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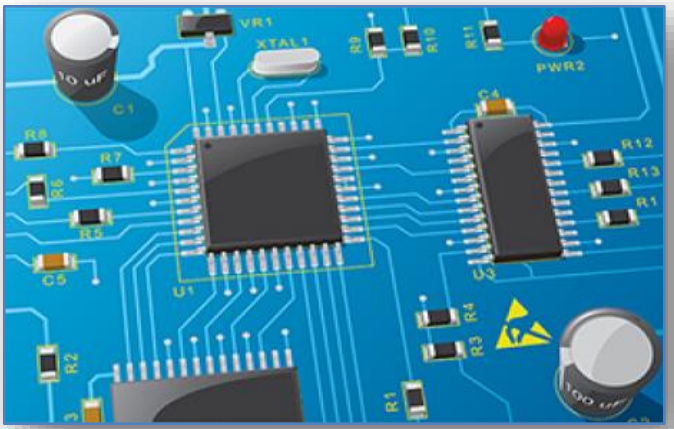
# CHAPTER 2

# COMPUTER ARCHITECTURE

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## COMPUTER INTERIOR

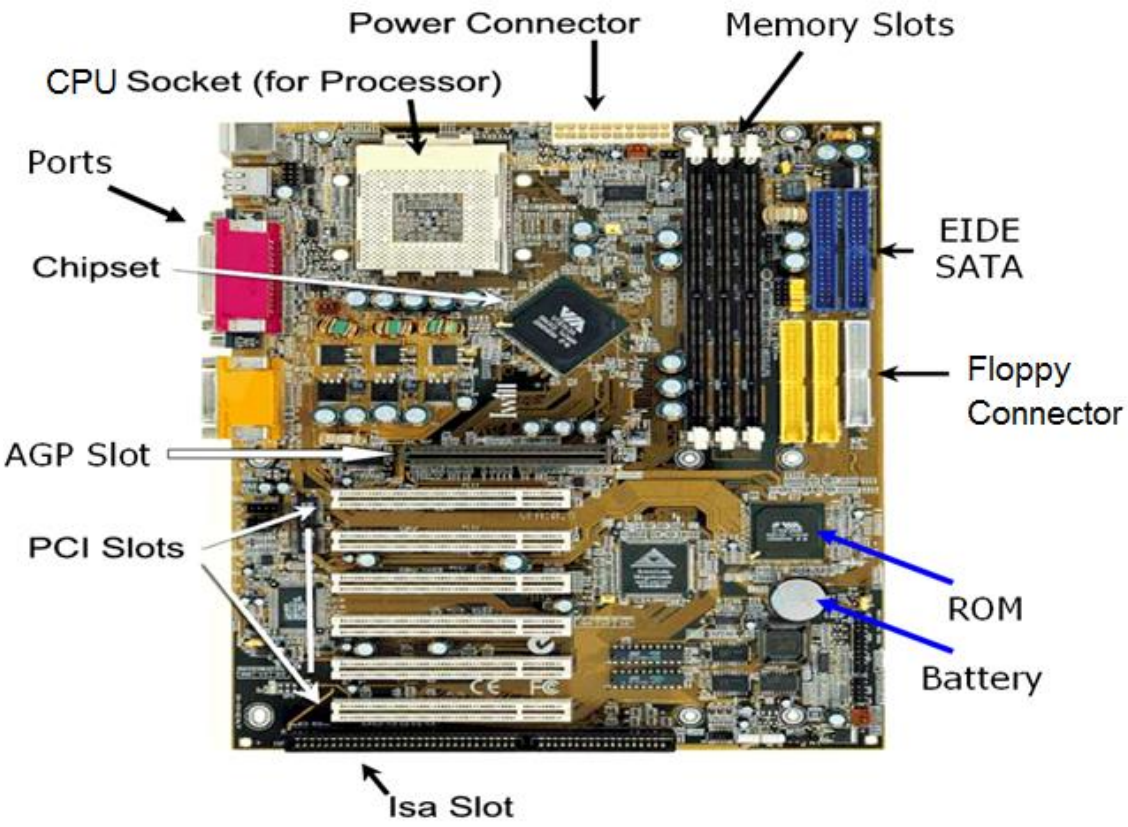
The **central unit** of computer (**case**) contains electronic components that work together, so the computer can operate as an integrated system (**computer system**).

## POWER SUPPLY

- It is a device that **converts the high voltage** power (AC 220 – 240V) to low voltage (DC 5 – 12V) with which a computer can operate safely. All electronic circuits of a computer cannot work safely with high voltage power, so they need a device to convert it for them.

## MOTHERBOARD

- It is a **printed circuit board** inside computer that holds crucial components of the system and provides connectors for other peripherals.
- All the computer components are connected in this board in order to communicate and cooperate.
- Motherboard among others contains:
  - A set of **slots** in which we place a number of specific expansion cards (e.g. **AGP** and **PCIx** slots for placing graphics cards, **PCI** slots for placing sound and network cards, a **CPU socket** for installing microprocessor and a set of **Ram slots** for installing computer memory modules.
  - A set of **ports** to which the external peripherals are connected through suitable cables (e.g. monitors, printers, keyboards etc.)
  - **EIDE & SATA connectors** for connecting internal storage devices (hard disks, floppy disks, optical disks)
  - **ROM memory** which is embedded on the motherboard and is necessary for system boot.
  - A **lithium battery** (CMOS battery) which maintains date and time settings as well as ROM settings while computer is off.
  - A **power connector** for connecting motherboard components to electric power.



## **CENTRAL PROCESSING UNIT** (CPU)


- It is the most important and **faster component** of computer (also called computer brain).
- It **accesses RAM directly** and executes its data in binary form in billionths of a second.
- It is permanently placed on CPU socket of motherboard.
- Since it is easy heated, it is accompanied with a **fan** (heatsink) which cools its surface as it works.

## **RAM** (Random Access Memory)

- It retains temporarily data and commands of running programs before they are sent to CPU for execution.
- It **saves temporarily** all the active applications and processes of computer.
- It is installed on RAM slots of motherboard as an **expansion card** (**RAM module**).
- Each memory module has a capacity that is measured in **MB** or **GB**.
- It loses its data without stable power supply.

## **ROM** (Read Only Memory)

- It is a small capacity memory which is **readable only** by the microprocessor.
- Its data have been set by the manufacturer so the user cannot change them.
- It is printed on the motherboard as an integrated circuit.
- It holds all the necessary data for supporting computer **boot**.

## **GRAPHICS CARD**

- It processes the **video signal** that is sent to computer screen.
- It has its own processor (accelerator) and RAM memory to relax computer from heavy tasks increasing the processing speed.

## **SOUND CARD**

- It processes the **audio signal** that is sent to computer speakers.
- It also accepts signal from audio input devices such as microphone or musical instruments (through MIDI port) and digitalizes it.

## **NETWORK CARD** (Network Card)

- It supports computer **connection with other computers** inside a local area network.
- The connection might be **wired** (ethernet cable) or **wireless** (antenna).

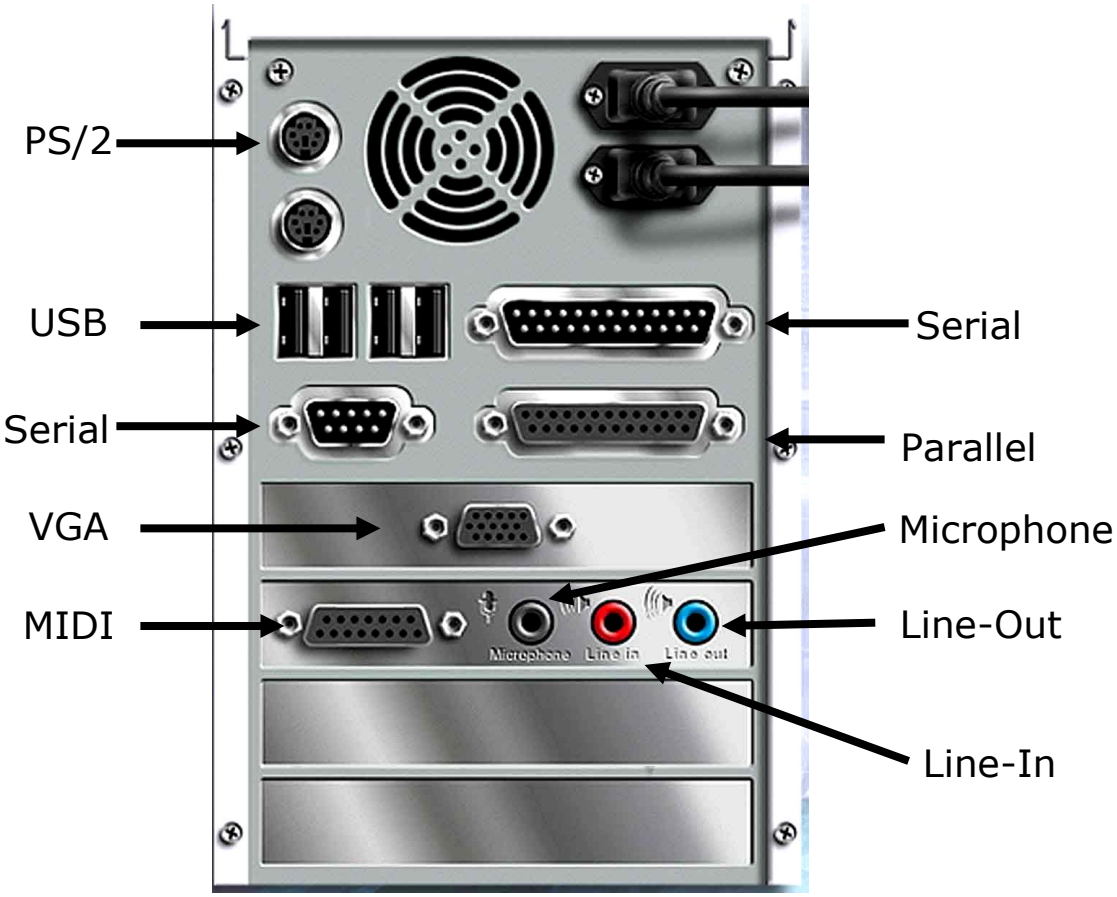
## **OTHER EXPANSION CARDS**

- **Radio card** (for listening to radio stations)
- **TV card** (for managing TV channels)
- **Video card** (for processing video movie files)
- **Modem card** (for connecting to the Internet through a telephone line)

In recent years for economic reasons the trend is sometimes the expansion cards to be **incorporated** and **integrated** on the motherboard e.g. on-board graphics cards or sound cards.

## PORTS

In the back side of the central unit there is set of **ports** to which all the external **peripheral devices** are connected through cables.




| PORT | APPLICATION |
|---|---|
| **PS/2** | Older interface used to connect **keyboard** and **mouse** to computer. |
| **USB** | It connects a **variety of peripherals** (e.g. keyboard, mouse, printer, scanner)<br>It has a **high** transmission **speed** (480 Mbps).<br>It has replaced older and slower interfaces becoming a **commonplace** for connecting the majority of modern peripherals.<br>It **supplies** the devices connected to it with **electric power**. |
| **Serial Port** | Older interface used to connect **slow peripherals** with low speed requirements (mouse, modem). Today it has been abandoned. |
| **Parallel Port** | Older interface used to connect **fast peripherals** with high speed requirements (monitors, scanners).<br>Today it has been completely replaced by USB.<br>It is 8 times faster in data transmission than serial port. |
| **VGA** | It connects **computer screen** to graphics card.<br>Today it has been exceeded by other faster interfaces (e.g. DVI, HDMI) |
| **MIDI & Microphone** | It connects **musical instruments** (Musical Instruments Digital Interface) and **microphone** to the sound card. |
| **Line-In & Line-Out** | It connects an **external sound source** (e.g. sound system) or headset to sound card. |