### Introduction about computer

• ENIAC Introduced in 1946, ENIAC (Electronic Numerical Integrator and Computer) was the first general-purpose electronic computer. It was built for the United States military to calculate the paths of artillery shells. Physically, ENIAC was enormous, weighing more than 27,000 kilograms and filling a large room. To process data, ENIAC used about 18,000 vacuum tubes, each the size of a small light bulb. The tubes burned out easily and had to be constantly replaced.
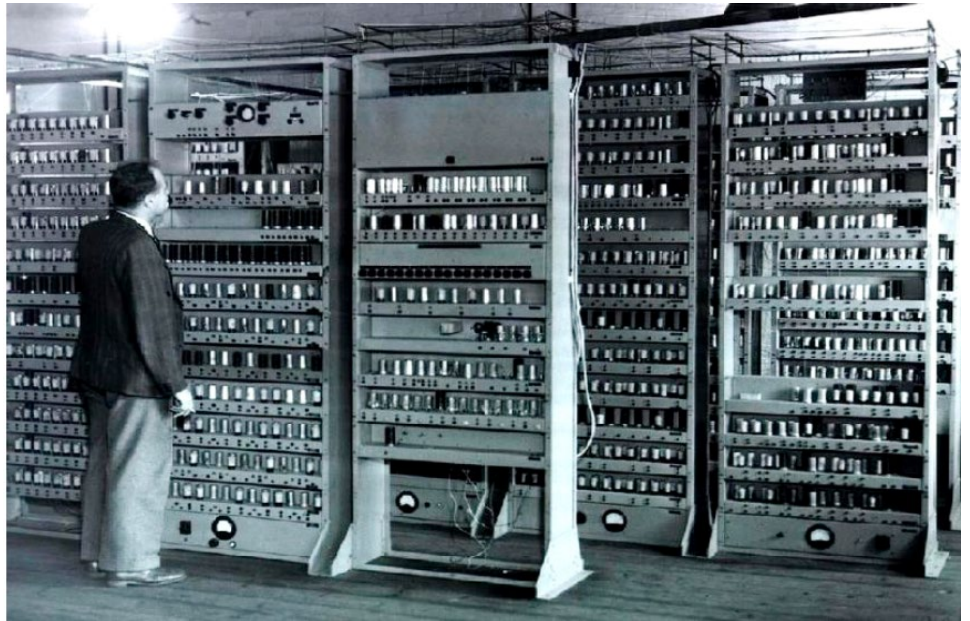
• A computer is a machine that accepts data as input, processes that data using programs and outputs the processed data as information.

• Initially, computers were developed to perform mathematical operations, but later on, they were used to store the result of those operations, which with the time leads to the storage of other data or information.

• **Data** is a collection of unprocessed facts, figures, and symbols. *e.g.* Ram, age, 32, years, old

• **Information** is a processed form of data. It is organized, meaningful, and useful. *e.g.* Ram is 32 years old. *Or* Ram's age is 32 years.

What can do with computers?

In the workplace, many people use computers to keep records, analyze data, do research, and manage projects. At home, you can use computers to find information, store pictures and music, track finances, play games, and communicate with others and those are just a few of the possibilities.

You can also use your computer to connect to the Internet, a network that links computers around the world. Internet access is available for a monthly fee in most urban areas, and increasingly, in less populated areas. With Internet access, you can communicate with people all over the world and find a vast amount of information.

Here are some of the most popular things to do with computers: **the web, E-mail, Instant messaging, Pictures, music, movies, and gaming**

Types of Computers : Computers range in size and capability. At one end of the scale are supercomputers, very large computers with thousands of linked microprocessors that perform extremely complex calculations. At the other end are tiny computers embedded in cars, TVs, stereo systems, calculators, and appliances. These computers are built to perform a limited number of tasks.

Desktop computer

The personal computer, or PC, is designed to be used by one person at a time. This section describes the various kinds of personal computers: **desktops, laptops, handheld computers, and Tablet PCs.**

1. Desktop computers

Desktop computers are designed for use at a desk or table. They are typically larger and more powerful than other types of personal computers. Desktop computers are made up of separate components. The main component, called the system unit, is usually a rectangular case that sits on or underneath a desk. Other components, such as the monitor, mouse, and keyboard, connect to the system unit.

2. Laptop computers and small notebook PCs

Laptop computers are lightweight mobile PCs with a thin screen. Laptops can operate on batteries, so you can take them anywhere. Unlike desktops, laptops combine the CPU, screen, and keyboard in a single case. The screen folds down onto the keyboard when not in use.

Small notebook PCs (often referred to as mini-notebooks), are small, affordable laptops that are designed to perform a limited number of tasks. They're usually less powerful than a laptop, so they're used mainly to browse the web and check e-mail.
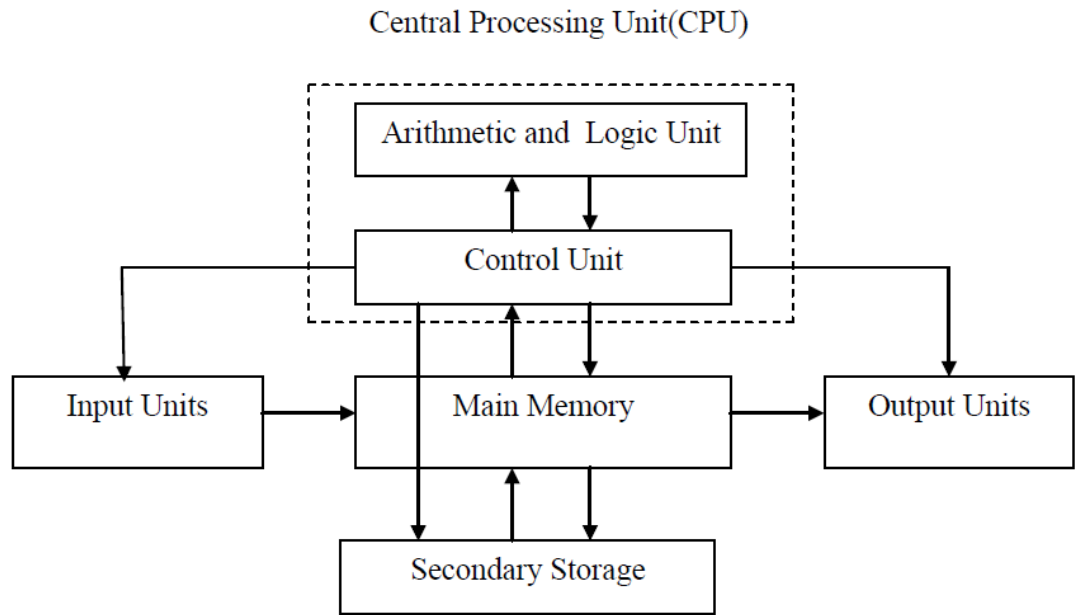
3. Computers Operations

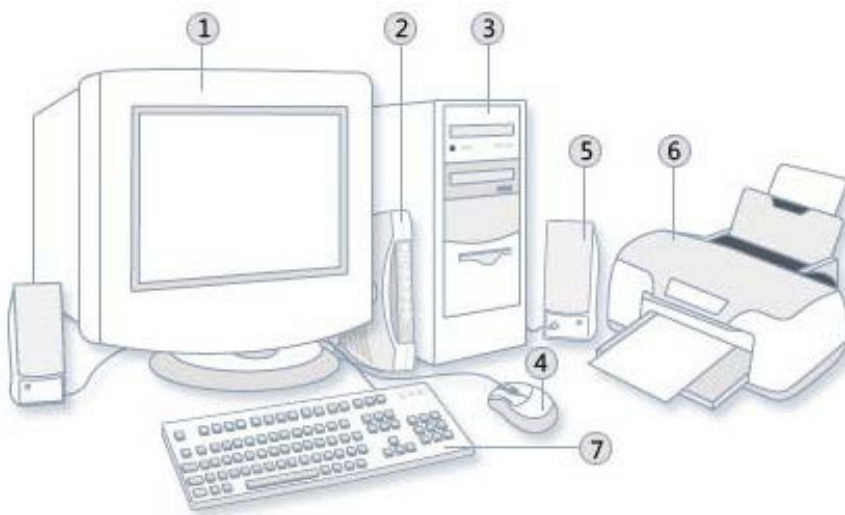All computers execute three basic operations:

1. Input data and instruction by input unit.

2. Save and process data and instruction by memory unit and central processing unit.

3. Output results and instruction by output unit.

Computer Hardware

refers to the parts of a computer that you can see and touch, including the case and everything inside it. The most important piece of hardware is a tiny rectangular chip inside your computer called the Central Processing Unit (CPU), or microprocessor.

Central Processing Unit(CPU)

Arithmetic and Logic Unit

Control Unit

Input Units → Main Memory → Output Units

Secondary Storage

Computer Hardware Diagram

It's the "brain" of your computer—the part that translates instructions and performs calculations. Hardware items such as your monitor, keyboard, mouse, printer, and other components are often called hardware devices, or devices

If you use a desktop computer, you might already know that there isn't any single part called the "computer" .A computer is really a system of many parts working together. The physical parts, which you can see and touch, are collectively called hardware. (Software, on the other hand, refers to the instructions, or programs, that tell the hardware what to do.)

The following illustration shows the most common hardware in a desktop computer system. Your system might look a little different, but it probably has most of these parts. A laptop computer has similar parts but combines them into a single, notebook-sized package. Let's take a look at each of these parts.

Input / Output Units

① Monitor ③ System unit ⑤ Speaker ⑦ Keyboard

② Modem ④ Mouse ⑥ Printer

Desktop computer system

• Mouse

A mouse is a small device used to point to and select items on your computer screen. Although mice come in many shapes, the typical mouse does look a bit like an actual mouse. It's small, oblong, and connected to the system unit by a long wire that resembles a tail. Some newer mice are wireless.

A mouse usually has two buttons: A primary button (usually the left button) and a secondary button. Many mice also have a wheel between the two buttons, which allows you to scroll smoothly through screens of information.

When you move the mouse with your hand, a pointer on your screen moves in the same direction. (The pointer's appearance might change depending on where it's positioned on your screen.) When you want to select an item, you point to the item and then click (press and release) the primary button. Pointing and clicking with your mouse is the main way to interact with your computer.
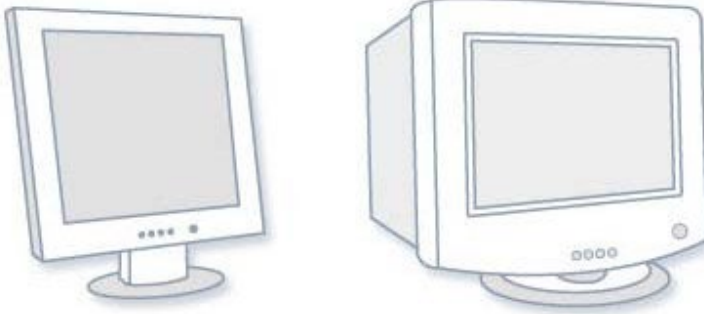
Mouse

- **Keyboard**

A keyboard is used mainly for typing text into your computer. Like the keyboard on a typewriter, it has keys for letters and numbers, but it also has special keys:

- The function keys, found on the top row, perform different functions depending on where they are used.
- The numeric keypad, located on the right side of most keyboards, allows you to enter numbers quickly.
- The navigation keys, such as the arrow keys, allow you to move your position within a document or webpage.

You can also use your keyboard to perform many of the same tasks you can perform with a mouse.

Keyboard

- **Monitor**

A monitor displays information in visual form, using text and graphics. The portion of the monitor that displays the information is called the screen. Like a television screen, a computer screen can show still or moving pictures.

There are three basic types of monitors: CRT (cathode ray tube) monitors and the newer LCD (liquid crystal display) monitors. Both types produce sharp images, but LCD monitors have the advantage of being much thinner and lighter. and state of the art A LED display is a flat panel display that uses an array of (light-emitting diodes) as pixels for a video display. Their brightness allows them to be used outdoors where they are visible in the sun for store signs and billboards.

LCD monitor (left); CRT monitor (right)

- **Printer**

A printer transfers data from a computer onto paper. You don't need a printer to use your computer, but having one allows you to print e-mail, cards, invitations, announcements, and other material. Many people also like being able to print their own photos at home. The two main types of printers are inkjet printers and laser printers. Inkjet printers are the most popular printers for the home. They can print in black and white or in full color and can produce high-quality photographs when used with special paper. Laser printers are faster and generally better able to handle heavy use.
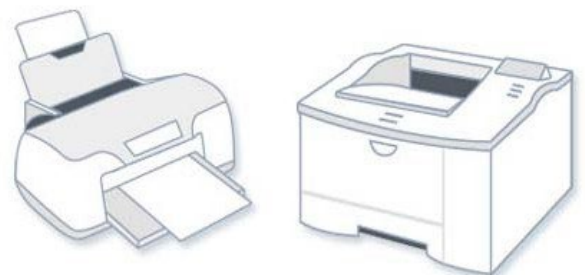
Inkjet printer (left); laser printer (right)

- **Speakers**

Speakers are used to play sound. They can be built into the system unit or connected with cables. Speakers allow you to listen to music and hear sound effects from your computer.
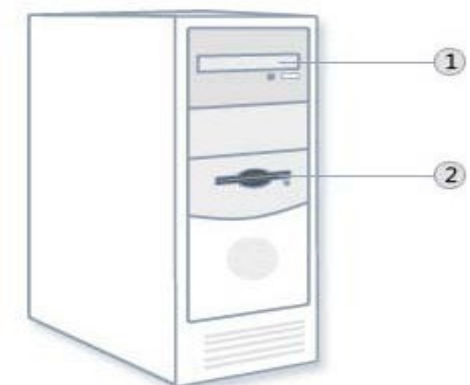
Computer speakers

- **Modem**

To connect your computer to the Internet, you need a modem. A modem is a device that sends and receives computer information over a telephone line or high-speed cable. Modems are sometimes built into the system unit, but higher-speed modems are usually separate components.

Cable modem

- **System Units** The system unit is the core of a computer system. Usually it's a rectangular box placed on or underneath your desk. Inside this box are many electronic components that process information. The most important of these components is the **Central Processing Unit (CPU), or Microprocessor**, which acts as the "brain" of your computer. Another component is **Random Access Memory (RAM),** which temporarily stores information that the CPU uses while the computer is on. The information stored in RAM is erased when the computer is turned off. Almost every other part of your computer connects to the system unit using cables. The cables plug into specific ports (openings), typically on the back of the system unit. Hardware that is not part of the system unit is sometimes called a peripheral device or device.

① CD/DVD drive   ② Floppy disk drive

System unit

- **Central Processing Unit (CPU):** the main circuit chip in computer, it performs most of the calculations necessary to run computer. **CPU** speed measured by account of instructions that can execute in one secant, usually measured in **(GHz)**. CPU contents two units:

1. **Control Unit (CU).**
2. **Arithmetic and Logic Unit (ALU).**

1. Control Unit (CU).

This unit control or supervised to all parts of computers such as:

- Control operation of transfers data and instruction from input unit to memory and from memory to output unit.
- Control operation of account executable instructions on ALU.
- Basic work of CU is interpreter the instructions that is mean data oriented to specific location on ALU. for example: if the instruction is (B+C) the B,C values transfers to (Adder) part, if the instruction is (BxC) the B,C values transfers to (Multiplier) part,

2. Arithmetic and Logic Unit (ALU).

This unit execute the following operations:

- Mathematical operations such as: add (+), abstract (-), multiplier (×), divide (÷).
- Logical operations: this is basic to account comparisons to choose true or false specific case, such as >,< ,>=,<=,<>,= as a result of these comparisons specific instructions may be executable.
- Merge number of simple comparisons by specific tools such as: AND, OR, NOT.

What are Buses? The command received on CPU through buses, where the buses use to transfer electric impulse between different computer parts, as code signals therefore the buses are data path between the CPU and other computer parts such as input, output , and storage units. The one bus made of set of metal wires that sprawled over mother board. The types of buses are:

1. **Data Bus**: use to transfer data.
2. **Address Bus**: use to transfer storage location addresses.
3. **Control Bus**: use to transfer control signal and operation timer between computer parts.
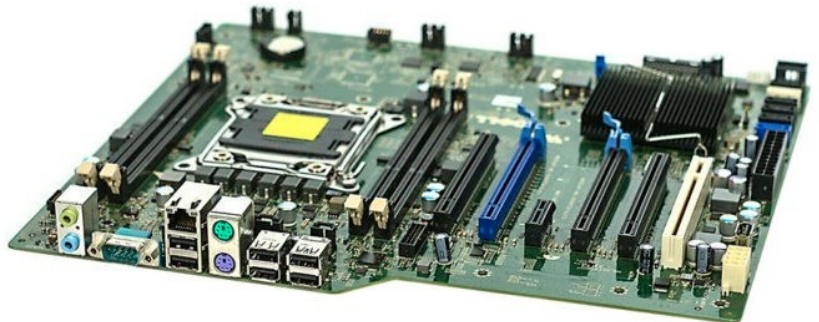
System Board or Mother Board: the important part on computer loading the CPU, memories, and control circuit. it is allowing to computer parts to exchange data to perform the required work, and coordinate computer parts, and memory organization.

- **Main memory:** refers usually to Random Access Memory (RAM) the temporary storage area the computer uses to run programs and store data. information store in RAM is temporary and is designed to be erased when computer turn off.**RAM** is a general indication of performance that is measured either in megabytes (MB) or gigabytes (GB): the larger the number, the faster some programs will run. Memory is set of electronic circuit named **(Cells),** each cell store 0 or 1, like (on or off),the single cell content named **(BIT)** which represent basic unit in process data, because all data transfer to set of bits in digital computers.**(BYTE)** term for eight Bit i.e:
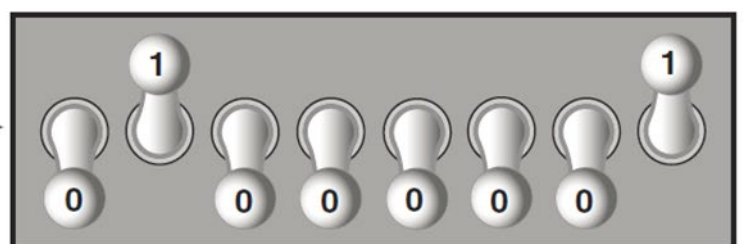
For large capacities, the terms Kilobyte (KB), megabyte (MB), gigabyte (GB), terabyte (TB) and Petabyte (PB) are used.

1 nibble = 4 bits , 1 byte = 8 bits, 1 KB = 1024 bytes, 1 MB = 1024 KB, 1 GB = 1024 MB,

1 TB = 1024 GB, 1 PB = 1024 TB

$$1 0 0 1 1 1 0 1$$

$$1 + 4 + 8 + 16 + 128 = 157$$
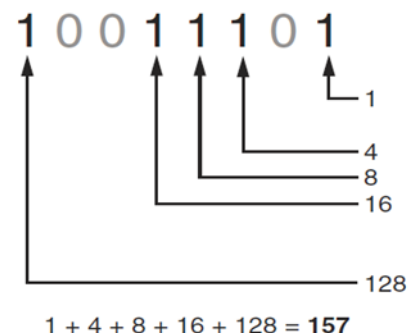
Types of Memory

There are two categories of memory: Primary memory and Secondary memory (or external memory).

Primary Memory is very fast as data and programs must be in the primary memory for execution. Random Access Memory (RAM) and Read Only Memory (ROM) are both primary memory.

• **Random Access Memory** refers to memory that can be selected and used randomly. The information stored here disappears the very moment the machine is turned off. It is also referred to as volatile memory.

• **Read Only Memory** is permanently built into the computer at the time of production. The information from this memory can only be read and it is not possible to write fresh information into it. It permanently stores a set of instructions which instructs the computer how to work. After we switch on the computer, it uses instructions stored here to carry out a series of tasks automatically, before we can actually use the computer.
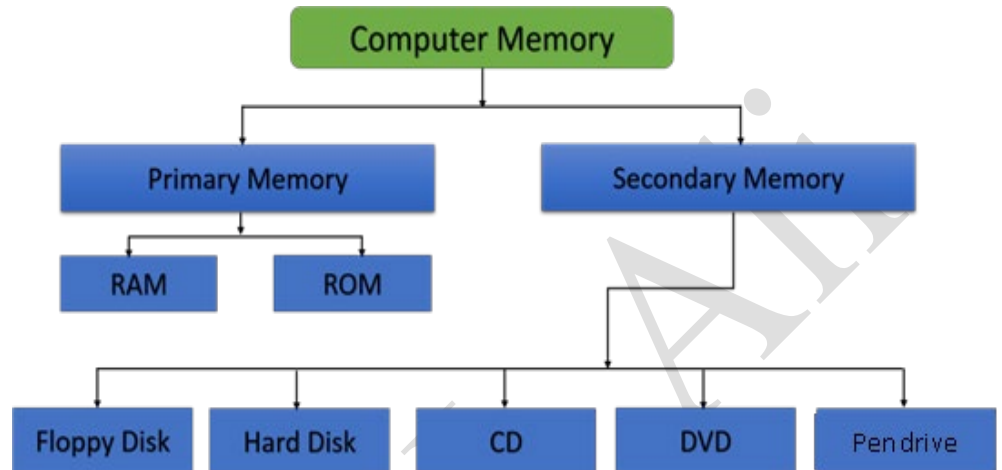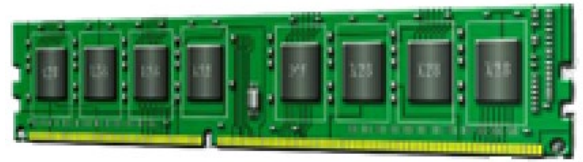
Secondary Memory or Auxiliary Memory: The content on the RAM is erased when electric power is switched off. So, it becomes necessary to store this data for future use, somewhere else. Since, primary storage is expensive too; we need a relatively cheaper form of backup storage which can store vast quantities of information. Thus, **Secondary Memory** devices become an important part of the computer. that store information on a metal or plastic disk. The disk preserves the information even when your computer is turned off.
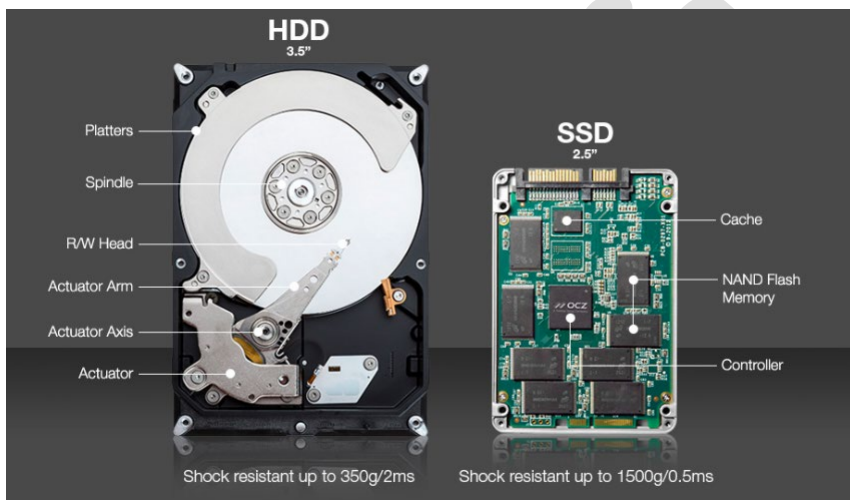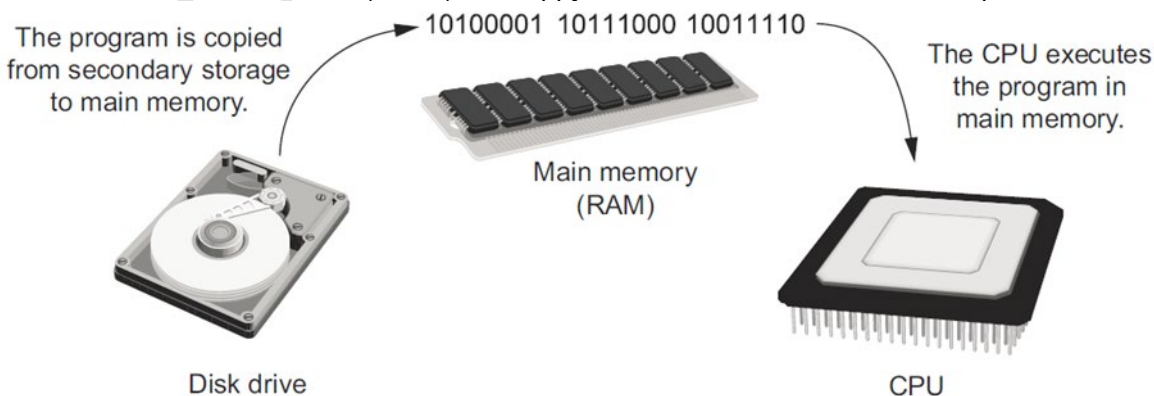
• **Hard disk drive (HDD)**
Your computer's hard disk drive stores information on a hard disk a rigid platter or stack of platters with a magnetic surface. Because hard disks can hold massive amounts of information, they usually serve as your computer's primary means of storage, holding almost all of your programs and files. The hard disk drive is normally located inside the system unit.

• **A solid-state drive (SSD)**
solid-state storage is a 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. It is also sometimes called a semiconductor storage device, SSDs lack the physical spinning disks and movable read–write heads used in hard disk drives (HDDs) and floppy disks. SSD also has rich internal parallelism for data processing.

The program is copied from secondary storage to main memory.

10100001 10111000 10011110

The CPU executes the program in main memory.

Main memory (RAM)

Disk drive

CPU

- ## CD and DVD drives

The compact disc was first developed by Philips and Sony in 1982. Denon expanded on the CD-DA (compact disc digital audio) format to create the CD-ROM format, allowing it to store any data and not only audio.

The first CD-ROM disc introduced to the public had a storage capacity of 553 MB. Today, a standard CD-ROM disc can store up to 700 MB of data, or 80 minutes' worth of audio. Non-standard CD-ROM discs also exist that store up to 900 MB of data, or 99 minutes of audio.

a **CD-ROM** is an optical disc containing audio or software data whose memory is read-only. A **CD-ROM Drive** or **optical drive** is the device used to read them. CD-ROM drives have speeds ranging from 1x to 72x, meaning it reads the CD roughly 72 times faster than the 1x version. As you would imagine, these drives are capable of playing audio CDs and reading data CDs, including CD-R and CD-RW discs. A CD-ROM drive cannot read a DVD, including movie DVDs and data DVDs. The DVD format is different than a CD

The real difference between a CD-ROM and a DVD is how much information they can store. A CD-ROM can store approximately 650MB (megabytes) of information, while a DVD can store much more, up to 17 GB (gigabytes) or 17,000MB on a double-sided DVD. Most CD-ROMs and DVD are read-only, meaning you can't write information to them. You can buy special CD-ROM and DVD drives that can write or burn information to special CD-R, CD-RW, DVD-R, and DVDRW discs.

Figure beside shows a double-sided DVD that may typically be a DVD-Video providing the video in a full-screen TV version on one side of the disc and a wide-screen version on the other side. When double-sided DVDs also have double layers on both sides, they may have almost quadruple the capacity of single-sided/single-layered DVDs .
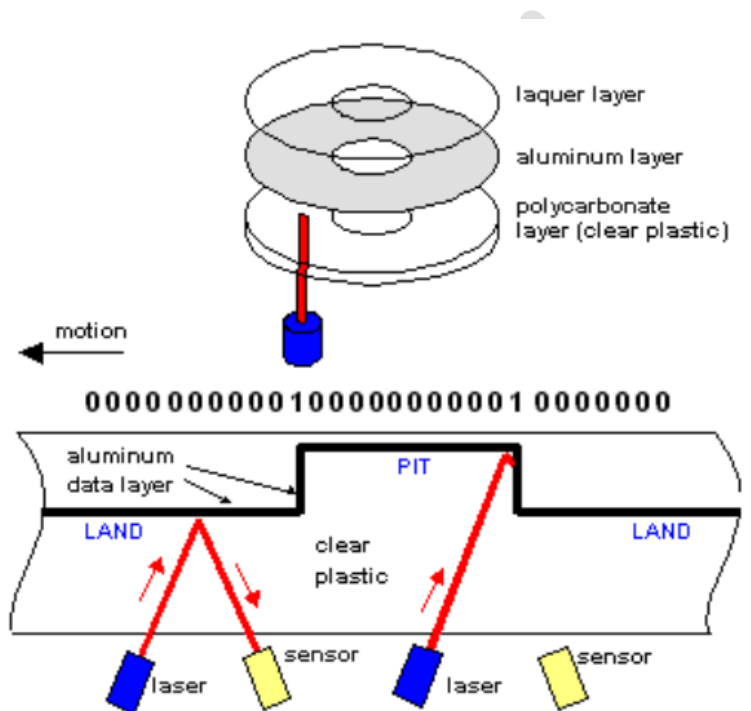
- ## Floppy disk drive

Floppy disk drives store information on floppy disks, also called floppies or diskettes. Compared to CDs and DVDs, floppy disks can store only a small amount of data. They also retrieve information more slowly and are more prone to damage. For these reasons, floppy disk drives are less popular than they used to be, although some computers still include them. Why are these disks called "floppy" disks? The outside is made of hard plastic, but that's just the sleeve. The disk inside is made of a thin, flexible vinyl material. Floppy disk storage capacity between 360 KB and 1.44 MB.
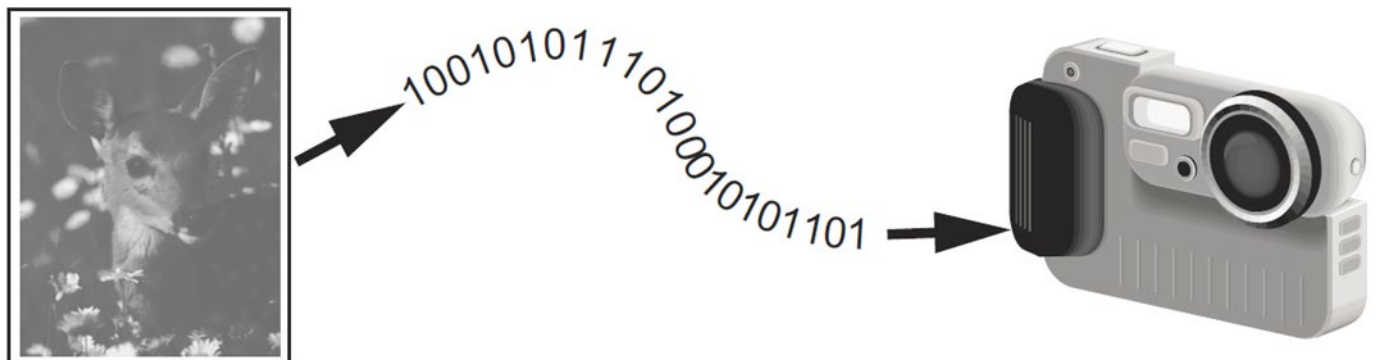
each pixel in an image is converted to a numeric code that represents the pixel's color. The numeric code is stored in memory as a binary number.