

Personal computer - PC

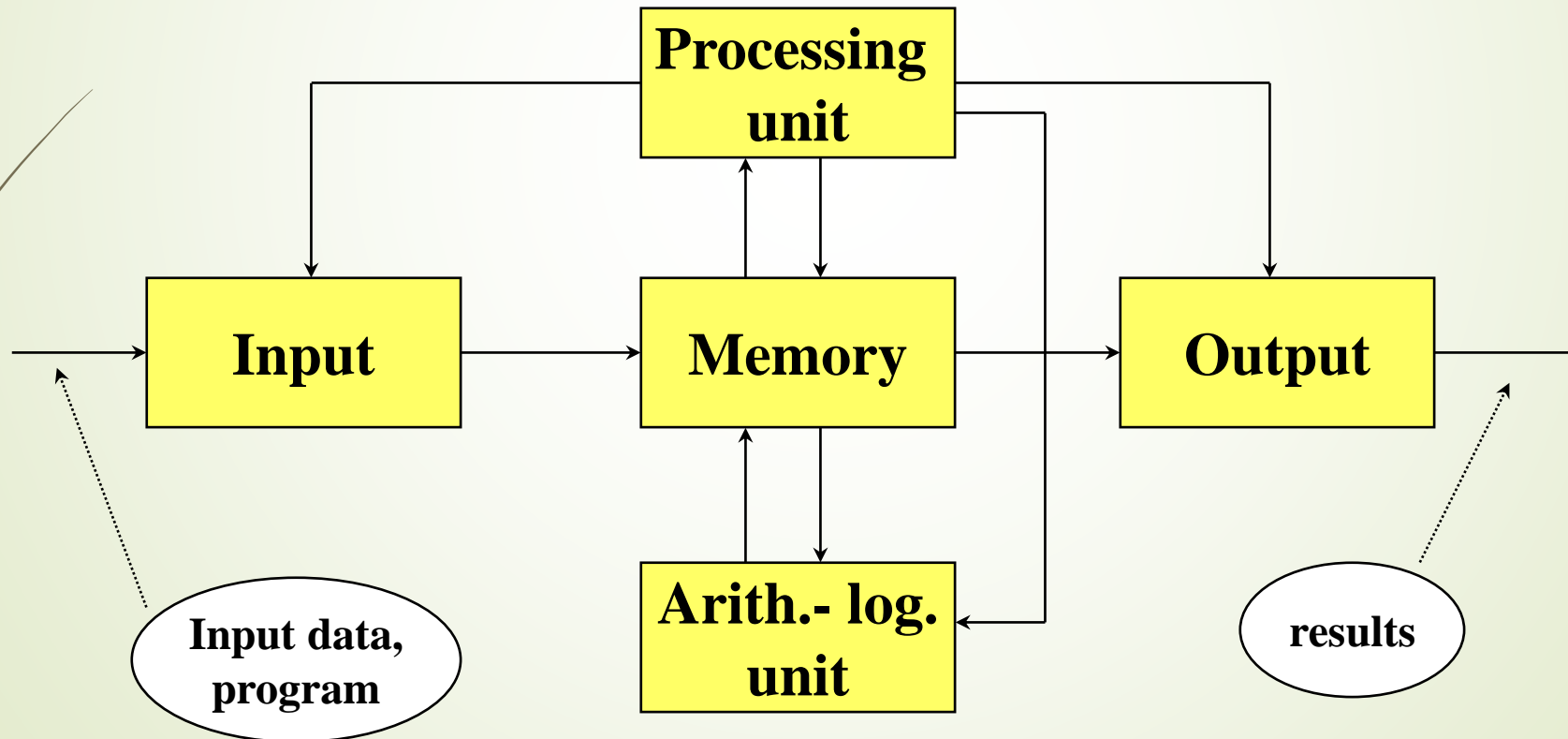
doc. Ing. Marcela Hallová, PhD.


What is a computer?

- A computer is an electronic device that manipulates information, or data.
- It could store, retrieve, and process data.
- **COMPUTER** – Commonly Operated Machine Particularly Used for Trade/Technology, Education, and Research.
- History -
<https://www.computerhistory.org/timeline/computers/>

Personal computer (PC)

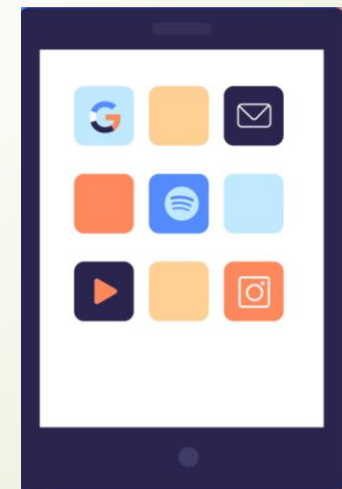
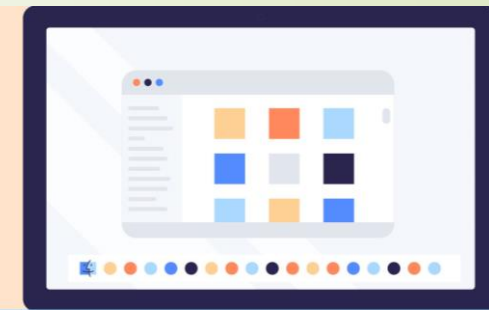
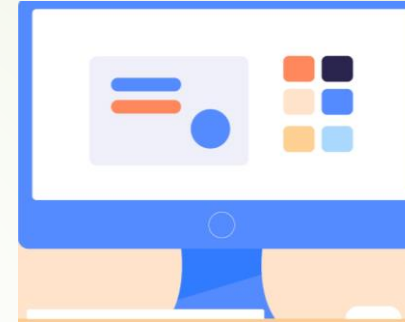
- Architecture is based on **Von Neuman conception** that means computers with internal management i.e. not only data processed are saved in memory but also the *program* that manages whole process of data processing.



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- **System memory** serves to store the processed program and data processing – input and output.
 - **Arithmetic logic unit (ALU)** performs all arithmetic calculations and logical operations, which are implemented by additioners, multiplications and comparators.
 - **Controller (control unit)** via the **control signals** governs the operation of individual parts of the computer.
 - **Input devices** (e.g. keyboard, scanner, mouse) are devices intended for entering of programs and data.
 - **Output devices** (monitor, printer) are designed to display data processed by computer.

Different types of computers

- **Desktop computers** - designed to be placed on a desk, and they're typically made up of a few different parts, including the computer case, monitor, keyboard, and mouse.
- **Laptop computers** - battery-powered computers that are more portable than desktops, allowing you to use them almost anywhere.
- **Tablet computers** - handheld computers that are even more portable than laptops. Instead of a keyboard and mouse, tablets use a touch-sensitive screen for typing and navigation.



Different types of computers

- **Servers** - computer that serves up information to other computers on a network.



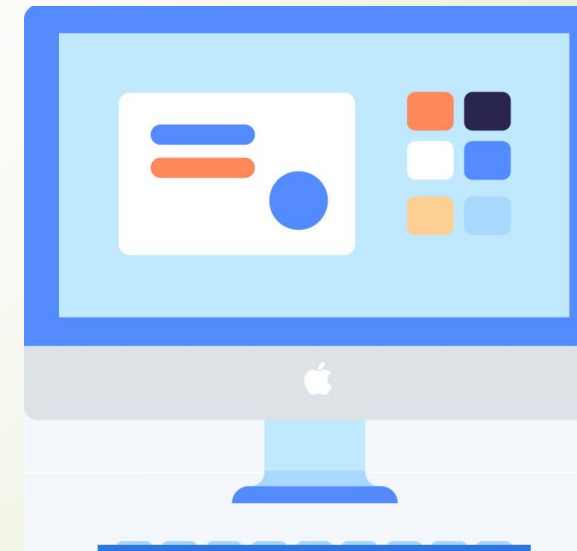
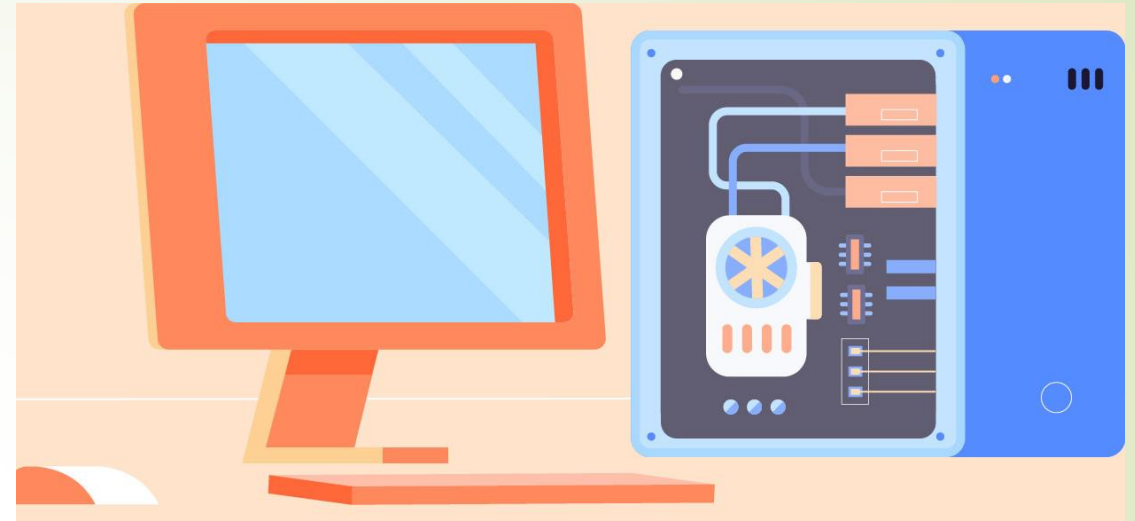


Other types of computers

- **Smartphones** – many cell phones can do a lot of things computers can do, including browsing the Internet and playing games. They are often called smartphones.
- **Wearables** - wearable technology is a general term for a group of devices—including fitness trackers and smartwatches—that are designed to be worn throughout the day.
- **Game consoles** - a game console is a specialized type of computer that is used for playing video games on your TV.
- **TVs** - many TVs now include applications—or apps—that let you access various types of online content.

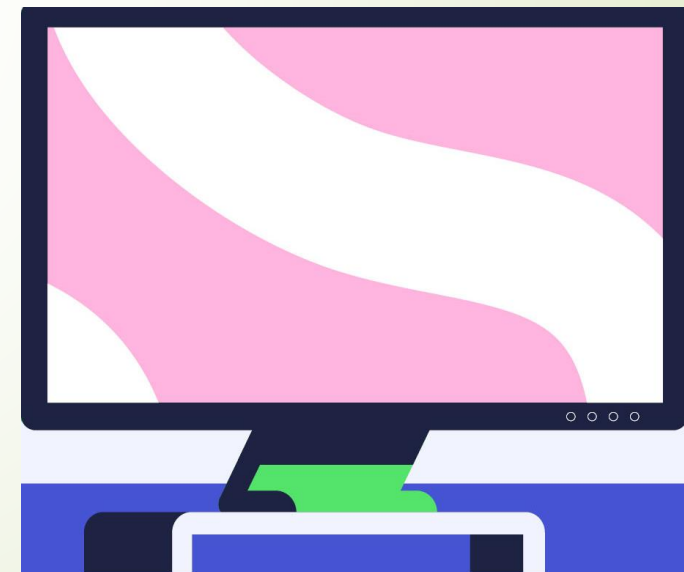
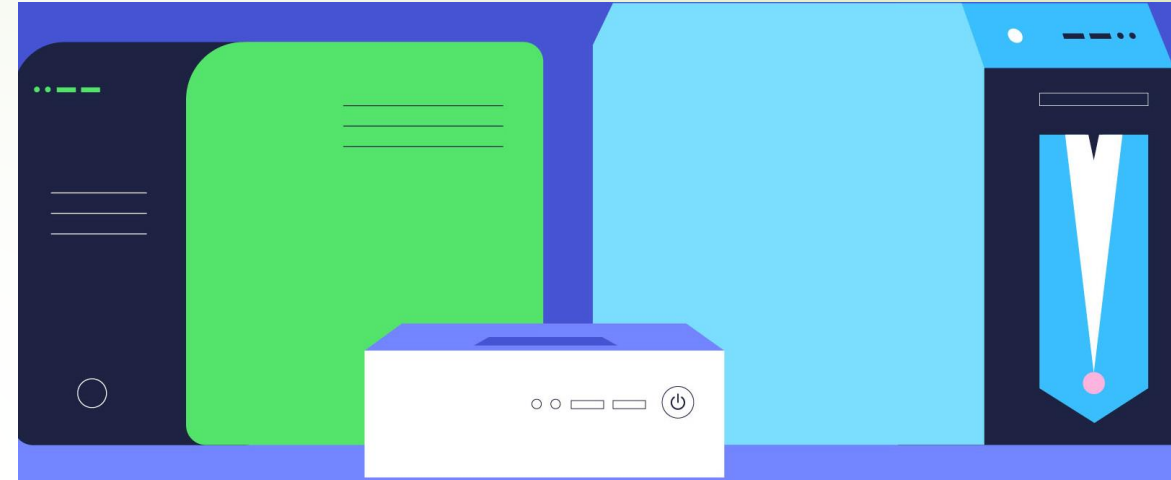
PCs and Macs

- **PCs** - this type of computer began with the original IBM PC that was introduced in 1981. Other companies began creating similar computers, which were called IBM PC Compatible (often shortened to PC).
- **Macs** - the Macintosh computer was introduced in 1984, and it was the first widely sold personal computer with a graphical user interface, or GUI. All Macs are made by one company (Apple), and they almost always use the Mac OS X operating system.



Basic Parts of a Computer

- **Computer case** - is the metal and plastic box that contains the main components of the computer, including the motherboard, central processing unit (CPU), and power supply. The front of the case usually has an On/Off button and one or more optical drives.
- **Monitor** - works with a video card, located inside the computer case, to display images and text on the screen. Most monitors have control buttons that allow you to change your monitor's display settings, and some monitors also have built-in speakers.



The Computer Case Types And Form Factor



Super
Tower

Full
Tower

Mid
Tower

Mini
Tower

Small
Case

HTPC
Case

Basic Parts of a Computer

- ➔ **Keyboard** - one of the main ways to communicate with a computer. There are many different types of keyboards, but most are very similar and allow you to accomplish the same basic tasks.
- ➔ **Mouse** - commonly known as a pointing device, it lets you point to objects on the screen, click on them, and move them.



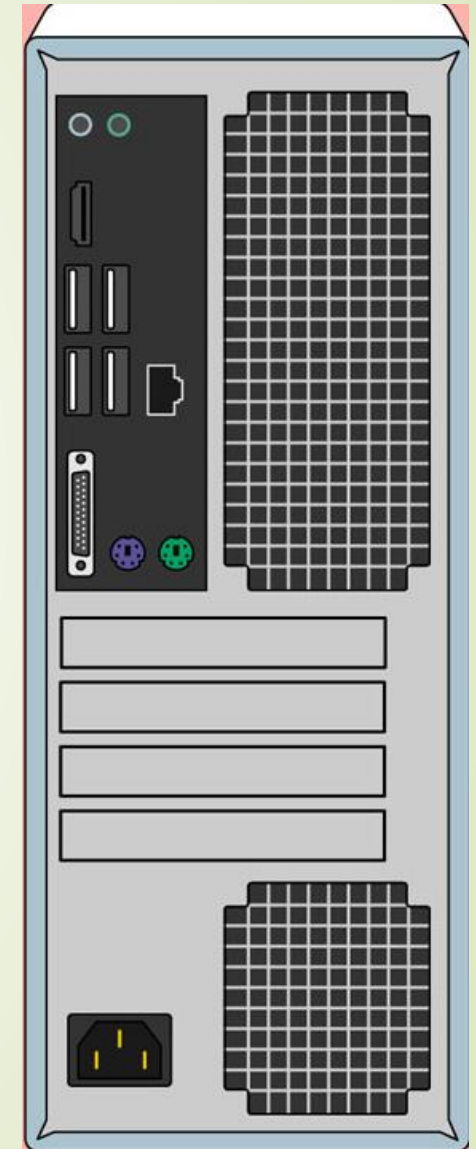


Mouse alternatives

- **Trackball** - has a ball that can rotate freely. Instead of moving the device like a mouse, you can roll the ball with your thumb to move the pointer.
- **Touchpad** - also called a trackpad—is a touch-sensitive pad that lets you control the pointer by making a drawing motion with your finger. Touchpads are common on laptop computers.

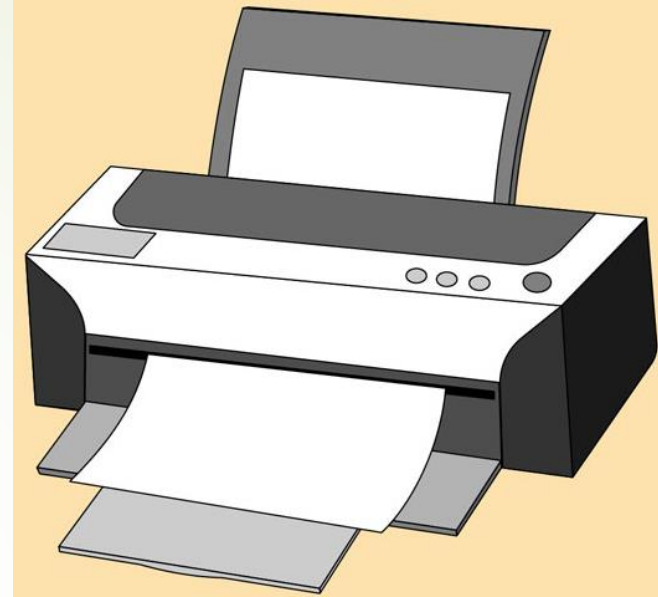
Buttons and Ports on a Computer

- Each computer is different, so the buttons, ports, and sockets will vary from computer to computer.
- However, there are certain ones you can expect to find on most desktop computers.
- **Front of a computer case** - Optical Disc Drive, Power Button, Audio In/Audio Out, USB (Universal Serial Bus) Port.
- **Back of a computer case** - Audio In/Audio Out, Monitor Port, USB Ports, Ethernet Port, Serial Port, PS/2, Expansion Slots, Power Socket



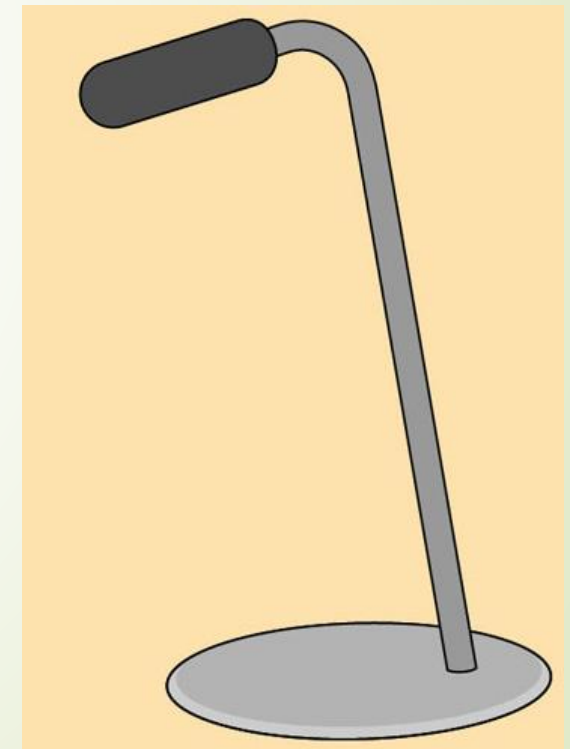
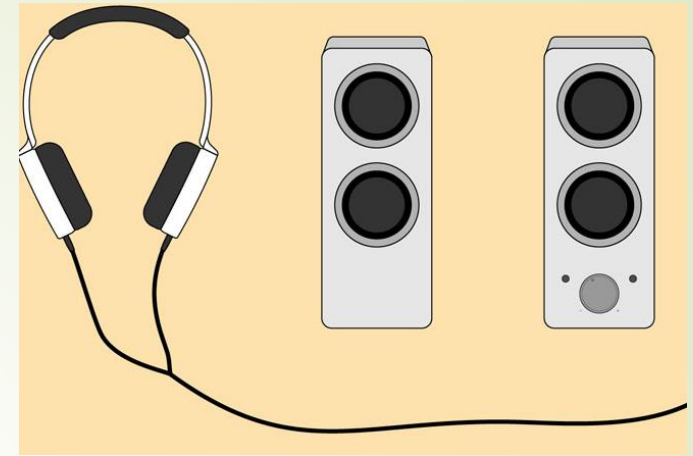
Peripherals

- **Printers** - a printer is used to print documents, photos, and anything else that appears on your screen. There are many types of printers, including inkjet, laser, and photo printers. There are even all-in-one printers, which can also scan and copy documents.
- **Scanners** – a scanner allows you to copy a physical image or document and save it to your computer as a digital (computer-readable) image. Many scanners are included as part of an all-in-one printer, although you can also buy a separate flatbed or handheld scanner.



Peripherals

- **Speakers/headphones** - speakers and headphones are output devices, which means they send information from the computer to the user—in this case, they allow us to hear sound and music. Depending on the model, they may connect to the audio port or the USB port. Some monitors also have built-in speakers.
- **Microphones** – a microphone is a type of input device, or a device that receives information from a user. We can connect a microphone to record sound or talk with someone else over the Internet. Many laptop computers come with built-in microphones.



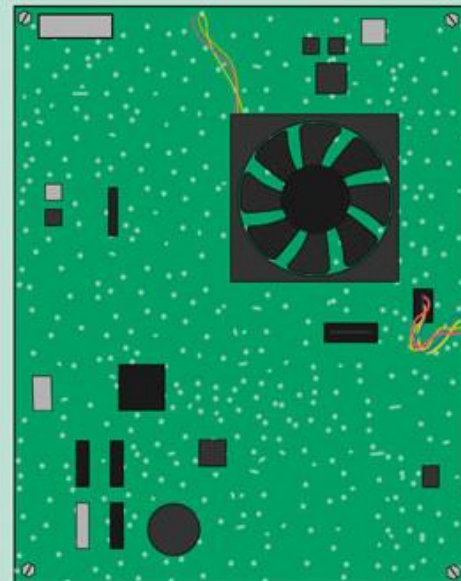
Peripherals

- **Web cameras** - a web camera—or webcam—is a type of input device that can record videos and take pictures. It can also transmit video over the Internet in real time, which allows for video chat or video conferencing with someone else. Many webcams also include a microphone for this reason.
- **Game controllers and joysticks** – a game controller is used to control computer games. There are many other types of controllers we can use, including joysticks, although we can also use our mouse and keyboard to control most games.
- **Digital cameras** – a digital camera lets us capture pictures and videos in a digital format. By connecting the camera to our computer's USB port, we can transfer the images from the camera to the computer.
- **Mobile phones, MP3 players, tablet computers, and other devices**

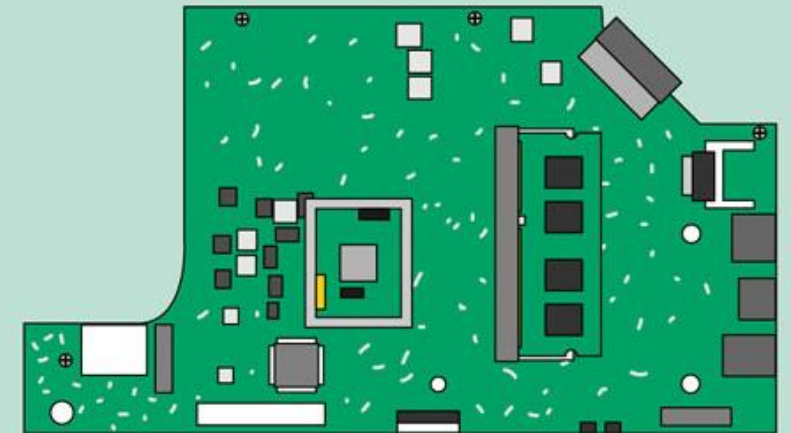
Inside a computer - Motherboard

- ▶ The motherboard is the computer's main circuit board. It's a thin plate that holds the CPU, memory, connectors for the hard drive and optical drives, expansion cards to control the video and audio, and connections to your computer's ports (such as USB ports). The motherboard connects directly or indirectly to every part of the computer.

DESKTOP

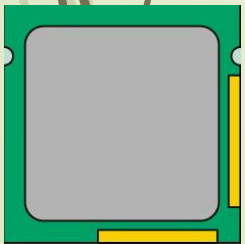


LAPTOP



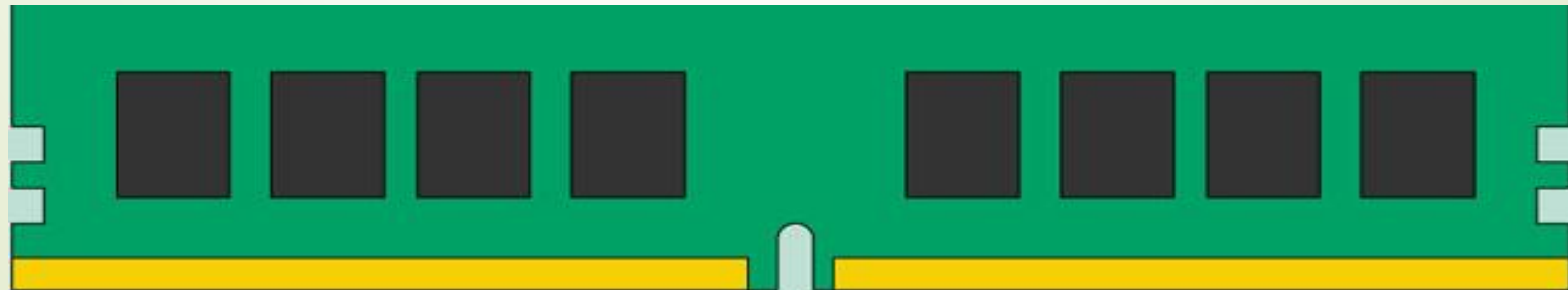
Inside a computer - CPU/processor

- The central processing unit (CPU), also called a processor, is located inside the computer case on the motherboard. It is sometimes called the brain of the computer, and its job is to carry out commands. Whenever you press a key, click the mouse, or start an application, you're sending instructions to the CPU.
- The CPU is usually a two-inch ceramic square with a silicon chip located inside. The chip is usually about the size of a thumbnail. The CPU fits into the motherboard's CPU socket, which is covered by the heat sink, an object that absorbs heat from the CPU.
- A processor's speed is measured in megahertz (MHz), or millions of instructions per second; and gigahertz (GHz), or billions of instructions per second. A faster processor can execute instructions more quickly.



Inside a computer - RAM (random access memory)

- ▶ RAM is our system's short-term memory. Whenever our computer performs calculations, it temporarily stores the data in the RAM until it is needed.
- ▶ This short-term memory disappears when the computer is turned off. When we save a file, the data is written to the hard drive, which acts as long-term storage.
- ▶ RAM is measured in megabytes (MB) or gigabytes (GB). The more RAM we have, the more things our computer can do at the same time. If we don't have enough RAM, we may notice that our computer is sluggish when we have several programs open. Because of this, many people add extra RAM to their computers to improve performance.

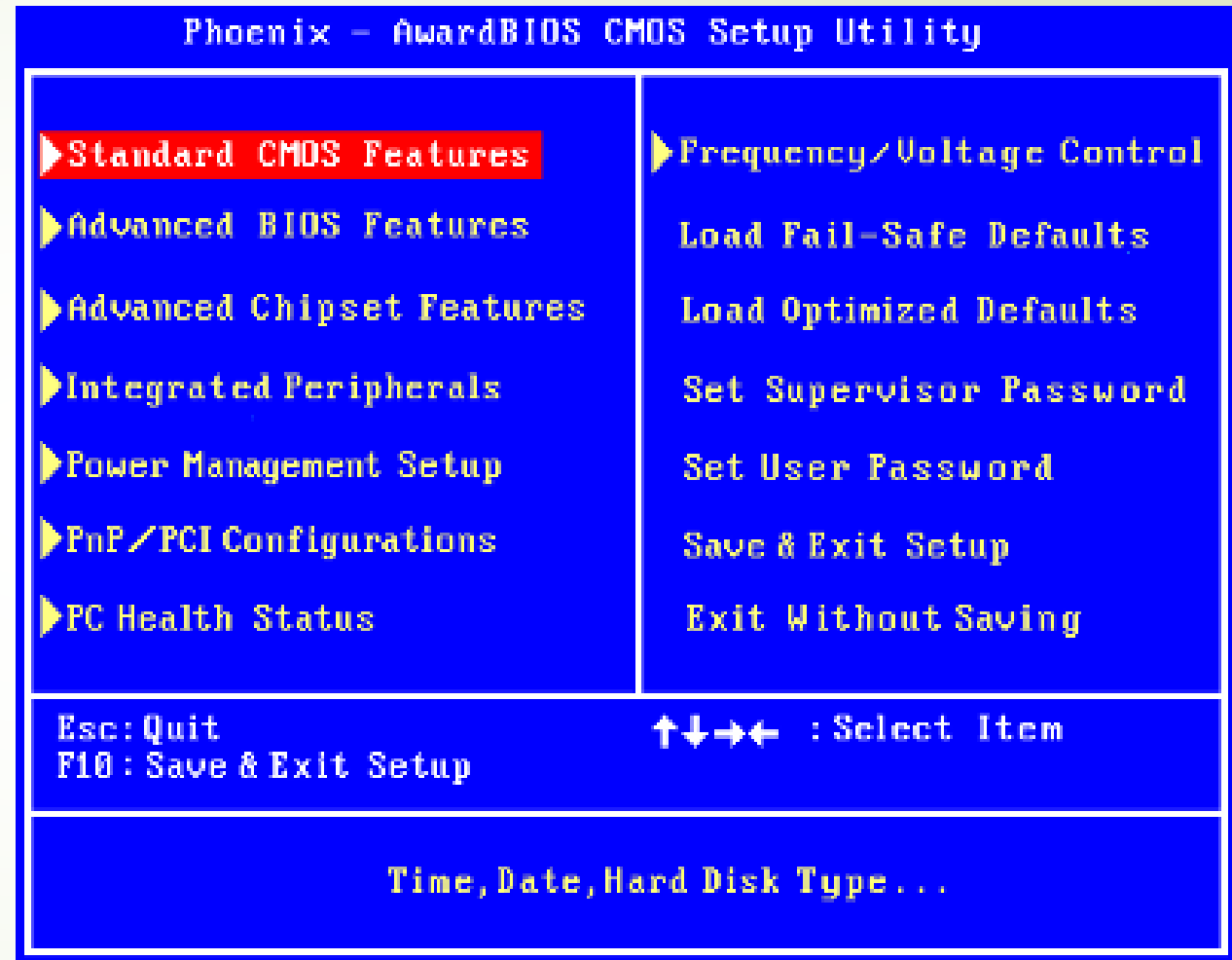


Inside a computer - ROM (Read Only memory)

- ▶ ROM (read-only memory) is a non-volatile memory type.
- ▶ This means it receives data and permanently writes it on a chip, and it lasts even after we turn off your computer.
- ▶ The data is coded to not be overwritten, so it's used for things like our printer software or our startup programs.
- ▶ Almost every computer incorporates a small amount of ROM that contains the start-up firmware. This boot firmware is called the basic input/output system (BIOS). This software consists of code that instructs the boot-up processes for the computer -- such as loading the operating system (OS) into the random-access memory (RAM) or running hardware diagnostics.

BIOS

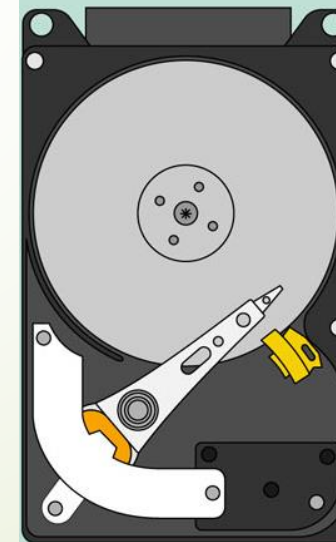
- ➔ For the interconnection of the various technical elements and different operating systems is used BIOS (**B**asic **I**nput **O**utput **S**ystem).
- ➔ BIOS is the most basic system program for the technical operation of your computer, stored in ROM memory and it mediates the communication between the technical and operational data of computer systems .



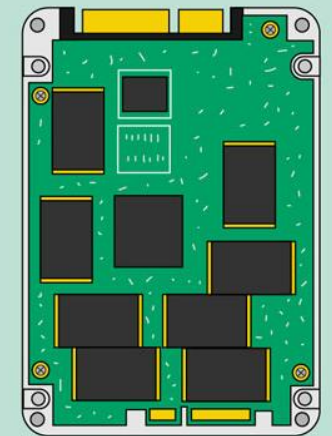
Inside a computer - Hard drive

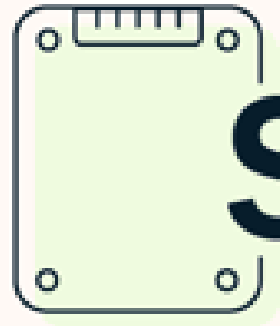
- The hard drive is where our software, documents, and other files are stored. The hard drive is long-term storage, which means the data is still saved even if we turn the computer off or unplug it.
- When we run a program or open a file, the computer copies some of the data from the hard drive onto the RAM. When we save a file, the data is copied back to the hard drive. The faster the hard drive, the faster our computer can start up and load programs.

HARD DRIVE

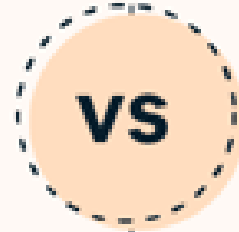


SOLID-STATE DRIVE





SSD



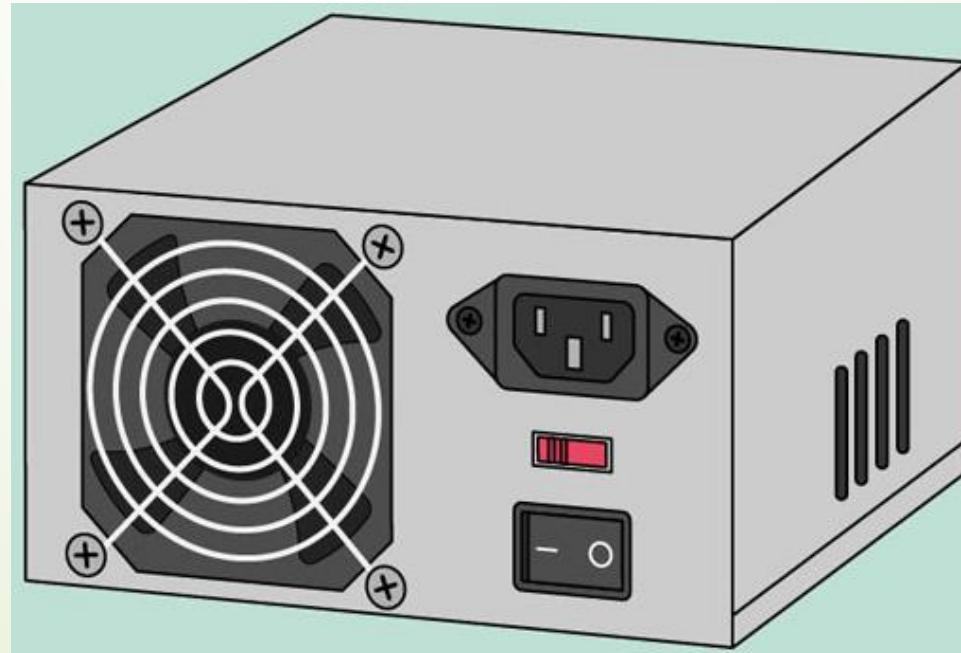
HDD



faster			slower
more expensive			cheaper
non-mechanical (flash)			mechanical (moving parts)
shock-resistant			fragile
best for storing operating systems, gaming apps, and frequently used files			best for storing extra data, such as movies, photos, and documents

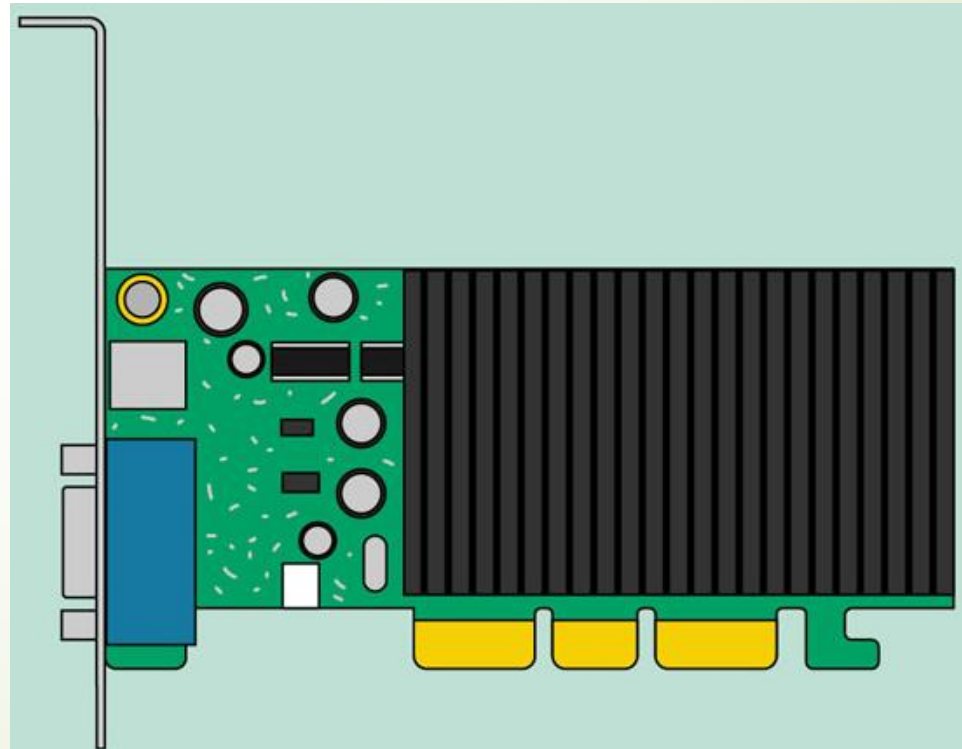
Inside a computer - Power supply unit

- ▶ The power supply unit in a computer converts the power from the wall outlet to the type of power needed by the computer. It sends power through cables to the motherboard and other components.
- ▶ If we decide to open the computer case and take a look, we need to make sure to unplug the computer first.



Expansion cards - Video card

- ▶ The video card is responsible for what we see on the monitor. Most computers have a GPU (graphics processing unit) built into the motherboard instead of having a separate video card. If we like playing graphics-intensive games, we can add a faster video card to one of the expansion slots to get better performance.

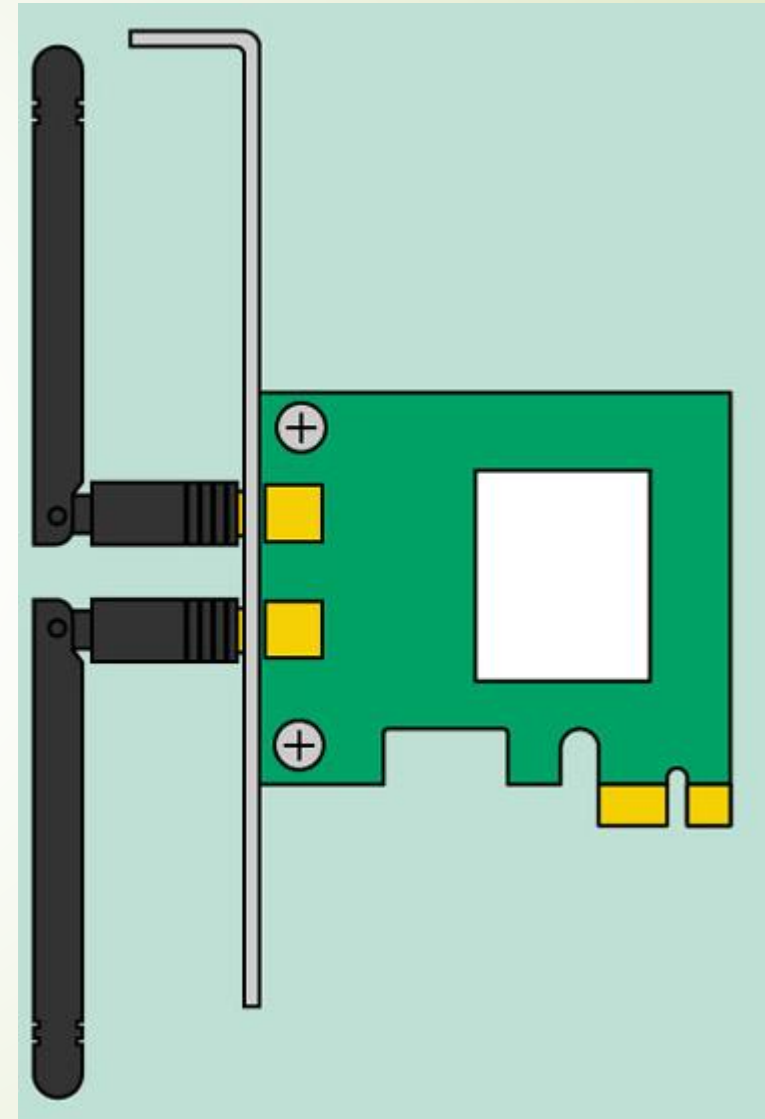


Expansion cards - Sound card

- The sound card—also called an audio card—is responsible for what we hear in the speakers or headphones. Most motherboards have integrated sound, but we can upgrade to a dedicated sound card for higher-quality sound.

Expansion cards - Network card

- The network card allows our computer to communicate over a network and access the Internet. It can either connect with an Ethernet cable or through a wireless connection (often called Wi-Fi). Many motherboards have built-in network connections, and a network card can also be added to an expansion slot.



Expansion cards - Bluetooth card (or adapter)

- Bluetooth is a technology for wireless communication over short distances. It's often used in computers to communicate with wireless keyboards, mice, and printers. It's commonly built into the motherboard or included in a wireless network card. For computers that don't have Bluetooth, we can purchase a USB adapter, often called a dongle.



External memory

- External memory devices are not located on motherboard.
- They are used for permanent storage of data, since their content remains after turning the computer off or removal of the storage medium.
- Information stored on external storage media can be read at any time into the internal memory and processed.
- Like the internal memory also external memory is characterized with capacity and the access time (latency).
- External memory devices have greater capacity but lower access speed than the internal memory.

Magnetic memory

HDD (Hard Disk Drive)

external memory



Floppy disk: 5,25" a 3,5"

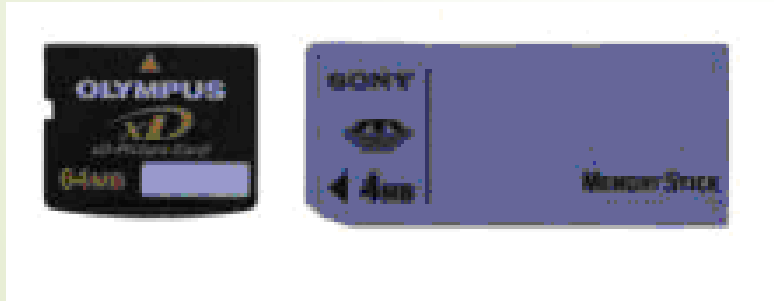


Optical Memory

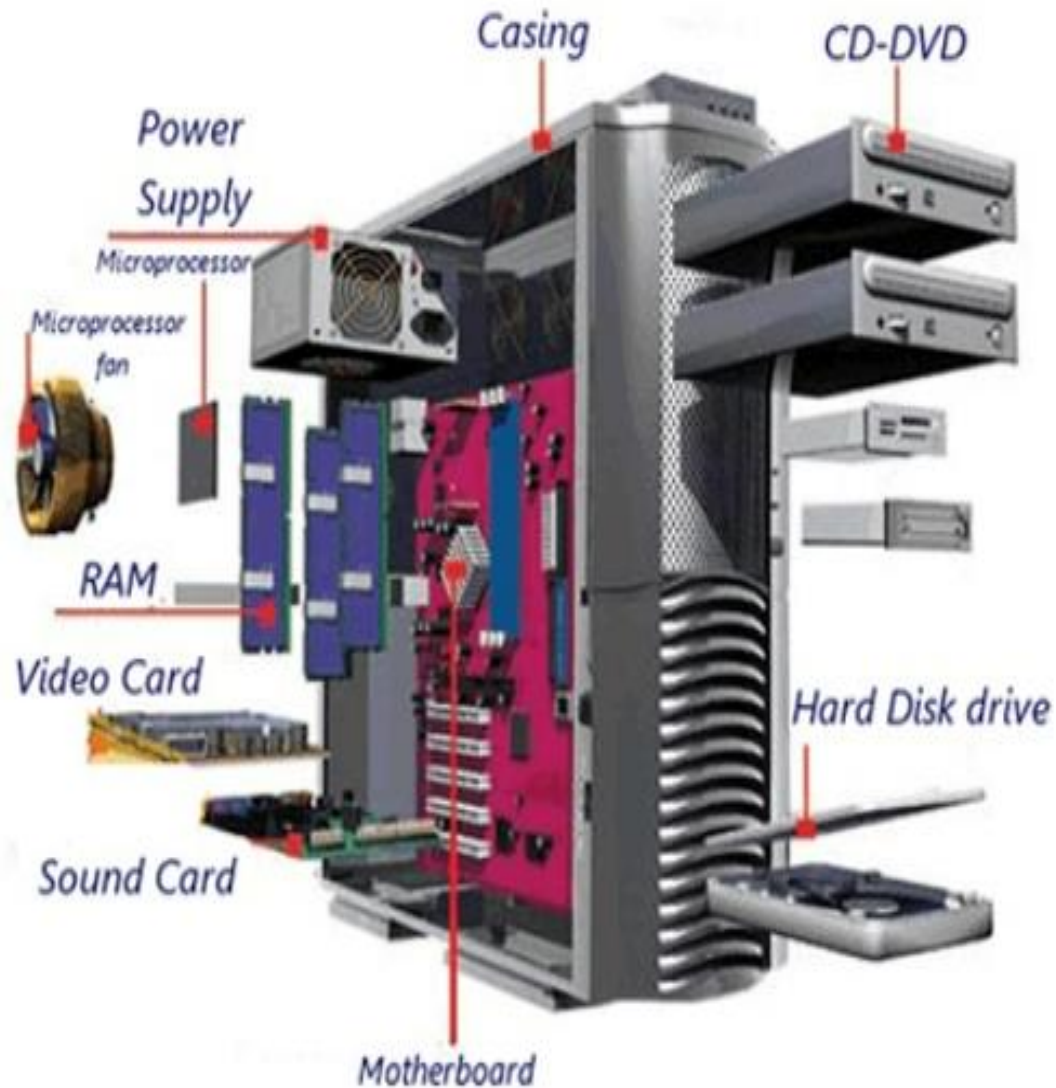
- Optical storage media raised their popularity with the introduction of the Windows 3.0.
- In Optical Memory, data is stored on an optical medium (i.e., CD-ROM or DVD), and read with a laser beam. While not currently practical for use in computer processing, optical memory is an ideal solution for storing large quantities of data very inexpensively, and more importantly, transporting that data between computer devices.
- Currently, in addition to conventional optical CD (Compact Disc) are also used digital DVD (Digital Versatile Disc) and BlueRay Disc.

Semiconductor memory

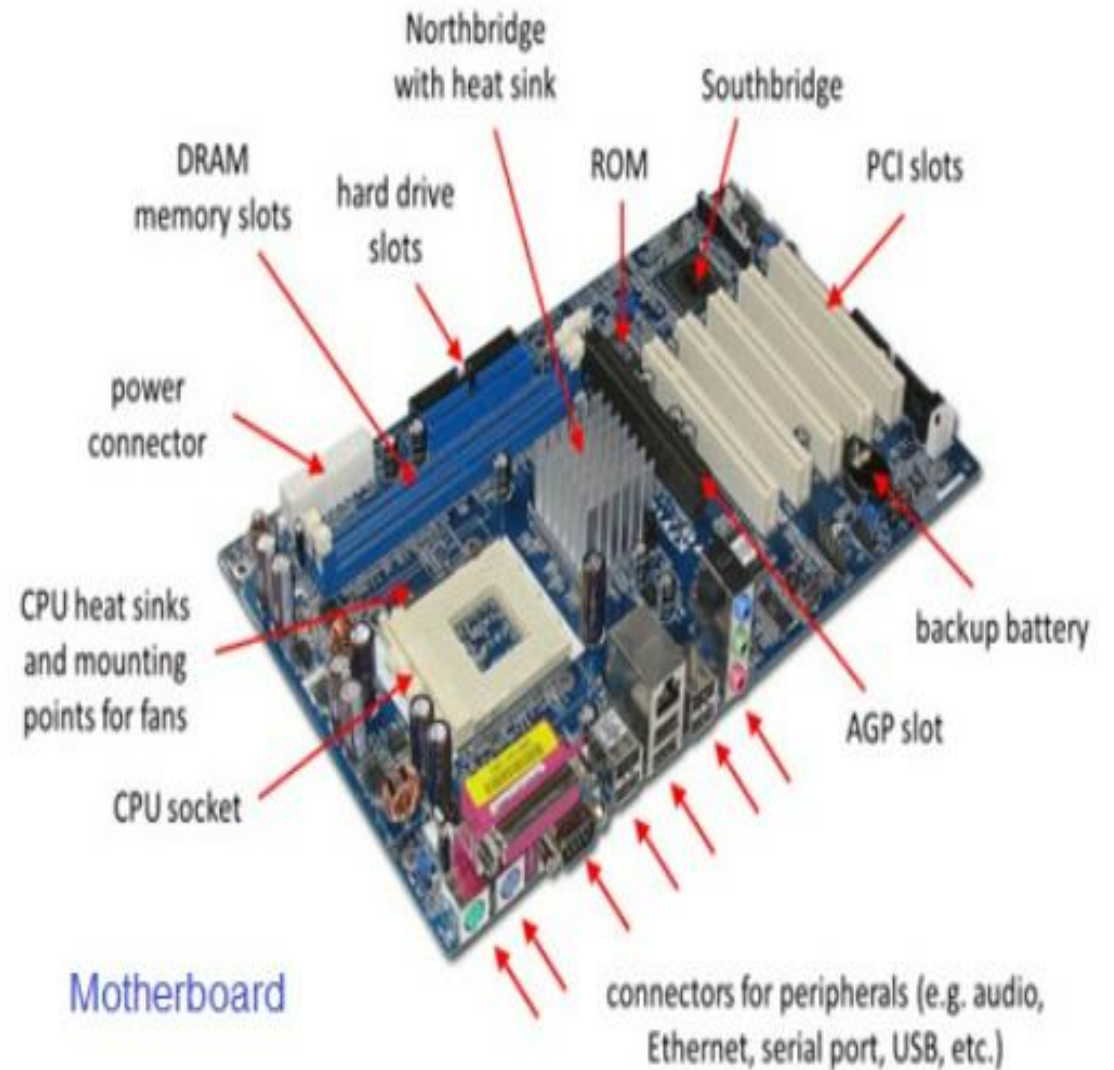
- In addition to the internal memory, semiconductor memory includes the USB drives and memory cards (memory cards are mainly used in digital cameras and camcorders, PDAs, MP3 players, etc.).

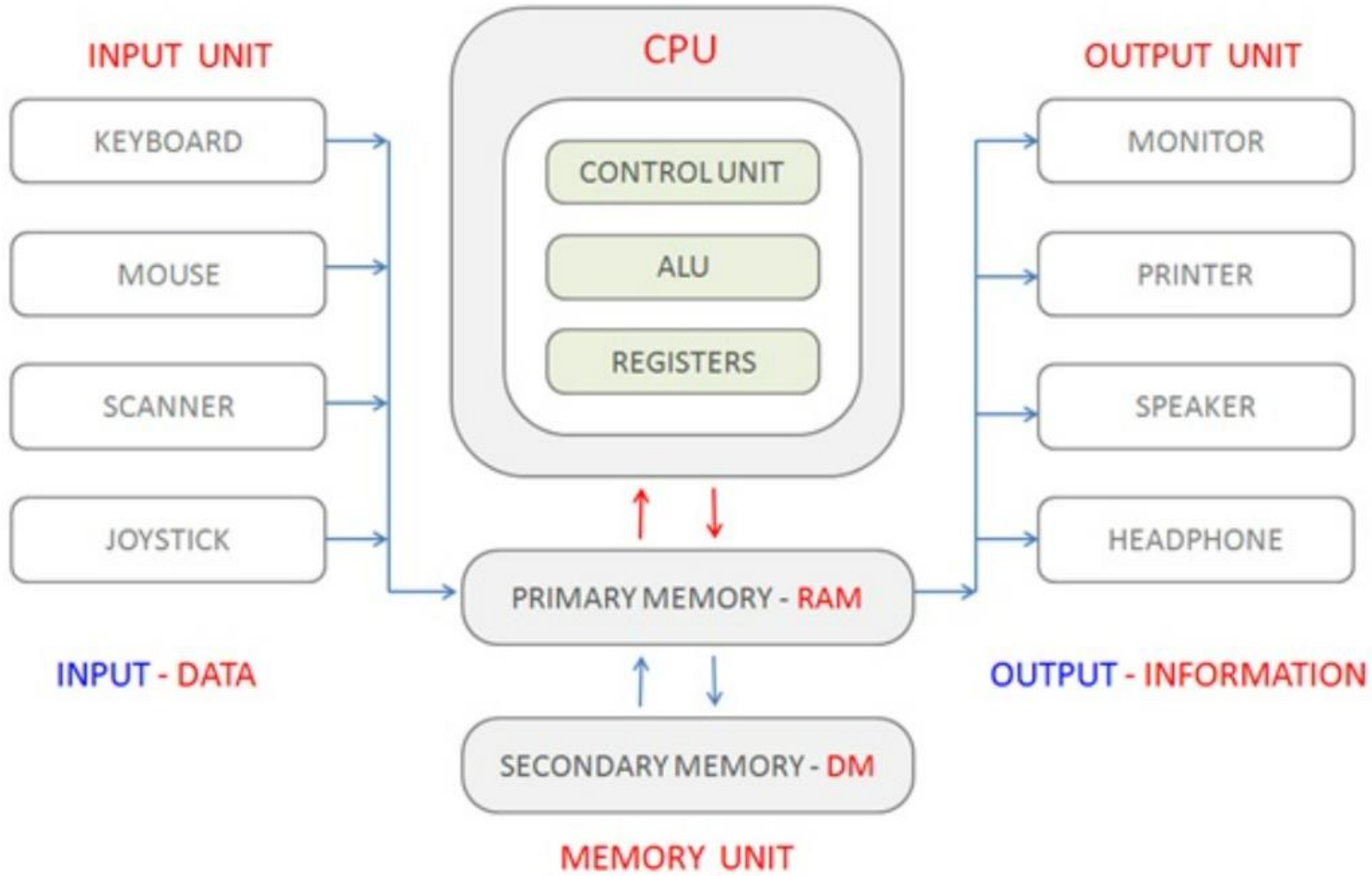


Computer Hardware Components



Computer Hardware Components





Laptop computer

- A laptop is a personal computer that can be easily moved and used in a variety of locations.
- Most laptops are designed to have all of the functionality of a desktop computer, which means they can generally run the same software and open the same types of files.



How is a laptop different from a desktop?

- A laptop has an all-in-one design, with a built-in monitor, keyboard, touchpad (which replaces the mouse), and speakers.
- This means it is fully functional, even when no peripherals are connected.
- A laptop is also quicker to set up, and there are fewer cables to get in the way.
- We have option to connect a regular mouse, larger monitor, and other peripherals. This basically turns our laptop into a desktop computer, with one main difference: we can easily disconnect the peripherals and take the laptop with us wherever we go.

Main differences we can expect with a laptop

- Touchpad - also called a trackpad - is a touch-sensitive pad that lets us control the pointer by making a drawing motion with our finger.
- Battery - every laptop has a battery, which allows us to use the laptop when it's not plugged in. Whenever we plug in the laptop, the battery recharges.
- AC adapter – a laptop usually has a specialized power cable called an AC adapter, which is designed to be used with that specific type of laptop.
- Ports - most laptops have the same types of ports found on desktop computers (such as USB), although they usually have fewer ports to save space. However, some ports may be different, and we may need an adapter in order to use them.

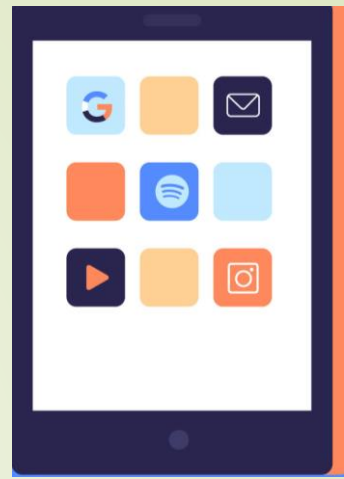


Mobile Devices

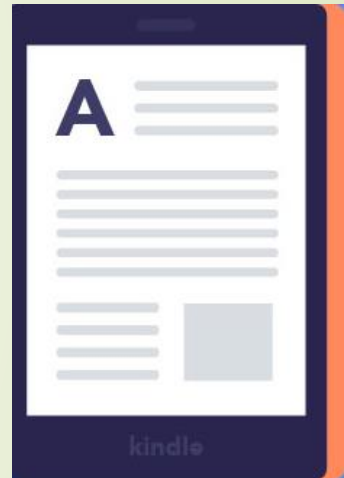
- A mobile device is a general term for any type of handheld computer.
- These devices are designed to be extremely portable, and they can often fit in our hand.
- Some mobile devices—like tablets, e-readers, and smartphones—are powerful enough to do many of the same things we can do with a desktop or laptop computer.

Mobile Devices

Tablet computers - designed to be portable. However, they provide a different computing experience. The most obvious difference is that tablet computers don't have keyboards or touchpads. Instead, the entire screen is touch-sensitive, allowing us to type on a virtual keyboard and use our finger as a mouse pointer.



➔ **E-readers** - also called e-readers—are similar to tablet computers, except they are mainly designed for reading e-books (digital, downloadable books). Most e-readers use an e-ink display, which is easier to read than a traditional computer display.



➔ **Smartphones** – are more powerful version of a traditional cell phone. In addition to the same basic features—phone calls, voicemail, text messaging—smartphones can connect to the Internet over Wi-Fi or a cellular network



**H C W
o o o
w m r
p k
u s
t
e
r**

- 🖥 The User starts the computer.
- 🖥 The computer performs power supply Check (POST).
- 🖥 The CPU activates BIOS to initiate the booting process.
- 🖥 The BIOS loads the operating system.
- 🖥 The Operating System takes the control of the computer.
- 🖥 The user initiates the program execution .
- 🖥 The operating system loads program into the main memory.
- 🖥 The CPU initiates the program execution.
- 🖥 The user input data is stored into the main memory..
- 🖥 The processed data is sent to the output device.



**Thank you for your
attention!**