COMPUTER LITERACY

(ECD, PRIMARY AND SECONDARY EDUCATION)

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Introduction

What is a computer?

- A computer may be defined as an electronic device which accepts data, processing it and outputs it into information.

- A computer is any device capable of performing computations (making calculations). it performs a computation and produces an answer.

- A computer is an electronic device which is capable of receiving the inputs (data from the user), storing it for a desired period of time, manipulating it according to the set of instructions (called program) and producing the output to the user in desired form.

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A Complete Computer System

A complete computer system comprises of the following components.

- **Hardware**: These are physical or tangible equipments that can be seen or attached to computers. These components are responsible for the attribute of computer systems. Examples of physical components of computers include; CPU (Central Processing Unit), Monitor, Keyboard, Mouse, etc.

- **Software**

  These are set of computer programs or its official intelligence that enables the computer to perform different task. Example application and system software.

- **The users (trained manpower)**

  In order to lean the computer system properly it is essential that people involve in operating system should have sufficient knowledge so as to operate it collectively.

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CHARACTERISTICS OF A COMPUTER

For a device to be characterized as a computer it must manifest some or all of the following characteristics

- **Speed:**

  Computers operate at speeds, which are by human standards unbelievable. The speed of a computer is normally given in terms of the following time units for the access time.

- **TIME:**

  Millisecond [1ms]   -   A thousand of a second or 10^{-3}

  Micro seconds [1μs]   -   A millionth of a second or 10^{-6}

  Nano seconds [1ns]   -   A thousand millionth of a second or 10^{-9}

  Pico second [1ps]   -   A million millionth of a second or 10^{-12}

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CHARACTERISTICS OF A COMPUTER

The speed of a computer is also measured in terms of instructions per second. There are two such measures

KIPS -   Kilo Instructions Per Second

MIPS-   Million Instructions Per Second

However, their speeds today are measured in Hertz i.e MegaHertz(MHz), GigaHertz(GHz).

- **Accuracy**

As opposed to the human beings, computers are extremely accurate and reliable in its calculations. This is because of the intrinsic accuracy of their electronic components.

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- **Ability to store data/information**

For a computer to be able to work, it must have some form of work space where data is stored before being processed or where information is stored before being output to particular devices

- **Diligence/ Endurance**

a Computers has the ability to perform the same task 'over and over' with the same speed and accuracy for a long time without getting bored or tired.

- **Artificial Intelligence/ Interactive**

Computers are artificially intelligent. They can respond to requests given to them and provide solutions.

- **Automation/ Programmable machine**

Computers also work automatically in that once a programmed process is initiated, it does not require a prompt from an operator at each stage of the process.

- **Versatility**

Computers can work with wide number of applications in different work areas and environments.

Precautions of Handling a Computer

- Computers are delicate operating machine which need to handled with care
- Handle every device of a computer with care
- Do not connect a computer peripherals (components such as mouse, keyboard, printer, etc) when power is on.
- Avoid abrupt on/off a computer
- Wait for the reading/writing on a drive especially floppy drive A, D, E and etc.
- Don't open the inside part of computer
- A void dust environment(eating near a computer)

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ADVANTAGES OF A COMPUTER

- Computer operates at high speed, hence enabling them to work on voluminous data very fast

- The computer results are accurate and reliable.

- Computers can work continuously without getting bored or tired

- Computers can work on any problem provided relevant instructions are set.

- Computer can operate in risky environments e.g volcanic sites, lethal chemical plants, where human life is feared.

- The computer is flexible i.e can adapt to any workload without much strain.

- Large volume of data can be conveniently stored, accessed and altered thus reducing on office space that would be occupied by several filing cabinets.

- Security and integrity of information is greatly enhanced by the use of computers.

- Computers have provided employment for those with skills in their usage.

- Introduction of computer networks, the Internet and E-mail facilities has enabled easy, fast, more secure and cheap communication over distant areas, and also enabled sharing of scarce yet expensive resources in organizations.

- The number of persons required for performing various organizational activities will be reduced by using a computer system, thus cutting organisations' labour costs

DISADVANTAGES OF USING COMPUTERS.

- Computers and their related facilities initial cost of installation or acquisition is normally very high.

- Due to the rapid change in the computer technology, the computer and related facilities can become obsolete/ outdated very fast, hence posing a risk of capital loss.

- When there is failure in the computer and there are no proper backup measures, it will lead to great loss of organizations vital information.

- Introduction of computers to organizations has led to large numbers of unemployment.

- The use of computers also poses a health hazards, especially to the eyes

- Introduction of the Internet has also led a lot of online crime by e.g hackers, terrorists, virus transmitters, moral degradation due to pornographic exposure to the under-aged, e.t.c

- Changing from the old system, the manual system is a gradual process during which there is interruption in the normal working environment.

- In case the computer system fails, it might be extremely difficult to revert back to the old manual system. For this reason, stand by procedures are necessary, but expensive

AREAS WHERE COMPUTERS ARE COMMONLY USED TODAY

The areas that computers are widely used include.

- **Scientific Research:**

  Recent advancements in scientific research have been possible mainly due to the use of computers. New drugs have been introduced, exploration into space is possible, and in places where human beings cannot survive.

- **Business Environment:**

  Very many businesses have realized the benefits of computers. For instance, with most money markets (Stock Exchanges), your only need to sit in front of your computer. Today E-commerce has been more feasible with computers e.g in Banks, doing electronic shopping, ordering and payments, e.t.c.

- **Recreation purposes:**

  There are hosts of computer games, some of which exist as shareware (free software programs supposed to be shared freely) while others need a license to run. Disney world, one of the worlds biggest entertainment companies, has made a fortune with computer games.

- **Education purposes:**

  With the development of the computer, the internet has emerged. Many local intuitions have linked up with those big universities and libraries overseas, hence facilitating Education and research.

- **In Modern Military.**

  Modern military today use computer guided missiles,e.t.c

HISTORY/EVOLUTION OF COMPUTERS

- The first electronic computers were produced around 1940's. This was after a gradual change from the traditional processing aids e.g. abacus, slide rule etc.

- Some of the silent historical events as concerns the research towards computer's origination are described as below:

➢ Before the 17th Century, the early Babylonians invented simple traditional calculation aids e.g. the abacus, which was used as a mathematical instrument.

- The abacus was one of the first computation devices and it consisted of columns of beads that can slide to and fro to represent numbers.

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➢In the early 17th Century, (1614) logarithm as an aid of calculation was invented by a Scottish mathematician known as John Napier, who subsequently invented a rod of bones (Napier bones), the idea that was in use three years later after his logarithm invention and was employed in carrying out multiplications.

• He invented a set of multiplication table or ivory sticks that could slide back and forth to indicate certain results.

• Napier bones were rectangular rod with readings written on them that led users to do division and multiplication by adding number positional bones.

➢In the year 1620, the slide rule was invented by William Oughtred an English man. This also performed multiplication and division.

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- It uses the same principle of logarithm except it is represented on a scale instead of a table.

- This was a ruler with numbers written on it and which can do some simple math by sliding a bar to and fro.

➢ In 1623, the idea of using binary numbers to represent e.g. characters, what was described as the binary codes was invented by Francis Bacon.

- This was the beginning of the "mechanical era" (1623 – 1945), these machines were characterized with mechanical gears, moving parts, electro-mechanical relays, dials and could use punched cards and tapes

- In 1642, Blaise Pascal a Frenchman invented the calculating machine, which had got both the ability to add and to subtract numbers.
- The machine used a system of gears and wheels. It had digits from 1 to 9 arranged on wheels similar to speedometer on a motorcar.
- In 1694, Gottfried William Leibnitz a German mathematician improved Pascal's design to create a Leibniz's Calculator that could perform arithmetic operations of addition, subtraction, multiplication, division and square root.
- At around 1802, Jacquard Weaving Loom was invented by Joseph Jacquard. The machine was used for controlling the weaving process when making complex patterns.
- This system could use metal cards punched with holes in storing data. The machine could store programmes or instructions using the hole and no-hole method on the cards. This formed the basis for the programmable computer.

➢ In 1820, Thomas De columnar a Frenchman invented a calculating machine which he called Arithermometer. He produced it in large numbers and in fact established an industry for making calculating machines.

➢ In 1834, Charles Babbage, a professor of mathematics invented an Analytical Engine. The machine introduced the idea of memory for storing results and the idea of printed output.

➢ Between 1847-54,George Boole discovered Boolean algebra, whose principles are the basis of the today's computer's logic gates used as logical elements.

➢ Around Mid 1880's the tabulator machine was discovered by Herman Hollerith, the machine had the capabilities of detecting data stored in terms of punched holes on the cards.

➢ In 1900, the magnetic storage media principles as on e.g. magnetic tapes was discovered by Valdemar Poulson. At around 1906, thermionic valves was invented by the Lee de Forest. The valves were useful in the electronic logics implementation.

➢ In 1938, Claude Shannon established how Boolean algebra could be applied in the design of the computer's logical circuits.

➢ In 1937, automatic sequence controlled calculator (ASCC) was developed by Howard Aiken and IBM. In 1959, Aiken developed punched paper tape, to be used as an input medium

➢ In 1941, the calculating machines, Z3 and Z4 were developed by Konrad Zuse and these machines had the ability to use programs.

➢ In 1946, Von Neumann gave a report on the design of the computer of today

COMPUTER GENERATIONS

- Introduction

  This gives a grouped summary of the gradual developments in the computer technology. The historical events are not considered individually or in terms of individual years but in classifications of durations more than a year known as 'generations'. The transition from one generation to another was and is influenced by the amount of research towards further development of the computers and their related facilities.

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First Generation Computers

- These were the earliest time computers, which were introduced in 1946 – 1956.

- They used big physical devices in their circuitry and hence were very big in their physical size.

- Their circuits incorporated e.g. the vacuum tubes/thermionic valves, as the major logic element, which was a non solid state electronic device.

- These computers consumes a lot of power, generating a lot of heat.

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Their design was based on the John Von Neumanns's criterion. Examples of the first generation computers are

- UNIVAC - UNIVersal Automatic Computer by Remington Rand in 1951.

- ENIAC - Electronic Numerical Intergrator and Calculator, developed by John Presper Eckaert and John .W. Mauchly.

- EDVAC - Electronic Discrete Variable Automatic Computer. Developed by John Von Neumann in 1946

- EDSAC - Electronic Delayed Storage Automatic Computer

- IBM – 650, e.t.c

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Summary of Major Characteristics

- Used Vacuum tubes as their active element.

- Were large in size (could fill the entire room)

- Used great quantities of electricity and generated a lot of heat, therefore requiring much cooling.

- Were slow in processing.

- They could not store much information i.e. they had limited primary memory.

- Computer programming was done in machine and assembler languages.

- Used punched cards to input and output data

- They were very expensive.

- Were unreliable due to frequent failures.

- They were restricted to scientific and commercial applications

- Had no operating systems.

Second Generation Computers

- These were computers of the closing of the 1950's to early 60's (1957 – 1963), which uses transistors as their active elements

- The computers were more reliable and comparatively small in size

- The processors operated at a comparatively higher speed than the first generation computers

- Examples of the Second Generation Computers include IBM 300 series, ATLAS, LEO mark III, IBM 1400, IBM 7000 series, NCR 501, CDC6600, e.t.c

Summary of Major Characteristics

- Used Transistors as their active element.

- Were smaller in size compared to the 1st generation computers.

- Used less electricity and gave off less heat, therefore requiring less cooling compared to the 1GCs

- Computers become less expensive

- Increased memory capacities

- Introduction of magnetic tapes and disks for storage

- Computers had increased speed and became more reliability

- Introduction of high level programming languages e.g. FORTRAN

- Had no operating systems

Third Generation Computers

- The computers of this generation came into being towards mid 60's (1964 – 1979) and they used Integrated Circuits (ICs) to replace the Second Generation physical transistors, diodes etc

- The integrated circuits combine several physical electronic components within a small crystal called the silicon clip (IC-Integrated Circuit).

- The ICs are much smaller as compared to the physical electronic components hence the resulting computer was reduced in size as compared to the second generation computers.

- They have higher main memory capacity, reliable than the second generation computers

Summary of Major Characteristics

- Used Integrated Circuits (I.Cs) as their active element.
- Were smaller in size than the 2nd generation computers.
- Had lower power consumption, generating less heat and requiring less cooling.
- Were much faster than the 2GCs.
- Introduction of operating system e.g. Multics
- Introduction of simpler programming languages e.g. BASIC, COBOL, e.t.c
- Introduction of Networking of computers.
- Common use of mini computers
- Reduction costs
- Increased primary memory capacities.

Fourth Generation Computers

- The fourth generation computers were a modification of the third generation computer's technology.

- They use complex circuitry, an enhancement of the IC technology of the third generation computers.

- The design of this generation computer is based on Large Scale Integration (LSI) of circuitry or use of Large Scale Integrated Circuits (LSIC) and also Very Large Scale Integrated Circuits (VLSIC).

- This generation marked the origin of micro computers in use today. Examples include: IBM 370 series, Honeywell 6080 series, Apple the COMMODORE PET, PC-8088, 80286, 80386, 80486, the Pentium series, e.t.c

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Summary of Major Characteristics

- The use of Large Scale Integrated Circuits and Very Large Scale Integrated Circuits.

- Reduction in size

- Increased memory and secondary storage capacities

- Much faster and reliable

- Require less power thus generating less heat and requiring less cooling

- Development of the microprocessor

- Introduction of microcomputers

- Greater versatility in software

- Parallel processing become possible

- Limited artificial intelligence and expert systems

- Robotics was introduced

- Improved operating systems .E.t.c

Fifth Generation Computers

- The fifth generation computers are a state of the art technology that is still in development. The design of these computers is based on the ULSI technology (*Ultra-Large Scale Integration*).

- They will contain millions of components in a single chip. Japan and USA have undertaken projects to design and develop such computers.

- These computers will use intelligent programming and knowledge based problem solving techniques. They will use improved human-machine interface.

- The input and output for these machines will be in the form of graphic images or speeches. Such machines will be able to interprete natural languages.

- The software which the 5GCs will use will have artificial intelligence (AI) The intelligent programs will tell the computer what to do and not how to do

Summery of Computer Generations

The research noted that, the trend in the computer's technological revolution is that there is:

- Continual decrease in computer size.

- Improved speed and power of processing

- Increase computer memory and secondary storage capacities

- Decrease in computers and its related facilities cost.

- Introduction of better software

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COMPUTER CLASSIFICATIONS

Introduction

There are several methods of classifying computers. Computers are classified in various IT ways and these may include the following;

➤ Classification by size

➤ Classification by purpose

➤ Classification by processor power

➤ Classification by the way they process data

➤ classification by manufacturers and standards

Classification According to Size

There are three major sizes of computers these include the following;

The Mainframe computers:

➢ These are large general-purpose computers, which can accommodate many users (i.e 500 – 1000) at a time. Each user works separately with a separate keyboard and monitor but they use the same processor or central processing unit.

➢ They have multi-user operating system, very expensive, because of the size and the many jobs they can do simultaneously.

➢ Mainframes consumes a lot of power, make noise, generate a lot of heat and need a lot of cooling etc.

➢ These types of computers are normally used in Large multinational companies, software houses or governments and so many other big organizations.

➢ Mainframe computers today have enhanced technological features and are therefore fast, with large storage capacities, e.t.c. Examples of mainframes include DEC-VAX-8800, CPC-7600, IBM-370, IBM S/390, e.t.c.

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Mini computers

➢These have the same working principles as the mainframe computers but they are considerably smaller.

➢These computers falls in the range of 50 – 500 users at a time, depending on the model. Examples include the IBM's AS400 range, IBM-17, HP-3000, DECPDP-11, e.t.c.

➢These computers were usually used in medium sized organizations or located at district headquarters.

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Micro-computers or Personal computers (PCs)

➢ These are smaller compared to the previous two. i.e. mainframes and mini computers.

➢ They are single user in terms of capacity, i.e. the keyboard, CPU and monitor can only be used by one person at a time. This implies that all system resources are allocated to a single user. In fact that is where the name personal computer originates.

➢ Personal computers (PCs) are relatively cheap and because of the size and one task at a time.

➢ They don't consume a lot of power, they do not generate a lot of heat and require little cooling system.

➢ Examples include the IBM PS/2, Apple Macintosh, Dells, Acer's, Hp, Gateway e.t.c

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The Sub-categories of Micro-computers

Desktop Computers:

➢ These are designed to be stationed in one place probably on top of a desk, i.e. in the office or at home.

Laptop Computers:

➢ These are personal systems(PSs) or PCs are designed for mobile computing.

➢ They are designed to emulate all facilities and system resources offered by a desktop PC, such that even if one is on a bus or plane, one could still continue working like on a desktop PC.

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Personal Digital Assistants (PDAs):

➢ They are designed for those persons who are ever on the move.

➢ They can easily fit in a shirt pocket and at any time one can check e-mail, take a few notes, keep schedules and appointments .

➢ Modern PDAs have been integrated within cellular phones. See the figure below.

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Illustration of Cellular Phones

Mini PC

Enhance your business

Transfer of data

Wholesome entertainment

Stay connected anytime anywhere

Classification by Purpose

These computers are classified according to the work they are designed to do. These include; special purpose computers and General Purpose Computers.

Special Purpose Computers

➢These are designed to handle only a particular task.

➢These are also designed to perform a particular task and no other. Example ATM machines, whether forecasting computers, full pumps, etc.

General Purpose Computers

➢These are designed to carry out multiple purposes.

➢They are also designed to be used in a variety of application environments as required.

➢A computer of this type can perform many tasks like word processing, desktop publishing, databases, gaming etc.

Classification by Processor Power

➢ Micro-processors differ in terms of speed at which they process data: in other words each micro-processor has its operating/clock speed which measures how fast the micro-processor works.

➢ The higher the processing power, the faster the computer. There are several manufacturers of processor chips today e.g Intel, AMD, Nexgen, e.t.c. Processors today are commonly grouped into processor families. The most common types of processor are:

- Pentium 1 (80586)

- Pentium II or Pentium Pro

- Pentium III

- Pentium IV

- Intel Pentium D

- *Pentium(r)-dual-core, etc*

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Classification by Category (the way they process and store data)

➢Analog Computers

➢Digital Computers

➢Hybrid Computers

Analog Computers

➢ These are scientific or engineering computers which are used to control objects on motion e.g. Satellites, missiles, etc.

➢ The out put from analog computers are optimal in form of smooth graph from which information can read.

➢ These computers also perform arithmetic operations and logical comparison by measuring changes in physical magnitudes e.g. electronic voltage, pressure changes, temperature changes, e.t.c. An example of an analogue device is a car speedometer.

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Digital Computers

➢ These are more commonly used compared to the Analog computers. Their arithmetic operations and logical comparisons are based on binary digits (0s and 1s).

➢ These computers can process both numeric and alphanumeric data.

➢ They are used in a wide variety of application area such as scientific, industrial and most of the other computer based data processing applications.

➢ The digital computer also has a unique ability of storing large quantities /volume of data.

➢ e.g. Digital watches are special time digital computers

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Hybrid computers

➢These are designed by interconnecting the digital and analog computers' element directly into one processor, using a suitable interfacing circuitry, i.e both the analog and digital features are built within the same computer/processor.

➢Hybrid computers are more advantageous because they combine both the functional capabilities of the digital and analog computers, though because of their capabilities they are expensive.

➢E.g. in hospital such as intensive care unit., analog devices may measure patient's heart function, temperature and others.

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Classification by Manufacturers and Standards

- computers can be classified according to makers. There are so many labels that manufacturers use in order to distinguish their computers. for example IBM, Compaq, Aple, Gate way, Dell, Toshiba, HP, Acer and so many others . All these makes computers that differ in manufacturing and standards.

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Computer Hardware

The physical and tangible parts of a computer that we can see, feel and touch are called '*hardware*'. If it can be touched, it must be hardware. The more efficient the hardware, the quicker the programs will run. Hardware devices can be grouped into the following forms:-
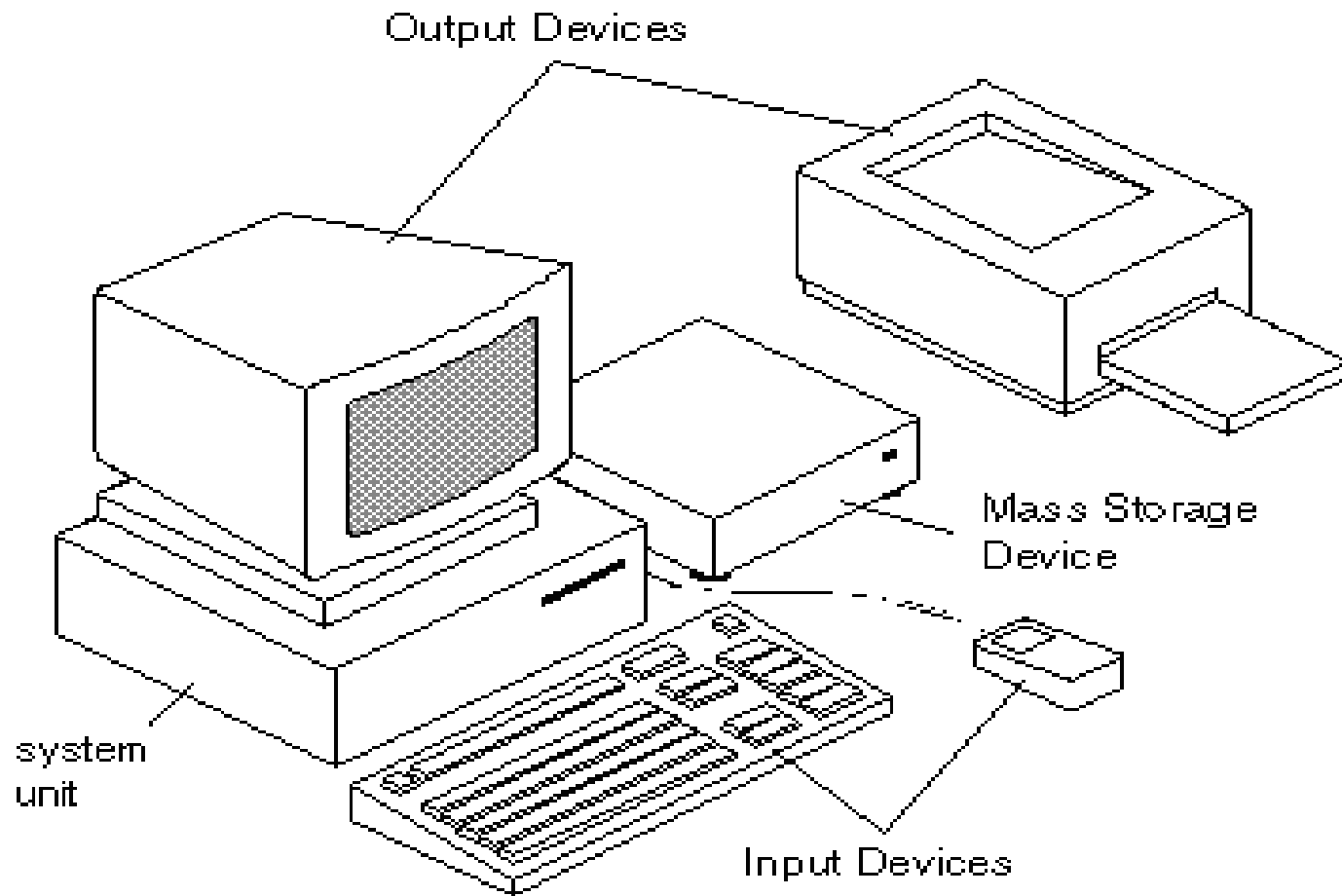
- Input devices
- Output devices
- Processing devices
- Storage devices
- Communication devices

Computer Hardware Functions
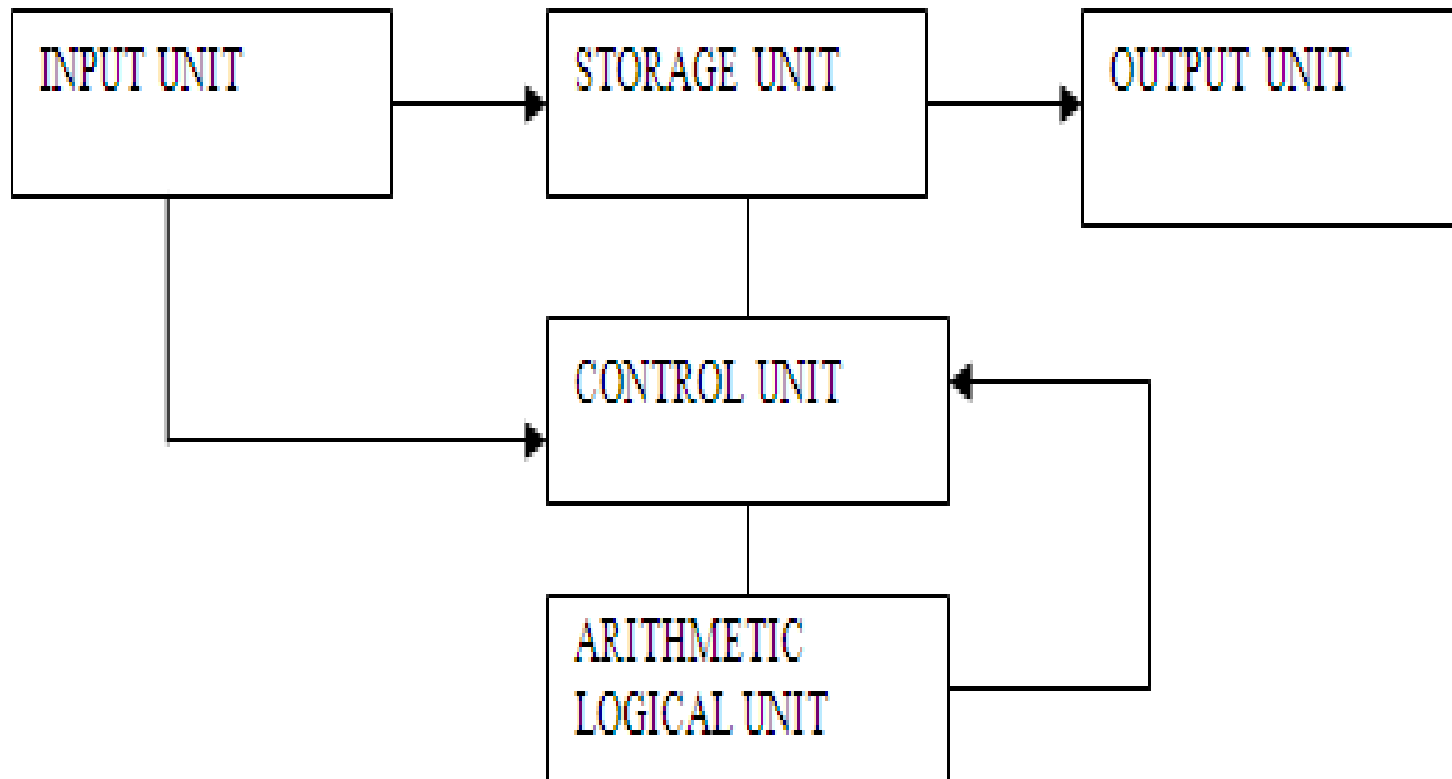
Computer Hardware components

Output Devices

Mass Storage Device

system unit

Input Devices

Input Hardware

These allow the user to input data into the computer for analysis or storage, as well as give commands to the computer. Input devices include:

- Keyboard
- Mouse
- Joy sticks and game pads.
- Light pens
- Optical scanners
- Voice Recognition Equipment (VRQ'S)
- Touch screen panels
- Digital cameras
- Digitizers, e.t.c

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The Keyboard

➢ The keyboard is the most widely used means of entering data into a computer.

➢ The keyboard is therefore also referred to as the computer's primary input device. Pressing a key on the keyboard generates a code that represents the character associated with the key.

➢ It resembles a typewriter keyboard except for some special keys like function keys, control (ctrl), Alter key, escape etc. It has mainly four parts which include the following:-

- The QWERTY or typewriter area
- The numeric key pad
- The function keys
- The cursor movement and control keys

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Uses of Some Keys

- **Caps Lock:-** When on, it locks the characters 'A' through 'Z' in the upper case position (capital letter) and therefore whatever will be typed on the keyboard will be in uppercase.

- **Shift key:-** When held down, it shifts the alphabetic keys, 'A' through 'Z', to uppercase mode when the Caps Lock is off and vice versa.

- **Num Lock:-** When pressed once or when on, it locks in the numbers, so that the numeric keypad can only be used to type numeric characters. When off the numeric keyboard works as the alternative below the numbers.

- **Enter key:-** Confirms to the computer whatever is typed i.e when a command is issued it can only be executed after pressing the enter key.

- It also helps the user to move from one line to the next on the screen when typing our documents.

- **Backspace key:-** This key moves the cursor to the left by one position each time it is pressed

- **Delete key:-** It erases the character to the right of the cursor or those above the cursor incase one is using a DOS text editor.

Uses of some keys

- **Home key:-** This moves the cursor to the beginning of the currently active line.

- **End key.** This key moves the cursor to the end of the line or end of a sentence incase it doesn't reach the end of the page margin.

- **Space-bar:-** This creates one space between words as one types.

- **Tab key:-** This is used to move the cursor, several spaces (5-7) at a time.

- **Arrow keys:-** These are the four keys pointing in different directions and are used to move the cursor to the direction in which the key points. They are called the left, right, up and down arrow keys.

- **PageUp and PageDown Keys:-** These are used to move the cursor to the previous and next page respectively incase a document has more than one page.

- **Insert key:-** When this key is on, it overwrites whatever is on the right of the cursor during text editing. Press it once to put it off.

- **Functional keys:-** These perform various functions depending on the application or program being used. Most applications for example use the F1 key to start their Help facility.

Uses of Some Keys

- **Print Screen:** This key enables the user to capture an exert image of whatever is currently being displayed on the screen.

- The **Alt, Esc, Ctrl** keys perform a variety of functions in various application programs. They can also be used in combination with other keys to perform certain tasks e.g Ctrl + Alt + Del can be used to restart the computer

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The Mouse

➢On modern computers especially personal computers (PCs), mice supplement keyboards as tools for entering certain commands.

➢The mouse employs the principle of moving a ball, which in turn moves rollers adjacent to it.

➢These then transmit the electrical codes that relocate the pointer or cursor on the different coordinates of the screen.

➢A mouse normally has a number of selection buttons associated with it (left/primary and right/secondary mouse buttons).

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Types of Mouse

➤ ***The Desktop Mouse:*** Commonly used with desktop computers, has two push buttons on top and a ball below it. Today we also see, PS/2, USB, Serial and Optical mice being used with PCs.

➤ ***Trackball Mouse:*** Here a rolling ball and buttons are embedded within the keyboard. It's commonly seen in earlier laptop computers.

➤ ***Touchpad Mouse:*** This one has a rectangular pad with two push buttons, the movement of a finger on the pad causes the mouse pointer to change positions accordingly. They are commonly seen in recent laptops today.

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Scanner

➢This is a device which can read, copy or scan data, say from a piece of paper into the computer memory for eventual reproduction e.g printing, appending say a picture into a text document, etc.

➢Scanners operate in a similar way like photocopiers; however in this case, the duplicate copies are not output on paper but transmitted as an image.

➢The image can be a document, a photograph, an artwork, e.t.c. Pen pocket readers use the scanners principle to read lines of text, which is displayed on the pen's screen or downloaded to a PC. Most pocket readers can translate the scanned text into another language other than the original.

➢Optical Character Reader(OCR), Optical Mark Reader(OMR), Magnetic Ink Character Reader(MICR), Bar Code Reader (BCR), Badge Readers use the same scanning principals.

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Joysticks and Game Pads

➤ There are used in playing modern computer games on domestic or recreational centers' computers.

➤ The game is played by the joystick or game pad controlling movement on the screen.

➤ The joystick is an analog – digital converter, whose input is the control lever movement, that can move sideways, upwards or downwards to control the cursor movement. It has the button for selecting the input just as the mouse.

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Digital camera's

➢These take photographs like the normal camera does. The major difference is that they do not create an image on a film as in the ordinary cameras, but instead the image is stored and later downloaded onto a PC for further editing and or printing.

Touch Sensitive Screens

➢ These are screens that can sense when a particular part of the screen is touched/pressed and hence respond accordingly.

➢ These are common with security systems, which can read finger prints of an individual. Most PDAs use touch screens as their basic input device.

➢ Some sophisticated mobile phones use touch screen digits instead of the usually common press button digits.

➢ The operator touches the surface of the screen, the touch impact is sensed by the unit and conveyed to go as computer input in terms of electronic signals.

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Light pens

- These are pens like device that is light sensitive and is hand held, it provide a direct input mode.

- Light pens commonly used in high tech designs, have a beam of light that is radiated onto different parts of a specialized screen which is able to sense light shining on the screen using special hardware and software.

- These beams of light are very small and sharp therefore very precise.

- They are intended for use in the so-called 'computer aided design' (CAD) used by engineers, artists, architects, designers etc.

Voice Recognition Equipment (VRQ)

➤ These VRQs include all types of microphones, which are used to capture sound.

➤ The computer normally senses the sound patterns and conveys these patterns to go as computer input in terms of digital patterns.

➤ Voice input is especially useful when the keyboard can not be used optimally.

➤ Most multimedia computers have at least one microphone. Musicians use multimedia computers to edit and record or computerize their musical tracks.

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Digitizers

- A digitizer is an input device that converts graphical drawings or images on the paper or other material into digital data and conveys them to go as computer input.

- The input drawings can be displayed or even be processed. One form of a digitizer is the graphic pad/tablet.

- The digitizers have got sensitive device incorporated on a special tablet on which the material to be digitized is placed. The digitizers are applied in for example signature verification in banks, where the signature on the pad is compared against the one formerly stored in the computer.

- They are also used in cartography (map making) and architectural drawings, to accurately trace out lines on a map.

The Processor Unit/Processing Devices

➢These are the hardware of the computer where data is converted into the required outputs / information.

➢It comprises the Arithmetic and logic unit, a control unit, and the primary storage/memory of the computer

➢This carries out a variety of activities that directs and controls the overall operation in the computer system i.e. the processing unit is the heart of the computer system.

➢It comprises the Arithmetic and logic unit, a control unit, and the primary storage/memory of the computer.

➢It interprets and executes the instruction. It also manipulate data to generate information and coordinate or to other components of the computer system.

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Control units

➤ The control unit (CU), as the name suggests, controls other hardware of a computer.

➤ The control unit controls those other hardware by interpreting computer instructions and directing the relevant hardware to act: for example, if a calculation is necessary, the control unit will interpret the instruction and direct the ALU to act.

Function performed by Control Unit

- Maintains order and control activities in CPU.

- Doesn't store data but directs sequences of all operation.

- Interprets instructions and gives commands.

- It communicates with input, outputs devices transfer data/results in to storage.

Arithmetic Logical Unit

➢This carries out all arithmetic and logical operations of computer.

➢Note it is faster than calculator being capable of processing mms of instructions per sec MIPS.

➢The ALU, as its name suggests, is responsible for carrying out arithmetic operations i.e calculations e.g adding, subtracting, dividing, multiplying etc.

➢ it is also responsible for 'logical operations': by 'logical operations', we mean the ability to see which one is greater (>), which one is smaller (<), whether the two are equal (=) etc.

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Memory/Primary storage

➢Computer memory acts as a "scratch pad" space where programs and data are kept during operation. Computer memory plays a vital role in computers, especially for the processor.

➢Microcomputers use two basic types of internal memory

ROM (READ ONLY MEMORY)

➢This type of memory usually forms a small proportion of main storage and is used to store only vital data and programs which need to be held within main storage art all times.

➢The programs may include those which instruct the computer on what to do when power is switched on. For example, checking whether the hardware components like the keyboard and monitor are connected properly

Other types of ROM on chips include;

➢ **PROM (Programmable Read Only Memory)**

This kind of memory can only be programmed once after it has been manufactured. Once programmed and the instructions stored, it can never be altered. This is common with compact disc writables. (Write once).

➢ **EPROM (Erasable Programmable Read Only Memory)**

With this kind of memory, instructions can only be erased once and then reprogrammed; afterwards, they can never be altered. For example, the compact disc re-writables.

➢ **EEPROM (Electronically Erasable Programmable Read Only Memory)**

This type of memory unlike the above three, enable a user put instructions in this memory as many times as one may like. This type of memory is evident in applications like most TVs, mobile phones, etc

RAM (RANDOM ACCESS MEMORY)

- This usually forms the major proportion of main storage. It is the one which is constantly being re-used for the temporally storage of the different data items or programs.

  RAM uses include:

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

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

- Temporary storage of a data items that have been input from the keyboard or other input device until when instructions call for the data to be transferred into the CPU for processing.

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CACHE MEMORY

➢Data that is being accessed frequently by the processor is usually stored in this type of extra high speed access memory.

➢The role of cache memory is therefore to provide a space for temporary storage of frequently accessed data.

➢Most modern computers today have only 256K or 512KB of cache pipeline burst RAM.

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OUTPUT HARDWARE/DEVICES:

➢When the computer has completed processing the data, the information produced must be output.

➢Computer output devices accept information from the Central Processing Unit (CPU) and produce it in a suitable form for us.

Forms of Computer Output

A computer can output information in one or more of the following forms.

➢Text

➢Graphics or images

➢Sound and

➢Computer usable form/output

OUTPUT HARDWARE/DEVICES:

The type of output device depends on whether a computer is to produce a hardcopy output (this is information recorded on a tangible medium e.g. on paper) or a softcopy

The principal output devices include;

➤ The Video Display Unit (VDU) or Monitor or Screen

➤ Speakers

➤ Plotters

➤ Printers

➤ Projectors

➤ 3-D Spectacles

➤ Facsimile machine

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SECONDARY STORAGE HARDWARE

➤ These are devices store electronic data permanently as long as device is not tamped with the stored information lasts a long period.

Examples of storage devices

➤ Magnetic tapes, floppy diskettes, hard disks, zip disks, compact disc (CDs), flash disks, e.t.c

Magnetic Tapes

➢They are storage devices commonly used for large computers, the so-called '*mainframes*' and '*mini*' computers. A computer has a slot where a tape is mounted, written on and read from called a '*tape drive*'

➢Magnetic tapes are used primary for backups and for archival

➢Their storage capacities range in between 20MB to 500MB depending on the type.

Some disadvantages

➢The original ones were as big as a projector film roll, up to 0.5 meter in diameter.

➢The sequential mode of data access was so inconveniencing

Floppy Diskettes

- These came into play to alleviate the shortcomings of the magnetic tapes.

- They are storage devices that are used to keep permanent copies data

- The floppy diskettes come in three sizes – the current $3^1/_2$" size, the old $5^1/_4$" type and the older 8" type

- The $3^1/_2$" High Density 1.44MB are now the most commonly used diskettes and these can accommodate a whole ream of text on paper

- The first drive is referred to as A (**A:** drive) any additional floppy drive is labeled with the next letter in the alphabet (**B:**).

-

Floppy Diskettes

- Floppy diskettes are designed in different capacities:

  === 3.5 " ===
  * low density capacity: 360kbytes * hi density capacity :
  720kbytes * double hi density: 1.44 megabytes
  === 5.25" or 5 1/4 " ===
  * low density: 360kbytes * high density: 1.2 megabytes

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Super Disk 120

➢ This is another type of floppy diskette of the modern developments in technology.

➢ They have capacities of up to 120MB. Their drives however are fully backward compatible with the conventional 1.44MB floppy diskettes.

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Magnetic Hard Discs

➢A hard disk is supplied with all microcomputers and is mounted inside the machine casing.

➢It's a metallic magnetic media

➢They are usually fixed within the computer cabinet and are therefore not very portable

➢Hard disks are faster in data access and have a higher storage capacity than floppy disks

Their major advantages include

➢ They have enormous storage capacities compared to other storage media e.g 20GB, 40GB, 80GB, 200GB, 400GB, e.t.c.

➢ Their data access time and speed is very fast and convenient i.e ten times that of a floppy diskette.

➢ Their data life is also very long

➢ Because they reside inside the computer casing, there are fewer chances of them being misplaced, stolen affected by factors such as moisture, durst, magnetic fields, e.t.c, therefore making them more secure.

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THE MAIN DISADVANTAGE

➤ These disks can also fail due to violent shaking or vibrations.

➤ -They are also susceptible to virus attacks, especially in unprotected systems, thereby causing vital data loss.

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Compact Disks (CDs)

➤ They are called compact disks (CD) because they are small with a diameter of 12cm and thickness of a few millimeters.

➤ The information on a Compact Disk is stored in a permanently accessible form.

➤ They have a slot in the computer called the CD drive for reading and writing.

➤ These use a special sharp laser beam to write/read/burn information in CDs. They commonly used for distributing computer software/programs

advantages

➤They are easily portable because of their small size.

➤-They have enormous storage capacities e.g 650MB, 700MB, 720MB and even 4.7GB for DVDs (Digital Versatile Disks)

➤Depending on the speed of the drive, their access speed is also very fast thus reducing access time.

➤ Their data life is also very long as long as they are kept well

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Zip disk

➢ These also employ a laser to read and or write on the disk.

➢ They have an internal or external slot for reading and writing called the Zip drive.

➢ They are suitable for backup storage or transferring large files say clip art, video or sound files.

➢ They have storage capacities, which range between 100MB to 2GB and they have a 30 year guaranteed data life.

➢ Most zip drives have the word Iomega written on them because Iomega is one of the most popular manufacturers of zip drives and disks.

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Flash disks

➢This is a recent technology in storage media.

➢Flash disks have enormous storage capacities e.g 256MB, 512MB, 1GB, 2GB, e.t.c and are easily portable.

➢They use a USB(Universal Serial Bus) port for data access and their data access is therefore very fast.

➢They however require high hardware and software resources to operate.

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MEASUREMENT OF CAPACITY

➤ Computers use the binary system of measurement as their basis of working, that is 0 and 1. Therefore computer memory is measured in terms of Binary digiTS (BITS), which are the 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 summarizes the equivalence of the various conventional units of bytes to the actual binary system of bytes

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MEASUREMENT OF CAPACITY

Measurement	Equivalence in bytes	Actual bytes
1 Binary digit (BIT, 0 or 1)	1 bit	
1 Nibble or 4 bits	0.5 byte	
1 Character or 8 bits	1 byte	2^0
1 KiloByte (KB)	1,000 bytes	1,024 or (2^{10})
1 MegaBytes (MB)	1,000,000 bytes	1,048,576 or (2^{20})
1 GigaBytes (GB)	1,000,000,000 bytes	1,073,741,824 or (2^{30})
1 TeraBytes (TB)	1,000,000,000,000 bytes	1,099,511,627,776 or (2^{40})

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COMPUTER SOFTWARE

INTRDUCTION

➢ The modern digital computer has one fundamental factor that distinguishes it from earlier mechanical computational devices.-

➢ The modern computer is able to perform long sequence of computations without interference from human unlike say the pocket calculator.

➢ This ability is within the software on the system, i.e. computer software

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COMPUTER SOFTWARE

Computer software is sub-divided into three main groups:

➢ System software

➢ Applications software.

➢ Programming languages

SYSTEMS SOFTWARE.

➢ These are the various programs that control the way a computer operates.

➢ They provide facilities that enhance the computers general operation.

➢ These software programs are written by computer manufacturers or professional system programmers.

➢ Systems software can be grouped into the following groups:

• Utilities

• Operating system

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UTILITIES

These are the programs used frequently to carry out routine jobs. Utilities can also be called service programs that are used to enhance the performance of the operating systems. The most common utilities are;

➢ File compression

➢ Diagnostic utility

➢ Disk scanner

➢ Disk defragmenter

➢ Uninstaller

➢ File viewer

➢ Backup utility

➢ Antivirus utility

➢ Screen saver

➢ Sorts for data sorting

➢ Merge utility, etc

COMPUTER OPERATING SYSTEMS

➢An Operating system is a suite of programs that manages the computer resources such as input/output transfers, memory and C.P.U time.

➢The operating system is a set of programs that coordinate the operation of all hardware and application software components of a computer.

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COMPUTER OPERATING SYSTEMS

- Operating systems carry out various "house keeping" routines like:

- Memory allocation and loading of programs

- Job scheduling

- Peripheral control

- Error reporting

- Interfaces the user or the operator to the system's hardware

- Keeping logging and accounting records in computer resources usage

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COMPUTER OPERATING SYSTEMS

The main operating systems on computers can be grouped into the following classes:

➢Desktop Operating Systems

➢Networking Operating Systems

➢PDA Operating Systems

➢Windows 2000 Operating Systems

➢Other Operating Systems.

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DESKTOP OPERATING SYSTEMS

Desktop operating systems are commonly used on personal computers; normally stand alone PCs.

These include:

DOS (DISK OPERATING SYSTEM)

➢There are two types of DOS, currently in use on microcomputers. These include PC-DOS, which was developed by the IBM Corporation and MS-DOS, which was developed by Microsoft Corporation.

MS-WINDOWS 95 and MS-Windows 98

➢The Microsoft Corporation developed these new operating systems, as a result of technological advancement over the window 3x.

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DESKTOP OPERATING SYSTEMS

OS/2(Operating System-2)

➢This is another desktop operating system, which offers multi-tasking abilities. It was designed for the IBM PS/2 model 50 and above, computers. Microsoft and IBM Corporations collaboratively developed this operating system.

BeOS.

➢Simple for Be Operating System is one of the recent developments in OS. It was built due to the increased demands in the multimedia industry for robust and larger file handling abilities. Its 64-bit file system can handle files of up to 18 million terabytes. This makes it ideal to handle files that include video, sound, and three-dimensional images. (3D-images.)

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WINDOWS 2000 OPERATING SYSTEM

➢Originally, called windows NT5, it is an operating system also from Microsoft It is both a desktop Operating System as well as a net work Operating System both for the small and big corporate organizations.

➢It has many new features than earlier Microsoft operating systems. Its main aim is reliability and manageability with the help of Active Directory.

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NETWORK OPERATING SYSTEMS:

➤ These are designed to be used on several computers that do exist on a network. Although at times they can be installed on stand- alone computers. Common examples include:

- **Novell Netware**
- **Windows NT 4.0**
- **UNIX**
- **LINUX**

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PDA OPERATING SYSTEMS

➢These are operating systems, which specifically designed for the hand held computers, personal digital assistants (PDAS) Normally this operating systems which are pen driven or touch sensitive come when they are already loaded in the computers ROM BISOS

➢Common examples include:

- **Windows CE**

- **(c) EPOC**

- **Palm OS**

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OTHER OPERATING SYSTEMS:

Examples include:

➤**Mac OS 8.5.** For Macintosh computers

➤**Arcon Risc OS.** For machines that use Arcon Risc processor.

➤**VMS** for the DECS minicomputers types,

➤ **VME** for the ICLs, minicomputers

➤**System-7** for the Apple Macs computers.

➤**C P/M** (Control programs for microcomputers)

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Programming langages

There are three types of programming languages.

➢ Machine language/machine code

➢ Low level languages LLL

➢ High level languages

Machine Language

➢ This is the type of languages that the machine can understand. It is the lowest level of programming languages.

➢ It is written in 1 and 0s hence very difficult to understand by programmers. This was the first type of languages to be used. Machine language executes various computer instructions to be able to effect an operation. **There are five basic types of machine instructions:-**

➢ **Input/output instruction**. These control the transfer of data between peripherals and the processor.

➢ **Arithmetic instructions**. These perform additions, substations, multiplications Division etc

➢ **Branch instructions.** These control repetitions and selections

➢ **Logic instructions.** These match and compare data items

➢ **Data handling instructions.** These move and manipulate data.

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Low Level Languages (LLL)

➢ This was developed to ease the problem of writing in machine language. It is sometimes called symbolic language. It uses mnemonic codes in place of the operation code part of instructions e.g. Add, sub, etc

- **Add-addition**

- **Sub-subtraction**

High Level Languages (HLL)

➢These were intended to reduce the limitations of low level languages mainly;

➢program writing is relatively time consuming business programmer

➢LLL are machine oriented i.e. each conforming to the instruction set of the machine on which they are used and therefore restricted to use on that machine.

➢HLL are intended to be machine independents and are program oriented languages (POLs). Source program are written in statements similar to English ie short English statements.

High Level Languages (HLL)

Features of HLLs

➢ They have an extensive vocabulary of words symbols and sentences

➢ programs a written in whole statements and translated into many machine code instructions

➢ Libraries of macro and sub routines can be incorporated

➢ Since they are program oriented languages, the programmer is able to work, at least to some extent independently of the machine

➢ A set of rules must be obeyed within writing a source program

High Level Languages (HLL)

Translation of HLL

- This is carried out by compliers or interpreters but they perform translation in two completely different ways.

Terminologies

- **Compilation**; this is a term used to describe the translation process from high level language to machine language

- **Complier**; this is manufacturers special written program which translate a high level source program into machine language.

- **Source program**; this is a name given to an original way (program) in which the language was written

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APPLICATIONS SOFTWARE

➢It refers to the programs which help the computer to work efficiently for a specific application.

➢The application program is developed to handle the organizations application requirements. That is, there are programs written o solve the problems of the organization a particular interest.

➢Application software can be classified as application packages and user applications

Application Off-shelf packages

➢ These are programs developed and supplied by the computer manufacturer or a software house.

➢ These are also commonly supplied by Applications Service Providers (ASP). The major categories include;

- Word processors
- Spreadsheets
- Presentation software
- Databases
- Desktop publishers
- Communication
- Computer Aided Design
- Accounting packages

Application Off-shelf packages

- Statistical packages
- Reference
- Project management
- Integrated software
- Educational
- Entertainment
- Multimedia authoring
- Video and Audio editing
- Image editing
- Personal Information Management
- Web page authoring
- Personal financial management, e.tc

Application Off-shelf packages

Advantages

➢They are readily available

➢They are cheap to buy and install

➢they are portable i.e. easily installed from one computer to another

➢they are user friendly because they have a lot of menu driven operations

➢New versions come to market quite often

➢Brand loyalty is greatly maintained

➢they have excellent documentation

➢There are extremely few, if any programming errors- bags. This is because they have been widely tested and approved

Application Off-shelf packages

Disadvantages

➢They are easily pirated ie illegally copied

➢They low efficiency of utilization because they are very many menu items some of which may not be used by an individual.

➢they have low use satisfaction

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Customized software or User Programs

➢ These are developed by the user to solve specific processing tasks within the organization so as to meet the requirements and the needs of the organization i.e. they are developed by programmers employed within the organization. Programmers develop programs as per the specification of the system analyst.

Customized software or User Programs

Advantages

➢ It fits the specification and requirement of the customer.

➢ The efficiency of its utilization is very high. All the menus included in the software are used.

➢ it is not easily pivoted

Customized software or User Programs

Disadvantages

➢ It is very expensive because the client has to shoulder the costs alone

➢ it is not readily available, thus if it got corrupted(spoiled) it would be very difficult to replace.

➢ it takes long to develop

➢ On a number of times, it contains a number of errors because it is not widely tasted by a number of people.

➢ New versions are more or less un-heard of .

➢ it is not easily installed from one computer to another ie their portability is highly limited.

They have very poor documentation

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…Thank you…

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