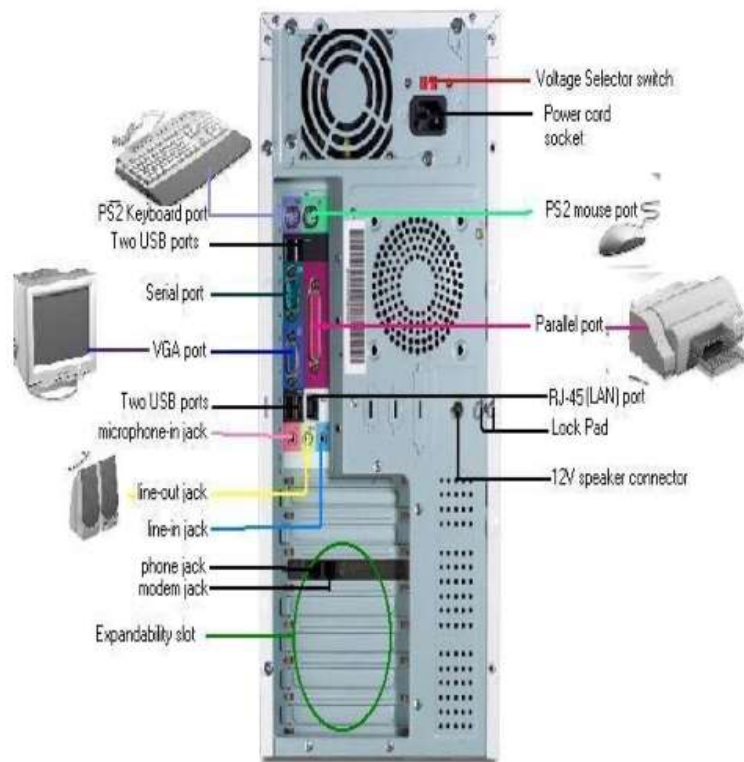
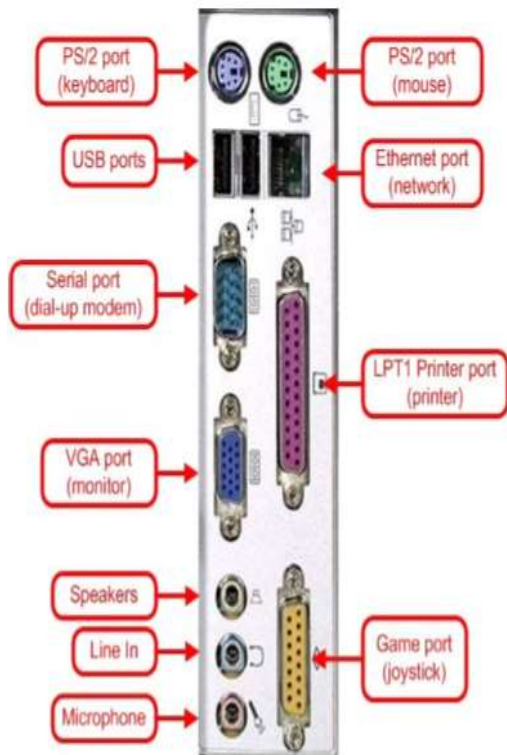


## Lab # 01

### Introduction to Computer Hardware

#### Objective:

To Learning about the different parts of the Computer Hardware Technologies.



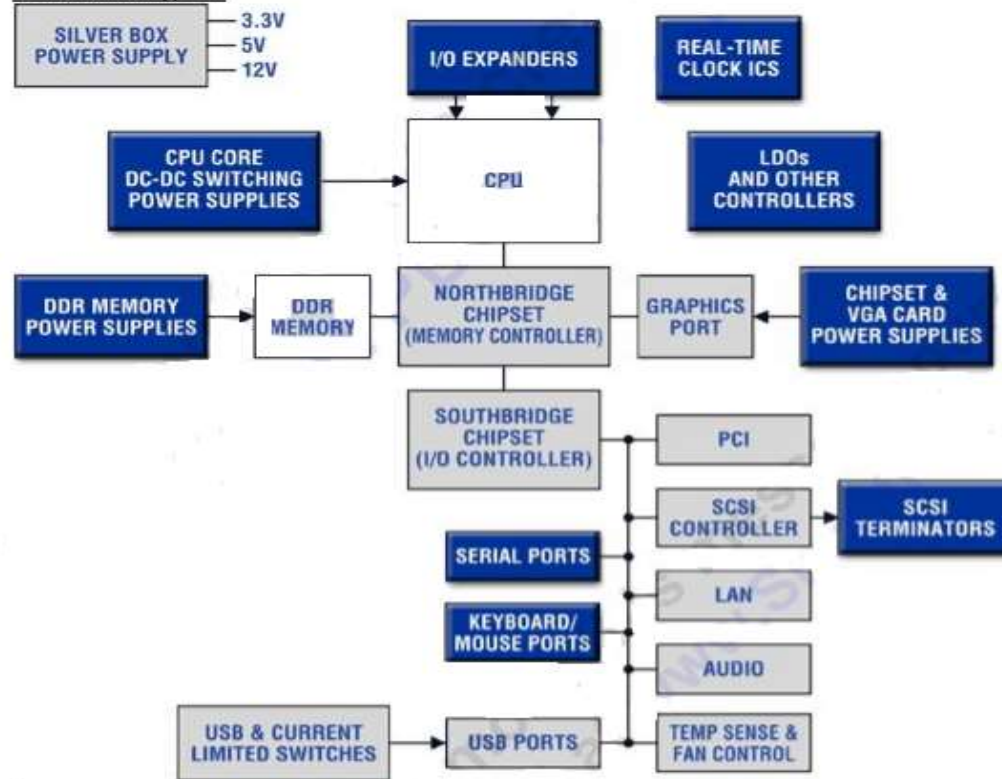
#### What is Motherboard:

The **motherboard** is the **main circuit board** inside a computer.

- It connects **all the components** of the system (CPU, RAM, storage, input/output devices).
- Also called the **system board** or **mainboard**. Without it, hardware components cannot communicate.
- Acts as the **backbone of the computer system**.
- Ensures all parts (CPU, memory, storage, I/O) work together smoothly.
- Determines what kind of processor, RAM, and storage you can use.

The motherboard is the **central hub** of a computer that connects all components and allows them to communicate.

**BLOCK Diagram**



## Motherboard Parts Explained!

This motherboard parts introduction explains the main goal of your motherboard in your computer. The most important parts are explained with only a brief introduction to the technologies behind them not to bore the newcomer who may be confused.

For those who are seeking more advanced information you will find links throughout the content and at the bottom as how to install a motherboard.

## **What Is The Motherboard Main Goal?**

The main goal is to connect all the hardware together like hard drives, memory modules, CPU, etc...

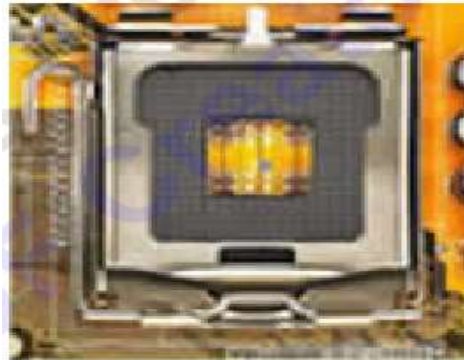
A computer mother board is made of several parts, and each one has a hardware that can be connected to it. On the right, the image is showing a modern motherboard with all its parts.

If you click on the link under the image, you will find a larger image with the motherboard parts name.

Learning about your motherboard parts help to understand how upgrade able it is.

### The Processor Socket

Sockets are the home for your Central Processor Unit (**CPU**). Several types of socket exist, but only 2 of them are really used, and both of them are used by Intel and AMD. The Pin Grid Array (**PGA**) and the Land Grid Array (**LGA**).



CPU Socket

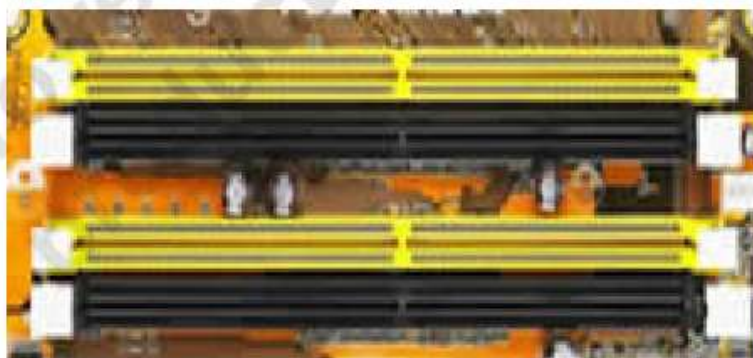
With the type PGA, the CPU will have pins to fit in the socket holes, but with the type LGA, the CPU will not have such pins and will just sit on the socket.

I am discussing this subject in more details in the CPU socket type guide.

To know the form of CPU your motherboard can use and the range of powers and FSBs, look in your motherboard's book. The book that comes with your motherboard has a chart about it in the socket or CPU chapter. That information will give you an idea to how far you can upgrade your CPU.

### Memory Slots

Memory slots also call memory banks are for **Random Access Memory modules (RAM)**. Each memory bank can receives a RAM module designed for a specific pc mother board. Ranging from 2 to 4 banks, you will encounter single and dual-channel technologies.



Memory Banks

With single-channel, you can use 1, 2 or 3 Ram modules, and it should work perfectly. On the other hand, with dual-channel technology, if you fill only 1 bank, you will lose some strength from your module.



## INTRODUCTION TO INFORMATION & COMMUNICATION TECHNOLOGIES

To get the most of it, you need to fill 2 banks with the same module types, from the same manufacturer with exactly the same memory amounts.

If you want 1GB of memory, you need to use 2 512MB modules from the same manufacturer with the same technology type. This way, motherboards use the modules strength to its full capacity. Otherwise it may not work at all.

Like the socket, to find out the type, the manufacturer and the total MB or GB quantity you can use, take a look in your motherboard's book. You should be able to find everything you need.

### Main Power Connector And The 4 Pins Connector

The main power connector is used to get the electric energy from the power supply which the motherboard requires to function properly.



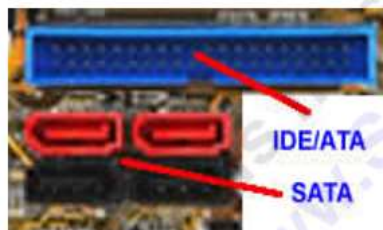
24 Pins Main Power Connector

There are 2 main power connector types for those motherboard parts. The 20 pins + 4 pins (2 separate connectors on the same motherboard), and the 24 pins.

Not all power supplies have the 2 types, but it is possible to work around the problem if you run into an incompatibility situation. Which will be discussed in a future power supply guide about how to install it and where to plug the connectors.

### IDE, ATA And S-ATA Interface Connectors

Many interface standards have been created throughout the years, maybe too many for discussing about all of them. I will then talk about the ATA and the S-ATA only as the IDE is the same thing as the ATA, only the name has changed. Also I will be brief because it is more a hard drive topic than anything else.



IDE/ATA And SATA Interface

The Advanced Technology Attachment (ATA) interface is used to connect hard drives and optic drives. You can attach 2 drives on the same ribbon, 1 master and the other slave, and it supports almost all modern hard drives storage capacities.

## INTRODUCTION TO INFORMATION & COMMUNICATION TECHNOLOGIES

Modern computer mother boards have the new interface called Serial Advance Technology Attachment (**S-ATA**). It is faster than the ATA and only 1 device can be attached to it. The wire is thinner than his predecessor and surely help at the cooling process inside the computer case.

I cover the topic in more details in the What Is SATA Interface guide.

### Floppy Drive Connector



Floppy Drive Connector

Plug your "3.5" floppy drive there. Not really used now, they are going to disappear completely very soon.

### 32 bit PCI Slots, AGP And PCIe

32 bit slots Peripheral Component Interconnect (**PCI**) are used to install sound cards, graphic cards, Ethernet cards and modems.



PCI, AGP or PCIe Ports

The motherboard parts Accelerated Graphics Port (**AGP**) and PCI Express (**PCIe**) focus on graphic cards only. AGP standards use x2, x4 or x8 technologies. AGP 8 being the best, it is highly boosting your graphics and video performances. In Comparison with his old brother PCI, it is day and night.

PCIe standard is even better than AGP standard, and mostly the only one used right now. Some like to say, PCIe is a AGP standard at x16 and it is the #1 choice for gaming machines right now.

More motherboard content will be written on it, especially for graphic cards.

### Processor

Central Processing Unit, Computer **CPU**, is the component installed in your motherboard socket. The CPU executes and interprets programs, and processes data.

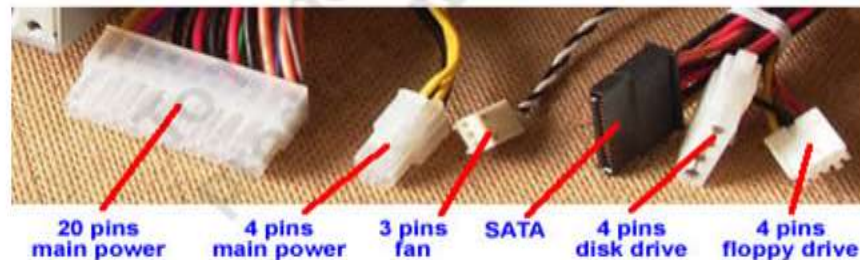


AMD Processor



## Power Supply Connectors, Where To Plug Them?

Main power connectors are plugged to the motherboard. The connector with 20 pins may be used on ATX motherboards and the connector with 4 pins is used for extra power for CPUs and graphic cards. Not all motherboards require the use of connector with 4 pins, if it's the case; do not bother, you do not need to use all connectors anyway.

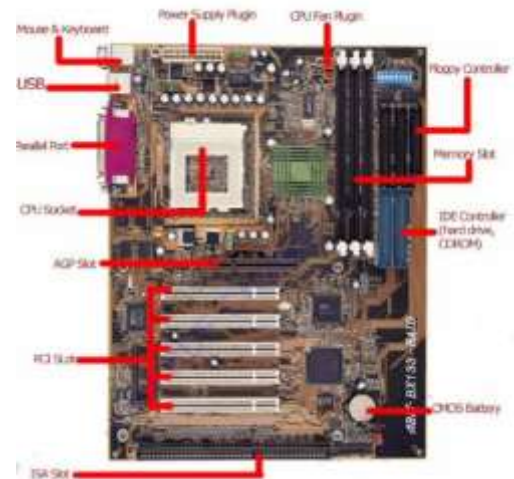
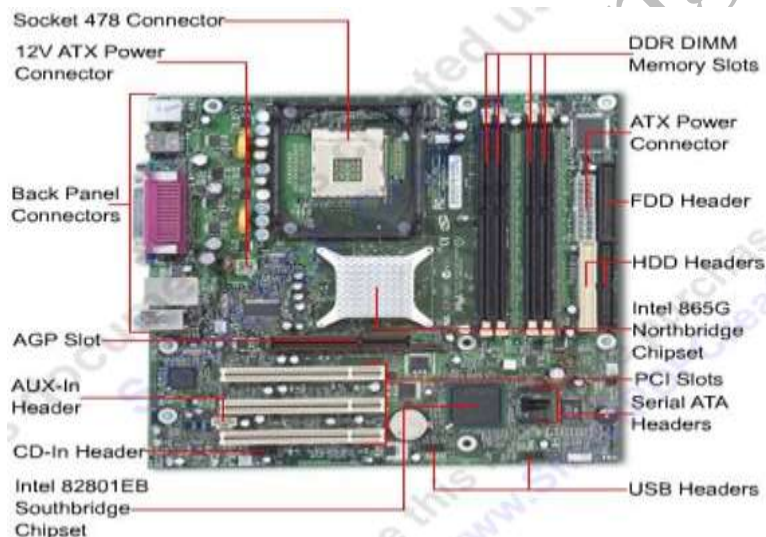


The fan connector is used for plugging the back/front wall or side panel case fans. As fans do not require a lot of energy, the connector is small and very fragile, be careful when working with them.

The Serial ATA connector is used for hard disk drives. Having that connector on your power supply is a good thing as this technology speeds up drives data transfer.

The peripheral connector with 4 pins is used for optic drives as hard drives. It was the only connector for mass storage devices before the SATA.

The small connector with 4 pins is used for floppy drives. Here too, I recommend caution when working with small connectors like this.





### What is Ram with Defination?

Computer main memory in which specific contents can be accessed (read or written) directly by the CPU in a very short time regardless of the sequence (and hence location) in which they were recorded. Two types of memory are possible with random-access circuits, static RAM (SRAM) and dynamic RAM (DRAM). A single memory chip is made up of several million memory cells. In a SRAM chip, each memory cell stores a binary digit (1 or 0) for as long as power is supplied. In a DRAM chip, the charge on individual memory cells must be refreshed periodically in order to retain data. Because it has fewer components, DRAM requires less chip area than SRAM; hence a DRAM chip can hold more memory, though its access time is slower.

Many RAM types exist as:

- **SDRAM**, synchronous dynamic random access memory
- **DDR SDRAM**, double-data-rate synchronous dynamic random access memory
- **R DRAM**, rambus dynamic random access memory
- **DDR2 SDRAM**, double-data-rate 2 synchronous dynamic random access memory
- **DDR3 SDRAM**, double-data-rate 3 synchronous dynamic random access memory

The DDR and DDR2 are largely used now as they are faster, and demand less power. The DDR3 is mainly used on graphic cards so far.



### Assignment:

1. What is peripherals device? List the names of peripherals device.
2. Write down the name and function of each hardware part observed.