COM111: COMPUTER APPLICATIONS
CHAPTER 2: BASIC HARDWARE UNITS OF A COMPUTER

At the end of the chapter the learner shall be able to;
- Explain the different hardware units of a computer system such as input, output, Central processing unit (CPU), main memory and secondary storage
- Explain how the different units of a computer interact witch each other to give the user output
- Explain how information is stored in a computer
- Explain the different storage units of a computer such as byte, Kilobyte, megabyte, Gigabyte and Terabyte

Hardware units (Devices) of a computer can be categorized into five units;
   i.   Input unit
  ii.   Output Unit
 iii.   Central processing unit (CPU) or processor
  iv.   Primary Memory
   v.   Secondary Storage/Backing Storage

2.1   Input Devices
An input device lets you communicate with a computer. They are used to enter information and issue commands to the computer. Commands tell the computer to do something, like save the file. A keyboard, mouse, scanner, digital camera, touch pads and joystick are examples of input devices.
   a) **Keyboard** Used to type data into the computer. It has special keys for giving the computer commands called command or function keys
   b) **Pointing Devices** Pointing devices move some object on the screen and can do some action Mouse is a common pointing device
   c) **Scanner** allows you to scan documents, pictures, or graphics and view them on the computer. You can also use software to edit the items you scan. Used to put printed pictures and text into a computer. It Converts an image into dots that the computer can understand .To scan text, optical character recognition (OCR) software is needed
   d) **Digital Camera** Used to take electronic pictures of an object. The pictures taken by a digital camera can be used directly by a computer
   e) **Microphone** Used to put sound into a computer. Need sound recording software
   f) **Video Capture Card** Usually place inside the computer's case. Use to put video into a computer. Need a video source, either a video camera or video recorder
   g) **Voice input device-**A computer I/O device in which vocal commands may be entered into a computer system.
   h) **Optical character recognition (OCR)** is computer software designed to translate images of handwritten or typewritten text (usually captured by a scanner) into machine-editable text, or to translate pictures of characters into a standard encoding scheme representing them (e.g. ASCII or Unicode).
   i) **Optical Mark Reader (OMR)** A special scanning device that can read carefully placed pencil marks on specially designed documents. OMR is frequently used in forms, questionnaires, and answer-sheets

2.2   Output device
An output device displays information on a screen, creates printed copies or generates sound. A monitor, printer, and speakers are examples of output devices.
a) **Monitors and Displays** Shows the processed information on a screen. A monitor uses a Picture Tube like a television with the image displayed on the front of the tube, which is called the screen.
b) **Printers** produce a hard copy. The information is printed on paper and can be used when the device is off. It is also called a printout. There different types of printers;

Impact printers: In case of Impact printer an inked ribbon exists between the print head and paper ,the head striking the ribbon prints the character. Impact printers are basically divided into 2 types
- Serial/Character printers eg. Dot matrix printers
  - Uses metal pins to strike an inked ribbon to make dots on a piece of paper.
  - Lowest print quality of all of the printers.
  - Very low in cost per page to use.
- Daisy wheel printers eg. Line Printers

Non-Impact Printers: Non Impact printers use techniques other than the mechanical method of head striking the ribbon. Non Impact Printers are divided into 3 categories
- Thermal printers

- Ink jet printers
  - Use drops of magnetic ink to produce dots on a page to produce text or images.
  - The print quality is almost the same as a laser printer's.
  - The ink is very expensive
  - The ink is water soluble and will run if the paper gets wet
  - Highest cost per page of all the printers
  - For producing color documents, it has the highest quality at a reasonable price.
- Laser printers
  - A laser or LEDs make dots on a light sensitive drum
  - Toner (very tiny particles of plastic) stick to the drum where the dots where made
  - For black and white printouts, very low cost per page
  - Printout is permanent
  - Color laser printers are still fairly expensive

Classification of Printers
Printers are classified by the following characteristics:
1) **Quality of type:** The output produced by printers is said to be either *letter quality* (as good as a typewriter), *near letter quality*, or *draft quality*. Only daisy-wheel, ink-jet, and laser printers produce letter-quality type. Some dot-matrix printers claim letter-quality print, but if you look closely, you can see the difference.
2) **Speed:** Measured in characters per second (cps) or pages per minute (ppm), the speed of printers varies widely. Daisy-wheel printers tend to be the slowest, printing about 30 cps. Line printers are fastest (up to 3,000 lines per minute). Dot-matrix printers can print up to 500 cps, and laser printers range from about 4 to 20 text pages per minute.
3) **Impact or non-impact:** Impact printers include all printers that work by striking an ink ribbon. Daisywheel, dot-matrix, and line printers are impact printers. Non-impact printers include laser printers and ink-jet printers. The important difference between impact and non-impact printers is that impact printers are much noisier.
4) **Graphics:** Some printers (daisy-wheel and line printers) can print only text. Other printers can print both text and graphics.
5) **Fonts**: Some printers, notably dot-matrix printers, are limited to one or a few fonts. In contrast, laser and ink-jet printers are capable of printing an almost unlimited variety of fonts. Daisy-wheel printers can also print different fonts, but you need to change the daisy wheel, making it difficult to mix fonts in the same document.

c) **Speakers** Used to output sound
d) **LCD Projectors** Similar to monitors but projects an image on to a screen. They are mainly used for presentations.
e) **Scanners**

Scanners create a digital reproduction of an image or document and come in a variety of shapes and sizes designed to perform different types of tasks. There are three types of office scanners usually seen in the market and the functions they serve are as follows:
1) **Flatbed:** The flatbed scanner consists of its own base with a flat piece of glass and cover just as is found on most copiers. The scanning component of flatbeds runs over the length of the image in order to gather data. Flatbeds are useful when a user needs to scan more than single page documents.
2) **Sheetfed:** Sheetfed scanners are only used if one wants to scan for anything other than sheets of paper. The scanning component of a sheetfed is stationary while the document being scanned passes over it's 'eyes' similar to a fax machine. It is so thin just a couple of inches deep, such that it can easily fit between keyboards and monitor. Sheetfeds usually work best in conjunction with an automatic document feeder for large projects. Pictures and other documents which are smaller than a full page can also be scanned using a sheetfed scanner. They have been known to bend pictures and reproduce less than quality images.
3) **Slide:** There is a need for accurate reproduce of very small images. For such application the resolution required is very sharp and slide types of scanner create a totally different scanner market. Slides are usually inserted into a tray, much like a CD tray on ones computer, and scanned internally. Most slide scanners can only scan slides, though some newer models can also handle negative strips.

2.3 Central Processing Unit (CPU)/Processor:

Composed of the Arithmetic and Logic Unit (ALU) and the Control unit. The CPU is the brain of the computer. The CPU consists of electronic circuits that interpret and execute instructions; it communicates with the input, output, and storage devices. The CPU of a microcomputer is called a microprocessor.

The microprocessor contains the CPU which is made up of three components-the control unit supervises all that is going on in the computer, the arithmetic/logic unit which performs the math and comparison operation, and temporary memory. Because of the progress in developing better microprocessors, computers are continually evolving into faster and better units.

The processor and main memory of a PC are commonly held on a single board called a mother board. The processor has the following functions:

a) It controls the transmission of data from input devices to memory;

b) It processes the data held in main memory;

c) It controls the transmission of information from main memory to output devices.

Central Processing Unit is implemented in a single piece of silicon device known as a computer chip.

2.3.1. CPU Operation

The Control unit of the CPU, with the help of memory, executes instructions in the repetition of machine cycles. A *machine cycle* consists of four steps – fetch, decode, execute, and write back:

1. The control unit *fetches* an instruction and data associated with it from memory.
2. The control unit *decodes* the instruction.
3. The arithmetic/logic unit *executes* the instruction.
4. The arithmetic/logic unit stores / writes back the *result* in memory.
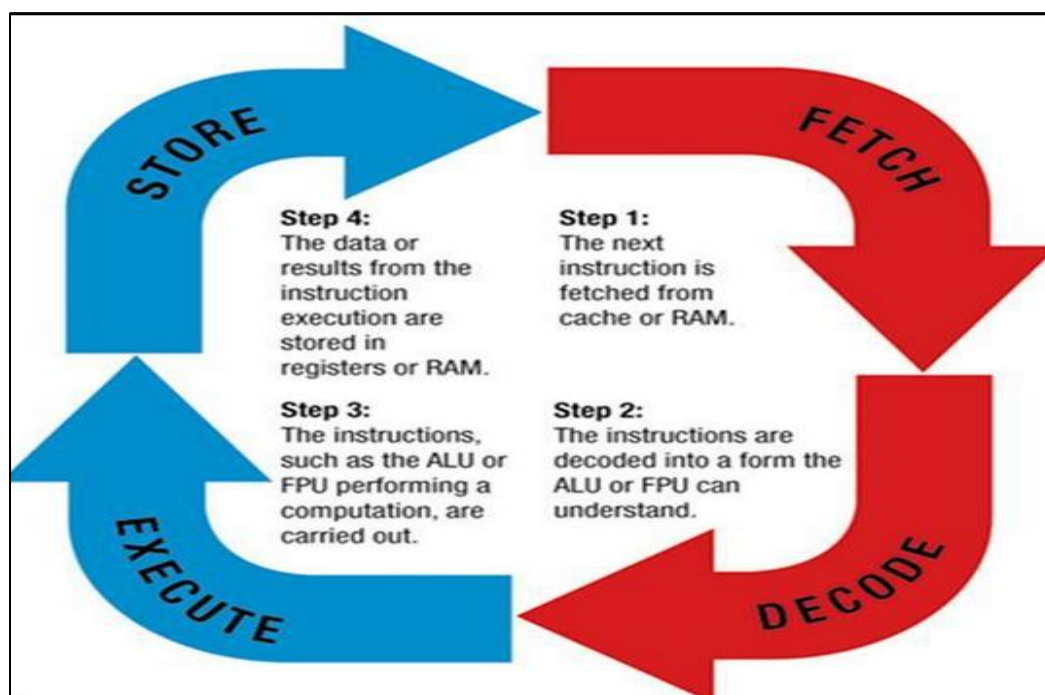
The **arithmetic/logic unit(ALU)** plays two roles.

- **Arithmetic** operations – these operations are addition, subtraction, multiplication and division..
- **Logical** operations – it compares two data items to determine whether the first one is smaller than, equal to or greater than the second item.

Processors

The term processor is a sub-system of a data processing system which processes received information after it has been encoded into data by the input sub-system. These data are then processed by the processing sub-system

before being sent to the output sub-system where they are decoded back into information. However, in common parlance processor is usually referred to the microprocessor, the brains of the modern day computers.

There are two main types of processors: CISC and RISC.

1) **CISC:** A **Complex Instruction Set Computer** (CISC) is a microprocessor Instruction Set Architecture (ISA) in which each instruction can indicate several low-level operations, such as a load from memory, an arithmetic operation, and a memory store, all in a single instruction. The term was coined in contrast to Reduced Instruction Set Computer (RISC).

   Examples of CISC processors are the VAX, PDP-11, Motorola 68000 family and the Intel x86/Pentium CPUs.

2) **RISC: Reduced Instruction Set Computing (RISC)**, is a microprocessor CPU design philosophy that favors a smaller and simpler set of instructions that all take about the same amount of time to execute. Most types of modern microprocessors are RISCs, for instance ARM, DEC Alpha, SPARC, MIPS, and PowerPC.

2.3.2. Components of CPU

The components of the CPU includes;

Arithmetic and Logic Unit (ALU)

The Arithmetic Logic Unit or the ALU is a digital circuit that performs arithmetic and logical operations. Where arithmetic operations include things such as ADD and SUBTRACT and the logical operations include things such as AND, OR, NOT. The ALU is a fundamental building block in the central processing unit (CPU) of a computer and without it the computer wouldn't be able to calculate anything!

Control Unit (CU)

The control unit controls the movement of data and instructions into and out of the CPU and controls the operation of the ALU. The control unit sits inside the CPU and coordinates the input and output devices of a computer system. It coordinates the fetching of program code from main memory to the CPU and directs the operation of the other processor components by providing timing and control signals.

Clock

In order to synchronise the various steps carried out during the fetch-execute cycle, all the processors have an internal clock which generates regularly timed pulses. All the processor activities, such as fetching an instruction, reading data into the memory register etc. must begin on a clock pulse, although some activities take more than one clock pulse to complete. Typically the clock pulse rate in 2000 is around 500 megahertz (million cycles per second). The clock speed, therefore, is one of the factors which will influence the speed at which instructions are executed; a 600MHZ processor will in general operate faster than a 500MHz processor.

Clock speed is measured in Hertz, which means 'per second' (cycles/second). You have probably heard of clock speeds such as 1 MHz, this means 1,000,000 cycles per second and potentially a million calculations. A computer of speed 3.4 GHz means it might be capable of processing 3,400,000,000 instructions per second!

✓ One megahertz (MHz): one million cycles per second
✓ One gigahertz (GHz): one billion cycles per second

Common ratings for motherboard buses: 2600 MHz, 2000 MHz, 1600 MHz, 1333 MHz, 1066 MHz, 800 MHz, 533 MHz, or 400 MHz

Range of CPU speeds: 166 MHz to 4 GHz

Registers

A *register* is a storage device that holds a word exactly like a memory location. Registers are used as temporary storage places to hold frequently used data In principle, there's no difference between a location in memory and a register because they both do the same thing. The real difference is one of accessibility. Registers are located within the CPU and can be accessed faster than memory locations

Four registers are essential to instruction execution:

- *Program counter (PC)*: Contains the address of an instruction to be fetched.
- *Instruction register (IR)*: Contains the instruction most recently fetched.

- *Memory address registers (MAR)*: Contains the address of a location in memory.
- *Memory buffer register (MBR)*: Contains a word of data lo be written to memory or the word most recently read.

Others includes;

- **General purpose registers** are used for performing arithmetic functions. In some computers, there is only one general purpose register, usually called an accumulator, which acts as the working area.
- **Current instruction register (CIR)** contains both the operator and the operand of the current instruction.
- **Memory address register (MDR)** holds the address of the memory location from which data will be read or to which data will be written.
- **Memory data register (MDR)** is used to temporarily store data read from or written to memory.
- **Status register (SR)** contains bits that are set or cleared based on the result of an instruction.

System Bus – Communication pathways

The communication links between the registers, ALU and control unit are called buses. The buses are the electrical paths for data to flow from point to point in a circuit. There are three types of Buses for Communication in CPU are

1) Control Bus: - The Path for all controlling and timing functions sent by the control unit to other units of CPU.
2) Address Bus: - This Path is used for locating the address of the memory location where the next instruction to be executed or the next piece of data is found. This is used for data retrieval storage and manipulations where address of storage locations are required.
3) Data Bus:- This is the path on which actual data transfer takes place.
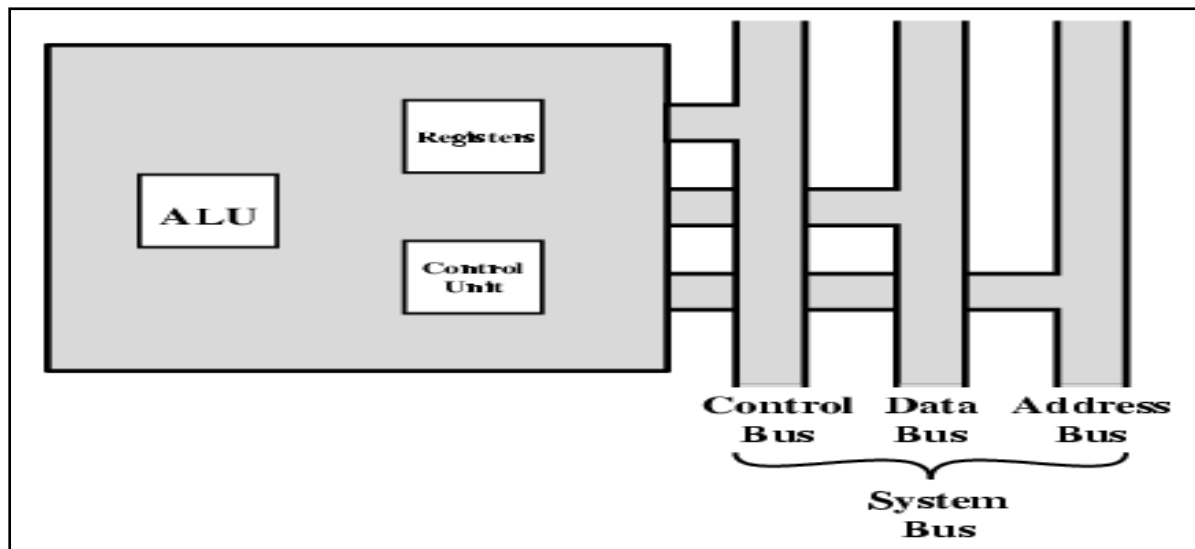
2.4 Memory:

Memory refers to the physical devices used to store programs (sequences of instructions) or data on a temporary or permanent basis for use in a computer or other digital device.

2.4.1. Types;

1) Primary Memory Primary storage is directly connected to the central processing unit of the computer. It must be present for the CPU to function correctly.
2) Secondary Memory: (also known as external memory or auxiliary storage), differs from primary storage in that it is not directly accessible by the CPU. The computer usually uses its input/output channels to access secondary storage and transfers the desired data using intermediate in primary storage

It includes the
a) Secondary Storage; storage inside the computer – Hard disk

b) Offline storage: storage using removable media drives – Flash disks, CD's. The *storage* is a computer data storage on a medium or a device that is not under the control of a processing unit.

- Off-line storage increases general information security, since it is physically inaccessible from a computer, and data confidentiality or integrity cannot be affected by computer-based attack techniques.

c) Tertiary Storage; Typically it involves a robotic mechanism which will *mount* (insert) and *dismount* removable mass storage media into a storage device according to the system's demands; these data are often copied to secondary storage before use. It is primarily used for archiving rarely accessed information since it is much slower than secondary storage This is primarily useful for extraordinarily large data stores, accessed without human operators. Typical examples include tape libraries and optical jukeboxes

These are devices which are used to store huge information for future use. This is mostly hard drives and removable media such as floppy disks, optical media (CD ROM) etc.

2.4.2. Primary Memory

It contains the programs that are currently being run and the data the programs are operating on. The arithmetic and logic unit can very quickly transfer information between a processor register and locations in main storage, also known as a "memory addresses".

a). Processors Register

It is the internal to the central processing unit. Registers contain information that the arithmetic and logic unit needs to carry out the current instruction. They are technically the fastest of all forms of computer storage.

b). Cache memory

It is a special type of internal memory used by many central processing units to increase their performance or "throughput". Some of the information in the main memory is duplicated in the cache memory, which is slightly slower but of much greater capacity than the processor registers, and faster but much smaller than main memory.

c). Virtual Memory

Virtual memory is a special memory that lets your computer handle many programs and applications with only a small amount of RAM!. It is a Primary memory stored on secondary memory is called "Virtual Memory". Virtual memories are very helpful in that they free up space on the Ram.

d). Main Memory

It contains the programs that are currently being run and the data the programs are operating on. The arithmetic and logic unit can very quickly transfer information between a processor register and locations in main storage, also known as a "memory addresses".

Types of the Main Memory
1. **Random Access Memory (RAM)**
   - Is the basic kind of internal memory that holds data and instructions while the computer is in use.
   - It can be read from and written to.
   - It is called random access because the processor or computer can access any location in memory in any order as contrasted with sequential access devices which must be accessed in order.
   - RAM is volatile; losing the stored information in an event of power loss, and quite expensive.

There are two basic types of RAM.
a) **Static RAM** (SRAM)does not need to be refreshed, which makes it faster; but it is also more expensive than dynamic RAM.
b) **Dynamic RAM** (DRAM) needs to be refreshed thousands of times per second. Both types of RAM are *volatile,* meaning that they lose their contents when the power is turned off.

2. **ROM (Read only memory)**
   - Is also random access but only for reads, once data has been written onto a ROM chip, it cannot be removed and can only be read.
   - It refers to special memory used to store programs that boot the computer and perform diagnostics. Most personal computers have a small amount of ROM (a few thousand bytes).

- Retains its contents even when the computer is turned off and is therefore referred to as being *nonvolatile*.

Types of ROM

a). PROM (Programmable Read Only Memory)

A variation of the ROM chip is programmable read only memory. PROM can be programmed to record information using a facility known as PROM-programmer. However once the chip has been programmed the recorded information cannot be changed, i.e. the PROM becomes a ROM and the information can only be read.

b). EPROM (Erasable Programmable Read Only Memory)

As the name suggests the Erasable Programmable Read Only Memory, information can be erased and the chip programmed a new to record different information using a special PROM-Programmer. When EPROM is in use information can only be read and the information remains on the chip until it is erased.

2.5 Secondary Storage

These are devices which are used to store huge information for future use. This is mostly hard drives and removable media such as floppy disks, optical media (CD ROM) etc.

Hard Drive:

Floppy Disk: Floppy disks allow information to be transported easily from one computer to another they have limited storage capacity, generally 1.44 MB. Saving and retrieving information from a floppy disk is slower than on a hard drive. They are more susceptible to physical damage and viruses than the hard drive. The size of a hard drive is usually expressed in terms of megabytes and gigabytes.

Compact Disk Read Only Memory (CD ROM): CD ROMs are read only storage medium. Typically, a CD ROM holds up to 650 MB of information. While information retrieval is faster than from a floppy disk, it is still not as fast as from the hard drive.

Compact Disk-Writable (CD-R): A CD-R is highly effective for storing a large amount of data. Can hold up to 700MB of information. A CD-R is a one time recordable compact disc.

Compact Disk-Re-Writable (CD-RW):

A CD-RW allows you to read, write, erase and write again. Writing takes place in a single pass of the focused laser beam. This is sometimes referred to as direct overwriting and can be repeated several thousand times per disc.
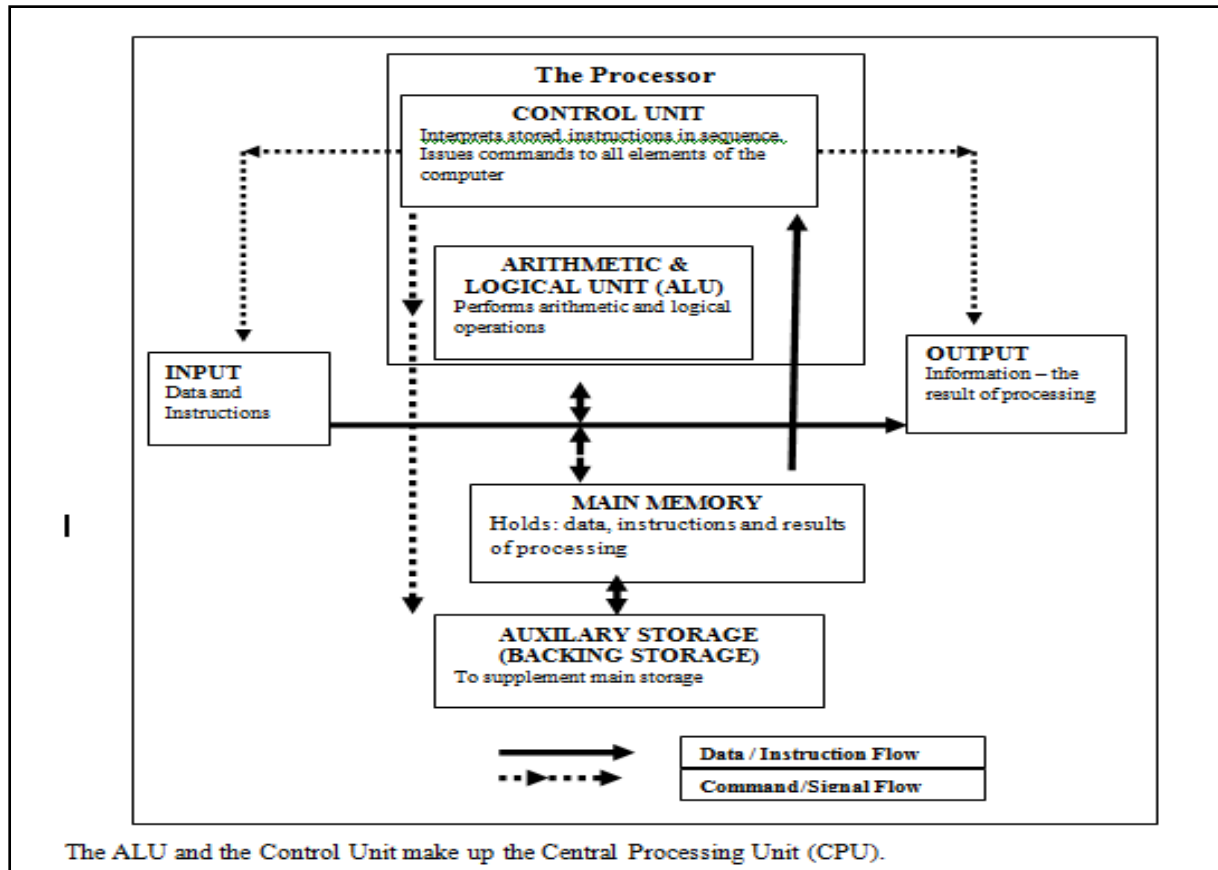
2.6. Memory Size

Byte – a string of 8 bits
Kilobyte – 1,000 bytes
Megabyte – 1,000,000 bytes
Gigabyte – 1,000,000,000 bytes
Terabyte – 1,000,000,000,000 bytes

2.7 Computer units interaction diagram

The Processor

CONTROL UNIT
Interprets stored instructions in sequence. Issues commands to all elements of the computer

ARITHMETIC & LOGICAL UNIT (ALU)
Performs arithmetic and logical operations

INPUT
Data and Instructions

OUTPUT
Information – the result of processing

MAIN MEMORY
Holds: data, instructions and results of processing

AUXILARY STORAGE (BACKING STORAGE)
To supplement main storage

| → | Data / Instruction Flow |
| ⋯▶⋯➤ | Command/Signal Flow |

The ALU and the Control Unit make up the Central Processing Unit (CPU).

The processor and main memory of a PC are commonly held on a single board called a **mother board**
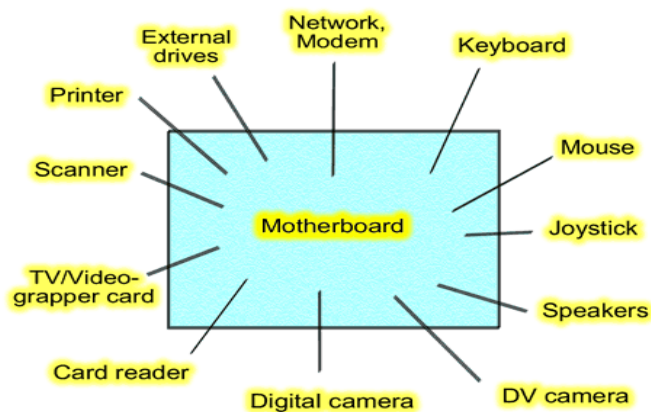
2.8. Mother Board

The motherboard is a large printed circuit board, which has lots of chips, connectors and other electronics mounted on it. It contains CPU, expansion slots, other devices. Most of the data exchange takes place on the motherboard itself, where all the components are connected to each other. All devices communicate with motherboard CPU via:

a) Buses
b) Expansion Slots
c) Cables.

The motherboard is mounted in the PC box using small plastic brackets and screws. The cabinet and the motherboard are made to suit each other, so there are holes in the metal for the connectors mounted on the board. Finally, the motherboard has to be connected to the PC's power supply installed in the cabinet. This is done using a standard connector
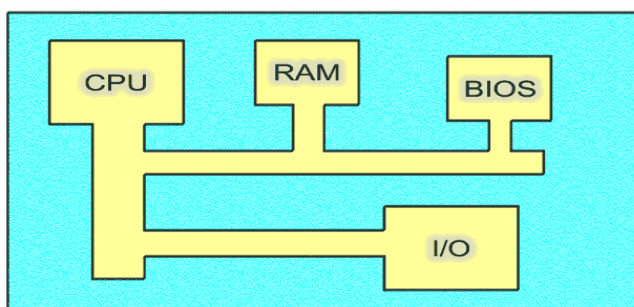
In relation to the PC's *external* devices, the motherboard functions like a central railway station. The motherboard is the Hub of all communication/ data exchanger. All traffic originates from or ends up in the motherboard; which is appropriately called the most important component of the PC

2.9 Mother Board Components

Chips

The active devices on the motherboard are gathered together in *chips*. These are tiny electronic circuits which are crammed with transistors. The chips have various functions. For example, there are:

- ROM chips, which store the BIOS and other *programs*.
- CMOS storage, which contains user-defined data used by the setup program.
- The chipset, which normally consists of two, so-called *controllers*, which incorporate a number of very essential functions.
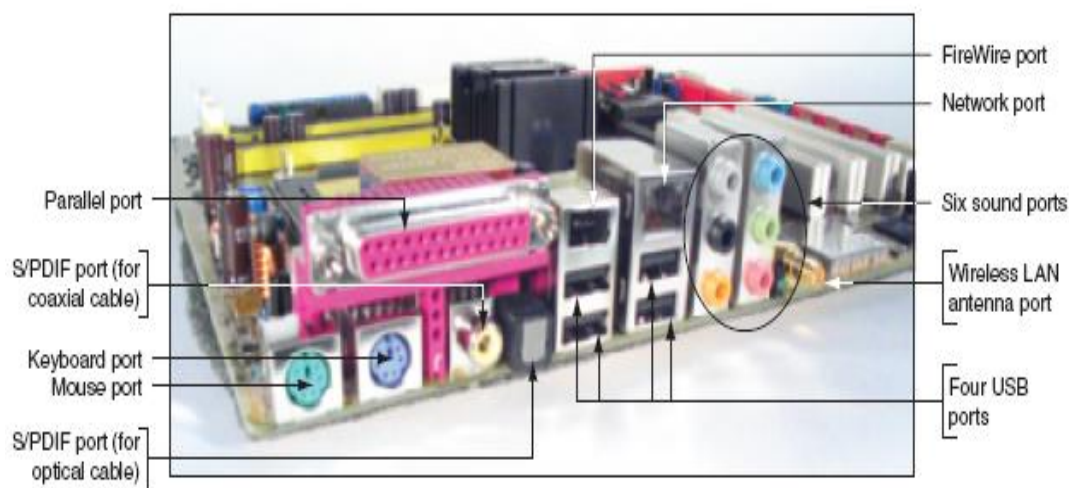
Sockets

These are holders, which have been soldered to the motherboard. The sockets are built to exactly match a card or a chip. A number of components are directly connected to the motherboard using the sockets. For example, there are sockets (*slots*) to mount:

- The CPU and working storage (the RAM modules).
- Expansion cards, also called adapters (PCI, AGP and AMR slots, etc.).

They facilitate the installation of components directly on the motherboard without needing special tools. The component has to be pushed carefully and firmly into the socket, and will then hopefully stay there.

Input / Output Ports

A motherboard provides ports for common I/O devices. These motherboard ports may be outside of the case.

- Ports for the keyboard and mouse.
- Serial ports, the parallel port, and USB ports.
- Sockets for speakers/microphone etc.

2.9. 1. Personal Computer Ports and Connectors

In a computer there are various connectors and ports, which help in establishing a communication path between the CPU and the various Storage devices. Before learning about the various available connectors, it is essential to be familiar with the following terms:

a) Cable is a wire
b) Socket is the female side of a connector.
c) Pin is the male side of a connector.
d) Port is generally a place for physically connecting to some other device usually with a socket.
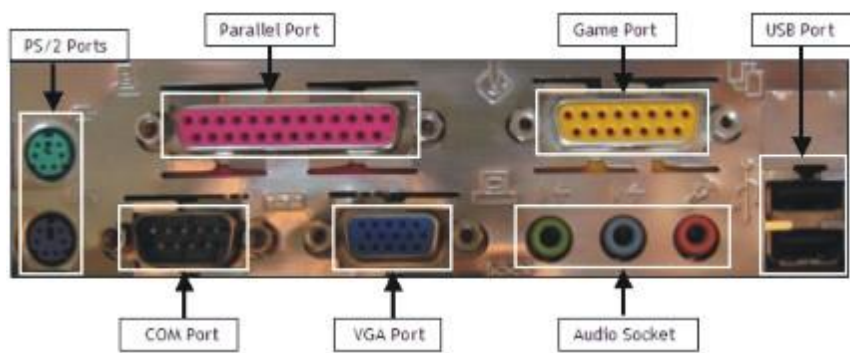
Parallel Port

Parallel ports can be used to connect a host of popular computer peripherals like:

a) Printers
b) Scanners
c) CD burners
d) External hard drives
e) Iomega Zip removable drives
f) Network adapters
g) Tape backup drives

Parallel ports were originally developed by IBM as a way to connect a printer to PC. Parallel ports are also known as LPT ports. Facilitates Bi-directional communication that allows each device to receive data as well as transmit it.

Serial Port

Serial ports, also called communication (COM) ports, support sequential data transmission and are bi-directional. Bi-directional communication allows each device to receive data as well as transmit it. The name "serial" comes from the fact that a serial port "serializes" data. That is, it takes a byte of data and transmits the 8 bits in the byte one at a time serially one after the other. A serial port is commonly used to connect external modems, scanners or the older computer mouse to the computer. It comes in two versions, 9-pin and 25-pin. 25-pin COM connector is the older version while the 9-pin connector is the current standard. Data travels over a serial port at 115 Kb per second.

USB (Universal Serial Bus) Port

USB, introduced in 1997 is a plug and play peripheral connection, which was invented to solve all these headaches. It is used to connect various devices, for example, digital joystick, a scanner, digital speakers, digital cameras, or a PC telephone etc. to the computer. USB is generally a two-and-a half-inch long port on the back of computers or built into a hatch on the front of a computer.

The Universal Serial Bus provides a single, standardized, easy-to-use way to connect up to 127 devices to a computer. Just about every peripheral made now comes in a USB version. A sample list of USB devices that you can buy today includes:

a) Printer
b) Scanner
c) Mic
d) Joystick
e) Flight yoke
f) Digital camera
g) WebCam
h) Scientific data acquisition device
i) Modem
j) Speaker
k) Telephone
l) Video phone
m) Storage device such as Zip drive
n) Network connection

Fire-wire Port

This port was originally created by Apple and standardized in 1995 as the specification IEEE 1394 High Performance Serial Bus and is very similar to Universal Serial Bus (USB). The most important features of Firewire port are:

- Fast transfer of data - the latest version achieves speeds up to 800 Mbps. At some time in the future, that number is expected to jump to an unbelievable 3.2 Gbps
- Ability to put lots of devices on the bus. It is possible to connect up to 63 devices to a FireWire bus. Windows operating systems (98 and later) and Mac OS (8.6 and later) both support it.
- Hot-pluggable ability - they can be connected and disconnected at any time, even with the power on.
- Provision of power through the cable - FireWire allows devices to draw their power from their connection.

Plug-and-play performance - if you connect a new FireWire device to your computer, the operating system auto-detects it and asks for the driver disc. If you've already installed the device, the computer activates it and starts talking to it.

PS/2 Port

IBM developed the PS/2 port. It is also called a mouse port. It is used to connect a computer mouse or keyboard. A PS/2 connector is a round connector with 6 pins. Nowadays few computers have two PS/2 ports, one for keyboard and one for mouse. A colour code is used to distinguish between the two ports the keyboard port is green and the mouse has a purple port.

Monitor Socket

This connector is used to attach a computer display monitor to a computer's video card. The connector has 15 holes.

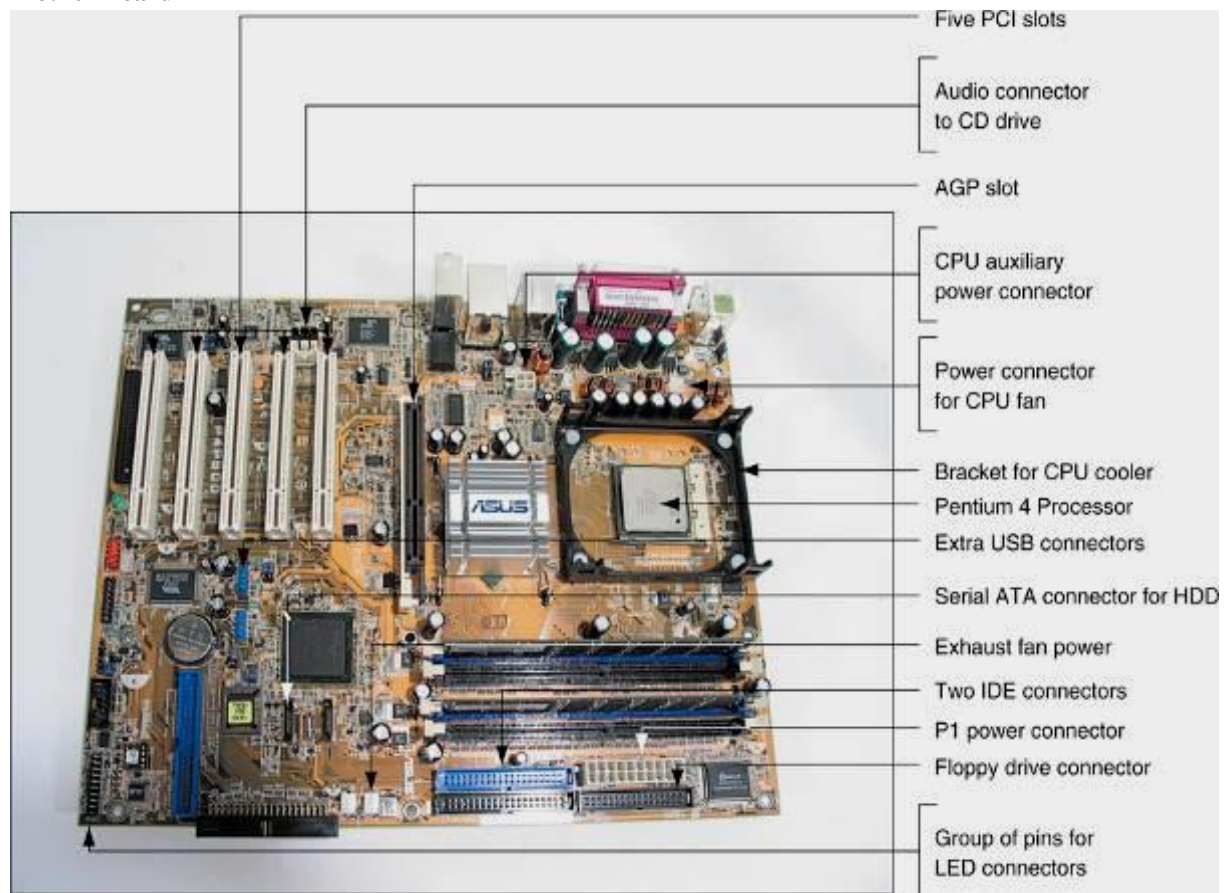### Audio/Speaker and Microphone Socket

At the back of the computer system we can find three small sockets of blue, green and pink colors used to connect speakers, audio input devices and microphones to the PC respectively. The connectors for microphone and speakers look like as shown in the adjacent figure. They are color coded to help in troubleshooting.

In addition to these sockets, connectors and ports, the motherboard contains a number of other contacts. These include:

- The big *connector* which supplies the motherboard with power from the power supply.
- Other connectors for the secondary storage devices, and CD-ROM drive etc
- Jumpers which are used on some motherboards to configure voltage and various operating speeds etc

- A number of pins used to connect the reset button, LED for hard disk activity, built-in speaker, etc

Mother Board

Five PCI slots
Audio connector to CD drive
AGP slot
CPU auxiliary power connector
Power connector for CPU fan
Bracket for CPU cooler
Pentium 4 Processor
Extra USB connectors
Serial ATA connector for HDD
Exhaust fan power
Two IDE connectors
P1 power connector
Floppy drive connector
Group of pins for LED connectors

2.10. Chapter Review Questions

1. Which are the five basic units of a computer?
    (a) Central processing unit, Arithmetic and Logic Unit, Input Unit, Output Unit, Visual Display unit
    (b) Central processing unit, Random Access Memory, Input Unit, Output Unit, Visual Display unit
    (c) Central processing unit, Random Access Memory, Input Unit, Output Unit, Visual Display unit
    (d) Central processing unit, Main Memory, Input Unit, Output Unit, Backing Storage

2. Which of the following is **not** an input device
    (a) Mouse   (b) speaker   (c) Scanner   (d) Digital Camera

3. Which of the following is **not** an output device
    (a) Printer   (b) Scanner   (c) speaker   (d) Monitor

4. Which of the following is **not** a task of the Central Processing Unit?
    (a) It controls the transmission of information from application programs to output devices
    (b) It controls the transmission of data from input devices to memory;
    (c) It processes the data held in main memory;
    (d) It controls the transmission of information from main memory to output devices

5. Which of the following is used to store programs and data that are currently being used
    (a) Read only Memory   (b) Hard Disk
    (c) Random Access Memory   (d) Magnetic Disk