**COMPUTER STUDIES**

**INTRODUCTION TO COMPUTERS**

**Computer Studies** refers to a subject which deals with the features of computers, ways and methods of using computers so as to provide a basis for understanding the impact of computers on individuals, organizations and the society.

**What is a computer?**

**A computer is** an electronic device that accepts user input, processes it under special instructions, to produce the desired meaningful output.

**Alternatively, a computer can be defined as** a programmable machine that receives input, stores and manipulates data, and provides output in a useful format.

**REASONS FOR STUDYING COMPUTERS**

1. To acquire creative skills for problem solving
2. We study computers in order to pass examinations
3. To acquire knowledge as a foundation for further studies in the computing field
4. To acquire general knowledge and skills in the use of a computer and related technologies.
5. To use the knowledge acquired in computer studies to other fields like Banking, Education etc.
6. To exhibit basic computer skills for employment.
7. To acquire knowledge as a foundation for further studies in computer technology.

**INFORMATION PROCESSING CYCLE**

This refers to the sequence of operations used to transform data into information.

**OR** is a series of activities that take place in transforming data into information

**There are four stages i.e**

1. Input stage
2. Processing stage
3. Storage stage
4. Output stage

**An illustration showing the information processing cycle**

1 2 4

Data Information

Input

Output

Processing

1

Storage

3

**1) Input- (entering data into the computer).** Data is entered into the computer using input devices e.g. a keyboard, mouse, scanner

**2) Processing (performing operation on the data).**

Input data is then manipulated/ changed into useable information by processing devices e.g. the CPU( Central Processing Unit)

**3) Storage operation (saving data, programs or output for future use).** Processed or unprocessed data is then stored/ kept on storage devices for future reference using storage devices e.g. RAM( Random Access Memory), Hard disk.

**4) Output operation (presenting the results).** Processed data is then transmitted into a user sensible form using output devices such as monitor, printer, speakers etc.

**Advantages of using a computer system for information processing**

**i)** Can process large amount of data

ii) Very high level of degree of accuracy

iii) Easy sharing of data

**Main Characteristics of modern computers**

**1. They are Speedy**Computers operate at extremely high speeds. Their speed is measured in millions of instructions per second (MIPS) and Gigahertz (GHz).

**2. They are Automatic (Spontaneous)**The computers are automatic. They do not need any supervision in order to do tasks when instructed.

**3. They are Accuracy**Computers are very accurate. The errors in made computing are due to the users but not technological weakness. If a user enters wrong data, the computer gives wrong Information. This trend is described as GIGO (Garbage In, Garbage Out)

**4. Computers are versatile:**Modern Computers can perform different kinds of tasks at the same time. For example you can play music while typing a document at the same time.

**This is also known as multi-tasking.**

**5. Diligence (Endurance)**Computers have the ability to perform the same task for a long time without getting tired.

This is because a computer is a machine, and so does not have human behaviors of tiredness and lack of concentration.

For example, Computers which are used for controlling the satellites.

**6. Adaptability:** Modern Computers can be adapted to comply with different settings and environments.

For example, they can be used as personal computers, for home use, banking, communication, entertainment, weather forecasting, space explorations, teaching, railways, medicine etc.

**7. Need User input**Computers cannot initiate themselves and make the decisions. They need instructions from users to enhance the process. After all, a computer is only a machine.

**8. Artificial intelligence**Computers are artificially intelligent. i.e They can be programmed to assume capabilities such as learning, reasoning, adaptation, and self-correction.

For example computers can respond as if they were thinking by playing chess, recognize handwriting and speech.

**NB.** However, the computers themselves cannot think. The artificial intelligence is only supported by the power of the programs installed in them.

**9. Storage**For a computer to be able to work, it must have some form of work space where data is stored before being processed. All information is stored on a hard disk or in the Random Access Memory (RAM).

**10. Reduction of cost**Computer is a short term investment in order to achieve a long term gain.

Though the investment is high, they reduce the cost in the long run. They reduce man power and lead to a neat and efficient way for solving various tasks.

**Terminologies and basic concepts**

**1. Data**This refers to the raw facts and figures, which are entered into the computer by the user in a form suitable for processing.

Data may consist of characters, symbols, sounds and graphics, videos e.t.c.

**Examples of data include;**

* Letters e.g. a, y, o, b etc.
* Student's marks

**2. Information**It refers to the processed data that makes meaning and is useful.

**Examples of information**

* A word, sentences, phrases e.g. a boy, school etc.
* A students report

**Characteristics of good information**

* It is relevant to its purpose
* It is accurate and comprehensive
* It is obtained from a reliable source
* It is communicated to the right people
* It is understood by the users

**3. Information and communication Technology (ICT)**It is the branch of engineering that deals with the use of computers and telecommunications to retrieve, store and transmit information.

**4. The term information technology (IT**) is used to describe the use of computers in business, education and everyday life.

**5. Data entry**It is the act of in putting data into the computer. This is done by the help of input devices like keyboard, mouse etc.

**6. Byte**A byte is a unit of computer memory or digital information that consists of eight binary digits (bits).  
NB. 1 byte stores 1 character.

**7. Binary**The number system used to represent digital information in computers where data is expressed by combinations of the digits 0 and 1, corresponding to power states "off" and "on" respectively.

**8. Computer Memory**This acts as a store for digital Data, processed information and programs in a computer system.

**9. RAM** (Random Access Memory) is temporary and volatile working memory that contains all the work in progress, since the user last saved to disk.

NB: RAM changes constantly as the computer is used for different tasks and is lost when the computer is switched off.

**10. Computer Literacy** is the ability to use computers and related technology efficiently, with a range of skills covering levels from, elementary use to programming and advanced problem solving

**OR computer literacy** is having the knowledge and understanding of computers and their uses.

**11) Transfer rate** is the time required to transfer data or read from main memory (RAM)

**Or** is the time required to write data on the disk from the main memory.

12) **Storage capacity** is the total amount of data or information that the storage device can hold.

13) **Device driver** is a program that controls a particular type of device that is attached to a computer system

**EVOLUTION OF COMPUTERS**

The word Evolution comes from the Latin word, ‘ēvolvō’ which literally means; to ‘unroll’, or to ‘unfold’.

**Evolution of computers** refers to the historical developments through which computers and technology have passed, from the time they started to exist in ancient forms to their current state.

**OR. Evolution of computers** refers to the gradual development in the technology of computers from a simple to a more complex form.

**To trace the origin and explain evolution of computers:**

* + Origin of Computing
  + Mechanical era
  + Electro-mechanical era
  + Electronic era (including Computer Generations)

**a) Origin of Computing (Counting and Calculating using devices)**

The origin of computing started with the early man who used fingers, stones, sticks, marks on walls, sand, e.t.c.

**NB The word ‘compute’ was derived from two Latin words; ‘*com’*, which means ‘together’ and ‘*putare’*, which may means ‘add, calculate, count, or estimate’.**

**Examples of ancient counting and calculating devices**

i) The abacus, ii)Napier’s bones iii) the Slide rule.

**i). The Abacus (3000 BC)**

The abacus is believed to be the first computer device. It was developed in 3000 BC by Chinese (about 5000 years ago).

The abacus helps people keep track of numbers as they do the computing. It is quick but has no storage capabilities.

**ii). Napier’s bones (1617)**

John Napier was a Scottish mathematician and inventor. **Napier is famous for creating the decimal point. In 1617**, the last year of his life, Napier invented a tool called **“Napier's Bones”.**

Napier's bones was multiplication tables written on strips of bones, ivory, silver, or wood. The invention was used for simplifying multiplication, division, and taking square roots and cube roots.

**iii). William Oughtred’s Slide rule**

In 1622, William Oughtred created the slide rule which originally circular and was based on logarithms. It was the primary calculator for engineers throughout the 19th and early 20th centuries.

**b) The Mechanical Computers era (1642 - 1890)**

Before 1642, all computations were done by humans.

Manual devices used then could just aid the users to keep track of numbers as they did the computing.

In the Mechanical Era (Period) however, machines with gears work did the computations.

**The popular mechanical developments of computers in this period include:**

* + Blaise Pascal's Calculator (1642),
  + Leibniz’s Stepped Reckoner (1694),
  + Jacquard’s Loom (1801), and
  + Charles Babbage’s Analytical & Difference Engine (1834).

**NB: This era also saw the development of the world's first computer programmer Ada Byron Lovelace (1815-1852)**

**i) Blaise Pascal's Calculator (1642)**

Pascal, Blaise (1623-62), was a French philosopher, mathematician and physicist.

In 1642, at the age of 18, he invented the first **mechanical calculator** to speed arithmetic calculations for his father, a tax official.

**i) Blaise Pascal's Calculator (1642)**

Numbers were dialed in on the metal wheels on the front of the calculator.

The solutions appear in the little windows along the top.

**(ii) Leibniz’s Stepped Reckoner (1694)**

The Stepped Reckoner was a digital mechanical calculator invented by German mathematician Gottfried Wilhelm Leibniz around 1672 and completed in 1694.

It was the first calculator that could perform all four arithmetic operations: addition, subtraction, multiplication and division.

Its complex gear work, however, was a bit beyond the manufacturing technology of the time;

Mechanical problems, in addition to design defects in the carry mechanism, prevented the machines from working reliably.

**(iii) Jacquard’s Loom (1801)**

In 1801, Joseph Marie Jacquard (1752-1834) of France made the first successful automatic draw loom by means of a series of instructions given to the threads by a punched card system.

The loom could produce complex patterns and pictures in silk and other materials.

By 1812, the punched card device was attached to 18,000 looms in Lyons.

**(iv) Charles Babbage’s Analytical & Difference Engine (1834)** The concept of today's computers (Input - Process - Output) was first visualized by Charles Babbage in 1834 in England. **He is therefore regarded as the father of computers.** His idea for the Analytical Engine consisted of 4 parts: an input device, a mill (processing unit), a storage device, and an output device.

**The First Computer Programmer**

Ada Byron Lovelace (1815-1852) was the world's first computer programmer.

In 1842, Ada was asked to write a scientific interpretation of the Analytical Engine and its operations.

These extensive writings on the Analytical Engine later became known as the first explanation of computer programming.

A computer language, *Ada*, was later named after her by the Ada Joint Program Office in 1964

**(c)The Electro-mechanical Computers Era (1890 - 1946)**

**The popular developments of computers in the Electro- mechanical era**

1. Hollerith's tabulating machine (1890)
2. Howard Aiken’s Harvard Mark I (1944)
3. Program “debugging”

**(i) Hollerith's tabulating machine (1890)**

Herman Hollerith (1860 –1929) was an American statistician who developed a mechanical tabulator based on punched cards to rapidly tabulate statistics from millions of pieces of data.

**He decided to use punched cards to represent the data gathered for the USA population census of 1890**, and to read and collate this data using an automatic machine.

Hollerith’s machine used a set of spring loaded wires suspended over the punched card reader.

When the wires were pressed onto the card, punched holes allowed wires to complete electric circuits.

The cards were coded for age, state of residence, gender, and other information

The census results were ".. finished months ahead of schedule and far under budget".

**ii) Howard Aiken’s Harvard Mark I (1944)**

While a professor of Physics at Harvard University, Howard Aiken, was supported by IBM to build an electro-mechanical computer which began computations for the U.S. Navy Bureau of Ships.

The computer was called the Automatic Sequence Controlled Calculator – (ASCC) by IBM but Aiken renamed it the Mark I

**The First Computer Debugger**

Dr. Grace Murray Hopper was a lady in the U.S. Navy Bureau of Ships, who worked with Howard Aiken from 1944 and used his machine for gunnery and ballistics calculation

One day, the program she was running gave incorrect results and, upon examination, a bug (moth) was found blocking one of the relays.

The bug was removed and the program performed to perfection. Since then, **a program error in a computer is known as a bug.**

**Debugging** is a process of finding and correcting errors, in a computer program or a piece of electronic hardware.

**Electronic era (1946 - Today) including The Computer Generations**

Application of mechanical gears in Computers stopped in the Electro-mechanical era.

Computer evolution since 1946 has been categorized into five generations.

Each generation had a major characteristic development (commonly referred to as Hallmark) and distinct characteristics in terms of Physical setup, Technology, Software, and Set-backs of the computers.

**COMPUTER GENERATION**

This refers to various stages that took place in the development of computer technology and size and each stage being more advanced than the previous one**.**

**THE FIRST GENERATION (1946 – 1958): VACUUM TUBES**

**Characteristics**

* The computers used vacuum tubes.
* First generation computers were very large
* They used punched cards and paper tape for input.
* They used magnetic drums for memory.
* They used binary number system..
* First generation computers used machine language, the lowest-level programming language understood by computers.
* They broke down frequently (Required standby technicians)
* Needed very many people to operate due to their huge size.
* They produced a lot of heat and burned out.
* They consumed a lot of power
* They produced a lot of noise.
* They had limited primary memory, and so they were very slow.
* They were very expensive to buy setup and maintain.
* Air conditioning required

**Examples of first generation computers:**

1. **ENIAC** - Electronic Numerical Integrator and Computer (1946) was the first electronic digital computer. It had over 18,000 vacuum tubes.
2. **EDVAC** - Electronic Discrete Variable Automatic computer (1947) was built for the U.S. Army's Ballistics Research Laboratory
3. **The UNIVAC (1951**) (Universal Automatic Computer) was the first general-purpose electronic digital computer designed for commercial use.

**THE SECOND GENERATION (1958 – 1964): TRANSISTORS**

**Characteristics**

* They relied on transistor technology
* They still used punched cards for input and printouts for output
* Memory size expanded to approximately 32 kilobytes
* The computers increased in processing speed and reliability - Speed was about 30,000 instructions per second
* Transistors consumed less power as compared to vacuum tubes
* Memory moved from a magnetic drum to magnetic core technology, in which Hard disk storage was now available.
* Second generation computers used assembly and high level programming languages such as FORTRAN (FORmula TRANslator) which allowed programmers to specify instructions in words.
* They produced less noise but their cost was still very expensive.
* High level of training was required before use.
* Transistors gave much heat that could damage other components.
* The computers could still run only one application program at a time (Multi-tasking was not possible)
* Air-conditioning was required.
* Manual assembly of individual components into a functioning unit was required.

**Examples of second generation computers:**

1. IBM 305 RAMAC.(1956), was the first commercial computer that used a moving head hard disk drive (magnetic disk storage) for secondary storage. RAMAC stood for "Random Access Method of Accounting and Control".
2. The IBM 1401, - was a variable word length decimal computer that was announced by IBM on October 5, 1959
3. The CDC 6600 was a mainframe computer from Control Data Corporation, first delivered in 1964. It remained the world's fastest computer from 1964–1965.
4. Integrated Circuits. An integrated circuit (IC) was just a combination of thousands of transistors and tiny wires onto a small "chip" made of semi-conductor material such as silicon.

**THIRD GENERATION COMPUTERS:**

**Characteristics**

* The computers extremely reduced in size due to fabrication of various circuit elements in a single chip.
* As a result, the computer could now fit onto a desk and the monitor became the largest visible part of the computer.
* The keyboards and monitors replaced punched cards for input and output.
* Magnetic hard disks were developed for storage purposes
* Memory size expanded to approximately 2 megabytes of RAM
* The computers became more reliable because of elimination of soldered joints and need for fewer inter-connections.
* Speed increased to 5 million instructions per second
* Integrated Circuits consumed a lower electric power.
* The noise produced by the computers reduced drastically.
* Simple programming languages like BASIC were introduced.
* Multi-tasking was now possible.
* They required Air-conditioning in many cases due to the heat produced.
* Quite delicate in handling as these cannot withstand rough handling or excessive heat

**Examples of third generation computers:**

* Popular developments in the third generation include:
* The PDP-8 was the first commercially successful minicomputer. It sold more than 50,000 systems for $18,000.
* The HP-2115 which was made by Hewlett-Packard (HP)
* Fast minicomputers such as IBM 360 series and ICL 19000 series

**The third generation (1965 – 1970): Integrated Circuits**

**Characteristics**

* Another very good development that came up in this generation (1969) was The Advanced Research Projects Agency Network (ARPANET),the world's first operational packet switching network
* The ARPANET is the core network of a set that came to become the global Internet.
* The network was created by a small research team at the United States Department of Defense.

**THE FOURTH GENERATION (1971 – TO DATE): MICROPROCESSORS.**

**Characteristics**

* Invention of the microprocessor was made by a team at Intel Corporation.
* Microprocessors are VLSI devices.
* Very-Large-Scale Integration (VLSI) is the process of creating integrated circuits by combining thousands of transistors into a single chip.
* The fourth generation computers saw the development of the mouse and handheld input devices.
* The Fourth generation computers were more powerful, they could be linked together to form networks.
* A vast variety of Storage memory media used such as Floppy disks (1971),Optical Compact Discs(1982), USB flash drive disks(2000), etc.
* Memory size progressively expanded up to more than 8 Gigabytes of RAM
* There has been development of extremely fast computers referred to as super computers with speeds over 100 million instructions per second.
* Merging of Telecommunication and Computing Technology.
* Development of Laptop and Palmtop computers which were portable and suitable for mobile business**.**
* Operating systems based on the Graphical User Interface (GUI) were developed.
* A GUI is a user Interface in with visual images such as icons and buttons are used to issue commands.
* Microsoft Windows 1.0 was released by Bill Gates’ Microsoft Corporation on November 20, 1985
* Operations at low voltage as microprocessors function at fairly low voltage.
* Quite delicate in handling as these cannot withstand rough handling or excessive heat

**Examples The fourth generation computers**

* The Xerox Alto (1973) was the first computer to use a GUI.
* The IBM 5100, portable computer that appeared in September 1975.
* The Apple Macintosh (1984 ), was a mouse-driven computer at a much cheaper price**.**

**THE FIFTH GENERATION (TODAY TO FUTURE):   
Artificial Intelligence and Robotics.**

**Artificial intelligence** (AI) is the ability of machines to have human capabilities, such as the five senses (to see, hear, feel, taste, smell), plus, understanding, communication, reasoning, learning, learning from past experiences, planning, and problem solving.

In future, computers are to be applicable in almost every imaginable place at home, office, factory, church, etc.

**Characteristics**

* The physical size of computers in this generation can be customized to any shape of interest be it as small as a pen or in the shape of a human being.
* There is use of coordinated parallel processing; where computers have many microprocessors being used side by side.
* We shall see the development of many gadgets like remote control and optical input devices.
* Secondary Storage Hard disk drives which can store Terabytes of Data.
* RAM will continue to increase to 8GB, 16GB, 32GB, 64GB,128GB e.t.c.
* The computers to become 99% reliable.
* More development of Notebook and Mobile computers which can store power for a long time, hence becoming too mobile.
* More networking containing millions of interconnected 4th Generation computers**.**
* Fifth-generation programming languages (5GLs) will be used. Visual Basic is an example of a 5GL
* There will be a wide variety of computer Operating Systems and Application programs designed to solve specific tasks in a user-friendly manner**.**
* Computer Obsession and addiction is seriously spoiling the writing and thinking abilities of human beings.
* Computer Crime such as hacking and online theft is on the rise due to misuse of 5th Generation computer technology.
* Robotics in the fifth generation will cause unemployment as machines take on the jobs people could do.

**Examples of fifth generation computers:**

* TOSY Ping Pong Playing Robot (2007) is a humanoid robot designed to play table tennis against a human being.
* Hospital Robots are becoming more useful to hospital staff; from supporting surgeons to paying bedside visits to patients.
* The iPad (2010) is a tablet computer designed and marketed by Apple Inc., with a flat touch screen. It is primarily operated by touching the screen rather than using a physical keyboard.

**CATEGORIES OF COMPUTERS**

Computers can be categorized according to the process they use to represent data.

**Computer categories are basically three:**

1. Digital computers 2. Analog computers 3 .Hybrid computers

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

It generally deals with physical variables such as temperature, weight, voltage, pressure, speed, etc. The results given by the analog computers are approximate since they deal with quantities that vary continuously.

**Examples of Analog computers**

1. Thermometers 4) Anemometer,
2. Hygrometer 5) Voltmeters Ammeters 7) Speedometers
3. Barometers 6) Traditional automatic watches

**Characteristics of Analog Computers**

They operate by measuring physical quantities like, speed, temperature, humidity, distance

1. They are big in size
2. They are less accurate and may give inconsistent results with the same input values
3. They are interfered by background noise
4. They are generally slow
5. They are expensive
6. Data degrades over time during transmission
7. They store data internally and temporarily
8. Analog computers are commonly used for scientific applications

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

The binary digits simply mean the presence or absence of an electric pulse/ voltage.

The state of being on is represented by 1 and off is represented by 0.

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

**Examples of Digital Computers Include**

* Laptops, Digital Watches Desktop computers
* Mobile phones, Calculators, Digital cameras

**Characteristics of Digital Computers**

1. They use binary codes to manipulate and store data
2. They are not interfered by background noise
3. They are generally fast
4. They are cheap
5. Data does not degrade over time during transmission
6. They are small in size
7. They are very accurate and consistent in their results
8. They store data permanently both internally and externally

**Hybrid Computers.** These are computers having the combined features of both the digital and analog computers. A hybrid computer accepts analog signals and converts them to digital for processing.

It is mostly used for automatic operations of complicated physical processes and machines. They are mostly used in scientific research

**Examples of Hybrid computers**

* Digital petrol pumps are an example of hybrid computers.

**CLASSIFICATION OF COMPUTERS**

**A. Classify computers by size**

Super Computers Mainframes, Mini Computers and Micro Computers

**b. Classify computers by purpose**

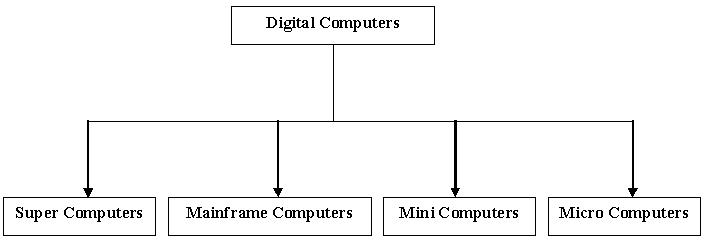
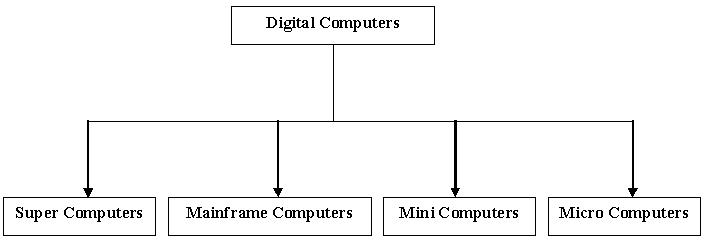
**C. Classify computers by the functions they perform**

i) Stand-alone ii) Networked iii) Real-time Systems Integrated Systems

**CLASSIFICATION COMPUTERS BY SIZE/ CAPACITY**

According to size or capacity, we base on the physical size and the number of people the computers can accommodate at the same time.

Digital computers can be grouped into four classes as follows



**Super Computers**

A super computer is the fastest, most powerful, and most expensive computer used for applications that require complex and sophisticated mathematical calculations. These computers can process billions of instructions per second.

**Typical tasks carried out by super computers include;** weather forecasting, space exploratory projects, managing nuclear stations, scientific research, scientific computation, petroleum exploration, worldwide weather forecasting and weapons research

**Characteristics of Super Computers**

1. They are approximately 50,000 times faster than micro computers
2. Their memory is very huge and they are the most expensive
3. They can handle large volumes of scientific computations
4. They are sensitive to changes in, temperature, humidity and dust. Hence, they are housed in a special room.

**MAINFRAME COMPUTERS**

These are powerful computers used mainly by large organizations for bulk data processing such as census, and financial transaction processing. **They are also called central processors** because they process data centrally.

These computers are used in places where processing needs to be done in bulk such as banks, insurance companies

Users typically access a mainframe via a personal computer or a terminal.

**Characteristics of Mainframes**

1. They have a large memory size
2. They support a wide range of peripherals
3. They have a high rate of data transfer between the processor and the peripherals
4. They support 500 to 1000 users at the same time
5. They are sensitive to changes in, temperature, humidity and dust. Hence, they are housed in a special room.

**What are Dumb Terminals?** Dumb terminals are display and input devices which don't process data, instead they transmit input to a computer to which it is connected and display the resulting output.

**Mini Computers** A minicomputer is a class of multi-user computers that lies in the middle range between mainframe computers and the smallest single-user systems (microcomputers or personal computers).

**Examples include; DECS VAX range and IBM AS400 range.**

**Characteristics of Mini Computers**

1. They are physically bigger than microcomputers but smaller than the mainframe
2. They can support a moderate range of peripheral
3. They are more powerful than Microcomputers
4. They can support 50 to 500 users at a time depending on the model
5. They have a low rate of data transfer between the processor and the peripherals

**Micro computers**

A microcomputer is a computer that can perform the: input, processing, output and storage activities by itself. They are small and the most commonly used in the world today. All the system resources like: monitor, mouse, keyboard, system unit, are allocated to a single user at a time.

**The types of microcomputers**

* Workstations and Personal computer (PCs)

**Personal Computers** These are small computers, which are portable and can fit on a desk. **Examples of personal computers include;**

*Desktop, tower, laptop and palmtop computers*

1. **Desktop computers;** these are designed to be stationed at one place like: on top of the desk or table. They are standard PCs where by the monitor is placed on top of the system unit.
2. **Laptop computer;** It is a portable PC, small enough to fit on the lap. It is also known as a notebook computer. It has a rechargeable battery, making it usable even without power and during travelling
3. **Palmtops;** they are small and portable computers that can fit in the palm of the user. They are also referred to as personal digital assistants (PDAs). Modern PDAs have been integrated with cellular phones.
4. **Tower model computers;** these have a tall and narrow system unit that can be placed adjacent to the monitor or on the floor

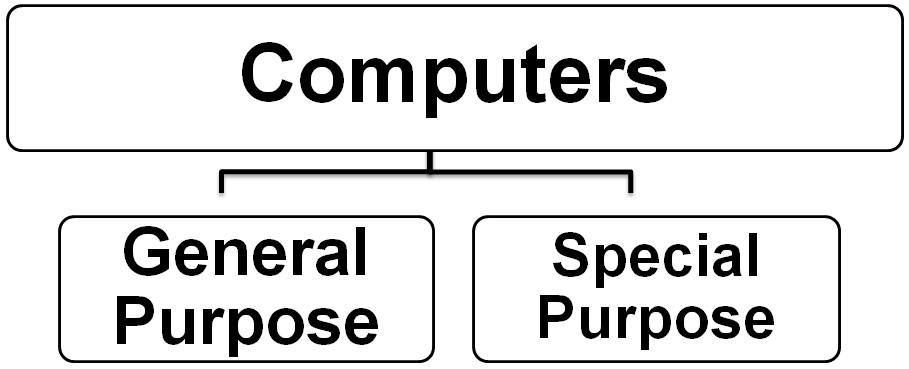
**WORKSTATIONS**

Workstations look like Desktop computers but they are far more powerful. They are used for Computer Aided Design and Manufacturing, software development and scientific modeling.

**CLASSIFICATION OF COMPUTERS BY PURPOSE**

According to Purpose, we base on the variety of problems that a computer can help to solve.

Computers can be grouped into two classes as follows



**Special Purpose Computers** A special purpose computer is designed to operate on a restricted type of problems.

**Examples of Special Purpose Computers**

1) Automatic Teller Machines (ATM) 2) Pocket calculators 3) Computers that operate lifts.

They have instructions permanently stored in them to perform the given task quickly and efficiently.

They are commonly referred to as "dedicated computers,”

**General Purpose Computers** General-Purpose Computers are designed to solve a wide range of problems.

**The tasks include**, analyzing results, making reports, reading data, managing databases, performing calculations, by means of different software programs they have

Most PCs (Desktops, laptops and palmtops) are general purpose.

**CLASSIFICATION COMPUTERS BY FUNCTION**

According to Function, we base on what computers do and how they do it.

We have four classifications of computers by function:

1. Networked 2. Stand-alone 3. Real-time Systems 4. Integrated Systems

**Networked computers** These are computers connected by channels to other computes so that they can communicate with each other and share resources like data, internet connection, printers, etc.

**Stand-alone computers** This is a computer that operates and does everything independently.

A photocopying machine is a stand-alone device because it does not require a computer, printer, modem, or other device.

A printer, on the other hand, is not a stand-alone device because it requires a computer to feed it data.

**Real-time systems** These are systems that respond to an event that has occurred within a certain specified time frame.

Real-time means that after an event has occurred, a system or application has to react to that event within a certain time period or deadline.

**For example**, computers for a banking system are real time systems.

**Integrated system** An integrated system is a group of interconnected units that form a functioning computer system.

An integrated system has separate programs that perform separate functions but they all contribute to the same output.

**Boeing Integrated Defense Computer System (1995)**

**CLASSIFICATION COMPUTERS BY PROCESSING POWER**

PCs can be classified by their microprocessor model name or number.

The leading processor chip manufacturers for personal computers are Intel, AMD, IBM, and Motorola.

**Examples of Microprocessors**

**The most common types of processor power are:-**

**a)** Pentium I, b) Pentium II, c) Pentium III, d) Pentium IV,

1. Pentium f) Duo core, g) Core 2 Quad,
2. Celeron, j) Celeron D, k) Xeon, l) Opteron, m) Athlon, n) Itanium

NB The unit for measuring the processing power is the Hertz.

**For example, Celeron processors’ speed ranges from 266MHz – 2.8 GHz.**

**A *COMPUTER SYSTEM***

**A *computer system*** is a set of interrelated computer components that work together to manage and process data into information.

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

**Elements of computer system**

A computer system is made of six elements**.** These include; People (users), Procedures, Data/information, Hardware, Software and Communications.

Failure of one of the system components may imply failure for the whole system.

**1) Computer Hardware**

Refers to the physical and tangible components of the computer system, like: mouse, keyboard, scanner, monitor, system unit, projector, and printer

**2) Computer software**

These are a series of programs (instructions) that tell the computer what and how to work.

Computer software can be grouped into System software and Application software

System software like the Operating system manages and coordinates all the computer resources and activities.

Application software like Games, Calculator and Media Player solve the specific or exact needs of the user.

**3) Human ware /Users**

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 of Computer 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.

**4) Data**

Data refers to raw facts and figures that are entered into the computer for processing.

**OR:** Data is anything in a form suitable for input into a computer for processing.

**Data can also be grouped into two:**

Unprocessed data Like Letters, digits and symbols (e.g., a, b, c, &, ...), Musical notes, etc.

Processed data (Information) Like a words (e.g boy), a mathematical formula, grades, a piece of music, a song etc

**5) Communication**

This is the transmission of data and information over a channel between two or more computers.

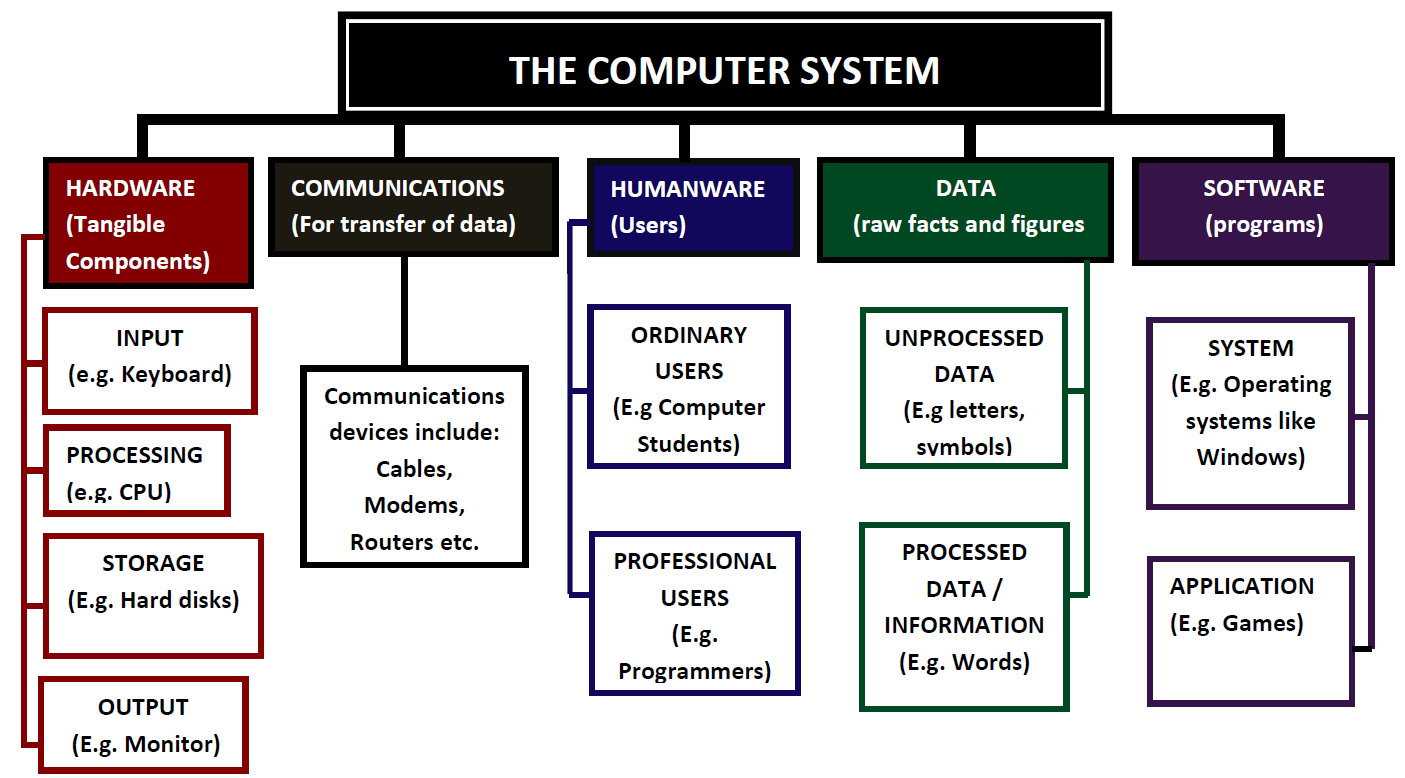
Computer communication allows sharing of hardware, software, data and human ware among computers in a network like the Internet.

Communications devices are used for enabling computer communication.

They include

1. Cables, 2) Switches, 3) Routers 4) Modems, etc

**Illustration**



**COMPUTER CARE AND SAFETY**

Computers, like any other piece of electronic equipment, need special care and attention in order to perform properly and safely.

**The computer laboratory Rules and Regulations**

1. Computer components should be kept dust free
2. Never try to remove the cover on your computer or touch inside the system unit
3. Keep all liquids and food items away from your computer
4. Never use your computer during a storm.
5. Physically, be careful; avoid knocking and dropping any hardware to the ground as this could cause any of the delicate components to break.
6. Proper shut down of computers should be followed to avoid disk and system failure
7. Be careful when using the internet. Do not accept downloads from Internet sites that you don't know and trust.
8. And never open an email attachment unless you know and trust the person who sent it.
9. Avoid making hardware connections to the motherboard when the computer is on. Eg keyboard, monitor and mouse connections.
10. Handle delicate storage devices with care. Don’t touch the inner surface of Compact disks and Floppy disks. Safely remove Flash disks from the system.
11. Always Sit upright to avoid muscle pains and back aches caused by poor sitting posture

**b)Management Of Computers And Their Environments**

1. Avoid direct sunlight and high temperatures that may damage hardware components
2. Always use surge protectors, Uninterruptible Power supply (UPS) or voltage stabilizers to ensure steady power supply to safeguard their system.
3. A computer room should have fire extinguishers of carbon dioxide but not water or powder
4. Proper cable installation and placement should be done
5. Burglar proofing avoid unauthorized access to computer room.
6. Fit strong locks, doors, windows and roofing. Security should be good around computer room to avoid thefts
7. Overcrowding of either machines or people should be avoided.
8. Always install lightening conductors to the computer laboratory to protect the machines and the users of the computers
9. Ventilation should be good. Good aeration enables the computer to cool and hence avoids overheating
10. Minimize Electrical noise / interferences in the computer environment.

**ELECTRICAL NOISE** refers to externally radiated signals that cause undesirable additions to the current voltage.

Electrical noise is commonly generated by devices like Fluorescent lights of high frequency, Motors, Battery Chargers, Inverters, Radios, television, and Cell phones.

11 A computer room should have enough light avoid eyestrain, and headaches

1. Radiation filter screens should be fitted to reduce the light that reaches the eye.

**Controlling computer related health hazards**

* Use of anti-glare in front of the monitor to cut down on screen reflections that can tire the eyes
* Look away from the monitor at a regular intervals and refocus on distant or loose objects to exercise the muscles in the eye.
* Use of adjustable chair, and take time to set it up properly.
* Use a wrist rest to support wrist while typing
* Take regular breaks – get up , walk around, stretch your muscles

**C) Maintenance of Computers in Good Working Conditions**

* Regular servicing should be done for hardware and software updates to ensure proper working conditions of the computers
* Computers require special cleaning even on the outside including hardware parts such as the mouse and keyboard to perform correctly
* Always use optimizer utilities  
   that modify programs to make computers to improve performance and make them to run more quickly.
* Always use and regularly updated antivirus software. Viruses and worms are horrible computer-unfriendly programs that can crash your system and cause damage
* Avoid Installation Marathons
* Carry out Disk Defragmentation when necessary.
* A computer is a storehouse for large amounts of data and so, having a disorganized computer slows down the processing time.

**Disk Defragmentation is** the process in which scattered pieces of individual files and free space are reorganized and stored in an adjacent manner (next to each other) on the disk.

**d) The Ethics And Integrity In Computer Use**

* **Computer Ethics** Computer Ethics are human values and moral conduct of computers users.  **OR. Computer Ethics** refers to the right or wrong behavior exercised when using computers.
* **Computer Integrity** refers to the loyalty or faithfulness to a set of laws about computerusage.
* In 1991, the Computer Ethics Institute(CEI) held its first National Computer Ethics Conference in Washington, D.C.
* The Ten Commandments of Computer Ethics were first presented in Dr. Ramon C. Barquin's paper prepared for the conference,

*"In Pursuit of a 'Ten Commandments' for Computer Ethics."*

**The Computer Ethics Institute published them as follows in 1992:**

**1**. You Shall Not Use a Computer to Harm Other People.

2 You Shall Not Interfere with Other People's Computer Work.

3. You Shall Not Snoop around in Other People's Computer Files.

4. You Shall Not Use a Computer to Steal.

5. You Shall Not Use a Computer to Bear False Witness.

6. Thou Shall Not Copy or Use Proprietary Software for Which You Have Not Paid.

7. You Shall Not Use Other People's Computer Resources without Authorization or Proper Compensation

8 You Shall Not Appropriate Other People's Intellectual Output.

9. You Shall Think about the Social Consequences of the Program You Are Writing or the System You Are Designing.

10. You Shall Always Use a Computer in Ways That Insure Consideration and Respect for Your Fellow Humans.

**Requirements for a Modern Computer Lab**

1. **Computers**. These are electronic machines for processing data into information.
2. **Computer network**. It enables sharing of computing resources like: files and folders, programs, printers.
3. **Fire extinguisher**. This is an active fire protection device used to extinguish small fires in the computer laboratory, often in emergency situations. It is not intended for use on an out-of-control fire.
4. **Security cameras**. The computer laboratory requires surveillance in areas that may need monitoring such as the inside of the lab and its outside. This is mostly done by use of CCTV cameras and sensor devices.
5. **Air conditioner** (A.C) or fan. This regulates the temperature in the computer laboratory. Air conditioning is any form of technological cooling, heating, ventilation, or disinfection that modifies the condition of air.
6. **Metallic doors and windows**. For safety against burglary (physical break into the room)
7. **Burglar proofs**. These are metallic bars which help in physical protection against theft or burglary
8. **Printer**. It is used to output information on a physical medium, such as a paper, cloth, plastic card, etc.
9. **Wall clock**. For timing lessons and examinations
10. **Woollen carpet**. For absorbing dust in the computer laboratory. This reduces the amount of dust in the lab.
11. **Curtains**, for doors and windows, to prevent direct sunlight and heat from the metallic doors and windows
12. **Blower**. This is an electronic device that is used to blow dust from computers and the peripheral devices
13. **First aid kit**. For emergencies such as accidents, sicknesses, etc, in the lab. First aid kit is a collection of supplies and equipment for use in giving first aid.
14. **Surge protector**. This is a sophisticated device for protecting computers against short circuits caused by current fluctuation. It therefore helps to stabilize power
15. **Uninterruptible power supply (UPS)**. It is a device for regulating power entering the computer and the peripheral devices. It stores power in its rechargeable battery which is used when main power is off.
16. **Power adaptors**. For taping power from sockets to the computer and the peripheral devices like printers.
17. **Anti-glare filter screen**. This is a rectangular glass mounted onto the screen to reduce on the intensity of light and the flickering effect caused by EMR, so as to prevent eye defects. Antiglare screens are recommended for any person spending at least two hours a day on a personal computer

**SERVICING AND MAINTENANCE OF COMPUTER SYSTEMS**

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

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

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

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

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

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

**IMPORTANCE OF SERVING AND MAINTENANCE**

1. To promote the life time of hardware
2. to repair PC components with mechanical faults
3. to update outdated programs such as antivirus, operating systems, etc

**QUESTION:**  **what shows that a computer has a problem?**

1. Takes long to boot
2. Rebooting
3. Refusing to boot
4. Freezes
5. Mouse fail to work
6. Keyboard fail to work

**INSTALLING SYSTEM AND APPLICATION SOFTWARE**

**Installation:** is the process of setting up a program on a computer to be able to use it.

**OR** Installation**:** is the act of making program ready for execution

**Reasons for installation of programs**

1. When the program previously installed is corrupted and you need to reinstall it to be able to use it.

**Program installer:** is specialized program which automates most of the work required for a program installation.

**Program installation:**  is the act of making the program ready for execution.

**Important issues to consider before and when installing a program.**

**1)** Requirement of the program

2) Other programs needed a long that programs

**Reason why software may fail to install**

1) Computer system may not have system requirements for the system to run.

2) Putting wrong product key

**NB: Uninstalling software is** the deliberate process of removing part or all of a given software from the computer

**Reason for uninstalling software**

I) Software may not be working properly

ii) Conflicting with other programs

iii) Running out of disk space.

**Process of uninstalling software**

i) Click on start, select control panel

ii) Click installed software to see list

iii) Select the one you want to uninstall and click uninstall.

**COMPUTER MANAGEMENT**

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

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

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

**BOOT SEQUENCE**

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

**Types of booting**

There are basically two types of booting:

1**. Cold booting.**

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

**Steps for Cold Booting a Computer**

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

2**. Warm booting.**

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

**Steps for Cold Booting a Computer**

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

**Reasons for warm booting/ Conditions under Which a Warm-Boot is performed**

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

**SHUTTING DOWN A COMPUTER**

This refers to switching off the computer systematically after a work session. It is advisable that one follows the correct procedure for shutting down their computer.

If the correct procedures are not followed, the user is most likely to experience the following problems; Loss of data, Damage of programs, Damage of the processor, Crashing of the hard disk drive.

**Procedure for Shutting Down a Computer**

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

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

**Steps involved in the Boot Process**

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

**Further Definitions.**

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

**A boot drive** is the drive from which your personal computer boots (starts). In most cases, drive C (the hard disk) is the boot drive

**THE DESKTOP**

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

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

**AN ICON**

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

**Typical Icons on the Desktop**

**My Computer**:This gives access to, and information about, the disk drives, cameras, scanners and other hardware connected to your computer

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

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

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

**CONTENTS OF THE TASKBAR**

1. **The start button**. This is where everything springs from. Click this button to display the start menu.
2. **Start menu**. It provides access to all programs and windows settings, a help and support guide, etc.
3. **Notification Area**.This section of the taskbar not only houses the time; it also contains icons for handy little programs, which run all the time your computer is on. It is also known as system tray
4. **The quick launch bar**. This provides a quick and easy way to start programs you use frequently, such as your web browser and email program. You can drag shortcuts to other programs into the quick launch bar.
5. **The task manager**. This is the part of the taskbar that shows all the programs and processes currently running, the users currently logged on, networking, and the general performance of the computer system.

**CONTENTS OF THE START MENU**

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

**THE WINDOW**

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

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

**PARTS OF A WINDOW**

1. **Title bar**. Displays the name of the window or program running, e.g. my computer, MS word, control panel
2. **Control menu box**. This is located in the top left corner of the window. it contains the control menu, which is activated by clicking on this box
3. **System buttons**. These are three buttons in the upper right corner of the window and they include:

* *Minimize*. Reduces the window to an icon on the taskbar. The window is hidden but not closed
* *Maximize & Restore*. The maximize option expands the window’s workspace to fill the entire desktop. The restore option restores the maximized window to its previous size and location.
* *Close*. This button terminates the entire window.

1. **Menu-bar**. This stretches across the window, just below the title bar. It contains the available menus which one can work with in that particular application.
2. **Toolbar**. A set of icons below the menu-bar, used to provide shortcuts to commands on the menu-bar.
3. **Window borders**. This is the perimeter, which defines the window’s work area.
4. **Work space**. The inside part of the window where you can type, edit, view and store the data
5. **Scroll bars**. Appear on the right and bottom borders of the window if the window contains more items than can fit in the visible work area. Scrolling the window using scroll bars brings the hidden items into view.

**DIALOG BOX CONTROLS**

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

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

**SYSTEM CONFIGURATION**

**PARTS OF A COMPUTER**

These are the components that make-up a complete functioning computer. System configuration refers to the connection and setup of hardware and software components to form a complete functioning computer. The basic parts that make up a functioning personal computer are: the system unit, monitor, keyboard and mouse.

**THE SYSTEM UNIT** This is a metallic case containing the electrical components of the computer that carry out processing function. ***The components of the system unit include***: motherboard, power supply, drives, CPU, CMOS battery, RAM chip, BIOS chip, heat sink, and peripheral device interfaces.

**THE MOTHERBOARD**

This is a flat circuit board where the other electronic components in the system unit are attached. **It is also known as** **the system board or circuit board or main board**. It houses the CPU, controller circuitry, bus, RAM, expansion slots for additional boards, and ports for external devices. In addition, it contains the CMOS, other ROM chips, BOIS chips and support chips providing varied functionality.

An ***expansion slot*** is a special socket designed for attaching expansion cards onto the motherboard, e.g. PCI, SCSI, AGP, and IDE slots. ***Expansion cards*** are special circuit boards mounted onto the main board in the expansion slots to increase a computer’s functionality, e.g. video card, sound card, network interface card (NIC)

**DRIVES**

A drive is a device that reads data from a storage medium and writes data to a storage medium. Examples of drives include; **Compact disk drive** (CD drive), **Digital Versatile Disk drive** (DVD Drive), **Floppy Disk Drive** (FDD), **Hard Disk Drive** (HDD), and **Zip Drive**.

**COMPLEMENTARY METAL-OXIDE SEMICONDUCTOR (CMOS)**

CMOS is a special memory for storing a computer’s configurations including time and date. It is powered by a special battery known as the *CMOS battery* similar to that of a digital watch, which resides on the motherboard.

**MEMORY CHIP (RAM)**

RAM is an electronic component for holding data and instructions temporarily during data processing. Instructions & data stored in RAM are temporary and they can be lost as soon as power is switched off. RAM is also called user memory or main memory. It is the working place of your computer where active programs and data are loaded so that any time the processor requires them, it does not have to fetch them from the hard disk.

**CENTRAL PROCESSING UNIT (CPU)**

This is a chip which resides on the motherboard, and performs the processing function inside the system unit. **It has five parts,** **namely;** control unit, ALU, registers, buses and a clock. The CPU, also known as the microprocessor or the processor can be thought of as the brain of the computer.

Processing speed (or clock speed/rate) is the maximum number of instructions executed by the CPU per second. It is given in Kilohertz (KHz) or Megahertz (MHz) or Gigahertz (GHz). The clock regulates the rate at which instructions are executed. e.g. a CPU labelled 3.5 GHz means the clock speed is 3.5 billion cycles per second.

**PERIPHERAL DEVICE INTERFACES**

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

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

1. **Serial ports**. These are serial communication physical interface through which information transfers in or out one bit at a time. They connect low transmission speed devices, e.g. mouse and keyboard.
2. **Parallel ports**. These are parallel communication physical interfaces through which information transfers in or out several bits at a time. Most printers connect to the system unit using a parallel port.
3. **Universal serial bus** (USB). A USB is an external data pathway. A USB port transmits data through a USB cable to a USB device. USB ports support ***port plugging*** and ***plug and play***. **Plug and play** is the ability to add a new hardware component to a computer & have it work automatically without physical configuration
4. **VGA (Video Graphics Array) port**. This is a female external port that allows a user to connect the system unit to the display unit, like the monitor.
5. **Audio ports**. These transfer audio data to and from the computer. They are female plug-in jacks usually two in number. These include one for audio input, e.g. microphone connection, and the other for audio output, e.g. to a speaker
6. **Personal system (PS/2) ports**. These are small circular female ports for connecting the keyboard and mouse to PCs. Communication is serial, synchronous and bi-directional.
7. **Power port**. Connects the power cable to the power supply to tap power from the source to the system unit
8. **Network port**. It is also called LAN port or Ethernet port. This is a port that facilitates network cables to connect to a computer system.

**THE MONITOR**

This is a video display output device that shows images generated from a computer without producing a permanent record. A video card is required to display data onto a monitor.

***Types of video cards include****;*

* MDA - Monochrome Display Adaptor. This displays only one colour against a different colour background
* CGA - Colour Graphics Adaptor. This adaptor displays images in a variety of colours
* EGA - Enhanced graphics adaptor
* VGA - Video Graphics Array: 640 x 480 pixels
* SVGA - Super Video Graphics Array: 800 x 600 pixels
* XGA - Extended Graphics Array: 1024 x 768 pixels

A ***video card*** is a printed circuit board attached to the mother board inside the system unit for controlling output to a display screen. A ***VGA cable*** is the one used to connect the system unit to the monitor, to transfer the video signal from the system unit to the monitor so that it can be displayed

**SYSTEM SPECIFICATIONS**

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

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

**FILE MANAGEMENT**

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

OR: A computer file is a specific piece of data that is held on a computer system.

**DEFINITION OF TERMINOLOGIES**

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

**e.g.** C:\Class work \ ICT \ marks.doc. This path statement means that: a file named **marks.doc** is in a sub-folder named **ICT** and in a folder named **Class work** on drive **C:\**

* **Path Delimiter**;is a symbol (/ or \) that separates one directory from another in a file path

**TYPES OF COMPUTER FILES**

1. **System file.** These are files used to run the computer system hardware and application programs e.g windows operating systems and device drivers
2. **Program files.** This is an organized list of instructions that, when executed, cause the computer to behave in a predetermined manner. **NB** without programs computers are useless.
3. **Document files** is a computer file created by the use of application programs like word document or spreadsheet document
4. **Data file** is a file which stores data to be used by a computer application or system
5. **Multimedia file.** File that combines multiple media such as video, audio, graphics and text.
6. **Directory (Folder) file**. Is a virtual container with graphical user interface, in which groups of computers files and other sub directories can be kept and organized.

**RULES TO CONSIDER WHEN NAMING FILES**

1. A file specification consists of two parts, that is, file name and file extension
2. A file name can have 1 to 255 characters (in windows operating system) or 1 to 8 characters (in DOS)
3. The file extension may have 1 to 4 characters
4. In a file specification, a file name is separated from the file extension by a period (.) or a full stop
5. Some special characters like; +, =, additional period, space, [, ], may not be accepted in a file specification
6. Files under the same directory/folder cannot have the same file specification

**OPERATIONS THAT CAN BE PERFORMED ON A FILE**

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

**Common files with their extensions.**

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

1. Note pad file .txt
2. Microsoft PowerPoint Presentatio .ppt
3. Microsoft Word document .doc
4. Microsoft Excel work book .xls
5. Microsoft Publisher file .pub
6. Microsoft Access Database file .mdb
7. Batch file having DOS command .BAT
8. Adobe illustrator file .ai
9. Video file .AVI/.mp4/.DAT
10. Compressed audio .mp3/.wav/.amr
11. Portable document format file .pdf
12. Image file .gif/.jpg/.jpeg/.tif/.png/.bmp
13. System file .sys

14. program/executable files .exe

**Ways of starting a program**

1. click start
2. point to all programs
3. open program folder, by clicking on it

OR: Double click on the shortcut of the program on the desktop

USES OF COMPUTERS IN SOCIETY

**Computers are applied in the areas of**

1. **Education,**
2. **Research,**
3. **Business,**
4. **Health,**
5. **Communication,**
6. **Military/security,**
7. **Home and**
8. **Entertainment / leisure.**

**USES OF COMPUTERS AT HOME**

1. Paying bills using services like: e-banking, electronic funds transfer, among others on the internet
2. Budgeting and personal financial management like: balancing a check-book, buying and selling stocks online, manage investments and family budgets
3. Computers are used for doing School Assignments (Home Work)
4. Entertainment through listening to music, watching movies and videos, playing games
5. Online learning, producing assignments and reports
6. Helping youngsters to read, write, count and spell words

Communicating with others around the world using email, chat rooms, Skype and instant messaging

**USES OF COMPUTERS AT SCHOOLS/EDUCATION & TRAINING**

1. Computer Assisted Instruction (CAI). Teachers can use computers to present teaching material in a more interesting way
2. Computer Assisted Learning (CAL). Students use computers and appropriate software to learn at their own pace
3. Computer Assisted Assessment (CAA). This is the use of computers with appropriate hardware and software to mark scripts. This method reduces labour and time needed to mark students’ answer scripts
4. Distance learning, through computer based training and web based training
5. Simulation of real life situations that may be hazardous
6. Electronic library system of searching, borrowing, and returning books
7. School Administration and Management Systems (SAMS) for keeping records of students, producing reports cards, financial management, and other related records.
8. Edutainment, which is a type of educational software that combines education with entertainment
9. They are used by bursars in monitoring students’ school fees in schools
10. They are sources of employment opportunities e.g. computer teachers
11. They are used by teachers to present teaching materials for better understanding of the learners e. by use of projectors
12. They aid in e- learning where learners search for information from the internet
13. They are used by school administrators in keeping records of students particulars, teaching and non-teaching staff
14. They are used in electric library for searching, borrowing and returning books

**ADVANTAGES OF USING COMPUTERS IN EDUCATION**

1. Students can learn by themselves when the teacher is not available
2. Students can learn and proceed at their own pace
3. Students can usually get their feedbacks immediately after answering the question or taking an action
4. There are rich educational resources on CD-ROMs and the internet
5. CAI and CAL packages that usually contain multimedia effects make learning more interesting and interactive
6. Teachers can present subject matter and explain abstract concepts more clearly with the help of multimedia
7. Teachers can show experiments that are difficult or dangerous in nature through simulations software
8. Advanced instructions can be given to students in areas where the teacher may not be qualified

**APPLICATIONS OF COMPUTERS IN OFFICES**

1. Documents processing like creating office memos, letters, reports, etc.
2. Preparing: pay rolls, budgets, income statements and balance sheets
3. Tracking inventory and generating invoices and receipts
4. Presenting projects and ideas by means of presentation software
5. Using of facsimile, electronic mail, electronic bulletin and video conferencing to communicate information
6. Use of telecommuting, so that employees can work away from a company’s standard work place
7. Creating websites to provide selected information, advertise products by conducting e-commerce

**APPLICATIONS OF COMPUTERS IN BUSINESS**

1. Making deposits, withdrawing cash and transferring money between accounts
2. Receiving information about your bank account
3. Using Magnetic Ink Character Recognition (MICR) readers to process checks
4. Using microfilms and microchips to store transaction records
5. Automated Teller Machine (ATM). This is a self-service banking machine attached to the host computer through a telephone network.

*Services available through* ATM *include*; Making deposits, Withdrawing cash, Transferring money between accounts, and Obtaining account balances

1. Online banking. Services available through Online banking include;

* Transferring money electronically among different accounts
* Loan and credit card applications
* Obtaining credit card statements, bank statements, and account balances
* Downloading monthly transaction information

1. Electronic commerce (e-commerce). This is a financial business transaction that occurs over an electronic network, such as the internet.

**APPLICATIONS OF COMPUTERS IN ENTERTAINMENT**

1. Playing computer games
2. Listening to music
3. Watching videos & movies
4. Taking and editing photographs
5. Reading a book or magazine online

**APPLICATIONS OF COMPUTERS IN INDUSTRY AND MANUFACTURING**

1. Designing and printing product labels
2. Designing the layout of the product and how it will be packaged
3. Keeping track of inventory and products
4. General records management
5. Robotics. A robot is a computer-controlled device that can move and react to instructions from the outside world. Robots are used in tasks and processes that are dangerous in nature to man.
6. Quality control. Computer Aided Design (CAD) and Computer Aided Manufacturing (CAM) software are used in quality control.

**APPLICATIONS OF COMPUTERS IN HEALTH**

1. Maintaining patients’ records in hospitals and clinics
2. Monitoring patients’ vital signs in hospital rooms and at home
3. Carrying out Computer Assisted Medical Test
4. For research and diagnosis of medical conditions
5. Implanting computerized devices, like, pacemakers, that allow patients to live longer
6. Use of computer-controlled devices during operations that require great accuracy, like, laser eye surgery and heart surgery
7. Telemedicine through computers with video conferencing capabilities
8. Use of Computer Aided Surgery for training before performing surgery on live humans

**USES OF COMPUTERS IN THE AREA OF SECURITY/MILITARY**

1. Computers aid monitoring security through cameras, Automatic number plate recognition, e.tc.
2. Communication systems are widely used in the military to coordinate the personnel.
3. Some computer systems can detect temperatures and alarm in case of danger of fire outbreaks.
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**ADVANTAGES OF USING COMPUTERS**

1. Computers are fast in task execution compared to manual methods. e.g. using a computer one can easily produce many letters to different recipients compared to writing them manually
2. Computers can identify mistakes and correct mistakes. e.g. the spelling and grammar checker tool which identifies and proposes alternatives in case of any spelling or grammar error
3. Neatness and professionalism. Computers programs have formatting tools that can be used to produce outstanding, neat and smart work, compared to the manual methods where creativity is limited.
4. Accuracy. Computers execute tasks accurately according to the commands given by the user as compared to manual methods especially in calculations.
5. They are a source of employment to people like: data entrants, software engineers, ICT teachers, technicians and computer programmers.
6. They store vital information in their memory that can be referred to in the future
7. They act as a research tool for scientists and students of both high school and higher levels of leaning through a variety of information that they offer
8. They help to ease communication through e-mails, teleconferencing and video-conferencing technologies
9. They help to increase productivity and efficiency of work. This is because, they simplify complex tasks which may be difficult for man to perform into simple ones thus increasing output

**N.B**, other advantages include the characteristics of modern computers

**DISADVANTAGES OF USING COMPUTERS IN SOCIETY**

1. They are relatively expensive to buy and maintain and they need regular servicing and repairs.
2. They require intensive training before one can be able to use them, which is costly and takes time.
3. They lead to loss of data due to; attacks by viruses, hardware or software failure, theft of system, etc.
4. They are power dependent. Since they are electronic machines, they only operate when there is power.
5. They consume a lot of power, therefore, they increase one’s expenditure on electricity
6. They lead to unemployment. With computerization, most work is electronically processed. This reduces jobs man can do thus causing unemployment
7. They lead to increased crime rate like forgery. Computers help criminals in exchange of information which increases insecurity.
8. As a result of using computers in education and training, face-to-face interactions between teachers and students may be reduced which hinders effective teaching and learning process
9. Prolonged use of computers may lead to health hazards like eye-strain, backache, headache, etc. This is due to electromagnetic radiation light rays from the monitor, poor sitting posture etc.
10. Loss of individual privacy as confidential information is exposed to other people over networks.
11. Loss of writing and spelling skills. The computer does not involve the use of a pencil or pen, this leads to loss of writing and spelling skills.
12. Pollution of the environment. This is comes as a result of improper disposal of e-waste (electronic waste), like spoiled or obsolete computers, printers, scanners, keyboards, mice, among others.
13. **Computers lead to moral decay** since**,** Today the youth are glued on internet watching immoral Pictures, movies and magazines etc i.e. pornography and coping western culture.
14. **They lead to Unemployment.** Computers are mainly used by literate people hence cannot be used by illiterate people hence causing unemployment amongst people in a society.
15. Software Piracy: Stealing software, not paying for licenses through cracking.
16. Risk of addiction. Many people don't care about anything else because they spend many hours in front of computer.