



Welcome to Introduction to Computing.

## What you will learn

### At the core of the lesson

You will learn how to:

- Express the value of technology
- Define basic computing terms



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After completing this module, you should be able to:

- Express the value of technology
- Define basic computing terms

Our digital world

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## Your last online experience

### What was the last thing you did online?

- Purchase an item from Amazon
- Watch a video
- Chat with a friend
- Play a video game

### What did you use to get online?

- Mobile phone or laptop
- Game console
- Application or app
- Internet



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Think about the last thing that you did online. Perhaps it was to purchase an item from Amazon, or play an online game, or chat with a friend.

How did you do it? Today, you can use many different types of devices to perform these activities, including smartphones, desktop computers, and game consoles. You also use applications, or *apps*, and of course, the internet.

## Technology in our lives

### Technology is part of our daily lives and our digital world

You use technology to:

- Get educated
- Shop online
- Keep track of your finances
- Secure your home
- Communicate with others
- Entertain yourself



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Today, technology enables you to extend your activities beyond physical, geographical, and time limits. You live in a digital world, and technology plays an integral role in your life.

## Building blocks of the digital world

### Applications, computers, and networks enable the digital world



- Applications: Mobile app, web application, game application
- Computers: Mobile phone, tablet, eReader, laptop, desktop, web server, database server
- Network: Internet, wired network, wireless network

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Applications, computers, and networks are at the heart of the technology that enables the digital world. Devices such as smartphones, tablets, and eReaders are essentially computers.

In the next section, you will learn the definition of some of these key computing terms.

Basic computing terminology

## Computer application

### An application is a computer program

- Set of instructions that run on a computer to perform a specific task
- Computer program is written as code in a programming language
- Computer programs are generally called software



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An application is a computer program. It's a set of instructions that run on a computer to perform a specific function.

Programs can be written in many different programming languages, such as Java, Python, and C++.

The term *software* is synonymous with computer programs.

## Types of applications

### Applications run on different types of devices and are accessed in different ways

- Web application: Runs in a **web server** or **application server**, and is accessed from a **web browser**
- Mobile app: Runs in and is accessed from a **mobile device**
- Desktop application: Runs in and is accessed from a **desktop computer**
- Internet of Things (IoT) application: Runs in and is accessed from an appliance or **specialized device that's connected to the internet**

Many different types of applications exist. They can be differentiated based on what type of device they run on and how they are accessed.

The following list contains some examples of different types of applications:

- Web application – Anything that can be accessed through a web browser, such as Mozilla Firefox—for example, amazon.com
- Mobile application – Amazon Shopping Mobile App, your bank's mobile banking app
- Desktop application – Word processors, web browsers, games, video editing software, and programming tools
- Internet of Things (IoT) application – Application on a smartwatch or inside a smart refrigerator, global positioning system (GPS) navigation application in a car

## Components inside a computer

### Hardware

- Motherboard
- Central processing unit (CPU)
- Memory
- Storage drive
- Network card



### Software

- Operating system (OS)
- Application



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A computer contains hardware and software. *Hardware* refers to a computer's physical components, such as its central processing unit (CPU), memory, and storage drive. *Software* is the collection of applications and programs that are installed on the computer. For example, software includes an *operating system* (OS) such as Amazon Linux, and an *application* such as the Amazon Shopping Mobile App.

The main hardware components inside a computer are:

- CPU
- Memory
- Storage drive
- Network card

The main software components are:

- OS
- Applications

You learn more about each of these components in the next slides.

## Motherboard

**Holds all of the core computer hardware components together**

- Printed circuit board (PCB)
- Connects directly or indirectly to:
  - CPU
  - Memory
  - Storage drive
  - Network card
  - Video card
  - Computer ports

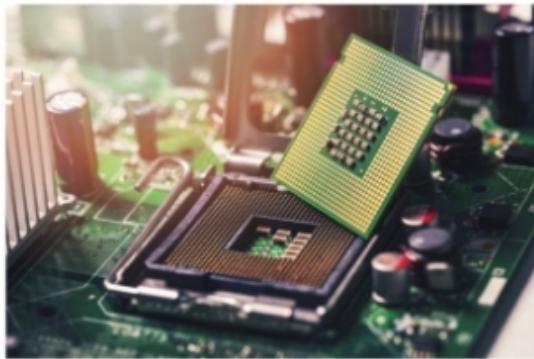


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Also called the *system board*, the motherboard holds together all the computer's hardware pieces: random access memory (RAM), CPU, hard drive, network, and video cards.

## Central processing unit (CPU)

### **The brain of the computer**



- Runs the instructions that it receives from applications and the OS
  - Arithmetic and logical operations
  - Control and input/output (I/O) operations
- Can have multiple **cores**, which increases performance
- Also called the **processor**

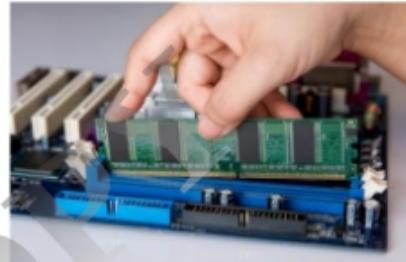
The CPU is the electronic circuitry in a computer that carries out the instructions of a computer program. It performs the basic arithmetic, logical, control, and input/output (I/O) operations that the instructions specify.

A CPU with multiple cores increases performance. For example, a dual-core CPU has two cores, which act as two separate CPUs. This arrangement enables the OS to run two separate applications at the same time, and therefore, speed up the system.

## Memory

### Holds program instructions and data for the CPU to run and use

- CPU retrieves program instructions from memory.
- CPU retrieves and stores program data in memory.
- Memory is **temporary storage**. The data is lost when the computer is turned off.
- Size of memory is measured in **megabytes (MB)** or **gigabytes (GB)**.
  - 1 megabyte (MB) ≈ A million bytes or characters
  - More memory = Faster performance
- Memory is also called **random access memory (RAM)**.



*Memory*, also called *RAM*, is the hardware component that stores the OS, application programs, and data in current use. In this way, the CPU can access these resources quickly.

The basic unit of measurement for memory is *bytes*, where a byte represents the amount of memory needed to store a *character (8 bits)*. Because memory sizes in computers today are large, they are typically measured in units of *megabytes (MB)* or *gigabytes (GB)*. A MB is approximately one million bytes, and a GB is approximately one billion bytes.

More memory enables the OS to load more applications into memory at once, or keep all of an application's data in memory at one time. The result is improved system performance.

## Storage drive

**Stores program files, application data, and user documents**



- Two popular types of drives:
  - Hard disk drive (HDD)
  - Solid state drive (SSD)
- Drive storage is **persistent**. The data is preserved when the computer is turned off.
- Drive performance is measured by its data access speed in **MB per second (MB/s)** or **number of I/O operations per second (IOPS)**

Storage drives are used to store and retrieve digital data, such as documents, programs, application preferences, and more.

*Hard disk drives (HDDs)* are the traditional and most popular type of storage drives. They use a mechanical system of spinning magnetic disks to store data and provide an inexpensive storage solution.

*Solid state drives (SSDs)* are now gaining more popularity. They have no mechanical parts, and they use flash-based memory (integrated circuits) to store data. As a result, they are significantly faster than hard disk drives but more expensive.

The performance characteristics of a storage drive are typically measured in terms of its data access speed in MB per second (MB/s) or I/O operations per second (IOPS).

## Computer network

### Connects multiple devices to share data and resources

- Connected devices can be different types, such as computers, printers, storage drives, and smartphones
- Types of networks –
  - Wired: Devices connect by using an **Ethernet** cable
  - Wireless: Devices connect by using a **Wi-Fi** signal
- The **internet** is the largest and most popular computer network



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An application that runs on a given computer might interact with other applications that run on different computers to access information and complete its function. For example, mobile apps often communicate with other applications that run on a web server to get data. A computer network enables these different computers to connect and communicate with each other.

In a wired network, computers are connected to a *router* by using wires, typically Ethernet cables. In a wireless network, computers connect to a *router* by using the router's Wi-Fi signal. You will learn more about routers later in the course.

## Network interface card

### Connects a computer to a computer network

- Enables a computer to communicate over a network, such as the internet
- Different types of network cards provide **wired** or **wireless** connection options
- Speed of a network card is measured in **gigabits per second (Gbps)**
- Also called a **network adapter**



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A *network interface card*, also called *network adapter*, connects a computer to a computer network. It uses a cable that's connected to a hub or switch.

A wired network card uses an Ethernet cable to connect a computer to the network. A wireless network card uses a Wi-Fi signal instead.

A network card's performance is measured by its transmission speed in gigabits per second (Gbps).

## Operating system

### An OS manages a computer's hardware and software

- Shares and coordinates the use of CPU, memory, storage, and network by applications
- Provides the user interface
  - Command line interface
  - Graphical user interface (optional)
- Examples:
  - Microsoft Windows
  - macOS
  - Amazon Linux 2
  - iOS
  - Google Android



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An OS manages a computer's hardware and software. You also use it to interact with your computer.

Some applications work only on specific operating systems.

## Key takeaways



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- Applications, computers, and networks enable the digital world.
- An application is a computer program. It's a set of instructions that a computer runs to perform a specific task.
- A computer's hardware consists of its physical components, such as its CPU, memory, storage drive, and network card.
- A computer's software consists of the programs that run on it, such as its OS and user applications.

Some key takeaways from this lesson include:

- Applications, computers, and networks enable the digital world.
- An application is a computer program. It's a set of instructions that a computer runs to perform a specific task.
- A computer's hardware consists of its physical components, such as its CPU, memory, storage drive, and network card.
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