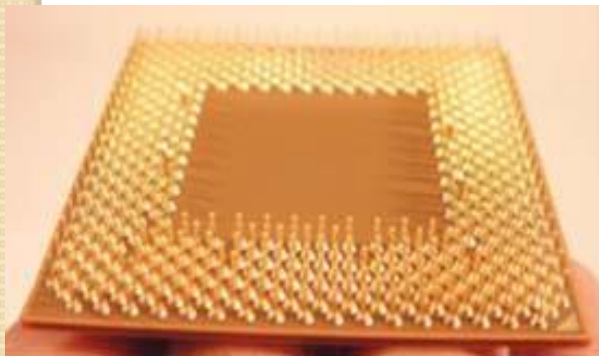


PROCESSING DEVICES

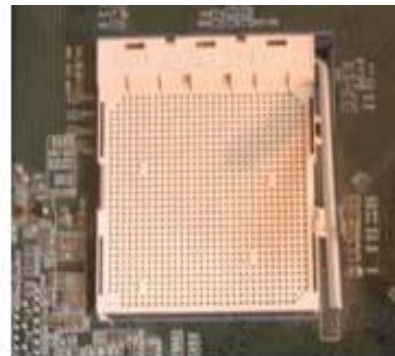
- Processing devices are the computer electronic components and chips housed in the system unit that execute instructions that are fed into the computer.
- Examples of processing devices include
 - ❖ Central processing unit
 - ❖ Motherboard
 - ❖ Main memory.....etc

COMPUTER CENTRAL PROCESSING UNIT (CPU)

- CPU is the electronic device that interprets and carries out the instructions that tell the computer how to work.
- CPU is considered as the brain of the computer and it controls the operations of all other parts of a computer.
- Examples of CPU in diagrams



PGA Processor



PGA Slot

This arrangement is known as Pin Grid Array (PGA)



LGA Processor



LGA Slot

This arrangement is called Land Grid Array (LGA) where the pins are located on the slots

- CPU can store data, intermediate results and instructions when the computer is processing.
- On a personal computer, the CPU is usually housed in a single chip called microprocessor.
- The CPU is made of three components namely

Control unit

This is a unit that has the overall function of controlling and coordinating all the operations within the CPU.

The functions of control unit include;

- It is responsible for controlling the transfer of data and instructions among other units of a computer.
- It manages and coordinates all the other units of a computer.
- It obtains the instructions from the memory, interprets them and directs the operations of a computer.
- It communicates with input and output devices for transfer of data from storage

Arithmetic logic unit (ALU)

- This is where the actual execution part of instructions cycle takes place during the processing.
- This unit consists of two sub sections

Arithmetic section

- A function of this section is to perform arithmetic operations like addition, subtraction, multiplication and division. All complex operations are done by making repetitive use of above operations.

Logic section

- Function of logic section is to perform logic operations such as comparing, selecting, matching and merging of data.

Registers

- This unit stores instructions, data and intermediate results temporarily during the processing cycle.
- Its size affects speed, power and capacity of a computer

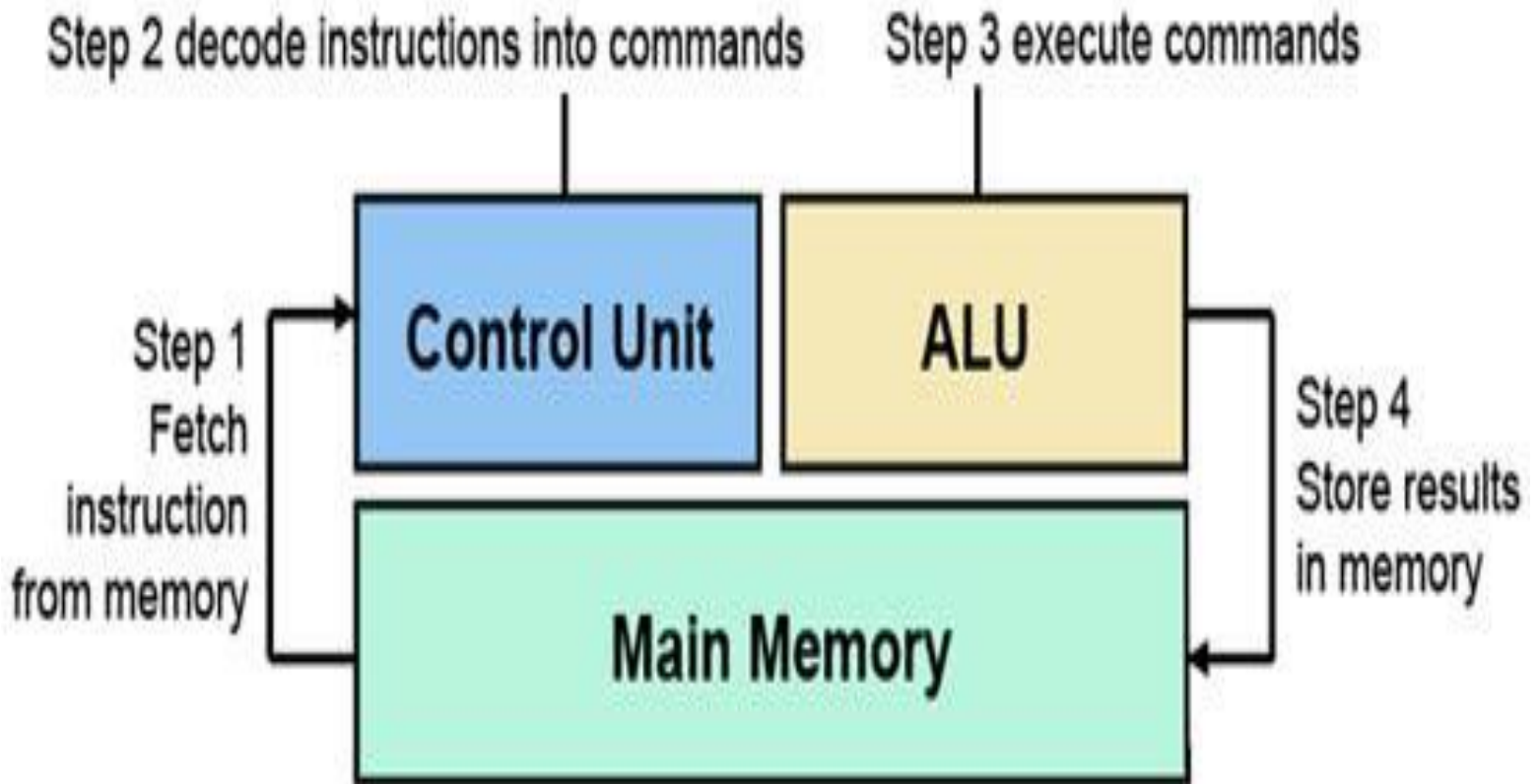
Common types of registers include

- **Instruction register** which temporarily stores instructions being executed.
- **Address register:** This holds the address of locations when an instruction is read out or written in memory.
- **Accumulator:** This holds the initial data item to be operated upon and the results of arithmetic and logic operations
- **Storage register:** This temporarily holds data taken from or about to be sent to memory.
- **program counter:** It holds the address of the next instruction to be executed.
- **General purpose register:** this is used for several functions as assigned by CPU

Machine cycle

- The steps performed by the computer processor for each machine language instruction received. The **machine cycle** is a 4 process cycle that includes reading and interpreting the machine language, executing the code and then storing that code.

Machine Cycle



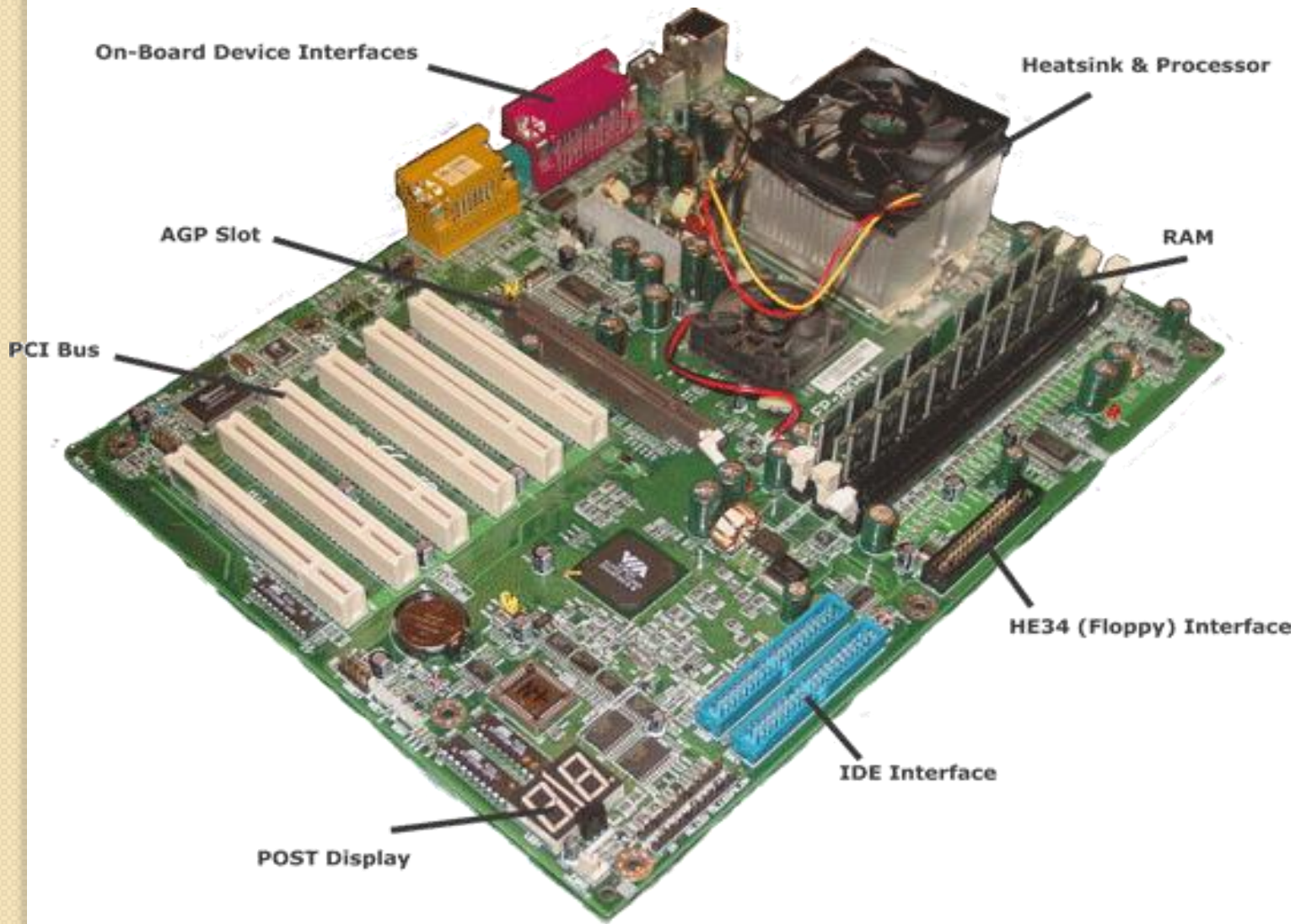
<http://www.computerhope.com>

Four steps of Machine cycle

- **Fetch** - Retrieve an instruction from the memory.
- **Decode** - Translate the retrieved instruction into a series of computer commands.
- **Execute** - Execute the computer commands.
- **Store** - Send and write the results back in memory.

The motherboard

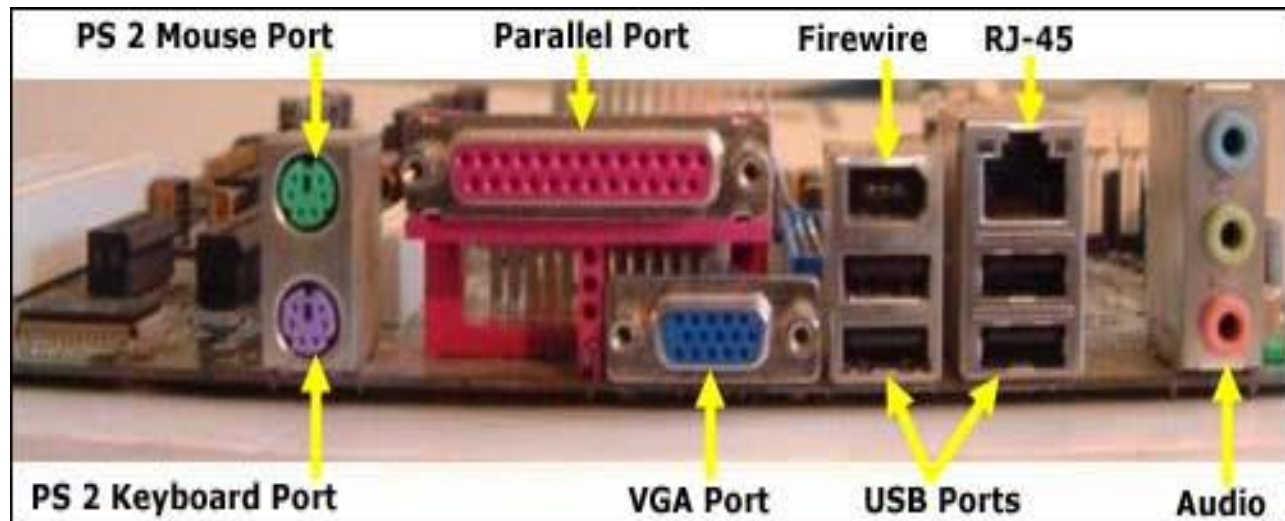
- The motherboard is a single circuit board, that provides the path through which the processor communicates with internal and peripheral devices.
- The components attached to the motherboard include the processor chip (the CPU), memory chips(RAM, ROM), ports, buses, and Expansion Slots for Adapter Cards.



COMPONENTS OF THE MOTHERBOARD

Computer Ports

- These are sockets or slots that peripheral devices connect to on the motherboard.
- A peripheral device is an external device attached to system unit, for examples monitor, disk drives, keyboard, mouse, speakers, microphone etc



Types of ports

Serial ports

- Used to connect devices that use a serial interface such as modem, scanner, mouse etc
- This port transmits data bits one after the other serially over a single line. They are of two types i.e. a 9 pin male connector (COM1) for the mouse and a 9 pin male connector (COM2) for the modem.

Serial Port



Parallel ports

- These are ports used to connect newer versions of printers and other peripherals devices such as portable hard disk, scanners, CD ROM that need faster data transfer.
- This port contains 8 lines for transmitting an entire byte (8 bit) across the eight data lines simultaneously.
- It is a 25 pin model

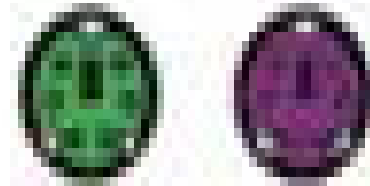
Parallel Port



PS/2 ports

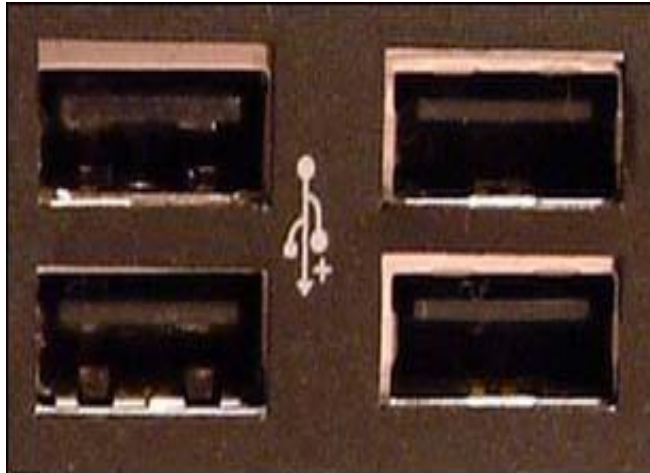
- There are two PS/2 ports, PS/2 keyboards and mouse ports used to connect the keyboard and mouse respectively.
- The cable that connects the PS/2 keyboard and mouse uses a 6 pin mini DIN.

PS/2 Port



Universal serial bus (USB)

- This can connect up to 127 external USB devices such as hard disk, printer, scanner, mouse, keyboard etc. USB compliant devices can get power from a USB port.
- It has a data transfer rate of 12 megabits per second.
- USB devices can be hot plugged (hot swapped) i.e. can be attached while the computer is already powered and running.



USB Ports



USB Cable

Video graphics array (VGA) port

- This connects monitor to the video card. It is similar to serial port connector but serial port connector has pins and it has holes.

VGA Port



Power connector

- This is three pronged plug that connects to the computer's power cable that plugs in the wall socket.

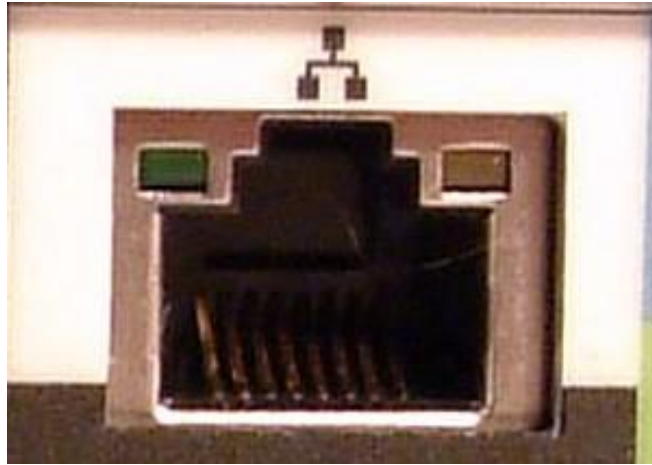
Fire wire port

- These transfer large amounts of data at very fast speed. It is used for connecting camcorders (video recorders) and other video equipments to the computer.
- They are much similar to the USB are much faster and transfer data at rate of 400-800 mbps.



Ethernet port

- This resides on the Ethernet card and connects a network cable to the computer.



Digital video interface (DVI) port

- Connects a flat panel LCD monitors to the computer's high end video graphics card. It is capable of transferring digital signal.



Socket

- Connect microphone, speakers, and headphones to sound card of the computer.

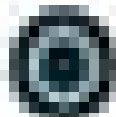




Audio MIDI - Audio Devices



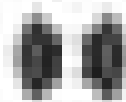
Microphone



External Line-In



External Line-Out



Speaker Left



Center / Subwoofer

BUSES LINES

- The bus is an electrical path on the motherboard that allows data flow between RAM, CPU and other peripherals.

All computer buses have two parts:-

- The **data bus** which transfers actual data bits.
- The **address bus** which transfers information about where the data should go in memory

Connectors

- These are used to join cables to ports. Connectors are of two types namely
- Male connector: this has one or more pins that stand out
- Female connectors : these have matching holes to accept the pins of male connectors.