COMPUTER SCIENCE

What exactly *is* Computer Science?

Computer Science or computing science is the scientific and mathematical approach to computation and specifically to design computing machines and processes. A computer scientist is a scientist who specializes in the theory of computation and the design of computers.

What does it take to be a successful Computer Scientist?

* Computer science is about problem solving. The qualities of a good computer scientist include

– A passion for finding elegant solutions,

– An ability to use mathematical analysis and logical rigor to evaluate such solutions

– Creativity in modeling complex problems through use of abstractions

– Attention to detail and hidden assumptions

– An ability to recognize variants of the same problem in different settings

– An ability to retarget known efficient solutions to problems in new settings.

Computer Literacy

This refers to having knowledge and understanding of computers and their uses.

COMPUTER SCIENCE: O’LEVEL SYLLABUS

TEACHING SEQUENCE

S.1 – TERM 1

TOPIC 1 – 2: INTRODUCTION TO COMPUTER

* Evolution and history of computer
* Uses and functions of computers
* Computer care and safety
* Classification of computers
* Computer system

TOPIC 2: Computer hardware

* Categories of computer hardware
* Application of different hardware components

TOPIC 3: COMPUTER SOFTWARE

* Introduction to software
* System software
* Application software

TOPIC 4: WORD PROCESSING

* Introduction to Word processing
* Microsoft word

TOPIC 5: COMPUTER PRESENTATION

* Introduction to presentation software
* Microsoft Power Point

TOPIC 6: SYSTEM STARTUP AND CONFIGURATION

* Computer booting process
* System configuration
* Software installation
* Computer trouble shooting

TOPIC 7: COMPUTER COMMUNICATION AND NETWORKING

* Introduction to Networking
* Networking

TOPIC 8: SPREADSHEETS

* Introduction to Spreadsheets
* Microsoft Excel

TOPIC 9: WEB DESIGNING

* Introduction to web designing
* Web design

TOPIC 10: DATABASES

* Introduction to databases
* Database design

TOPIC 11: ELEMENTARY COMPUTER PROGRAMMING

* Introduction to programming
* Developing a simple program

TOPIC 12: TRENDS OF COMPUTING

* Computer integrity and security
* Computer ethics
* Computers and society
* Emerging technologies
* Systems analysis
* Computer professions

COMPUTER SCIENCE

This is the study of computers including their design and how they are operated

Definition of the term computer

A computer can simply be defined as a machine which simplifies work than a man can. This is the layman’s definition.

Technically, a computer is an electronic device that receives, processes, stores data and outputs information.

A computer can also be defined as a general purpose machine which can receive, store process data and output information.

It is the processing machine or device made up of electronic and electro-mechanical components that can perform computations including arithmetic and operations.

It is an electronic device capable of interpreting and executing programmed commands for input, output computation and logical operations.

A computer is an electronic programmable device that receives, stores, processes data and output information.

Note:

Data refers to the raw facts of input by the user (a person operating a computer) into the computer.

Information refers to the processed facts of output by the computer to the user for the purpose of decision making or record keeping.

Why we study computer studies in schools

* To widen our reasoning and thinking capacities
* To develop in students an appreciation of the range and power of computer applications
* To develop an understanding and practical experience of the computer system
* To provide students with the basic knowledge and skills required for computer use
* To develop a desire (need) to use computer within other interests like games
* To develop an understanding of the organization of computer system such as computer software, hardware and communication.

Reasons for studying computers

1. To attain knowledge for problem solving.

2. To acquire critical and analytical thinking for prove (hands-on) solutions.

3. To get awareness about ICT developments (emerging issues) in the world.

4. To get jobs. There are specialized computer skills which are in high demand and once you acquire these specific skills you will be able to get an outstanding paying job fairly easily.

5. To acquire skills in the use of IT for enhanced productivity & development.

6. It makes work easier and faster

7. It helps organizations to store huge amount of data. Therefore studying it is important in order to know how storing data is done, Thus making data analysis easy.

8. Computers serve as an important part in the world of communications. Thus we should learn how to use computers in order to avail the applications it has.

9. One of the main reasons to study computers is to get money. There is lots of money in computers. For example there are specialized computer skills which are in high demand and once you acquire these specific skills you will be able to get an outstanding paying job fairly easily.

10. Self employment: Another benefit of studying computers is that you can become self employed. This means that you can use computers to offer services to people who will in turn pay you.

11. Computers keep us up to date because the nature of computers and technology keep advancing and changing. This forces you to keep on building your knowledge for the rest of your life. And in doing so, if you meet the needs on the market then you will always be able to find a job and will hopefully never be in too much of a financial crisis.

Others

* To get employment opportunities in future
* To get first hand information around the world
* To answer questions about computer in an exam

ADVANTAGES OF COMPUTERS:

1. Speed: A Computer can perform a lot of work in a short time.

2. Accuracy and consistency: If a Computer is properly programmed, it can hardly make a mistake.

3. Reliability: Computers are very reliable as tools of data processing. They can do the same task over and over again without making a machine processing error

4. Safe storage: Computers are equipped with a lot of memory that helps them to Store data safely.

5. Performs Variety of tasks: A Computer can do a variety of tasks like giving entertainment, film shows, telephone, and Communication service etc.

6. A Computer makes data less bulky. Since large volumes of data can be stored on magnetic disks as tinny Electromagnetic particles thus saving people from piling files and files of papers.

7. A Computer stores data for retrieval: (Receives) Stores and brings back). This enables one to use data for future references.

8. A Computer prints out neat work.

9. A Computer is economical to use i.e. it requires less manpower.

10. They help in breaking boredom since one can access many games using computers.

Advantages of computers

* It is a source of employment opportunities
* It has simplified communication
* Computers are a source of entertainment e.g. one can easily play computer games, music, watch a movie online etc.
* Computers simplify work since they operate at a very fast speed
* Computers are accurate and reliable
* Computers are a source of information e.g. a computer having internet services can provide information about anything all over the world
* Various research works can be done using computers connected to the internet
* Computers store data for a long time which can be used in future
* Computers have the ability to simply handle more than one task at a time (multitasking)
* Running costs become lower in the long run
* Computers are flexible i.e. they perform the tasks depending on the user’s interests
* Computers are diligent i.e. they do not get tired unlike human beings
* It is programmable i.e. you can give it instructions and it follows them
* Etc.

1.4 DISADVANTAGES OF COMPUTERS:

1. A Computer causes body fatigue i.e. backache, eyestrain etc if used for a long time.

2. A Computer is expensive to buy and maintain.

3. A Computer needs the literate class of people to operate it.

4. A Computer cannot work where there is no power (electricity).

5. There is a possibility of accidental loss of the information saved. Also data can be lost if not saved.

6. Computers cause unemployment since most of the work is performed by Computers.

7. Computers have no common sense and will do what is Instructed be right or wrong.

8. The Computer technology is ever changing and moving very fast that there is no guarantee that already bought machines will not be out dated in the next few days

9. They are very delicate to use and handle.

10. Viruses easily attack them, which may lead to loss of data and programs.

Disadvantages of Computers

* They are expensive to buy and maintain
* Computers have led to unemployment
* They do not favour the blind
* It takes a lot of time and money to learn how to use the computer
* Computers have led to moral decay i.e. there are a lot of pornographic images and literature on the Internet
* Etc

Uses and Functions of a Computer

The basic functions of computer

Basically, there are four functions, input, processing, storage and output.

(i) Input: computers making inputting any data such as words, articles relatively easy. Examples of input devices include keyboard, computer mouse, microphones, and scanners e.tc.

(ii) Processing: computer can rapidly solve all types of numerical problems. Solving numerical problems can be considered as an example of computer processing. Computers are accurate and error free, the can huge amount of information at the same time.

(iii) Storage: computers have a high storage capacity and are able to store all types of information and graphics & retrieved when needed. Examples of computer storage include hard disk, CD-ROM, DVD-ROM and others.

(iv) Output: computers can produce output in different formats. For example soft copy and hard copy outputs

Uses of computers in the society

Today, computers are widely used or employed in a number of fields for example:

(i) Research field

(ii) Business field

(iii) Education field

(iv) Military field

(v) Medical field

(vi) Transport/Airport field

(vii) Offices

(viii) Communication industry

(ix) Security field

(x) Banking industry

(xi) Homes

(xii) Recreation/ leisure field

(xiii) Construction field /Architectural field

(a) Uses of computers in Education

1. Timetables: Used to devise/design timetables using special software.

2. Communication: Students can communicate with students in other countries, and corporate with them on research projects.

3. In teaching, we use Computer Assisted Instruction (CAI) by use of Interactive whiteboards, and projectors, in class.

4. Records management: Computers are used in School administration to register students & record attendance.

5. Report Cards: Students’ Progressive Report Cards can be produced electronically by use of computers instead of hand-written ones.

6. Distance learning (e-learning) through computer based training. People get award such as degrees without going to class.

7. Simulation: Teachers use simulation software to perform difficult or dangerous experiments in class

8. Use of special facilities for students with disabilities like text to speech and speech recognition to help blind students.

9. Websites: Schools use computes to create school websites for sharing information with the public.

10. Projects: Productivity tools like desktop publishing and presentation software are used in projects and other school activities.

11. Time management: Digital computers are also used for telling and managing time in schools.

12. Students can also use computers to write reports, produce school newsletters and design posters.

(b) Uses o f computers in Research

1. Computers are dispensable throughout the research process.

2. Data Storage: Data can be stored for immediate use or can be stored in auxiliary memories like Compact disks, memory cards, so that they can be retrieved later.

3. The computers assist the researcher throughout different phases of the research process.

4. In scientific research they are used at all stages of study-from proposal/budget to submission/presentation of findings.

5. They have made searching the literature and references easier through use of electronic databases on the World Wide Web e.g. an online encyclopedia such as Wikipedia has over 15 times as many words as compared to printed Encyclopedia like Britannica.

6. Computers have tools such as Spell checking, cut-and-paste, etc., which make compiling and editing research work easier.

7. A lot of statistical software is available for performing calculations and analyzing the collected research data.

8. Research publishing: The research work can be converted to Portable Document Format (PDF) and published to the World Wide Web.

(c) Uses of computers in business and administration

The use of Computers has affected every aspect of business, transforming not only the way that business is conducted but also creating new Businesses sectors and jobs. Most offices today depend on computers.

Some examples of the nature of this change include:

Computers enable people to work from home, using computers connected to the employer’s network or via the internet. This is known as Telecommuting.

Employment: Computers have created more jobs such as computer Technicians, Computer Teachers, etc.

Source of income: Buying and selling of Computers and their components is a source of income to individuals, and companies.

Through, Computer Aided Design (CAD), scale drawings, and excellent designs can be created easily.

Mobile financial service: Computers are used for sending and receiving Mobile money and making worldwide money transfers.

Banking: Banks use computers to manage transactions and Automatic Teller Machines (ATMs) for 24 hour banking.

Websites and Advertising: Computers help in creating Business advertisement through designing websites, billboards, flyers etc.

Keep records: Computer programs such as QuickBooks & other accounting programs allow businesses to keep detailed records

Computers are used in typesetting during the production of document printouts and publication of Books for sale.

E-Commerce (Electronic commerce or EC): through sale of products (goods & services) over electronic systems such as the internet and other computer networks.

Production of goods: Through Computer Aided Manufacture (CAM), computers can be used to control the production of goods in factories.

Research: Business can use internet to research its competitor’s products and prices by studying their websites.

Communication: Coworkers can easily communicate with each other through e-mail. Customer service departments can also use e-mail and instant messaging services to communicate effectively with customers.

Software Development: Software can only be made using computers for the purpose of helping businesses to combine processes and carry out their work properly.

Seminars, conferences and meetings can be scheduled with bosses and big corporate giants through web conferencing that can be heard by all the employees simultaneously.

Customer Interaction: Computers now assist human call centers with answering customer questions, taking payments and providing general assistanceU

e) Health and medicine

The administration of hospitals depends more and more on computers. Some of the uses include the following;

1. Scheduling expensive and scarce equipment.

2. Making appointments for patients, printing labels, allocating beds; make staff rosters, etc.

3. Controlling ambulance fleets

4. Keeping comprehensive patient records electronically, rather than paper files.

5. Most modern drugs are designed with aid of computers & manufactured under computer control.

6. The Magnetic Resonance Imaging (MRI), CT scan, Ultrasound devices etc are amongst the uses of ICT in hospitals.

7. Web conferencing helps doctors treat people remotely.

8. Medical tests for instance blood, cancer, Brain damage etc

9. Carrying out sensitive operations on sensitive body parts like the brain, heart, kidney etc

10. Drug mixing and prescriptions are also done.

11. Internet helps us get Web sites for information on health care, treatments, conditions, etc.

12. Monitoring patient’s conditions and alerting staff when abnormalities arise.

13. Medical Training is facilitated by Simulation software and on-line data sources.

(e) Uses of computers in Communication

1. E-mail services: Electronic Mail sent from one person to other using connected computers helps a lot in the area of communication.

2. Tele Conferencing and Video Conferencing: enables people in different locations to conduct meeting as if they are in the same location

3. Faxing; Computers are used for sending an image of a document electronically.

4. Computers enable people to send voice, image, text and data through Telephones and mobile cell phones:

5. Exchange of information: Today computers are capable (through a phone line or cable connection) of exchanging information over internet.

6. Students might use computers to communicate with their classmates about homework assignments, group projects, or other school-related activities.

7. Social Networks such as Face book and Twitter enable people to stay In touch with their relatives, friends and interests

(f) Uses of computers in Military/Security.

Generally, security is today far much better than it was previously, thanks to the introduction of Computers into this field.

1. Computer Simulations allow the military to train soldiers for severe combat situation.

2. Communication systems are widely used in the military to coordinate the personnel.

3. Some computers can detect temperatures and alarm in case of danger of fire outbreaks.

4. Computers are used for capturing data for Police National Computer Databases, Vehicle Number Plates, Criminal finger prints etc.

5. Data storage: information about criminals under investigation by security organs like police, is today more safely or securely stored in computers.

6. Closed- Circuit Television (CCTV) systems right from home, on the streets, in the work places/offices like banking halls shopping malls, are indeed tightening security in those areas.

7. Gadget-tracking devices like car, laptop, mobile phone trackers, are also present today.

8. Computers are used to detect presence of illegal devices such as bombs.

9. Computers are also used for controlling dangerous weapons such as missiles.

10. Computers help design and test new systems

(g) Uses of computers at home

In the home, computers have found a wide variety of uses;

1. For playing games

2. For doing School Assignments (Home Work)

3. For keeping household accounts

4. For Accomplishing Work related tasks

5. For getting information over the Internet (for example, to research ancient history for a homework project or for checking the scores in the English Premier League)

6. For playback of Digital Media such as Video/Music/Family Pictures at home

7. For sending e-mail to friends and relatives abroad.

(h) Uses of computers in Leisure and Entertainment.

Computers introduced completely new type of entertainment like Computer games.

Listening and recording music, Video editing, CD burning, etc.

Messengers also allow us to connect to our friends across the world and talk to them.

Websites which carry news and other matters related to entertainment become a major source.

Online games allow us to play with other people who have access to that game in a virtual world, while all seated in our own room in front of our PCs.

Photographers and videographers, Digital cameras, mobile phones and other devices are used to take /make high quality photos/videos.

Satellite communication is also bringing a new dimension in entertainment especially through digital & satellite TV systems such as DSTV.

Computers are also used in Cinema halls and podiums for faster instant audio and video playback and presentation through projectors.

Tasks ideally suitable for computers

Computers can carry out dangerous tasks that humans would prefer not to. These tasks may include;

* Bomb disposal
* Providing round the clock services with minimal human resources
* Digital telephone exchange
* Computerized monitoring of stations in remote areas and hostile areas for further technological studies
* ATMs and electronic banking
* Monitoring vital functions in hospitals, etc

However, computers are not always the answer. In some areas human being may be better than computers.

Where would a human being be better than computers?

A human being would be better than computer in the following situations;

* Where a task involves the human touch
* Where human feelings need to be taken into account
* When it comes to performing tasks that are different every time
* In a situation where creativity is required
* When reacting to unpredictable situations
* In situations when human judgement is required or needed

1.4 Computer Care and Safety

This is a room that is specially designed and prepared to facilitate the installation of computers and to provide a safe conducive environment for teaching and learning of computer studies.

Factors to consider when preparing a computer laboratory

Security of computers, programs and other resources.

Reliability of the power source.

The number of computers to be installed and the available floor space.

The maximum number of users that the computer laboratory can accommodate.

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

- To avoid accidental injuries to the users.

- To avoid damage of computers.

- To avoid lack of a conducive teaching-learning environment.

PRECAUTIONS TO TAKE IN A COMPUTER LABORATORY

1. Switch on the computer system starting from the wall socket, UPS or stabilizer, computer then other peripherals like the printers
2. Avoid making connections when the computer is on power e.g. keyboard connections, mouse, printer, monitor, etc.
3. Avoid abrupt switching off and on the computer system. Use the normal way of shutting down or closing all the programs then shut down the computer from the start button.
4. Place the computer in a dust free environment with good ventilation. Dust covers should be used to cover computers when not in use and if you are using polythene covers, then do not cover the computer immediately after switching off as it will trap heat.
5. The computer should not be exposed to direct sunlight.
6. The computers should be regularly serviced at least once a year or more frequently if the environment is dusty. There should be blowing of dust from the machines. Clean the monitor and other machines with a dump cloth. Don’t drop water in the machines. If you drop water, do not use the machines until the water evaporates.
7. Do not open the computer for inside cleaning. It should be handled by qualified personnel.
8. It is good practice to keep record of the daily condition in case of computer failure.
9. The peripheral devices such as printers and mouse should be regularly serviced.
10. The floppy disks used for installation of programs and backups should be kept safely in disk banks and kept away from sunlight and magnetic media.
11. Diskettes have to be write protected all the time especially for installation diskettes and remove the write protection when writing on them if they are used for back up.
12. In areas where the power fluctuates, it is important to either use a stabilizer or UPS to ensure steady input of power to computer systems.
13. Food and drinks should not be allowed near computers.
14. Avoid smoking from the computer-room.
15. The computer system should not be connected to an electric line shared by other heavy equipment.

Major characteristics of modern computers

For a device to be regarded as a computer, it must have or manifest some or all of the characteristics below;

* Speed
* Accuracy
* Storage
* Diligence
* Artificial Intelligence (AI)
* Automation
* Connectivity
* Multitasking

Speed

Computers are very fast in their operations in that their speed in measured in millions of instructions per second (MIPS)

Accuracy

Computers are known to be so accurate that they hardly make any mistake. In fact computers are capable of detecting and correcting wrong mistakes made. It follows therefore that if wrong data is fed into the computer, wrong results are expected out. Hence the saying, “garbage in garbage out” (GIGO)

Storage

For a computer to be able to work, it must have some

work space where data is stored before being processed or where information is stored before being output to particular devices. This storage space is called memory.

Diligence

Computers have the ability to perform the same task over and over without getting bored or tired. This is seen in industrial robotics, like in car assembly lines.

Artificial Intelligence

Computers are artificially intelligent. They can respond to requests given to them and provide solutions. This is accomplished by the power of the programs installed in them.

Note:

1. Installation is the term used to refer to the act of adding or improving a program on your computer

2. A computer program is a set of instructions written in computer language e.g. Microsoft word, Microsoft excel, Microsoft Power point, Microsoft Access, Microsoft Publisher, Note pad, Word pad etc.

Automation

Computers work automatically. They do not need any supervision in order to perform programmed routines.

Multitasking

Computers have the ability of handling different types of tasks at the same time. i.e. a user can instruct it to print, scan for viruses, play music, search for the lost file, to mention but a few. All the above activities can be done at the same time or even more. Hence the term multitasking.

Connectivity

If computers are joined together i.e. interconnected using a given network media, then connectivity becomes another characteristic. This is aimed at sharing resources such as files, printers, programs, disk drives, etc.

Computer classifications

Computing devices fall into various classes. The basic computer classifications include;

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

Classification by purpose

Here computers are classified according to the work they are designed for. This classification is further divided into two sub-classes i.e.

* Special purpose computers
* General purpose computers

Special purpose computers

These are designed to handle only a particular task. Their form of operation is restricted in nature e.g. digital watches, pocket calculators etc.

General purpose computers

These computers are designed to solve a wide range of problems. A typical computer of this type can perform; calculations, keep date and time, word process documents, store database and so many other tasks. E.g. Desktop, laptop, palmtop computers

Classification by process

1.6: Categories of Computers

Computers can be categorized according to the process they use to represent data. People communicate through speech by combining words into sentences. Human speech is analog because it uses continuous (wave form) signals that vary in strength and quality. Most Computers are Digital.

Computers can generally be grouped under three (3) categories i.e.

a) Analog Computers

b) Digital Computers

c) Hybrid Computers

a) Analog Computers

An analog Computer is a computing device that uses continuously changing values to represent information.

These computers that represent data or information as continuous variable quantities or Units! It generally deals with physical variables such as temperatures, weight, voltage, pressure, speed, etc.

Examples of Analog Computers include;

1. The usual weighing scales

2. A slide rule

3. Mercury thermometers

4. Hydraulic Car Lifts

5. Voltmeters

6. Manometers

7. Speedometers

8. Barometers

The slide is a hand operated analog computer for doing multiplication and division, square roots, cubes and cube roots, etc.

b) Digital Computers

Digital Computers are those, which represent data or information as numerical (binary) digits.

These are computers that use discrete (discontinuous) values, i.e. binary digits (0, 1) to represent data.

Data entered is represented as a series of 0,s and 1’s, also kwon as binary notation or base two and is handled by micro processors.

The binary digits simply mean the presence or absence of an electric pulse or voltage. The state of being ON is represented by 1 and OFF is represented by 0.

Although digital representations are discrete, the information represented can be either discontinuous, such as numbers, and letters, or continuous such as sounds, images, and other measurements of continuous systems.

Digital computers are more accurate and work at a very fast rate.

Examples of Digital Computers include;

* Digital Watches
* Electronic calculators
* Mobile Phones
* Digital Cameras
* CCTV systems
* All PCs
* Television Sets

(c) Hybrid Computers

These are computers combine basic features from both Analog & Digital Computers.

A hybrid computer accepts analog signals and converts to digital for processing.

It is mostly used for automatic operations of complicated physical processes and machines. Now-a-days analog-to-digital and digital-to-analog converters are used for transforming the data into suitable form for either type of computation.

Hybrid computers are mainly used for specialized tasks.

Examples of Hybrid Computers

Digital gasoline/petrol pumps; they measure physical quantities and represent its values in digital form.

In Hospitals’ Intensive Care Units, analog devices measure the patient’s temperature, blood pressure and other vital signs. These measurements which are in analog are then converted into numbers and supplied to digital components in the system.

Difference between Digital Computers and Analog computers

Digital Computers Analogy Computers

- They use binary code to interpret information - They use analog

- They transmit data in discrete form - Transmit data in continuous form

- Fast and expensive - Slow and cheap

- Requires less memory - Requires more memory

- No interference of noise during operations - There is interference

- More accurate in interpreting information - Less accurate in interpreting information

Here general purpose computers are classified according to how data processed is presented. This classification is further divided into 3 sub-classes i.e.

* Digital computers
* Analog computers
* Hybrid computers

Digital computers

These are computers that process data that is presented in form of discrete values, i.e. discrete values are numbers that can be defined like 1, 2, 3, 4, 5, etc. digital watches are an example

Analog computers

These are computers that process data that is in a continuous form or measurable quantities/units e.g. pressure, temperature, electrical voltage are variable quantities. Examples of analog computers include those used in applications like thermometers, voltmeters and speedometers.

Hybrid computers

These computers have the combined features of both digital and analog computers i.e. they deal with analog signals and digital signals at the same time.

Note:

The transfer of digital signals to analog signals is called modulation and analog to digital is called demodulation hence the term “Modem”.

Classification by size

Here hybrid computers are classified depending or according to the user capacity and size of the machine. This classification is further classified into 3 sub-classes or categories i.e.

* Super computers
* Mainframe computers
* Mini frame computers
* Microcomputers/Personal computers

Supercomputer

An extremely fast computer, which can perform hundreds of millions of instructions per second

Main Frame

These are very large computers normally owned by the state and process data at high speed. Multi-user computer system capable of supporting hundreds of users simultaneously. Software technology is different from minicomputer.

Mini frame computers

These are smaller than the mainframe computers and owned by same big corporations and research centres. They are capable of supporting between 50 – 500 users at a time.

Microcomputers/Personal computers (PCs)

These are the smallest compared to the above two categories i.e. mainframe and Mini frame computers. These support only one user at a time, meaning that all system resources are utilized by one user only. Microcomputers are further classified into 3 categories i.e.

* Desktop computers
* Laptop computers
* Palmtop computers

Desktop computers

These are designed to be stationed in one place probably on top of a desk or table

Laptop computers

These are computers that are smaller than desktop computers and are designed for mobile computing. They have all the facilities and system resources offered by desktop computers

Palmtop computers

These are smaller than laptop computers. They are designed for those people who are ever on the move. Like the laptops, palmtops have all the facilities and the system resources offered by desktop computers.

REVISION QUESTIONS:

(a) What are the differences between a mainframe Computer and a microcomputer?

(b) Briefly comment on the various computer classifications used to identify the different types.

(c) List at least four main types of computer processors familiar to you.

(d) Explain four ways in which computers may be classified according to size.

(e) Briefly elucidate on the five advantages of personal computers over mainframes.

A HISTORY OF THE COMPUTER

FIVE ERAS IN COMPUTER DEVELOPMENT

* Pre-History
* Electronics
* Mini
* Micro
* Network

PRE-HISTORY ERA: 4th century B.C. to 1930s

* The abacus is believed to have been invented in 4th century B.C.
* The Antikythera mechanism, a device used for registering and predicting the motion of the stars and planets, is dated to 1st century B.C.
* Arabic numerals were introduced in Europe in the 8th and 9th century A.D. and was used until the 17th century.
* John Napier of Scotland invents logs in 1614 to allow multiplication and division to be converted to addition and subtraction.
* Wilhelm Schickard, a professor at the University of Tubingen, Germany builds a mechanical calculator in 1623 with a 6-digit capacity. The machine worked, but it never makes it beyond the prototype stage.
* Leonardo Da Vinci is now given credit for building the first mechanical calculator around 1500. Evidence of Da Vinci’s machine was not found until papers were discovered in 1967.
* Blaise Pascal builds a mechanical calculator in 1642 with an 8-digit capacity.
* Joseph-Marie Jacquard invents an automatic loom controlled by punch-cards in the early 1800s.
* Charles Babbage designs a “Difference Engine” in 1820 or 1821 with a massive calculator designed to print astronomical tables. The British government cancelled the project in 1842; Babbage then conceives the “Analytical Engine”, a mechanical computer that can solve any mathematical problem and uses punch-cards.
* Augusta Ada Byron, Countess of Lovelace and daughter of English poet Lord Byron, worked with Babbage and created a program for the Analytical Engine. Ada is now credited as being the 1st computer programmer.
* Samuel Morse invents the Electric Telegraph in 1837.
* George Boole invents Boolean Algebra in the late 1840s. Boolean Algebra was destined to remain largely unknown and unused for the better part of a century, until a young student called Claude E. Shannon recognized its relevance to electronics design.
* In 1857, only twenty years after the invention of the telegraph, Sir Charles Wheatstone (the inventor of the accordian) introduced the first application of paper tapes as a medium for the preparation, storage, and transmission of data.
* The first practical typewriting machine was conceived by three American inventors and friends, Christopher Latham Sholes, Carlos Glidden, and Samual W. Soule who spent their evenings tinkering together.

The friends sold their design to Remington and Sons, who hired William K. Jenne to perfect the prototype, resulting in the release of the first commercial typewriter in 1874.

* Herman Hollerith’s Tabulating Machines were used for the 1890 census; the machines used Jacquard’s punched cards.

ELECTRONICS ERA: 1900-1964

* In 1926, Dr. Julius Edgar Lilienfield from New York filed for a patent on a transistor.
* KonradZuse, a German engineer, completes the 1st general purpose programmable calculator in 1941.
* Colossus, a British computer used for code-breaking, is operational by the end of 1943.
* ENIAC (Electronic Numerical Integrator Analyzor and Computer) is developed by Ballistics Research Lab in Maryland and built by the University of Pennsylvania and completed in 1945.
* The transistor is developed by Bell Telephone Laboratories in 1947.
* UNIVAC (Universal Automatic Computer) is developed in 1951 and can store 12,000 digits in random access mercury-delay lines.
* EDVAC (Electronic Discrete Variable Computer) is completed for the Ordinance Department in 1952.
* Texas Instruments and Fairchild Semiconductor both announce the integrated circuit in 1959.

## The IBM 360 is introduced in April of 1964 and quickly becomes the standard institutional mainframe computer. By the mid-80s the 360 and its descendents have generated more than $100 billion in revenue for IBM.

MINI ERA: (1959-1970)

* The Mini Era began with the development of the integrated circuit in 1959 by Texas Instruments and Fairchild Semiconductor.

Ivan S utherland demonstrates a program called Sketchpad (makes engineering drawings with a light pen) on a TX-2 mainframe at MIT’s Lincoln Labs in 1962.

* By 1965, an integrated circuit that cost $1,000 in 1959 now costs less than $10.
* Doug Engelbart demonstrates a word processor in 1968.
* Also in 1968, Gordon Moore and Robert Noyce founded a company called Intel.
* Xerox creates its Palo Alto Research Center (Xerox PARC) in 1969.
* Fairchild Semiconductor introduces a 256-bit RAM chip in 1970.

In late 1970 Intel introduces a 1K RAM chip and the 4004, a 4-bit microprocessor. Two years later comes the 8008, an 8-bit processor.

MICRO ERA: 1971-1989

* Bill Gates and Paul Allen form Traf-O-Data in 1971 to sell their computer traffic-analysis sytems.
* Gary Kildall writes PL/M, the first high-level programming language for the Intel Microprocessor.
* Steve Jobs and Steve Wozniak are building and selling “blue boxes” in Southern California in 1971.
* Intel introduces the 8008, the first 8-bit microprocessor in April of 1972.
* Jonathan A. Titus designs the Mark-8 and is featured in the July 1974 *Radio Electronics*.
* In January 1975 *Popular Electronics* features the MITS Altair 8800; it is hailed as the first “personal” computer.
* Paul Allen and Bill Gates develop BASIC for the Altair 8800. Microsoft is born!!!
* Apple is selling its Apple II for $1,195, including 16K of RAM but no monitor by 1977.
* Software Arts develops the first spreadsheet program, Visicalc by the spring of 1979. 500 copies per month are shipped in 1979 and sales increase to 12,000 per month by 1981.
* By 1980 Apple has captured 50% of the personal computer market.
* In 1980 Microsoft is approached by IBM to develop BASIC for its personal computer project. The IBM PC is released in August, 1981.
* The Apple Macintosh, featuring a simple graphical interface using the 8-MHz, 32-bit Motorola 68000 CPU and a built-in 9-inch B/W screen, debuts in 1984.
* Microsoft Windows 1.0 ships in November, 1985.
* Microsoft’s sales for 1989 reach $1 billion.

NETWORK ERA: (Late 50s to present)

* Timesharing, the concept of linking a large numbers of users to a single computer via remote terminals, is developed at MIT in the late 50s and early 60s.
* Paul Baran of RAND develops the idea of distributed, packet-switching networks.
* ARPANET goes online in 1969.
* Bob Kahn and Vint Cerf develop the basic ideas of the Internet in 1973.
* In 1974 BBN opens the first public packet-switched network –Telenet.
* A UUCP link between the University of North Carolina at Chapel Hill and Duke University establishes USENET in 1979.
* TCP/IP (Transmission Control Protocol and Internet Protocol) is established as the standard for ARPANET in 1982.
* The number of network hosts breaks 10,000 in 1987; two years later, the number of hosts breaks 100,000.
* Tem Berners-Lee develops the World Wide Web. CERN releases the first Web server in 1991.
* By 1992, the number of network hosts breaks 1,000,000.
* The World Wide Web sports a growth rate of 341,634% in service traffic in its third year--1993.

WEBSITES

* <http://www.pbs.org/nerds/timeline>
* <http://www.maxmon.com/history.htm>
* <http://ei.cs.vt.edu/~history/>
* <http://www.cybergeography.org/atlas/historical.html>
* [http://www.computerhistory.org](http://www.computerhistory.org/)

COMPUTER GENERATIONS

The term computer generation refers to the various stages computers have under gone from the first computer, present and the future computers.

There has been four (4) general computer generations in the history and evolution of computers. This is from 1640s to 1980s.

|  |  |  |  |
| --- | --- | --- | --- |
| First ()1940s – 1960s) | Second (1960 – 1964) | Third (1964 – 1970s) | Fourth (1970s – 1980s) |
| Vacuum tubes | Transistors | Integrated Circuits (ICs) | Large Scale Integrated Circuits (LSICs) |
| Hundreds of computers in use | Thousands of computers in use | Ten thousand computers in use | Millions of computers in use |
| 1000 circuits per cubic foot | 100,000 circuits per cubic foot | 10 million circuits per cubic foot | Billions of circuits per cubic foot |
| ENIAC, EDSAC, EDVAC, UNIVAC | “ | Minicomputers developed | Microcomputer developed |

FIRST GENERATION COMPUTERS (1945 - 1959)

World War efforts provided a catalyst for the development of first generation computers. As a preparation, Howard G Aiken, working in conjunction with IBM uncovered electromechanical calculator in 1944 called “MARK1”.

Characteristics of first generation computers

The following characteristics were common in first generation computers;

* Computers relied on vacuum tubes to store and process information
* They limited primary memory
* Computers used punched cards for input and output of data
* They used magnetic drums for primary storage
* Programming was done in machine and assembler languages
* Computers had no operating system
* They consumed a lot of power and produced a lot of heat
* They were short lived and needed a standby technician
* They were very huge and heavy
* Computers took long to be constructed or made i.e. one computer would take about 10 years

Examples of computers in the first generation:-

* IBM 650
* UNIVAC: Universal Automatic Computer
* EDSAC: Electronic Display Storage Automatic Computer
* EDVAC: Electronic Discrete Variable Automatic Computer
* ENIAC: Electronic Numerical Integrator and Automatic Calculator
* Etc.

SECOND GENERATION COMPUTERS.

The following characteristics were common in second generation computers;

* There was use of transistors for their internal operations
* Computers generated less heat and consumed less power as compared to first generation computers.
* Introduction of high level programming languages e.g. FORTRAN (Formula Translation), COBOL (Common Business Oriented Language).
* Introduction of super computers e.g. IBM 7030
* There was a reduction in size and in cost as compared to the first generation computers
* There was an increase in memory capacity as compared to the previous generation
* There was an increase in processing speed and reliability
* Computers never had an operating system
* Computers used magnetic tapes and disks for secondary storage

Examples of Second generation computers

* NCR 501
* IBM 7094
* CDC 6600 (Mainframe computers)
* IBM 1401
* Etc.

THIRD GENERATION COMPUTERS (1964 - 1979)

Third generation computers were associated with the following characteristics:-

* Computers used integrated circuits (ICs) or silicon chips for their internal operations
* Limited Artificial Intelligence (AI) and Expert systems came into play
* There was use of parallel processing
* Introduction of the first operating system e.g. multics
* Introduction of simple programming languages like BASIC i.e. Beginners All-purpose Symbolic Instruction Code
* The production of the first microcomputer (Personal Computer)
* Computers reduced in size and in cost
* Magnetic disks were developed during this period for storage purposes
* There was a common use of mini frame computers

Examples of third generation computers

* IBM 360
* IBM 370
* PDP I
* PDP II
* Etc.

Fourth Generation Computers (1971)

Computers in fourth generation were associated with the following characteristics;

* Computers used large scale and very large scale integration for internal operations
* Introduction of microcomputers and super computers
* Development of a micro processor
* Computers became more powerful and cheap enough that schools and homes were able to purchase them.
* Limited Artificial Intelligence and expert systems
* Introduction of a wide variety of software
* Use of parallel processing
* Computers became more faster in terms of speed
* There was a decrease in heat generation and power consumption

Examples of fourth generation computers

* Desktop computers
* Laptops
* Palmtops

FIFTH GENERATION COMPUTERS

The fifth generation is expected to be characterized with the following;

* Computers will be able to simulate thoughts and judgement
* They will be able to enhance human judgement but never will they replace human imagination and judgement.
* May produce computers that accept spoken instructions, translate foreign languages, etc.
* Computers are expected to be very fast in their operations and efficient.
* Computers are also expected to at low prices in future for everyone to possess

Other characteristics expected include;

* Wireless controls
* Universal and cheap internet connections
* Wireless networks
* High sense of touch
* Artificial Intelligence (AI)

THE INFORMATION PROCESSING CYCLE

This involves different stages the data goes through to be transformed into information. The series of input, process, output and storage (IPOS) activities are often called information processing cycle.

Data

Process

Information

Process

Basic stages of Information processing cycle

The following are basic stages of information processing cycle i.e.

* Collection
* Preparation of data
* Input of data
* Processing of data
* Output of information

Collection of data

This involves capturing data from different sources such as text book, Internet, people, etc, and recording it onto some media such as paper.

Preparation of data

This stage involves copying, grouping or arranging data in a more convenient way for input.

N.B

Checking and verifying the data collected are done at this stage.

Data verification is checking of mistakes or transmission errors when data is copied from one place to another.

Data validation: This is the checking of input data for errors before processing.

Data validation techniques  
Presence check: This is to ensure that data is actually present.   
Range check/character check/alphanumeric check: This is to ensure that entered data is of correct type like numeric or alphabetic.   
Consistence check: This is to compare new data with previous data e.g. current gas meter reading against past readings.   
Control total check: This is to compare the computer calculated total like the total value of all the invoices with the manually calculated total.   
Hash total check: Is to compare the computer calculated total with the manually calculated total

Input of data

It involves entering the data or sending the stored data into the processing system. Checking the accuracy and validity of the input data are often done at this stage.

The Processing of data

This stage involves calculating or manipulating the data input and even storing the result for future use.

Output of information

This stage involves giving out the processed results in a readable form or report.

Data verification

This refers to the checking of input data for errors before brought out. E.g. is it of the correct data type.

Common data collecting and processing equipments

Types of writer or manual electronics:-

* Fax machine
* Telephones
* Computers

THE COMPUTER SYSTEM

The computer system refers to all components (functional units) combined together to make up a computer.

For a computer to be able to work or must be available that the computer system.

A computer system is made up of five main elements as listed below;

* Hard ware
* Soft ware
* Data /information
* Human ware /Live ware
* Procedure.

When one computer system is set out to communicate with another computer connectively becomes the sixth system element.

N.B:

The two main parts of a computer system are hard ware and software.

1. Humanware:

People operate the computer hard ware. They create the computer software instruction present.

Human ware/Users/People –This is the most important component of a computer system.

Human ware refers to the people who operate and initialize instructions to the computer system

They design and develop computer systems, operate the computer hardware, create the software, and establish procedures for carrying out tasks.

Kinds/types of users

There are two kinds of Computer Users:

Ordinary user - is someone without much technical knowledge of computers but uses computers to produce information for professional or

personal tasks, enhance learning, or have fun. Ordinary users include Computer students, Typists (Secretaries), etc.

Professional user -is a person in a profession involving computers who has had formal education in the technical aspects of computers; Examples include Computer programmers, webmasters, etc.

1. Data/information:

Data is the raw material used to get information in other wards its un evaluated facts and figers or instructions.

This raw material is processed into useful information. In other words information is a product of data processing.

This processing involves refining, summarizing and categories etc.

1. Software:

This is a term used to describe the instructions that tell the hard ware how to perform tasks.

OR

These are intangible components of a computer.

Procedure;

These are various steps one uses to utilize the computer effectively e.g. to open any start button.

* Click on the start button.
* Move to All-Programs and click on it.
* Select Microsoft office.
* Finally select a program to use.

1. Hard ware:

These are physical, tangible components of a computer. There devices enable the user to enter data into the computer, view the output on the screen, print, process, store the information etc.

N.B

Hard ware + Software = A working system

CLASSIFICATION OF HARDWARE COMPONENTS

These hard ware components can be classified as follows.

* Input devices
* Output devices
* The Central Processing System (CPU)
* Memory

Other hardware components include;

* Data buses
* Stabilizers
* Un interruptible power supply
* Power supply
* Mother board
* Expansion slots

1. INPUT DEVICES:

These are devices that are used to enter data into the computer. They offer a crossing point between a user and the computer.

They let users into information and issue commands.

Input Devices

Input devices are used to enter data or commands in a form that the computer can use.

They send the data or commands to the processing unit. According to the type of data they input, they can be grouped into the following:

* Text input devices
* Pointing input devices
* Imaging input devices
* Gaming input devices
* Audio input devices
* Biometric input devices and
* Other Specialized input devices

(a) Text input devices

Text is a general word for all characters such as letters, numerical digits, symbols and marks that combine to form words, sentences, paragraphs and so on.

Text input devices include:

* The keyboard
* Voice Recognition Equipment
* OMR and Barcode Readers
* OCR and Optical Readers
* RFID readers
* Magnetic Strip Card Readers, etc.

1. The Keyboard

Definition: A keyboard is an input device, consisting of a set of keys used to operate a computer.

A keyboard is the main and most reliable computer input device. The QWERTY is referred to as the "Universal" keyboard layout. Other keyboard layouts include: Dvorak, ABCDE, GKOS, QWERTZ and AZERTY

Advantages of Keyboard

* Keyboards are very common (commonly supplied with computers)
* Entering data and commands with keyboard is faster as compared to the mouse
* Keyboards are more reliable

Demerits of Keyboard

* It takes a lot of time to practice in order to type quickly
* Keys can easily become faulty due to dust.
* Some keyboards keys are very hard to press, causing fingers to hurt.

2. Voice Recognition Equipment

Voice Recognition Equipment (Speech recognition) converts spoken words to text.

Advantages

* No typing of data is necessary.
* Voice recognition can be used by people whose hands are disabled.
* Dictating text is faster than typing.
* Voice Recognition systems are also ideal for the blind.

Demerits of text input by speech Recognition

* Error rate is high, depending on user’s accent.
* Words with the same pronunciations (Homophones) like see and sea cannot be distinguished
* Speech Recognition can’t work in noisy environment
* The Voice Recognition software must be trained to recognize more words.
* It requires the user to speak in a writing style, i.e. even pronouncing the marks such as comma.

3. Optical Mark Recognition (OMR)

Optical mark recognition (OMR) devices read hand-drawn marks such as small circles or rectangles. A person places these marks on a form, such as a test, survey, or questionnaire answer sheet.

4. Barcode readers

A bar code reader is an optical reader that uses laser beams to read bar codes that are printed on items usually in super markets.

5. Optical Character Recognition (OCR)

Optical character recognition (OCR) is a technology that involves reading typewritten, computer-printed, or handwritten characters from ordinary documents and translating the images into a form that the computer can understand.

6. MICR readers

Magnetic-ink character recognition (MICR) reader is used to read text printed with magnetized ink. MICR readers are mainly used by the banking industry for processing checks.

7. RFID readers

Radio-Frequency Identification (RFID) is a technology that uses radio waves to transfer data from an electronic tag, attached to an object, through a reader for the purpose of identifying and tracking the object. An RFID tag can be affixed to cars, computer equipment, books, mobile phones, etc.

8. Magnetic Strip Card Readers

A magnetic strip card reader reads the magnetic stripe on the back of credit cards, bank ATM cards, and other similar cards.

(b) Pointing Devices

A pointing device is an input device, which allows users to move a pointer and make selections on the computer screen. A pointing device is any piece of hardware that is used to input spatial data into a computer.

Examples of pointing devices are:

* Mouse
* Stylus pen & digitizing tablet
* Cordless mouse
* Trackball
* Touchpad
* Light pen
* Touch screen
* A Track point, etc.

1. The Mouse

Mouse - The mouse is a hand held device that lets you point to and make selections of items on your screen. In a PC mouse there are mostly 2-3 buttons.

2. Stylus pen & digitizing tablet

Stylus pen- The pen lets you draw on what is called a digitizing tablet that mirrors the surface area of the computer screen. The pen can be used as a standard mouse (without wires connected to it) or also as a free flowing drawing device.

3. Cordless Mouse

Cordless Mouse –is as a normal mouse, but has no wire that connects it to the system unit. Instead it uses batteries to broadcast a radio signal to a sensor that is connected to the system unit usually through the USB port

4. Trackball

The trackball is an upside-down mouse that remains stationary on your desk. It is the same principle as the mouse except that the rollers are reversed and the ball is on top.

5. Touchpad

The touchpad has sensors that sense your touch. When they sense your touch they send a signal to the computer to move the mouse pointer to that location on the screen. Common on laptop computers

6. Joystick

Joystick- Consists of a stick that pivots on a base and reports its angle or direction to the device it is controlling. Joysticks are often used to control video games, and usually have one or more push-buttons whose state can also be read by the computer.

7. Light pen-

Light pen- is a form of a light-sensitive wand used in conjunction with a computer's CRT TV set or monitor. It allows the user to point to displayed objects, or draw on the screen, in a similar way to a touch screen but with greater positional accuracy.

8. Touch Screen-

Touch Screen- The touch screen lets the user touch the area to be activated by using the finger or hand.

9. Track Point

A Track Point, also called a pointing stick, is a cursor control device located in the middle of the keyboard between the G, H, and B keys. The control buttons are located in front of the keyboard toward the user.

(c) Imaging Devices

Imaging input Devices are devices that input images such as still photos, motion pictures, graphics, video etc. into the computer for processing.

Common Imaging devices include:

* Image scanner
* Digital camera
* Digital Video (DV) camera
* Camcorder
* Webcam

1. Image scanner

A scanner is a light-sensing input device that converts hardcopy documents, drawings, or pictures to an electronic version (softcopy), which can then be stored on a disk. The electronic version of scanned material is in the form of rows and columns of dots called a bitmap. Each dot on a bitmap consists of one or more bits of data.

Common types of scanners include:

* Flatbed scanner
* Pen or handheld scanner
* Sheet bed scanner
* Drum scanner.

2. Digital Camera

A digital camera allows users to take pictures and store the photographed images digitally instead of storing on a traditional film. When you take pictures, the images are electronically stored in the camera.

3. Digital Video (DV) Camera

A digital video (DV) camera, by contrast records video as digital signals instead of analog signals. To transfer recorded images to the computer hard disk, users connect DV cameras directly to a port on the system unit.

4. Camcorder

This is a light weight video camera that records data in digital form onto a storage device such as a videotape.

5. Web Cam

A Web cam, also called a PC video camera, is a type of digital video camera that usually sits on top of the monitor. Some laptop computers have built-in Web cams.

Webcams enable users to:

* Capture video and still images,
* Send e-mail messages with video attachments,
* Add live images to instant messages,
* Broadcast live images over the Internet,
* and make video telephone call

(d) Gaming Input Devices

Gaming input devices are devices specifically designed to be used for playing computer games. Examples Include:

* Gaming keyboard
* Gaming wheels
* Joystick
* Game pad
* Light guns
* Dance pad
* Motion sensing game controllers

1. Gaming keyboard

Gaming keyboards typically include programmable keys so that gamers can customize the keyboard to the game being played.

2. Joysticks and wheels

A wheel is a steering wheel-type input device. Users turn the wheel to simulate driving a vehicle. Most wheels also include foot pedals for acceleration and braking actions.

3. Gamepad

A gamepad controls the movement and actions of players or objects in video games or computer games. On the gamepad, users press buttons with their thumbs or move sticks in various directions to trigger events.

4. Light guns

A light gun is used to shoot targets and moving objects after you pull the trigger on the weapon. Instead of emitting light, most light guns work by detecting light.

5. Dance pad

A dance pad is a flat electronic device divided into panels that users press with their feet in response to instructions from a music video game.

6. Motion sensing game controllers

These are devices that allow the user to guide onscreen elements by moving a handheld input device in predetermined directions through the air.

(f) Audio Input Devices

Audio input is the process of entering any sound into the computer such as speech, music, and sound effects. To enter sound into a computer, it must have a sound card. Audio input devices are plugged into a port on the sound card.

Examples of audio input devices include:

* Microphones
* Sound cards
* MIDI devices
* Dictaphone

1) Microphones

A microphone is an instrument for converting sound waves into electrical energy variations, which may then input into the computer for processing, recording or audio playback.

Microphones are connected to the sound card in the system unit.

2) Sound Card

It is a device that can be slotted into a computer to allow the use of audio components for multimedia applications. Without a sound card, Audio input and output is not possible.

3) MIDI devices

MIDI (musical instrument digital interface) is the standard that defines how digital musical devices represent sound electronically.

4) Dictaphone

This the earliest device most commonly used to record speech for later playback or to be typed into print. It was established by Alexander Graham Bell in Washington, D.C. in 1881.

(e) Biometric Input Devices

A biometric device translates a biological personal characteristic into a digital code that is stored or compared with a digital code stored in the computer. Common biometric devices include:

* Iris recognition system
* Signature verification systems
* Hand geometry system
* Face Recognition systems
* Fingerprint scanner

1. Fingerprint scanner

A fingerprint scanner captures curves and indentations of a fingerprint.

2. Face Recognition systems

A face recognition system captures a live face image and compares it with a stored image to determine if the person is a legitimate user.

3. Hand geometry system

Biometric devices measure the shape and size of a person's hand using a hand geometry system. Some large companies use this system as time and attendance devices or as security devices.

4. Signature verification systems

A signature verification system recognizes the shape of your handwritten signature, as well as measures the pressure exerted and the motion used to write the signature.

5. Iris recognition system

These read patterns in the iris of the eye. These patterns are as unique as a fingerprint.

(g) Other Specialized Input devices

There are many other special input devices that are used for doing special customized tasks. Some of them include: Remote Control, Sensors Etc.

(ii) Remote control

Remote control devices emit a beam of infrared light, which carries signals.

Remote control is commonly used with TVs but many laptop computers being produced come with remotes as form of input device, which allow you to operate the laptop from a distance.

(ii) Sensors

Chemical responses to the physical environment or movement can be converted to electrical signals by devices known as sensors, which input them to the computer for processing.

Various sensors can be used to measure heat, light, temperature, acidity, oxygen concentration, water flow, etc.

Example of input devices;

* + - * + Key board
        + Mouse
        + Joy stick
        + Light pen
        + Digital camera
        + Microphone
        + Barcode reader
        + Track ball
        + Scanner
        + Touch screen
        + Graphic tablets.
        + Optical mark recognition reader (OMR)
        + Optical character reader (OCR)

The key board

Whether you’re writing a letter or calculating numerical data, your keyboard is the main way to enter data into your computer.

Definition

A keyboard is an input device that converts characters into electrical signals that are readable by the processor (CPU).

This is the primary input device that resembles a type writer in terms of key arrangement only that it has more keys and advanced functions than a type writer.

Examples of Keyboard standards

* DEVORAK
* QWERTY

Parts of the Computer system keyboard

* Alpha numeric keys
* Numeric keypad
* Function keys
* Special keys

Alphanumerical/Character keys

These are keys on the main typing area having alphabetical letters i.e. marked from A – Z and are basically used for keying words.

Numeric keys (0 - 9)

These are keys representing the numerals. They are marked from 0 – 9 and are used for keying numbers. They are in two sets; a line of them runs just above the alphabetical keys and another collection on the far right corner on an area called Numeric Key pad that sometimes works as an adding machine.

Function keys

These run across the top of a keyboard and are marked F1 – F12. They have different functions i-n different application programs.

Uses of Function Keys (F1, F2… F12) in Windows environment

Every laptop, or rather every keyboard comes with a set of Function Keys which cater to special functions. And if you know how to use them optimally you might just enjoy [using the keyboard](http://www.guidingtech.com/4535/windows-7-keyboard-shortcut/). We will write about how to generally use the function keys across browsers, Windows and mainly MS Office.

F1

* Almost every program comes with a help or support menu and pressing F1 while on the program brings up the help menu instantly.
* F1 with the Windows key, however, shows up Windows Help and Support.

F2

* On Windows Explorer F2 lets you quickly rename the selected file or folder.
* Alt + Ctrl + F2 opens the Documents Library while on MS Office suite.

F3

* Whilst on desktop or Windows Explore press F3 to search for files and folders.
* On most browsers (at least on Firefox, Chrome and IE) F3 is an instant way of finding something by launching the Find bar.
* Repeats the last command on MS Dos.
* Shift + F3 toggles between capitalizing each word, lower case and upper case for selected text on MS Word.

F4

* Known to all, Alt + F4 closes the current program. When no program is running it launches the Shutdown dialog box.
* On Windows Explorer it takes the focus or cursor to address bar. It does the same on Internet Explorer.

F5

* Performs the refresh action on Windows and all common browsers that we know of.
* Use it on PowerPoint to start a slide show.
* Opens Find, Replace, Go to dialog on MS Office programs.

F6

* On Windows desktop pressing F6 tabs from desktop files to the taskbar and the system tray icons.
* Focuses on the address bar on most browsers.
* Toggles between the menu items and workspace on MS Office suite.

F7

* Could not figure out anything for Windows.
* Turns on Caret browsing on Mozilla Firefox. This feature places a moveable cursor in web pages, allowing you to select text with the keyboard.

F8

* Enters the Windows Start Menu (commonly used to launch the safe mode) if pressed during boot process.

F9

* Still looking for something significant.
* If you are a programmer you would know its uses on Integrated Development Environments. Generally, compiles and runs the code in combination with Ctrl key.

F10

* Shows the Menu bar in Firefox and IE or highlights the same on most programs.
* Shift + F10 is equivalent to right-click and pops out the context menu.

F11

* Opens full screen mode in Windows Explorer and all browsers.
* On MS Excel Shift + F11 adds a new sheet and Ctrl + F11 adds a new macro to the workbook.

F12

## Opens Save As window on MS Office.

* Ctrl + Shift + F12 is equivalent to Ctrl + P on MS Office.

Conclusion

While we have tried our best to explore what we could, we might have missed out on some uses of function keys. Well, that’s why we’ve got awesome readers like y’all, right? Share what you know and also tell us what you discovered today through this article that you are likely to use frequently from now on.

Special keys

Enter key (Return key)

It confirms to the computer whatever is typed i.e. when a command is issued it can only be executed after pressing enter key.

Back space key

Erases the character to the left of the cursor and moves the cursor one position to the left.

Delete key

Erases the character to the right of the cursor and moves the cursor one position to the right.

Escape key

It has many uses but it is most commonly used to cancel an action that is being under taken.

Escape key

It has many uses but it is commonly used to cancel an action that is being undertaken.

Control key (Ctrl)

It is used in combination with the rest of the alphabetical keys to issue commands e.g. to save a file, you press Ctrl key + S

Alternate Key (Alt)

It is also used in combination with other keys to issue commands e.g. to close a program that is running, press Alt key + F4

Caps lock key

It is used when turning to upper case (capital letters) or lower case (small letters).

Shift key

The shift key performs two functions i.e.

1. Turn to upper case or lower case depending on the keyboard case mode. Holding down the shift key and pressing any letter from A – Z, turns the particular letter to the case that is opposite to the current one.
2. Activating characteristics on top of the buttons with two characters in the type writer area e.g. !, @, #, $, %, \*, ?, <, etc.

In all the above two functions, hold down the shift key and press the button in question when the shift key is still down.

Space bar

This is the longest button on the keyboard. It is used for inserting spaces between words and characters.

Num lock key

This is used to activate numbers from 0 – 9 on the right hand of the keyboard.

2. Navigation/Arrow Keys

These are used for moving around in documents or web pages and editing text. They include the arrow keys as well as the Home, End, Page Up, Page Down, Delete, and insert keys.

Arrow Keys are four in number;

Up Arrow Key: Moves the cursor upwards line by line

Down Arrow: Used to move the cursor downwards line by line.

Left Arrow: Moves the cursor to the left one character.

Right Arrow: Moves the cursor to the right one character

Navigation Keys include;

a. Home: Moves the cursor either to the beginning of the typing line or to the first page in the document when used with the ctrl key [Ctrl + Home] depending on the Program in use.

b. End: Moves the cursor either to the end of the typing line or to the end of the last page in the document when used with the Ctrl key [Ctrl + End] depending on the program in use

c. Page Up: Displays on the screen the contents of the previous page(s).

d. Page Down: Displays on the screen the content of the following page(s).

e. Insert: The insert key is a toggle key that switches from insert to overstrike or write mode and vice versa. Normally if you move the cursor to a place in your document and start typing, you insert information without deleting existing characters.

Note:

When entering data into your computer, you should be aware that the zero (0) and letter O are not used interchangeably.

Number 1 and small letter are also not used interchangeably.

NOTE

A key-pad is an electronic device that enables the linkage of characters labeled on the keys to the computer system.

When a keyboard character is typed, it is pressed on a keypad which transfers it as an electronic signal to a processor (Central Processing Unit)

A standard keyboard of a personal computer is made up of 102 - 105 keys. There is a wide variety of keyboard designs including the full sized, immature and flexible ones.

The most common types of keyboards include;

* Traditional keyboard
* Ergonomic Keyboard
* Flexible Keyboard
* Wireless Keyboard
* PDA Keyboards

Some general key-combinations (short-cuts)

When working with a keyboard, it is possible to press more than one key at once to enable you command a computer program or windows to do something.

However, this depends on the currently running or opened program on your computer screen.

A combination of two or more keys pressed simultaneously is called a short-cut of that actual command- since it is faster than normal way! Below are some:

a. Alt+PrtScrn-captures an image of just an active window instead of entire screen.

b. Alt+Tab- helps you to switch between open programs or windows.

c. Alt+F4 – immediately closes the active item, or exits the active program.

d. Alt+E – brings the edit option in current program

e. Alt+Enter – opens the properties window of selected icon or program.

f. Alt+F – brings the file menu options in the current program.

g. Alt+Spacebar – drops down the window control menu.

h. Ctrl+PrtScn – creates a screen –shoot of all windows on the entire screen.

i. Ctrl+Alt+Del – restarts the computer if pressed at start up. However, if it is pressed with system already on, it opens the windows task manager.

j. Ctrl+Backspace – deletes a full work at a time instead of a single character.

k. Ctrl+Home – when pressed enables you to move to the top of a current document.

l. Ctrl+End – will help you to move to the End of an open document.

m. Ctrl+A – enables you to select all items in the current document or window.

n. Ctrl+C – it copies all the selected items & temporarily stores them in the clipboard. Alternatively, one can press Ctrl+Insert.

o. Ctrl+F – opens the ‘Find’ utility in any open program, which enables the user to find documents relating to the entered search criteria.

p. Ctrl+P – initiates the print wizard for the currently open document/page.

q. Ctrl+S – allows you to save the current file or document.

r. Ctrl+Shift+Esc – immediately brings up the windows task manager.

s. Ctrl+X – completely cuts or moves the selected item or items to the clipboard.

t. Ctrl+V – pastes the previously selected item or items, from the clipboard. Alternatively, one can press Shift+Insert.

u. Ctrl+Z – is used for Undoing a previously done action(s). However, one can press Ctrl+Y to Re-do the previously undone action.

v. Shift+F10 – simulates the right click option on the selected item.

1.5.1: Pointing Devices

A pointing device is an input device, which allows users to move a pointer and make selections on the computer screen.

A pointing device is any piece of hardware that is used to input spatial data into a computer.

Types of pointing devices are:

(i) The Mouse

Mouse - The mouse is a hand held device that lets you point to and make selections of items on your screen. In a PC mouse there are mostly 2-3 buttons.

(ii) Stylus pen & digitizing tablet

Stylus pen- The pen lets you draw on what is called a digitizing tablet that mirrors the surface area of the computer screen.

The pen can be used as a standard mouse (without wires connected to it) or also as a free flowing drawing device.

(iii) Cordless Mouse

Cordless Mouse –is as a normal mouse, but has no wire that connects it to the system unit. Instead it uses batteries to broadcast a radio signal to a sensor that is connected to the system unit usually through the USB port

(iv) Trackball

The trackball is an upside-down mouse that remains stationary on your desk. It is the same principle as the mouse except that the rollers are reversed and the ball is on top.

(v) Touchpad

The touchpad has sensors that sense your touch. When they sense your touch they send a signal to the computer to move the mouse pointer to that location on the screen. Common on laptop computers.

(vi) Joystick

Joystick- Consists of a stick that pivots on a base and reports its angle or direction to the device it is controlling. Joysticks are often used to control video games, and usually have one or more push-buttons whose state can also be read by the computer.

(vii) Light pen

Light pen- is a form of a light-sensitive wand used in conjunction with a computer's CRT TV set or monitor.

It allows the user to point to displayed objects, or draw on the screen, in a similar way to a touch screen but with greater positional accuracy.

(viii) Touch Screen-

Touch Screen- The touch screen lets the user touch the area to be activated by using the finger or hand.

(ix) Track Point

A Track Point, also called a pointing stick, is a cursor control device located in the middle of the keyboard between the G, H, and B keys.

The control buttons are located in front of the keyboard toward the user.

The Mouse

It is a pointing device that acts as an electronic figure. It is used for selecting and issuing commands in windows and software (application) packages. It is normally represented on the screen by an arrow called Mouse Pointer. The mouse has 2 buttons on the top i.e. left and right hand click buttons.

Left mouse button

The left button is used for four (4) basic functions i.e.

1. Pointing

This involves moving the mouse until the mouse pointer is positioned on the desired object or spot on the screen and then press the left button once.

2. Clicking

This means pressing and releasing a left mouse button one time. Clicking is basically used for selecting items and or commands.

3. Double clicking

This means clicking twice in a rapid succession i.e. pressing and releasing the left mouse button twice but very fast or simultaneously. Double clicking is used for launching actions like opening icons, programs, etc.

4. Dragging

This means moving an item on the screen i.e. moving an item from one position to another on the screen. The item can be an icon or even a window.

Right mouse button

This means pressing and releasing the right mouse button once. Right clicking provides a shortcut menu about a given item or icon that has been clicked.

Barcode reader:

Stripped barcode are bow found on most products in shops.

A barcode reader is a unique combination of vertical lines together with a numeric code that is printed onto a small label on a product packaging.

Scanner:

It is an input device that leads images or text and converts the data into what we call digital signals.

Scanners are widely used in graphic studios but libraries to active volumes of paper basal information.

Light pen:

A light pen is an input device which uses light sensitive stylus to select items or draw directly it on the screen or digitalizing label.

Digital:

Looks like a usual camera but it does not have a film but instead uses a memory to store photos. Its later connected to the computer where all photos are copied and later printed.

Joystick:

A joy stick looks like a gear of a car which helps in controlling objects or pictures on the screen especially when playing games.

Digitalizes:

It looks like a mouse except that it has a glass with across in the middle. It is mainly used in drawing maps or architectural drawings to accurately trace out lines on the map.

Expansion slots and Adapter cards

An expansion slot is a socket on the motherboard that can hold an adapter card. An adapter card, also called expansion card, is a circuit board that increases the capabilities of the system or provides connections to peripherals

Plug and Play (PnP)

In the past, installing a card was not easy and required you to set switches and other elements on the motherboard. Today, many computers support Plug and Play.

PnP refers to the computer’s capability to automatically configure adapter cards and other peripherals as you install them when the computer is still running.

Buses

The BUS is a common electrical path that enables data flow between the various system components.

A bus allows the various devices inside and attached to the system unit to communicate with each other. All buses consist of two parts:

The data bus which transfers actual data bits and

The address bus which transfers information about where the data should go in memory.

Ports

A port is the point at which a peripheral attaches the system unit.

Through a port, the peripheral can send data to or receive information from the computer. A peripheral device, such as a keyboard, monitor, printer, mouse, digital camera, and microphone, often attaches by a cable to a port on the system unit.

Common ports

A serial port is a type of interface that connects a device to the system unit by transmitting data one bit at a time. A serial port has pin holes and usually connects devices such as mouse and keyboard.

USB (Universal Serial Bus) ports are used in high-speed device interfaces.

Bluetooth ports use radio waves to transmit data between two devices, without using cables.

Connectors

A connector joins a cable to a port. A connector at one end of a cable attaches to a port on the system unit, and a connector at the other end of the cable attaches to a port on the peripheral. Most connectors are available in one of two genders: male and female.

Male connectors have one or more exposed pins.

Female connectors have matching holes to accept the pins on a male connector.

Power Supply and Cooling Technology

The power supply is the component of the system unit that converts the wall outlet of AC power of 110 to 240 volts into DC power of 0.5 to 12 volts. Built into the power supply is a fan that keeps the power supply cool. Processor chips generate heat, which could cause the chip to burn up.

A heat sink is a small ceramic or metal component with fins on its surface that absorbs and disperses heat produced by electrical components such as a processor.

The CPU

This is the electronic device that interprets and carries out instructions that tell the computer how to work.

Output devices

These are hardware components that provide processed data (information) to the user. These devices display the results of all the processed data.

* Display device (monitor/screen)
* Printer
* Audio output device (speaker)
* Data projector
* Facsimile machine
* Malfunction machine
* Terminal
* Plotters
* Light emitting diode

Display device/monitor/screen.

The monitor is the primary output device

It holds information on a screen for temporary use.

Monitors can be monochrome means that information displays in one colour on a different colour background e.g. black on white.

Types of monitors/display devices

There are two main types of monitors

These are:

1. Cathode Ray tube monitors (CRT)
2. Liquid Crystal Display Monitor (LCD)

Cathode Ray tube Monitor (CRT)

A Cathode Ray RT monitor works like a standard television because it also contains a Cathode ray tube CRT)

Advantages of a CRT monitor over LCD

* Can produce fast and rich colour output
* Can be viewed from a very wide angle
* Cheaper than LCD monitor in general

Disadvantages of CRT monitors

* Emit higher electromagnetic radiation than LCD monitors
* Consumes more energy than LCD monitors

Liquid Crystal Display (LCD)

An LCD monitor uses Liquid Crystal rather than a Cathode Ray Tube to create images on the screen.

LCD monitors produce colour using either passive matrix or active matrix technology.

Advantages of LCD monitors

* Radiation emitted by LCD monitors is neglectable
* LCD monitors require less than one third of the power and takes up less desk space than traditional CRT monitors.

Disadvantage

* LCD monitors are usually more expensive than CRT monitors
* LCD monitors can only be viewed from a very narrow angle

CRT monitors use an analog signal to produce a picture while LCD monitors use a digital signal to produce a picture.

Advantages of display devices

* The time to display the image is fast
* Screen displays can include text, graphics and colours
* Display devices are usually quiet
* No paper is wasted for obtaining output
* The display devices are the user’s work – place, hence making it easier to use
* Transmission to another device is faster e.g. on a LAN
* Output can be modified or changed easily, scrolling enables to focus on a particular or point of the document.

Disadvantages of display devices

* Information produced on the screen is only temporary and will be lost when the power of the display device is turned off.
* Unsuitable for users with visual problems
* Needs a separate device to produce the hard copy.

Advantages of hard copy over soft copy

* It cannot be easily changed with trace
* It can be read without a computer
* No computer is needed to read it
* Hard copies are universal as both the rich and poor readers read them.
* Hard copies last longer if stored in a safe place as compared to soft copy, which must be all the time changed with the technological developments taking place.
* It is cheaper compared to soft copy, which requires computer devices to be able to read the information/ data.

More Terms associated with Display Devices

1. Resolution is the number of horizontal and vertical pixels in a display device. A higher resolution uses a greater number of pixels and thus provides a smoother, sharper, and clearer image. Resolution is measured in dpi (dots per inch)

2. Dot pitch or pixel pitch, is the distance in millimeters between pixels on a display device. Text created with a smaller dot pitch is easier to read.

Printers

A printer is an output device that produces text and graphics on a physical medium such as paper.

The information that has been printed is termed as “hard copy”

Categories of printers

Printers are grouped into two main categories i.e.

1. Impact printers
2. Non-impact printers

IMPACT PRINTERS

These are printers that form characters and graphics on a piece of paper by striking a mechanism against an ink ribbon that physically contacts the paper.

An impact printer forms characters and graphics on a piece of paper by a striking mechanism against an ink ribbon that physically contacts the paper. Impact printers are noisy because of this striking activity.

Features of impact printers

* + their price is low
  + poor output on graphics (pictures)
  + make a lot noise during printing
  + each character has its printer head
  + can withstand dusty environment

Types of impact printers

There two common types of impact printers. These are

1. Dot matrix
2. Line printers

\\\\\\\\\\\\\

Non-impact printers

These are printers that form characters and graphics on a piece of paper without actually striking the paper.

A nonimpact printer forms characters and graphics on a piece of paper without actually striking the paper. Some spray ink, while others use heat or pressure to create images.

Commonly used non–impact printers are ink-jet printers, laser printers, thermal printers, plotters, and mobile printers.

Characteristics of Non-impact printers

* + Use toner to form characters
  + Have no print heads or ribbon
  + They are more expensive than impact printers
  + They make low noise during printing
  + They use light rays (beam of light) to print
  + They print quality work and good for graphics
  + They cannot withstand dusty environments
  + They cannot print multipart because they cannot print through layers of paper

Types of Non – impact Printers

There are two common types of Non – impact printers. These are

1. Ink jet printers
2. Laser jet Printers

A comparison of impact and Non – impact printers

Advantages of Impact printers

* Can with stand dusty environment, vibration and extreme temperature
* Ideal/suitable for painting multipart forms because they can easily print through many layers of paper
* Non – impact printers
* Generally much quite than impact printers because there is no striking mechanism.
* Can produce high quality output.

Disadvantages

* Generally noisy because of the striking activity
* Produce near letter quality NLQ print only which is just suitable for printing, making labels, envelopes or invoices
* Cannot produce multipart forms

The most commonly used types of printers

There are mainly 3 types of printers which are commonly used: these are:

1. Dot – matrix printer
2. Ink – matrix printer
3. Laser jet printer

Dot – matrix printer

A dot – matrix printer is an impact printer that produces printed images with a print head striking mechanism

Note:

1. Most dot- matrix printers use continuous form paper
2. A higher number of pins on the printer head means more dots are printed, which results in higher print quality i.e. a 24 pin printer has better print quality than a 9-pin printer
3. The spread of a dot – matrix printer is normally measured by the number of characters per second (CPU) it can print.

Advantages of dot matrix Printer

* Can print multipart forms
* Can with stand dusty environment, vibrations, and extreme temperatures
* It is cheaper than other types like laser jet printers

Disadvantages

* Are generally noisy because of the striking mechanism
* Their print quality is not as good as those from ink jet printers and laser jet printers

Ink – jet Printer

It is not non – impact printer that forms characters and graphics by spraying tiny drops of liquid ink onto a piece of paper.

Ink jet can produce letter quality (LQ) text and graphics in both black and white and colours

Printer resolution is measured in dots per inch (dpi)

The speed of ink jet printer is measured in pages per Minute (PPM)

Advantages of ink jet include

* Ink jet printers are generally quick
* Can produce high quality colour out put

Disadvantages

* Specialized papers are required to produce high quality colour output.
* The ink cartridge and specialized papers are expensive.
* The ink may smear when printing on ordinary paper

Laser jet Printer

These are also known as page printers because they process and store entire page before they actually print it.

Laser printers can print text at speeds of four to over thirty pages per minute.

Advantages of Laser printers

* Laser printers are generally quiet and faster
* Laser printers can produce high quality output on ordinary papers
* The cost per page to toner cartridges is lower than those other printers

Disadvantages of laser printers include

* The initial cost of laser printers can be high
* Laser printers are more expensive than dot – matrix printers and ink jet printers.

Less common types of printers

* Line printers - Daisy wheel printers
* Plotters - Ball printers
* Portable printers - Large- format printers
* Photo printers - Braille printers
* Label printers

Advantages of printers

* Information produced is permanent

Disadvantages of printers

* The time to get the print out is slow, when compared with display devices
* Paper is wasted for obtaining the output
* Printers are generally noisier than display devices

Common factors to consider when buying a printer

* Page per minute print out (PPM)
* Memory of at least 2 megabytes
* Price of the cartridge or toner
* Availability of the toner or cartridge
* Purpose for which the printer is going to be put to use.
* Printer drivers – most printer drivers are installed before a printer can print some work for you

Terms associated with Printers

1. Toner is a powder used in laser printers and photocopiers to form the printed text and images on the paper.

2. DPI. (Dots per inch) is a measure of the number of individual dots printed in a line within the span of 1 inch (2.54 cm). The DPI value correlates with image resolution.

3. Hard copy is a permanent reproduction on the form of a physical object of any media suitable for direct use such as paper.

4. Page orientation is the way in which a rectangular page is focused on for normal viewing. The two most common types of orientation are portrait and landscape

Data projectors

A data projector takes the image that displays on a computer screen and projects it onto a longer screen so that people can see the image clearly.

Facsimile machine

A facsimile (fax) machine is a device that transmits and receives documents over telephone lines. Documents sent or received via a fax machine are known as faxes

A fax modern is a communication device that allows a user to send and receive electronic documents as faxes

Advantages of using a fax modem

* It saves paper
* It allows a user to store, receive faxes on the computer
* Received faxes can be e-mailed to others

Advantages of fax

* Hard copies are available

Disadvantages of fax

* Sending a big document can be slow
* Wasteful of paper when junk faxes are sent

Multifunction

This device is a single piece of a printer, scanner, copy machine, and a facsimile machine.

Advantages of a multifunction device

* Takes up less space than having a separate printer, scanner, copy machine, and fax machine
* It is also significantly less expensive than purchasing each device separately.

Disadvantages

* If it breaks down, the user loses all its functionality

Terminal

A terminal is a device with a monitor and a keyboard. It can also refer to any device that sends and receives computer data

Types of terminals

There are mainly two types of terminal i.e. dumb terminal and intelligent terminals

Dumb terminal

It is a kind of terminal which has no processing power, cannot act as a stand-alone computer, and must be connected to a server to operate.

Intelligent terminal

It is a kind of terminal which has memory and a processor so that it can perform some functions independent of the host computer

Examples of host computers

1. Electronic point of sale (EPOS)

This is used to record purchase at the point where the consumer purchases the product or services.

1. Electronic Fund Transfer Point of Sale (EFTPOS)

These ae terminals that are able to transfer funds from a customer’s bank account directly to a retail out lets accounts after reading the customer’s debit card.

1. A n Automated Teller Machine (ATM)

Is a self – service banking machine attached to a Host computer through a telephone network.

Speaker

This is an output device that produces information in form of sound. Most speakers have cone shaped diaphragm to produce sound.

Spectacles:

These are common in modern computer games. The user wears the glasses like ordinary sun glasses except that here instead of seeing through the glasses, one will be treated to a high quality three dimensional (3D) pictures.

Other hardware devices

Power supply

This is one of the components found in the system unit. Its work is to distribute power to different components of the computer system

Data buses

These are high ways on which data travels in the computer.

Expansion slots

These are empty slots left on the main board / mother board of the computer where additional control circuits can be added.

Mother board

This is the main circuit board in the system unit that connects all hardware together and helps to coordinate devices.

DEVICE DRIVES

These are devices which work as interface between the computer and other devices connected to it.

MEMORY

Internal storage areas in the computer, the term memory identifies data storage that comes in the form of chips, and the word storage is used for memory that exists on tapes or disks. Every computer comes with a certain amount of physical memory, usually referred to as main memory or RAM.

Memory Terminology

Memory speed: Measured in nanoseconds, this is the time taken to access data that is stored in memory. The lower the nanoseconds the faster the memory.

Parity: A simple error checking method used in memory correction.

ECC: Error correction code used in memory correction for newer computers.

Memory Banks: a socket where memory is installed for example 4 banks will have 8MB of memory ach for a total of 32MB.

Types of memory:

The system unit contains two types of memory: volatile and nonvolatile. The contents of volatile memory are lost when the computer power is turned off. The contents of nonvolatile memory are not lost when power is turned off. RAM is the most common type of volatile memory. Examples of nonvolatile memory include ROM, flash memory, and CMOS. Below, we discuss these types of memory.

Random Access Memory (RAM)

Random Access Memory (RAM) is the memory chip that is mounted directly on the motherboard or mounted on peripheral cards that plug into the motherboard. When the computer is powered on, certain operating system files are loaded from a storage device such as a hard disk into RAM. These files remain in RAM as long as the computer is running.

This memory is constantly being re-used for temporary storage of different data items or programs

The computer normally uses RAM because it is very fast in reading and writing data

Although RAM is very fast, it is a very unsuitable medium of storage because once power is switched off all its contents will disappear.

Other functions of RAM include;

- Storage of a copy of the main software program that controls the general operation of the computer (operating system)

- Temporary storage of a copy of application program for interpretation and execution by the CPU.

- Temporary storage of data items that have been input from the keyboard or input devices until when it is transferred into the CPU for processing.

Temporary storage of data items that have been processed by the CPU awaiting to be transferred to output devices

Basic types of RAM

* Dynamic RAM (DRAM) must be refreshed (or recharged) constantly by the CPU static RAM,
* Static RAM (SRAM) is faster and more reliable than any form of DRAM. The term static refers to the fact that it does not have to be re-energized as often as DRAM.
* Magneto resistive RAM (MRAM), stores data using magnetic charges instead of electrical charges. MRAM has greater storage capacity, consumes less power, and has faster access times.

Virtual RAM (VRAM): Modern operating systems can use spare storage space on the hard disk as if it is working memory and this is referred to as Virtual memory or Virtual RAM

Summary of the differences between ROM and RAM

ROM RAM

* It is non volatile - It is volatile
* It is read only - It is read and write
* It is permanent - It is temporary
* Normally not increasable - It can be increased

Application of each one of the above

ROM

It is used to store software and configurations used in booting a computer

RAM

It is used to store programs apparently used by the user when the computer is working.

Read-only memory (ROM)

Read-only memory (ROM) refers to memory chips storing permanent data and instructions. That is, the items stored in ROM chips cannot be modified—then, the name read-only. Firmware can be read and used, but cannot be changed by user.

Basic types of ROM

Programmable read-only memory (PROM) is a blank ROM chip on which you can permanently place data and programs. Once the data and instructions are programmed into PROM chip, the chip functions like a regular ROM and cannot be erased or changed. A variation of the PROM chip, called electrically erasable programmable read-only memory (EEPROM) chip, allows a programmer to erase the microcode with an electric signal.

Differences between RAM and ROM

RAM ROM

1. Volatile, temporally 1.Non Volatile, permanent

2. Contents lost when power goes off 2. Contents remain when power goes off

3. Read and Write 3. Read Only

4. Can be increased 4. Can’t be increased

5. Not installed at Factory 5. Installed at Factory

Memory cache

A cache is a relatively small block of very fast memory designed for the specific purpose of speeding up the internal transfer of data and software instructions. Cache uses internal storage technologies that are much faster than conventional RAM. Cache speeds up processing time because it stores frequently used instructions and data. The processor first checks cache, then RAM for needed data and instructions

Flash memory

Flash memory is a chip also that keeps its memory when the power is shut off. Flash memory can be erased electronically and reprogrammed. Most computers use flash memory to hold their startup instructions because it allows the computer easily to update its contents.

CMOS

Complementary Metal-Oxide Semiconductor (CMOS) technology provides high speeds and consumes little power. CMOS technology uses battery power to retain information even when the power to the computer is off. Battery-backed CMOS memory chips, for example, can keep the calendar, date, and time current even when the computer is off.

Units of Measuring Computer Memory

The smallest unit of measuring Computer Memory is a Binary digit (Bit). Binary digits are the numbers 1 and 0 which can be represented in a computer by switching voltage on and off. Eight little bits make one BYTE. The storage capacity of computers (RAM and ROM) and that of auxiliary storage units like disks are generally given in bytes. One BYTE stores approximately one character.

Secondary Storage Devices (Auxiliary Storage Devices)

These are peripherals (devices) used for the permanent storage of data and programs. In other words, storage devices are designed to hold your data on permanent or semi – permanent basis.

Types of secondary storage devices

These are mainly two types of secondary storage devices i.e.

* Magnetic storage devices.
* Optical storage devices.

|  |  |
| --- | --- |
| Magnetic storage | Optical storages |
| 1. Stores data in magnetic form | a) Stores data optically & used laser to read/write |
| 1. It is affected by magnetic field. | b) It is not affected by magnetic field |
| 1. It has high storage capacity | c) It has less storage than hard disk |
| 1. It doesn’t use laser to read/write data | d) Data accessing is high as compared to floppy |
| 1. Magnetic storage devices are; Hard disk, floppy disk, magnetic tape etc. | e) Optical storage devices are; CD-ROM, CD-R, CD-RW, DVD etc. |

Magnetic storage;

* Magnetic tape
* Hard disk
* Floppy disk
* Zip disk
* Magnetic stripes on the back of bank cards.

Magnetic storage devices store the data on a magnetically coated surface. They can generally be used many times. They tend to have a large storage capacity when compared to optical media.

The main disadvantage is that the data held on these can be damaged if the device is put too close to a strong magnetic field such as a loudspeaker.

Optical storage:

* CD-ROM
* DVD

Optical storage devices are read by a laser beam. Generally they have a more limited storage capacity when compared to magnetic devices. However, one advantage is that they are more hard wearing than magnetic devices.

Magnetic storage:

Magnetic Tapes

Main advantages Magnetic tapes

* Relatively cheap
* Can hold in excess of 20GB of data (it is possible to get devices that will back up over 200 GB of data)
* Backup capacity is easily expanded by simply using more tape.

Main disadvantages

* Serial access – this means that in order to get to something on the tape, you have to go through everything that comes before it. Slow – Because of serial access, it is relatively slow to find the data that you need.
* Specialist hardware is needed to read the tapes. Most standard PCs do not come with the hardware required to use them.
* Not suitable for heavy use – as you may realize from video tapes at home – they are a bit fragile with tendency to stretch and tangle! Tape is best suited for back up purposes.

Tape is a magnetic storage device

Hard disk drive (HDD)

The Hard Disk Drive is the main storage device within a computer. It is where all the applications software and data is kept.

N.B. Data stored on a hard disk can be accessed much more quickly than data stored on a floppy disk.

Modern Hard drives are measured in gigabytes (GB). The most expensive computers will have the largest hard drives. Standard systems come with hard drives between 40GB and 250GB.

There are two types of hard disks (standard);

IDE (Integrated Device Electronics)

* Standard interface in PCs.
* More common than SCSI
* Cheaper and slower than SCSI

SCSI (Small Computer Systems Interface)

* Faster – high speed of transfer than IDE
* More reliable than IDE
* Specialist card required
* More expensive than IDE

Advantages of using hard disks as a storage media

* Large storage capacity
* Stores and retrieves data much faster than a floppy disk or CD – ROM
* Data is not lost when you switch off the computer
* Usually fixed inside the computer so cannot get mislaid.
* Cheap on a cost per megabyte compared to other storage media.
* Hard disks can be replaced and upgraded as necessary.
* Can have two hard disks in a machine, one can act as a mirror of the other and create a backup copy.

Disadvantages of using hard disks as a storage media

* Hard disks eventually fail which stops the computer from working
* Regular ‘head’ crashes can damage the surface of the disk, leading to loss of data in that sector
* The disk is fixed inside the computer and cannot easily be transferred to another computer

This is a magnetic storage device.

Floppy diskettes

The ‘floppy disk’ has been with us since the beginning of the personal computers in the 1980’s. The very earliest ones were 8 inches across! Hence the word ‘Floppy’

Then came the 5.25 inch format which was popular for a few years. Finally the 3.5 inch floppy disk was developed which offered a hard plastic case and sliding metal cover to protect the fragile magnetic sheet inside.

A standard floppy disk can store up to 1.44 MB of data which is approximately equivalent to 300 pages of A4 text.

Advantages

* Portable – small and lightweight
* Allows random access of data (unlike tape which is serial)
* Can provide a valuable means of backing up data
* Inexpensive
* Useful for transferring files between computers or home and school
* Private data can be stored securely on a floppy disk so that other users on a network cannot gain access to it.
* Security tab to stop data being written over.
* Most computers have a floppy drive.
* Can be written too many times.

Disadvantages

* Not very strong – easy to damage
* Data can be erased if the disk comes into contact with a magnetic field
* Quite slow to access and retrieve data compared to a hard disk drive, but it is faster that tape.
* Can transport viruses from one machine to another
* Small storage capacity, especially if graphics need to be saved.
* New computers are starting to be made without floppy drives.

This is a magnetic storage device.

CD – ROM

CR – ROM stands for Compact Disk Read Only Memory

Although we tend to talk about ‘CD – ROMS’, it is important to note that there are three types of CD – ROMS;-

CDROM

These disks have been pre – recorded with data, for example

* Music Compact Disks cannot be over written
* Product Catalogues from suppliers
* Computer games
* Documentation such as technical manuals.

CD-R

These disks are blank but have been designed to be written onto once only. Disk.

CD-RW

Often described as ‘CD Read –Write’. This technology allows the same area of the disk to be over – written many times (about a 1000 times).

CD-RW DISKS PROBLEMS

There are two problems with the CDRW Disks i.e.

Unlike CD-R some drives have a problem reading CDRW disks that have been burnt by other manufacturers’ drives.

Secondly, CD-R disks and now so cheap that it is less hassle to simply use a blank disk!

In an exam questions, it is important that you can distinguish between the different types of CDs.

How the CDs work

CD-ROM disks do not store data magnetically like floppy disks and hard disks. Instead, tiny pits are burnt onto the surface by a laser beam in the CDROM drive.

This is why they are known as optical storage devices. A laser beam also reads the information from the disk. The same technique is used for CD music disks, which is why many computers with CD-ROM drives can play audio CDs.

A typical CD-ROM can store approximately 650 megabytes of data which is equivalent to about 450 1.4MB floppy disks. The entire contents of a text based encyclopedia takes up only 25% of one standard CD-ROM.

CDs are useful for

* Backup
* Transferring files that do fit onto a floppy disk
* Providing data that you do not want altered by someone else e.g. – software programs or technical manuals.

Advantages

* Data cannot be erased from CD-ROMs
* CD-ROMs are small and portable
* Very cheap to produce
* CD-ROMS have a much larger storage capacity than floppy disk.
* Will usually work in a DVD drive.

Disadvantages

* Fairly fragile – easy to break or scratch
* Because they are portable they can be lost
* Smaller storage capacity than a hard disk
* Slower to access than the hard disk

This is an Optical storage device.

DVDs stand for Digital Versatile Disk and is a relatively new technology. Like CD – ROMs, they are an optical storage device.

These are becoming increasingly popular, and are expected to replace ordinary compact discs and video tapes in the future. This is because a DVD disc can store between 5 – 17 gigabytes of data.

This amount of storage makes it possible to store complete movies along with special features and multiple language tracks.

Advantages

* Very large storage capacity
* Sound and picture quality is excellent which makes them suitable for video and sound
* Increasing availability
* Price is dropping for both DVDs and DVD drives.
* Does not transmit viruses.
* DVD players can read CD-ROOMs

Disadvantages

* Still a relatively new technology so still expensive compared to CD-ROMs
* DVDs do not work in CD ROM drives.

DVD-RW

This new technology is only just becoming affordable to the general public. It is increasingly common to have a DVD rewriter drive in a new personal computer. There are also stand – alone DVD-RW units that allow you record television programs directly onto disk.

Advantages

* Can store seven times more data than a CD-RW
* Suitable for storing video and television programs

Disadvantages

* There are many ‘standards’ in use, so you have to make sure you buy the correct disk for your drive.
* Relatively expensive media compared to a CD-R, so you have to decide whether your data can be stored on one or two 650 Meg disks.

High Capacity DVD formats

* A Blu-ray Discs-ROM (BD-ROM) has storage capacities of up to 100 GB.
* The HD (high-density) DVD-ROM has storage capacities up to 60 GB.
* A mini-DVD that has grown in popularity is the UMD (Universal Media Disc), which can store up to 1.8 GB of games, movies, or music.

Care for Optical Disks

The following should be done for the safety of data on Optical disks:

* Do not expose the disc to excessive heat or sunlight
* Do not eat, smoke or drink near a disc.
* Do not stack disks.
* Do not touch the underside of the disk.
* Always store the disc in a jewel box when not in use
* Always hold a disc by its edges.
* Do not drop the disk to the ground
* Don't bend the disk.

Zip drive

The zip drive is similar to a floppy drive but can store 100MB of data, at least 70 times more than a floppy. Some zip disks store as much as 250MB.

The zip disk is slightly thicker than a floppy disk and needs a separate drive. Zip disks are particularly useful for backing up important data or for moving data easily from one computer to another. Data is compressed, thereby reducing the size of files that are too large to fit onto a floppy disk.

Advantages

* Stores more than a floppy disk
* Portable

Storage Media & Devices

A storage medium is the physical material on which a computer keeps data. There is a variety of storage media available.

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

A Storage Device reads and writes data to and from a storage medium.

Reading is the process in which a storage device transfers data, from a storage medium into memory.

Writing is the process in which a storage device transfers these data from memory to a storage medium.

Access time, is a measure of the amount of time it takes a storage device to locate an item on a storage medium.

Transfer rate is the speed with which data, instructions, and information move to and from a device. Transfer rates for storage are stated in KBps (kilobytes per second) most storage media are either Magnetic media, or Optical media.

MEMORY MEASUREMENT

In memory, data is represented electronically by storage cells, which are either charged ON or discharged OFF.

The computer memory can be represented as either, ON or OFF. Mathematically it is represented as either 1 or 0 in the binary system or binary code.

Computers use the binary system of measurement as their basis of working, that is 0 & 1 therefore computer memory is measured in terms of digits (BITS) which are lowest units of measurement.

To make up a single character in a computer, a group of up to eight bits will be needed; therefore one character is equivalent to eight bits. And eight bits are equivalent to one byte.

The table below shows summary of memory measurements

Measurement

Equivalent in bytes

Actual bytes

1 binary digit (0 or 1)

1 bit

1 character, 8 bits

1 byte

20

1 KB (kilo byte)

1000 bytes

1024 (210)

1 MB (Mega byte)

1,000,000 bytes

1048576 (220)

1 GB (Giga byte)

1,000,000,000 bytes

1073741224 (230)

1 TB (Tera byte)

1,000,000,000,000 bytes

1,099,511,627,776 (240)

BINARY CODES

Various groups of binary codes have been developed to represent the 26 alphabetical letters and the special keys in accordance with specific standards and codes.

Types of Binary codes

(1.) ASCII Code

It stands for American Standard Code for Information Interchange (ASCII). This is a standard code for information interchange and most commonly used code for information communication with a set of 256 characters.

In this code, a character like 5 is represented as 01000101 in the binary format and its decimal value is character 69

(2.) EBCDIC code

It stands for Extended Binary Coded Decimal Interchange Code (EBCDIC) and was mostly widely used on larger computers.

It has 8 bit characters compared to the 256 characters of ASCII

(3.) BCD Code

It stands for Binary Coded Decimal (BCD) and its is the least to be used. Characters are only represented with 6-bit combination. A character like S is represented as 110101

PARITY BIT

This is a type of bit, which is normally added to data by the computer to ensure its accuracy.

Data may be stored in 8 bits, 16 bit or 32 bit, but if the memory on your computer is a parity memory then an extra bit is added on the data to become 9 bit, 17 bit or 33 bit.

Parity Check

Refers to transmission process of moving data from one end/place to another while ensuring that no bit of data is lost during the transmission

Central Processing Unit (CPU) also known as the heart or brain of the computer

The Central Processing Unit (CPU) is the portion of a computer system that carries out the instructions of a computer program, to perform the basic arithmetical, logical and input/output operations of the system.

Components of a micro-processor

* Arithmetic logic unit (ALU)
* Control unit (CU)
* Registers.

Arithmetic logic unit (ALU)

To begin with, the arithmetic logic unit is the part of the CPU that as its name implies, carries out the mathematical functions of addition, subtraction, multiplication and division.

Operations performed by ALU.

The ALU specifically performs three operations namely;

* Arithmetic operations
* Comparison operations
* Logical operations

Arithmetic operations

These include addition, subtraction, multiplication and division.

Comparison operations

These involve comparing one data item to another, and determine if the first item is greater than ( equal to (=), less than () etc. the other item.

Logical operations

These work with conditions and logical operators such as AND, OR and NOT.

The Control Unit (CU)

The control unit is another fundamental part of the CPU. Essentially, it regulates the flow of information through the processor. The functions that a control unit performs can vary based on what a particular CPU was built to do.

For every instruction, the control unit repeats a set of four basic operations called the machine cycle or instruction cycle.

The operations are;

1. Fetching 2. Decoding 3. Executing 4. Storing

Fetching

This is the process of obtaining a program instruction or data item from memory. The time taken to fetch is called instruction time.

Decoding

This is the process of translating the instruction into commands that the computer understands.

The Registers

Registers

Registers are high-speed working storage areas that temporarily hold instructions and data. Registers work under the direction of the control unit to accept, hold, and transfer instruction or data and comparisons at high speed.

More components of a CPU that are vital to its operation are the registers, which are very small memory locations that are responsible for holding the data that is to be processed.

Types of registers

Instruction register, which contains the instruction being executed;

Address register, which keeps track of where a given instruction or piece of data is stored in memory;

Storage register, which temporarily holds data taken from or about to be sent to memory;

The Accumulator, which collects the result of computations;

General-purpose register, which is used for several functions, as assigned by the CPU

The system clock

The system clock is a small chip that is used by the CPU to synchronize the timing of all computer operations. The system clock generates electronic pulse or ticks at a fixed rate, which set the operating pace of components in the system unit. Each tick is called a clock cycle, which affects machine cycle time.

The faster the clock, the more instructions the CPU can execute per second.

Clock speed

This refers to the speed at which a processor executes instructions. Clock speed is measured in hertz. A hertz is one cycle or tick per second. A Megahertz (MHz) equates to one million ticks of the system clock per second. Processor’s speed is sometimes measured according to the number of MIPS (millions of instructions per second) it can process.

N.B

Not all computational systems rely on a central processing unit. An array processor or vector processor has multiple parallel computing elements, with no one unit considered the “center”. In the distributed computing model, problems are solved by a distributed interconnected set of processors.

Components of a processor in summary

* Control unit – responsible for supervising the operation of the entire computer system.
* Arithmetic/logic unit (ALU) – provide the computer with logical and computational capabilities.
* Register – a storage located inside the processor.

N.B

Not all computational systems rely on a central processing unit. An array processor or vector processor has multiple parallel computing elements, with no one unit considered the “center”. In the distributed computing model, problems are solved by a distributed interconnected set of processors.

Advantages of processing devices

* They manage flow of data in the computer
* They are fast in converting data into information
* They can carry out complicated tasks in short period of time
* They are automatic
* They process huge volumes of data with maximum accuracy
* They are robust (the ability to cope with errors during program execution,

Disadvantages

* They are expensive and delicate
* Installation and repair requires technical experts.
* Operation requires energy/power i.e. electricity
* The computer fully depends on it since it is the brain of the computer.
* Technology keeps on changing, hence expensive to maintain

System unit  
This is a box-like case that houses the electronic components of a computer used to process data. It protects

Components of the system unit

Motherboard:   
Basic components of the mother board

This is the main circuit board where the components of the system unit are mounted. It is made up of fiber and does not conduct electricity. It contains the CPU, BIOS (Basic Input Output System), memory, serial and parallel ports, expansion slots, and all controllers like display screen, keyboard and disk drives.   
Expansion slots: These are sockets on the mother board into which you can plug expansion cards, or add. They are circuits on board that provide more memory space or peripheral devices.   
Data buses: These are highways where data travels in the computer. They include data buses and address lines   
Disk drives: Computers use disk drives to transfer programs and data between memories and disks, they work as input/output devices. There are many types of disk drives and these include; floppy drive, hard drive, CD- ROM drive, zip drive among others.

Peripheral devices: These are devices interconnected to the system unit. Some are connected using wireless technology and others use ports or peripheral device interfaces such as USB (Universal Serial Bus), Serial and Parallel ports.

Peripheral devices include:

Keyboard: This helps the user to enter or input data and instructions in a computer.

Mouse: It is a pointing device that enables the user to enables the user to execute commands and complements the keyboard and the monitor. Its basic task is to move the cursor or pointer to different positions on the screen/monitor. Types of mice include: touch pad, optical, track ball, mechanical or desktop mouse.   
Printer. A printer is a computer peripheral device used to produce information on a piece of paper. It is used to convert soft copy into hard copy.   
Monitor: A monitor or simply a screen is a television-like structure that enables the user to see what is going on En the computer. It is one of the most important components of a computer system. It enables the user to have a visual display of any data in the computer. Types include Cathode Ray Tube (CRT), Liquid Crystal Display (LCD).   
Scanner: This capture data into the computer directly. Scanning devices convert images and text and are displayed on the computer.   
Light pen: Is a hand held pen with a light sensitive point. It can make selections.

COMPUTER SOFTWARE   
This refers to written programs or procedures with associated documentation that run on computer hardware. When a computer processes data, it follows a particular sequence of instructions which is stored in its memory with specific details. This sequence is called a program and the preparation of such instructions is done by humans in a process called programming.

CATEGORIES OF SOFTWARE   
Software is often divided into two categories:   
1. Systems software: Includes the operating system and all the utilities that enable the computer to function.

2. Application software: Includes programs that do specific work for users. For example word processors, spreadsheets, and database management systems fall under the categories of applications software,

SOFTWARE   
Software is a collection of computer programs and related data that provides the instructions for telling the computer what to do and when to do it. OR   
This refers to a set of programs that controls the operations of the computer and its devices. It serves as the interface between the user, the application software and hardware. They provide the facilities that enhance the computer’s general performance.

CHARACTERIISTIICS OF A GOOD COMPUTER SOFTWARE

1. Maintainability: well designed software should be flexible enough to accommodate future changes that will be needed as new requirements come to light.

2. Correctness: Well designed software should meet all the stated requirements.

3. Reusability: is ease with which software can be reused in developing other software. By reusing existing software, developers can create more complex software in a shorter amount of time.

4. Reliability: is the frequency and criticality of software failure. The criticality is measured by the average time required for repair.

5. Efficiency: is the degree with which software fulfills its purpose without waste of resources (like RAM, Storage, CPU & Network)

6. Portability: is the ease with which software can be used on computer configurations.

7. Robust or Stable: it should be stable even with unexpected conditions (like wrong input)

8. Data-protective: it should be able to protect information it is responsible.

9. Documentation: it should be accompanied by complete documentation

10. Speedy: it should be faster in accomplishing tasks (quick in processing)

Types of software

Software can be categorised in two (2) types:

* System Software
* Application software

System Software

System Software is computer software designed to operate the computer hardware and to provide a platform for running application software and hardware.

Examples of system software include:

* Operating systems,
* Utility programs
* System development software (Programming languages).

The system software is installed on your computer when you install your operating system.   
These programs are written by the computer manufacturers or professional programmers. Some of these programs reside inside ROM are known as firmware. System software consists of:   
1 .Operating System   
2.Programming languages   
3. Utility programs

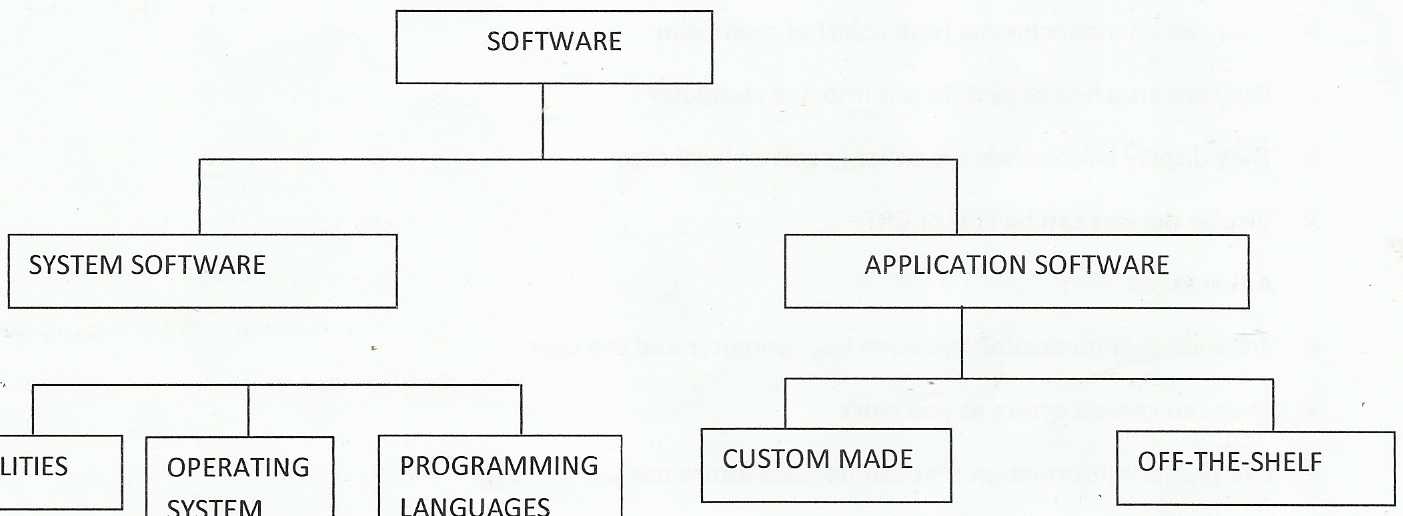
FUNCTIONS OF SYSTEM SOFTWARE

* The common function of the software include the following:
* It is used for shutting down the computer and restarting it.   
  It helps to detect wrong commands   
  It is used for installing both the new hardware and the applications software   
  It helps in multi-programming   
  It controls all activities in the various parts of the computer.   
  It alerts the user and reports errors.   
  Provides memory space and programs for execution.   
  It helps to translate language: high level language codes into low, level language codes that the user can understand e.g. compilers, interpreters, linkers and assemblers.

FUNCTIONS OF SYSTEM SOFTWARE

* Starting up a computer
* Transferring data between input and output devices
* Executing and storing application programs
* Storing and retrieving files
* Formatting disks
* Translating program instructions into machine language
* Sorting data files

DIAGRAMMATIC ILLUSTRATION OF COMPUTER SOFTWARE



OPERATING SYSTEMS (OS)   
Operating systems software refers to a set of programs that coordinate the operation of all hardware and application software components of a computer. These are programs responsible for the management and coordination of processes and the sharing of the resources of hardware to make a computer easier to use because they ‘insulate” the user from the hardware. When a computer is switched on, the OS program runs and checks to ensure that all parts of the computer are functioning properly. Once coded, the OS manages all activities on the computer and it operates with input and output devices.

Functions of operating system

* Resource allocation i.e. allocates processing time and memory to tasks like printing. Creates a document, etc.
* It helps in hardware management like accessing disk drives, printers and key board.
* It helps in file management and serving the user from knowing where in memory his files are to be stored.
* Coordinates the operation of all application software by enabling its interface between the computer user and the computer.
* Helps in administering security to the computer.
* It monitors system performance.
* The operating system coordinates the operation of all hardware and application software components of a computer.
* Data management
* Booting
* Spooling print jobs
* Memory management
* Job (task management)

FUNCTIONS OF THE OPERATING SYSTEM

* Loading of programs and data files from the secondary storage to the memory when required.
* Control of hardware resources of a computer by allocating the use of peripheral devices

for example input, output, storage and processing devices.

* Protects hardware, software and data from improper use.
* Controls and interprets keyboard, mouse and other inputs.
* Controls the computer systems security for example by monitoring the use of passwords.
* It provides a computer user with an interface that enables him or her to easily manage, control and operate a computer.
* It checks whether hardware is working properly, equipment malfunctioning and displays error handling and correct messages.
* Keeping track and furnishing a complete record of all that happens during the processing.
* Responsible for starting a computer.
* Provides a means to establish web connections and some include a web browser and e-mail program.

Responsible for administering security where administrators establish user accounts that require a user name and password to access a computer system.

* Responsible for managing and monitoring directories and files stored and the disks.

TYPES OF OPERATING SYSTEM   
Single user  
Single user operating system allows one user to login at a time. Examples include DOS and windows 98. It allows one operation at a time i.e. you can’t start a document and open graphics to copy the school budge at the same time.

Multi-user  
It allows multiple users to log on to the system at ago. Examples are UNIX and LINUX. It allows users to access the same data at the same time. It is tised in networking. Each person on the network appears to be a sole user of the computer by allocating each user on a network at a time and when the time elapses, the next person is given a go ahead.

Multi-tasking  
This allows the computer to do more than one job at the same time. There is no time lag between the different tasks e.g. One can type a document as he is printing at the same time.

Networked   
This is an operating system that contains components and programs that allow a computer on a network   
o serve requests from other computers for data and provide access to other resources such as printer and file systems. Examples are Ms-windows 2000 server, Ms Windows 2003 server, UNIX and LINUX.

Standalone  
Stand alone are usually not connected to a network and thus cannot access resources. Examples of operating systems include; Disk Operating System (DOS), UNIX. Windows like windows 95,98.2000, 2003, XP, Vista.

NB:

The operating system commonly used on micro computers are; Ms [ and windows.

DOS i s a command driven user interface which has been described by many as not being a user friendly program. It has a set of programs which help one to work with a computer effectively, merge the information on the external storage device and carry out all housekeeping routines. It is used to manage devices, command processing, control programs and manages system resources and errors. Examples of DOS include Personal Computer Disk Operating System (PC-DOS) and Microsoft Disk Operating System (MS-DOS).   
Windows is a GUI (Graphical User Interface) operating system .it combines a number features e.g. It is easy to make programs, easy to use. Its main aim is reliability and manageability with the help of active directory Common examples include windows 2000.

Differences between DOS and Windows   
Network operating system was designed to be used on several computers that exist on a network although at times they can be installed on standalone computers. Common examples include Windows NT 4.0, UNIX and Linux.   
PDA operating system is specifically designed for handheld computers. They are pen driven or touch sensitive and come already loaded in the computer’s ROM-BIOS.

USER INTERFACES   
When a computer is turned on, an interface is seen. This consists of the cursor, menus, icons etc. that allow users to do things with the computer. A user interface can make a computer either easy or hard to use.   
In the designing of a user interface, sound, colors, graphics, position of items on the screen and availability of help are considered.

Types of interfaces   
1. Command Line Interface (CLI)  
These accept commands in the form of special words or letters. The user types keywords or presses special keys on the keyboard to enter data and instructions, It provides a virtually empty screen with blinking cursor (prompt) where commands are keyed in and the computer executes them on pressing the enter key.

|  |  |
| --- | --- |
| DOS (CLI) | WINDOWS (GUI) |
| Is a command — line interface that takes up little memory and normally does not require a very fast processor. | Is a graphical user interface that needs more memory as well as a faster processor |
| Operations are fast because commands can be entered directly through the keyboard. | Operations in a windows environment  depend on the powerfulness of the processor |
| Many commands can be grouped together as a  batch file so that repetitive tasks can be automated | It is difficult to automate, functions for expert users |
| Commands have to be learnt | It is user friendly because it is easy to learn and work with. |
| Commands have to be memorized | Commands need not be memorized because they are represented in icons and pictures. |

The commands are accepted and executed by a part of the operating system called the command processor or command line interpreter. Command line software is more flexible but more difficult to learn. Users must have knowledge of the available commands, what they do and the rules governing how they should be typed. It is more suited for experienced users. Examples include: DOS, UNIX, LINUX

2. Menu driven  
There are many different menu forms that provide the user with a list of program commands displayed on the screen and a simple means of selecting between them. It presents the user with a choice and does not need one to remember the commands. It is suitable for beginners and infrequent users.

3. Graphical User Interface (GUI).   
A GUI shows a user to use menus and visual images such as icons, buttons and other graphic objects to issue commands. It provides a colored screen with icons each representing a program. A mouse may be used. This allows the user to enter commands by pointing and clicking at objects that appear on the screen. It makes the program easier to use. Examples include; windows (3.1, 95, 98, 2000, win XP, Susie Linux, Novel Netware.

Components of GUI   
Pointer: Is a symbol that appears on the display screen that is moved to select objects and commands. It usually appears like a small angled arrow. A pointing device is a device such as a mouse that enables the user to select objects on the display screen.   
Icons: These are small pictures which represent commands, files or windows. A command can be executed or turned into a window by moving the pointer to the icon and pressing the mouse button.   
Window: Is a visual area containing a user interface that displays output and allows input to one or more processes. The screen can be divided into different areas running different programs or displaying a different file. Windows can be moved around the display screen and their shape and size at will.   
Desktop: This is the area on the display screen where icons are grouped.   
Menus: This is a program’s list of user choices or possible actions usually shown on the screen. These help in execution of commands by selecting a choice from the menu

PROGRAMMING LANGUAGES   
This refers to the means of communicating with the processor or Programming languages are medium used by man to write instructions that command the computer hardware to perform certain tasks. They involve definition of a list of words and symbols according to a particular predetermined rule of grammar (syntax) into a logical manner to form a computer program.

Categories of programming languages include the following:

LOW LEVEL LANGUAGES

Machine language

Machine languages are the only languages understood by computers.  
These are programming languages that provide little or no abstraction from the computer’s architecture. They are called low level languages because they are closely associated with the processor.   
They are two types of low level languages.   
1. Machine code   
2. Assembly code

MACHINE CODE  
This is a low level language in which systems of impartibly instructions ara executed directly by a computers CPU. Each instruction performs a very special task. This s a first generation language and unfamiliar to humans it is not user-friendly at all. All instructions in machine code are represented in the binary format e.g. 100100100010001 on a 16 bit machine. Machine code language is highly efficient and allows direct control of each operation though it is difficult to read and debug, tedious, time consuming, error prone and designed for a specific machine and microprocessor.

Advantages of machine code languages

* Are highly efficient
* They allow direct control of each operation

Disadvantages of machine code languages

* They are difficult to read and learn since programmers write computer programs using 0s and 1s.
* They are very unfamiliar to humans
* They are not user friendly at all.
* Programming in machine code is tedious; time consuming hence chances of errors are high.
* They are designed for a specific machine and specific micro processor.

ASSEMBLY CODE

Assembly languages have the same structure and set of commands as machine

languages, but they enable a programmer to use names instead of numbers.  
This is a low level language in which each statement corresponds to a single machine language instruction. They are always specific to certain computer architecture and allow the use of systematic representation of machine codes. This was invented to assist machine code programmers. It is more easily understood and remembered by humans e.g. SUB for subtract. FNO for first number. It has a closer control over the hardware and executes efficiently but it is designed for a specific machine and microprocessor.   
Low level languages are closer to the hardware than are high level languages which are closerto humans.

Advantages of assembly language

* This language was more understood and remembered by human beings.
* It has closer control over the computer hardware and executed very efficiently.
* It is useful for writing operating systems and game programs which require faster and

efficient use of the central processing unit.

Disadvantages of assembly language

* It depends on registers and memory locations in a computer so cannot be transferred from

computer to computer.

High level languages

These are programming languages that are easier to write and understand than low level languages because they are closer to English but have to be converted into machine code before being run.

A high-level programming language may be more abstract, easier to use, or more

portable across platforms.

Advantages

* The language is widely used
* It is machine independent
* Its English-like statements are easy to understand
* It can handle many files
* It has a pool of skilled programmers
* It can easily handle input/output operations
* It is portable

Disadvantages

* Its structure makes even simple programs long
* Since it is readable, it is wordy
* It cannot handle mathematical processing

HIGH LEVEL LANGUAGE (HLL) 3GLs  
A high level language is an advanced computer programming language that is not limited to the computer or for one specific job and is more easily understood. These were introduced as a further refinement in the assembly language. They make programming much easier to use. In language, fewer instructions are written and therefore a lot is done in less time. They are user friendly and problem oriented since they involve wide vocabulary of words, symbols and sentences. They are used in conjunction with their syntax. They are also called procedural languages or machine independent languages or one-to-many languages.   
There are over 500 high level programming languages which include the following:

COBOL: Common Business Oriented Language. This was designed for business and commercial processing. COBOL is widely used because it is compatible to different types of computers and a pool of skilled programmers.   
FORTRAN: Formula Translation is usually used in processing numeric data in scientific and engineering applications.   
BASIC: Beginners All Purpose Symbolic Instruction Code. This can do almost all computer processing tasks. It is used to teach students how to use computers.   
PASCAL: This is used for teaching programming. It uses procedures and functions which allow a top-down approach to solving problems.   
HTML: Hypertext Markup Language is one of the main programming languages used to create web pages for the Internet or intra nets.   
JAVA: This is an object oriented programming language that displays graphics, accesses the network and interfaces with users via classes that define similar states and common methods for an object’s behavior.

VERY HIGH LEVEL (VHLL) 4GL’s (4 generation languages):   
These are higher, easier and shorter than high level languages. They tell the computer what to do but not how to do it i.e. they are non-procedural. They use menus and prompts to guide a non-specialist to retrieve data with ease.   
Examples include SQL (Structured Query Language), Oracle, RPG (Report Program Generator, HTML, XHTML (Extended HyperText Markup Language). These were designed to make programming much more easily.

NATURAL LANGUAGES 5GLs (fifth generation language):  
These are in form of natural languages where the user enters his/her request in form of human speech they are still undergoing development. These types of languages are normally used in intelligent based systems (1 KS) such as robots. Examples include: V8 (Visual Basic), OB (Quick Basic). They manipulate facts and rules to reach a conclusion.

OBJECT ORIENTED LANGUAGES   
The current state of art in programming technology is object oriented language. Every object has its own properties which can be set such as colour, size, data source etc.

WEB DEVELOPMENT LANGUAGES  
They include HTML and JAVA that are most commonly used for creating web pages or the www.

LANGUAGE PROCESSORS   
A language processor is a hardware device designed or used to process program code to machine code. Language processors are mainly used with high level programming to work backwards to the processor. Their main work is to translate high-level language codes into low-level language codes that the processor can understand.   
A translator on the other hand is a program that accepts text expressed in one language pd generates semantically equivalent text expressed in another language.   
Language processors include: Compilers, assemblers, interpreters and Linkers

Compilers   
These translate a program written in high level language into machine code or into assembly code program. The entire program is translated into machine code at compilation time. They do the following:   
• Allocate areas of main storage.   
• Generates the object program on cards, tapes, or disc as required.   
• Produces a print listing of the source and object programs when required.   
• Tabulates a list of errors found during compilation e g the use of Words or statements not included in the language vocabulary.

Assemblers  
An assembly is a program that translates assembly language/instructions into binary code or machine code, a format that is understood by the processor. They normal begin from where compilers stop. They do the following:

* Assemblers allocate areas of storage.
* Detects and indicates invalid sources-language instructions
* Produces the object program on cards, tapes, or disc as required
* Produces a print listing of the source and object projects with comments
* Data may be added to tell which program may be executed when the assembly process is completed
* This program can only be executed when the assembly process is completed
* Translates mnemonic operation codes into machine code, and symbolic addresses into machine code

Interpreter   
An interpreter translates high level instructions into an intermediate form which it then executes. The source program is translated line by line while the program is running. As a result, a program running under an interpreter runs very slowly as compared to a compiled program.   
It does not need to go through the compilation stage, the interpreter immediately executes high level programs and thus it is faster.

Linkers

These programs combine compiled programs and determine where the program will be located in memory. When the linker has transformed an object code, an executable file is generated. This normally results in files with the extension.

UTILITIES   
A utility is a program that performs a specific task related to the management of computer functions, resources or files like virus protection, memory management, password protection and file compression. Utilities are also called service programs and they are used to enhance the performance of the operating system. These programs are part of system software used to support, enhance and expand existing programs in a computer system and make’ it more and more user friendly. The most common utilities include:   
i. Debuggers: are used during the testing of programs and locating errors.   
ii. Sorting utility: used for sorting data.   
iii. Editors: for making changes, used for word processing.   
iv. Resource: used in networks   
v. Disk scanner utility: detects and corrects both physical and non-logical problems on storage devices.   
vi. Disk defragmenter: it recognizes the files whose contents are broken and spread across several locations on the hard disk and moves fragments to one location for efficiency.   
vii. File compression utility: shrinks the size of the file which takes up less storage space. Compressed files are sometimes called zipped files with a .zip extension.   
viii. Cryptographic utilities: encrypt and decrypt streams and files.   
ix. Spy ware remover: detects and deletes spy ware. Spy ware is a program placed on a computer to secretly collect information without the user’s knowledge.   
x. Internet filters: remove or block certain items from being displayed.   
xi. Merge utility: for merging or combining different files into one.   
xii. A personal firewall: detects and protects a personal computer from unauthorized intrusions.   
xiii. An installer utility: removes an application as well as any associated entries in the file system.   
xiv. A backup utility: it allows a user to copy or back up selected files on to another storage disk.   
xv. Data recovery utility: recovers accidental deleted files from your computer.   
xvi. An antivirus utility: It prevents, detects and removes viruses from a computer memory or storage device.   
xvii. Screen saver utility: is a utility that causes the monitor’s screen to display a moving image or blank screen if no keyboard or mouse activity occurs for a specified period of time.   
Screen savers were originally developed to prevent a problem called ghosting, in which images could be permanently etched on a monitor’s screen.

Screen savers can be used for reasons of security, prevent unwanted onlookers from accessing data or information from your computer, for advertisements on the screen, for entertainment and also prevent burn in.

Functions of utility programs

* + To detect for and remove viruses by using Antivirus programs.
  + They compact data with the aim of gaining space by use of data compression.
  + To combine data from more than one file.
  + To detect errors from hard disk and fix them.
  + Takes in data and re-arrange it using sorting utility.
  + backup data (safe keeping) by storing it on other facilities
  + To recover the lost data due to power going off by using data recovery

APPLICATION SOFTWARE

Application software refers to related programs designed to perform a specific task to

solve a particular problem for the user. They are designed to solve practical problems experienced in life.

Application package

This is a user software program designed to accomplish a given task.

Characteristics

* Targeted to wide range of users
* Easy to use-user friendly
* Designed for power and flexibility
* Machine independent

Software suite

This refers to the collection of individual applications sold as a single package.

The common software suites include:

* Microsoft office
* Lotus smart suite
* Corel word perfect suite

Advantages of software suites

* Cost significantly less than purchasing a single program
* Easy to use since applications inside use and share common features

Uses of application software

* Create graphics and multimedia projects
* Productive tool/business tool
* Support personal activities, business and education
* Facilitate communication

Features of application software include:

* Cursors
* Scrolling
* Menus
* Help screens
* Dialog boxes
* Special purpose and function keys
* Macros
* Tutorials and documentation

Application is software that enables a computer to perform a specific task or carry out a specific job. The job is called an application. These programs make a computer perform different activities like or uses like word processing, accounting, and graphics etc. They are called application programs because they direct the processing required for the particular task of the computer. They include: word processing, spreadsheets, databases, presentations, desktop publishing, graphics processing and communication software.   
Application software needs a particular hardware and operating system for their application. It is divided into two categories:

Custom made/tailored/bespoke software   
This is an application program which is designed and developed at a user’s request to satisfy personal data processing needs. It gives the user a chance to customize programs according to the suitable environment e.g. stock control programs, library software, etc. This software is used to serve a particular purpose and no other. Such software includes: school management system, banking system, insurance system and payroll system.

Packaged/Off-the-shelf software   
This is an application program which is copyrighted and designed to meet needs of a wide variety of users. These are of general nature and solve needs which are common in nature.   
They are already made programs designed to suite any environment and are bought from the shops and then installed in a computer.

Advantages of off the shelf software

* They are usually provided with extensive documentation to help the user.
* They are easy to use and are suitable for people with little or no computing knowledge.
* They are appropriate for a large variety of applications
* They are relatively low priced since they are sold in large numbers.
* They are readily available
* They can be customized
* They have less errors
* They can be customized.
* They are Cheap

Disadvantages of off the shelf software

* The package may allow only clumsy solution to the task at hand.
* Some packages need developing for example databases so require thorough knowledge

that is quite expensive.

* The user has to provide documentation for the particular application created.
* It is easy to forget commands to use the package especially if it is not used frequently.

They categories of Off-shelf packages:   
a) Word processing: This is used in the creation, editing, formatting, saving and printing of documents such letters, reports, labels, poems, memos, newsletters etc., word processing applications include Microsoft word, word pad, note pad, word star, word perfect, core! word, perfect writer, professional writer. Etc.   
b) Spread sheets: These are simple grids of cells arranged in rows and columns. They are used in handling numeric data such as finance, planning, budgets, etc. They include Microsoft excel, macromedia director, and lotus freelance, Lotus 1-2-3, Quattro pro, SuperCalc among others   
c) Data bases: These are used in creation and management of large volumes of information related to a particular topic or subject e.g. mailing lists, customers and supplies. They enable the user to work with up to 15 files at once to manipulate, update and revise data to produce meaningful reports. Their power comes from the ability to sort information through or from large volumes of information. Examples include: My SQL, Ms Access, Oracle, Lotus approach, Fox pro, Sybase, postgre SQL.

d) Presentation software: This is used in creation of computer based slide shows, overheads, etc. using sophisticated graphics styles, effects transitions and animations schemes. Examples include Ms Power point, Freelance graphics, core! etc.   
e) Desktop publishing: This is used to combine graphics to create a publication e.g. brocure, prospects, booklets, business cards etc. they include adobe PageMaker, Microsoft publisher, Quark press, Adobe InDesign, Serif PagePlus, Apple Page 2 among others. etc.

f) Graphics processing: These are used in the creation and editing of graphics ranging from charts, representation graphs, paint and drawing. They include Photoshop, Microsoft photo draw, adobe illustrator, Corel draw, etc.  
g) Communication software: This is used in exchange of messages by sending and receiving data via computers to different areas of the world, They include software browsers like Netscape, Microsoft navigator, internet explorer etc.  
  
2. Freeware   
This is copyrighted software provided at no cost to users e.g. games like solitaire and Dave, antivirus software like   
AVG.

3. Shareware   
This is copyrighted software distributed free for the trial period and payment is required for continued use after the trial period e.g. Motorbikes, computer car driving simulations, VS NET, antivirus software like MacAfee.

4. Public domain software  
This is free software donated for public use with no copyright restriction e.g. parliament news,   
newspapers like new vision and monitor.

Word processing

Word processing software also known as a word processor is used to create, edit, format , save, and print documents that contains text and graphics.

Popular word processing software:

* Microsoft word
* Lotus word pro
* Corel word perfect

Others include;

* MultiMate
* Perfect writer
* Professional writer
* Word perfect
* Word star

ADVANTAGES OF WORD PROCESSINGSOFTWARE OVER ORDINARY TYPEWRITER:

* Easy and fast to make changes to the documents.
* Has many look features to create document that looks professionally and visually appealing.
* Documents can normally be previewed before being printed.
* Documents can be saved for future use and editing.
* Convenient to create forms letters and mailing labels.
* The quality of the final text is heater, character style can be changed.
* Prevents unnecessary duplications of documents when changes have to be made, because it is not necessary to retype the document.

DISADVANTAGES OF WORD PROCESSING SOFTWARE

* Expensive equipment is needed.
* Working knowledge of word processing is essential
* Impractical for short text
* Information can be lost because of power failure and if a disk is damaged.

Differences between operating a word processor and an ordinary typewriter

* A word processor prints the entire documents at a time which an ordinary typewriter prints one character at a time.
* A word processor automatically moves the cursor to the beginning of the next line when text extends beyond the right page margin while the user needs to advance the lever manually when using an ordinary typewriter.

Text editors

These are simple word processors which are generally used to type without any special formatting .

Text editors are mainly used to write small notes, memos and programs.

Creating a document involves entering text or number or symbols, inserting graphics, and performing other task using an input device such as keyboard or mouse

Editing

This is the process of making changes to the existing content of the document.

COMMON EDITING FEATURES

Inserting; When text is inserted or added to a document, the surrounding words automatically move to make rooms for inserted text.

Deleting; when text is deleted or removed from a document, the surrounding words automatically move to fill the gaps left by the deleted text.

Cutting; when text is cut, it is stored in a temporary location called the clipboard. However, the original is removed from its place.

Copying; when text is copied, it is a duplicate and stored in the clipboard. However, the original text remains in place.

Pasting; when text is pasted, it is placed from the clipboard in the document.

Formatting;

Formatting involves changing the appearance of a document. There are four different levels of formatting;

* Character formatting
* Paragraph formatting
* Section formatting
* Document formatting (formatting page)

Character formatting;

Involves changing the font type, font size or font style. The most common way to emphasize text is to apply bold face, italic or underline character forming styles.

Paragraph formatting;

This involves text alignment, lines spacing, indentation s, tab settings, and borders.

A paragraph can be a single line of text or an entire page, and may be formatted independently from the rest of the document.

Section formatting;

This lets you specify page numbers, headers and footers for different sections or computers of a document.

Document formatting (forming pages):

This one specifies the overall page layout for printing .formatting at this level includes choosing the paper size (letter, legal, A4,A3), page orientation (portrait or landscape) and also involves changing the margins left, right, top, and bottom )or the distance between the main body of text and the edge s of the paper.

Undo;

This one allows actions that have been performed to be reversed such that if some text was accidently deleted, then the action can be undone.

Saving;

This is the process of copying a document from the memory to a storage medium such as floppy disk or hard disk.

NOTE:

Any document can be saved and exist as a new file, which is a named as collection of data, instructions or information.

Printing;

This is the process of sending a file to a printer to generate output on a medium such as a paper.

Popular features of word processing software includes (characteristics)

Word wrap;

This is the term used to describe a situation where the cursor automatically jumps to the next line. It allows a user to type continually without pressing the enter key at the end of each line.

Find and search;

This feature allows a user to locate all occurrences of a particular character, word or phrase.

Replace;

This feature allows the user to substitute existing characteristics, word, or phrases with new ones.

Spelling checker;

This allows the user to check the spelling of a whole document at one time or to check and even correct the spelling of individual words as they are typed (ie Auto correct)

Grammar checker;

Reports grammatical errors and suggest ways to correct them.

Thesaurus;

This suggests alternative words with same meaning (ie synonyms for use in the documents).

Mail merge;

Create form letters, mailing labels, and envelopes’. Used when similar letters have to be sent to several people. The names and addresses of each person can be merged with one single document and then printed out.

Automatic page numbering;

Numbers the pages automatically in a document.

Tables;

Allows a user to organise information into rows and columns.

Macros;

Allows a user to record or save frequently used key strokes and instructions, which can be executed later by running the corresponding macros.

Multi-columns;

This arranges text in two or more columns that look similar to a newspaper or magazine.

Clip art gallery;

Allows a user to insert drawings, diagrams and photographs into a document.

Mathematical formulae types setting;

Allows a user to type and set complex mathematical formulae within the program.

Template;

Allows a user to create documents, which are frequently used.

Printing ;

Allows a user to print single or multiple copies, fully or part of a document.

PRESENTATION SOFTWARE

This is an application program that allows users to create a variety of visually appealing slides that are used to help further communication ideas. OR

It is an application software that enables users to create computer – based slide shows using sophisticated graphics and animations to enhance images.

A presentation is the collection of slides handouts, speakers note and outlines in a single file.

These applications are also able to create slide shows are normally employed during meetings or seminars to enhance speakers or presenters’ ideas graphically.

Presentation software (sometimes called "presentation graphics") is a category of [application](http://searchsoftwarequality.techtarget.com/definition/application) programs that are used to create visual presentations. These presentations are usually delivered in a slide show format, and can be created with a variety of programs. The programs make it possible to combine text and graphic elements to convey important information to a group of people all at once.

Each presentation software allows users to develop a slide show presentation; however, the methods for viewing the presentation may vary from program to program. Both the [PowerPoint® presentation software](http://www.wisegeek.com/what-is-powerpoint-presentation-software.htm) and the Impress programs allow for the presentation to be viewed full screen on a computer monitor, where the presenter can either have slide changes timed, or click through them. The presentation can be moved to a larger screen by connecting the monitor to another screen.

Examples of Presentation software are;

* Microsoft power point
* Corel presentation
* Lotus freelance graphics
* Macromedia director
* Adobe works
* Screen cast
* [Microsoft PowerPoint](http://en.wikipedia.org/wiki/Microsoft_PowerPoint)
* [OpenOffice.org Impress](http://en.wikipedia.org/wiki/OpenOffice.org_Impress)[Apple Keynote](http://en.wikipedia.org/wiki/Apple_Keynote)
* [Corel Presentations](http://en.wikipedia.org/wiki/Corel_Presentations)
* IBM Lotus Freelance [CustomShow](http://en.wikipedia.org/wiki/CustomShow)
* [Google Docs](http://en.wikipedia.org/wiki/Google_Docs) (web-based)
* [Harvard Graphics](http://en.wikipedia.org/wiki/Harvard_Graphics) (obsolete)
* [Hewlett Packard](http://en.wikipedia.org/wiki/Hewlett_Packard)[Bruno (software)](http://en.wikipedia.org/wiki/Bruno_%28software%29)
* [Graphics](http://en.wikipedia.org/wiki/IBM_Lotus_Freelance_Graphics) (obsolete)
* [Kingsoft Presentation](http://en.wikipedia.org/wiki/Kingsoft_Presentation)
* [PresentiaFX](http://en.wikipedia.org/w/index.php?title=PresentiaFX&action=edit&redlink=1)
* [Prezi](http://en.wikipedia.org/wiki/Prezi)
* [SlideRocket](http://en.wikipedia.org/wiki/SlideRocket)
* [SlideWiki](http://en.wikipedia.org/wiki/SlideWiki)

Functions of presentation software

Basically the following are the functions of presentation software.

* It helps you to organize and present information to an audience.
* It provides tools that help you outline your thoughts, build a presentation quickly using professionally designed templates.
* It is used to enhance your presentation with pictures, charts, sound and video.

Features and terms associated with presentation software;

Slides:

A slide is an individual page in your presentation. You can output the slides on your printer as overhead transparencies.

Handouts:

A handout consists of two to six slide images on a single page. Handouts help to support your presentation by keeping the audience focused on what you are saying.

Outline:

For brain storming and organizing your thoughts. The text of your presentation i.e. headings and main body text appears without the slide’s background, colours and graphics.

Transitional looping:

It is a facility which sets up the presentation to run continuously until is stopped by the presenter.

Templates:

A template is a pre – designed presentation that defines what your presentation will look like, where text and other objects will appear and which foreground and background colours will be used.

Auto features.

These features make it easier for you to perform your work e.g. the auto clip art command.

Wizards.

Power point employs many wizards which make short order of the tasks that might otherwise be repetitive, time consuming or difficult.

The office assistant.

This is a feature that;

* Analyses your request and provide a resource list of potential help topics.
* Provides step – by – step instructions on how to complete a task and even perform certain tasks for you.

Auto content wizard.

This is a presentation design wizard that contains data from which one can select and edit to create customized/personal presentation.

Place holders

These are boxes with dotted borders that one part of most slide layouts.

These boxes hold title and body text or objects such as charts, tables and pictures.

Action buttons:

These are buttons that is used in presentation software as hyperlinks to navigate the presentation.

Examples of Action buttons:

* Forward
* Backward
* Home
* Previous

Slide master;

This is a single slide that controls all other slides in a given presentation.

Any change made to it affects the rest respectively.

Multimedia:

Refers to audio, video, charts, pictures that are used in slide presentation.

NB:

Slide mode of printing involves:

Printing each slide on its separate page while handout mode of printing, lets you print your desired number of slides on one page.

Application of presentation software.

There are various circumstances in which a presentation is made. These include;

* Teaching/lecturing a class
* Preaching the word of God
* In seminar discussions
* Introducing a product to sale
* Explaining an organizational structure.

Microsoft power point

This is a presentation software program used to perform computer based presentations. In other words, it is a powerful tool used to create professional looking presentations and slide shows.

Starting Microsoft power point 2007

Just like all the application programs Microsoft power point is started or launched as follows;

* After your computer has been started.
* Click on the start button
* Move to all programs
* Select Microsoft office
* Choose Microsoft Office power point 2007.

Note:

Power point starts running on your screen once you click on it, with a title slide as the default slide layout. But one can easily change to any other layout depending on the question.

Features associated with Microsoft power point window 2007.

When Microsoft power point is launched the following features will be seen on the screen.

* The Microsoft office button
* The quick access tool bar
* The title bar
* The ribbon
* Rulers
* Slides, place holders, and notes.
* Status bar, tabs, view buttons and more.

Types of views in Microsoft Power Point provide different layouts for constructing and viewing your presentation. These include;

* Normal view
* Slide view
* Outline view
* Slide sorter view
* Slide show view
* Notes pages view

Normal view;

Here the screen is split into three sections, showing presentation outline on the left, the active slide in the main window and the notes at the button.

Slide view:

The slide view displays each slide on a screen and is helpful for adding images, formatting text and adding background styles.

Outline view;

The presentation outline is displayed on the majority of the screen with small windows for the slide and notes. This enables one to edit and display all presentations text in one location instead of one slide at a time.

Slide sorter view;

Here, a small image of each slide in a presentation is displayed on one page. This can be very helpful when you want to arrange and sort slides.

Notes Pages View;

This enables one to create and edit notes for the presenter’s speaker.

Slide show View;

It displays one’s slides in sequence, moving from one slide to another, transitioning (changing) with special effects that one has setup and moving at a present timing that one can control.

Terms used in slide show;

1. Transitional effect;

These are different styles in which slides come and leave the screen during a presentation. It also includes timing, mouse click, transitions sound effects.

1. Timing;

Refers to the technique by which slides or text appear on screen during a presentation. (Mouse click or automatic)

Slide master layout;

This is a term used/applied to a presentation’s overall design.

i.e. it is a single slide that controls all other slides in a given presentation. Any change made to it affects the rest respectively.

Slide layout.

This is a given design of slide showing divisions or areas or sections of a slide where work can be done.

Examples of layouts in Ms. Power Point presentation software such as Microsoft power point provides a number of slide designs that one can use to come up with him or her presentation. These include;

* Title slide
* Title and content/bulleted list
* Two content/two column
* Comparison
* Title only
* Section header
* Blank
* Content with caption.
* Picture with caption.

Creating your first power point presentation..

|  |  |
| --- | --- |
| Advantages of presentation software   * Presentation software is incredible easy to learn how to use. | |
| * It is supplied with a large library of background templates and custom layouts | |
| * Multimedia can easily be added to the presentation | |
| * Presentations are easy to edit | |
| * Presentations can be easily output to different formats e.g. interactive whiteboard, acetate slides, handouts | |
| * Excellent for summarising facts | |
| * Great for showing graphs/charts/diagrams to an audience | |
| * Can create a set of handouts for people to write on whilst presentation being given |
| * Allows you to face your audience and make eye contact rather than facing the screen. |

 Disadvantages

|  |
| --- |
| * It is difficult for the audience to take notes while the presentation is taking place, otherwise they lose concentration |
| * Audiences are often happy to sit placidly and not interact with the presenter |
| * Not good for presenting certain kinds of information such as complex math equations |
| * It is all too easy to make a very bad presentation with too many animation effects and too much text, images |
| * Presenters often just read from the presentation which is boring for the audience. |

ELECTRONIC SPREAD SHEETS (MIS)

The electronic spread sheets are some of the management information system (MIS) tools for policy analysis due to their speed, efficiency, flexibility and functionality that meet the needs of various users like the policy managers.

Electronic spread sheet replaced paper version of work sheets. They have a lot of advantage such as the ability to carry out calculations automatically.

This ability can save the user aright time of furious arithmetic.

Examples of spread sheet program

* Microsoft Excel
* Lotus 1-2-3
* Frame work
* Microsoft work
* Visual calc
* Quattro program

SPREAD SHEET APPLICATIONS

These programs can be applied in the following financial applications.

* Budget planning
* Analysis of financial data
* Production of invoice and statements
* Tax tables
* Interest schedules.
* Non-financial applications
* Recording students marks
* Mathematical evaluations

Advantages of Electronic spread sheet program

* Repeated calculations can be done easily with the facility to copy formula
* Data stored can be easily retrieved
* A spread sheet can be printed in part or in full.
* Spread sheet can be easily edited with the help of the insert, delete and formatting facilities.
* Spread sheet information can be transformed to other application program such as Microsoft word.
* If one value in a spread sheet is changed all the values of formulas relating to it automatically change.
* Once a model of a spread sheet has been entered it is only necessary to change the data to obtain a new set of results.
* Many built in mathematical statistical and financial functions available.

Disadvantages of spread sheets

* The staff must be trained to enter band edit spread sheets.
* Only a fraction of the spread sheets can be seen at any given moment.
* It is expensive in terms of equipment used.

Spreadsheet Terms

Like all other areas of computer technology, Microsoft Excel worksheets have their own "language." This list of common terms is provided to serve as a reference for you as you work in Excel.

Cell

The intersection of a column and row. Information is stored in cells.

Cell Pointer

The cell pointer is similar to Word's insertion point. It selects or marks the current cell (where the next activity is going to take place). The Excel pointer changes shape depending on location and corresponding function. For more information, refer to Pointer Shapes above.

Cell References

The address, consisting of the column and row IDs, of a specific cell. The current cell location is displayed in the upper left corner of the worksheet.

Column

A vertical group of cells within a worksheet.

Formula

A set of instructions which perform a calculation based on numbers entered in the cell or numbers entered in other cells (referred to by cell references). All formulas begin with the equal sign (=).

Function

A pre-programmed formula. The function performs the calculation based on the cells referenced in the function. All functions begin with the equal sign (=).

Range

A group of cells. Ranges are often referenced for formulas, printing, and designating information to be copied or cut. Ranges can be selected by clicking and dragging over the cells.

Row

A horizontal group of cells within a worksheet.

Value

A number that can be used in an Excel calculation.

Workbook

A collection of worksheets contained within a single file.

Worksheet

A single layer or single sheet within the workbook. A worksheet can contain data, charts, or both. Instead of compiling all of your information into one worksheet, you can create several worksheets within the one workbook file. With this organization, similar information is grouped together to make it easier to locate and use. The worksheets for your workbook will vary based on its content and purpose.

EXAMPLE: If you want one file containing the grade books for all sections you teach, each section can be on a separate sheet.

NOTE:

The terms *worksheet* and *spreadsheet* are often used interchangeably.

Common mistakes in Microsoft Excel formulas

Whenever a mistake is made in a formula, Microsoft Excel displays an error message. Excel also tries to place the cursor on or to the mistake on the line that contains the error

Common mistakes done in Microsoft Excel.

These include;

* The name of the function is miss pelt
* There being excess spaces in the name of the function and the first bracket (parenthesis)
* There being no similar numbers of left parenthesis and right parenthesis
* Multiple arguments not being separated by commas
* You have entered the correct number of arguments in an incorrect order
* Invalid characters being placed where an operator is expected

Error values

Microsoft excel displays an error value in a cell when it cannot calculate the formula for that cell

|  |  |
| --- | --- |
| Error values | Meaning |
| #Div/0! | The formula is trying to divide by zero (0) |
| #N/A! | No value is available |
| #Name? | Microsoft excel does not recognize a name used in the formula |
| #Null! | You specified an intersection of two areas that don’t intersect |
| Num! | There is a problem with the number |
| #REF! | The formula refers to a cell that is not valid |
| #VALUE! | An argument or operator is on the wrong type |

RELATIONAL DATABASE MANAGEMENT SYSTEM:

A RDMS is a type of software that enables one to create manipulate and query a data base. i.e. a program that enables you to manage data. These programs enable the user to store large amount of data that can be easily retrieved and processed with great flexibility to produce meaningful managements report.

Examples of Data base programs

* Micro soft Access
* Oracle
* Fox pro
* D base
* Lotus approach
* Paradox
* My sql

Database Functions

There are several functions that a DBMS performs to ensure data integrity and consistency of data in the database. These include the following;

* Data dictionary management
* Data transformation and presentation
* Security management
* Multiuser access management
* Data integrity management
* Database access languages and application programming interface
* Backup and recovery management
* Database communication interfaces,
* Transaction management
* Data storage management.

MS. ACCESS

MS. Access is one of the most common database programs on market. Ms. Access which comes as part of MS. Office first appeared as Ms.access 2.0. With the up grading of various applications programs Ms. Access was up graded to Ms. Access 97, Ms. Access 2000, MS. Access XP, MS. Access 2007, MS. Access 2010 and MS. Access 2013.

TERMS ASSOCIATED WITH MS. ACCESS (Data base program)

Name sex District Allowance

Richard M Kampala 100,000

Martin M Mpigi 120,000

Mary M Soroti 240,000

Jack M Lira 321,000

Justin F Apac 380,000

Data base:

This is a collection of related information stored for a particular purpose. The data in the data base is arranged in column and rows.

Field:

This is the entire column that contains similar data items. e.g. the names column in the table above contains each individual name.

Record:

It is asset of the entire data items in the row. In other words a record is a collection of different fields in particular table .e.g. . If you are to consider the data item in the second row in the table above this contains all the information concerning Richard.

Field Name:

A field name is a file of particular column (field) e.g. sex, District, Names, and allowances are field names.

Field Properties:

A field property is a characteristic of a particular field. The field properties are normally specified from the general tab of the data table structure.

Field type (Data type):

This specifies the specific, data item stored i.e. field can either be text, Number, Date/time, currency, Auto number, OLE object, hyper link.

Data Tables:

There are the fundamental structures in Ms. Access data base.

Queries:

These are tools used to manipulate data in t5he data tables i.e. they do operation tasks like how many people are male and live in Kampala.

Macros:

This is an automated procedure of action in a computer. It is also called a main program because it has short automated procedures which consist of simple commands.

Modules:

These are Microsoft access objects that enable the users to work processes. Just like macros they provide work process von the specific commands.

Unlike macros, modules need one to have a good back ground in the programming languages and preferably in Ms. Visual BASIC.

REPORT:

These are tools in access that enables one to preview and print data in a meaning full format.

Forms:

These are tools in MS. Access that enables one to enter and display records from the data base tables registration forms, data words, receipts.

Foreign Key

This is a field in a relational database record that points to a key field in another table or a column in a table that match the primary key in another table within the same data store.

Primary Key

This is a feature in database programs that uniquely identify a record. In other words,

Functions of a Primary key

CREATING A NEW DATA BASE IN MICRO SOFT ACCESS

(Using MS. Access 2007)

To create a new data base follow the steps below.

* Start MS. Access by clicking on the start button ,move to all programs and click on it
* Click on Microsoft Office
* Click on Microsoft Office Access 2007
* Click on blank database
* In the file name text box, type in the suitable name for your database.
* Specify the folder or drive where you want your database to be saved or stored.
* Click on OK button
* Finally, click on Create for the database to be created.

Categories/Types of Databases that can be created

There basically two (2) types of databases that can be created i.e.

* Flat Database
* Relational Database

Flat Database

This is one that only contains a single table of data. In other words, all of the data in database is stored in this one place.

Relational Database

A relational database is one that contains two or more tables of data, connected by links called relationships.

OBJECTS IN DATA BASE PROGRAM (MS.ACCESS)

These are tools that are used to manipulate data in data base programs.

They include the following;

* Queries
* Forms
* Report
* Pages
* Macros
* Modules

Advantages

* Reduced data redundancy
* Reduced updating errors and increased consistency
* Greater data integrity and independence from applications programs
* Improved data access to users through use of host and query languages
* Improved data security
* Reduced data entry, storage, and retrieval costs
* Facilitated development of new applications program

Disadvantages

* Database systems are complex, difficult, and time-consuming to design
* Substantial hardware and software start-up costs
* Damage to database affects virtually all applications programs
* Extensive conversion costs in moving form a file-based system to a database system
* Initial training required for all programmers and users

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DATA COMMUNICATION AND NETWORKING   
Data communication refers to the transfer of data from one point to another using different types of network media. Data communication provides services like E-mail, Skype, News groups, instant messaging among others.

Terms associated with data communication   
Sending device: This is a device that is used to transmit or send data from one point to another.   
Communication device: This is a device that facilitates connection between computers and between groups of connected computers (networks).   
Receiving device: This is a device that accepts data from a given point and forwards it to a particular destination.   
Communication channel: This is a communication path between two computers or devices through which data travels.   
Computer network: This is a collection of computers linked together using transmission media for the purpose of communication and resource sharing. Resources shared include data, software, peripheral devices etc.   
Multiplexing: This is the process of sending multiple data signals over the same medium.

De-multiplexing: This is the process of separating the multiplex signals at the receiving end.   
Bandwidth: This is the maximum amount of data that a transmission medium can carry one time. lt expressed in bits per second (bps). The higher the bandwidth, the more data and information the channel can transmit.   
Broad band transmission: In this transmission, an analog signal is sent over the transmission medium using a particular frequency.   
Base band signal: This is a digital signal that is generated and applied to the transmission directly without modulation (changing from digital to analog).

Attenuation: This is the decrease in magnitude and energy as a signal progressively moves along a transmission medium.

Encoding: Is the process through which information from the sending device is converted into signals which the communication medium can carry. *(Sending digital receiving analog)*

|  |  |  |
| --- | --- | --- |
| Decoding: This is the process through which signals are converted back into the information in its original form in the receiving device.  Transmission: This is the process through which signals are broadcast or sent out through the medium to the receiving device.  Telecommunication: Refers to the transmission of data and information over a long distance e.g. Television  Teleprocessing: Refers to the access and modification of computer files located elsewhere.  Downloading: Is to transfer a file to your computer from another computer.  Uploading: Is to transfer a file from your computer to another computer.  Data encryption: This is the process of converting data into coded form (cipher text) to prevent it from being read or understood by un authorized people.  Communications software: Refers to software needed by a computer before it starts sending and receiving data from other computers.  Network protocol: It is a set of rules and procedures governing the transmission of data between two computers. .,  TRANSMISSION MEDIA (CHANNELS) This refers to the physical or nonphysical link between two or more computers. Physical links include:   * Twisted Pair cables (copper cables), * Coaxial cable, * Fibre Optic Cables   TWISTED PAIR CABLES  These are extensively used for telephone systems and their connectors are Registered Jackets (Ri). They are divided into two:  Shielded Twisted Pair(STP): This is shielded to avoid Electro-Magnetic Interference (EMI) but it is difficult to install because of the thick braided shield that makes it heavy.  Unshielded Twisted Pair (UTP): These are the mostly used cables for telephone systems.  Advantages of Twisted Pair.   * It’s widely available due to its use by mobile telephone systems. * The cables can be easily and cheaply installed with the help of various equipment. * Due to its extensive use, reconfiguration of the network is very easy.   Disadvantages of TP.   * There are high chances of losing and corrupting data. * It’s susceptible to Electro-magnetic interference. * It can only transfer data at speeds of up to 155 mbps although theoretically, it can support much higher rates.   COAXIAL CABLES. | | |
|  |  |  |
| These consist of single copper wire surrounded by at least three layers: -an insulating material, a woven or braided material and a plastic outer coating.  Cable TV wiring often uses coaxial cables because it can be cabled over long distances than twisted pair cables. They are categorized into two: - the Thick Ethernet cable (Thicknet) and thin Ethernet cable (Thinnet).  The thicknet requires a hole to be drilled into the cable through a device called the vampire. The network tab contains a transceiver to receive and handle the signals on the network.  The thinnet can be cut at the position at which you want to attach a device to it. It can be attached to BNC connector at both ends of the cable. A T-piece is used to reconnect two pieces of cables while the remaining connector on the T-piece is used for connecting the media to another computer.  Advantages of coaxial cables.   * The installation is relatively simple although the cables can be bulk and thick making it more difficult. * They theoretically support higher bandwidth than twisted pair. * The thin coaxial cable is relatively cheap and in the same price range of twisted pair. * They resist electro-magnetic interference better than the twisted pair. * It is used for longer distances (300 — 600 meters). * Transmits faster than UTP.   Disadvantages of coaxial cables.   * It may be difficult to reconfigure coaxial network. * Coaxial cables need a booster over long distances.   FIBRE OPTIC CABLES  These are light signals instead of electrical signals and comprises of glass core known as cladding and a protective coating. The light travelling along the protective core is called wave guide. They are used by many local and long distance telephone companies, cable TV and in high traffic networks. They are two categories:  Mono mode: which is a single wave length light that follows the same path along the fibre. It supports higher transmission speeds over long distances but very expensive.  Multimode; which is a multiple wave length light that follows the multiple light path along the fibre. The light pulse at the receiving end is more blurred than the light source created by monomode system.  Advantages of fibre optic cables.   * It is a reliable and secure transmission medium as it immune to electro-magnetic interference. * It has long life and thus doesn’t require to be reinstalled. * It is smaller and lighter than the copper cables. * It can be used in hazardous conditions which are highly flammable due to its non use of electro signals. * It can be used over longer distances because it has low attenuation. * It can support extremely high bandwidth of 2 Gbps. * They are smaller in size and much thinner and lighter than other cables.   Disadvantages of fibre optic cables.   * The connectivity device and installation of cables is relatively expensive. * It is relatively complex to configure and to install as compared to other cables.   WIRELESS COMMUNICATION  Wireless communication technologies transport digital communications without cables between communication devices. They include broadcast radio, cellular radio, micro waves, communications satellite, infrared and Bluetooth. |  |  |
|  |  |  |

1. MICROWAVES   
These are high frequency radio waves that are sent through the atmosphere and space to deliver telecommunications services including TV distribution. It is dependent on line of sight.  
  
Advantages of microwaves.

* They transmit large quantities of data.
* Low construction costs, since they do not require physical cables.
* Speed of light.

Disadvantages of microwaves.

* Microwave systems are a line of sight technologies where signals will not pass through objects such as mountains, buildings. There is need for radio transmitters in networks using air interface (radio waves) to be positioned free of obstacles.
* They are subject to electro-magnetic interference i.e. any disturbance that degrades, interrupts or obstructs performance of microwave signals.

2. SATELLITE

This is a microwave station placed in outer space. The satellite receives a signal from the earth, amplifies it and then rebroadcasts it at a different frequency to any number of earth based stations. Satellites are placed about 22300 miles above the earth‘s equator and moves at the same rate as the earth.

Advantages of satellites.

* Lots of data can be sent simultaneously.
* They allow high quality broad band communication across continents.

Disadvantages of satellite.

* It is expensive to launch.
* Infrastructure needed to access satellite is so expensive.

3. BLUETOOTH  
It is a kind of short range (about 10 meters) broadcast radio communication which can transmit data at a rate of 1 Mbps among Bluetooth enabled devices. Many computers, peripherals, smart phones, PDAs, cars etc. are Bluetooth enabled; which means they contain a small chip that allow them to communicate with Bluetooth enabled devices.

Advantages of Bluetooth.

* It is widely used.
* It has simple features; you do not need to know much technology.
* It’s free of charge.
* There is privacy.

Disadvantages of Bluetooth.

* It requires more battery.
* Bluetooth internet is sometimes very slow.

4. INFRA-RED COMMUNICATION   
IrDA(Infra-red Data Association) ports transmit data via infra-red light waves. As long as the devices are within a few feet and nothing obstructs the path of the light wave, data will be transferred.

5. CELLULAR RADIO.  
This is a form of broadcast radio used for mobile communication.

Advantages of wireless transmission

* Mobility — user device can be moved easily.
* Less costs for cabling infrastructure and device.
* There is neat and easy installation since cables are not involved. You just start up the wireless device.

Disadvantages of wireless transmission

* There is relatively lower bandwidth speed since the more the users, the band width gets smaller.
* Ease of access means more security is needed to protect data and band width and since people can connect anywhere within range without seeking network plug.

Advantages of using mobile telephones for Internet

* Faster connections.
* Readily available everywhere you go.
* Immediate contact is available.
* It saves time.
* There is instant communication.
* It is cheaper to users.
* Mobile telephones are easy to carry i.e. portability.

Disadvantages of using mobile telephones for internet connections

* There is limited display of content due to small screens
* Large volume of data may not be down loaded
* A mobile telephone can be easily lost due to its portability
* Some phones cannot open certain websites.

Implications of data communication services  
Importance

* Data communication services allow resource sharing e.g software, hardware, information among others.
* They facilitate communication between people through electronic mail, mobile phones among others.
* There is security and tight control measures over data access.
* It enables online learning and collaborative research.
* Data communication services have enabled improved travel services through e-bookings and e-reservations.
* They provide for online employment e.g. telecommuting.
* They allow access to common databases for example in banks.

Limitations of data communication

* There is a lot of data theft
* There is rapid spread of computer virus
* It is expensive to setup
* There is dependence on main file server
* Computer networks can fail especially if a single network component fails, the whole network comes to a standstill.
* Automatic downloads — on a network, it is easier to download and install software from a network on a computer without human intervention. If this software hasn’t been tested, it could cause unpredictable behavior.
* Exposure to external exploits — someone on a different computer can send data to the computer in such a way as to attack it, make it lock up, slow down or even crash.

DATA TRANSMISSION   
This refers to the process through which data signals are broadcast or sent out through the medium to the receiving device.

Analog and digital signals   
Ananalog signal uses variations which are represented by a continuous wave form to convey information. It is particularly useful for wave data like sound waves. Analog signals are used by normal phone lines and sound speakers. Therefore, an analog device processes data that is in continuous motion or form. Some of them operate on measurable quantities like speed, time, weight such as thermometers, speedometers, voltmeters.

A digital signal is a series of discrete (discontinuous) bits which are simply the presence or absence of an electric pulse. The state of being on or off represents the binary digit of 0 or 1 respectively.  
  
Therefore digital device processes data that is presented in form of discrete values such as 1,2,3e.g.digital watches, digital cameras, calculators among others.

Advantages of digital signals

* Digital signals can be copied exactly without any loss of quality
* Digital signals can be further processed by computer.

TRANSMISSION MODES

When two devices exchange data, it flows between the devices as a continuous stream of bits. There are two basic transmission modes/techniques for separating the groups of bits:

1. Asynchronous transmission
2. Synchronous transmission

Asynchronous transmission   
This transmits one bit at a time over a line at irregular intervals. Each bit is framed by controls; a start bit for marking the beginning of the byte, a stop bit for marking the end of the byte and a parity bit for error checking. It’s possible for low quantities of data like conversation over telephone lines.

Synchronous transmission

This transmits groups of bytes simultaneously at regular intervals. The beginning and ending of a block of bytes is determined by the timing of the sending device and receiving device. This method is more common with data transmission at high baud rate. The rate at which the data can be transmitted is measured in baud. This mode provides much higher speeds and greater accuracy than asynchronous.

TRANSMISSION DIRECTION  
This is the direction in which data flows along transmission media. It is categorised as;

- Simplex   
- Half duplex   
- Full duplex   
- Multiplex

Simplex transmission sends data in one direction only. It is used only when the sending device doesn’t require a response from the receiving device e.g. TV broadcasting.

Half duplex transmission allows data transmission in either direction but only one way at a time. E.g. police radio calls, credit cards verification systems, fax machines and Automated Teller Machines.

Full duplex transmission allows data to flow in both directions at the same time e.g. a regular telephone line allows both parties to talk at the same time.   
Multiplex transmission allows several types of signals to be carried at once through the same line. E.g. during video calls involving images.

INTRODUCTION TO COMPUTER NETWORKS   
A computer network consists of two or more computers connected to each other and other devices by a transmission medium that allows them share resources.

Networking hardware: This includes all computers, a server, computer peripherals and   
communication devices that enable two or more computers to exchange items such as data, instructions and information with each other. Examples include: a server computer, clients/work stations, network interface cards, modems, Hub/switch, repeater, router among others.

Basic requirements for setting up a computer network   
Network interface card (NIC) or network card: This is a device that enables a computer or a device that does not have built-in capability to access a network. Examples include adapter card, PC card, USB Network adapter, flash card, etc.  
Modems (signal converter): A modem is a device that modulates a digital signal from computers into an analog one to send data out over the phone line. Then for an incoming signal, it demodulates the analog signal into a digital one.   
A Router: This connects multiple networks and routs communications traffic to the   
appropriate network using the fastest path available. It allows multiple computers to share   
a single high speed internet connection such as through a cable   
modem.

Hubs and switches: A hub (multi-station Access Unit (MAU)) is a device that provides a central point for cables in a network. It directs information around the network.

A switch sends the data packets only to the destined computer but doesn’t broadcast data to all the computers.

Network bridge: This is a device that connects two networks making each accessible to the other. E.g it can connects two LANs.   
Repeater: This is a device that accepts a signal from a transmission medium, amplifies it and retransmits it over the medium.

Multiplexer: Is a device that combines two or more input signals from various devices into   
a single stream of data and then transmits it over a single transmission medium. It increases the efficiency of communications and reduces the need for multiple separate transmission media when it combines the separate data streams into one.

NETWORKING OPERATING SYSTEM (NOS)   
This is the system software that organizes and coordinates the activities in a network. The NOS does the following tasks:

* It controls the network
* It controls data access to the network
* It controls data transmission
* It detects or corrects errors
* It works on network security
* It works on file management tasks
* It works on system maintenance tasks such as backup
* Prioritizing print jobs on the network

Examples of Network Operating System include:  
Novell Netware, Microsoft Windows Server 2003 & 2008, AppleShare, Unix/NFS and Sun Solaris

NETWORK TOPOLOGY/NETWORK ARCHITECTURE   
Network topology is the physical layout of connected devices on a network. It refers to the ways in which networks are physically organized in terms of how they are wired.   
In a network topology, any network hardware component is also called a node.

TYPES OF NETWORK TOPOLOGIES   
The common types of topologies include: Star, Bus, Tree, Ring, Mesh Topologies.

Bus topology  
A bus or linear network topology consists of a single central cable that connects all   
computers and devices together.   
The physical cable that connects the computers and other devices is known as the bus or the backbone.

Advantages of Bus topology.

* Easy to install as it requires less cables
* Cheaper than other topologies.
* Computers and devices can be attached and detached at any point on the bus without disturbing the rest of the network.
* Failure of one device usually does not affect the rest of the bus network.
* Data, instructions, and information in a bus network can be transmitted in both directions.
* Cable faults are easily identified.

Disadvantages of bus topology

* If there is a problem with the cable, the entire network goes down.
* There is no central host computer to control the network
* Only one device can transfer items at a time.
* If many computers are attached, the amount of data flowing along the cable increases, data collisions occur and the network slows down
* Limited cable length and number of stations.
* Performance degrades as additional computers are added or on heavytraffic.(shared bandwidth)
* It is slower than the other topologies.

Ring topology

Ring network consists of a cable forming a closed ring, or loop, with all the computers and devices in a network. A ring network links all nodes together in a circular chain.   
The node examines any data that passes by to see if it is the addressee; if not, the data is passed on to the next node in the ring.

Advantages of ring topology

* Ring topology can cover a larger distance as compared to a bus network and is commonly used in wide area networks (WAN)
* No collisions occur because data takes one direction only
* Very orderly network where every device has access to the token and the opportunity to transmit
* The speed of data transmission is faster than in a bus topology.
* There is no dependence on a central computer/server and each node controls transmission to and from itself

Disadvantages of ring topology

* Ring Topology Network is more difficult to establish.
* If the cable fails, the whole network goes down.
* Data messages travel in only one direction from device to device around the entire ring
* If a node on a ring network fails, all nodes after the failed nodes cannot function.
* There is no central host computer to control the network.
* Moves, additions and changes of devices can affect the network

STAR TOPOLOGY   
On a star network, all of the computers and devices (nodes) on the network connect to a central hub or switch. The central resources for the network would be located at the centre of the star. All data that is transferred from one computer to another passes through the hub.

Advantages of star topology.

* Easy to install and maintain.
* Better performance: The star topology prevents the passing of data packets through an excessive number of nodes. Thus there is no collusion of data.
* Computers and devices can be added to or removed from the network with little or no disruption to the network.
* Reliable because each device connects directly to the hub, if one device faiLs, only that device is affected.
* It’s a reliable market proven system.

Disadvantages of star topology

* If the hub fails, the entire network fails
* Lots of cable required so that the installation cost is expensive.
* Network size is limited by the number of connections that can be made to the hub.
* Performance for the entire network depends on the capabilities of the hub.
* Set up of the system can be very complex.

MESH TOPOLOGY  
This is the type of network topology in which each of the nodes of the network is connected to each of the other nodes in the network.   
Fully connected Mesh topology makes it possible for data to be simultaneously transmitted from any single node to all of the other nodes.

Advantages of Mesh topology

* Data will always be delivered.
* All of the data that is transmitted between nodes in the network takes the shortest path between nodes.
* In the case of a failure or break in one of the links, the data takes an alternate path to the destination.

Disadvantages of Mesh topology

* Mesh topology is generally too costly and complex for practical networks, and very hard to setup.
* Lots of cable required so that the installation cost is expensive.
* Network size is limited by the number of interconnections that can be made between the computers.
* It requires that the nodes of the network possess some type of logical ‘routing’ algorithm to determine the correct path to use at any particular time.

TREE TOPOLOGY   
Tree network topology is also known as a hierarchical network topology. This is because it contains different levels of hierarchy.   
The type of network topology in which a central ‘root’ node (the top level of the hierarchy) is connected to one or more other nodes that are one level lower in the hierarchy (i.e., the second level). Each of the second level nodes will also have one or more other nodes that are one level lower in the hierarchy (i.e., the third level) connected to it. The hierarchy of the tree is symmetrical - Each node in the network having a specific fixed number, of nodes connected to it at the next lower level in the hierarchy.   
It usually has three layers: the core layer, the distribution layer and the Access layer.

NB: The FDDI (Fibre Distributed Data Interface) backbone is a high speed communication link used to provide the basis for a network consisting of small sub-networks. In other words, it links sub-networks.

Factors to consider When Choosing a Topology

* Cost.
* Future growth:

INTERNET

Internet   
This is the biggest area of WAN. It is accessed by means of software browsers such as Internet Explorer, Netscape, Microsoft Navigator, Mozilla Firefox among others.

Differentiate between Intranet, Extranet and Internet   
Intranet is used within an organization;   
Extranet is an extension of an intranet - used even outside the organization.   
Internet is global.  
TYPES OF INTERNET CONNECTION   
The more technology grows, the bigger, better and faster Internet connections come up. The Methods of connecting to Internet are only two:   
- The Dial Up/Analog access; which uses normal telephone lines   
- Wireless connectivity; which requires no telephone lines

The common Example of the wireless type is Broadband,a high speed Internet connection. Others include; ISDN, DSL, Cable, 3G phones and satellite.

NB:Integratedservicesdigital network (ISDN) is an international communications standard for sending voice, video, and data over digital telephone lines or normal telephone wires. Typical ISDN speeds range from 64 Kbps to 128 Kbps.Digital Subscriber Line (DSL*)* is a family of technologies that provides digital data transmission over the wires of a local telephone network.

INTERNET SERVICES   
After connecting to the internet, the following are the services that we can utilize online.   
1. Telnet: One of the amazing features of the Internet that lets you use the resources of another computer in another part of the world. This is done by remotely logging to the distant computer which is called the host.   
2.Email: It allows the transfer of messages, documents, and pictures among others, across the Internet.   
3. Mailing list: This is based on the email protocol. As an electronic mailing list it is very convenient when somebody wants to send a message or newsletter, for example, to many people in one go.   
*4.* Internet Relay Chat (IRC): Allows people to converse in real time by typing questions and responses. Chats are usually organized in what we call chat rooms.   
5. File Transfer Protocol: The standard method for transferring files, whether downloading or uploading, to and from your computer with another computer on the Internet.   
6. Newsgroups: This is an Internet equivalent of a discussion group or an electronic bulletin board. There are newsgroups for every conceivable topic and more, e.g. educational technology.   
7. World Wide Web: This refers to the global collection of electronic documents called WebPages stored on computers all over the world. As it is the most exciting feature that has revolutionized the Internet, people use this service to surf or browse for information.

NB:

Gateways allow different types of computers to communicate with one another even if   
they use different communications protocols or transfer data at different speeds.

FACTORS THAT AFFECT THE SPEED OF AN INTERNET CONNECTION  
Computer processor speed: A person using a Computer with dual Pentium IV processor is most likely to get faster connectivity to the internet as compared to one with a Pentium Ill or Pentium II processor.   
Distance the data travels: Actual Internet speeds will vary, depending on the distance the data travels coupled with how many servers it has to go through and the different speeds of each server. Additionally, the shorter the cables or the closer the computers are to the routers, the faster the connection speed.   
Heavy traffic on the network: The greater the number of computers on the network is, the more the internet speed reduces.   
ISPs are allocated a certain amount of bandwidth which is shared among all of the incoming and outgoing connections.   
Malware, spy ware and viruses: Viruses hinder the operation of programs on the computer, regardless of its processor strength; this in turn slows down the speed of connectivity.   
Modem speed: If the modem is substandard with a low rating, or not compatible with your ISP’s modem then this will slow down the speed at which data is transmitted.   
Natural conditions: Instability in connection speed is also commonly caused by natural conditions such as stormy weather and thunder, which interfere with the transmission of signals.   
Positioning of the modems and routers: Modems and Routers should be strategically positioned. The routers should not be put below or under tables but should be raised well to be able to send the signals directly to the receiving computers! laptops.   
Hardware problems: A poor network card, video card or signal receiver can seriously reduce the speed of the data being processed by your system, slowing down the speed at which your computer can take the information coming in. If your Internet service comes over the phone line and you have a faulty filter attached, the speed will be compromised.  
Software problems: You need good updated web browser software to display the web pages efficiently. Currently Internet explorer version 6 is unable to display some WebPages with advanced features. It is also good to have updated software and device drivers to newer versions for optimum performance.   
Available memory: With each program you open on your computer, you are using up more RAM memory. Your computer has to write this data to the disk, and the more memory you are using up on open programs, the less memory there is available to receive the data. Data will slow down if your computer cannot receive it fast enough, making the Internet speed seem slow.   
Computer internet settings: Improper computer settings can also affect the speed of your internet connection. Setting your firewall, safe search and other options properly will improve the speed as well.   
Technological circumstances: Slow speed of an internet connection can be due to technical causes such as loose connections of cables or maintenance works being done by an your ISP.   
Cookies: When surfing, the browser collects information, such as passwords and stores it on your local hard drive in a file known as a cookie. Over time, these cookies can compromise the speed of your Internet connection, particularly if you visit many websites during a browsing session.   
Quality or type of internet connection; some of them are slow but some are faster.

Advantages of the internet

• Enhancement of transport and communication.

• It helps in accounting and finance.   
• Access to information worldwide.   
• Business (buying and selling over internet 24 hour transaction)   
• E-banking i.e. electronic money transfer   
• Climatic and weather forecasting   
• Entertainment and leisure where movies and songs are downloaded.   
• Employment online   
• Security and military   
• Education and telecommunication   
• Advertisement   
• Social network facility e.g. face book and twitter

• The internet helps to link thousands of computers enabling them to share information.   
• It eases access to information.   
• It offers online chatting.   
• The government uses the internet for distribution of information and internal communication.   
• Businesses use the internet to sell and buy products online and interact with other businesses.   
• Education and medical research is available on the internet.   
• It provides employment opportunities   
• Social networking

Disadvantages of the internet

* There is no privacy for information
* Information control is limited
* Installation and maintenance cost are high
* Virus threats make data storage insecure
* Internet spamming which are irritating
* IT related diseases e.g. eye sight, repetitive strain injury etc.
* Moral decay due to pornographic materials, increased crime through piracy, forgeries and scam (conmen)
* Continued isolation of man
* Unemployment as the unskilled get retrenched

E-MAIL COMMUNICATION  
Email (Electronic Mail) Communications refers to the transmission of messages via a computer network such as; a local area network or internet. The email can be simple text, or include an attachment such as a word processing document, a graphic, an audio clip or video clip.

Components of an e-mail  
Headers: The message headers contain information concerning the sender and recipients. The exact content of mail headers can vary depending on the email system that generated the message.   
Subject: The theme of the email message   
Sender (From): This is the senders Internet email address.   
Date and time received (On): The time the message was received.   
Recipient (To :): First/last name of email recipient, as configured by the sender.   
CC (Carbon copy): enables copies of the email message to be sent to third party while acknowledging other recipients   
Bcc (Blind Carbon Copy): Enables copies of the mail message to be sent to the third party without acknowledging nay other recipients.   
Reply-to: This is the Internet email address that will become the recipient of your reply if you click the Reply button.   
Body: The body of a message contains text that is the actual content, The message body also may include signatures or automatically generated text that is inserted by the sender’s email system.   
Attachments: Attachments are optional and include any separate files that may be part of the message.   
Signature: Personalized information about sender.

E-mail software  
This refers to the programs that are used to manage email account messages.   
They are in two categories: Application packages locally installed on the computer (email clients), and Online email programs hosted by a website on the www (webmail).   
Examples of email clients include: Microsoft Outlook, Thunderbird

The most popular webmail software: Yahoo, Hotmail, Gmail, Excite, Mail.com, Netscape,   
web mail, AOL, Eudora mail etc.

Advantages of using e-mails

* Easy to use. Emails applications have user friendly tools that help during composing messages.
* Email supports sending of attachments like documents, zipped files, etc.
* It is very fast in terms of speed: The e-mail is delivered instantly, anywhere across the globe.
* Easy to prioritize: Since the mails have subject lines, it is easy to prioritize them and ignore unwanted mails.
* Email messages can be sent to many recipients at the same time
* Emails can also carry hyperlinks that lead to other web pages with just a click
* One can subscribe to news and other online services through email
* Email software have management features that help users to organize their messages in folders like inbox, sent, draft, etc.
* Easier for reference: When one needs to reply to a mail, there is a provision in the mailing system to attach the previous mails as references. This refreshes the recipients knowledge, on what he is reading.
* Environment friendly: Postal mails use paper as a medium to send letters. Electronic mail thus, saves a lot of trees from being axed. It also saves fuel needed in transportation.
* Email software have address book features that may be sorted in alphabetical order.
* Email software has a good degree of security features such as username and password before sign in
* Email applications have inbuilt English dictionary which safeguards the sender from incorrect spelling and grammar.
* Email is a relatively cheap means of communication since there are no printing or postage expenses involved.
* There is flexibility in time of opening the e-mail for any time access. At any time of the day or night, one can communicate with friends, relatives, professors and business associates.
* Messages remain permanent for future and frequent accessing from anywhere.
* Use of graphics such as colorful greeting cards and interesting pictures can be sent through e-mails.
* Advertising tool: many individuals and companies are using e-mails to advertise their products, services, etc.

Disadvantages of using e-mail

* Emails can carry Viruses: The recipient needs to scan the mails, as viruses are transmitted through them and have the potential to harm computer systems.
* Spam and Junk: E-mails when used to send unsolicited messages and unwanted advertisements create nuisance called Spam. Checking and deleting these unwanted mails can unnecessarily consume a lot of time, and it has become necessary to block or filter the unwanted e-mails by means of spam filters.
* E-mail spoofing is another common practice. Spoofing involves deceiving the recipient by altering the e-mail headers or the addresses from which the mail is sent.
* Hacking and email interception: The act of unauthorized attempts to bypass the security mechanisms of an information system or network is termed as hacking.
* After the e-mail is sent and before it is received by the desired recipient, it “bounces” between servers located in different parts of the world. Hence, the e mail can be intercepted by a professional hacker.
* Misinterpretation: One has to be careful while posting any kind of content through an e-mail. If typed in a hurry, the matter could be misinterpreted.
* The content posted via e-mails is considered informal. Therefore, there is a chance of business documents going unnoticed. Thus, urgent transactions and especially those requiring signatures are not managed through e-mails.
* Crowded inbox: Over a period of time, the e-mail inbox may get crowded with mails; it becomes difficult for the user to manage such a huge chunk of mails.
* Need to check the inbox regularly: In order to be updated, one has to check his e-mail account regularly, which may be expensive in the long run.
* Email cannot be used without computers especially in remote areas without electricity   
  In case one forgets his/her password, signing in is not possible and this can lead to loss of information.
* Email may violate privacy in case someone else gets to know your user password since the other may check your mails.

SYSTEM SECURITY; ICT ETHICAL ISSUES AND EMERGING TECHNOLOGIES COMPUTER SECURITY RISKS  
A computer security risk is any event or action that could cause a loss or damage to computer hardware, software, data or information. Any illegal act involving a computer is generally referred to as a computer crime e.g. computer misuse.   
Cybercrime refers to online or internet — based illegal acts.   
Hacking is a term used to describe attempts (successful or otherwise) to gain unauthorized access to computer systems.

Examples of security risks include:

* V es
* Un authorized access and use of computer systems
* Hardware theft and software theft
* Information theft and information piracy
* Internet based fraud

COMPUTER VIRUS   
This is a program that copies itself into other programs and spreads through multiple computers. Viruses are often designed to affect or infect a computer negatively by altering the way it normally works without the user’s knowledge.

Types of viruses   
A boot sector virus executes when a computer starts up because it resides knowledge or permission of the owner. In the boot sector of a floppy disk or the master boot record of a hard disk.  
A file virus attaches itself to program files and is loaded into memory when the infected file is running.   
A macro virus uses the macro language of an application (e.g. word processor or spreadsheet) to hide the virus code.   
A logic bomb is a virus that activates when it detects a certain condition.   
A time bomb is a kind of logic bomb that activates on a particular date.   
A worm copies itself in the memory or on a disk drive until no memory or disk space remains, which makes the computer stop working or crash.   
A Trojan horse is a program that hides within or looks like a legitimate program but executes when a certain condition or action is triggered.   
A polymorphic virus modifies its program code each time it attaches itself to another program or file, so that an antivirus utility has difficulty in detecting it.

Risks/problems caused by viruses   
These risks are classified into two: destructive viruses and non — destructive viruses. Destructive viruses   
*Massive destruction* viruses attack the formats of disks where by any program or damage will be unrecoverable.   
*Partial destruction* viruses erase and modify specific portion of a disk affecting any files stored in that location.   
*Selective destruction* viruses erase and modify specific files or file groups.

*Random havoc randomly* changes data during normal program execution or changing key   
stroke values or data from other input/output.   
*Network saturation* viruses systematically use up memory or space to impede performance or cause the system to crash.   
Non destructive viruses   
These do not cause any destruction but are annoying. They change display colors, display messages. Change key board values e.g changing the effect of the shift/un shift keys and delete characters displayed or visual display.

SYMPTOMS OF VIRUSES   
The presence of viruses can be indicated if one or more of the following symptoms appear on your computer:   
- Unfamiliar graphics or quizzical messages appearing on screens   
- Programs taking longer than usual to load   
- Disk accesses seeming excessive for simple tasks   
- Unusual error messages occurring more frequently   
- Less memory available than the usual   
- Access lights turning on for non referred devices

HOW VIRUSES ARE ACTIVATED   
There are three basic ways:   
1. Opening an infected file   
2. Running an infected program   
3. Starting up the computer with an infected disk

SOURCES OF VIRUSES   
1. Contact with contaminated systems: Any diskettes used on a contaminated system could become contaminated. If the same disks are used on another computer system, the virus will be spread.   
2. Pirated software: The use of pirated is a risk in that this software may be contaminated by virus code or amended to perform some other destructive function which may affect your system.   
3. Infected proprietary software: Some viruses were introduced to contaminate software which is under development in laboratories and then being installed on to disks containing the finished show software products.   
4. Fake games: Many people play games and so games programs spread very fast. These games keep infecting systems as they are installed. Games such as HOT SEX.EXE   
5. Freeware and shareware: These are programs commonly available from Bulletin Board System (BBS). These terms are used to mean offering software copyright-free. Such programs should be treated with caution until they are found virus free or without destructive codes.   
6. Updates of software distributed via internet or other networks: Software distributed via the net in most cases targets virus programmers as they provide a built-in method for widespread and anonymous propaganda.

PRECAUTIONS TO PREVENT VIRUS INFECTION   
- Ensure that the e-mail is from a trusted source before opening it   
- Install an antivirus utility and update its virus definitions frequently for detecting and removing virus   
- Never start up a computer with a floppy disk in the floppy drive   
- Scan all disks and files for possible virus infection before opening them using software antivirus   
- Backup important files regularly   
- Write protect the recovery disk before using it   
- Make sure that all purchased software comes in sealed ;tamper-proof packaging

NB:

An Antivirus utility is a program that prevents, detects and removes viruses from a computer’s memory or storage devices e.g. Norton, F-secure, Mac-café, AVG, Kaspersky, Avira

UN AUTHORIZED USE AND ACCESS OF COMPUTERS  
Unauthorized access is the use of a computer or a network without permission.   
A cracker or hacker is someone who tries to access a computer or network illegally   
Unauthorized use is the use of a computer or its data for unapproved or possibly illegal activities

EXAMPLES OF UNAUTHORIZED USE OF COMPUTERS   
V An employee using a computer to send personal e-mail   
V Someone gaining access to a bank computer and performing an authorized transfer

HOW TO PREVENT UNAUTHORIZED ACCESS AND UNAUTHORIZED USE OF COMPUTERS   
This is done by utilizing access control.   
An Access control is a security measure that defines who can access a computer, when the users can access the computer and what actions the users can take while accessing the computer

IMPLEMENTATION OF ACCESS CONTROL   
This is implemented using a two-phase process i.e.   
1. Identification-verifies whether the user is a varied one.   
2. Authentication-verifies that the user is really the one he or she claims to be.

METHODS OF IDENTIFICATION AND AUTHENTIFICATION

There are basically four methods:

• User names and passwords   
• possessed object   
• Biometric devices   
• Call back system

A password is a combination of characters associated with a user name that allows a user to access a computer or network.   
A possessed object is any item that a user must carry to gain access to a computer or computer facility.   
A personal Identification Number (PIN) is a numeric password, either assigned by a company or selected by a user.   
A Biometric device authenticates a person’s identity by verifying personal characteristics such as finger prints.   
A biometric device translates a personal characteristic into a digital code that is compared with a digital code stored in the computer.

Examples of biometric devices  
- A finger print scanner which captures curves and identifications of a finger print. It uses infrared scanner to capture unique pattern of blood vessels under the skin.   
- A hand geometry system which can measure the shape and size of a person’s hand.

Biometric methods include:

Finger print recognition techniques, voice recognition, and face recognition among others.   
A call back system connects a user to a computer only after the computer only after the computer calls the user back at a previously established telephone number.

COMPUTER PROTECTION   
Computer protection mechanisms are built into the computer to support the enforcement of security policies.

Computer protections tools  
1. Digital certificates: These help prevent people from viewing incoming mails. Digital certificates come with a public key and a private key. Anyone can know the public key. To enable one send you an encrypted message, you must send that person your public key. You decrypt the message using a private key known by you only.

NB:

Hash code is a digital signature generated by taking a mathematical summary of the document.   
2. Virus detection: This is done by use of antivirus software to detect and get rid of viruses.   
3. Security and the law: Under the Data Protection Act, personal data must be kept secure and one has right over their data.   
4. Social and cultural issues: The net is not a totally risk-free environment and so unwanted pornographic material can come to your computer. To combat such dangers, blocking software can be installed which sensors unacceptable material. Examples of such software include: Net Nanny http://www.netnanny.com, Surf watch http://www.surfwatch.com   
5. Data encryption: This is the translation of data into a secret code. It’s meaningless to those who don’t know how to code it.  
Encrypted data is called cipher text.   
Unencrypted data is called plain text.

Types of data encryption  
• Public key encryption: Is a system that uses two keys i.e. public key which encrypts and is known to every one and a private key which decrypts and is secret, known to the recipient of the information.   
• Symmetric encryption: The same key is used to encrypt and decrypt the message.

Reasons for data encryption  
- Shielding or protecting data from eyes of other people

- To avoid hackers from hacking important information   
- Maintaining confidentiality of information   
- To avoid information altering

Disadvantages of data encryption  
-It takes computer processor time. The more complex the encryption, the more time it takes.   
- Encryption keys can become lost rendering data irremovable   
- Encryption that is managed by the user can cause problems in managed network by rendering necessary files un accessible to the network managers.

6. Firewalls: This is a set of related programs located at the network at the network gateway server that protects the resources of a private network from users from other networks. Or A firewall is a mechanism for protecting a corporate network from external communications system such as the internet. Network Interface Cards (NIC) and running a special firewall program. One network card is connected to the company’s private LAN and the other connected to the internet. The machine acts as a barrier through which the information passing between the two networks.

Types of firewalls  
i) Network firewall: This protects the perimeter of a network by watching traffic.   
ii) Host-based firewall: This protects individual computers regardless of the network its connected to.   
iii) Hardware firewall: Is a device connected to your network   
iv) Software firewall: Is a software program installed to protect the computer from unauthorized incoming and outgoing data.

Uses of firewalls

* They help keep networked computers secure and safe
* They help filter incoming and outgoing traffic that flows through your computer system
* They protect the applications, services, machines of the network from unwanted traffic from public internet
* They limit or disable access from hosts to the network

COOKI ES   
Acomputer cookie is a string of text that websites place into a browser’s memory. It tells the website information about the user and keeps the user from having to repeatedly enter this information.

They identify users and possibly prepare customized websites for them. When you enter a website using cookies, you may be asked to fill a form providing your name and interests. This information is put into a cookie and sent to your web browser for later use.

Advantages of cookies

* They ease browsing since it is responsible for making personalized services such as Google mail or yahoo function correctly.
* They keep users logged into websites, save personal preferences and make online sales significantly easier.
* Ease of control due to their storage in text format, users can examine them individually. Most browsers allow users block some or all cookies and to delete unwanted cookies.
* They don’t require any server resources since they are stored on the client.
* You can configure cookies to expire when the browser session ends (these are referred to as session cookies) or they can exist for a specified period of time on the client computer (referred to as persistent cookies).
* The data becomes attached to the customer. If she/he starts to an order and then jumps to a different HTML documents and returns later, the items that had been selected earlier are still selected.
* The order form could be on several screens with each adding information to the cookie.

Disadvantages of cookies

* Limited duration: The browser keeps the cookie only until a certain date and so the website can only track information stored in the cookie for a limited time.
* Privacy concerns: Cookies allow websites keep track of more than just user names, passwords and similar data yet some marketers use this information to advertise without permission.
* Cookies exist in plain text on the client machine which may pose a security risk as anyone can open them.
* A user with an old browser that doesn’t support cookies, the application will not   
  work.
* Cookies can be disabled on user browsers.
* There is no security for sensitive data.

GREEN COMPUTING   
This is the environmentally responsible use of computers and related resources. It involves implementation of energy efficient CPUs, servers and peripherals as well as reduced resource consumption and proper disposal of electronic waste (e-waste).

Implementation of green computing

* Minimize the use of paper and properly recycle waste paper
* Power-down the CPU and all peripherals during extended periods of inactivity.
* Power-up and power-down energy intensive peripherals such as laser printers according to need.
* Dispose-off the waste according to federal, state and local regulations.
* Use Liquid Crystal Display (LCD) monitors rather than Cathode Ray Tube (CRT) monitors.
* Use notebook computers rather than desktop computers whenever possible.
* Employ alternative energy sources for computing workstations, servers, networks and data centers.
* Use the power-management features to turn off disk drives and displays after several minutes of not in use.

MEASURES FOR GREENER COMPUTING

* Lower power hardware: PCs can be made to use less electricity by using a lower processor e.g. using passive cooling rather than energy consuming fans.
* Virtualization: This is the use of computer software to simulate hardware e.g. install virtual   
  servers to appear like physical machines.   
  Cloud computing: This is where software applications, processing power, data and even artificial intelligence are accessed over the internet. This helps to reduce the capacity of run time for servers thus reducing energy consumption.   
  Energy efficient coding: This helps to save power by using much of software and less hardware.   
  Improved repair, re-use, recycling and disposal: This involves reducing quantity of electrical and electronic equipment as well as to increase its re-use, recovery and recycling.   
  Less pollutant manufacture: Many hazardous chemicals are üsed to make computers. Green computing entails reducing the use of such substances and more electronics wastes for safe recycling.

CLOUD COMPUTING   
This refers to the use and access of multiple server-based computational resources via a digital network e.g. WAN, Internet connection using the World Wide Web.   
Cloud users may accept the server resources using a computer notebook, smart computer or other device.   
The cloud server manages and provides application and data is also stored remotely in the cloud configuration.   
All processing and storage are maintained by the cloud server. Users do not down load and install applications on their own device/computer.

How cloud computing works   
A cloud user needs a client device such as a laptop or desktop computer, smart phone or other resource with a web browser to access a cloud system via the www.   
The user will log into the cloud at a service provider such as their employer.  
It works on a client-server basis, using web browser protocols. The cloud provides server based applications and all data service to the user e.g. if a user wishes to create a word processor document, the cloud provides a suitable application running on the server which displays the work done by the user on the client web browser display.

Risks associated with cloud computing

* Information security and user’s privacy: Storing data may expose the user to potential violation of privacy.
* International, political and economic problems may arise when public data are freely collected and privately stored from clouds’ archives located in a country other than those of the cloud’s users.
* Continuity of service: A malfunction can affect a large number of users at once because these services are often shared on a large network.
* Data migration problems when changing the cloud provider. There is no defined standard between the operators and such a change is extremely complex.

Advantages of cloud computing

* Cost efficient: It’s the most cost efficient to use, maintain and upgrade. The cloud is cheaper than traditional desktop software.
* Unlimited storage: Storage of information in the clouds gives you unlimited storage capacity.
* Backup and recovery is much easier since all your data is stored in the cloud. Since service providers handle recovery of information.
* Automatic software integration: This means that you do not need to take additional efforts to customize and integrate your applications as per your preferences.
* Allow you to customize your options with great ease: You can hand pick just those services and software applications that you think will suite your enterprise.
* Easy access to information: Once you register yourself in the cloud, you can access   
  information from anywhere where there is an internet connection.
* Quick deployment: Your entire system can be fully functional in a matter of a few minutes as soon as you opt for cloud computing.
* Relieves burden of IT professionals and frees up their time in office.
* Most service providers have pay structures that only call for payment when used.
* It eliminates a physical storage center; something that reduces costs and loss of information.
* You can access your data at all times when needed.
* Device and location independence enable users to access systems using a web browser regardless of their location or what device they are.
* Reliability is improved if multiple redundant sites are used. This makes well-designed cloud computing suitable for business continuity and disaster recovery.
* Maintenance of cloud computing applications is easier because they do not need to be installed on each user’s computer.

Disadvantages of cloud computing

* You will not need a very good internet connection to be logged onto the server at all times, In case of network problems, you’ll get stuck.
* It’s prone to attacks: storing information in the cloud could make your company vulnerable to external hack attacks and threats. Nothing on the internet is completely secure.
* Security in the cloud: in cloud computing, you are surrendering all your company’s sensitive information to a third party cloud service provider.
* Technical issues: Much as you can access information from anywhere any time, there are sometimes when the system is not functioning due to technical problems.
* There is long term dependence on host for maintenance and confidentiality of your   
  information and data.
* There is less control over your information and data when handing it over.

UNIFORM RESOURCE LOCATOR (URL)   
This is the global address of documents and other resources of the World Wide Web. E.g. http://www.google.com

Components of the URL   
The name of the protocol to be used to access the file resource   
A domain name: This is a name given to an organization which is connected to the internet/a single/a group of computers which constitutes the Internet site. It identifies a specific computer on the internet.   
A Pathname: This is a hierarchical description that specifies the location of a file in the computer.

Parts of the URL   
http: protocol used in communication between the browser and web server   
Colon (:): Separates the protocol from the other part of the web address   
Slash(//)*:*  Indicates that the contact a server is to be achieved   
www.google.com: Name of a server listening to messages using http protocol   
/- indicates the route folder of the folder system hosted by the web server

EMERGING TECHNOLOGIES   
These are new technologies that are currently developing or will be developed over the next five years. Or   
These are technical innovations which represent progressive developments within a field for competitive advantages.   
They include Artificial Intelligence, Digital Forensics, Information Technology, Wireless data communication, man-machine communication, on-demand printing, bio-technologies and advanced robotics.

ARTIFICIAL INTELLIGENCE   
This is a branch of computer science concerned with making computers behave like humans. It uses high level languages such as LISP AND Prolog.

Examples of Al  
Games playing: Programming computers to play games such as chess and checkers.   
Expert systems: Programming computers to make decisions in real life situations e.g. those that help diagnose diseases.   
Natural language: Programming computers to understand natural languages. Some translation systems exist but not as good as human translation.   
Neural networks: Systems that simulate intelligence by attempting to reproduce the types of physical connections that occur in animal brains.   
Voice recognition: Systems can convert spoken sound into, words but they do not understand what they are writing.   
Robotics: Programming computers to see, hear and react to other sensory stimuli. Application of Al   
Al is used in medical diagnosis, stock trading, robotic control, law, scientific discovery and toys, finance, etc.   
Finance: Used to organize operations, invest in stock and manage properties.   
Medicine: In the medical field, Al is used in the following:

* Image recognition and interpretation where many medical images can now be automatically interpreted from x-ray.
* Generating alerts and reminders on expert systems attached to a monitor can warn on patients’ conditions.
* Diagnostic assistance especially if the person making the diagnosis is inexperienced.
* Artificial neural works are used as clinical decision support systems for medical diagnosis.
* Make staff rotation
* Organize the bed schedule

Heavy industry: - Robots are considered for jobs which dangerous for humans. e.g.

* Robots are used in repetitive jobs which may lead to mistakes or accidents due to mistakes or accidents clue to lapse in concentration.
* On-line and telephone customer service
* Answering machines of call centers use speech recognition to allow computers handle 1st level customer support.
* Automated on-line assistant providing customer service.
* Transportation: Fuzzy logic controllers have been developed for automatic gear boxes in automobiles.
* Aviation: - Air plane simulators are using Al in order to process the data taken from simulated flights.
* Simulated aircraft warfare: computers are able to come up with the best success scenarios in these situations.  
  Pilots can be given assistance in the air during combat by computers. Al programs can sort information.
* Computer simulated pilots can be used to simulate data.
* Computer simulated pilots can also be used to train future aircraft controllers.

PROBLEMS TO WHICH Al METHODS ARE APPLIED   
1. Optical character recognition: Is the electronic/mechanical translation of scanned images of handwritten, type written or printed text into machine encoded text.

2. Handwriting recognition is the ability of a computer to receive and interpreted   
intelligible handwritten input from sources like paper documents, photographs, touch screens, etc.   
3. Speech recognition/automatic/computer speech recognition: converts spoken words into text.   
4. Face recognition: identifying a person from a digital image or a video frame from a video source.   
5. Virtual reality (VR): Like the situation in imaginary worlds.   
6. Image processing: Here the input is an image e.g. a photograph or video frame.   
7. Computer/machine vision: This is science and technology of machines that see/extract information from an image to solve a task e.g. count bottles speeding up on a production line.   
8. Pattern recognition: Is the assignment of some sort of output value to a given input value according to some specific algorithm e.g. determining whether a given e-mail is ‘spam’ or non-spam.

Advantages of Al

* Machines take of complex and stressful work which would be performed by humans.
* Machines can complete tasks faster than humans
* Robotics discover unexplored landscapes and outer space
* Less danger, injury and stress to humans as machines do work.
* It aids mentally, visually and hearing impaired individuals
* It is used for games — you do not feel as if you are with the machine
* Understanding complex software is made easy.
* Machines make less errors and defects
* Using Al minimizes time and resources

Disadvantages of Al

* The ability to replace human jobs has created un employment
* Machines lack human touch. Human qualities are sometimes ignored e.g. caring behavior of hospital nurses
* Al can malfunction and do the opposite
* Al may corrupt young generation
* It can be used to cause mass scale destruction
* Unemployed people will be mentally depressed, in poverty and increase crime in society.
* Human beings are deprived of their work life and left with empty time
* Intelligent machines may not be the right choice for customer service
* Machines can’t be humans; we may make them think but can’t feel
* Machines may enslave human beings and start ruling the world. This means Al can take over human intellect.
* Intelligent machines won’t work whole heartedly because they don’t have a heart.
* Intelligent machines won’t be able to work for long hours without total dedication

DIGITAL FORENSICS   
This is a branch of emerging technologies that involves the recovery and investigation of material found in digital devices, often in relation to computer crime.

Digital forensic process   
This investigation commonly consists of 3 stages:   
1. Acquisition stage: This involves creating forensic duplicate of the media often using a write blocking device to prevent modification of the original.   
2. Analysis stage: In this stage, an investigator covers evidence material using a number of different methodologies and tools. Common methodologies include keyword searches across diRital media recovering deleted files and extraction of registry informatione.g. to list user accounts or attached USB devices. The evidence recovered is analyzed to reconstruct events or actions and to reach conclusions.   
3. Reporting: When an investigation is complete, the data is represented, usually in the form of written report in lay person’s term.

Branches of digital forensics  
1. Computer forensics: These explain the current state of a digital artifact *(by people);* such as a computer system, storage medium or electronic document. These deal with things like internet history, actual files on the drive.

Application (advantages) of computer forensics

* Investigate and uncover evidence of illegal activities conducted via computer such as credit card fraud, intellectual property theft and hacking.
* Investigate and uncover evidence of crimes that were not directly committed via computer but for which the accused might have stored evidence on computer data storage devices.
* Detect and close computer security holes through ‘legal’ hacking.

NB: Cyber cops/cyber investigators/digital detectives are computer forensic experts.

Disadvantages of computer forensics

* Privacy concerns: The clients’ privacy is compromised since its sometimes impossible to maintain secrecy of data and information especially if its needed as evidence to crime courts of law.
* Data corruption: Sometimes the investigator can alter the original data in the process of attempting to acquire it or it can even be lost. Even in analysis, the data can be modified.
* Costs: costs may be high for computer analysis tools, software and security.
* Some data may be encrypted so it needs a lot to decrypt it.
* Some malicious programs may be introduced in the computer systems which may corrupt data at a later stage. A virus may be released during analysis.
* Physically extracted and relevant evidence may be destroyed or lost. Therefore the computer forensic team is responsible for the custody of data.

2. Mobile device forensics: This is a sub branch of digital forensics relating to discovery of digital evidence or data from a mobile device. Unlike the computer forensics, this one has an in-built communication system and usually a storage mechanism. Here investigations focus on simple data such as a call data and communications

(SMS/email) rather than in-depth recovery and related data. Mobile devices are also   
useful for providing location information.   
3. Network forensics: This is concerned with the monitoring and analysis of computer network traffic both local and WAN/Internet for purposes of information gathering, evidence collection or intrusion detection.   
4. Database forensics: Database forensics is a branch of digital forensics relating to the basic study of databases and their metadata (information about the web page that is currently on). Investigations use database contents, log files and in-RAM data to build a time line or recover relevant information.

EXPERT SYSTEMS   
(INTELLIGENT KNOWLEDGE BASED SYSTEMS (IKBS/KBS)   
It is an application of artificial intelligence where traditional human expert knowledge and experience are made available through a computer package.

Components of expert systems   
Knowledge base: This is a representation of the expertise   
Working storage: The data which is specific to a problem being solved.   
Inference engine: The code at the system which derives recommendations from the knowledge.   
User interface: The code that controls the dialog between the user and the system.

Advantages of expert systems

* They don’t forget as human experts do.
* Many copies of an expert system can be made but training new human experts is expensive time consuming.
* They can increase output and decrease personnel costs.
* They are not expensive to maintain though expensive to build.
* An expert system can review all the transactions whereas a human expert can only review a sample.   
  Errors arid fraud can be prevented.
* Cost savings i.e. wages, elimination of a room full of clerks also minimize losses and loans.

Disadvantages of expert systems

* Machines do not use common sense.
* No creativity; expert systems are not creative.
* Expert systems automatically adapt to changing environment but do not learn.

CAREERS IN COMPUTER AND COMPUTING

Today, the growing role of computers on our lives has resulted in many new jobs and careers. These include; secretary, teachers/Instructors, computer programmers, computer analysts, hardware engineer / technician, Data communications manager, data entry clerk, computer designers, information systems manager, systems development manager, Information administrator, information center manager, Database administrator,   
People trained in the ICT industry are bound to do the following jobs:   
1. Networking or System Administrator: computer networking careers involve designing, setting up and maintaining a network.   
2. Programmer and software developer: This requires the development and maintenance of a software program. It requires understanding a programming language.   
3. Hardware specialist: This requires a hardware designer, circuit design, firmware e.t.c. It requires you to design and create a complete hardware package or portions of the hardware device.   
4. Repair andfix specialist: It requires you to fix and repair computer and computer equipment. It involves removing a component from within the computer replacing it with a good component.   
5. Web designer/web master: It requires a person to create, maintain or completely design a web page.

6. Database developer: Creates and implements databases, maintaining and updating   
them. It needs training in hardware and software systems and programming languages.   
7. Data entry: This requires one to take information from a hard copy or other source and enter it into an electronic format.   
8. 3D Animation *or* graphic design specialist: This one designs and creates either a graphic or 3D animations for software programs, games, movies, web pages etc. Also work on existing graphics, animations, movies etc. done by other people.   
9. System analyst or tester, Quality Assurance (QA): This requires that the employee test out all the features of a product for problems or usability issues.   
10. Electronic technician or engineer: It requires assembling, testing and repairing electronic equipment.   
11. Technical support (Technician or help desk): It requires helping an end user or company employee with their computers, software programs and hardware device.

COMPUTER MAINTENANCE   
This refers to caring, catering of a computer with a purpose of preserving, keeping it in good working order and to prevent any damage.

TYPES OF MAINTENANCE

* Hardware and software maintenance
* Preventive maintenance
* Routine/regular/frequent maintenance (it is time tabled e.g. weekly, monthly, annually)
* Prompted/unprompted maintenance (if there is problem)

IMPORTANCE OF COMPUTER MAINTENANCE

* To enable computer serve for a long time
* To enable a computer operate at its designed capacity
* To prevent a computer from total breakdown leading to loss of all information
* To reduce associated costs for repairing and risks
* To prevent/avoid abrupt/unscheduled breakdown of computers that can lead to loss of information

Factors to consider in computer maintenance

* Type of computer, manufacturer e.g. IBM compatible, Macintosh, Toshiba, tropix and processor speed e.g. Pentium I, II, Ill, IV.
* Tools to apply e.g. blower, liquids brushes, pliers etc.
* Type of problem, is it
* or software problem.
* Environment of the computer, office, school lab, public place etc.
* Operator/user, is it personal or shared computer.
* Whether the system is networked or not
* Type of software; operating system, type of packages (applications) it has.
* Type of room where the computer is kept; is it air conditioned or not.

DATA SECURITY AND CONTROL

Data security is the protection of programs and data in computers and communication systems against unauthorized modifications, destruction, disclosure or transfer, whether accidental or intentional.   
Data control is the variation measures taken to enforce the security of the programs and data. Data can be lost in various ways such as viruses, user errors, computer crashes, hacking etc.

COM PUTER SECURITY   
Computer security is concerned with taking care of hardware, software and data. Loss of data can have various consequences which may include the following:

* Bad business decision
* Loss of good will from customers
* Cash flow problems
* Adverse publicity from the press
* Late delivery of goods
* Failure to receive payments

Physical security  
Computer equipment and its data need to be protected from physical harm. These include natural ones such as fire, lightening, water damage, theft, etc.

Protection from fires

* Fire proof doors
* Use smoke detectors
* Use gas folding systems used in large computer installations.

Protection from dust and extremes of temperature

* Air conditioning is important whereby temperature and humidity must be controlled
* True air must be pure and filtered

Computer theft

* There are many ways of making sure that unauthorized people are denied access to the system through use of keyboard locks and passwords. It is more difficult to prevent a thief from icking up a system and stealing it.
* Burglar proof doors and windows should be put on computer laboratories.
* Locks alarmed on circuit board and tags are methods of hardware protection.

Preventing theft

* Note the serial numbers of computers and peripherals
* Lock the computers in case and keys should safely be saved
* Data should be backed up regularly
* All staff should be aware of computer security
* All staff should wear security budges that contain their photographs to identify them

Software security   
Data is a vital part of a computer and so it suffers from a number of risks. Such risks include:

* Accidental loss of data
* Accidental damage or corruption
* Theft
* Deliberate damage or corruption
* Authorized disclosure

To guard against these risks, ensure the following:

* Make backup of copies regularly. Before backing up, make sure that the data is virus free to avoid making a backup of corrupted data.
* Minimize the number of visitors to your computer installation and do not allow anyone to use the server except the network administrator.
* Avoid diskettes coming from different installations as your system might contract viruses.
* If you have unwanted printouts, destroy them because data is not supposed to fall in hands of unauthorized hands.
* Save data regularly as an abrupt power cut off may corrupt your data if you have no UPS.