

LESSON 03 - HARDWARE OVERVIEW

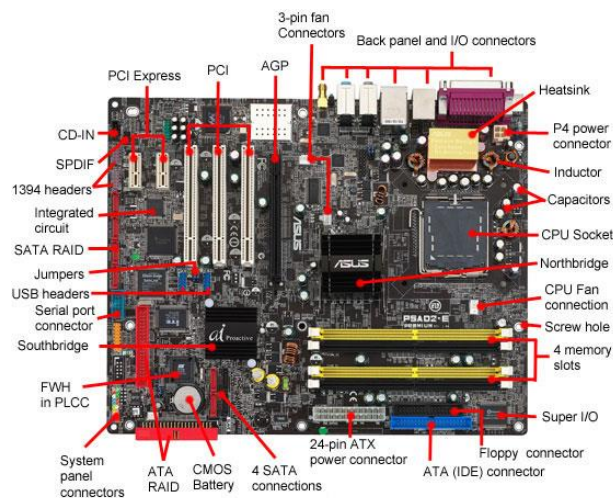
In this lesson we will breakdown the major hardware components of a computer. We will also discuss various types of computers that are widely used.

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I. HARDWARE COMPONENTS:**CASE:**

A computer case, also known as a computer chassis, tower, system unit, or cabinet, is the enclosure that contains most of the components of a personal computer. Cases are usually constructed from steel, aluminium, and plastic (Wikipedia).

MOTHERBOARD:

A motherboard is the main printed circuit board in general-purpose computers and other expandable systems. It holds and allows communication between many of the crucial electronic components of a system, such as the central processing unit and memory, and provides connectors for other peripherals (Wikipedia). Motherboards contain slots and plugs for all the other hardware components (i.e., CPU, RAM, Hard Drive, etc.) to connect to. There are also special slots called **expansion slots** where you can add even more capabilities to your computer via **expansion cards** (i.e., graphics cards, sound cards, etc.) (see below).

CENTRAL PROCESSING UNIT (CPU)



A central processing unit, also called a central processor, main processor or just processor, is the electronic circuitry that executes instructions comprising a computer program. The CPU performs basic arithmetic, logic, controlling, and input/output operations specified by the instructions in the program (Wikipedia).

MEMORY:

- **RAM:**



Random-access memory is a form of computer memory that can be read and changed in any order, typically used to store working data and machine code (Wikipedia).

- **ROM:** Read-only memory is a type of non-volatile memory used in computers and other electronic devices. Data stored in ROM cannot be electronically modified after the manufacture of the memory device (Wikipedia). **Recall:** As mentioned in the previous lesson, the **ROM** is where the **BIOS** is stored.
- **CPU CACHE:** A CPU cache is a hardware cache used by the central processing unit of a computer to reduce the average cost to access data from the main memory. A cache is a smaller, faster memory, located closer to a processor core, which stores copies of the data from frequently used main memory locations (Wikipedia).

HARD DRIVE/DISK (HD):



A hard disk drive, hard disk, hard drive, or fixed disk is an electro-mechanical data storage device that stores and retrieves digital data using magnetic storage and one or more rigid rapidly rotating platters coated with magnetic material (Wikipedia).

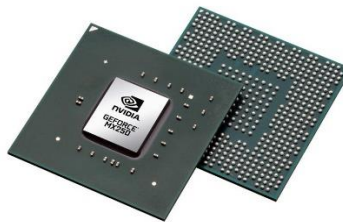
SOLID-STATE DRIVE (SSD):



A solid-state drive is a solid-state storage device that uses integrated circuit assemblies to store data persistently, typically using flash memory, and functioning as secondary storage in the hierarchy of computer storage (Wikipedia).

GRAPHICS PROCESSORS / GRAPHICS CARDS:

- **GRAPHICS PROCESSING UNIT (GPU):**



A graphics processing unit is a specialized electronic circuit designed to rapidly manipulate and alter memory to accelerate the creation of images in a frame buffer intended for output to a display device. GPUs are used in embedded systems, mobile phones, personal computers, workstations, and game consoles (Wikipedia).

- **GRAPHICS CARD:**



A graphics card is an expansion card which generates a feed of output images to a display device. Frequently, these are advertised as discrete or dedicated graphics cards, emphasizing the distinction between these and integrated graphics (Wikipedia).

It's important to note that a motherboard usually contains a GPU, whereas a graphics card may be added to a computer (plugged into the motherboard) to enhance the graphics of a computer (serious gamers will usually add a graphics card to their computers).

SOUND CARD:

A sound card is an internal expansion card that provides input and output of audio signals to and from a computer under control of computer programs. The term sound card is also applied to external audio interfaces used for professional audio applications (Wikipedia). Most motherboards will have built-in sound processing, however, sometimes it is preferred to add a sound card to a computer (plugged into the motherboard) to enhance the computer's sound experience/capabilities.

REMOVABLE STORAGE MEDIA:

Expandable storage is a form of computer storage that is designed to be inserted and removed from a system (Wikipedia). There are many forms of removable media. Here are few to consider:

- **USB FLASH DRIVE:**



USB flash drive is a data storage device that includes flash memory with an integrated USB interface. It is typically removable, rewritable, and much smaller than an optical disc. Most weigh less than 30 grams (Wikipedia).

- **SD CARD:**

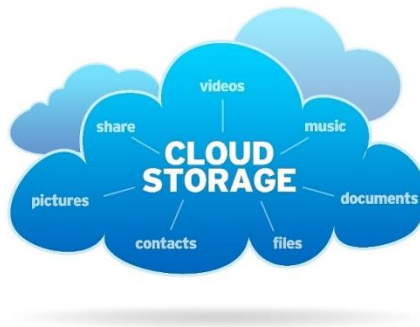


Secure Digital, officially abbreviated as SD, is a proprietary non-volatile memory card format developed by the SD Association for use in portable devices (Wikipedia).

- **OPTICAL DISK:**



In computing and optical disc recording technologies, an optical disc is a flat, usually circular disc that encodes binary data in the form of pits and lands on a special material, often aluminum, on one of its flat surfaces. Its main uses are physical offline data distribution and long-term archival (Wikipedia). There are generally 3 forms of optical disk: **CD** (holds up to 680MB), **DVD** (holds up to 4.7GB), and **Blu-ray** (holds up to 50GB).

CLOUD STORAGE:

Cloud storage is a model of computer data storage in which the digital data is stored in logical pools, said to be on "the cloud". The physical storage spans multiple servers, and the physical environment is typically owned and managed by a hosting company (Wikipedia). Popular cloud storage services are Microsoft OneDrive, Google Drive, and Apple iCloud.

PERIPHERALS: A peripheral or peripheral device is an auxiliary device used to put information into and get information out of a computer (Wikipedia). There are two types of peripherals:

- INPUT DEVICES:**



Any data that goes into a computer is done through an input device. There are many types of input devices: keyboard, mouse, microphone, scanner, etc.

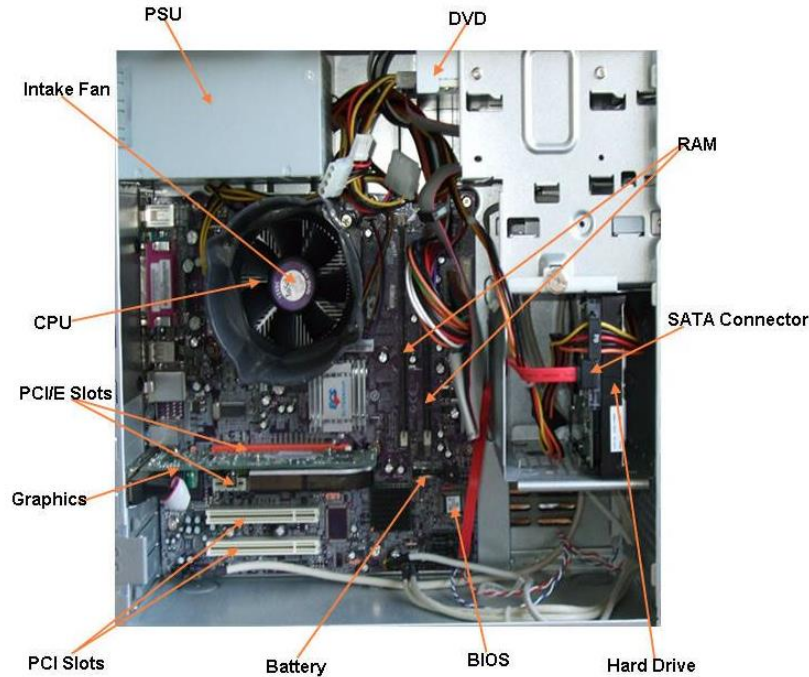
- OUTPUT DEVICES:**




Any data that comes from a computer is done through an output device. There are many types of output devices: monitor, speakers, projector, etc.

II. PUTTING IT ALL TOGETHER:

We will not get into any more detail about hardware, however, to sum things up here was what the inside of a computer can look like when everything is connected:



Notes:

- This diagram illustrates the major components of a computer, although the details could go further.
- Notice that there is a **fan** usually located on top of the **CPU** since CPUs can become very hot.
- A **PSU** is short for **Power Supply Unit** (we plug a power cord from this to an outside electric outlet) and it regulates how the electricity is dispersed through the computer circuitry.
- **PCI/E Slots** are the **expansion slots** that were discussed previously where we can add **expansion boards** (i.e., graphics cards, sound cards, etc.).
- **SATA Connectors** are the cables used to connect **hard drives** (or **SSD drives**) and **optical drives** (in this case a **DVD drive**) to the motherboard.
- All motherboards have a **battery** which keeps the internal clock going even when the computer is shut off.
- Motherboards contain **ports** for **peripherals** that are usually exposed on the back and front of a case. The most common type of ports used for peripherals are **USB Ports**,  although others do exist (for example, **display ports** for monitors, or **auxiliary ports** for speakers).

III. TYPES OF COMPUTERS:

Computers come in many forms. Here are a few types of computers you may encounter:

Desktops:



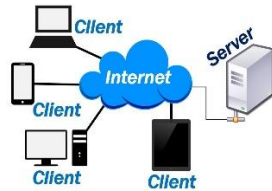
A Desktop computer is a personal computer designed for regular use at a single location on or near a desk due to its size and power requirements (Wikipedia).

Laptops:



A laptop, laptop computer, or notebook computer is a small, portable personal computer with a screen and alphanumeric keyboard (Wikipedia).

Servers:



In computing, a server is a piece of computer hardware or software that provides functionality for other programs or devices, called "clients". This architecture is called the client-server model (Wikipedia).

Mobile Devices: (i.e., tablets, phones, smart watches, etc.)



A mobile device is a computer small enough to hold and operate in the hand. Typically, any handheld computer device will have an LCD or OLED flat screen interface, providing a touchscreen interface with digital buttons and keyboard or physical buttons along with a physical keyboard (Wikipedia).

Embedded Computers:



An embedded system is a computer system—a combination of a computer processor, computer memory, and input/output peripheral devices—that has a dedicated function within a larger mechanical or electronic system (Wikipedia). Embedded computers have become commonplace with much of our technology. Many products that are considered 'smart' products have an embedded computer. For example, fridges, cars, washing machines, TVs, etc.