/she is only provided with a license agreement which gives him/her the right to use the software.

Types of license agreements

Single user or end user license agreement

This is the most common license agreement provided to individual users after purchasing a software.

This agreement gives a user a right to; o
Install the software on only one computer
o Make one copy for backup.

However, with such an agreement, a user cannot;

1. Install the software on a network
2. Give away copies of the software to other users.
3. Rent or lease the software.

Software site license

This agreement gives the consumer the right to install the software on multiple computers at a single site.

This site may be a school computer laboratory, a company's computer laboratory, etc.

Network site license

This allows network users to share a single copy of the software which resides on the network server.

Dangers (risks) associated with software piracy o It increases the chance of spreading computer viruses because pirated software in most cases is a target for spreading viruses.

The consumer cannot receive any technical support for the software from the manufacturer.

It becomes expensive in the long run for all the illegal users.

Reasons why software piracy has persisted

Legal protection for software doesn't exist

Laws for prohibiting software piracy are rarely enforced.

Most buyers believe that they have a right to copy the software they have paid for.

Information privacy

Privacy is the moral right of individuals to be left alone, free from surveillance or interference from other individuals or organizations, including the state.

Information Privacy refers to the right individuals, companies or organizations have to deny or restrict the collection and use of information about them.

Online tracking devices

These are methods used by online advertisers, online communities and online businesses to keep track of their visitors' behavior. They include;

A **cookie** is a small text file that a Web server stores on your computer that allows a site to track the actions of its visitors.

E-commerce, Webcasting, and other Web applications often rely on cookies to identify users and track information about viewers, customers, and subscribers.

NB; *although the cookie resides on an individual's hard drive, it does not interact with other information store on the system.*

Uses of cookies

Web sites that allow for personalization often use cookies to track user preferences. On such sites, you may be asked to fill in a form requesting personal information, such as your name, postal code, or site preferences.

A news Web site, for example, might allow users to customize their viewing preferences to display certain stock quotes. Your preferences are stored in cookies on your hard disk.

Many Web sites use cookies to store users' passwords, so they do not need to enter it every time they log in to the Web site.

Online shopping sites generally use session cookies to keep track of items in your shopping cart. This way, you can start an order during one Web session and finish it on another day in another session. Session cookies usually expire after a certain time, such as a week or a month.

Some Web sites use cookies to track how regularly you visit a site and the Web pages you visit while at the site.

Web sites may use cookie to target advertisements. Your interests and browsing habits are stored in the cookie.

Spyware and Adware

Spyware is a program placed on a computer without the user's knowledge that secretly collects information about the user.

Spyware can enter a computer as a virus or as a result of a user installing a new program.

Adware is a program that displays an online advertisement in a banner or pop-up window on Web pages, email, or other Internet services.

Web bug, is another type of spyware hidden on Web pages or in email messages in the form of graphical images.

Web businesses use Web bugs to monitor online habits of Web site visitors.

Spam

Spam is an unsolicited (unrequested) email message or newsgroup posting sent to many recipients or newsgroups at once. Spam is Internet junk (unwanted) mail.

The content of spam ranges from selling a product or service, to promoting a business opportunity, to advertising offensive material.

Types of spams

Spim

This is a spam sent instant messaging

Spit

This is a spam sent via VoIP

How to get rid of spams

Some email programs have built-in settings that allow users to delete spam automatically. Users also can sign up for email filtering form their Internet service provider.

Email filtering is a service that blocks email messages from designated sources. These services typically collect the spam in a central location that users can view at any time.

Using an anti-spam program that attempts to remove spam before it reaches your inbox.

NB: The disadvantage of email filters and anti-spam programs is that sometimes they remove valid email messages. Thus, users should review the contents of the spam messages periodically to ensure they do contain valid messages.

Phishing

Is a scam (a trick) in which a perpetrator sends an official looking email that attempts to obtain your personal and financial information.

A ***phishing filter*** is a program that warns or blocks you from potentially fraudulent or suspicious Web sites.

Pharming

Is a scam in which a perpetrator sends an official looking message that requests you to type a Web address in the Web browser, and then redirects you to a phony Web site that looks legitimate which requests you enter confidential information.

Employee Monitoring

Employee monitoring involves the use of computers to observe, record, and review an employee's use of a computer, including communications such as e-mail messages, keyboard activity, and Web sites visited.

Content Filtering

Content filtering is the process of restricting access to certain material on the Web.

Many businesses use content filtering to limit employees' Web access.

These businesses argue that employees are unproductive when visiting inappropriate or objectionable Web sites.

Some schools, libraries, and parents use content filtering to restrict access to minors.

Methods used to ensure privacy to data and information

i) Encryption

Encryption is the process of transforming plain text or data into cipher (unreadable) text that cannot be read by anyone other than the sender and the receiver.

Or

It is the process of covering readable data into unreadable characters to prevent unauthorized access.

The receiver needs an encryption key in order to regain the original data sent over a communications channel.

Methods of encrypting data

Transportation; This involves switching the order of the characters.

Substitution; this involves replacing characters with other characters.

Expansion insertion; this involves inserting characters between other characters.
Compaction; this involves removing characters and storing them elsewhere. NB:

An encryption key is a formula used to decrypt encrypted data back into its original format.

Types of encryption keys;

Private key encryption

With this key, both the sender and the recipient use the same secret key to encrypt and decrypt the data.

Public key encryption

With this key, a public key encryption software generates both the private key and the public key.

The sender uses the receiver's public key to encrypt the message and the receiver uses his or her private key to decrypt the message.

Information accuracy

Millions and millions of information reside on websites of certain organizations. But in some instances, the website providing access to information may not be the one which created it.

Some of the information on these websites may not be 100% accurate.

Therefore, it is always good to evaluate and analyze the information provided on a web page before using it.

TRADEMARK RIGHTS

(ii). Intellectual property rights

Intellectual property rights

***Intellectual property* (IP)** refers to unique and original works such as ideas, inventions, art, writings, processes, company and product names, and logos.

Intellectual property rights are the rights to which creators are entitled for their work.

(iii). Copyright

Is the protection given to the author of an original piece, including "literary, dramatic, musical, artistic and certain other intellectual works," whether the work has been published or not

A copyright gives authors and artists exclusive rights to duplicate, publish and sell their material. These material may be songs, movies or books.

However, governments of some countries have come up with copyright laws which usually give the public a fair use to copyrighted material. ***iii. A trademark***

A trademark protects a company's logos and brand names

CODES OF CONDUCT

A **code of conduct** is a written guideline that helps to determine whether a specific action is ethical or unethical.

Recognizing that individuals need specific standards for the ethical use of computers, a number of computer-related organizations have established IT codes of conduct, which helps determine whether a specific computer action is ethical or unethical;

Some of the IT codes of conduct include:

i). Computers may not be used to harm other people
ii). Users may not interfere with other users' work.
iii). Users may not meddle in other people's files
iv). Computers may not be used to steal
v). Computers may not be used to bear false witness
vi). Users may not copy or use software illegally.
vii). Users may not use other resources without authorization
viii). Users may not use others' output
ix). Users shall consider the social impact of programs and systems they design.
x). Users should always use computers in a way that demonstrates consideration and respect for other people.

NETIQUETTE

Netiquette refers to the dos and don'ts of online communication.

It includes the following.

- Communicate effectively; be short and precise.
- Observe before participating in any discussion.
- Don’t participate in flame wars. Flame wars are nasty exchange of messages.
- Use other people’s work with their permission.
- Do not spam especially when doing business. Spamming is when a person sends out unsolicited messages to a large number of people.
- Protect your privacy, security and well-being; avoid unnecessary give away of usernames and passwords.
- Avoid downloading pornography from the internet.

Avoid using a company’s account to join discussion groups.

ICT EMERGING TECHNOLOGIES

Emerging technology is defined as a media that is coming into view or existence or coming into commonality.

Its innovative technology that is reshaping the nature of education. Technologies are transforming classrooms into more engaging collaborative and productive learning environments.

There are 6 major emerging technologies and these include;

1. **Blog;**
   This is a web based journal in which items are posted on a regular basis and displayed in reverse chronological order. It allows the writer (Blogger) to post ideas using conversational language for many to read and each entry includes a link to leave a comment. The contents of each blog differ depending on the interests and styles of the author.
2. **RSS (Really Simple Syndication)**
   This is an XML based format designed for sharing headlines and other web context. It's a time saving way to receive news and informational updates from a number of sites in a central location. Simply put, think of RSS as your own personal wire service.
3. **Podcast**
   This is an audio file (usually in MP3 format) posted on the website so that others may listen to it. Podcasts are automatically delivered over the internet using either RSS or atom syndication. Subscriptions to podcasts are usually free.
4. **Wikis**
   This is a website that allows a user to easily create and edit pages. The characteristics that set Wikis apart from other web based forums and discussions is that they may be authored and edited at any one time.
   Some of the advantages of Wikis include;
   - It supports students' collaboration.
   - It allows flexibility, ease of use and low barriers
5. **Handheld Appliance (PDAs-Personal Digital Assistants)**
   This is a small low cost, highly versatile mobile computer. It's a device that can store data, share files with computers, displays graphs and images and rapidly exchanges

information.

6. **Robotics**
   This is a science or study of the technology associated with the design, fabrication, theory and application of robots.

Other emerging technologies include;

- *Digital Video*
- *Distance Education*
- *Social networking*
- *Tablet computers*
- *Virtual world*
- *Interacting white board technologies.*

Qn. ***Distinguish between artificial intelligence and digital forensics***

- **Artificial intelligence**. A major feature of the fifth generation computers. It enables computers to behave and mimic like human beings.

Applications of artificial intelligence

- ✓ Game playing
- ✓ Speech recognition
- ✓ Understanding natural language. Computers can be trained to learn and take instructions using natural language

- ***Digital forensics***. A branch of investigative science around material found in digital devices, often in relation to computer crime like hacking, cracking, spamming etc.

Branches of digital forensics

- ***Mobile device forensics***. Related to recovery of digital evidence or data from a mobile device.
- ***Network forensics.*** Concerned with monitoring and analysis of computer network traffic, both local and WAN/internet for the purpose of gathering information, evidence collection or crime detection.

- ***Database forensics*.** Related to forensic study of databases and their metadata. Investigations use database contents, log files and in-RAM data to build a time-line or recover relevant information.

THE FUTURE OF COMPUTERS

- The ever-increasing need for faster and efficient computers is constantly creating technological advances that can be considered amazing.
- The following is expected to happen to computers and to the lives of people in future;
- Computers are expected to increase in the processing speed, memory and storage capacity.
- Computers are being taught how to think like human beings. They are expected to think and reason like human beings in years to come.
- People are developing natural question and answering systems.
- Computers will become much easier to use by almost all people all over the whole world.
- There will be an increase in the use of expert systems, advanced robotics and autonomous systems.
- The internet will continue to expand and change in several ways.
- New multimedia is expected to be developed.
- There will be an increase in the use of virtual reality.
- More users are expected to connect to the internet. It will become universal.
- Learning will become possible at anytime, anywhere around the world.
- There will be reductions in physical movements. Workers will have to conduct much of their businesses from home.
- There will be less use of physical cash. There will be an increase in the use of electronic fund transfers (EFTs) and E – money.
- There will be less use of manual document systems to store information in most organizations.
- Most ordinary jobs like secretariat, store keeping etc, are likely to phase off. This will finally lead to a great increase in unemployment and loss of jobs.

Online Storage is a browser-based application that allows you to store and access your important files, safely and securely — **online**. Much like a folder on your hard drive, **Online Storage** allows you to back up your files and stores them in a safe place for you.

Advantages Online Storage

- ✓ **Data storage saving:** By storing your data online you are reducing the burden of your hard disk, which means you are eventually saving disk space.

- ✓ **World Wide accessibility:** This is the main advantage of online data storage. You can access your data anywhere in the world. You don't have to carry your hard disk, pen drive or any other storage device.

- ✓ **Data safety:** You cannot trust your HDD and storage device every time because it can crash anytime. In order to make your data safe from such hazards you can keep it online.

- ✓ **Security:** Most of the online storage sites provide better security.

- ✓ **Easy sharing:** you can share data with your friends' faster, easy and secure manner.

- ✓ **Data recovery:** online data storage sites provide quick recovery of your files and folders. This makes them more safe and secure.

Automatic backup: you can even schedule automatic backup of your personal computer in order to avoid manual backup of files.

Disadvantage of online storage

None of the thing in this world doesn't have disadvantage. There are few disadvantages there while using online data storage but if you handle things with care then you can surely avoid them. Some of them are as follows-

- ✓ Improper handing can cause trouble: You must need your user-id and password safe to protect your data as if someone knows or even guess your credentials, it may result in loss of

data. Use complex passwords and try to avoid storage them in your personal storage devices such as pen drive and HDD.

- ✓ Choose trustworthy source to avoid any hazard: There are many online storage sites out there but you have to choose the one, on which you can trust. You can always refer the list of free online data storage sites, which I shared above

- ✓ Internet connection sucks!! To access your files everywhere the only thing you need is internet connection. If you don't get internet connection somewhere then you will end up with no access of data even though it is safely stored online.

How to secure data on online storage.

- **Pick a good password.** All Cloud services require a master password to get into your files, so make it a good one, something that is pretty long. When it comes to passwords, longer is better. True, it can be a hassle to remember a strong password but it's an even bigger hassle to have your information stolen.
- **Don't reuse your passwords.** The password you choose to access the Cloud should be unlike any other password you use. If a hacker gets access to your Facebook password which also happens to be your email password, they will not only have a clear view of where you hold financial accounts, but they will be able to reset all of your passwords without your knowledge.
- **Don't share your passwords.** Even with a trusted friend, sharing your password is never a good idea. The more people who know your password, the more likely it is to be spread around. Your password is the lock to your information, don't let more people in than need be there.
- **Back up your data.** The same way you back up your computer's hard drive, back up your Cloud data. There are some companies that offer a small amount of storage free of cost. Take advantage of this and make sure you have your most important data backed up in case of an unexpected loss.
- **Examples are**
- Cloud storage
- Dropbox
- Open Drive

- SpideOak
- ZumoDrive
- One drive

GREEN COMPUTING.

Green computing, green IT or ICT Sustainability, refers to environmentally sustainable computing or IT. Green computing is environmentally responsible use of computers and related resources.

Green computing involves the implementation of energy-efficient central processing units (CPUs), servers and peripherals as well as reduced resource consumption and proper disposal of electronic waste (e-waste).

To promote Green IT concepts at all possible levels, the following 4 concepts/approaches are employed;

a) ***Green Use***: This means minimizing the electricity consumption of computers and their peripheral devices.
b) ***Green Disposal*****:** This means remaking an existing computer or appropriately disposing off/recycling unwanted electronic devices.
c) ***Green design*****:** Designing energy efficient computers, servers, printers and other digital devices.
d) ***Green Manufacturing*****:** This means minimize waste during manufacturing of computers and other sub systems to reduce the environmental impact of these activities

Goals of green computing

- Reduce the use of hazardous materials,
- Maximize energy efficiency during the product's lifetime,
- Promote the recyclability or biodegradability of malfunctioning products and factory waste.
- The work habits of computer users and businesses can be modified to minimize adverse impact on the global environment.

Measures intended to promote green computing

- Conserving resources means less energy is required to produce, use and dispose of products

- Saving energy and resources saves money.
- Green computing even includes changing government policy to encourage recycling and lowering energy use by individuals and business.
- Reduce the risk existing in the laptops such as chemical known to cause cancer, nerve damage and immune reactions in humans.
- Using other power alternatives like Solar energy
- Replacing of CRT Monitors with LCD monitors.
- Repairing computers instead of buying new ones.
- Use of less energy consuming devices and resources
- Promoting recyclability.
- Promoting proper disposal of e-waste.

CAREERS IN THE ICT INDUSTRY

Many people today are employed in various organizations because of their association to the computer world.

Information and communication technology (ICT) has created new job titles such as computer operators, computer technicians, system analyst, computer programmers, software engineer,

Information systems manager, data base administrator, computer trainer, web administrator, computer graphics designers and network administrator. This section explains some responsibilities of these professionals who are generally called information technology workers.

Data entry

this is a job that requires one with the basic computer skills of managing computer skills. One has to take information from a hard copy and enter it into an electronic format or taking electronic data and entering into a database for easy sorting and locating.

Computer operator.

Some of the responsibilities of a computer operator include;

1. Entering data into the computer for processing.

. 2. Keeping up-to-date records (log files) of all information processing activities.

Computer technician.

Given that computers require regular maintenance, upgrading as well as emergency repairs, demand for computer technicians continues to grow as more people computerize their workplaces and homes.

Some of the responsibilities of a computer technician are;

1. Troubleshooting computer hardware and software related problems.

2. Assembling and upgrading computers and their components.

3. Ensuring that all computer related accessories such as printer modems, storage media devices are in good working condition.

4. In developed countries, technicians help hardware engineers in designing and crating some computer components such as storage devices, motherboards etc.

System analyst and designer

This is a person who methodically examines an information system and considers improving it when required basing on various data flow models. At the end of the analysis, a report has to be delivered to a responsible party for scrutiny and examination.

Note: system analysts is a person who is responsible for analyzing a company's needs or problems then designs and develops a computer based information system. A good analyst is one who has at least the following attributes;

1. Good problem solving skills and creativity, i.e. must have wide experience in solving problems.

2. Good communication skills: The analyst must be able to communicate clearly and precisely both in writing and in speech. He/she must be able to talk to different groups of people e.g. managers, operators, attendant and general public.

3. Must have business knowledge: the analyst must clearly understand the environment for which the system is being developed.

4. Technical knowledge: A system analyst must be well trained in relevant areas of computer science such as hardware, software programing knowledge.

Some of the responsibilities of a system analyst include:

a) Reviewing the current manual or redundant information system and making recommendations on how to replace it with a more efficient one.

b) Working with programmers to construct and test the system.

c) Coordinating training for users of the new system.

Computer programmer

This is a person whose responsibility is to write, execute as well as debug (remove errors) the source code of a given software program.

Large organizations such as insurance companies, banks, manufacturing firms and government agents hire programmers to work together with system analysts in order to:

1. Develop in house application programs or system programs.

2. Customize commercial application packages to suite the organization needs.

3. Install, test, debug, and maintain programs developed or customized for the organization.

Computer engineer.

Computer and electronic engineers are coming up with new and more efficient technologies in information and communication technology almost daily. Since computers are electronic devices, hardware designers must be good in electronic engineering in order to be able to:

1. Design and develop computer components such as storage devices, motherboards and other electronic components.

2. Determine the electrical power requirement of each component.

3. Re-engineer computer components to enhance its functionality and efficiency.

4. Design and develop engineering and manufacturing computer controlled devices such as robots.

Web administrator/webmaster.

This is a person whose responsibility is to effectively manage and control a company's website.

Internet is one of the areas of information and communication technology that has drawn the interest of most people. Thus people are able to exchange messages, search for information and do business through the internet. A web administrator is responsible for:

- Developing and testing websites.
- Maintaining, updating and modifying information on the website to meet new demands by the users.

- Monitoring the access and use of internet connection by enforcing the security measures.
- Downloading information needed by an organization or institution from internet websites.

Computer graphics designers and 3D Animation

In publishing, skilled graphics designers and typesetters are required in order to design graphical objects and professional publications. Such people may get employed in publishing houses to typeset books, newspapers and magazines.

3D animation for movies, software programs, games etc.

Self-employment.

Self-employment can be achieved by using a computer or other ICT devices such as mobile phones to start bureau services, internet services, consultancy services and computer hardware and software vendor business.

Network administrator.

This is a person responsible for configuring and maintaining the day today operation of a computer network. Typically, a network administrator assigns user accounts and passwords, establishes security levels and monitors system to prevent unauthorized access and attacks.

A network administrator is a specialist whose responsibilities are to:

- Set-up a computer network.
- Maintain and enforce security measures on the network.
- Monitor the use of network resources.
- Maintain and troubleshoot network related problems.

Data Processing manager

This is a person responsible for overseeing activities as well as setting procedures followed in the data processing department.

Computer sales representatives.

Computer sales representative should have good knowledge in information and communication technology. This would help them to analyze customer needs and advice accordingly. A good computer salesman needs to be self-confident, persuasive and proficient in business communication.

Database administrator

This is a person who develops and maintains a database of a company as well as designing and implementing policies essential for ensuring its security and integrity.

Quality Assurance (QA)

This is job requires that an employee tastes out all features of a product or use ability issues.

Security Expert.

This requires one to taste and find vulnerabilities in a system hardware or software programs.

Hardware Designer

This is a person who designs different hardware, circuit designs, embedded systems, firmware etc.

It's a job that requires you to design and create complete hardware packages or portions of hardware assistance.

FILE EXTENSIONS

File Extension	File Type
.AIFF or .AIF	Audio Interchange File Format
.AU	Basic Audio
.AVI	Multimedia Audio/Video
.BAT	PC batch file
.BMP	Windows BitMap
.CLASS or .JAVA	Java files
.CSV	Comma separated, variable length file (Open in Excel)
.CVS	Canvas
.DBF	dbase II, III, IV data
.DIF	Data Interchange format
.DOC or .DOCX	Microsoft Word for Windows/Word97
.EPS	Encapsulated PostScript
.EXE	PC Application
.FM3	File maker Pro databases (the numbers following represent the version #)
.GIF	Graphics Interchange Format
.HQX	Macintosh BinHex
.HTM or .HTML	Web page source text
.JPG or JPEG	JPEG graphic
.MAC	MacPaint
.MAP	Web page imagemap
.MDB	MS Access database
.MID or .MIDI	MIDI sound
.MOV or .QT	QuickTime Audio/Video

.MTB or .MTW	MiniTab
.PDF	Acrobat -Portable document format
.P65 .T65	PageMaker (the numbers following represent the version #) P=publication, T=template
.PNG	Public Network graphic
.PPT or .PPTX	PowerPoint
.PSD	Adobe PhotoShop
.PSP	PaintShop Pro
.QXD	QuarkXPress
.RA	RealAudio
.RTF	Rich Text Format
.SIT	Stuffit Compressed Archive
.TAR	UNIX TAR Compressed Archive
.TIF	TIFF graphic
.TXT	ASCII text (Mac text does not contain line feeds--use DOS Washer Utility to fix)
.WAV	Windows sound
.WK3	Lotus 1-2-3 (the numbers following represent the version #)
.WKS	MS Works
WPD or .WP5	WordPerfect (the numbers following represent the version #)
.XLS or .XLSX	Excel spreadsheet
.ZIP	PC Zip Compressed Archive
.bat	Batch file
.ai	Adobe illustrator