Senior Secondary School

COMPUTER SCIENCE

1

EDUBASE

SS1

COMPUTER SCIENCE

FIRST TERM

TABLE OF CONTENT

Week 1

Topic: Overview of a Computer System

Contents:

What is a Computer?

A computer is a mechanical programs machine that accepts data as input, store and manipulates the data through instructions in order to give output as information.

A Computer is an electronic device known to be a very powerful tool for processing data into meaning information in a faster, neater and cheaper form. The Computer System is one that is able to take a set of inputs, process them and create a set of outputs.

A Computer is a general-purpose device that can be programmed to carry out a set of arithmetic or logical operations automatically. Since a sequence of operations can be readily changed, the computer can solve more than one kind of problem. Conventionally, a computer consists of at least one processing element, typically a central processing unit (CPU), and some form of memory.

An INPUT consists of data or commands that are entered into the computer usually via an input device such as keyboard, mouse, scanner e.t.c. The role of an input is to provide data for further processing.

Processing is the stage where the input data is manipulated to produce meaningful information. Processing can include a number of stages, sorting, searching, calculating, graphing e.t.c The result obtained is called output.

An OUTPUT is the stage where information received via processing is presented to the user in suitable format. Most outputs involve converting digital data to a physical effect which a person can see or hear. You might be able to see your output via a print out or a display and also hear via music, voice training instructions.

Constituents of a Computer

The computer system has two main parts namely

1. Computer hardware
2. Computer software

Computer hardware: This refers to the physical things of a computer, things that can be seen, touched and handled. Example – the system unit and peripherals.

1. **The system unit**: This is the combination of the major parts of the computer which includes CPU, mother board, RAM, ROM, chipsets, power module, CMOS battery e.t.c
2. **The peripherals**: These are hardware parts used to enhance the capabilities of the computer or improve its performance. E.g keyboard, mouse, joystick, light pen, scanner, monitor, speaker, printer e.t.c

Computer software: Is a set of instructions or programs that direct the operation of the computer and devices attached to it. Computer software is any set of machine-readable instructions that directs a computer's processor to perform specific operations. Computer software contrasts with **computer hardware**, which is the physical component of computers.

The computer software can be divided into two – the system software and the application software.

1. **System software**: These are software used in performing basic tasks in order to manage a computer system. E.g. windows 95, 98, 2000, xp, vista, Windows 8, linux , computer antivirus, basic input-output systems, device drivers.

2. **Application software**: These are software used to perform specific task, processing data in the computer. Application software uses the computer system to perform special functions or provide entertainment functions beyond the basic operation of the computer itself. There are many different types of application software, because the range of tasks that can be performed with a modern computer is so largeE.g Ms word – for typing documents, Ms Excel – For accounting, Adobe photoshop – for editing pictures, Corel draw – for graphics designing, Ms powerpoint – For slide presentations.

3. **Malicious software** or **malware –** They are computer programs developed to harm and disrupt computers. As such, malware is undesirable. Malware is closely associated with computer-related crimes, though some malicious programs may have been designed as practical jokes.

Characteristics of a Computer

1. Accuracy and precision
2. High speed of operation
3. Reliability
4. Versatility
5. Automation
6. Speed
7. Storage.

ASSESSMENT.

1. Explain the term "Computer Hardware".

2. Explain the term “Computer Software”.
3. What are the components of computer hardware?
4. List three output services.

Week 2

Topic: History of Computer

The development of the first counting device has been dated to ancient times, a man called abacus used a counting device about 3000 years ago and from this time and man has continued to improve. Ancient methods of counting were through the use of fingers, stones, sticks and grains.

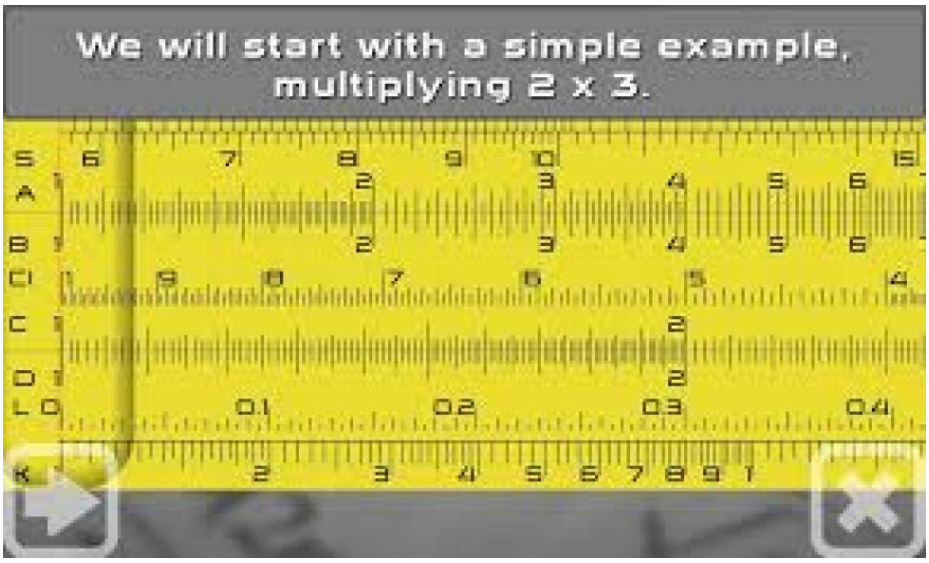
The **history of computer science** began long before the modern discipline of computer science that emerged in the 20th century, and hinted at in the centuries prior.The progression, from mechanical inventions and mathematical theories towards the modern computer concepts and machines, formed a major academic field and the basis of a massive worldwide industry.

The earliest known tool for use in computation was the abacus, developed in period 2700–2300 BCE in Summer . The Sumerians' abacus consisted of a table of successive columns which delimited the successive orders of magnitude of their sexagesimal number system. Its original style of usage was by lines drawn in sand with pebbles. Abaci of a more modern design are still used as calculation tools today

Charles Babbage is described as the 'Father of Computer'. Charles Babbage, an English mechanical engineer and polymath, originated the concept of a programmable computer. Considered the "father of the computer", he conceptualized and invented the first mechanical computer in the early 19th century. After working on his revolutionary difference engine, designed to aid in navigational calculations, in 1833 he realized that a much more general design, an Analytical Engine, was possible. The input of programs and data was to be provided to the machine via punched cards, a method being used at the time to direct mechanical looms such as the Jacquard loom. For output, the machine would have a printer, a curve plotter and a bell. The machine would also be able to punch numbers onto cards to be read in later. The Engine incorporated an arithmetic logic unit, control flow in the form of conditional branching and loops, and integrated memory, making it the first design for a general-purpose computer that could be described in modern terms as Turing-complete.

Mechanical devices

1. **Abacus**: It is the earliest form of computing system and was produced by the Chinese in the early age. It is made up of a frame, iron and beads in between them. They are used for counting and calculating. Also functions in adding and subtracting.
2. **Slide rule**: This is used for performing operation which involves multiplication and division.



Slide rule

Abacus

Electronic devices

1. **Pascal's calculating machine**: Blaise Pascal invented a hand operated calculator. This was operated by turning dials.
2. **Charles Babbage**: He was credited for the invention of modern computer and he was also called the Father of Computer. The machines he invented are called the "difference machine" and the 'Analyte machine'. In 1930, he used these machines to solve mathematical equations.

charles babbage Analyte machine

Pascal's calculating machine

The various generations of computers are listed below

(i) First Generation (1946-1954): In **1946** there was no 'best' way of storing instructions and data in a computer memory. There were four competing technologies for providing computer memory: electrostatic storage tubes, acoustic delay lines (**mercury or nickel**), **magnetic drums** (and disks?), and **magnetic core storage.**

The digital computes using **electronic valves** (Vacuum tubes) are known as first generation computers. The first 'computer' to use electronic valves (i.e. vacuum tubes). The high cost of vacuum tubes prevented their use for main memory. They stored information in the form of propagating sound waves.

The vacuum tube consumes a lot of power. The Vacuum tube was developed by Lee DeForest in 1908. These computers were large in size and writing programs on them was difficult. Some of the computers of this generation were: Mark I (electro-mechanical computer) built in 1944, ENIAC (First general purpose electronic computer) built in 1946, EDVAC (binary serial computer) built in 1950, EDSAC (first stored-program computer) built in 1949, UNIVAC (First Commercial Computer) built in 1951.

Other Important Computers of First Generation

Some other computers of this time worth mentioning are the Whirlwind, developed at Massachussets Institute of Technology, and JOHNNIAC, by the Rand Corporation. The Whirlwind was the first computer to display real time video and use core memory. The JOHNNIAC was named in honor of Jon Von Neumann. Computers at this time were usually kept in special locations like government and university research labs or military compounds.

Limitations of First Generation Computer

Followings are the major drawbacks of First generation computers-

1. *They used valves or vacuum tubes as their main electronic component.*

2. They were large in size, slow in processing and had less storage capacity.

3. They consumed lots of electricity and produced lots of heat.

4. Their computing capabilities were limited.

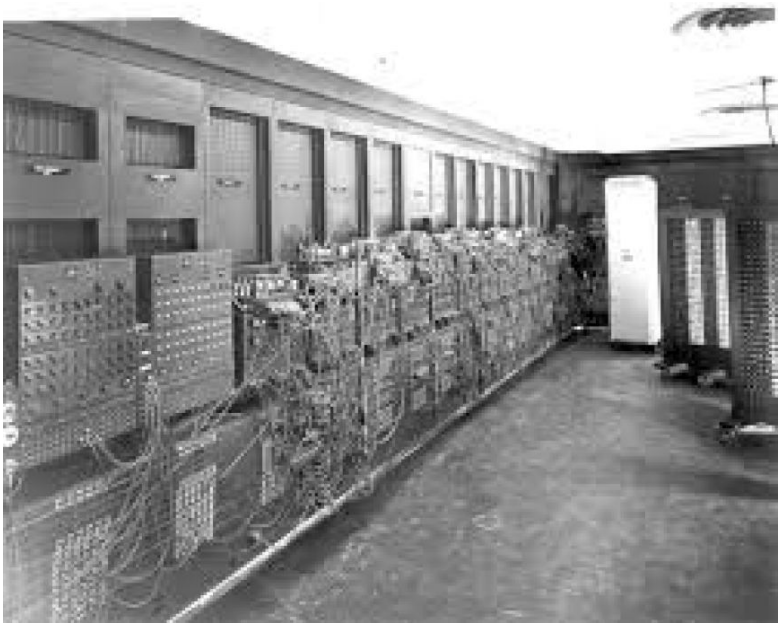
5. They were not so accurate and reliable.

6. They used machine level language for programming.

7. They were very expensive.

Example: ENIAC, UNIVAC, IBM 650 etc

ENIAC – Electronic Numerical Integrator and Calculator/Computer: This was developed by John Mauchly and J. Presper Eckert at the school of engineering of the university of Pennsylvania in 1946. It was the prototype from which most other modern computers evolved. ENIAC contained 17,648 vacuum tubes, 7,200 crystal diodes, 7,000 resistors, 1,500 relay, 10,000 capacitors and 60,000 manual switches and consumed 150watts of power. It has thirty separate unit power supply and forced air cooling. ENIAC also had a functioning unit that was equipped with local program control circuits and store a minimum of twenty 10digit decimal number. It uses card reader for input, card punch for output and the 1500 associated relays. ENIAC is used for arithmetic operations and to calculate the trajectory of artillery shells.



Eniac computer

UNIVAC – Universal Automatic Computer: This was the world's first commercially available computer developed by the same designers of ENIAC. It was used for general purpose computing with large amounts of input, output and storage capacity compared to earlier machines. UNIVAC was the first computer to come equipped with a magnetic tape unit and it is also the first computer to use buffer memory. It contains 5600 tubes, 18000 crystal diodes and 300 relays, internal storage capacity of 100 words or 1200 characters.

Univac Computer

(ii) **Second Generation (1955-1964):** The second-generation computer used **transistors** for CPU components & **ferrite cores for main memory** & **magnetic disks** for secondary memory. They used high-level languages such as **FORTRAN (1956), ALGOL (1960) & COBOL (1960 – 1961)**. I/O processor was included to control I/O operations.

Around 1955 a device called ***Transistor*** replaced the bulky Vacuum tubes in the first generation computer. Transistors are smaller than Vacuum tubes and have higher operating speed. They have no filament and require no heating. Manufacturing cost was also very low. Thus the size of the computer got reduced considerably.

It is in the second generation that the concept of Central Processing Unit (CPU), memory, programming language and input and output units were developed. The programming languages such as COBOL, FORTRAN were developed during this period. Some of the computers of the Second Generation were

1. **IBM 1620**: Its size was smaller as compared to First Generation computers and mostly used for scientific purpose.

2. **IBM 1401**: Its size was small to medium and used for business applications.

3. **CDC 3600**: Its size was large and is used for scientific purposes.

Features:

1. Transistors were used instead of Vacuum Tube.

2. Processing speed is faster than First Generation Computers (Micro Second)

3. Smaller in Size (51 square feet)

4. The input and output devices were faster.

Example: IBM 1400 and 7000 Series, Control Data 3600 etc.

Week 3

Topic: History of computer II

(iii) **Third Generation (1964-1977) :** By the development of a small chip consisting of the capacity of the **300 transistors**. These Integrated Circuits (IC) are popularly known as ***Chips***. A single IC has many transistors, registers and capacitors built on a single thin slice of **silicon**. So it is quite obvious that the size of the computer got further reduced. Some of the computers developed during this period were **IBM-360, IBM-370, and VAX-750**. Higher level language such as **BASIC (Beginners All purpose Symbolic Instruction Code)** was developed during this period. Computers of this generation were small in size, low cost, large memory and processing speed is very high. Very soon ICs Were replaced by **LSI (Large Scale Integration)**, which consisted about 100 components. An IC containing about 100 components is called LSI.

Features:

1. They used Integrated Circuit (IC) chips in place of the transistors.

2. Semi conductor memory devices were used.

3. The size was greatly reduced, the speed of processing was high, they were more accurate and reliable.

4. Large Scale Integration (LSI) and Very Large Scale Integration (VLSI) were also developed.

5. The mini computers were introduced in this generation.

6. They used high level language for programming.

Example: IBM 360, IBM 370 etc.

(iv) **Fourth Generation :** An IC containing about 100 components is called LSI (Large Scale Integration) and the one, which has more than 1000 such components, is called as **VLSI (Very Large Scale Integration)**. It uses *large scale Integrated Circuits* (LSIC) built on a single silicon chip called microprocessors. Due to the development of microprocessor it is possible to place computer's *central processing unit* (CPU) on single chip. These computers are called microcomputers. Later *very large scale Integrated Circuits* (VLSIC) replaced LSICs.

Thus the computer which was occupying a very large room in earlier days can now be placed on a table. The personal computer (PC) that you see in your school is a Fourth Generation Computer Main memory used fast semiconductors chips up to 4 M bits size. Hard disks were used as secondary memory. Keyboards, dot matrix printers etc. were developed. OS-such as **MS-DOS, UNIX, Apple's Macintosh** were available. Object oriented language, **C++** etc were developed.

Apple's Macintosh

Features:

1. They used Microprocessor (VLSI) as their main switching element.

2. They are also called as micro computers or personal computers.

3. Their size varies from desktop to laptop or palmtop.

4. They have very high speed of processing; they are 100% accurate, reliable, diligent and versatile.

5. They have very large storage capacity.

Example: IBM PC, Apple-Macintosh etc.

(v) **Fifth Generation (1991- till date) :** 5th generation computers use ULSI (Ultra-Large Scale Integration) chips. Millions of transistors are placed in a single IC in ULSI chips. 64 bit microprocessors have been developed during this period. Data flow & EPIC architecture of these processors have been developed. RISC & CISC, both types of designs are used in modern processors. Memory chips and flash memory up to 1 GB, hard disks up to 600 GB & optical disks up to 50 GB have been developed. fifth generation digital computer will be **Artificial intelligence**.

ASSESSMENT.

1. Who is the “father of computer”?
2. List and explain the various mechanical and electronic devices you know?
3. What are the limitations of first generation computers?
4. What are the features of the second generation of computers?
5. Which year was the fifth generation computer discovered?

Week 4

Topic: Input Devices

Input devices are equipment used to get instructions into the computer. It takes in data (facts) and instructions in a suitable form.

Types of input devices

- Keyboard
- Mouse
- Scanner
- Microphone
- Joystick
- Card reader
- Light pen
- Digital camera e.t.c

1. **Keyboard**: This is the most important input device used when working with a computer. It is used to type instructions that direct the computer on what task to perform. There are four types of keys on the keyboard.

- **Function key**: These are keys with f1, f2, f3 ….. f12 on the keyboard. They are used to give commands to the computer.
- **The alphabetic key**: These are the type writer keys (A-Z) on the keyboard. They are used for typing documents, letters and symbols e.t.c
- **The numerical keys**: The numeric keys contain numbers 0….9.
- **The special keys**: These include the arrow key, insert key, delete key, home key, backspace key, page up and down, control key and shift key e.t.c

There are two main types of keyboards, the QWERTY keyboard and the enhanced keyboard. The most commonly used keyboard is the QWERTY keyboard.

2. **Mouse**: The mouse is a pointing device used to give instructions to the computer. It is used to select and move items on the computer screen.

Mouse

Uses of Mouse

- It is used for dragging and dropping.
- It is used for making selections
- It is used to point at objects on the screen.

Types of Mouse

- The mechanical mouse
- Optical mouse
- Opto-mechanical mouse
- Cardless mouse

3. **Light Pen:** A **light pen** is a computer input device in the form of a light-sensitive wand used in conjunction with a computer's CRT display. It allows the user to point to displayed objects or draw on the screen in a similar way to a touchscreen but with greater positional accuracy.

light pen

4. **Scanner:** The scanner provides copy, fax, and scan-to-network capability. A scanner is a digital device that converts films, documents and photographic prints to digital images**.** A scanner is a device that captures images from photographic prints, posters, magazine pages, and similar sources for computer editing and display.

Scanner

5**. CPU (Central Processing Unit)**: The brain of the computer. The thing that carries out the tasks you give it. Better CPUs can perform more tasks at once, and perform them faster.

That said, not everyone actually takes advantage of their processor's full speed, so the high-end models are only really crucial.

CPU

6. **Fan**: To keep CPU cool and prevent overheating. A **computer fan** is any fan inside, or attached to, a computer case used for active cooling, and may refer to fans that draw cooler air into the case from the outside, expel warm air from inside, or move air across a heat sink to cool a particular component.

FAN

ASSESSMENT.

1. List the various input devices of a computer system?
2. What are the four types of keys on a keyboard?
3. List the types of mouse you know.
4. What are the functions of a mouse?

Week 5

Topic: Basic Functions and Uses

Content:

Basic Functions of a Computer

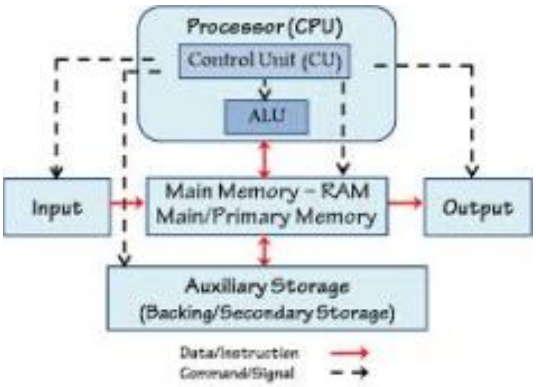
Uses of a Computer

BASIC FUNCTIONS OF A COMPUTER

All computers, from the smallest hand held computer to the largest supercomputer, perform the same basic functions with digital information. Those functions are:

- **Input** – Receiving or accepting information from outside sources. The most common way of performing this function is through the information entered through the keyboard and the click of mouse. Typing characters at a keyboard, moving the mouse around the screen or speaking to a computer.
- **Output** – The results of the processing are made available for use by any user or other devices. The most common ways of producing such outputs are through computer monitor, speakers, and printers. When a computer is connected to other devices, including through Internet, this output is in the form of electrical pulses. Displaying characters or pictures on the screen, printing a research paper, or sending an e-mail message.
- **Processing** – This is really the core of computer operation. The computer processes the data that is fed to the computer by various means and the data already contained in internal memory to produce the results that is the core of all computer application. E.g. Calculating the square root of a number, sorting a list of names, or producing a three-dimensional image
- **Storage** – Store information in the computer. The memory is stored in computer in in several different ways depending on how the information is used. For simplicity we will classify in two broad categories. First is the memory in the central processing unit of the computer, and second is the auxiliary memory. The auxiliary memory includes devices such as fixed hard drives. The information stored in computer can also be divided broadly used in two categories. The user data and the instructions used for internal operation and processing in the compute. These instruction are what we call computer programs or software. E.g. Saving your research paper or resume, keeping track of your credit card purchases, or archiving digital pictures of your relatives

- **Retrieve** – E.g. Recalling a list of addresses or business contacts



USES OF COMPUTER

Computer can be used in all aspects of our everyday lives.

1. **Education :** Getting the right kind of information is a major challenge as is getting information to make sense. Research shows that computers can significantly enhance performance in learning. Students exposed to the internet say they think the web has helped them improve the quality of their academic research and of their written work. Lots of academic information are available on the internet.

2. **Health and Medicine**: All medical information and patient records can now be digitized. Software is now able to check the risk of a disease through computer usage. Mental health researchers are using computers to screen troubled teenagers in need of psychotherapy.

3. **Defence**: a) Computers are used in helping the military find out where all their assets are (Situational Awareness) and in Communications/Battle Management Systems. b) Computers are used in the logistic and ordering functions of getting equipments to and around the battlefield. c) Computers are used in tanks and planes and ships to target enemy forces, help run the platform and more recently to help diagnose any problems with the platforms. d) Computers help design and test new systems.

4. **Sports**: In today's technologically growing society, computers are being used in nearly every activity such as recording information, analyzing athlete's movement, score board e.t.c

5. **Government**: Various departments of the Government use computer for their planning, control and law enforcement activities. To name a few – Traffic, Tourism, Information & Broadcasting, Education, Aviation and many others.

ASSESSMENT.

1. What are the basic functions of a computer?
2. List and explain the uses of a computer?

Week 6

Topic: BASIC LANGUAGE

BASIC LANGUAGE/SIMPLE LANGUAGE

A computer language is a special language understood by a computer. It consists of various commands that we give to the computer to do any work.

BASIC (an acronym for **Beginner's All-purpose Symbolic Instruction Code)** is a family of general-purpose, high-level programming languages whose design philosophy emphasizes ease of use.

A computer language is a set of words, symbols and codes that are used to write a computer program. The process of writing these instructions (program) is called PROGRAMMING. The people who write these programs are called PROGRAMMERS.

Human beings understand a variety of spoken languages (English, Hausa, Igbo and so on) but computer cannot understand these languages. Computer can only understand on language, that is the machine language.

Computer uses machine language to carryout their jobs. This language uses binary digits, 0 and 1, which stand for 'off and on' condition of the electric current. It is difficult for the programmer to write the program directly in terms of these digits. So, they write their program in a language called Programming Language.

Programming language code programs in such a manner that the computer can understand them and decode (translate) them into its machine language.

CATEGORIES OF PROGRAMMING LANGUAGE

There are a number of programming languages available nowadays. Some languages are developed for specific computer, other were developed for specific uses, such as scientific or business application.

Programming languages are classified into two major categories.

1. **LOW LEVEL LANGUAGE**: Low level languages are written to run one particular computer and cannot be easily used on another computer. These languages are difficult for a common programmer to learn

- **Machine Language**: A machine language is a language directly understood by a computer without any translator. It refers to 0's and 1's that the computers understand as instruction. Due to this reason, it is also called a low level language or the first generation language. Writing or coding of programs in the 1s and 0s of machine can be boring and can take a lot of time.

- A machine language program written in assembly language uses a short sequence of letter called mnemonic code like A for addition, C for comparison, L for loading and M for multiplying. As the computer only understands machine languages, you have to convert these mnemonic codes to machine language (0s and 1s). To convert these mnemonic codes into machine language requires the use of translators. An assembler is a program used to translate assembly language into machine language so that the computer can understand it.

2. **HIGH LEVEL LANGUAGE**: A high level language has the instructions which are similar to English language. It is very user friendly. It is much easier to understand and write with a program using this language. The greatest advantages of these languages are its independence. A program written in HLL can be used on almost all computers without any change. The instructions written in HLL are also converted into machine language with the help of translators. Interpreter and compiler are two program used to translate a high level language into machine language so that the computer can understand it.

- **Third generation language**: Third generation language uses English – like words to make it easy for the programmer to write the program. For example, a programmer writes ADD for addition and PRINT for print. Many third generation language also use arithmetic operation such as * for multiplication and + for addition. A third generation program is called source program, which must be translate into machine language before the computer can understand it. Compiler and interpreters are the program used to perform the translation for third generation language. BASIC, COBOL, PASCAL, and FORTRAN are example third generation language.

- **Fourth generation language**: The fourth generation language also uses English like statement. A fourth generation language is fast and requires much less time and effort on the part of the programmer. In fact, fourth generation language is so easy that the user with very little program background can develop programs while using it. VISUAL BASIC, ORACLE, JAVA e.t.c are example of fourth generation language.

- **Natural language**: A natural language program does not follow a specific set of rules unlike the fourth generation language. A natural language, sometimes called fifth generation language is a type query language that allows the user to enter request that resembles the speech. Natural languages are often associated with expert system and artificial intelligence.

These systems are popular in the medical field, but are not widely used in business application.

SOME HIGH LEVEL PROGRAMS

1. **BASIC**: It stands for Beginner's all purpose symbolic instruction code. It is a programming language used by beginners
2. **LOGO**: It stands for Language of Graphics Oriented. It is a programming language used to draw different shapes and figure.
3. **COBOL**: It stands for common business oriented language. This language is specially designed for business application
4. **FORTRAN**: It stands for 'Formula Translation'. It is one of the oldest high level languages. This language was designed to solve scientific problems
5. **C AND C++**: They are the general purpose programming languages popular on minicomputer and microcomputer. They are the most widely used language for developing commercial applications.
6. **JAVA**: Java is a programming language developed to write programs. It helps in creating games and animation and in developing multimedia effect for the internet.

TYPICAL BASIC KEYWORDS

Data Manipulation

- LET: assigns a value (which may be the result of an expression) to a variable.
- DATA: holds a list of values which are assigned sequentially using the READ command.

Program Flow Control

- IF ... THEN ... ELSE: used to perform comparisons or make decisions.
- FOR ... TO ... {STEP} ... NEXT: repeat a section of code a given number of times. A variable that acts as a counter is available within the loop.
- WHILE ... WEND and REPEAT ... UNTIL: repeat a section of code while the specified condition is true. The condition may be evaluated before each iteration of the loop, or after.
- DO ... LOOP {WHILE} or {UNTIL}: repeat a section of code Forever or While/Until the specified condition is true. The condition may be evaluated before each iteration of the loop, or after.

- GOTO: jumps to a numbered or labelled line in the program.
- GOSUB: jumps to a numbered or labelled line, executes the code it finds there until it reaches a RETURN Command, on which it jumps back to the operator following the GOSUB – either after a colon, or on the next line. This is used to implement subroutines.
- ON ... GOTO/GOSUB: chooses where to jump based on the specified conditions. See Switch statement for other forms.
- DEF FN: a pair of keywords introduced in the early 1960s to define functions. The original BASIC functions were modelled on FORTRAN single-line functions. BASIC functions were one expression with variable arguments, rather than subroutines, with a syntax on the model of DEF FND(x) = x*x at the beginning of a program. Function names were originally restricted to FN+one letter.

Input and Output

- PRINT: displays a message on the screen or other output device.
- INPUT: asks the user to enter the value of a variable. The statement may include a prompt message.
- TAB or AT: sets the position where the next character will be shown on the screen or printed on paper.

Miscellaneous

- REM: holds a programmer's comment or REMark; often used to give a title to the program and to help identify the purpose of a given section of code.
- USR: transfers program control to a machine language subroutine, usually entered as an alphanumeric string or in a list of DATA statements.
- TRON: turns on a visual, screen representation of the flow of BASIC commands by displaying the number of each command line as it is run. The TRON command, largely obsolete now, stood for, TRace ON. This meant that command line numbers were displayed as the program ran, so that the command lines could be traced. This command allowed easier debugging or correcting of command lines that caused problems in a program. Problems included a program terminating without providing a desired result, a program providing an obviously erroneous result, a program running in a non-terminating loop, or a program otherwise having a non-obvious error.
- TROFF: turns off the display of the number of each command line as command lines run after the command TRON has been used.
- ALT+CTRL+DEL: For re-booting a computer

ASSESSMENT.

1. What is a computer language?
2. The process of writing instructions for the computer is called?
3. List and explain the various categories of programming languages.
4. List and explain the types of High Level programs.

Week 7

Computer Hardware/Software

Computer Hardware are the physical elements or the equipment of the computer. Examples include the keyboard, monitor, mouse and the processing unit etc. In other words, ***Computer Hardware*** is the physical components of a computer which can be touched and felt. They are tangible. On the other hand however, ***Computer Software*** *"is that part of a computer system that consists of data or computer instructions, in contrast to the physical hardware from which the system is built. In computer science and software engineering, computer software is all information processed by computer systems, programs and data. Computer software includes computer programs, libraries and related non-executable data, such as online documentation or digital media. Computer hardware and software require each other and neither can be realistically used on its own."*

Components of computer hardware

1. *Input/output*
2. *System unit*
3. *Processing unit*
4. *Storage devices*

- **Input devices** are hardware devices which take information from the user of the computer system, convert it into electrical signals and transmit it to the processor. The primary function of input devices is to allow humans to interact with the computer system. For instance a mouse allows the user to control the movement of the pointer (a common element in user interface design).
- **Output devices** take data from the computer system and convert it to a form that can be interpreted by humans. For instance a monitor creates a visual electronic display to output information created by the processor to the user.
- **System Unit** is a box-like case that contains the electronic circuits that cause the processing of data to occur. Part of the computer system where the computing is done. This is where the computer programs are executed and the data is

manipulated. It consists of the Central Processing Unit (CPU), memory (Random Access Memory-RAM), and other electronics.

- **Processing devices** are the components responsible for the processing of information within the computer system. This includes devices such as the CPU, memory and motherboard.
- **Storage devices** are components which allow data to be stored within a computer system. This includes devices such as hard disk drives and compact disk drives.

Basic input services

1. *Keyboard*
2. *Mouse*
3. *Scanner*
4. *Touch pad*

Output devices

1. *Speaker*
2. *Monitor*
3. *Printer etc*

Other parts of the computer (Software)

- **Arithmetic/logic unit**
    - Contains the electronic circuitry necessary to perform arithmetic and logical operations on data.
- **Communications Devices**
    - Enable a computer to connect to other computers. Devices that enable a computer to connect to other components; includes modems and network interface cards.
- **Control Unit**
    - The component in any computing system that works in coordination with the central processing unit to instruct, maintain and control the flow of information.
- **Central Processing Unit (CPU)**

- The component in any computing system that represents the circuitry necessary to interpret and execute program instructions, it consists of the Control Unit, arithmetic/logic unit and the controller.. It is the corollary to the brain in organic systems.

ASSESSMENT

1. List 4 input devices
2. List 3 output devices
3. What is a computer hardware?
4. List 3 components of a computer hardware.

Week 8

Computer Output Devices

DEFINITION OF COMPUTER OUTPUT DEVICES

Computer Output Devices are various types of *computer hardware* which uses data and commands from the computer itself to perform assigned tasks. In other words, the output devices facilitate data processing by carrying out commands given by the computer. They convert electronically-generated information into human-readable forms.

TYPES OF OUTPUT DEVICES:

There are three types of output devices. These are discussed below-

Graphics Output (Visual): This is an output device that enables graphical contents to be displayed for viewing; usually on screen. These contents could be texts, images or moving pictures (videos). Please note that prior to being displayed on your computer screen, graphic files are stored on your computer, and they do not have physical size until they are displayed on screen or printed on paper. In this light therefore, graphics output devices are important for a wholesome use of the computer system.

Tactile Output: These types of computer output devices are also used for displaying objects but mainly in the form of printing. Tactile output devices are also described as "handheld devices that use an array of vibrating pins to present a tactile outline of the characters or text under the viewing window of the device."

Audio Output: These include everything from speakers to headphones and every audio-related devices that are used for the purpose of interpreting information from the computer system; albeit in an audio format. These information could include audio-texts, music and other sounds.

EXAMPLES OF OUTPUT DEVICES:

1. Computer Screens/Monitors
2. Digital Projectors

3. Printer
4. Speakers/Headphones
5. GPS
6. Braille Reader etc

ASSESSMENT.

1. Define computer output devices.
2. List and explain the types of output devices.
3. List the examples of output devices.
4. List and explain the types of printers.

Week 9

OUTPUT DEVICES (PRINTER):

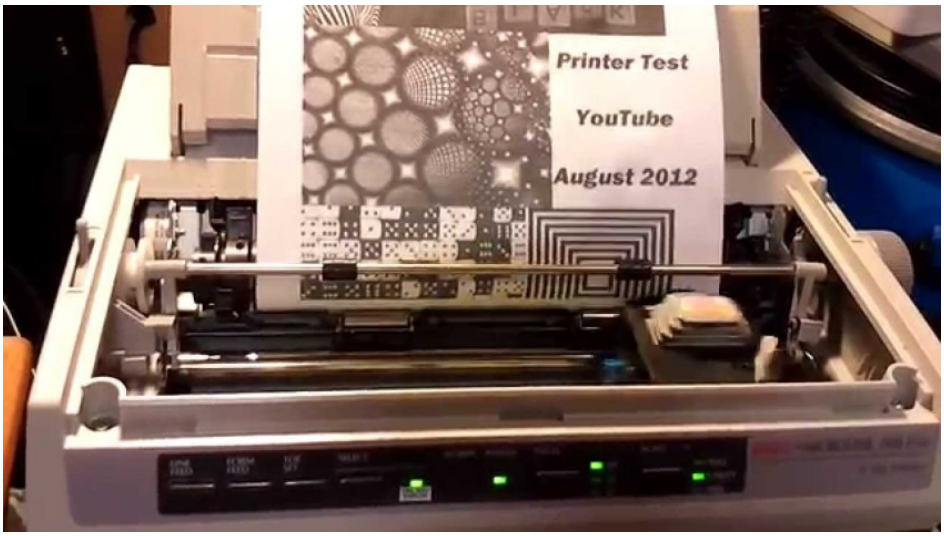
WHAT IS A PRINTER?

A printer can be defined as an external output device that facilitates the production of electronic data into hard copy formats. In other words, a printer will enable you to generate a physical (hard copy) file of your document. In various offices and schools, people print several copies of their work reports and assignments using the computer. Indeed, printers are important computer output devices used for printing several types of documents; mainly texts and pictures. There are also various types and variants of printers as you shall see shortly.

TYPES OF PRINTERS

In computer science, we have two major types of printers. These are Impact and Non-impact printers. These types of printers shall now be separately defined and discussed below-

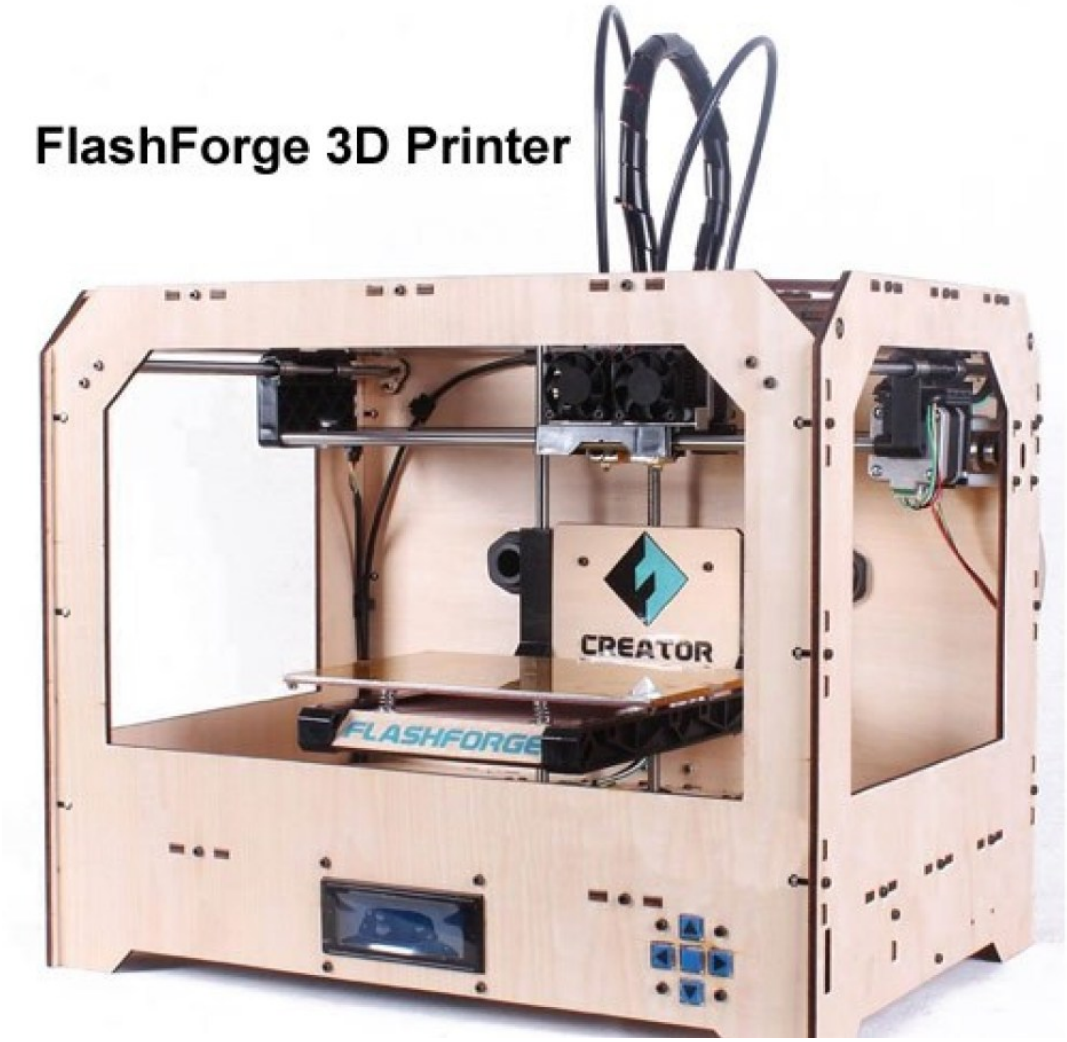
Impact Printer: Impact is a process of printing by which a printer works by banging a needle against an ink ribbon and making marks on the paper in the process. In other words, this type of printers work by hammering strikes against the paper through an ink ribbon. Though its printing quality is fairly good, impact printing has its demerits, chief among which is its excessive noise-making due to the constant banging of needles against the ink ribbons. Examples of Impact Printers are daisy-wheel printers, dot-matrix printers and line printers. These types of printers sharply contrast with laser and ink-jet printers which shall be discussed shortly under Non-impact printers.



Non-Impact Printer: These are printers which do not have to strike against a ribbon before texts or images can be printed on papers. Examples of such include laser printers, ink-jet printer, LED page printer. In this vein, non-impact printers are very much unlike printers like the dot-matrix printer which (although the printing quality is good) makes a lot of noise due to the constant hammering. Most people currently use the non-impact printing system because it is noiseless while producing good quality prints. Above all, it is very fast too.

EXAMPLES OF PRINTERS

- **3D Printer:** A **3D printer** can create physical objects from a digital model of such objects by using materials such as metal alloys, polymers, or plastics. It was created Created in the year 1984 by a scientist called Charles Hull.



Other examples of printers include the following:

- All-in-one (AIO) printer
- Dot matrix printer
- Inkjet printer
- Laser printer
- LED printer
- Multifunction printer (MFP)

- Plotter
- Thermal printer

ASSESSMENT.

1. Define computer output devices.
2. List and explain the types of output devices.
3. List the examples of output devices.
4. List and explain the types of printers.

SS1

COMPUTER SCIENCE

SECOND TERM

TABLE OF CONTENT

Week 1:

Computer System Software

Understanding Computer System Software

This is in contrast to hardware; it is the invisible part of a computer system. These set of software are provided by the manufacturer to assist the computer operators/users to make the best use of their machine as distinct from the specific programs written to solve specific problems.

Software is generally categorised into two:

- System software
- Application software

1. **System software**: This software contributes to the control and performance of the computer system. The collective name of the programs is system software or utility software. System software can further be sub-divided into – a. operating system, b. translators, c. utilities. System software is a type of computer program that is designed to run a computer's hardware and application programs. If we think of the computer system as a layered model, the system software is the interface between the hardware and user applications.The operating system (OS) is the best-known example of system software. The OS manages all the other programs in a computer.**Other examples of system software and what each does:**
    - The BIOS (basic input/output system) gets the computer system started after you turn it on and manages the data flow between the operating system and attached devices such as the hard disk, video adapter, keyboard, mouse, and printer.
    - The boot program loads the operating system into the computer's main memory or random access memory (RAM).
    - An assembler takes basic computer instructions and converts them into a pattern of bits that the computer's processor can use to perform its basic operations.
    - A device driver controls a particular type of device that is attached to your computer, such as a keyboard or a mouse. The driver program converts the

more general input/output instructions of the operating system to messages that the device type can understand.

    - According to some definitions, system software also includes system utilities, such as the disk defragmenter and System Restore, and development tools such as compilersand debuggers.

- **Operating system**: A computer cannot understand instructions without the operating system. OS is a set of instruction (programs) designed to efficiently manage the resources of the computer system. Operating system supervises the input and output operation, communicating with the operator and allocating the computer resources to allow the operation of the computer to progress smoothly with minimum intervention.

An operating system performs these services for applications:

- In a multitasking operating system where multiple programs can be running at the same time, the operating system determines which applications should run in what order and how much time should be allowed for each application before giving another application a turn.
- It manages the sharing of internal memory among multiple applications.
- It handles input and output to and from attached hardware devices, such as hard disks, printers, and dial-up ports.
- It sends messages to each application or interactive user (or to a system operator) about the status of operation and any errors that may have occurred.
- It can offload the management of what are called *batch* jobs (for example, printing) so that the initiating application is freed from this work.
- On computers that can provide parallel processing, an operating system can manage how to divide the program so that it runs on more than one processor at a time.

Examples of Operating System

- Ms DOS: Microsoft Disk operating system commonly
- Noval: This is usually used in a network environment and linked together to share resources.
- UNDC: Usually used in a multiuser environment where many people can use one log computer at the same time.
- Windows Operating System: Can be defined in a single microcomputer or in a network environment.

Functions of the Operating System

All operating systems must be the same and can be divided into 3:

Allocating system resources: Operating system directs the traffic (movement) inside the computer deciding what resources will be used and for how long.

- **Time**: The CPU time is divided into time slices which are measured in milliseconds. When a task starts, a certain number of time slices is assigned. When the time expires, another task gets the turn to start; the first task must wait until it has another turn. Tasks are assigned so that the high priority task gets more time slices than the low priority task.
- **Memory**: The memory must be managed at all times. One way to help the traffic arm is to use virtual memory, which includes disk space as main memory. It is slower to put data on hard disk but it increases the amount of time. When the memory gets full, some of the data is paged out to the hard disk. This is called swapping.
- **Input and output flow control**: The OS reads data that are coming in data form from the disk and signals the printer to print and send data. To speed up the output to the printer, most OS allows print spading, where the data to be printed is first put in file, this helps to sped up the process.

Breakdown of Operating System Functions.

1. Boot process: When the computer is switched on the boot program that is resided in Rom initialize the setup of the computer, the then load the rest of the operating system from the banking storage (hard ware) in the RAM.
2. Operating system does the work of sharing and accounting of the computer resources
3. Operating system handles the input and output of data and information.
4. Operating system handles the management of memory.
5. Operating system handles the management of the hardware.
6. Operating system handles multitasking and multi programming.
7. Operating system handles protection and error trending.
8. Operating system acts as an interface between the user and the computer
9. Operating system controls interaction and program control

ASSESSMENT

1. Computer system software is the ___ part of the computer
   (a) visible
   (b) invisible
   (c) hard
   (d) soft

2. Software contributes to the ____ and ____ of the computer system
   (a) hard and soft
   (b) clean and unclean
   (c) straight and crooked
   (d) control and performance

3. The set of instructions designed to efficiently manage the resources of the computer system is known as
   (a) conducting system
   (b) producing system
   (c) software system
   (d) operating system

4. Examples of operating systems are the following except
   (a) MS DOS
   (b) Noval
   (c) Doors
   (d) Windows

5. RAM means
   (a) Routing Access Memory
   (b) Return Access Memory
   (c) Round Access Memory
   (d) Random Access Memory

ANSWERS

1. b
2. d
3. d
4. c
5. d

Week 2:

Computer Application Software

Application Software

Application software is a programme or group of programmes designed for end users. This software can be divided into classes: system software and application software. **Application software** is a set of computer programs designed to permit the user to perform a group of coordinated functions, tasks, or activities. Application software cannot run on itself but is dependent on system software to execute. Examples of an application include a word processor, a spreadsheet design and management system, an aeronautical flight simulator, a console game, a drawing, painting, and illustrating system, or a library management system.

Computer application software are so numerous. The different types of application software are:

- Office application
- Business application
- Accounting application
- Scientific application
- Industrial applications
- Games

a. **Office/business application**: Computer has become very important in offices and business world including bank, aviation, industry and communication organisations. Before now, there were lots of paper works in offices but today, the computer has reduced this as lots of information are stored directly into it. Eg of various business application are

- Payroll system: used to prepare staff salaries.
- Invoice control: given to a customer after a purchase has been made.
- Stock control: used in supermarket and departmental stores to keep a record of purchases made by customers and to know the current stock of goods in the store.

- Bank transaction such as deposit, withdrawal, funds transfer and customer information unit are all done in the bank.

b. **Scientific/industrial application**: Computers are used for scientific research, weather forecast, space exploration, and laboratory tests – manual and automated e.t.c.

c. **Games**: There are different kinds of games that can be played through the use of the computer system. E.g spider solitaire, card games, chess e.t.c.

d. **Application Suite**: Has multiple applications bundled together. Related functions, features and user interfaces interact with each other.

e. **Enterprise Software**: Addresses an organization's needs and data flow in a huge distributed environment.

f. **Enterprise Infrastructure Software**: Provides capabilities required to support enterprise software systems.

g. **Information Worker Software**: Addresses individual needs required to manage and create information for individual projects within departments.

h. **Content Access Software**: Used to access contents and addresses a desire for published digital content and entertainment.

i. **Educational Software**: Holds contents adopted for use by students.

j. **Media Development Software**: Addresses individual needs to generate and print electronic media for others to consume.

Examples of Application Software

Microsoft Word is a popular word-processing application that is included in the **software suite** of applications called Microsoft Office. A software suite is a group of software applications with related functionality. For example, office software suites might include word processing, spreadsheet, database, presentation, and email applications.

Graphics suite such as Adobe creative suite includes application for creating and editing images while Sony Audio suite is for Audio production.

ASSESSMENT

1. Application software is a programme or group of programmes designed for
   (a) manufactures
   (b) end users
   (c) retailers
   (d) engineers

2. Application software permit the user to perform the following operations except
   (a) coordinated functions
   (b) tasks
   (c) activities
   (d) reboot

3. One of these is not a type of application software
   (a) office software
   (b) business software
   (c) RAM software
   (d) games

4. Word processing, spreadsheet, database, presentation are all examples of
   (a) Enterprise software
   (b) games
   (c) accounting software
   (d) office software

5. The application software that holds contents adopted for use by students is
   (a) educational software
   (b) business software
   (c) office software
   (d) games

ANSWERS

1. b
2. d
3. c
4. d
5. a

Week 3:

Topic: Programming Language

Programming Language

This is a process that results in the development of a set of detailed instructions following a pattern of a particular programming language necessary to solve a problem. A **programming language** is a formal constructed language designed to communicate instructions to a machine, particularly a computer. Programming languages can be used to create programs to control the behavior of a machine or to express algorithms. A vocabulary and set of grammatical rules for instructing a computer to perform specific tasks. High-level programming languages, while simple compared to human languages, are more complex than the languages the computer actually understands, called *machine languages*. Each different type of CPU has its own unique machine language.

Levels of Languages

Each language has a unique set of keywords (words that it understands) and a special syntax for organizing program instructions.

- Machine language
- Low level language
- High level language
- Natural level language

1. **Machine language**: This was the first level of language known to man. It involves the use of binary digits ie 0s and 1s to write programs and instructions.
2. **Low level language**: This was the next language developed after the machine language. It involves the use of binary code.
3. **High level language**: They are highly developed languages and are currently used by programmers in the world today. It involves the use of English to write programming instructions. The invention of high level language has made it easy for programmers to develop programs in the shortest possible time.

Types of high level programs

- BASIC
- FORTRAN
- COBOL
- PASCAL
- C – Language (C++)
- JAVA

4. **Natural language**: This involves different types of languages known to mankind e.g. Igbo, Yoruba, Hausa, Chinese, Ghanaian languages.

ASSESSMENT

1. _____ is a formal constructed language designed to communicate instructions to a machine, particularly a computer
   (a) programming language
   (b) natural language
   (c) Igbo language
   (d) Yoruba language

2. Levels of language include the following except
   (a) Machine language
   (b) human language
   (c) low level language
   (d) high level language

3. The language the computer actually understands is called
   (a) man language
   (b) animal language
   (c) machine language
   (d) mechanics language

4. ____ involves the use of the use of binary digits i.e. Os and 1s
   (a) low level language
   (b) machine language
   (c) natural language
   (d) high level language

5. These are examples of high level programs except
   (a) FORTRAN
   (b) COBOL

(c) JAVA
(d) D++

ANSWERS

1. a
2. b
3. c
4. b
5. d

Week 4:

Topic: Translators

Introduction

Translators are highly developed programs capable of converting high level language to machine language, low level language to machine language. A **translator** is a **computer** program that performs the translation of a program written in a given programming language into a functionally equivalent program in a different **computer** language, without losing the functional or logical structure of the original code (the "essence" of each program).

Types of translators

- Assembler
- Compiler
- Interpreter
-
    - If the translator translates a high level language into another high level language, it's called a translator or source-to-source compiler. Examples include Haxe, FORTRAN-to-Ada translators, CHILL-to-C++ translators, PASCAL-to-C translators, COBOL (DialectA)-to-COBOL(DialectB) translators.
    - If the translator translates a high level language into a lower level language it is called a compiler. Notice that every language can be either translated into a (Turing-complete) high level or assembly language.
    - If the translator translates a high level language into an intermediate code which will be immediately executed it is called an interpreter.
    - If the translator translates target/machine code to source language it is called a decompiler. Example: DCC, Boomerang Decompilers and Reverse Engineering Compiler(REC).
    - If the translator translates assembly language to machine code it is called an assembler. Examples include MASM, TASM and NASM.
    - If the translator translates machine code into assembly language it is called a disassembler. Examples include gdb, IDA Pro and OllyDbg.

- Translators that translate from a human-readable design specified in terms of rules and high level functions, into the equivalent logic gates and chip layout needed to achieve its manufacture, belong to electronic design automation and hardware description language categories.

1. Assembler: This is a translator that is capable of converting low level language to machine language directly. An **assembler** translates assembly language into machine code. Assembly language consists of mnemonics for machine opcodes so assemblers perform a 1:1 translation from mnemonic to a direct instruction.
For example: LDA #4 converts to 0001001000100100

Advantages of using an Assembler:

➕ Very fast in translating assembly language to machine code as 1 to 1 relationship

➕ Assembly code is often very efficient (and therefore fast) because it is a low level language

➕ Assembly code is fairly easy to understand due to the use of English-like mnemonics

Disadvantages of using Assembler:

➖ Assembly language is written for a certain instruction set and/or processor

➖ Assembly tends to be optimised for the hardware it's designed for, meaning it is often incompatible with different hardware

➖ Lots of assembly code is needed to do relatively simple tasks, and complex programs require lots of programming time

2. Compiler: This is a translator that is capable of converting high level language to machine language directly. A **Compiler** is a computer program that **translates code** written in a high level language to a lower level language, object/machine code. The most common reason for translating source code is to create an executable program (converting from a high level language into machine language).

Advantages of using a compiler

➕ Source code is not included, therefore compiled code is more secure than interpreted code

➕ Tends to produce faster code than interpreting source code

Produces an executable file, and therefore the program can be run without need of the source code

Disadvantages of using a compiler

Object code needs to be produced before a final executable file, this can be a slow process

The source code must be 100% correct for the executable file to be produced

3. Interpreter: An interpreter program executes other programs directly, running through program code and executing it line-by-line. As it analyses every line, an interpreter is slower than running compiled code but it can take less time to interpret program code than to compile and then run it — this is very useful when prototyping and testing code. Interpreters are written for multiple platforms, this means code written once can be run immediately on different systems without having to recompile for each. Examples of this include flash based web programs that will run on your PC, MAC, games console and Mobile phone.

Advantages of using an Interpreter

Easier to debug(check errors) than a compiler

Easier to create multi-platform code, as each different platform would have an interpreter to run the same code

Useful for prototyping software and testing basic program logic

Disadvantages of using an Interpreter

Source code is required for the program to be executed, and this source code can be read making it insecure

Interpreters are generally slower than compiled programs due to the per-line translation method

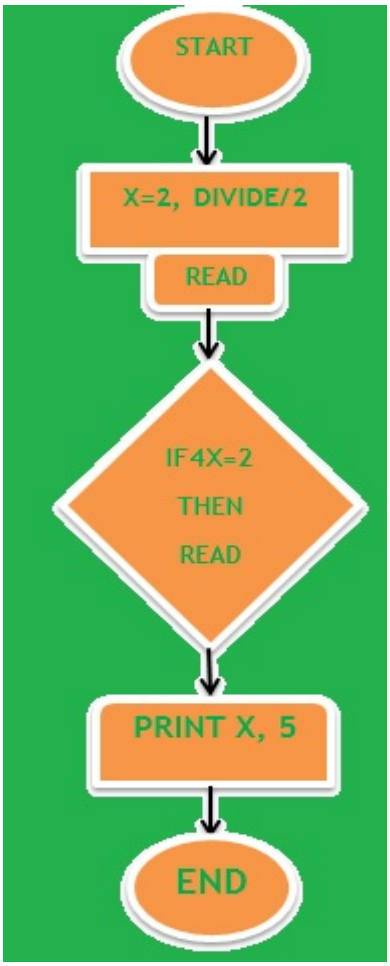
Stages of programming

There are six stages in developing a good program.

1. Program analysis
2. Program design
3. Program coding
4. Program verification

5. Program documentation
6. Program maintenance

Flow chart: This is the pictorial or graphical representation of steps in writing a program.



Flow Chart

A logarithm is the step by step procedure in solving a problem or task

Basic programming language

The programming language must have the following basics

1. **Language syntax**: This involves codes which are understood by computer compiler of the computer language. Example “20” is a Hausa syntax. Compiler has its own syntax and it includes

- Print
- REM

- Input
- Output
- Tab

2. **Variable**: Also known as identifier, which contains some known or unknown quantity of information referred to as a *value*.
3. **Constant**: These are data items which do not change during program execution.

Examples include:

1, 2, 3 ……..

A, B, C, ……

4. **Operator**: This can be arithmetic, relational or logic.

Examples:

Arithmetic operators include (arithmetic language)

+ = addition

− = subtraction

x = multiplication

/ = division

Øˆ or ** = Exponent

Relational operators include

= for equality

> = greater than

< = less than

≤ = less than or equal to

≥ = greater than or equal to

Logical operations

True or false

Yes or no

OR or AND

Every program must have

1. Beginning
2. End
3. Body

ASSESSMENT

1. ____ converts high level or low level language to machine language
   (a) transmitter
   (b) translator
   (c) transferrer
   (d) transducer

2. One of these is not a type of translator
   (a) assembler
   (b) compiler
   (c) interpreter
   (d) silicon

3. If the translator translates target/machine code to source language it is called a
   (a) machiner
   (b) languager
   (c) decompiler
   (d) congester

4. _____ is capable of converting high level language to machine language directly.
   (a) assembler
   (b) compiler
   (c) interpreter
   (d) silicon

5. How many stages are involved in developing a good program.
   (a) 4
   (b) 5
   (c) 6
   (d) 7

ANSWERS

1. a

2. d
3. c
4. a
5. c

Week 5:

Topic: Communication System

Introduction:

Communication system is the same as ICT, which means information, communication and technology. This is the use of technology in processing information. It uses electronic devices (computer) and computer software to store, protect, process, transmit and retrieve information anytime, anywhere.

- **Convert**: is the changing of data from one form to another e.g signal to digit.
- **Store**: ICT is able to keep information in a safe place
- **Protect**: ICT guides data from being damaged or lost
- **Process**: This performs an action on the data e.g. Arithmetic operation e.t.c

Examples of communication system components

- Computer
- Telephone (GSM)
- Cellular telephone
- Cellular network
- Satellite communication
- Television

Note: Television is a telecommunication system for broadcasting and receiving pictures and sound over long distance.

Elements of Television

- An image source e.g camera, flying sport
- A sound source
- A receiver

INTERNET

This is the worldwide accessible network of interconnected computer networks that transmits data information from one place to another. Internet is defined as a global electronic communication network. It is one of the largest networks that link trillions of computers all over the world. You can access this network via communication devices and media such as modems, cable, telephone lines and satellite.

Here are some of the things one can do on the internet.

- Banking called E-banking Or Internet Banking
- Invest
- Shop for goods and services
- Watch movies
- Download and listen to music
- Access Educational material e.g. Passnownow.com
- Access source of entertainment and leisure, such as online games, magazines or vacation planning guide
- Access other computer and exchange files, share and edit document with other in real time
- Provide information, photographs or audio or video clips

Benefits of communication system

1. Timely, better and cheaper access to knowledge and information (data). Example – the use of GSM phones is cheaper and timely to reach other people
2. It speeds up the processes of transaction
3. With ICT, distance is no longer a barrier in business transactions and dealings
4. It provides online business services
5. It enhances data security

Disadvantages of communication system

1. Laziness in people because of easy access to data and information
2. It has threatened other disciplines such as shorthand and typewriting
3. Encouragement of advanced free fraud (419)

4. One person can do the job of about 3 persons thereby leading to less need of labour force

ASSESSMENT

1. ICT stands for
   (a) information, communication and technical
   (b) information, community and technology
   (c) information, communication and technology
   (d) introduction, communication and technical

2. Which of these is not an example of communication system?
   (a) telephone
   (b) computer
   (c) television
   (d) car

3. The telecommunication system for broadcasting and receiving pictures and sound over long distance
   (a) telephone
   (b) computer
   (c) television
   (d) car

4. Internet is defined as a global electronic communication
   (a) network
   (b) community
   (c) connection
   (d) nutcase

5. One of these is not a benefit of communication system
   (a) it speeds up the processes of transaction
   (b) It provides online business services
   (c) It enhances data security
   (d) Encouragement of advanced free fraud (419)

ANSWERS

1. c
2. d
3. c
4. a

5. d

Week 6:

Topic: Programming Steps

Computer programming (often shortened to **programming**) is a process that leads from an original formulation of a computing problem to executable computer programs. Programming involves activities such as analysis, developing understanding, generatingalgorithms, verification of requirements of algorithms including their correctness and resources consumption, and implementation (commonly referred to as coding) of algorithms in a target programming language.

Steps Involved in Programming

1. Analyzing the Problem
2. Algorithm design / Pseudocode
3. Flowchart
4. Coding
5. Debugging
6. Testing
7. Final output
8. Documentation

1. Analyzing the Problem

This is the first step of programming and involves getting the following information. These things are very important for the programmer because it provides him the basis for planning about the programming and to control the potential difficulties that may arise.

2. Algorithm Design

All instructions to be performed at different stages are listed. This is done in simple English language. We may call it the strategic step.

3. Flowchart

It is a graphical tool that shows the steps/stages which are to be executed in a program. All the steps which are written in the second stage are now presented in a diagrammatic manner so as to make it easily understandable. Making off lowchart helps us in increasing our

process of program development because it facilitates our ability to define the logic, detecting and removing errors in a program design.

Types of flow chart

- System Flowchart shows the processing of the entire system. It describes the input/output devices, the media being used and the flow of data in the system.
- Program flowchart shows the complete steps involved in the execution of a program including I/O, processing, loops and branching. It is more detailed than system flowchart.

4. Coding

In this step, the programmer writes the instructions in a computer language to solve the problem. All coding processes depend upon the information obtained from previous steps. Choice of language depends upon the requirements and facilities available with a language.

5. Debugging

In this stage we remove all the errors in the program because when we are coding, there are chances that some mistakes may occur at that time. Here the program is executed manually, called DRY RUN. This is done several times until all the errors are removed from the program and the system becomes error free.

6. Testing

The program is tested by entering a dummy data (which includes usual, unusual and invalid data) to check the behavior and result of the program towards the given data.

7. Final Output

After going through all the above stages, the program is given the TRUE DATA. Here the programmer expects positive results of the program and expects full efficiency of the program.

8. Documentation

Most programmers neglect this stage by giving many reasons, but this is very important because this will help the programmer to correct the problems that may occur in the program.

There are two types of documentation

- User Manual provides the use complete information about how to operate the program and what needs to be done when the user face a problem.

- Technical Manual contains the technical information about the program. This is used to get technical details of the program, when the system is not working properly or requires modifications.

ASSESSMENT

1. Computer programming is often shortened to
   (a) progamme
   (b) programming
   (c) compute
   (d) computer

2. Programming involves activities such as the following except
   (a) analysis
   (b) developing understanding
   (c) generating algorithms
   (d) solving maths

3. First step of programming
   (a) flowchart
   (b) algorithms design
   (c) analysing the problem
   (d) debugging

4. ___ is a graphical tool that shows the steps/stages which are to be executed in a program
   (a) flowchart
   (b) documentation
   (c) algorithms design
   (d) User manual

5. The stage at which all errors are removed in the program is
   (a) flowchart
   (b) debugging
   (c) testing
   (d) coding

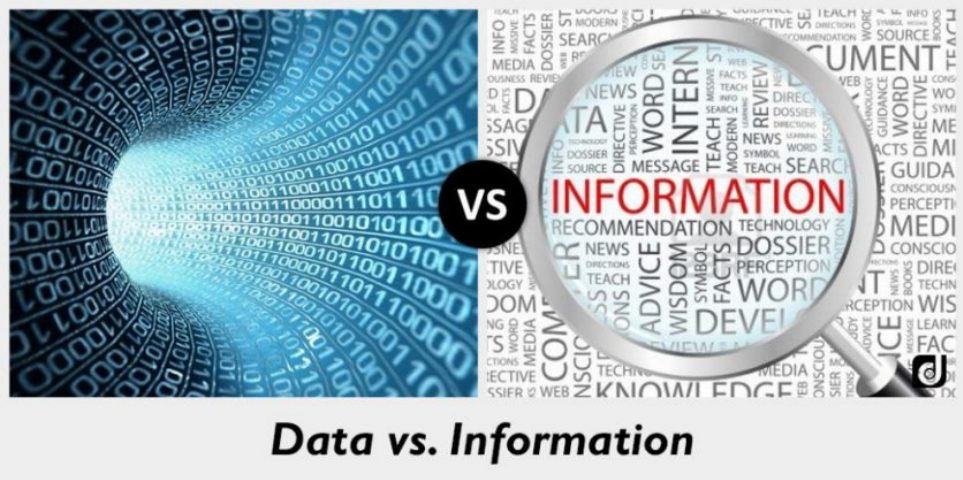
ANSWERS

1. b
2. d
3. c
4. a

5. b

Week 7:

COMPUTER DATA AND INFORMATION:



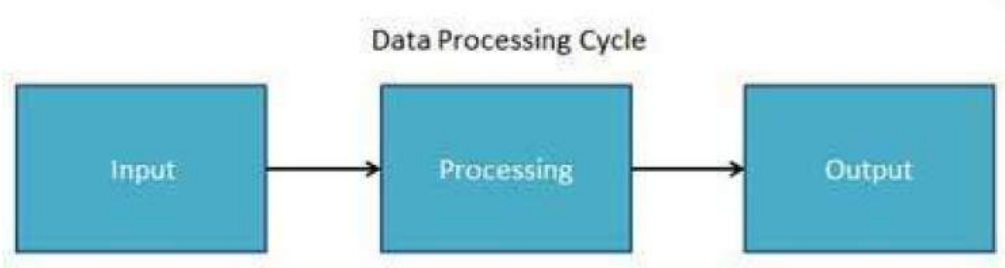
Topic: Computer Data and Information

DEFINITION OF DATA:

Computer Data can be defined as the representations of facts, concepts or instructions in formalized manner that are suitable for *communication*, *interpretation* and processing by human/electronic machine. As you should already know, a computer is an information processing machine. In this vein therefore, computers process data with the intention of producing information.

DATA PROCESSING CYCLE

Data processing involves the re-structuring or re-ordering of data by people or machine, with the intention of increasing their usefulness and add values for particular purpose. Data processing consists of basic steps input, processing and output. The diagram below illustrates the three steps that constitute the data processing cycle-



- **Input:** In this step the input data is prepared in some convenient form for processing. The form will depend on the processing machine. For example, when electronic computers are used, the input data could be recorded on any one of several types of input medium, such as magnetic disks, tapes and so on.
- **Processing:** In this step input data is changed to produce data in a more useful form. For example, pay-checks may be calculated from the time cards, or a summary of sales for the month may be calculated from the sales orders.
- **Output:** Here the result of the proceeding processing step are collected. The particular form of the output data depends on the use of the data. For example, output data may be pay-checks for employees.

DEFINITION OF INFORMATION

Information is organised or classified data which has some meaningful values for the receiver. Information is the processed data on which decisions and actions are based. Note that in order for decision-meaninful to be meaningful and worthwhile, the processed data which inform decisions must qualify for the following characteristics:

- **Timely:** Information should be available when required.
- **Accuracy:** Information should be accurate.
- **Completeness:** Information should be complete

DIFFERENCE BETWEEN DATA AND INFORMATION

Data: Data is raw, unorganized facts that need to be processed. Data can be something simple and seemingly random and useless until it is organized. For example, every student's after a **WASSCE** exam score is one piece of data.

Information: When data is processed, organized, structuredor presented in a given context so as to make it useful, it is called information. For example, the average score of a class or of the entire school (which can be derived from a given data such the one cited above), is an information.

ASSESSMENT

1. Computers process data with the intention of producing
   (a) data
   (b) calculations
   (c) information
   (d) process

2. The representations of facts, concepts or instructions in formalized manner that are suitable for *communication*, *interpretation* and processing by human/electronic machine is
   (a) computer data
   (b) computer information
   (c) computer system
   (d) computer nature

3. Data processing involves the re-structuring or re-orderingof ___ by people or machine
   (a) data
   (b) information
   (c) nature
   (d) system

4. Data processing consists of these three basic steps input, processing and ____
   (a) data
   (b) infusion
   (c) output
   (d) locking

5. _____ is organised or classified data which has some meaningful values for the receiver
   (a) output
   (b) data
   (c) information
   (d) lock

ANSWERS

1. c
2. a
3. a
4. c
5. c

SS1

COMPUTER SCIENCE

THIRD TERM

TABLE OF CONTENT

Week 1

Topic: HOW THE INTERNET WORKS

HOW THE INTERNET WORKS

On the internet, data and information are transferred world wide through the servers and clients (which are computers) connected to the internet.

The computers which are responsible for management of resources i.e program and data on a network, by providing a centralized storage area, is called a SERVER. The computer which has an access to the contents of the storage area on the server is CLIENT. On the internet, a client which can access file and services on a number of servers called a Host computer. Your computer is a Host computer.

The inner structure of the internet resembles a transportation system. In the transportation system, the maximum load of traffic is concentrated on the highways, which are linked to the major cities. Similarly, on the internet, there are certain main communication lines which carry the maximum load of traffic. These lines are collectively called the INTERNET BACKBONE.

The internet is a packet oriented network. It means that the data you transfer is divided into packets.

So what happens when you transfer data across the internet various networks?

The networks are linked by special computer, called ROUTERS. A router checks where your packet data goes and decides in which direction to send it. Of course, not every router is linked with every other router, they just decide on the direction your data takes. The internet knows where your data is going, as every destination has an address called an Internet Protocol (IP) address. The data transferred with IP is divided into packets. This is handled by another protocol, the transmission control protocol (TCP).

The internet is an addressing system used to send data and information to a fixed or specific destination, just like the postal system. An IP address i.e. internet protocol address has it own unique identification attached to a computer or a device connected to the internet. The IP address has a group of number and is separated by a period (.). The number varies between 0 and 255. For instance the number 153, 25. 15,10 are an IP address. Generally, the first part of the IP address identifies the network and the last portion identifies a specific computer.

It is difficult to remember and use this all numeric IP address. Hence, the internet favours the use of text name that represents one or more IP addresses.

The text version on IP is the domain name. The component of the domain name are separated by periods just like an IP address.

Every domain name contains a Top Level Domain (TLD) abbreviation that identifies the type of organization which is associated with the domain. Dot com (.com) is the name sometimes used to described an organization that has TLD of com. The domain name system is a system on the internet that stores the domain names and their corresponding IP address. Each time you specify a domain name, an internet server called the DNS server translates the domain name into its associated IP address, so data can be routed to the correct computer.

WEB PAGE

Web page is an electronic document on the World Wide Web. A web page consists of a HTML file in a particular directory on a particular machine (and in thus identification by a URL) a vast amount of information is provided by these web pages. The information may include graphics, sounds, or even movies. Usually, a web page contains links to other pages as well

WEBSITE

A website is a collection of web pages. Most websites have a home page as their starting point, which frequently has a table of contents for the site. Users need a web browser and a connection to access a website.

HOME PAGE

Home page is the first page retrieved when accessing a website. It serves as a table of contents for the rest of pages on the site and offers links to other websites. For example, a company's welcome page typically includes the company logo, a brief description and links to the additional document available on that site.

UNIFORM RESOURCE LOCATOR

The uniform resource locator is the address that defines the router to a file on the web. URLs are typed into the browser to access web pages for
example **https://www.teststreams.com** Retrieved home page for passnownow website. The http is the web protocol and **www.teststreams.com** is the domain name.

HYPERLINKS

Web pages contain highlighted text or image, called hyperlinks, that connect to other pages on the web. A hyperlink allows you to easily move through vast amount of information y jumping from one web page to another. You can select a hyperlink to jump to a web page located on the same computer or on a computer across the city, country or world. You can easily identify a text hyperlink in a web page because it appears underlined and in color.

WEB SERVER

A web server is a computer on the internet that stores web pages. A web page is available for other people to view, when it is stored in the we server.

WEB BROWSER

A web browser is a software program that allows you to access and view web pages. The web browser software is built on the hyperlinks, which allows users to point and click with a mouse in order to jump from one document to another in whatever order the are desire.

TYPES OF BROWSER

In January 1993, the first browser, viola and Midas were released for the X window system (UNIX). At the same time, a Macintosh browser was released called ALPHA version.

In February 1993, the first popular graphical World Wide Web browser was NCSA Mosaic. It was released for all common platforms (UNIX, windows and Macintosh) in September 1993.

Marc Andersen, the mastermind of mosaic, founded his own company, Mosaic communication corp., now known as Netscape and released a browser, the Netscape navigator 1.0. He soon controlled 70 percent of the browser market. Microsoft saw this gigantic success and soon released a browser called MS internet explore, for free, now new version of both browser support most HTML.

TYPES OF WEB BROWSER

1. MICROSOFT INTERNET EXPLORER: Microsoft internet explorer is the most widely used by people around the world. It was developed by Microsoft in 1995 as a supportive package to the Microsoft windows operating system.

2. MOZILLA FIREFOX: Mozilla fire fox is the second browser after the internet explorer. It can be used on many different operating systems including windows, Macintosh, OS/2 and UNIX. It supports tabbed browsing that allows user to open multiple sites in a single window.

3. OPERA: Opera is a web browser that was developed by Opera software in 1996. It is a well known browser that is mainly used in activated mobile phone and smart phones. It is used with many operating systems like Linux, MAC OS and MS window.

4. NETSCAPE NAVIGATOR: Netscape navigator was developed by Netscape Communication Corporation and was very popular in the 1990s. it was compatible with almost every operating system.

ASSESSMENT.

1. Explain how the internet works.
2. Define the following terms: server, client, host clients and internet plan.
3. What is the difference between a website and a web page?
4. Discuss the types of web browser.

Week 2

Topic: BENEFITS OF THE INTERNET

BENEFITS OF THE INTERNET

The benefits of the internet are as follows:

1. **INFORMATION**: The internet gives you access to information on any subjects of your interest. This makes the internet a valuable research tool. Most sources such as news paper and magazines have websites and a number of them only exist online. 2. **RESEARCH**: You can make use of the internet search facilities to research just about any topic you can think of. This information can help you with a school project, or a presentation at work. You can search for the data you need, or go to specific research sites.

2. **E-MAIL (electronic mail)**: Electronic mails enable us to exchange message with people around the world, including friends, family members, colleagues, customers and even people you meet on the internet. E-mail is an exciting feature of the internet as we can send and receive message over long distances. It is also fast, easy and inexpensive.

3. **ENTERTAINMENT**: The internet offer many different forms of entertainment, such as radio and television broadcast, video and music. You can find picture from the latest film, watch live interview of your favorite celebrities and listen to music before it is available in stores.

4. **PROGRAM**: You can find thousands of programs that can be used on your computer, such as word processors, drawing programs, games and accounting programs.

5. **ONLINE SHOPPING**: You can order for products on the internet, while sitting at home. You can purchase items such as books, flowers, music, CDs, pizzas, stock and used cars.

6. **CHATTING**: Chat features allow you to exchange typed message with another person on the internet. The message you send will instantly appear on the other person's computer. You can chat with a person or a group at the same time.

7. **BANKING**: You can use the internet to find financial sites that enables you to do your banking and investing online. Banking online is much more convenient and much less time consuming than doing it in person. Online banking is extremely secure because all modern browsers support robust security protocol which ensures that your financial data remains safe.

8. **E-LEARNING**: E-learning is a training or education program by electronic means. E-learning involves the use of computer or an electronic device (GSM handset) to provide training on educational technology as a tool for learning . Distant education can be done by e-learning.
9. **JOB SEARCH:** Internet makes life easy for both employers and job seekers as there are plenty of job sites which connects employers and job seekers.

ASSESSMENT.

List and explain five types of benefits of the internet

Week 3

Topic: ABUSE OF THE INTERNET

Internet abuse refers to improper use of the internet and may include:

- **Computer Crime** – or **cybercrime**, is any crime that involves a computer and a network. Use of computers for criminal activity.
- **Cyber-bullying** – Use of the internet to bully and intimidate. The use of information technology to repeatedly harm or harass other people in a deliberate manner. **Spam (electronic)** – Is the use of electronic messaging systems to send unsolicited messages (**spam**), especially advertising, as well as sending messages repeatedly on the same site. Sending of unwanted advertising messages.
- **Malware** – Software designed to harm a user's computer, including computer viruses. Malware, short for **malicious software**, is any software used to disrupt computer operation, gather sensitive information, or gain access to private computer systems. Malware is defined by its malicious intent, acting against the requirements of the computer user, and does not include software that causes unintentional harm due to some deficiency.
- Other ways of Abuse include:
    1. You can get harassing/threatening messages from people or from stalkers.
    2. It is very easy to find sites that promote hatred, violence, drug, sex, and other things not appropriate for children.
    3. There is no restriction on marketing products, such as alcohol, tobacco to children on the internet.
    4. Request for personal information for contests, survey e.t.c are used in unauthorized way.
    5. Pornographic sites are easily found on the internet instead of it being restricted.
    6. Time wastage
    7. Hacking

8. Posting of fake advertisements of Jibs and products
9. Internet scam
10. Piracy: Piracy is the act of illegally copying or downloading copyrighted material. People commit piracy because it saves money at their end.

ASSESSMENT.

In what form does internet abuse occur?

ANSWER

- **Computer Crime** – or **cybercrime**, is any crime that involves a computer and a network. Use of computers for criminal activity.
- **Cyber-bullying** – Use of the internet to bully and intimidate. The use of information technology to repeatedly harm or harass other people in a deliberate manner. **Spam (electronic)** – Is the use of electronic messaging systems to send unsolicited messages (**spam**), especially advertising, as well as sending messages repeatedly on the same site. Sending of unwanted advertising messages.
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Week 4

Topic: THE TEN COMMANDMENTS OF COMPUTER ETHICS

COMPUTER ETHICS

Computer ethics are rules that govern the use of a computer system. **Ethics** deals with placing a "**value**" on acts according to whether they are "**good**" or "**bad**". Every society has its rules about whether certain acts are ethical or not. These rules have been established as a result of consensus in society and are often written into laws. Computer ethics are increasingly becoming important because of the rising number of cyber crime issues, including software piracy, unauthorized access, pornography, spamming, target marketing, and hacking. The widespread popularity and use of the Internet has given rise to a number of cybercrime issues and concerns about user privacy.

THE TEN COMMANDMENTS OF COMPUTER ETHICS

The **Ten Commandments of Computer Ethics** were created in 1992 by the Computer Ethics Institute. The Ten Commandments is "a set of standards to guide and instruct people in the ethical use of computers."

1. Thou shalt not use a computer to harm other people.
2. Thou shalt not interfere with other people's computer work.
3. Thou shalt not snoop around in other people's computer files.
4. Thou shalt not use a computer to steal.
5. Thou shalt not use a computer to bear false witness
6. Thou shalt not copy or use proprietary software for which you have not paid.
7. Thou shalt not use other people's computer resources without authorization or proper compensation.
8. Thou shalt not appropriate other people's intellectual output.

9. Thou shalt think about the social consequences of the program you are writing or the system you are designing.
10. Thou shalt always use a computer in ways that ensure consideration and respect for your fellow humans.

EXPLANATION:

- **Commandment 1**

Simply put: Do not use the computer in ways that may harm other people.

Explanation: It is unethical to use a computer to harm another computer user. It is not limited to physical injury. It includes harming or corrupting other users' data or files. The commandment states that it is wrong to use a computer to steal someone's personal information. Manipulating or destroying files of other users is ethically wrong. It is unethical to write programs, which on execution leads to stealing, copying or gaining unauthorized access to other users' data. Being involved in practices like hacking, spamming, phishing or cyber bullying does not conform to computer ethics.

- **Commandment 2**

Simply put: Do not use computer technology to cause interference in other users' work.

Explanation: Computer software can be used in ways that disturb other users or disrupt their work. Viruses, for example, are programs meant to harm useful computer programs or interfere with the normal functioning of a computer or delete files on a computer. Malicious software can disrupt the functioning of computers in so many ways. It may overload computer memory through excessive consumption of computer resources, thus slowing its functioning. It may cause a computer to function wrongly or even stop working. Using malicious software to attack a computer is unethical.

- **Commandment 3**

Simply put: Do not spy on another person's computer data.

Explanation: We know it is wrong to read someone's personal letters. On the same lines, it is wrong to read someone else's email messages or files or documents. Obtaining data from another person's private files is nothing less than breaking into someone's room. Snooping around in another person's files or reading someone else's personal messages is the **invasion of his privacy**. There are exceptions to this. For example, spying is necessary and cannot be called unethical when it is done against illegitimate use of computers. For example, intelligence agencies working on cybercrime cases need to spy on the internet activity of suspects.

- **Commandment 4**

Simply put: Do not use computer technology to steal information.

Explanation: Stealing sensitive information or leaking confidential information is as good as robbery. It is wrong to acquire personal information of employees from an employee database or patient history from a hospital database or other such information that is meant to be confidential. Similarly, breaking into a bank account to collect information about the account or account holder is wrong. Illegal electronic transfer of funds is a type of fraud.

- **Commandment 5**

Simply put: Do not contribute to the spread of misinformation using computer technology.

Explanation: Spread of information has become viral today, because of the Internet. This also means that false news or rumors can spread speedily through social networking sites or emails. Being involved in the circulation of incorrect information is unethical. Mails and pop-ups are commonly used to spread the wrong information or give false alerts with the only intent of selling products.

- **Commandment 6**

Simply put: Refrain from copying software or buying pirated copies. Pay for software unless it is free.

Explanation: Like any other artistic or literary work, software is copyrighted. A piece of code is the original work of the individual who created it. It is copyrighted in his name. In case of a developer writing software for the organization he works for, the organization holds the copyright for it. Copyright holds true unless its creators announce it is not. Obtaining illegal copies of copyrighted software is unethical.

- **Commandment 7**

Simply put: Do not use someone else's computer resources unless authorized to.

Explanation: Multi-user systems have user specific passwords. Breaking into some other user's password, thus intruding his private space is unethical. It is not ethical to hack passwords for gaining unauthorized access to a password-protected computer system. Accessing data that you are not authorized to access or gaining access to another user's computer without his permission is not ethical.

- **Commandment 8**

Simply put: It is wrong to claim ownership on a work which is the output of someone else's intellect.

Explanation: Programs developed by a software developer are his/her property. If he is working with an organization, they are the organization's property. Copying them and

propagating them in one's own name is unethical. This applies to any creative work, program or design. Establishing ownership on a work which is not yours is ethically wrong.

- **Commandment 9**

Simply put: Before developing a software, think about the social impact it can have.

Explanation: Looking at the social consequences that a program can have, describes a broader perspective of looking at technology. A computer software on release, reaches millions. Software like video games and animations or educational software can have a social impact on their users. When working on animation films or designing video games, for example, it is the programmer's responsibility to understand his target audience/users and the effect it may have on them. For example, a computer game for kids should not have content that can influence them negatively. Similarly, writing malicious software is ethically wrong. A software developer/development firm should consider the influence their code can have on the society at large.

- **Commandment 10**

Simply put: In using computers for communication, be respectful and courteous with the fellow members.

Explanation: The communication etiquette we follow in the real world applies to communication over computers as well. While communicating over the Internet, one should treat others with respect. One should not intrude others' private space, use abusive language, make false statements or pass irresponsible remarks about others. One should be courteous while communicating over the web and should respect others' time and resources. Also, one should be considerate with a novice computer user.

ASSESSMENT.

1. What do you understand as computer ethics?

2. Write short notes on the ten commandments of computer ethics.

Week 5

Topic: Computer Viruses

What are Computer Viruses?

Computer viruses are small software programs that are designed to spread from one computer to another and to interfere with computer operation. A virus might corrupt or delete data on your computer, use your e-mail program to spread itself to other computers, or even erase everything on your hard disk.

Computer viruses are often spread by attachments in e-mail messages or instant messaging messages. That is why it is essential that you never open e-mail attachments unless you know who it's from and you are expecting it.

A **computer virus** is a malware program that, when executed, replicates by inserting copies of itself (possibly modified) into other computer programs, data files, or the boot sector of the hard drive; when this replication succeeds, the affected areas are then said to be "infected".

Viruses often perform some type of harmful activity on infected hosts, such as stealing hard disk space or CPU time, accessing private information, corrupting data, displaying political or humorous messages on the user's screen, spamming their contacts, logging their keystrokes, or even rendering the computer useless.

Viruses can be disguised as attachments of funny images, greeting cards, or audio and video files. Computer viruses also spread through downloads on the Internet. They can be hidden in illicit software or other files or programs you might download.

Types of Viruses

There are different types of viruses:

1. **Boot Sector Virus** – targets the boot sector of a hard drive and crucially effects the boot process. Boot sector viruses became popular because of the use of floppy disks to boot a computer. The widespread usage of the Internet and the death of the floppy has made other means of virus transmission more effective.

2. **File Infection Virus** – coded viruses that attach themselves to .exe files; compressed files such as zip or drive files.

3. **Multipartite Virus** – cross between a file virus and a boot sector virus.These type of viruses spread in many different ways. Their actions vary depending on the OS

installed and presence of certain files. They tend to hide in the computer's memory but do not infect the hard disk.

4. **Network Virus** – uniquely created to quickly spread throughout the local area network and generally across the Internet as well. Typically moves within shared resources like drives and folders.

5. **Macro Virus** – infects program files that use macros in the program itself, such as word processors. These viruses infect the files created using some applications or programs that contain macros such as doc, pps, xls and mdb. They automatically infect the files with macros and also templates and documents that are contained in the file. They hide in documents shared through e-mail and networks.**Macro viruses include:**
    - Relax
    - bablas
    - Melissa.A
    - O97M/Y2K

6. **E-mail Virus –** generally this is a macro virus which multiplies by sending itself to other contacts in your address book, in hopes they'll activate the virus as well. This is a virus spread via an email. Such a virus will hide in an email and when the recipient opens the mail.

7. **Memory Resident Viruses –** They usually fix themselves inside the computer memory. They get activated every time the OS runs and end up infecting other opened files. They hide in RAM. This type of virus is a permanent which dwells in the RAM memory. From there it can overcome and interrupt all of the operations executed by the system: corrupting files and programs that are opened, closed, copied, renamed etc.**Memory Resident Viruses Include:**
    - CMJ
    - meve
    - randex
    - mrklunky

8. **Worm:** This program is very similar to a virus and has the ability to self-replicate leading to negative effects on your computer.**Worm Viruses Include:**
    - lovgate.F
    - sobig.D

- trile. C
- PSWBugbear.B
- Mapson

9. **Trojans or Trojan Horses:** Another unsavory breed of malicious code (not a virus as well) are Trojans or Trojan horses, which unlike viruses do not reproduce by infecting other files, nor do they self-replicate like worms. Trojans can illegally trace important login details of users online. For example E-Banking is very common among users, therefore, vulnerability of tracing your login details whenever your PC is working without any strong powerful antivirus installed.

10. **Browser Hijacker:** This virus can spread in many different ways including a voluntary download. If infects certain browser functions especially in form of re-directing the user automatically to certain sites. A good example is the cool web search. This type of virus, which can spread itself in numerous ways including voluntary download, effectively hijacks certain browser functions, usually in the form of re-directing the user automatically to particular sites

11. **Polymorphic Virus**:They encode or encrypt themselves in a different way every time they infect your computer. They use different encryption and algorithms. This makes it difficult for the antivirus software to locate them using signature or string searches (since they are very different in each encryption).**Polymorphic Viruses Include:**
    - Marburg
    - tuareg
    - Satan bug
    - elkern

12. **FAT Virus:** The file allocation table or FAT is the part of a disk used to connect information and is a vital part of the normal functioning of the computer. This type of virus attack can be especially dangerous, by preventing access to certain sections of the disk where important files are stored. Damage caused can result in information losses from individual files or even entire directories.

13. **Overwrite Viruses**: These types of viruses delete any information in a file they infect, leaving them partially or completely useless once they are infected. Once in the computer, they replaces all the file content but the file size doesn't change.**Overwrite Viruses Include:**
    - Trj.Reboot
    - way

- trivial.88.D

14. **Companion Viruses**: Companion viruses can be considered file infector viruses like resident or direct action types. They are known as companion viruses because once they get into the system they “accompany” the other files that already exist. In other words, in order to carry out their infection routines, companion viruses can wait in memory until a program is run (resident viruses) or act immediately by making copies of themselves (direct action viruses).Some examples include: Stator, Asimov.1539, and Terrax.1069

ASSESSMENT.

1. What are computer viruses?

2. List and explain the various types of computer viruses.

Week 6

Topic: Application Software

APPLICATION SOFTWARE

Application software is any tool that functions and is operated by the means of a computer with the purpose of supporting or improving the software user's work. It is used for the implementation of the computer user's work.

TYPES OF APPLICATION SOFTWARE

It is divided into two which are

(i) **User application software**: User – written software are tailored to meet the user's specific needs. This includes spread sheet templates, word processor macros, scientific stimulations, graphics, and animation scripts. Users create this software themselves and often overlook how important it is.

(ii) **Application packages**: This is when multiple applications are bundled together as one package. It is also known as application suite. Examples are Microsoft office, Open office.org, and iwork which bundle together a word processor, a spread sheet, and several other discrete applications. The separate applications in a suite usually have some capability to interact with each other in ways beneficial to the user.

APPLICATION PACKAGE CATEGORIES

General purpose application software packages: These are general tools that provide specific capabilities, but not in support of specific purpose. Examples are:

(i) **Word Processing**: This is the process of using a computer to create, edit and print text – based documents. **Examples** are Ms – word, Word star, Word perfect, Window Word pad etc.

(ii) **Spreadsheet**: This is a table of values in rows and columns. Each value can have a predefined relationship to other values. Spreadsheet applications are computer program that let you create and manipulate spreadsheets electronically.

(iii) **Powerpoint Presentation**: A presentation program is a computer software package used to display information, normally in the form of a slide show to present either a business proposal, seminar or class lessons.

(iv) **Database management**: This is a program which allows one or more computer users to create and access data from a database. On PCs, Microsoft Access is a popular example.

(v) **Graphics package**: This is used for drawing and painting. Examples are Corel draw, Microsoft paint, Paintshop. Paint.net, Adobe Photoshopetc.

(vi) **Games**: This is an electronic game that involves interaction with users interface to generate visual feedback on a video device.

Special purpose application software packages: These are software that is limited in what they can do.

(i) **Accounting Management**: This is the practical application of management techniques to control report on the financial health of an organisation. This involves the analysis, planning, implementation, and control programs designed to provide financial data reporting for managerial decision making.

(ii) **Payroll System**: This is a program designed for calculating the regular salary, wages or other compensation paid to every employee in a company.

(iii) **Banking software**: It enables the management, monitoring and control of transactions for financial institutions and banks. Private Banks and mutual fund administrators as well as other wealth management firms utilize Banking system applications to provide front office services as well as back office functions such as customer account tracking, credit approval, and financial accounting and information system integration.

(iv) **Hospital Management Software**: It is also known as Hospital information System. It is a comprehensive, integrated information system designed to manage the administrative, financial and clinical aspect of a hospital. It benefits are easy access to patient data, helps in decision support system for health care polities, efficient and accurate administration of finance, improved monitoring of drug usage, etc.

(v) **Reservation System**: A computer reservation system is a computerized system used to store, retrieve information and conduct transactions related to air travel. It is designed and operated by airlines.

(vi) **Human Resources (HR) Management**: Its functions include a variety of activities, and key among them is deciding what staffing needs you have and whether to use independent contractors or hire employees to fill these needs, recruiting and training the best employees, dealing with performance issues, etc.

(vii) **Attendance System**: There are three components that make up a Time and Attendance system. First, Barcode readers are used to allow employee to make quick and adequate time transaction. Second, data taken from devices needs to be managed and stored by PC's. Third, management of the time transactions, payroll generation and detailed reports is done by the Time and Attendance software.

(viii) **Billing system**: This is a system that tracks customer usage of services, and calculates the impact on a customer's account, based on the price of the service. Billing systems have come to include non-core functionality such as customer management, integration with payment gateways, and statistical analysis.

ASSESSMENT.

1. What do you understand as application software?
2. List and explain the types of application software?
3. What are the various application package categories?