



# How Computers Work

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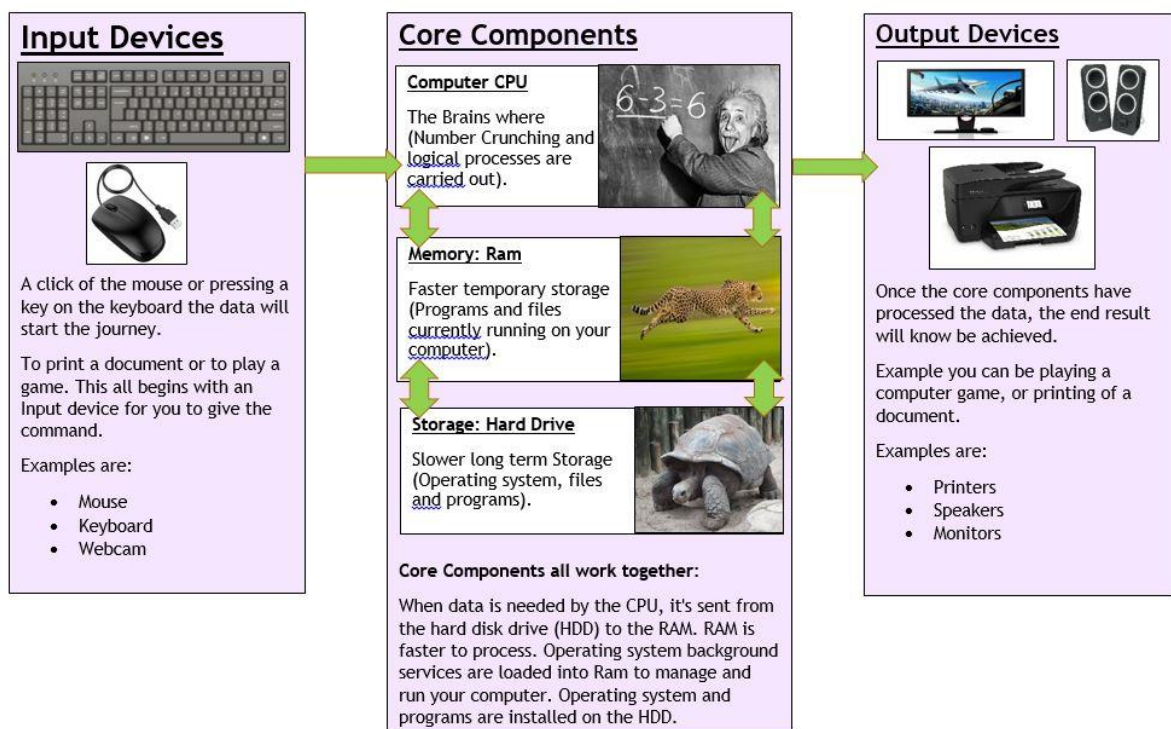
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# 1 Introduction

Computers may seem intimidating at first, but they are really quite simple when it comes to understanding the basics. A computer is an electronic device that manipulates information or data. It has the ability to store, retrieve and process data. You may already know that you can use a computer to type documents, send email, play games and browse the Web. You can also use it to edit or create spreadsheets, presentations and even videos.

Input devices are how you send instructions to your computer. The two most important are the keyboard and the mouse. Webcams, microphones and scanners are also useful input devices you can utilise.

Output devices return feedback from your assigned tasks. These include the monitor, printer and speakers which deliver pictures, text, printouts and sound. We will look at core components later.



## 2 Devices

Devices come in all shapes and sizes but will combine variations of input, output and components.

### 2.1 Desktop computers



Desktop computers offer a lot of computing power and options such as large memory capabilities, large screen sizes and faster processing speeds. Although they are called desktop computers, most desktop computers take the form of box-like CPUs (core component) that sit on the floor and connect to peripheral devices such as the monitor (output device), keyboard, and mouse (input devices) that are located on the desk. The components are separate, so you can choose or upgrade the CPU and peripheral devices.

Desktop computers run off a continuous power source (such as an electrical outlet), which enables uninterrupted use. Desktop computer systems take up more space than other options, and are intended to be set up permanently in a specific place.



### 2.2 Laptops

Laptops offer a lighter, more portable option to the desktop. They are designed to travel with you while still offering impressive computing ability. With a laptop you get your computer, keyboard, mouse and monitor all on one device.

Laptops can run on battery power or plug into electrical outlets for longer use. Many boast nearly the same capabilities as a desktop but are generally more expensive. If you are looking for something that offers full PC power on the go, the laptop is a great choice.



### 2.3 Tablets

Tablets are an extremely popular choice these days. They are handheld devices (smaller than laptops) that incorporate touchscreen capabilities which combines input and output. Many use a stylus, which is a pen-like device you can use to write, draw pictures or click options.

Some tablets, such as the Surface tablet from Microsoft, come with a flat, detachable keyboard that can also be used as a screen protector. Some tablets support the same full-featured programs that you can run on a desktop computer or laptop. Other tablets run apps, which require less computing power than full-featured programs.



### 2.4 Smartphones

Smartphones are tiny computers you can hold in one hand. Smartphones can run apps and connect to the Internet for email, text messaging and web searches. Smartphones are also functional telephones.

You can use smartphones to perform many tablet-like functions, including sending email messages, working with documents and playing music and videos. A cellular data connection is required to access many of the functions of a smartphone.

### 3 Computer Operating Systems



An **operating system** manages and controls the hardware connected to a computer. It helps other programs running on a computer to use the hardware. It helps you organise and manage files and folders on the computer and it provides a user interface so that you can interact with the hardware, the operating system itself and other programs.

Your computer comes with an operating system that allows you to interact with your programs and files by giving commands to complete tasks.

This is done through the user interface of the operating system. Today, operating systems are easier than ever to navigate because of simplified tiles, icons and graphics that access programs and tasks with the click of a mouse or tap of a finger.

Operating systems also provide utilities, for example which add Wi-Fi connections, manage space on a hard drive and automatically back up files, music and pictures.

**Programs** (for example Microsoft Office) communicate with an operating system, which in turn works with your computer's CPU or other hardware to quickly complete tasks.

Your operating system also allows you to secure your private data by setting up user authentication controls. This usually involves creating a username and password that

limits access to only the people you authorise to use your computer. (See 'User Accounts' module).

## 4 Components

Inside your computer is the motherboard. This connects input, output and processing (CPU) (see previous diagram) and tells your computer what to do. Extra components of the motherboard can include a video card, a sound card or a network interface card which allows your computer to communicate with other computers you choose.

### 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.



The **CPU (also called the processor)** processes the commands that you send to your computer. The CPU is the brain of a computer and the speed of the CPU affects the overall performance of the computer. A faster CPU allows a computer to run multiple programs or applications at the same time.

There is only one processor chip. That chip can have one, two, four, six, or eight cores. Each “core” is the part of the chip that does the processing work. Essentially, each core is a central processing unit (CPU).

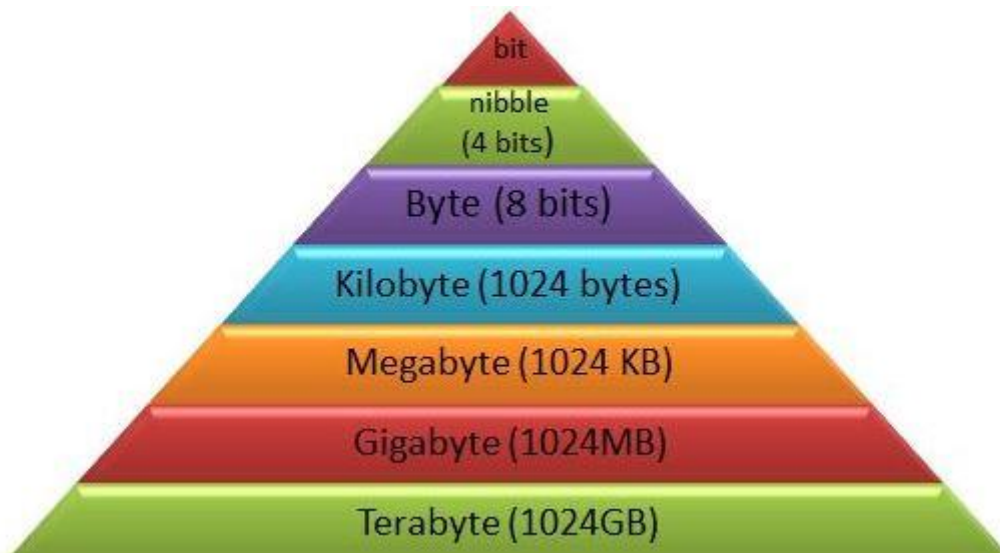
Some processors are dual- or quad-core units. This arrangement means they are set up to work as if they were two or four separate processors. A dual- or quad-core computer can work more efficiently because it can assign one or more cores to each particular task but can leave other cores free for other tasks. This division means the computer can carry out a complicated task such as video editing while still being able to run other applications without delays.



Information is stored in your computer's **memory**. Memory is broken down into two main different types: Random Access Memory (RAM) and Read-only Memory (ROM). Memory is expressed in terms of bits, bytes, mega-bytes, giga-bytes and even tera-bytes.

- A few kilobytes can hold a short email message or a simple text file.
- A megabyte is about the amount of information in a school textbook or a long novel.
- A gigabyte is nearly a billion bytes and denotes massive storage capability. For example, a video or film could use a gigabyte or more.
- Finally, we reach the mighty terabyte (1,024 gigabytes) representing a trillion bytes! A terabyte is so large that it can hold entire volumes of books. The terabyte is mostly used when an organisation or individual needs to store a huge amount of data.





The computer uses the RAM to store information that is being created and used by open programs. If you don't have enough RAM, your computer won't be able to smoothly run large programs like games, spreadsheets or presentations. When the amount of RAM is large enough to hold all of the information in use, the result is faster computer performance.



You use **storage devices**, either internal or external, to store information. Internal storage is built into your computer hardware. You can add storage capabilities with external storage devices such as CD-ROM or DVD-ROM disks, flash drives or with Cloud storage.

**Hard disks** are measured in both storage size and in the speed it can transfer and load files. Movies and other large files can take up a lot of room on a hard drive and require timely file access.

With a fast hard disk that has a large amount of storage capacity your computer won't have any trouble launching large programs or playing video files.

## USB and Cable Ports:



**Ports** allow you to plug in various input and output devices into your computer. The most commonly used are:

- Universal serial bus (USB) port
- Firewire port for fast digital devices (for example external hard drives)
- Network port for Internet connections
- Monitor port
- Power plug port

Exercise!

1. Give examples of input and output devices.
2. Describe some of the functions of the operating system.
3. Describe the function of the CPU.
4. List the various size of RAM.