2.10 INSIDE A COMPUTER CABINET

The components inside a computer cabinet include the power supply, motherboard, memory chips, expansion slots, ports and interface, processor, cables and storage devices.

2.10.1 Motherboard

The computer is built up around a *motherboard*

Most important part

Physically it's a large PCB

The motherboard is the hub, which is used to connect all the essential components of a computer

The RAM, hard drive, disk drives and optical drives are all plugged into interfaces on the motherboard. The motherboard contains the processor, memory chips, interfaces and sockets, etc.

characterized by the **form factor, chipset and type of processor socket used**

Form factor refers to the motherboard's geometry, dimensions, arrangement and electrical requirements. Advanced Technology Extended (ATX) is the most common design of motherboard for desktop computers.

Chipset is a circuit, which controls the majority of resources. It coordinates data transfers between the various components of the computer., it is important to choose a motherboard, which includes a recent chipset, in order to maximize the computer's upgradeability

BIOS It is the basic program used as an interface between the operating system and the motherboard. The BIOS is stored in the ROM and cannot be rewritten. When the computer is switched on, it needs instructions to start. BIOS contain the instructions for the starting up of the computer. The BIOS runs when the computer is switched on. It performs a Power On Self Test (POST) that checks that the hardware is functioning properly and the hardware devices are present. It checks whether the operating system is present on the hard drive. BIOS invokes the bootstrap loader to load the operating system into memory. BIOS can be configured using an interface named BIOS setup, which can be accessed when the computer is booting up (*by pressing the DEL key*).

CMOS Chip BIOS ROMs are accompanied by a smaller CMOS (CMOS is a type of memory technology) memory chip. When the computer is turned off, the power supply stops providing electricity to the motherboard. When the computer is turned on again, the system still displays the correct clock time. This is because the CMOS chip saves some system information, such as time, system date and essential system settings. CMOS is kept powered by a button battery located on the motherboard (Figure 2.15). The CMOS chip is working even when the computer power is switched off. Information of the hardware installed in the computer (such as the number of tracks or sectors on each hard drive) is stored in the CMOS chip.

2.10.2 Ports and Interfaces

The board has a certain number of I/O sockets that are connected to the ports and interfaces

Where external devices can be connected and communicate with motherboard directly

• Serial Port— to connect old peripherals.
• Parallel Port— to connect old printers

• USB Ports—to connect newer peripherals like cameras, scanners and printers to the computer. It uses a thin wire to connect to the devices, and many devices can share that wire simultaneously.

USB 2.0 offers transfer rates of 480 Mbps and **USB 3.0** offers transfer rates of 4.8 Gbps - that's 10 times faster.

• Firewire is another bus, used today mostly for video cameras and external hard drives.
• RJ45 connector (called LAN or Ethernet port) is used to connect the computer to a network. It corresponds to a network card integrated into the motherboard.
• VGA connector for connecting a monitor. This connector interfaces with the built-in graphics card.
• Audio plugs (line-in, line-out and microphone), for connecting sound speakers and the microphone. This connector interfaces with the built-in sound card.
• PS/2 port to connect mouse and keyboard into PC.
• SCSI port for connecting the hard disk drives and network connectors.

2.10.3 Expansion Slots

Mother Board comes with expansion slots, for upgrading and increasing performance by inserting the cards.

There are several types of slots:

• ISA (Industry Standard Architecture) slot—To connect modem and input devices.
• PCI (Peripheral Component InterConnect) slot—To connect audio, video and graphics. They are much faster than ISA cards.
• AGP (Accelerated Graphic Port) slot—A fast port for a graphics card.
• PCI (Peripheral Component InterConnect) Express slot—Faster bus architecture than AGP and PCI buses.
• PC Card—It is used in laptop computers. It includes Wi-Fi card, network card and external modem.

2.10.4 Ribbon Cables

Now a days Serial Advanced Technology Attachment (SATA) cables have replaced the ribbon cables to connect the drives to the motherboard.

2.10.5 Memory Chips

Two types of memory chips— Single In-line Memory Module (SIMM) and Dual In-line Memory Module (DIMM) are used in desktop computers. The CPU can retrieve information from DIMM chip at 64 bits

compared to 32 bits or 16 bits transfer with SIMM chips. DIMM chips are used in Pentium 4 onwards to increase the access speed.

2.10.6 Storage Devices

2.10.7 Processor

2.11 PERFORMANCE OF A COMPUTER

Command(msinfo32.)

Registers

RAM

System Clock

The clock speed of a CPU is defined as the frequency with which a processor executes instructions or the data is processed. Higher clock frequencies mean more clock ticks per second.

The clock frequency is measured in millions of cycles per second or megahertz (MHz) or gigahertz (GHz) which is billions of cycles per second

Bus

Higher the bus speed the better it is

Data bus is used for transferring data between CPU and memory. The data bus width affects the speed of computer.

The bus speed is measured in MHz.

Cache Memory

Larger the size of cache, the better it is. PCs nowadays

2.7 MICROPROCESSOR

A processor's instruction set is a determining factor in its architecture. On the basis of the instruction set, microprocessors are classified as

CISC and RISC

x86

Difference between **x64** and **x86**