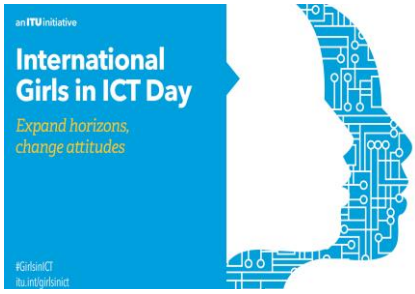
Ministry of Post, Telecommunication and Technology



National Communications Authority

Girls in ICT Day 2020 Workshops

Tittle: Expanding Horizons and Changing Attitudes

Workshop Title: Basic ICT knowledge

Location: Online- BY Zoom

Date & Time: 18th of April 2020, 8:00am to 11:00am

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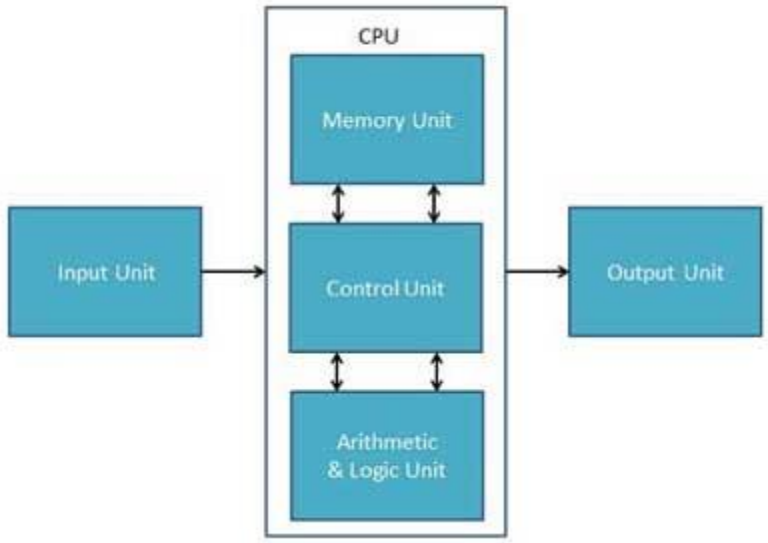
PART TWO:

COMPUTER COMPONENT (HARDWARE/SOFTWARE

Computer - Components

All types of computers follow the same basic logical structure and perform the following five basic operations for converting raw input data into information useful to their users.

No.	Operation	Description
1	Take Input	The process of entering data and instructions into the computer system.
2	Store Data	Saving data and instructions so that they are available for processing as and when required.
3	Processing Data	Performing arithmetic, and logical operations on data in order to convert them into useful information.
4	Output Information	The process of producing useful information or results for the user, such as a printed report or visual display.



❖ Input Unit.

This unit contains devices with the help of which we enter data into the computer. This unit creates a link between the user and the computer. The input devices translate the information into a form understandable by the computer.

❖ CPU (Central Processing Unit).

CPU is considered as the brain of the computer. CPU performs all types of data processing operations. It stores data, intermediate results, and instructions (program). It controls the operation of all parts of the computer.

CPU itself has the following three components:

- ALU (Arithmetic Logic Unit)
- Memory Unit
- Control Unit

❖ Output Unit.

The output unit consists of devices with the help of which we get the information from the computer. This unit is a link between the computer and the users. Output devices translate the computer's output into a form understandable by the users.

Computer - Input Devices

Following are some of the important input devices which are used in a computer:

❖ Keyboard.

Keyboard is the most common and very popular input device which helps to input data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing additional functions.

Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.

The keys on the keyboard are as follows:

No	Keys & Description
1	**Typing Keys** These keys include the letter keys (A-Z) and digit keys (09) which generally give the same layout as that of typewriters.
2	**Numeric Keypad** It is used to enter the numeric data or cursor movement. Generally, it consists of a set of 17 keys that are laid out in the same configuration used by most adding machines and calculators.
3	**Function Keys** The twelve function keys are present on the keyboard which are arranged in a row at the top of the keyboard. Each function key has a unique meaning and is used for some specific purpose.
4	**Control keys** These keys provide cursor and screen control. It includes four directional arrow keys. Control keys also include Home, End, Insert, Delete, Page Up, Page Down, Control(Ctrl), Alternate(Alt), Escape(Esc).

5	**Special Purpose Keys** Keyboard also contains some special purpose keys such as Enter, Shift, Caps Lock, Num Lock, Space bar, Tab, and Print Screen.

❖ Mouse.

Mouse is the most popular pointing device. It is a very famous cursor-control device having a small palm size box with a round ball at its base, which senses the movement of the mouse and sends corresponding signals to the CPU when the mouse buttons are pressed.

Generally, it has two buttons called the left and the right button and a wheel is present between the buttons. A mouse can be used to control the position of the cursor on the screen, but it cannot be used to enter text into the computer.

Advantages

- Easy to use
- Not very expensive
- Moves the cursor faster than the arrow keys of the keyboard.

❖ Joystick.

Joystick is also a pointing device, which is used to move the cursor position on a monitor screen. It is a stick having a spherical ball at its both lower and upper ends. The lower spherical ball moves in a socket. The joystick can be moved in all four directions.

The function of the joystick is similar to that of a mouse. It is mainly used in Computer Aided Designing (CAD) and playing computer games.

❖ Light Pen.

Light pen is a pointing device similar to a pen. It is used to select a displayed menu item or draw pictures on the monitor screen. It consists of a photocell and an optical system placed in a small tube.

When the tip of a light pen is moved over the monitor screen and the pen button is pressed, its photocell sensing element detects the screen location and sends the corresponding signal to the CPU.

❖ Scanner.

Scanner is an input device; a Scanner captures images from the source which are then converted into a digital form that can be stored on the disk. These images can be edited before they are printed.

❖ Microphone.

Microphone is an input device to input sound that is then stored in a digital form.

❖ Magnetic Ink Card Reader (MICR).

MICR input device is generally used in banks as there are large number of cheques to be processed every day. The bank's code number and cheque number are printed on the cheques with a special type of ink that contains particles of magnetic material that are machine readable.

❖ Bar Code Readers.

Bar Code Reader is a device used for reading bar coded data (data in the form of light and dark lines).

Bar coded data is generally used in labelling goods, numbering the books, etc.

Bar Code Reader scans a bar code image, converts it into an alphanumeric value, which is then fed to the computer that the bar code reader is connected to.

Computer - Output Devices

Following are some of the important output devices used in a computer.

- Monitors
- Printer

❖ Monitors

Monitors, commonly called as **Visual Display Unit** (VDU), are the main output device of a computer. It forms images from tiny dots, called pixels that are arranged in a rectangular form. The sharpness of the image depends upon the number of pixels.

There are two kinds of viewing screen used for monitors.

- Cathode-Ray Tube (CRT)
- Flat-Panel Display

Cathode-Ray Tube (CRT) Monitor:

The CRT display is made up of small picture elements called pixels. The smaller the pixels, the better the image clarity or resolution. It takes more than one illuminated pixel to form a whole character, such as the letter 'e' in the word help.

A finite number of characters can be displayed on a screen at once. The screen can be divided into a series of character boxes - fixed location on the screen where a standard character can be placed. Most screens are capable of displaying 80 characters of data horizontally and 25 lines

There are some disadvantages of CRT :

- Large in Size
- High power consumption

Flat-Panel Display Monitor:

The flat-panel display refers to a class of video devices that have reduced volume, weight and power requirement in comparison to the CRT. You can hang them on walls or wear them on your wrists. Current uses of flat-panel displays include calculators, video games, monitors, laptop computer, and graphics display.

❖ Printers.

Printer is an output device, which is used to print information on paper.

Computer - Memory

A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in the computer, where data is to be processed and instructions required for processing are stored.

The memory is divided into large number of small parts called cells. Each location or cell has a unique address, which varies from zero to memory size minus one. For example, if the computer has 64k words, then this memory unit has 64 * 1024 = 65536 memory locations. The address of these locations varies from 0 to 65535.

Memory is primarily of three types :

- Cache Memory
- Primary Memory/Main Memory
- Secondary Memory

❖ Cache Memory

Cache memory is a very high-speed semiconductor memory which can speed up the CPU. It acts as a buffer between the CPU and the main memory. It is used to hold those parts of data and program which are most frequently used by the CPU. The parts of data and programs are transferred from the disk to cache memory by the operating system, from where the CPU can access them.

Advantages:

The advantages of cache memory are as follows −

- Cache memory is faster than main memory.
- It consumes less access time as compared to main memory.
- It stores the program that can be executed within a short period of time.
- It stores data for temporary use.

Disadvantages:

The disadvantages of cache memory are as follows −

- Cache memory has limited capacity.
- It is very expensive.

❖ Primary Memory (Main Memory).

Primary memory holds only those data and instructions on which the computer is currently working. It has a limited capacity and data is lost when power is switched off. It is generally made up of semiconductor device. It is divided into two subcategories RAM and ROM.

Characteristics of Main Memory:

- These are semiconductor memories.
- It is known as the main memory.
- Usually volatile memory.
- Data is lost in case power is switched off.
- It is the working memory of the computer.
- Faster than secondary memories.

A computer cannot run without the primary memory.

❖ Secondary Memory.

This type of memory is also known as external memory or non-volatile. It is slower than the main memory. These are used for storing data/information permanently. CPU directly does not access these memories, instead they are accessed via input-output routines. The contents of secondary memories are first transferred to the main memory, and then the CPU can access it. For example, disk, CD-ROM, DVD, etc.

Characteristics of Secondary Memory

- These are magnetic and optical memories.
- It is known as the backup memory.
- It is a non-volatile memory.
- Data is permanently stored even if power is switched off.
- It is used for storage of data in a computer.

Random Access Memory.

RAM (Random Access Memory) is the internal memory of the CPU for storing data, program, and program result. It is a read/write memory which stores data until the machine is working. As soon as the machine is switched off, data is erased.

RAM is of two types :

- Static RAM (SRAM)
- Dynamic RAM (DRAM)

Characteristic of Static RAM:

- Long life
- No need to refresh
- Faster
- Used as cache memory
- Large size
- Expensive
- High power consumption

Characteristics of Dynamic RAM:

- Short data lifetime
- Needs to be refreshed continuously
- Slower as compared to SRAM
- Used as RAM
- Smaller in size
- Less expensive
- Less power consumption

Read Only Memory.

ROM stands for **Read Only Memory**. The memory from which we can only read but cannot write on it. This type of memory is non-volatile. The information is stored permanently in such memories during manufacture.

A ROM stores such instructions that are required to start a computer. This operation is referred to as **bootstrap**. ROM chips are not only used in the computer but also in other electronic items like washing machine and microwave oven

Computer – Motherboard.

The motherboard serves as a single platform to connect all of the parts of a computer together.

It connects the CPU, memory, hard drives, optical drives, video card, sound card, and other ports and expansion cards directly or via cables.

It can be considered as the backbone of a computer.

Computer - Memory Units.

Memory unit is the amount of data that can be stored in the storage unit. This storage capacity is expressed in terms of Bytes.

The following table explains the main memory storage units :

No.	Unit & Description
1	**Kilobyte (KB)** 1 KB = 1024 Bytes
2	**Megabyte (MB)** 1 MB = 1024 KB
3	**GigaByte (GB)** 1 GB = 1024 MB
4	**TeraByte (TB)** 1 TB = 1024 GB
5	**PetaByte (PB)** 1 PB = 1024 TB
6	**Bit (Binary Digit)** A binary digit is logical 0 and 1 representing a passive or an active state of a component in an electric circuit.
7	**Byte** A group of 8 bits is called byte. A byte is the smallest unit, which can represent a data item or a character.
8	**Word** A computer word, like a byte, is a group of fixed number of bits processed as a unit, which varies from computer to computer but is fixed for each computer.

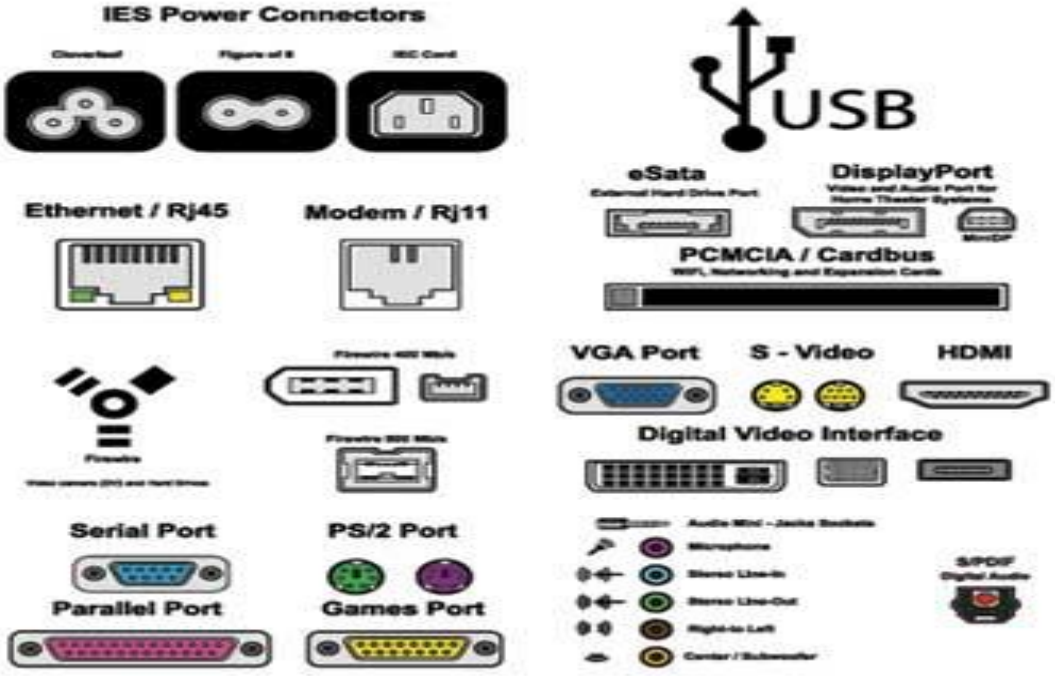
	The length of a computer word is called word-size or word length. It may be as small as 8 bits or may be as long as 96 bits. A computer stores the information in the form of computer words.

Computer – Ports.

A port is a physical docking point using which an external device can be connected to the computer. It can also be programmatic docking point through which information flows from a program to the computer or over the Internet.

Characteristics of Ports.

- External devices are connected to a computer using cables and ports.
- Ports are slots on the motherboard into which a cable of external device is plugged in.
- Examples of external devices attached via ports are the mouse, keyboard, monitor, microphone, speakers, etc.



Let us now discuss a few important types of ports:

Serial Port.

- Used for external modems and older computer mouse
- Two versions: 9 pin, 25 pin model
- Data travels at 115 kilobits per second

❖ Parallel Port.

- Used for scanners and printers

- Also called printer port
- 25 pin model
- IEEE 1284-compliant Centronics port

❖ Universal Serial Bus (or USB) Port.

- It can connect all kinds of external USB devices such as external hard disk, printer, scanner, mouse, keyboard, etc.
- It was introduced in 1997.
- Most of the computers provide two USB ports as minimum.

❖ VGA Port.

- Connects monitor to a computer's video card.
- Similar to the serial port connector. However, serial port connector has pins, VGA port has holes.

❖ Power Connector.

- Three-pronged plug.
- Connects to the computer's power cable that plugs into a power bar or wall socket.

❖ Ethernet Port.

- Connects to a network and high speed Internet.
- Connects the network cable to a computer.
- This port resides on an Ethernet Card.
- Data travels at 10 megabits to 1000 megabits per seconds depending upon the network bandwidth.

❖ Sockets.

- Sockets connect the microphone and speakers to the sound card of the computer.

Software.

Software is a set of programs, which is designed to perform a well-defined function. A program is a sequence of instructions written to solve a particular problem [1].

There are two types of software:

- System Software
- Application Software

❖ System Software.

The system software is a collection of programs designed to operate, control, and extend the processing capabilities of the computer itself. System software is generally prepared by the computer manufacturers. These software products comprise of programs written in low-level languages, which interact with the hardware at a very basic level. System software serves as the interface between the hardware and the end users.

Some examples of system software are Operating System, Compilers, Interpreter, Assemblers, etc.

Characteristic of system software:

- Close to the system
- Fast in speed
- Difficult to design
- Difficult to understand
- Less interactive
- Smaller in size
- Difficult to manipulate
- Generally written in low-level language

Low Level languages:

❖ Application Software.

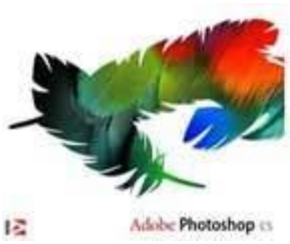
Application software products are designed to satisfy a particular need of a particular environment. All software applications prepared in the computer lab can come under the category of Application software.

Application software may consist of a single program, such as Microsoft's notepad for writing and editing a simple text. It may also consist of a collection of programs, often called a software package, which work together to accomplish a task, such as a spreadsheet package.

Examples of Application software are the following:

- Payroll Software

- Student Record Software
- Inventory Management Software
- Income Tax Software
- Railways Reservation Software
- Microsoft Office Suite Software
- Microsoft Word
- Microsoft Excel
- Microsoft PowerPoint



Features of application software are as follows:

- Close to the user
- Easy to design
- More interactive
- Slow in speed
- Generally written in high-level language
- Easy to understand
- Easy to manipulate and use
- Bigger in size and requires large storage space

High level languages:

❖ Operating systems.

An operating system is a program that controls the execution of application programs and acts as an interface between the user of a computer and the computer hardware.

❖ Compiler.

A compiler is a program that accepts a source program in a “high-level language “and produces a corresponding object program

❖ Assembler.

The input to an assembler is an assembly language program. The output is an object program plus information that enables the loader to prepare the object program for execution.

❖ Loader.

A Loader is a routine that loads an object program and prepares it for execution. The loader is a program that places programs into memory and prepares them for execution.

- **Object program**.

A computer program which has been translated into machine language by a compiler and assembler,

Introduction of Operating System

An operating system acts as an intermediary between the user of a computer and computer hardware [2].

An operating system is a software that manages the computer hardware.

- A more common definition is that the operating system is the one program running at all times on the computer (usually called the kernel), with all else being application programs.
- An operating system is concerned with the allocation of resources and services, such as memory, processors, devices, and information. The operating system correspondingly includes programs to manage these resources, such as a traffic controller, a scheduler, memory management module, I/O programs, and a file system.

There are primarily three choices: **Windows, Linux, Apple OS X.**

Linux is free, however people generally do not use it for home purpose.

Apple OS X works only on Apple desktops.

Windows 7 is very popular among desktop users.

Most of the computers come pre-equipped with Windows 7 Starter edition.

Windows 8 is recently introduced and is available in the market.

Windows 7 and Windows 8 come in multiple versions from starter, home basic, home premium, professional, ultimate, and enterprise editions.