PART ONE
INTRODUCTION TO COMPUTER STUDIES - THEORY

Preamble:

The study of computer studies has become too rich that it is now getting had to draw a difference between *Computer Studies* and "ICT".

Computers and communication have brought and still bringing changes in our lives. Therefore, the following concepts are more or less becoming family names.

- Information technology
- The communication revolution/Telephone revolution
- Internet revolution
- Multi media (data, sound & video)
- The Binary Age
- Information society
- The information super high way/ "Information" or I-way or Data-Way.
- The digital Age or Dot Age.

The need for better and best ways of doing things has triggered more and more research in the best technologies, more reliable information, and the best communication means. Hence;

Telecommunication = electromagnetic devices and systems for communicating over long distances. Such devices include; radios broadcast TVs, telephones and cable TVs.

Information = Information (May be Later)
Computer = may be later too.

Communication = Communication (electronic transfer of data from one place to another)

Technology = Methods/modes of doing things

ICT = Information Communication Technology

IT = Information Technology

Therefore, ICT/IT relates to all means, which facilitates information or data capture, processing, storage, and communication or output.

Old Technologies

- **Ne**wspaper
- Recordings
- Radio
- Paper Printed Photographs
- Film
- Televisions

New Technologies

- Satellites
- Cellular phones
- Compact disk
- E-mail
- Internet
- Data warehouses or data bases
- Video conferencing
- Fiber optic cables (for communication media)
- Fax machines
- Computers

NB;
ICT/IT concept is quite different from Computer Studies. Computer studies are simply a small section of IT.

Qn.

(a) Define a telecommunication system, and list its components.

(b) Explain the functions of a telecommunication system.

IMPACT OF IT/ICTs ON SOCIETY

ICTs have had both positive and negative contributions to society.

a) BENEFITS/ADVANTAGES OF INFORMATION TECHNOLOGY.

- Increased interaction /collaborations through e-mails, chat rooms, video conferencing, etc
- Increased sharing and access to common databases within and outside organizations through networking.
- Increased access to information through DBMS. Huge amounts of material on all subjects now exist – ease research.
- Increased inventions and innovations.
- More and more technology in management fields.
- Improved and sustained quality goods and services.
- Increased efficiency and effectiveness' leading to increased productivity (hence less wastages & more efficient use of resources).
- Increased investment opportunities in commercial tele-centers, Internet cafes, chart rooms, etc.
- More leisure as people get shorter working hours. Increased use of ICTS implies higher standards of living.
- Highly skilled jobs are being created like programming, systems analysis. Software engineering, etc.
- Many IT products for the disabled.
- Reduced costs of production through less demanding ICTs
- Improved corporate image.

b) Disadvantages

- Widens the gap between the rich and the poor as the rich producing with the help of ICTs produce faster and flood the markets.
- Isolate older people since it is not very easy for them to cope with the many IT changes.
- Bombards (internet) people with too much information- (good and bad)
- Increased instability as people get compelled to learn new things every now and then.
- Health problems e.g. eye sight losses, repetitive strain injury, etc
- Moral problem through access of pornographic materials on the net.
- Erosion of individual privacy as more data about people is stored on databases and can be accessed any time.
- Unemployment as less skilled people get retrenched and their roles taken over by more effective ITs.
- Addictions to computer games plus surfing by young people
- ITs isolate man and also erode the social aspect of work as some people opt for executing their office duties from their homes.
- Initial, maintenance and on-line IT costs are very high seggregative.
- Virus threats make data stored on computers very insecure.

- Increased crime through forgeries, piracy, etc.

AREAS OF APPLICATION FOR INFORMATION TECHNOLOGY

(I) Education and training.

Many Universities, Colleges, school and public libraries are on line with websites for purposes of making easy access to educational information..

Education references soft ware e.g. the Infopedia, Encarta, etc are programs used for helping people with English usage, data collection and analysis etc

(2) Information plus data storage.

ITs have got immense internal and external storage devices for storage of huge volumes Data. Hence the common paperless society

(3) Word Processing

Word processor programs e.g. Microsoft word, word star, lotus notes etc are now on market for use to produce professional looking documents like, letters, invoices, orders etc.

They have easy to use document edit, format, table tools etc.

(4) Business

E-Business and **E-commerce** facilitate the buying and selling of goods, services and works on line.

Businesses have got websites and networked computers they use to advertise, processing of orders, receipting of purchased products, etc.

For instance Web sites like: - www. CD-Now for buying music CDs, DVDs & VCDs, and Interflora.com – for flowers.

Other businesses include;

- Computer Secretarial Bureau.
- Internet cafes.
- Commercial computer schools.
- On-line banking

(5) Entertainment and Leisure.

ITs offers lots of leisure and entertainment activities in form of;

- Computer games
- Computer audio music and video players
- Games on line
- Leisure centers on line.
- Leisure websites

Skynet.com for sports and manu.com, are some of the informative leisure websites.

(6) Health & Medicine.

ITs are now being used for;

- Medical tests for instance blood, cancer, Brain damage etc
- Carrying out sensitive operations on sensitive body parts like the brain, heart, kidney, etc.
- Drug mixing and prescriptions.

7) Transport & communication

ITs are also being used for;

- Units of carriage surveyarance in logistics management.
- Sending and receiving of messages like sms (E-mail = sms over the internet), and interactive websites.
- Reservations for units of carriage and hotels.
- etc

8) Accounting and Finance.

Software/programs are now available for producing financial reports like income statements, Balance sheets, and cash flow statements. Such programs aid financial planning plus management, determination of NPV, PBP, IRR, etc
Such application/programs include Pastel, Tally, Sand systems, Excels, etc

(9) Climate and Weather:

Programs have now been developed to accurately predict and report changes in climate and weather to aid travelers and farmers.

(10) Security and military.

IT Laser guided cameras and satellites are now used for national and domestic security. Business like Banks, supermarkets etc also use IT Laser guided cameras for customer monitoring in the business hall.
Information technologies are also used in the military to fly and direct combat planes, locate enemy positions and hit/shell them with minimal civilian and property losses.

(11) Manufacturing:-

In many large manufacturing and production processes robots are being used to handle tasks, which cannot be efficiently handled by humans.
Computer Aided Design (CAD) and CAM (Computer Aided Manufacture) are also in this category.

Other areas of application include;

- Hotel and Institutional catering.
- **General Management. For instance;** DSS, HRS, MKT, ESS, tele-working and tele-commuting, .
- Information technology helps in the jurisdiction of cases in courts of laws, sports and games; ITs (video evidence) have been adduced to influence decisions.

THE CONCEPTS OF DATA AND INFORMATION

DATA:
Refer to basic/raw facts and figures. Data is not a good basis for planning or decision making e.g.

- Hours worked by an employee.
- Arrival time of an employee
- Sales figure for a day etc

TYPES OF DATA

Direct data or Primary data: Originates from the source i.e. first hand data.

Indirect or secondary data: Data which comes in a more round a bout way. It is already researched data e.g. textbook data, magazine data, newspapers, etc.

Others forms of data include;

- Currency. Data expressed in monetary value.
- Number (0 – 9)
- Date/time
- Memo
- Text. Data constructed from letters of the alphabet, or a combination of letters of the alphabet and numbers.
- Image.
- Voices.

Data processing methods includes:-

- Manual methods. Involves use of human beings for data processing.
- Mechanical. Involves use mechanical typewriters, abacuses, slide rules etc
- Electronic Data Processing (EDP)
- Electro-mechanical methods

(Think and give the Advantages and Disadvantages of each mode)

INFORMATION

This refers to processed data i.e. data that is already converted into a more useful/meaningful form. Information should be the basis for decision and policy making. On many occasions the two concepts (data and information) have been used interchangeably. One has been used to mean the other.

LEVELS OF INFORMATION

-Strategic information
-Tactical information
-Operation information

Types of information

- Past information
- Present information.
- Future information
- Strategic information
- Tactical information
- Operational information

The monetary value placed on information depends on:-

- ✓ The accuracy of the information
- ✓ It is intended purpose

Good information can do one or all of the following.

- Reduce costs
- Eliminate losses
- Lead to a more efficient use of resources
- Provide better management and more accurate decision-making.

QUALITIES OF GOOD INFORMATION

- Timelines. Having data at the right time.
- Cost effectiveness. Having data which is within the means of the firm.
- Completeness/ Comprehensiveness. Having information that is not lacking in any form.
- Relevance. Having data which is capable of solving organizational needs. It must be directed to the right audience and from the right author.
- Clarity. Having data that is error and ambiguity free.
- Must be through the most appropriate channel. I.e. a channel which is noise free, or minimizes noise.
- User specific or easily attached to the user. It must be properly qualified or structured.
- Accuracy. This is all embracing i.e.
  Time accuracy.
  Cost accuracy.

Data/Information Processing Cycle

Getting information is a process involving:

Data Collection →Data Inputting →Data Processing (Processor) → Data Outputting (Information).

PART TWO
SYSTEMS THEORY

A System:

A system is a set of ***inter-relate*** components/Elements set together to perform a given task.

Types of systems.

A system can be classified as;

- **Deterministic system:** - Is a system where given the input the output can be determined.
- **Probabilistic/stochastic system**. Is a system where given the input the output cannot be successfully determined.

- **Self–organizing/Adaptive/Cybernetic systems.**
  Systems which are highly complex. i.e. system which continuous adapt to changes in the environment.

Systems can also be classified as;

- Data processing systems.
- Information system.
- Knowledge based system

Data processing systems (DPS):

These are systems that automate many of the routine clerical and administrative procedures in organisation. E.g. order processing system
Stock control system, Routine billing system, etc
Management can not base on them for tactical and strategic decisions.

On-line Analytical Processing Systems (OLAPS):

These are Interactive systems.

Transaction Processing System(TPS):

Support the operation of organisations by processing transactions and keeping them in master files. They work as the interface between the organisation and its customers.

Information Systems (IS)/Management Information System (MIS):

Are system that convert data from internal and external source into information to be used by manager if effective decision making for planning, Directing and control of original activities.

They include:

Executive information system (EIS) or Executive Support system ESS.

Systems used by the highest levels of control to ease access to internal and external data for effective decision and policy making.
EIS/ESS usually provides summarized reports.

Decision support Systems (DSS)

Used to help manager in effective decision-making where data is unstructured. Unstructured data is one with very high level of uncertainning and it is more difficult to make the right decision using it.

Expert System:

Systems designed to provide specialized information/data. E.g.
Accounting/Finance system.
Marketing information system.
Human resource information system.
Health applications

Other Systems include;

Neural Network System
Artificial intelligence systems.
Fuzzy logic systems
Open systems
Closed Systems

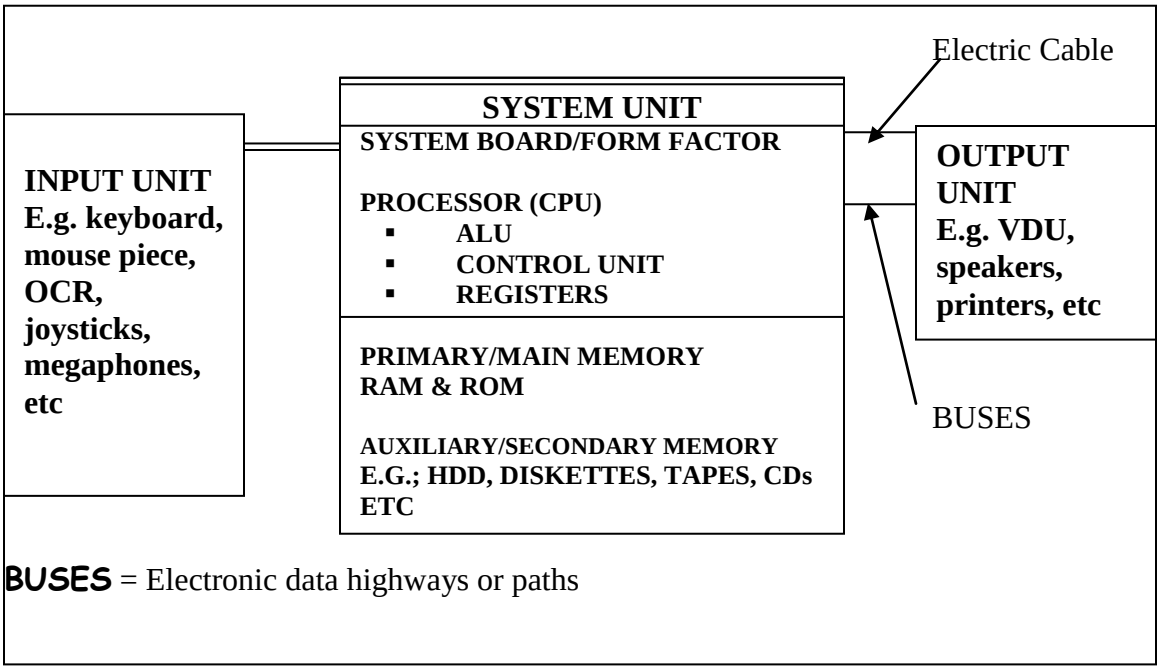
NB. The most fundamental Invention in ICTs is the *COM*PUTER.

PART THREE
THE COMPUTER

Computer (*Defined*):

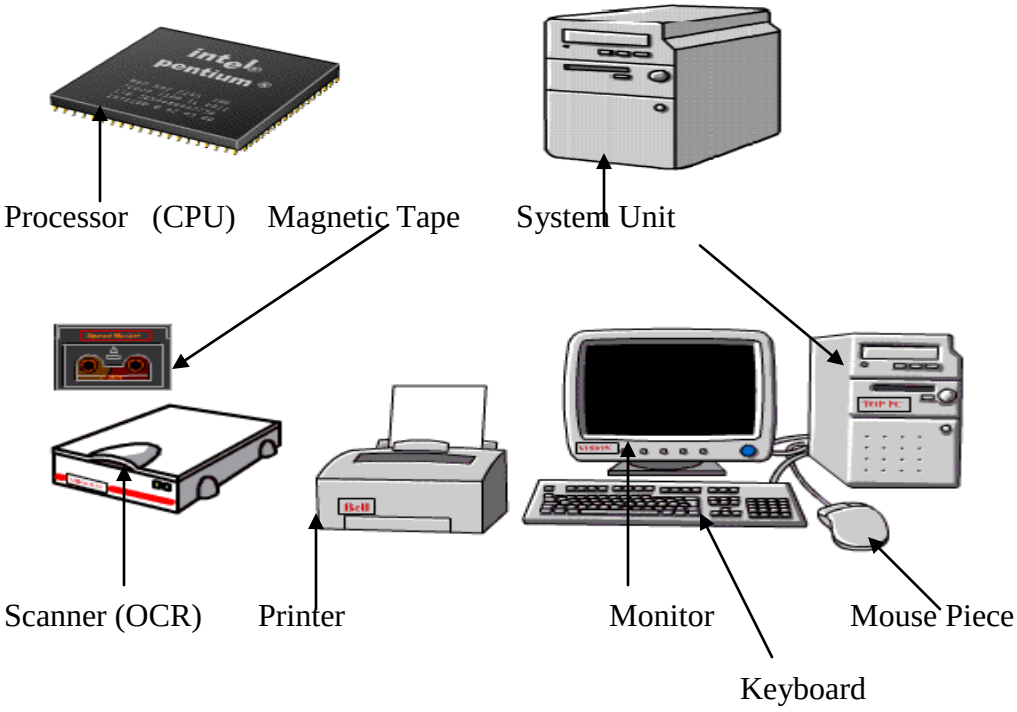
Is an electronic device which, when its **Hardware** combines with **Software/Program**, can **capture**, **Process, Store and Communicate/Output** data/information according to prescribed instructions of the user.

Structure of a Simple Computer System.



BUSES = Electronic data highways or paths

Some Basic Elements of the Computer System



(a) **Input devices:** These are devices used to key data and instructions into the Computer. E.g. the keyboard, mouse piece, scanners, digitizers, Microphones, Stripper barcode reader, etc.

(b) System unit: Is a metallic casing used to house the power supply unit, system speakers, hard disk, DVD/CD-ROM drive, floppy drive, and System mother board (or call it form factor or system planner with the CPU, system ports and slots, IDE cable/data buses, CMOS battery, Dimms/Simms, etc).

(c) **Output Devices:** These are devices used to communicate data and information to the computer user. They release stored/processed data and information for viewing. e.g. printers, speakers, lights, and Video Graphic Array (VGA) or monitor or Visual Display Unit (VDU) or screen, etc

ACTIVITY:
Evolution of computers or computer generations. (Can one of us direct the discussion to take us through the evolution of computers)

Dimensions of analysis:
Look at;

- Origin of computers, i.e. when and how they started.
- Personnel involved, i.e. the brains behind the inventions and changes to date.
- Mechanical vs. electronic changes and adjustments.
- Changes to-date. For instance,
  - Changes in physical size.
  - Increase processing speeds and storage power.
  - Changes in cost for computers, programs and accessories.
  - Emission of heat.
  - User friendliness.
  - **Etc.**

CHARACTERISTICS OF COMPUTERS

Speeds:
Computers are relatively faster in their processing speeds if compared to humans and other data processing means. Their operation speeds are in millions of calculations in a second.

Accuracy:
Once given the right instructions, computers are very precise and exact. Hence being the right tool in places where a lot of precision is needed. Computers are even capable of detecting mistakes and correcting them once made by the users.
Consider (GIGO!!!).

Diligence:
Computers are very meticulous and are capable of doing and repeating similar task without tiring or getting bored.

Memory Capacity:

Unlike other data processors, computers are capable holding data for long time without losing it through their storage media like; HDD, CDs, flash disks, DVDs, etd.

Artificial intelligence (AI):

Computers are very intelligent devices and can receive and respond to requests, and give the appropriate response.
AI = Ability of computer to mimic human thought.

Automation:

Computers receive and work on instruction on their own. They work on minimal human intervention.

Situations where computers might be more appropriate than people;

- Dangerous situations and tasks.
- Easily automated tasks like telephone call switch boxes
- Repetitive tasks which turnout to be boring.
- Mathematical calculations
- Situations calling for extra-ordinary skills.

FACTORS CONSIDER FOR PROCURING A COMPUTER SYSTEM.

- Needs of the organization or volume of transactions.
- System specifications e.g., capacity of HDD, RAM, processor speeds, and system board architecture (closed Vs. Open, Single vs. Double layered), monitor resolutions, accessories, etc.
- Nature of the Institution\Business
- Safety prorision, fatigue plus stress, Noise
- Costs of system components and development.
    - Initial cost outlay.
    - Installation costs
    - Maintenance and repair costs.
    - Personnel costs.
- Source of system components
- Environmental concerns. A good system must be environmentally friendly.
- Available employee skills.

METHODS OF COMPUTER SERVICE ACQUISITION

Computer services can be procured through the following modes.

- Direct purchase/procurement
- Hire.
- Rental
- Lease

NB: Consider the Advantages and Disadvantages of computer.

EXPRESSION OF COMPUTER CAPACITY/DATA CONVERSION/CODING SYSTEM

In the digital/computer world all characters are represented by either a byte or bytes depending on the coding system used. Bytes are derived from bits (0s and ls) which are combined to represent letters, numbers, or special characters.

Hence computer capacity can be expressed as:

A bit = A single 0 or l = the smallest unit of measurement.

Byte = A group of 8 bits forming characters.

Kilobytes (KB) = 1000byte = 8000 bits.

Megabytes (MB) = l, 048, 576bytes lm byte

Gigabyte (GB) = l, 073, 74, 824 bytes lb byte

Terabyte (TB) = l, 009, 5ll, 776 bytel trillion bytes

Binary coding schemes/standards:-

EBCDIC: Extended Binary Coded Decimal Interchange. Code used in mainframe computer.

ASCII: America Standard Code for Information Interchange. Used in microcomputer.

Unicode: A super set of ASII using it byte (l6bits) for each character

CODES FOR LETTERS OF THE ALPHABET

CHARACTER	EBCDIC	ASC11
A	ll00 000l	0100 0001
B	1100 00l0	0100 0010
C	1100 0011	0100 0011
D	1100 0100	0100 0100
E	1100 0101	0100 0101
F	1100 0110	0100 0110
G	1100 0111	0100 0111
H	1100 1000	0100 1000
I	1100 1001	0100 1001
J	1101 0001	0100 1010
K	1101 0010	0100 1011
L	1101 0011	0100 1100
M	1101 0100	0100 1101
N	1101 0101	0100 1110
O	1101 0110	0100 1111
P	1101 0111	0101 0000
Q	1101 1000	0101 0001
R	1101 1001	0101 0010
S	1110 0010	0101 0011
T	1110 0011	0101 0100
U	1110 0100	0101 0101
V	1110 0101	0101 0110
W	1110 0110	0101 0111
X	1110 0111	0101 1000
Y	1110 1000	0101 1001
Z	1110 1001	0101 1010

CODES FOR NUMERIC FIGURES

CHARACTER	EBCDIC	ASCII
0	1111 0000	0011 0000
1	1111 0001	0011 0001
2	1111 0010	0011 0010
3	1111 0011	0011 0011
4	1111 0100	0011 0100
5	1111 0101	0011 0101
6	1111 0110	0011 0110
7	1111 0111	0011 0111
8	1111 1000	0011 1000
9	1111 1001	0011 1001
!	0101 0101	0010 0001
;	0101 1110	0011 1011

CONVERSION/CODING/BINARY SYSTEM.

NB: A computer has got its own language or codes by which it understands instructions. Two digits of 0s and ls are combined in codes of 8 digits to represent a character i.e. letters, numbers or special drawing like lines, triangles, circles, curves, etc.
Hence;

One digit (0 or 1) = a bit.
Eight digits (bits) = one byte
One byte represents a character. E.g. a letter or number.

8 bits = l byte (b).
2^{10} bits = l024 bits = l Kilo byte (kb)
2^{10} KB = i024 KBs = l Megabyte (Mb)
2^{10} MB = l020 MB = 1 Gigabyte (GB)
2l0 GB = l024 GB = l Terabyte (TB)

ADVANTAGES OF COMPUTERS.

- Computers are more accurate, diligent and faster in data processing.
- Document which are computer set look more business.
- Offer a multiples of services like data storage, calculations etc.
- Computers are devices for entertainment/leisure through computer games, music, etc
- Computers are sources of knowledge through computer education software.
- Offer simple and easy to use document edit and format tools.

DISADVANTAGES OF COMPUTERS.

I. Need expensive specialized skills to maintenance and use.
II. Expensive to buy and maintain.

III. Lack human judgment.
IV. Computer related crimes like forgeries and illegal fund transfers through networks.
V. Computer errors can be fatal.
VI. Loss of man-hours through unnecessary games and surfing on the net.
VII. They are health and environmental hazards through eye defects, noise causing stress.
VIII. Computer viruses, which can lead data and information loss.

TYPES OF COMPUTERS

Computers can be classified according to:-

- Physical size of the computer system.
- Number of users a system can support at a time.
- Processing speeds/CPU.
- Nature of data presentation.
- Memory size.
- Nature of he system unit (desktop vs. tower computers).

Hence the following types of computers;

(a) MICRO COMPUTERS/PCs.

These are computers which can support one person at a time. They are also called personal computers (**PCs**). They also have the following additional characteristics;

- Use a micro-processor chip as its CPU.
- They are the smallest type.
- Relatively cheap.

Examples of personal computers include;
Portable Personnel Computer, e.g. Osborne 1, Compaq PC, Otrana, Attaché.
Handheld PCs like; TRS- 80, Sinclair 248l,etc
Consumer PCs like; TI 99/41, ATTARI l400, etc.
Business Personnel Computer, e.g. Apple Lisa, TRS 80II, DEC – 300.
Professionals PCs e.g. lBM Pc, TRS 80 III/DEC Rainbow, HP85/6, etc.

(b) MINI – COMPUTERS

These are computers, which can support 2-50 users at a time.
They also have the following features:

- Have multiprocessor CPUs.
- They are relatively expensive if compared to micro-computers.
- They are used in small and medium size.

(c) Mainframe computers

These are computers which can support processing requirement of a hundred to a thousand users at a time.

- They have relatively stronger multi-processors if compared to mini-computers.
- They are relatively big if compared to micro and mini computers.
- Used mostly by banks, aviation companies, universities, etc.

- They are relatively expensive if compared to mini-computers.

(d) Super Computer.

These are high intelligent specialized computers designed to handle sophisticated tasks in large plants.

- They are approximately 50,000 times faster than microcomputers.
- They can handle large Volumes of scientific computations.
- They are generally the most expensive in terms of initial outlay and maintenance costs.
- Used in defence, Nuclear plants, climate and weather stations, scientific research, and large manufacturing plants.

Other types of computers include:

Digital **vs**. Analog computers.

Digital computers are ones whose characters are represented to the computers in form of bits and bytes. Whereas, **analog computers** are ones which process data that is in continuous form or measurable quantities or units.

Dedicated **vs**. Non-dedicated computers

Dedicated computers are designed (dedicated) to carry out specific tasks

GENERAL CATAGORIES/DIVISIONS OF THE COMPUTER SYSTEM

i.e;

- Hardware.
- Software
- User.

Computer Hardware Components:

This refers to the **physical** components of a computer system. They are components which can be seen, touched or felt.

They can be generally categorized as:

- In-put Devices.
- The System Unit
- Back-up Storage devices
- Output Devices.

(a) INPUT DEVICES:

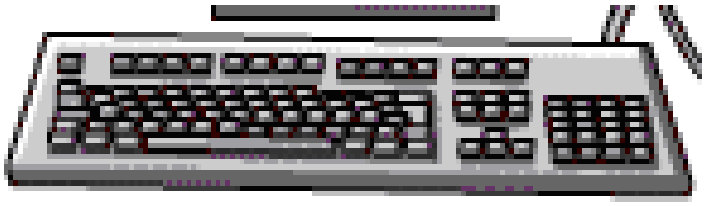
Are hardware components used to feed data (information) and instructions into the computer.

(b) **Keyboard**.

Is a primary input device with a number of special keys which can initiate programmed routines.

Types of keyboard:

83 key Pc and XT keyboard
84 key Pc and XT keyboard
10l - key enhanced keyboard. (Five pin)
104 - Key enhanced windows keyboard. (Six pin)
108 - Key enhanced keyboard.



Parts of a keyboard

- Function keys F1 – F10/F12.
- Typewriter Area (A – Z keys, and 0-9 keys)
- Cursor and screen controls keys (e.g. home and end keys, Page Up and Page Down keys, arrow keys, etc).
- Numeric key pad (with numbers 0 – 9 and arithmetic signs on the extreme right hand side of the keyboard)

Keyboard special keys

(a) Alt key:-

The Alt-key combines with other keys to perform specific functions.
In most window programs, the main menu Tabs have got underscored letters e.g. **F**ile, **E**dit, **V**iew, F**o**rmat, **T**ool, T**a**ble, **W**indow and **H**elp.
Pressing Alt with the underlined letter will activate that menu.
Alt + F4 = Exits a program.

(b) Control (ctrl) key.

Used with other keys to perform specific functions/operations e.g.
Ctrl + F2 = Print preview
Ctrl + Alt - Adds a new page (Page Beak)
Ctrl + Alt + F2 = gives '*Open file dialogue box*'.
Ctrl + Alt + Del = Initiates a reboot (warm boot)
Ctrl + P = initiate print dialog box
Ctrl + B = bolds a selection
Ctrl + S = saves a file
Ctrl + V = Paste.
Ctrl + W = New file
Ctrl + X = Cut.
Ctrl + Esc = Activates the startup menu.
Etc

(c) **Shift Key.**

Makes one alternate between lower and upper case characters during routine typesetting operations. It is also used for other short cut operations e.g.
SHT + F3 = Alternates between lower and upper case characters, title case and sentence case.
Shift + Arrows = used to select text.
Shift while inserting a CD-ROM to deactivate the auto-run.

d) **Windows key**: Activates the start-up menu for the computer user to run shutdown, Run, Help, Search, Settings, Documents, programs, Control panel, etc.
Ctrl + Esc = Activates the startup menu too.

e) **Enter key/Return**:
Used to enter/confirm commands or move the cursor/insertion point to a new line.

f) Tab key:
In normal typesetting, tab keys help in having data in columns with smooth margins. When working with tables it is used to move from field to field, and to add a field/Row in a table.
When the cursor is in the last bottom cell of the table, pressing tab key adds another row. Shift + Tab take you back to the previous field.

g) Del + Backspace key.

h) **Escape (ESC) key** = used to Exit/close a dialog box.

i) Cursor control Keys:

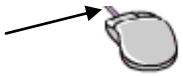
Home = Moves the cursor at the beginning of a line.
End = Moves the cursor to the end of a line.
Insert = for overtyping.
Delete = deletes one character at a time on the right of the cursor.
Back space key = deletes one character at a time on the left of the cursor.
Page up = Moves the cursor to the top of the page.
Page down = Moves the cursor to the bottom of a page.
Num lock key. = Activates the numeric keypad.
Print screen key = for printing what is on the computer screen.
Scroll Lock key = for scroll lock. Disabled in modern keyboards.

(c) MOUSE - MICE (plural).

It is a computer input pointin device used to move an arrow shaped pointer on the computer screen as it is gently moved onto the desk-top/mouse pad, to select, move and confirm operations.

Parts of a mouse piece.

Primary button
Secondary button
Wheel button.
Rubber ball – roller for ball type mouse – signal movements.
Mouse housing which can be held in to your hand.
Cables connecting the mouse to system board.

Mouse piece 

An Interface connecter to attaché the mouse piece to the mouse board.

Types of mice interface

(I) Serial interface: Used by old Pcs with 9 -25 pin male connectors. Most PCs used to have two serial ports i.e. COM1 and COM 2. Once the device driver is initialized it searches for the connected port.

(2) PS/2 mouse interface: i.e. on board mouse port interface or dedicated motherboard mouse port.

(3) USB interface: (input/output) this works through USB slots of the system board.

Types of Mice

Code less mouse: with optical sensor and doesn't accumulate dirt.

Ball type mouse.

Mice Faults

Mouse pieces are usually disturbed by the following;

- Dirt accumulating on mouse rollers and wheel mechanism.
- Bending pins.
- Interruption conflicts: The computer fails to recognize its mouse piece. Restart the computer or check mouse drivers/software.

Other computer pointing devices include:

Trackball
A trackball is a stationary pointing device with a ball mechanism on its top.

Joystick
A joystick is a pointing device with a vertical lever mounted on a base to control the position of the cursor.

Light pen
A light pen is a handheld pen like pointing device that has a light sensitive point to select options on the screen.

Touch screen
A touch screen is an input device that permits the entering or selecting of commands and data by touching the surface of a sensitized video display device with a finger or a pointer.

Touch pad
A touch pad is a small flat rectangular pointing device that is sensitive to pressure and motion.

OTHER INPUT DEVICES

Scanners: Optical character Recognition (**OCR)** works like a photocopier to transmit images of data/text into the computer as digital codes.
Sensors: Used to capture and measure data in form of temperature, light and sounds.
Digital cameras: These capture clips of happenings for processing and storage into the computer.
Microphones. For inputting audio or voice signals into the computer.
Touch panels. For touch signals.
Remote controls.
Graphics Tablet (Digitizer). A flat pad, which can be drawn or written on using a pressure sensitive stylus pen. Whatever is written is converted into digital signals for the computer.

Stripped bar code reader. Used in supermarkets to pick product codes for easy price calculations.

THE SYSTEM UNIT

Is a metallic casing housing the following devices:-

Power supply unit: Picks power from the mains and distributes it in required voltages.

Floppy disk drive
CD – ROM drives.
Hard/local disk.
System Power Switch.
System Speakers.

Read Only Memory (ROM). ROM can be in form of;
EPROM = Electronically Programmable Rom.
EEPROM = Electronically Erasable Programmable Rom.
System power and hard disk lights
System Board/mother board/planner/form factor or main system board. The System Board determines the computer system. Architecture. For instance, Closed Architecture, Open Architecture, Bit–Bus architecture. **i.e.**

ISA = Industrial Standard Architecture.
MCA = Micro channel Architecture
EISA = Extended industry standard Architecture.

TYPES OF SYSTEM BOARDS.

Baby AT. Cards are slotted onto the system board

Full size AT. It is bigger, almost twice the baby AT.

LPX – has a raiser card, very wide and typical of IBM and Compaq brands.

ATX – Commonly used to-date and combines both AT and LPX technology.

NLX – It is improved LPX, supports latest CPUs and changes in technology, Flexible, etc.

Proprietary design system boards.

System boards can also be classification according to their bit–bus architecture, hence having:
-Single layer System boards
-Double layer System boards.

System Board in Details

- CPU Socket.
- RAM Memory sockets i.e. for SIMMs or Dimms (Single in Line Memory Modules and Double in Line Memory Modules respectively).
- ROM Bios containing POST program, Bootstrap Loader, System board drivers, system setup program called CMOS setup. This can also determine and control how first operations can take place in the Pc.
- Data Buses
- Peripheral Ports

- Integrated Disk Electronic (IDE) Connectors
- USB Ports/PCI Slots
- Jumpers
- **N**etwork Adopter Card and NIC slots
- Video Adaptor Cards/VGA Cards
- Sound cards
- Television and Frequency media/modulation cards
- Etc

PROCESSING HARDWARE

This is composed of the **Central Processing Unit** (CPU).
This is the area which is responsible for the control and execution of all the computer operations. For instance, it accesses data from memory, carries out intended operations and stores the result into memory again.
The CPU is the brain of the computer.
Physically the CPU is identified as a micro or multi processor **chip.** It is made up of a numbered of circuits and buses and compacted as a chip.
The CPU is composed of three main parts i.e.

a. **– The control unit.**
b. **Registers/Accumulators**
c. - **Arithmetic Logic Unit** (ALU) i.e. works on data to be subjected to mathematical operations/calculations and logic. Arithmetic involves fundamental math operations of -, +,*, /, etc.
Logical Operations involve comparison of phenomena e.g. passed/failed, yes or no, present or absent, =, >, <, on/of, etc.

Control Unit (CU)

The CU performs the following functions;

- ♦ Fetches and sends commands to system devices and peripherals.
- ♦ Interprets commands i.e. it's is the intermediary between the user and the computer.
- ♦ Controls and times all tasks by the CPU (typical of Multi-tasking where processor time is shared amongst competing tasks).
- ♦ Directs the movements of electronics signals between the CPU, input, memory and output devises. Hence the CPU acting as a data traffic warden.

(3) **Registers or Accumulators**: Are additional storage locations in the CPU which hold data and instructions temporarily during processing.
Examples of processor on the market include;

-Intel 8085, 8085
-Intel Pentium I, II, III, and IV. (Double layer)
-Intel Celeron – Single layer, Heats up very fast, and they are cheaper if compared to double layer processor chips.

-Pentium Dual-Core
-Cyrix
-Motorola 68040, 68030
-Motorola G3 and G4. They are relatively expensive and can work for months and months without heating up. They are usually used in servers systems.

STORAGE HARDWARE or MEMORY UNIT

Memory hardware devices house/store computer programs or instructions, data and information.

Memory unit consists of:-

Primary memory \main storage
Secondary/Auxiliary or back-up storage units

(a) Primary Memory/Main/Internal/Memory

Primary memory consists of:-

(i) Read Only Memory. (ROM)

ROM is a write once read many memory. It houses data/information and programs the computer user can access but can not change or delete. Such information can be;
POST information
System device drivers i.e. program which enable specific parts of system to communicate with other system devices.
Manufacturers' information about his computer brand, etc. Physically, **ROM** is a chip and can be EPROM or EEPROM.

ii) Random Access Memory (RAM)

RAM holds data and programs the CPU is currently processing. It is the user at a given time.
RAM is very volatile i.e. it losses its data content on any sudden electric power loss or switch off. Hence need for back–up second storage device.
Physically it is a chip with storage capacities in MBs. E.g. 64, 118, 128, 256, etc.

NB: (1) **RAM** chip can be in form of **Single inline memory modules** (SIMMs) or **Double inline memory modules** (Dimms). **Others include;**
DRAM Chips = Dynamic RAM.
SRAM = Static RAM. It faster, expensive and offers more space.
EDO – RAM = Extended data out RAM

(2) **Spooling**: This involves transferring data from one storage media to another. Without spooling data from input devices would be stored in the primary memory making it overloaded.

(b) SECONDARY MEMORY.

Secondary memory relates to either removable or fixed data storage devices which provide information storage for reference purposes. They supplement RAM which is very volatile.
Includes:-

i) Serial Access media e.g. magnetic tapes, paper tapes, punched cards .etc
(ii) Random Access media e.g. discs or hard disks, floppy diskette, etc.

(ii) Magnetic (e.g. diskettes, magnetic tapes, hard disk, Zip and Jazz disc, etc) Vs Optical memory (e.g. CDs-R or W, VCD, DVD, etc).

CARE FOR DISCS AND DISKETTES

- Do not bend so avoid pocketing.
- Do not touch exposed data parts.
- Do not apply paraffin, petrol or acid.
- Do not expose to magnetic fields.
- Do not attach clips or Rubber bans.
- Do not write on or label using hard or sharp pens, or do not scratch
- Store bottom down.

Advantages and disadvantages of Floppies sizes.

Advantages

- Cheaper compared to other storage media
- Protected in plastic casing
- Facilitate data transfer.
- They are in standard sizes (e.g. **3½, 5¼**, and **8½**).
- Easily edited and formatted.
- Flexible/lighter making their transfer easy.

Disadvantages

- Virus transfer agents
- Have very limited storage
- Relatively not very durable
- Slower data access and storage.

HARD DRIVE DISKETTE (HDD)

Advantages

- ✓ Offer more data storage space.
- ✓ Always available.
- ✓ Faster data access and storage when compared to floppies.
- ✓ Supplement RAM. Facilitate backup.
- ✓ Provide more permanent data storage if compared to RAM.

Disadvantages

- ✓ Relatively expensive.
- ✓ Relatively heavy.
- ✓ Virus prone.
- ✓ Can clash leading to information losses.

Other Memory Options;

(I) Virtual Memory:

Storage space in the Hard disk used to expand/supplement RAM. It enables the computer user ran more programs than available RAM can handle.

(2) Cache Memory:

Is a special high speed memory area that the CPU can access quickly. It can be location in the CPU or on the system board/planner. To store frequently used programs.

(3) Video Memory (VRAM)

Used to storage display images for the monitor
Its size dets:-
=How fast images appear.
=No of colour available.

(4) FLASH MEMORY:

This is a special non–volatile RAM chip inserted into USB port to simulate and supplement the hand-disk.

OUTPUT HARDWARE DEVICES

These are devices through which processed or stored data is communicated or output to the computer user. They include;

(a) The Monitor/VDU/VDT/VGA, CRT or Screen.

This is a TV–like device which produce screen oriented soft copies of processed or stored data.

Types include:

Monochrome –Black and white and Black and green monitors.
Coloured/R, G & Blue.
Prism/Flat screen or Liquid crystal Display (LCD).

(b) Printer

This is an output device which produces hard copies of computer processed data.

Types

(i) Impact Vs Non–Impact Printer.

- **Impact printer**

Printer where the print element strikes the paper

Characteristics of impact printers

- ✓ Print by force
- ✓ Produce some noise while printing
- ✓ They are relatively slow.
- ✓ Use ribbon at times

They are used to cut stencils in the printery and schools.
Examples include;
Daisy wheel printers
Dot matrix, whose characters are in form of dots.

*Matrix Vs Plotters?????

- **Non-impact printers.**

These are printers based on scanning technology to produce hard copies. E.g. ink jet, laser jet etc.

Characteristics of non-impact printers

- ✓ Hardly produce noise. They are relatively quieter.
- ✓ Produce relatively better quality output.
- ✓ They are relatively faster when printing.
- ✓ Can produce colored output
- ✓ Use Tanner
- ✓ Use copying/burning principle.

- ✓ Relatively expensive
- ✓ They are available in a variety of sizes.

(ii) Serial Vs Parallel/Non–serial Printers.

Serial printers receive one bit of data, at a time. They are also capable of producing a single character or word at a time. Whereas parallel printers are ones which receive one character (byte) at a time. They are also capable of producing one line or page at a time. Examples include, line printers, drum/barrel printers, etc.

(iii) Unidirectional Vs Bidirectional.

Unidirectional printers print in one direction whereas, bidirectional printers can print from either side of the paper.

Other Output Device

Speakers/Earphones.
Disks and magnetic tape.
Plotters.

OTHER HARDWARE DEVICES

UPS – Uninterruptible Power Supply Unit
Anti–Glare screens.
Data buses and Electric cables
Dust covers

COMPUTER HARDWARE PROBLEM.

→Excessively low/high temperature causing:-

-Circuit/bus cracks
-Connection breaks.
-Chip crapes small movement\dislocation.

→Effects of dust:-

Dust builds thick coatings in slots, ports, internal chips, etc. Dust coating can cause unnecessary heat, data and electric insulation.

→Effects of corrosion:

Hardware comes into contact with atmospheric chemicals, food, human body, water etc causing rust.

→Magnetic Field:

They cause magnetic inductions, which disturb computer data movements and processing.

→Electrical Noise:

This can be in form of;
-Electronic static discharge causing short circuits.
-Electromagnetic interference, or
-Electro magnetic redactions traveling in space.

→Electrical power Variations

This causes the following.

-Blackouts
-Power transit i.e. excessive low voltage.
-Brown out. Lowered power from the mains

PART FOUR
COMPUTER SOFT WARE/PROGRAMS

SOFT WARE:

This refers to electronic instructions, commands or programs (artificial intelligence) which tells the computer how to perform tasks. It relates to all forms of information processing instructions.

Alternatively, a **program** is a complete sequence of instructions for data processing to be performed by a computer.

Software consists of:-

-Application software.
-System software.

(A) Application Software

Are programs or instructions, which direct data processing for a particular problem for a computer user. The problem can be word processing, spreadsheet management, presentations management, entertainment, etc.
Applications direct the computer how to produce information.

Application software is subdivided into:-

-Custom or tailor made software.
-Packaged/off-the-shelve software.

(i) Custom/Bespoke/Tailor-made Software or User Application

Are computer programs which are designed and developed for a specific customer.

Advantages custom/bespoke software

-Hard to manipulate.
-Improve image.
-Increase productivity.
-Cater if all firm needs by providing for all the necessary details.

Disadvantages

-They are very expensive to design and develop.
-They are very rigid. Since they can only be used by one customer.
-They are time consuming to develop.
-They need a lot of specialized skills which require expensive special training.

(ii) Packaged or off-the-shelve software

These are computer programs developed for sale to the general public to solve routine organizational problems. Application packages are either "specialised applications" or "generalized applications" e.g.

-Word processors like word perfect, Microsoft word, Note pad Word Star, etc.
-Electronic spread sheet Lotus 1-2-3, Microsoft Excel, etc.
-Presentation software.
-Database management software.
-Acting software like Pastel, sage, Quick books, Tally, etc.

Advantage of off-the-shelve software

-They are readily available in software kiosks.
-They are cheap to procure. Why?

-They are very flexible since they can be used by any organization.
-They are entertainment and leisure tools.
-Do not need a lot of specialized skills.
-They have educational value.

Disadvantages.

-They are very easy to manipulate since they are almost – known by every one.
-They are not very secure.
-May not handle some problem with ease.

General examples of off-the-shelve software include

-Productivity software.
-Education reference software: e.g. Infopedia, Encyclopedia English Usage Dictionary, etc.
-Home personal software for home repairs, gardening, decoration, travel planner, etc.
-Specialty software for desktop publishing, project management, presentation graphics.

B) SYSTEM SOFTWARE.

These are programs which contribute to the control and performance of the computer system. They enable application software to interact well with the computer, and also help it in managing its internal and external resources.
System software is usually found already installed by the computer manufacturer or vendor.

It consists of:-

-Operating system/the executive
-Service or utility programs /system utilities.
-Language translator.
-Database management system

(a) Operating System (OS).

(The executive or the traffic officer**)**

An operating system is a master control program which manages and supports the operations of the computer system. Operating systems contribute to the control and management of the computer system. E.g. Window 98, NT, 2000 & XP, UNIX, Linux, Wang, Novel Netware, Macintosh etc

Operating systems can be classified as;

-Single user OS
-Multi-user OS
-Multi–tasking OS
-Multi–processing OS

Functions of the Operating System

NB: It is worth noting that modern operating systems are embedded or come with a variety of programs and utilities which complicates their functions in view of other programs.

However, the traditional functions of the operating system involved the following;

(1) **Booting**: Load/enable the starting of the computer by accessing "starter files" located in the bootstrap loader or boot routine.

(2) **Managing storage media/files**

Perform common repetitive tasks necessary for storage media e.g. formatting of blank diskettes.

In addition the operation system keeps track of the locations within main memory where programs and data are stored. It swaps portions of data and program between main memory and secondary memory. I.e. Memory management.

Memory management can be done through.

-Partitioning – dividing memory into portions. E.g. fore ground and back ground.

-Queuing: This is typical of time shaming system where data is prioritized for purposes of processing in the CPU.

(3) **Management of computer resources**.

For instance, the operating system supervises activities of the CPU and other components, hence acting as a police officer directing traffic.

(4) Managing tasks and processes

This is done through:

Multitasking – A situation where processor time is shared between competing tasks. Help in running more than one programs concurrently.

Multiprogramming: Several user executing different user programs concurrently.

Time sharing: i.e. executing different users programs in round – ribbon fashion.

Multi-processing: Single or multiple users processing with two or more programs at the same time.

(5) Providing User Interface

Operating systems provide user controllable parts (icons, menus, buttons etc) which make it possible for the users to communicate or interact with the computers.

Interface = Input-Output methods/modes employed by the user to input/output data from the computer. Interface can be:

-Command Driven interface.

-Menu–driven interface.

-Graphic user interface (GUI) = Image (icons) and menu user.

-Network user interface.

The Kennel of the operating system.

Also known as the core of the operation system performs.

- ✓ Management of memory, files and other devices.
- ✓ Maintaining computer system clock.
- ✓ Loading applications/programs.

(6) Provision of the platform for application software to run

Activity: identify some of the current utilities and programs embedded in modern operating systems.

(b) System Utilities.

Are programs developed to improve, expand or support or enhance performance of other existing programs in the computer system. They are also referred to as service programs.

Specific Utilities and their Functions

(i) Back–up utilities: Help in making duplicate copies of every file on either internal or external media as security files for reference incase the original copy is destroyed. e.g. Colorado scheduler

(ii) Data Recovery utility: Used to "undelete" or resurrect a file or information that has been accidentally deleted e.g. - Recycle bin for windows, Norton un-erase wizard, etc.

(iii) Defragmentation utility or "Defragger"

Used to find all scattered portions of files on the hard disk and reorganize them as contiguous files.

Excessive file fragments slow down their from the storage media. E.g. Norton speed disk.

(iv) **Disk Repair Utility**

Checks your disk drive for defects and make repair on the spot or mark the bad area. E.g. Norton's disk Doctor.

(v) **Virus Protection Utilities/Anti-virus software.**

Is a utility program that scans storage media (hard disks, diskette and memory) to detect and destroy virus.

E.g. MacAfee virus scan, web scan, Norton artivirus, Dr. Solomon's anti-virus toolkit, etc

(vi) **Data Processing Utilities.**

Utility programs which remove redundant elements, gaps, and unnecessary data from computer storage space. E.g.

-Drive-space to stacker.
-Double Disk.
-Superstar pro.

(vii**) Memory management utilities:**

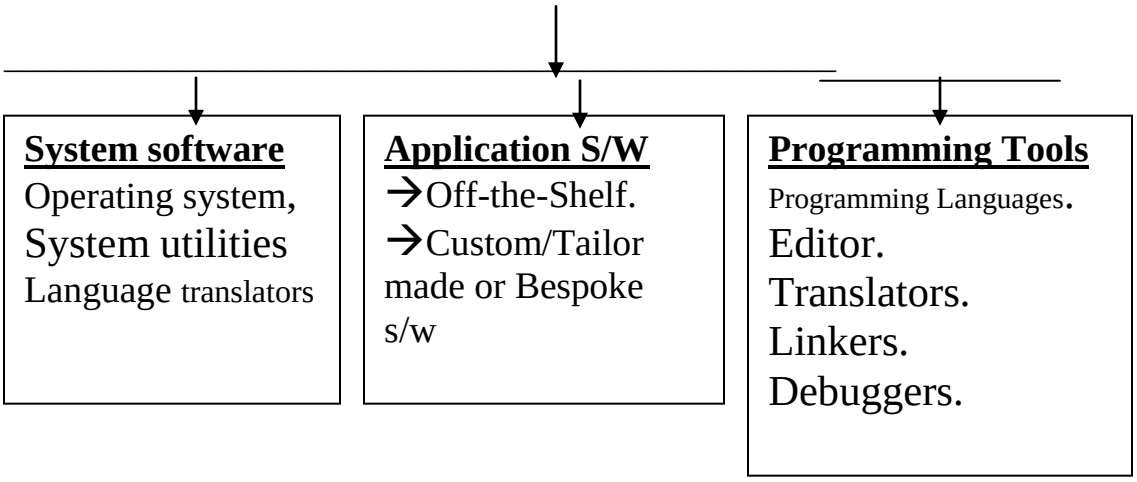
Are programs that determine how to efficiently control and allocate memory resources – (usually activated by software drivers)

(viii) Others:

→Screen saving.
→Sort utility – used for taking in data and re–arranging it in any prescribed order.
→Merging utility – Involves combining data from more than one file into one or so.

Qn. Explain the functions of service programs.

Diagram showing structure of computer software



(c) **PROGRAMMING TOOLS**

Background

(a) **What is a program:** A program is a set or a list of instructions that a computer must follow in order to process data into information. Instructions consist of coded statements used in a programming language like Basic, COBOL, etc.

Programming languages can be;
-General programming languages or,
-Web development languages e.g. HTML, JAVA, etc. for instance we can apply HTML to design one of the web pages for UCC Tororo website as follows;

```
<HTML>
<HEAD>
<TITLE> UCC TORORO SITE></HEAD></TITLE>
<BODY>
Welcome to the centre for business adventure.
</BODY>
```

b) **What is programming?** Is a multi–steps process for creating computer instructions.

c) Programming Steps

Step (1): Problem definition involving:
Specifying program objectives and users.
Specifying output requirements.
Specifying input requirements.
Specifying processing requirements.
Feasibility Study for implementing the program.
Document the analysis.

Step (2) **Program Design**.
Design program Logic through top–down approach and modularization using a hierarchy chart.

Design details using flowcharts, etc.

Step (3) **Program Coding**:

-Select the appropriate high to discover errors.
-Code the program in that language.

Step (4) **Program testing**

-Desk–check the program to discover errors if any.
-Run the program and debug it (alpha testing).
-Run real–world data (beta testing) as opposed to assumptions.

Step (5**) Program Documentation and maintenance:**

-Convert hardware, software and files.
-Write operator documentation
-Write programmer documentation
-Maintain the program**.**

Programming Tools Include:

(1) **Debuggers**: Programs which help programmers, to detect, locate or remove routine, syntax (process) and logical errors.
Syntax errors are caused by:
-Typographical errors.
-Incorrect use of the language.
Whereas Logical errors are caused by;
-Incorrect use of control structures. For instance, forgetting to close the title, head or body in web designing.
<Head></Head>

(2) **Linkers**: Enable calculation of any functions in the program.

(3) **Editors**: Facilitate creation, editing and formatting of program text files.

(4) **Programming languages**:

Are sets of instruction (sw) that tells the computer what operations to do during the programming process.

They include:

(1) 1st Generation languages/Top languages or Machine language/codes: These languages provide basic computer languages representing memory location, instructions and data in 1s and Os (binary number)

Characteristics machine codes

- ✓ Can be used directly by the computer without interpretation.
- ✓ They are machine/computer depend.
- ✓ Less user friendly - Not very easy to learn write, correct.
- ✓ They are typical of first generation computers.
- ✓ They are time consuming during programming.
- ✓ Allow the programmer to pay more attention to the problem.
- ✓ More technical if compared to others.

(2) 2nd Generation languages (1950) or Assembly (middle length).
Are low level languages (**LLL**) that allow the programmer to use abbreviations or easily remembered words instead of binary codes. Use mnemonic codes rather than binary code. E.g. Mult = Multiply; STO = Store, Div = Divide etc.

Characteristics of 2nd Generation languages

-Less technical compared to machine codes.
-More flexible user friendly compared to machine codes.
-Faster compared to machine codes.

(3) **3rd Generation languages (early 1960s) e.g. COBOL, Basic and FORTRAN.** Also known as "High level languages (HLL)". With HLL the programmer uses direct English words during the programming process. They are not machine dependent and can be used on more than one kind of Personnel computer.

Characteristics of HLL

Less technical if compared to both 1st and 2nd generation languages.
Less technical if compared to 1st and 2nd generation languages.
They are more user friendly.
A bit slow since they need to be interpreted to the computer first.
BASIC = Beginners all–purpose symbolic instructions
COBOL = Common Bs = oriented language.
FORTRAN = Formula translation

(4) 4th Generation languages (early 1970s)

Very High–level languages (VHLL)
Are non–procedural or rapid application development (RAD) tools where programs are written by only telling the computer what to do as opposed to a step-by-step process.
Examples include;
SQL = structured query language.
NOMAD, Focus, intellect 4 IBM, C++, etc.
Typical applications include report generators, Query languages, Application Generators, etc.

(5) **5th Generation language**: - Natural languages

These are programming languages which allow questions or commands to be formed in a more conversational way or in alternative forms.

(6) LANGUAGE TRANSLATORS:

These are programming tools which change programs written in 2nd, 3rd, 4th, and 5th generation languages into machine codes or 1st generation language (Os and 1s) which the computer can understand. Language translators are of three types, i.e.

-Assemblers
-Compilers,
-Interpreters

(a) **Assembler**:-

Is a program that translates the assembly – language program into machine language.

Assembly language is one that allows a programmer to use abbreviations or easily remembered words instead of numbers or binary codes.

(b) Compiler: (Executes later)
Is a language translator that converts the entire program of a high – level language into machine language before the computer executes the program.
E.g. of high–level language using compiler are Pascal, C, COBOL, and FORTRAN.

(c) Interpreters (executes immediately)
Is a language translator that converts each high–level language statement into machine language and executes immediately, statement by statement.

Other Software Classifications:

(i) Freeware:
Software distributed for free during the trial period and payment is required for continued use after the trial product.

(ii) Firmware:
Programs built in the computer at factory level with special instructions for basic computer operation

NB: - Usually stored in ROM chips which can not be easily erased.
Firmware helps in;
-Starting the computer.
-Putting characters on the screen.

(iii) Human ware

(vi) Spy ware

(iv) Malware.

(v) Computer viruses

NB:
Software related terms.

(a) **Version**: Aversion is a major upgrade in a software product e.g. from Pas 5.0 to Pas 6.0.

(b) **Release**: Is a minor upgrade in a software product e.g. Pas 5.0 to Pas 5.2.

(c) **Compatibility.** Means that documents created in earlier versions can be successfully processed on later versions.

PART FIVE
COMPUTER VIRUSES, ERRORS AND DATA SECURITY

i) VIRUSES:

A computer virus is a deviant program that attaches its self to the computer system and destroys or corrupts data.

Viruses are developed through love for **Adventure, Malice and sabotage.**

Ways through which viruses are spread;

Mainly:

→Through infected diskettes from infected computer systems and sales demonstration applications.
→Through networks
→Software updates
→E- Mails, E – Bulletins, Free computer games on the net, etc.

Virus Symptoms

→Annoying messages e.g. Your Pc is stormed, not secure or infected.
→Adding garbage to files
→Computer switching its self off and on.
→Unnecessary variations in computer processing speeds.
→Deletion of saved file or obliteration of the functioning of the computer system or software.
→Boot failure.
→Unprecedented screen colour changes.
→Hard disk crash
→Reformatting of the hard disk which is typical of

- World concept virus
- Wazzu
- Hurri
- Boot Malmo

Types of Viruses

Virus classifications can be based on the following;
-Environment
-Operating system
-Different Algorithms of work
-Destructive Capabilities, etc.
Hence the following virus types:

- ❖ File viruses
- ❖ Boot viruses
- ❖ Micro Viruses
- ❖ Network viruses

(a) Boot Sector viruses (BSU)

These are viruses which attack and reside in programs containing instructions for booting or powering–up the computer system e.g. Anti–CMOS virus, Anti-EXE
New York Boot (NYB), Stoned, Empire, Monkey, Ripper etc

(b) File viruses

These are viruses which attach themselves to files which begin/load a program (i.e. executable files). In DOS, files with extensions like .EXE or .COM.

(c) Multipartite virus

Combine traits of both file and boot viruses e.g. Junkie virus and Parity boot viruses.

Polymorphic virus can mutate or change form, whereas Stealth virus can temporally remove self from memory

(d) Macro viruses.

These are procedural or syntax viruses. They are found inside common data files such as those created by E-mails, Spread sheets, word. E.g. Concept virus in word documents, Laroux in excel.

(e) Logic bomb

Virus set to cause menace at a set date or time.

(f) Trojan horse

Viruses which place illegal and destructive instructions in the middle if the legitimate program or file. Once the program is run, the Trojan horse is also activated to begin havoc. E.g. Format C Virus.

Protecting the Computer System Against viruses

- ✓ Buy software from Authentic/legal vendors
- ✓ Avoid running unchecked/scanned files
- ✓ Avoid running files with attachment from unknown sources on the network.
- ✓ "Back-up your file plus folder regularly"
- ✓ Use Netware with strong validation checks and in-built firewalls (e.g. Linux). i.e. Hardware and soft ware which can limit unauthorized data through Networks to reach your work station.
- ✓ Disable Auto micros functions for Macro viruses.
- ✓ Use anti-virus programs. Utility programs used to scan files and programs in order to detect, destroy or quarantine virus-infected files e.g.
  - Mcafee
  - AVG
  - Pc Cillin
  - Inoculate IT
  - Webscan
  - DR. Solomon's Anti virus Toolkit,
  - etc

COMPUTER ERRORS AND ACCIDENTS

Computer related errors and accidents include;

-Human errors. Errors caused by human users.
-Procedure errors
-Software errors
-Electro mechanical problems i.e. printers keyboards, mouse foil to work.
-Dirty data problems e.g. typographic errors.
-Natural hazard.

-Civil strife plus acts of terrorism.

CRIMES AGAINST COMPUTERS

-Theft of Hardware
-Theft of software.
-Theft of time and services.
-Theft of information.
-Crime of malice plus destruction.

COMPUTER CRIMINALS.

Professional criminals

Where organized criminals use ICTs for illegal purpose e.g. Database used for tracking stolen goods or gambling debts.
Computer used to forge cheque books, passports, driving permits etc.

Hackers

Are people who gain unauthorized access to computers or telecommunications systems for the challenge or even the principle of it.

Crackers

Gain unauthorized access to ICTs for criminal/malicious purposes like selfish financial gains, shut down hardware, pirate software, or destroy data.

Employees

Corporate employees using company computers for personal gains. Other selfish and criminal acts by employees include;

-Unlawful copying of copyrighted software
-Unauthorized access to confidential files
-Importation of virus or worm
-Frauds centered on use of credit cards, telecommunications, and employee's personnel files etc.

Outside users

E.g. Suppliers and clients, due to their ability to access firm computers through net works.

Safeguarding Your Computer

-Identification plus access.
-Encryption. I.e. altering data to avoid usage.
-Protection of software e.g. through control of access - audit control and user controls.
-Disasters recovery plans.
-Use of strong firewalls.
-Install anti-virus utilities and virus time checks.

PART SIX
COMPUTER NETWORKS

Dimensions of Chapter analysis:

-Definition of Network.

-Types of Network.

-Network operating systems

-Some Network Features

-Impact of Network.

A network is a system of inter-connected computers, telephones or other communication devices that can commutate with one another, and share applications, messages, data, graphics and printers (resources) fax machines, modems, Digital cameras, etc.

Types of Networks

Local Area Network (LAN)

This is an inter–connection of computers which are in a relatively close proximity.

Wide Area Networks (WAN)

Is a network connecting LANs across geographical distances. E.g. states and continents.

Metropolitan Area Network (MAN)

Is a network connecting computers within a geographic or regional area.

Types of LANs or Network Models

Peer–to–Peer LAN

Is a LAN configuration where no particular computer is assigned the responsibility of administering other computers on the network. Computers on the network communicate directly with one another without a server.

Server Based/Client LAN

Is a LAN configuration with client computers serviced by a main computer called a server.

A server is a big and fast processor computer allocated the task of servicing other computers with applications, data, and other utilities on the network.

COMPONENTS OF A NET WORK

Basic hardware and software for a Network facility

(1) Network operating system:

Master control program/instructions that manage basic network operations like data and file transmissions, etc. e.g.

-Windows 2000, NT and xp

-Novell Netware.

-Apple Talk.

-IBMs LAN. Etc.

(2) **Network Adaptor/Network Interface Card** (NIC)

Hardware devices which make it possible for all computers on the network to communicate with others on the network.

(3) Hubs and Repeaters

Are devices which accept transmitted signals, amplifies them, and put them back on the network media rejuvenated. Hubs are typical of LANs whereas repeaters are typical of WANs.

NB. The most common network faults necessitating hubs and repeaters include;

(i) Distortion: - where information is confused at the source.

(2) Attenuation; i.e. Loss of signal strength.

Hubs can take any of the following forms:

- ✓ Active Hub: - Rejuvenates data signals
- ✓ Passive Hub
- ✓ Managed Hub
- ✓ Unmanaged Hub

(4) Shared peripherals

E.g. Network printers, scanners, fax machines etc.

(5) Client computers:

I.e. Computers sharing resources and capable of sending and receiving data signals to and from the server.

(6) Transmissions/Communication Media:

These can also be referred to as communication lines or links.

Coaxial cables

These are metallic connecting wires. They are typical of the following characteristics;

- They are shielded
- They have a lot of signal noise
- Provide minimum data strength.
- Used on Network antennas.

Fiber optic cables

These are non-metallic transmission media carrying signals in form of light beans.

Twisted pair cables:

These are typical of the following characteristics;

- ✓ Two or more twisted wires.
- ✓ Twisting conceal out or eliminates signal noise.
- ✓ Usually shielded but unshielded at times.

Wireless media

-Radio waves.

-Infra-red waves.

- Micro waves. These transmit voice and data through the atmosphere as super high frequency radio waves. They can not bend around corners.– use microwave Dishes/Antennas.

-satellite systems. I.e. microwave wave relay stations in orbit around the earth.
-pagers. Simple radio receivers that receive data sent from a special radio transmitter.

(7) Server:

Very fast processor computer dedicated to providing specific services for other computers connected on the network. A server can be in form of:-

- ✓ A file server.
- ✓ Application server.
- ✓ Communication server, etc.

Prerequisites for a Server

- ✓ Very strong processor e.g. Motorola G4 and Pentium V, IV, III, II, etc, Power Pc, etc.
- ✓ High RAM capability – DIMMs for RAM 500 + mBs.
- ✓ Very powerful storage abilities.
- ✓ Enhanced Network through-put.
- ✓ Expansion abilities.

Functions of a Server

- ✓ Administration of client computers.
- ✓ Security of files and applications.
- ✓ Managing printer Jobs.
- ✓ Data bank.
- ✓ Software and Applications handling.

(8) MODEM

A hardware device which transforms digital signals into wave form (analog - Modulation) to facilitates their transmission into air space, and vise versa (demodulation)

(9) Multiplexer

A hardware device which merges several low speed transmissions into one high-speed transmission.

A network device which enables several client computers to share a single line.

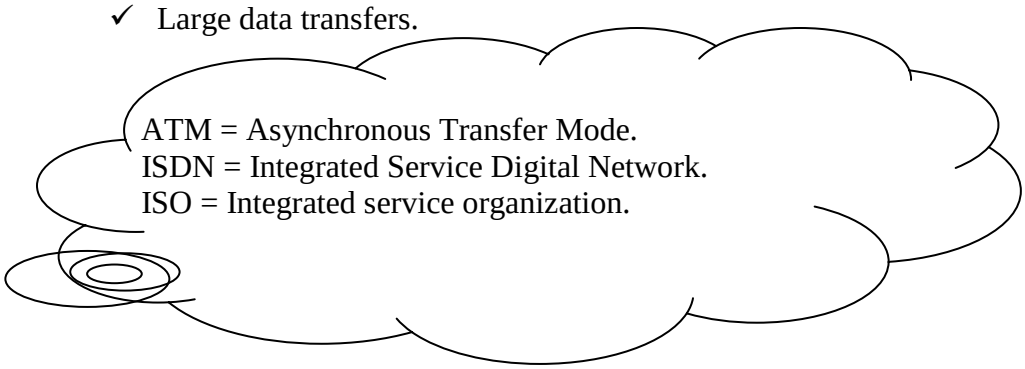
Factors to consider for a Network choice

- ✓ Size of the organization. A peer-to-peer network configuration is ideal for less than ten users.
- ✓ Needs of the Network e.g. network administrator, hardware and software, etc.
- ✓ Level of data security needed. A peer-to-peer network configuration is not very secure.
- ✓ Amount of network traffic expected (band width)

- ✓ Network budget/cost of the network configuration and installation.
- ✓ Maintenance requirements.
- ✓ Level of administrative support available.
- ✓ Types of business or organization.

Advantages of computer Network facilities/Rationale of networking

- ✓ They facilitate sharing of peripherals devices.
- ✓ Facilitate Sharing of programs and data files (resources).
- ✓ Better and enhanced communication and collaboration (networking).
- ✓ Better access to data bases and files for sharing through Uploading and Downloading receipt of files from host computer
- ✓ Down sizing and reduced operational cost. Flatter organizational structures.
- ✓ Offers more Data security. Information on networks (internet) can not be easily altered.
- ✓ Better management control through shortening the decision making process.
- ✓ Data consistence. Necessary changes can easily be made.
- ✓ Down sizing
- ✓ Large data transfers.

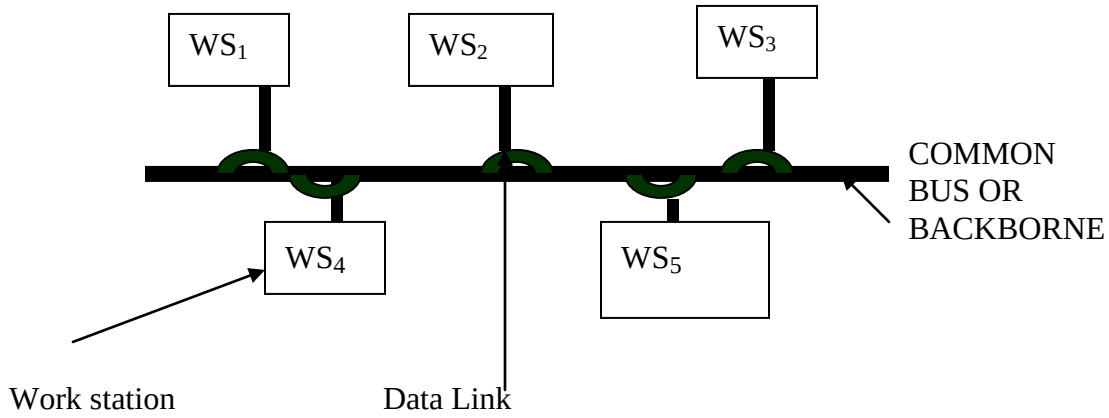


NETWORK TOPOLOGIES

Is the pattern by which the signaling and cabling medium is laid to interconnect the various computers which form the network. Include:-

(1) Bus or Linear Bus Topology

This is a topology in which all client computers connected to main coble – common bus or back born server or peer – to – peer network.



Advantages of bus topology;

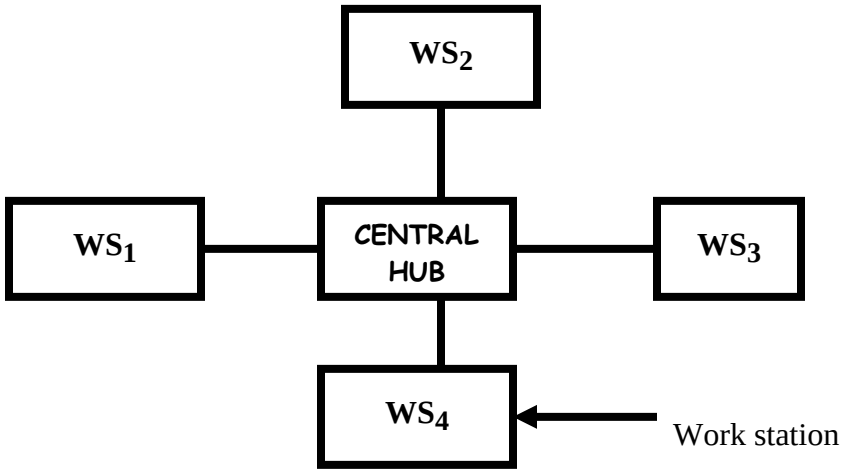
- ✓ It is cheaper as it does not involve expensive hubs and servers.
- ✓ Break down of one work station does not affect others.
- ✓ Easily organized into client server.
- ✓ Communication is very direct and faster.

Problems of bus topology;

Data is not very secure.

(2) Star Topology

Is a network cabling configuration that uses a central connection point called a hub, through which all communication is directed.



Advantages of bus topology;

- ✓ Life continuous even when connection is broken
- ✓ Data flow is faster with an active hub. Hub minimizes collisions between messages.
- ✓ Easily organized into client server.

Problems of bus topology;

- ✓ It is a bit expensive.
- ✓ If the hub goes down the entire network stops.

(3) Ring Topology

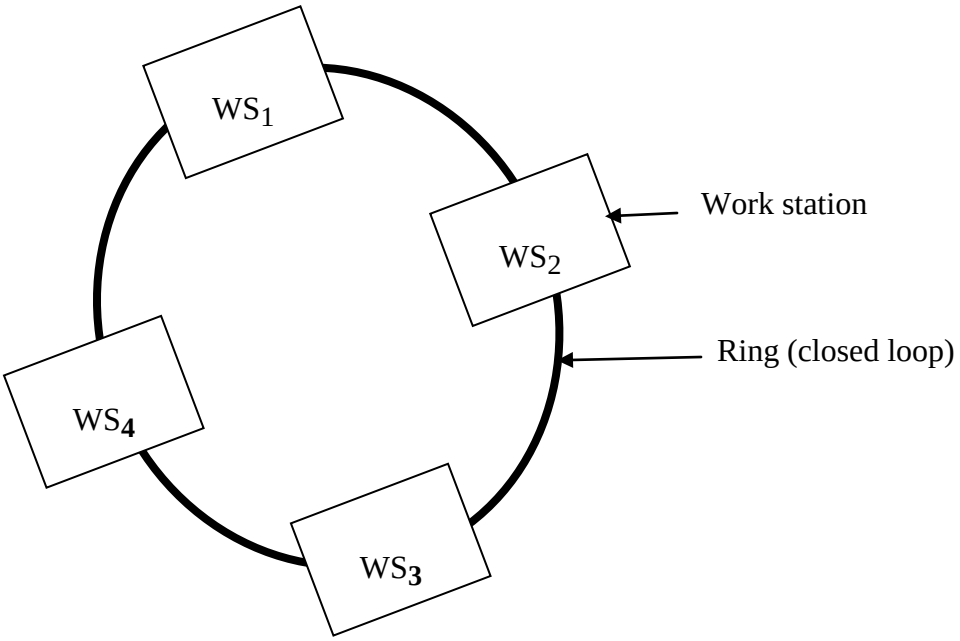
Is a topology in which the networked computers are connected in a series forming a closed loop.

Advantages of ring topology;

- ✓ Signal flow is one direction which avoids the danger of data collision.
- ✓ Where a double ring (FDDI) is involved data flow is continuous even in cases where one ring brakes down.
- ✓ Having no central server makes it cheaper.

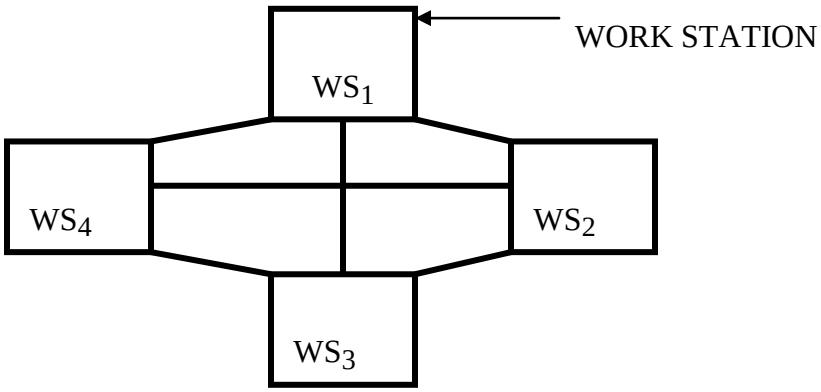
Disadvantages of ring topology

- ✓ If a connection in a single ring is broken the entire network stops working.
- ✓ Having no central server makes data very insecure.



(4) Mesh Topology:

Is a topology in which every client computer (WS) has got its own link to every other client computer on the network. This allows every client work station to communicate freely at any time.



(5) FDDI = Fiber Distributed Data interface.

FDDI network uses fiber-optic cables with an adaptation of a two token-ring configuration topology.

Advantages of FDDI

- ✓ Data flow is very fast. It can transmit 100 – 200mbs
- ✓ Where one ring fails another ring can continue with data supply.
- ✓ It can transmit 100 – 200mbs

Disadvantages of FDDI

- ✓ It is relatively expensive.
- ✓ A bit time consuming to construct.

(6) Hybrid/Tree Topology

Is a network configuration formed as a result of combining two or more of the above topologies interconnected by hubs. It can help in linking different types of LANs

NB;

A network can either stand a lone (i.e. PBX configuration) or be connected to other different network configurations which can be either similar or not, hence need for the following devices:

(a) A BRIDGE:

Is a device used link two similar networks to communicate to one another e.g. Bus – 2 – Bus or Star 2 star, etc.

(b) A GATEWAY

Is a device (interface) used link two different networks to communicate with one another. E.g. Bus to star, LAN to MAN, etc.

(c) ROUTER

Is a device used to link more than two different network configurations to communication to one another?

Factors affecting communication among devices

➔**Transmission rate** – frequency and Bandwidth. High frequency, wider bandwidth means more data.
➔**Line configurations** – point-to-point Vs multipoint. In a P-2-P a single line the sending and receiving devices are directly connected to one another. Whereas, in a multi-point configuration, a single line interconnects communication devices to one computer.
➔Serial (bits are transmitted sequentially one after the other) Vs parallel transmission (bits are transmitted through separate lines simultaneously).
➔**Direction of transmission** – Simplex (one direction flow), half – duplex (two but one at a time) and full – duplex (back and forth at the same time).
➔**Transmission mode** – asynchronous (one byte at a time) Vs synchronous (in blocks).
➔**Packet switching.**
➔**Multiplexing.**
➔**Protocol** – Set of convention governing the exchange of data amongst devices. Protocols are built into the hardware and software one is using.
➔Type of material one is trying to access. Pictures and other complex graphics take long to load because of larger files.
➔Speed of your modem, and modem at the other end.
➔Amount of other traffic on the Network.
➔Transmission media

Factors/Parameters of a good network

Consistence/reliability parameter. This describes the predictability of the network.

Flexibility. This defines networks ability to grow or change with minimal disturbances to the users and applications.

Availability = availability.

Recovery parameter. It should be very easy to restore the network to its operational level following it failure.

Performance. This is measured in terms of network throughput and response time. Throughput = work load per unit time ratio whereas response time = the rate at which the CPU interprets commands to the user.

Security parameter. This describes the restrictions to access information from the network, and limitations to network spasm plus hackers/crackers.

THE INTERNET

Is a global connection of computers and LANs sharing resources, data and information.

Or

Is a network of computers connected by telephone lines, cables or satellite radio links, sharing resources and data globally.

Internet = World Wide Web (www) = the Net

WWW transmissions range from simple letters (mail) to full
Multi –media i.e. text, sound, still and motion pictures

NB:-

Internet connectivity can be through;

- ✓ Dial-up Internet connectivity – (requires a telephone line).
- ✓ Wireless connectivity.

Brief History of Internet

The Internet was created by the U.S. Department of Defense in 1969 as **ARPAnet**.

ARPA was the U.S. military department's **Advanced Research Project Agency (ARPA)**.

The US military came up with this idea to serve two main ideas. That is;

- ♦ To share research among military, industry, and University sources.
- ♦ To provide a more secure diversified system for sustaining communication among military units in the event of nuclear attack.

The system was designed to allow many routes among many computers so that a message could arrive at its destination by many possible ways, not just a single path.
In the next ten years the network had been extended to connect over 200 computers in the military and research establishments throughout the U.S. and overseas. Some us universities followed by setting up systems of their own and by mid 1980's they merged with ARPA to form the Internet.
Today, most of the world's universities are connected directly or indirectly and many businesses have joined to take the advantage of the cheap and efficient international communication, advertising medium, and data source for research.
The original network system was largely based on the Unix Operating System using the Network Control Protocol (NCP) standard. With the many different kinds of computers being connected a more efficient and compatible standard **TCP/IP** for **Transmission Control Protocol/Internet Protocol** was developed in 1983. This made it easy for different computers on different networks to communicate with each other efficiently.
They Internet is growing day-by-day with very limited procedures and ownership.

BASIC WWW REQUIREMENTS/INFRASTRUCTURE

→ High memory/processor, client and host computer to receive, edit, keep, maintain and distribute data at any time.
→Moderns
→Communication software.
→Telephone line or satellite facility.

Connecting to the Internet can be done through;

- ♦ Schools, universities/colleges or places of work.
- ♦ Online information services.

- Internet service providers (ISP). **1st – tier** = Large ISPs from where small ISPs can buy access privileges.

→**Internet Services Provide (ISP)** i.e. an organization which maintains LANs attached to the WWW e.g.

-Africa online -MTN
-Info-Com - UTL
-Bush net - Afsat
-One2 net
-Dehezi international

NB: (1) The ISP provides the client with an Internet account or address through which he can control use of the satellite facility.

(2) Internet backbone = is a ultra – fast network that connects large organizations together. E.g. huge manufacturing firms, universities, or military services together.

FACTORS TO CONSIDER WHEN CHOOSING ISP

→Setup costs/Budget
→Experience for both ISP and client.
→Auxiliary services offered by the ISP e.g. E – Mail/telephone SMS facility.
→Availability of online help.
→Compatibility of ISP ware with yours e.g. windows Vs Linux Vs Wang.
→Efficiency/Effectiveness of ISP devices e.g. speeds of ISP modem, Bandwidth etc cabling architecture, Bit–Bus architecture for devices etc.

NB:

(a) Bandwidth refers to the rate at which data is transmitted over a communication channel.
(b) The Internet has emerged as the framework upon which to build global information infrastructure.
(c) It has attracted worldwide attention because of its very low user costs.
(d) The open architecture of the Internet and its underlying TCP/IP has opened up possibilities to exchange text, audio, video and other between different types of computer.

USES FOR THE INTERNET

(a) Offers personnel connectivity for friends and financiers through E- mails, E–collaboration and chat – rooms, online telephone calls, voice mails, video phones, etc
(b) It is a tool for entertainment through on–line games, clubs and interactive games, online chats, refreshing video clips (movies) and animals' zoos.
(c) It is a source of important electronic programs/applications through downloading of freeware, shareware and other programs.
(d) Offer travel services like E-Booking and reservations for aviation firms and hotels, to business travelers and holidaymakers.
(e) Is a tool for financial management offering answer to financial management challenges of where, when and how to invest especially in financial securities.
(f) Offers education and research facilities for either academic or knowledge enrichment. E-Publishing and E- Learning have greatly improved distance

learning. Hence the WWW being a body of knowledge. The common wall-less classrooms.

(g) Multimedia: offers Audio and video services.

(h) Offers Banking services for online Banking institutions, and electronic funds transfers (EFT). A case for western union. Digi Cash, Cyber Cash, Millicent, ATMs, and credit card facilities are in this category.

(i) Offers news updates (information Retrieval) for politics, social events, climate and weather, and sports. These usually in form of live radio, live TV, online newspapers and magazines, educative short films, etc.

(j) On – line employment for job seekers through online employment agencies, and firms advertising jobs online.

(k) E–Medicine where diseases diagnosis and drug prescriptions are done on-line

(l) E-Courtships and marriages, etc

(m) **Telecommuting**. Through internet connectivity and interactivity one can now work from home and communicate with the office through networked computers and telephone facilities.

(n) A tool for transacting business through E-commerce or E- Business where products can be "Marketed" (Procured OR shopped) on-line (Tele-shopping).

NB: - E-Business needs Avery secure, efficient and effective banking system.

Challenges/risks of E–Business

→High initial and maintenance cost.
→Lack of paper basis for basis for business creates skeptics.
→Mis use of customer bank account.
→Limited to on line firms and areas.
→Business strategies can be easily accessed by unauthorized competitors.

INTERNET/NETWORKING CHALLENGES/FLOW /HAZARDS OR SECURITY THREATS

- ✓ Privacy violations
- ✓ Information interceptions
- ✓ Viruses/malicious programs – can read copy or destroy sensitive files/folders.
- ✓ High cost implications for initial and maintenance costs.
- ✓ Dangerous information on grounds of health and morality (**pornography**). Others - information is available on how to make explosives (bombs) and detonation of explosives.
- ✓ Continued isolate man from man.
- ✓ **Internet scams** where people are conned property and loss life at times. The most recent true story is of a European dater who was abducted in West Africa and made to pay a ransom for his release while looking for his internet date.
- ✓ Addiction.
- ✓ **Spamming**. Uncalled for mails in form of advertisements, chain letters, etc.
- ✓ **Plagiarism.** This is manifested in sites offering academic papers for either free or at a cost and students just change the authors name to their own and present.

- ✓ **Risk of data and system obsolescence due to the rampant technological changes.**

INTERNET TERMINOLOGIES

(I) Web Server

Is a high speed and storage computer whose primary purpose is to provide requested information to computers on the WWW. It can be;

-- File server acting as cd\base
-- Application server
-- Communication server.
-- Multipurpose server

Characteristics

→Very high storage plus memory capabilities.
→Very strong multiprocessor e.g. Motorola G4, G3.
→High capacity RAM – DIMMs.
→Improved Network through-put (Enhanced NIC).
→Expansion capabilities for up grades to be effected.

(2) Web Browser or Browser.

A master control Network program which makes it possible for computers to share resource or data globally. e.g.

-Emissary.
-Netscape Navigator.
-Web surfer
-Ms Internet explores.

(3) HTML = (Hyper Text Markup Language)

It is a programming language/program used to design web pages and web sites.
As a standard tagging language or program, it helps in the creation and formatting of links, and other special handling of text, images, and objects in a web page so that a browser can know how to display them.

NB: Common Gateway Interface (CGI), is a script used when creating forms using web page wizard in order to accept the information a browser submits in a form and also forward the information to other programs.

(4) TAG

Is an embedded HTML code that specifies formatting for text and graphics for their proper display in a web browser.
E.g. <Head> </head>
<Body > </Body>, etc

(5) Hyper Link

Is a text or graphic designed to provide links in a website or document. Once a hyperlink is clicked it takes you to a related document, graphic or file.

Characteristics of hyperlinks

→They are usually underlined.
→Change colour.
→Mouse pointer changes shape to finger like pointer.

(6) WEBSITE/HOME WEB DIRECTORY:

This is an internet location on a computer/server on which a hyper link document is located.
It is a group of HTML, JAVA, SQL, etc document and associated files covering one or more related topics, and interconnected through hyperlinks on the world wide web.eg manu.com, gifted bynature.com look smart, CNN, bbc.com, yahoo etc.

A website can be;

Spider type website: With links e.g. Google etc

Yellow pages type websites: With just a list of possible pages on the sites e.g. yahoo which has a list 14 major topics including Art, Education, Entertainment, computer and internet, Health, News, Recreation, etc.

FUNCTIONS OF A WEBSITE:

➔Sharing of knowledge or information.
➔Presentation of information of interest.
➔Enhance communication and collaborator.
➔Skills building e.g. writing, editing etc designing
➔Trade purposes.
➔Pride of ownership/improved image.
➔Data information storage.
➔Research.
➔Entertainment and leisure in cases of E-Zoos plus E-museums, etc.

Qn. Discuss the benefits of having a website at UCC Tororo.

(7) URL (Uniform Resource Locator) or Web Address.

Is the address used to locate/visit/access a particular website on the WWW. It can be:
-Numerical e.g. http:// 10.181.62.81
Http: // 127.0.0.1 \student\html\.
-Alphabetic e.g.
Bbc.com
Visit Uganda.com
Hatwib. 4t.com etc
http:///

(8) SEARCH ENGINE

Is a program which allows web user to look for specific information or documents of interest on the WWW.eg Alta vista, Google, yahoo, Netiquette, info-seek, Dog pile, Lycos, Excite, etc.
Search engines use the Boolean logic operator to facilitate the searching. Major operators
-AND e.g. K and B.
-NOT e.g. Server Not Linux
-Near e.g. Server near Linux

(9) GOPHER

Is a menu driven program that links many internet data banks (website) into a unified information service.

(10) INTRANET

A network of networks within an organization used to share company resources and information amongst employees and departments.

(11) EXTRANET

Is an extended co-operate internet that uses WWW technology to facilitate communication with company customers, suppliers, or relevant government department.

(12) PROTOCOL

Refers to a set of rules (program) that control the way communication is handled across the internet (data exchange between the hardware and software)

Protocol includes:

-IP = Internet protocol

Are sets of rules which provide connectionless information delivery between computer systems, though IP does not guarantee delivery of data.

-TCP = Transmission Control Protocol

Are sets of rules that provide connection oriented communications. Provide and guarantee delivery of data, and should errors occur during transmission, TCP is responsible for retransmitting the data.

Protocols that suite TCP/IP include:

1) **HTTP** = Hypertext Transfer protocol: Used for sending and receiving web pages to and from web server.
2) **FTP** = File Transfer Protocol: Used for transferring any kind of file to and from the web server.
3) **SMTP** = Simple Mail Transfer Protocol: Used for transferring mail massages.

Others include;

SLIP = Serial line internet protocol, and **PPP** = Point-to-Point Protocol, Both used for controlling network traffic over a dial-up connection.

(13) TELNET

This is a terminal emulation protocol that allows you to connect to remote computers

Enables one to log on to a remote computer/machine and use it.

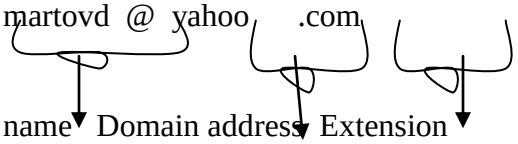
(14) ELECTRONIC MAIL (E- MAIL)

Is an SMS sent and received over the WWW. In order for one to send and receive E-mail he or she must have an E-mail account or address.

Elements of an E-mail account.

- User name
- Domain address.
- @ Sign between the user name and domain address.
- Pass word. A secret personal pin-code to avoid unauthorized access.
- An extension. E.g. .COM, .UK, .UG, etc.

E.g.; martovd @ yahoo .com



User name Domain address Extension

Qn. Distinguish an E-mail account from a uniform resource locator (URL).

How to create a free mail account

- Get hooked on the net or ISP.
- Select my mail or mail icon.
- Double click new user or sign me up button to load the account application form for new user.
- Fill in user identification details/account name; pass word, location of the user, security questions, first name, last name, language, country, town/city, postal address code and zip. One should pay close attention to those details which are mandatory and those which are optional.
- Click on submit button for your account to be registered for use.

Basic E-mail features;

In box = Lists the messages received.

Out box = Lists the messages you have composed but not sent.

Sent = Lists copies of all sent copies for reference purposes.

Send = Sends the message you have composed.

Compose = Activates the screen onto which a message to be sent is typeset.

Attachment = Helps you to attach other files and folders to accompany the directly composed message.

To = It's where you typeset the E-mail address of the receiver.

Subject = Subject of the message.

Cc = Enables copies of the E-mail to be sent to a third party while acknowledging other recipients.

Bcc = Enables copies of the E-mail to be sent to a third party without acknowledging any other recipients.

Advantages of electronic mails;

- ✓ Reduces paper costs and irritation.
- ✓ Provides immediate delivery feedback.
- ✓ They offer provision for attachments.
- ✓ Secured by passwords.
- ✓ E-mails can be conveniently sent to multiple recipients.
- ✓ By providing a list of senders and subjects one can prioritize on which messages to read first.
- ✓ Sending is cheaper.
- ✓ There is a possibility of multimedia mails where they can be received as voice mails and read aloud.
- ✓ Can easily go across many time zones (continents).

Disadvantages of electronic mails;

- ✓ Involves time consuming sorting through lots of messages every day.
- ✓ E-mails are not very private through tapings.
- ✓ System overloads can cause unnecessary delays.

Sample Questions.

a. **Give an overview of the history of the internet and briefly explain the technologies behind the internet.**
b. **The net is also referred to as the information high way, what are the merits and demerits associated with the evolution of this technology.**
c. **What are the most vital technologies, which allow the internet to be used as a tool for E-Commerce?**
d. **Explain the ways in which Uganda is exploiting the net giving your take on how you expect it to develop in future.**
e. **What hinders the development of the internet and E-Commerce in Uganda?**

PART SEVEN
FILE ORGANIZATION

What is a file?

A file is a collection of logically related records. It is one of the basic organizations information.

A file name is a name by which a file is identified. File names usually have three parts i.e. Disk drive designation, a label and an extension which indicates file type or nature e.g. System file (sys), Text/document file(txt/doc) and executable file (exe).

Categories of File Organization

1. **Serial file organization**.
   Is a file organization where records are not in any specific order: - Records location is tiresome and time consuming
2. **Sequential file organization**.
   Is a file organization where records are organized in a specific logical order. Records can be organized in either ascending or descending order. Records access becomes very fast and very efficient when dealing with huge volumes of data.

3. Indexed Sequential.
Allows records to be accessed sequentially in ascending key field sequence, and also at random typical of magnetic disks.

4. Random file organization,
Individual or records are stored randomly without following any particular sequence of the key field.

5. Inverted files

Is a file organization where no single key can retrieve a record, but rather a combination of keys.

Items possessing specific feature are grouped together to form an inverted file
A combination of keys known as "attributes" are used to search for a record
Files are not arranged in any particular sequence on the storage media.

6. Direct Access method.

Files are not arranged in any particular sequence on the storage medium.
New files do not need to be sorted and can be in any of the following forms;

- Full index
- Partial indexing
- Self indexing
- Algorithmic address generation.

TYPES OF FILES

(a) Master files.

These consist of records that are relatively permanent. Basic characteristics include;
Remain in the system indefinitely
Contains primary/basic data
Records occurrence remains active for along period of time e.g. cost Accounts files, Employee file, Inventory file, etc.

(b) Transaction files;

These are files which contain records which describe business. They ends to be temporary and they hold changes be made on master files e.g. order files, invoice file and materials requisition file.
They are temporary holding files for changes to be made in a master file i.e. additions, deletions and revisions contained records which describes business events.

(c) Scratch files

Also called work files or temporary files.
These are files that contain temporally duplicates or subsets of master or transaction files. Scratch files are usually created, used and disposed off. I.e. they are single task files e.g. re- sorted customer files.

(d) Table files

File used to store tabular data that changes relatively infrequently. They are typically loaded, as is, into the programs that use them. E.g. –Pay roll tax system tables and insurance actuary tables.

Other Types of Files

Program files - these are typical of the following extensions EXE, Com, DLL and DRV for machine language instrument files (program)

Data file

Master files, Transaction files, Scratch files, and Table files all contain data.
They are typical of the following extensions
DOC (4 document files), DAT, DBF and MDB (4 Database files) and, XLS and WKS (4 spread sheets)

ASCII files (Americans Standard Code for Information Interchange**)** (as-key)
Files for Text only without any graphics.
They possess the extension .TXT.

Image files

They are files with digitized graphics e.g. arts photographs. They are typical of the following extensions; TIF, EPS, JPG, GIF and BMP

Audio files

Files with digitized sound data. Common extensions are; WAV, MID, etc

Video Files

Digitized video images for conveying moving clips/images over the net. e.g. .AVI and MPG files.

Etc files.