Components of Computers

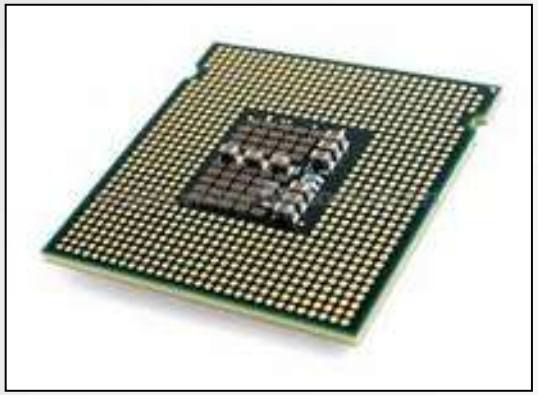
- Processor
- Memory
- Ports & Connectors
- Bus

Processor

- Central Processing Unit(CPU)
- Interprets and carries out the basic instructions that operate a computer.
- This little chip is the **heart** of a computer.
- Also referred to as the "**microprocessor**".
- Does all the computations such as adding, subtracting, multiplying, and dividing.
- The processor significantly impacts overall computing power and manages most of a computer's operations.

- Processor contains a control unit and an arithmetic logic unit(ALU).
- A processor chip has relatively little memory.
- Its basic job is to receive input and provide the appropriate output.
- A particular computer will have a particular type of processor, such as a Pentium processor or a SPARC processor.

Processors



Memory

- A memory is just like a human brain. It is used to store data and instructions.
- Memory consists of instructions and the data saved into computer through Central Processing Unit (CPU).
- It consists of electronic components that store instructions waiting to be executed by the processor.
- The memory is of three fundamental types

    1. Cache Memory
    2. Main memory
    3. Secondary memory.

2. Memory: Cache Memory

◆Cache memory is a very high speed semiconductor memory which can speed up CPU.

◆It acts as a buffer between the CPU and main memory.

◆It is used to hold those parts of data and program which are most frequently used by CPU.

◆It has only enough memory to hold a few instructions of a program and the data they process.

⋊**Advantages:**

•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:**

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

2. Memory: Cache Memory

- There are three types of cache: L1, L2 and L3.
- **L1: L1** is built directly in the processor chip. Usually have very small capacity, ranging 8KB to 128KB.
- **L2:** L2 cache is slightly slower than L1 cache but has a larger capacity ranging from 64KB to 16MB.
- **L3:** L3 cache is a cache on the motherboard that is separate from the processor chip.

2. Memory: Primary Memory (Main Memory)

- Main memory is sometimes called volatile because it looses its information when power is removed.

- Primary memory holds only those data and instructions on which computer is currently working. It has limited capacity and data is lost when power is switched off.

- RAM is type of Primary memory.

Characteristics of Main Memory:

- It is known as main memory.
- Usually volatile memory.
- Data is lost in case power is switched off.
- It is working memory of the computer.
- Faster than secondary memories.
- A computer cannot run without primary memory.
- Main memory is sometimes called main storage.

2. Memory: Secondary Memory

- This type of memory is also known as external memory or non-volatile. It is slower than 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.

- Contents of secondary memories are first transferred to main memory, and then 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 backup memory.
  - It is non-volatile memory.
  - Data is permanently stored even if power is switched off.
  - It is used for storage of data in a computer.
  - Computer may run without secondary memory.
  - Slower than primary memories.
- Secondary memory is sometimes called secondary storage or mass storage.

2. Memory: RAM & ROM

RAM - Random Access Memory

- It performs both read and write operations on memory.
- If power failures data will be lost permanently.
- RAM is volatile memory.
- RAM categorized into following types:
  1. DRAM(Dynamic Random Access Memory)
  2. SRAM (Static Random Access Memory)

2. Memory: RAM & ROM

ROM - Read Only Memory.

- ROM is permanent memory location to save data.
- It works with read only operation.
- No data lose happen when power failure occur during the ROM memory work in computers.
- ROM is a non – volatile memory.

- ROM categorized into following types:
    1. PROM: Programmable Read Only Memory
    2. EPROM : Erasable Programmable Read Only Memory
    3. EEPROM: Electrically Erasable Programmable Read Only Memory

3. Ports

PORT:

- It is a **physical docking point** used to connect an external device to the computer.
- It **communicates** with a system unit so that the peripheral can send data to or receive information from the computer.
- External devices often attaches by a **cable** to a port on the system unit.
- The term **JACK** is sometimes is used to identify audio and video ports.

- **Types of Ports :**

  Serial Port: Serial port uses the DB-9 connector (9 pins, D shape). This connector is used to connect serial devices to the PC, such as a mouse, modem or even a serial printer.

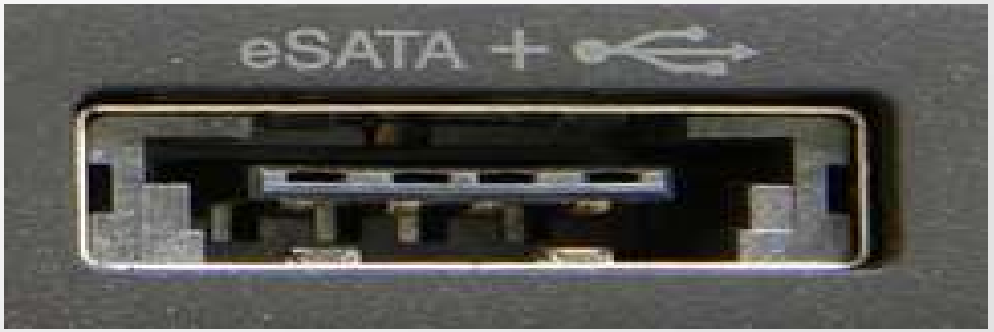
3. Ports

Parallel Port: Parallel connector uses a DB-25 connector (25 pins, D shape). It is used to connect parallel devices with the PC such as a printer, scanner or even external hard drive.

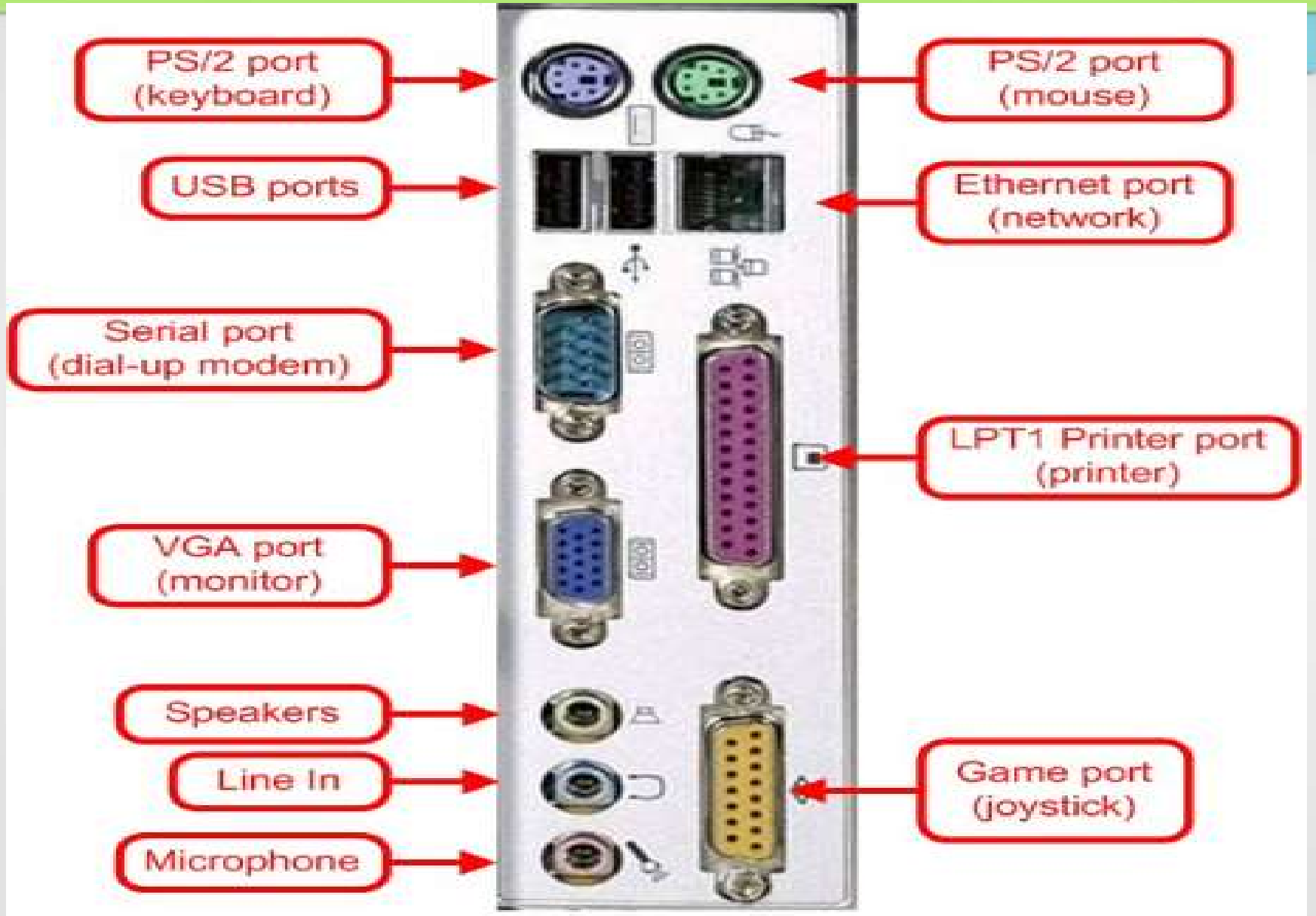
USB: USB allows to connect a variety of external devices. Upto **127** devices can be connected using series of USB hubs. We can connect printers, digital cameras, external hard drives, TV tuners, and many other devices.

3. Ports

•**Special Purpose Ports:** Special purpose ports are MIDI, eSATA, SCSI, Bluetooth. These ports may or may not be included in typical computers.



What are Ports?



3. Connectors

CONNECTOR:

- Joins a cable and a port.
- A connector at one end of the a cable attaches to a port on the system unit.
- A connector at the other end of the cable attaches to a port on the peripheral.

Connectors

4. Bus

- It is a data connection between two or more devices connected to the computer.
- In computer architecture, a bus or buss is a communication system that transfers data between components inside a computer, or between computers.
- For example, a bus enables a computer processor to communicate with the memory or a video card to communicate with the memory.
- This expression covers all related hardware components (wire, optical fiber, etc.) and software, including communication protocols.
- All buses consist of two parts
  an address bus - transfers information about where the data should go.
  a data bus - transfers actual data

4. Bus

- A bus is capable of being a parallel or serial bus
- Today all computers utilize two bus types,

  An internal/local bus - enables communication between internal components such as a video card and memory.

  An external / expansion bus - is capable of communicating with external components such as a USB device.

4. Bus