# Computer Components and Roles

*by Sophia*

# 1. Computing Systems

Simply put: a system is a combination of parts that work together to achieve a goal. Based on this definition, we can easily see how a computer fits the description of what a system is. All computers have a way to accept user input and receive instructions from users, a way of delivering data back to the user, a central processing unit, basic hardware, and software.

# 2. Data Processing Components

After a computer receives data from an input device, the data must be processed before it is sent to an output device such as a monitor. In a computer, a data processing device is any device that is responsible for the storage and retrieval of data. Listed below are the data processing devices located in a computer.

| Data Processing Devices | Description |
| --- | --- |
| Central Processing Unit (CPU) | Most computing devices have a similar architecture. The core of this architecture is the **central processing unit (CPU)**. The CPU can be thought of as the "brains" of the device. The CPU carries out the commands sent to it by the software and returns results to be acted upon. |
| Graphics Processing Unit (GPU) | The **graphics processing unit or GPU** is essentially what generates the image(s) on the monitor. It is located internally and typically connects directly to the motherboard. The GPU is more widely referred to as a "video card." |
| Motherboard | The **motherboard** is the main circuit board on the computer. The CPU, memory, and storage components, among other things, all connect into the motherboard. Motherboards come in different shapes and sizes, depending upon how compact or expandable the computer is designed to be. Most modern motherboards have many integrated components, such as video and sound processing, which used to require separate components. |
| Network Interface Card (NIC) | Commonly referred to as an ethernet card, the **network interface card (NIC)** is an expansion card that provides a computer with the ability to connect to a network. Most newer model computers have their network interface card built into the motherboard. |
| Sound Card | The **sound card** is an expansion card that produces sound through the speakers or headphone. The sound card is also sometimes referred to as the audio card. Sound cards are included with every computer system; however, they are not required by the computer to operate. |

▶ WATCH

Learn more about the data processing components in the video below.

📄 TERMS TO KNOW

**Central Processing Unit (CPU)**

The "brains" of the device; it performs computations and logic operations sent to it by application software, and returns results to be acted upon.

**Graphics Processing Unit (GPU)**

Generates images on the monitor; also referred to as the video card.

**Motherboard**

The main circuit board on the computer to which the CPU, memory, and storage connect.

**Network Interface Card**

Expansion card that provides a computer with the ability to connect to a network.

**Sound Card**

Expansion card that produces sound through the speakers or headphone.

# 3. Data Storage Components

In a computer, data storage is handled by several components. Generally, a data storage component is any hardware that can store information temporarily or permanently. Data storage devices are classified as either primary storage or secondary storage. Primary storage refers to internal storage, such as random access memory (RAM). Secondary storage is not readily accessible by the computer and can be internal or external, such as a hard drive or flash drive. Listed below are the data storage components located in a computer.

| Data Storage Components | Description |
| --- | --- |
| Hard Disk | Most of today's personal computers use a hard disk for long-term data storage. A **hard disk** is where data is stored when the computer is turned off and where it is retrieved from when the computer is turned on. Maximum capacity is currently around 22TB. |
| Solid-State Drives (SSD) | The solid-state drive (SSD) performs the same function as a hard disk: long-term storage. Instead of spinning disks, the SSD uses flash memory, which is much faster. Solid-state drives are currently quite a bit more expensive than hard disks. However, the use of flash memory instead of disks makes them much lighter and faster than hard disks. Maximum capacity is currently around 100TB. |
| Flash Drives | Around the turn of the century, a new portable storage technology was being developed: the USB flash drive. This device attaches to the universal serial bus (USB) connector, which became standard on all personal computers beginning in the late 1990s. Maximum capacity is currently around 256GB. |
| Random-Access Memory (RAM) | When a computer starts up, it begins to load information from the hard disk into its working memory. This working memory, called **random-access memory (RAM)**, can transfer data much faster than the hard disk. Any program that you are running on the computer is loaded into RAM for processing. In order for a computer to work effectively, some minimal amount of RAM must be installed. In most cases, adding more RAM will allow the computer to run faster. Another characteristic of RAM is that it is "volatile." This means that it can store data as long as it is receiving power. When the computer is turned off, any data stored in RAM is lost. |
| Optical Disc | An optical disc is a form of removable storage media that stores data on the surface of the disc. Compact Disc (CD) and Digital Video Disc (DVD) are examples of optical discs. Maximum capacity is currently 900MB for CDs and 50GB for DVDs. |

▶ WATCH

Learn more about the data storage components in the video below.

📄 TERMS TO KNOW

**Hard Disk**

The location for long-term data storage when the computer is turned off, and where data is retrieved when the computer is turned on.

**Random-Access Memory (RAM)**
The working memory of a computer that transfers data from the hard disk upon starting the device.

# 4. Input/Output Components

All computers accept input from the keyboard or mouse (or other designated input device), process it, and output it to a monitor (or other designated output device). An **input device** is any hardware component that sends data into a computer. An **output device** is any hardware component that sends data out of a computer.

> 📄 TERMS TO KNOW
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> **Input Device**
> Any hardware component that sends data into the computer.
>
> **Output Device**
> Any hardware component that sends data out from the computer.

Below are the common input and output devices utilized by most computer systems.

## 4a. Input Devices

- **Keyboard**: All personal computers need components that allow the user to input data. Keyboards help the user enter text or numbers as input for documents or files. Keyboards are available in different sizes. Some keyboards are designed for ergonomics, while others are designed to be small.
- **Pointing Device**: A pointing device is an input device that moves an on-screen pointer and gives users the ability to click to initialize applications, or to open files. The most common type of pointing device is a mouse. Users move the mouse across a flat surface and press a button to click. Another type of pointing device is a touchpad. A touchpad is a touch-sensitive pad that is built into a notebook computer and is designed to behave like a mouse.
- **Scanner**: Scanners allow users to input documents into a computer, either as images or as text. Most scanners have flat surfaces for users to place documents to be scanned on. However, some scanners feed documents one page at a time. Most scanners utilize the USB interface.
- **Digital Camera**: A digital camera is a device that captures a picture and converts it into digital information. Most digital cameras provide a local storage option until the picture can be transferred to a computer. Typically, a digital camera connects to a computer using the USB interface.

## 4b. Output Devices

- **Monitor**: A monitor is a device used to display video, images, or text. With a laptop computer, the monitor is built in, and with a desktop computer, the monitor comes as a separate component connected to the

system unit via cable (typically VGA). Most monitors are used only for output, but some, such as touchscreen monitors, can be used for both input and output.

- **Printer**: A printer is an output device that generates a hard copy of work created on a computer. All printers do the same basic thing: they print an image on a page. A printer's quality, cost, speed, and overall ability vary.

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🚩 **HINT**

Some devices can be both input and output devices if they are allowed to get information into the computing system, and also send information back out of the system. For example, a printer that has a scanner is both an input and an output device. A touchscreen is another example. The output is the monitor display, and the input is the touch interactions to click, zoom in, and zoom out.

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📋 **SUMMARY**

Computers are systems with multiple components all designed to work in concert for the purpose of **data manipulation**. In this tutorial, we examined what a **computing system** is, along with its **data processing**, **data storage components**, and its various **input/output** components.

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Source: Derived from Chapters 2 and 3 of "Information Systems for Business and Beyond" by David T. Bourgeois. Some sections removed for brevity.
https://www.saylor.org/site/textbooks/Information%20Systems%20for%20Business%20and%20Beyond/Textbook.html

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📄 **TERMS TO KNOW**

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**Graphics Processing Unit (GPU)**
Generates images on the monitor; also referred to as the video card.

**Hard Disk**
The location for long-term data storage when the computer is turned off, and where data is retrieved when the computer is turned on.

**Input Device**
Any hardware component that sends data into the computer.

**Motherboard**
The main circuit board on the computer to which the CPU, memory, and storage connect.

**Network Interface Card**

Expansion card that provides a computer with the ability to connect to a network.

**Output Device**

Any hardware component that sends data out from the computer.

**Random-Access Memory (RAM)**

The working memory of a computer that transfers data from the hard disk upon starting the device.

**Sound Card**

Expansion card that produces sound through the speakers or headphone.