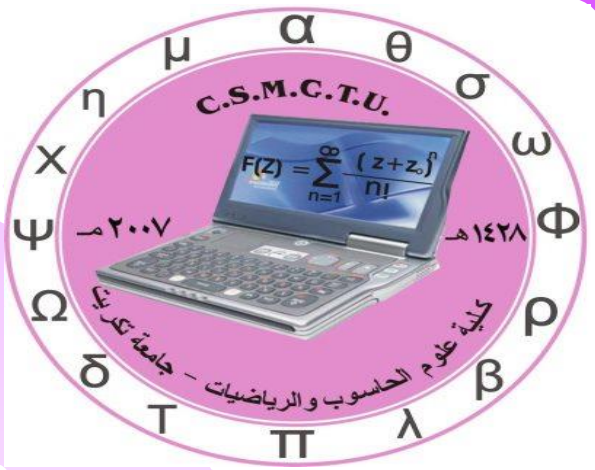
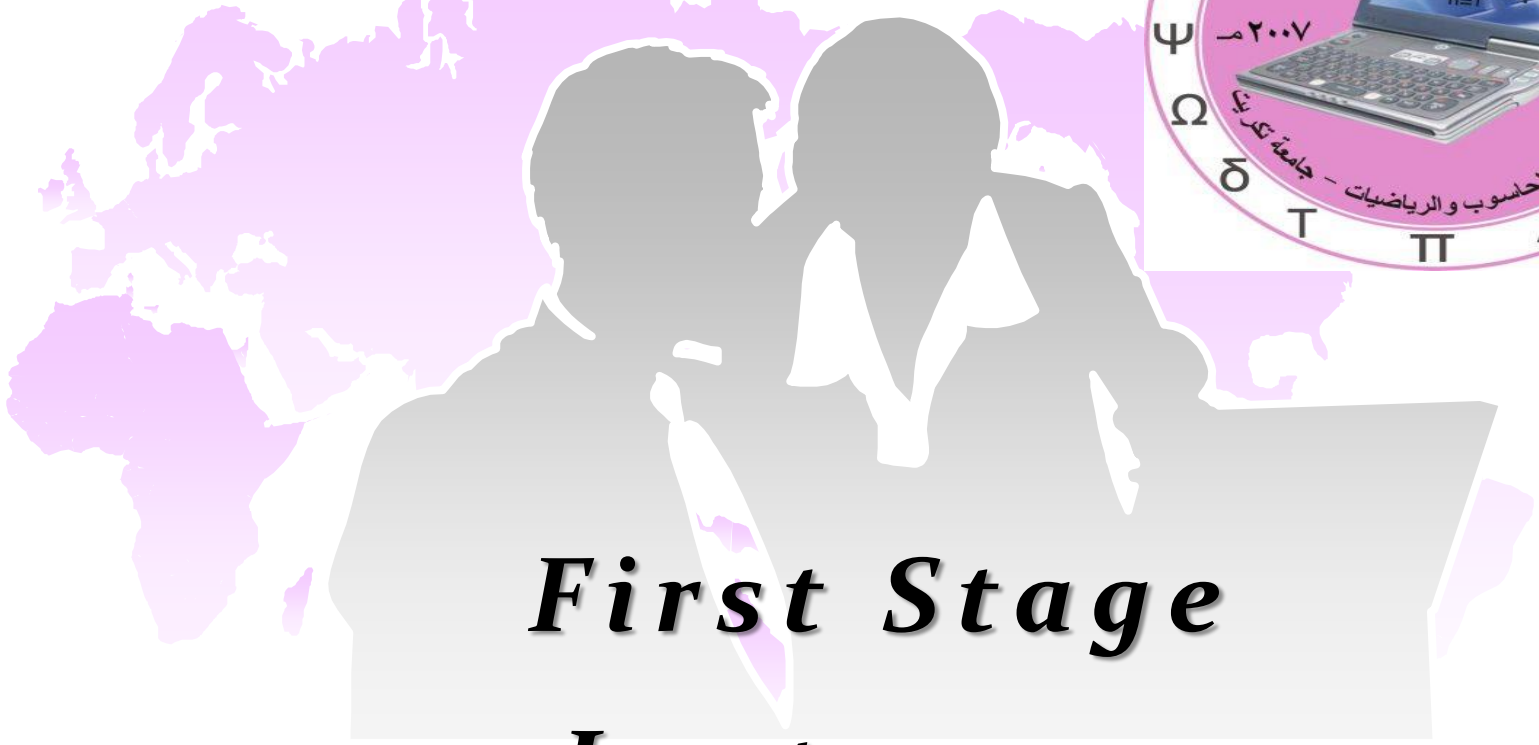
Computer Organization





First Stage

Lecture -5

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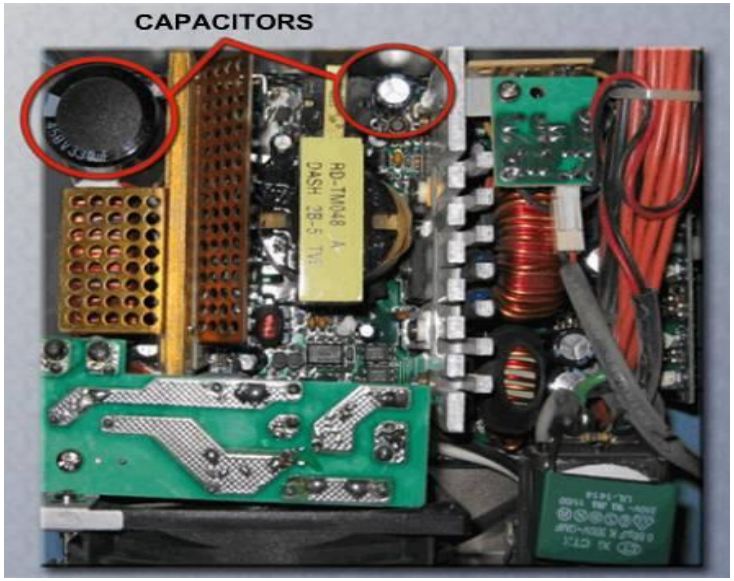
Internal Hardware Computer Components

- In the previous lectures we explain the essential internal hardware that build the computer system , such as Motherboard , CPU, RAM , ROM …etc.
- Internal computer components are designed to fit INSIDE the computer system and they all carry out important roles.
- In this lecture we will discuss extra hardware which are complete the computer system work :
  - ***Power supply.***
  - ***Computer case***.
  - ***Internal cables.***

Power Supply

- The power supply converts alternating-current (AC) power direct-current (DC) power, which is a lower voltage.
- Must provide enough power for the installed components and future additions.



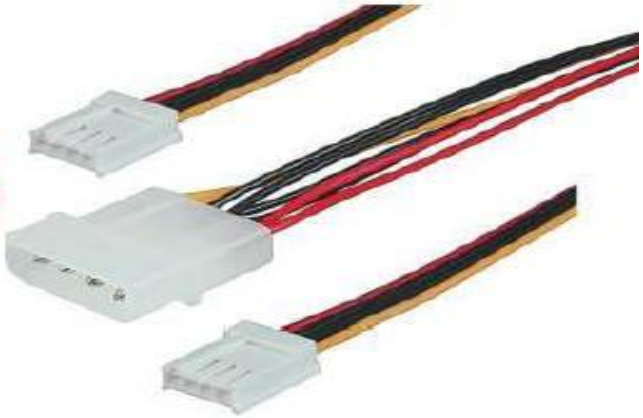
- **WARNING** : Do not open a power supply. Electronic capacitors located inside of a power supply can hold a charge for extended periods of time.

Computer Case

- Provides protection and support for internal components.
- Helps to prevent damage from static electricity .
- Should be strong, easy to service, and have enough room for expansion.
- Typically made of plastic, steel, and aluminum.

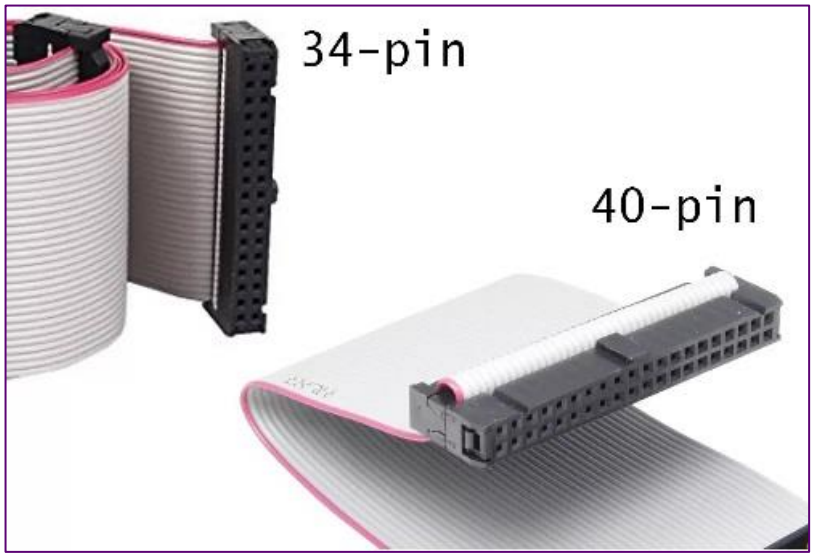
Internal Cables

- There are two primary types of connectors found internally: **Socket connectors** and **Power connectors.**
- **Socket connectors** are designed for use with flat ribbon cable, and are generally used to transfer data among devices.
- **Power connectors** are used to supply and distribute power to internal devices inside the computer.



Internal Cables

- Data cables connect drives to the drive controller, which is located on an adapter card or on the motherboard.
- IDE, an acronym for **Integrated Drive Electronics**, is a standard type of connection for storage devices in a computer.
- Generally, IDE refers to the types of cables and ports used to connect some **hard drives** and **optical drives** to each other and to the **motherboard**.



- PATA (IDE) data cable (Parallel).
- PATA (EIDE) data cable.
- SATA data cable (Serial) .

Internal Cables

- PATA (IDE) data cable (Parallel) and SATA data cable (Serial) .
- PATA: The two types of Parallel Advanced Technology Attachment cables, also known as Integrated Drive Electronics and Intelligent Drive Electronics, vary in how many conductors are built in to the cable. The two nearly identical looking types are referred to as 40-conductor that support transfer speeds of up to 33 Mbps, and 80-conductor cables that can handle data transfers of up to 133 Mbps. PATA was the primary means for connecting internal hard drives and optical drives to computers until the Serial ATA standard replaced it.
- SATA: SATA laptop hard drives can be identified by the two L-shaped connectors located on the back of the device. SATA is the most commonly supported laptop hard drive connection type and offers substantial performance gains over EIDE. SATA hard drives usually slide in to the connectors in the laptop hard drive bay. SATA 3.0 hard drives can reach transfer speeds of up to 6Gbps.

Computer Ports

- External devices are connected to a computer using cables and ports.
- **Ports** are slots on the motherboard into which a cable of external device is plugged in.
- Examples of external devices attached via ports are the mouse, keyboard, monitor, microphone, speakers, etc.

Computer Ports

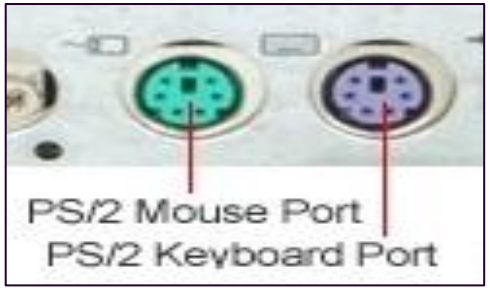
- Let us explain the important port.

1. Serial Port

- Used for external modems and older computer mouse
- Two versions: 9 pin, 25 pin model
- Data travels at 115 kilobits per second

2. Parallel Port

- ✓ Used for scanners and printers
- ✓ Also called printer port
- ✓ 25 pin model



3. PS/2 Port

- ❖ Used for old computer keyboard and mouse
- ❖ Also called mouse port
- ❖ Most of the old computers provide two PS/2 port, each for the mouse and keyboard

Computer Ports

4. Universal Serial Bus (or USB) Port

- It was introduced in 1997.
- Most of the computers provide two USB ports as minimum.
- Data travels at 12 megabits per seconds.

5. VGA Port

- Connects monitor to a computer's video card.
- It has 15 holes.
- Similar to the serial port connector. However, serial port connector has pins, VGA port has holes.

6. Ethernet Port

- Connects to a network and high speed Internet.
- Connects the network cable to a computer.
- Data travels at 10 megabits to 1000 megabits per seconds depending upon the network bandwidth.

Types of USB Ports and Connectors


USB-A


USB-B


USB-B MINI


USB-B MICRO


USB-C


LIGHTNING

Specification	Signaling Rate/Lane	Number of Lanes	Aggregate Bandwidth
USB 3.2 Gen 1×1	5 Gbps (SuperSpeed)	1	5 Gbps
USB 3.2 Gen 2×1	10 Gbps (SuperSpeed+)	1	10 Gbps
USB 3.2 Gen 1×2	5 Gbps (SuperSpeed)	2	10 Gbps
USB 3.2 Gen 2×2	10 Gbps (SuperSpeed+)	2	20 Gbps

The USB4 Gen 2×2 specification (known by its marketing name, USB4 20Gbps) and USB 3.2 Gen 2×2 both offer 20 Gbps connection. USB4 Gen 3×2 (USB4 40Gbps) uses a different data encoding scheme to achieve 20 Gbps per lane and 40 Gbps when in dual lane mode.

Specification	Signaling Rate/Lane	Number of Lanes	Aggregate Bandwidth
USB4 Gen 2×2	10 Gbps	2	20 Gbps
USB4 Gen 3×2	20 Gbps	2	40 Gbps

Types of USB Ports and Connectors

Port	Color	Type	USB Specification	Notes
	White	USB-A or USB-B Micro USB-A	USB 1.x	
	Black	USB-A or USB-B Micro USB-B	USB 2.0 Hi-Speed	
	Blue	USB-A or USB-B	USB 3.0 SuperSpeed	
	Teal	USB-A or USB-B	USB 3.1 Gen 1	
	Red	Sleep-and-Charge USB-A	USB 3.1 Gen 2 USB 3.2	Usually denotes an "always on" port
	Yellow	Sleep-and-Charge USB-A	USB 2.0 or USB 3.0	Higher power or "always on" port
	Orange	Sleep-and-Charge USB-A	USB 3.0	Charging capable Sometimes charge only