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Introduction to Computing

Cloud Foundations

Welcome to Introduction to Computing.

What you will learn

At the core of the lesson

You will learn how to do the following:
- Express the value of technology.
- Define basic computing terms.

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After completing this module, you should be able to do the following:
- Express the value of technology.
- Define basic computing terms.

Your digital world

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, 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 your life

Technology is part of your daily life and your digital world.

You use technology for the following:

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

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Today, you can use technology 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 run the digital world.

- Applications: Mobile app, web application, and game application

- Computers: Mobile phone, tablet, eReader, laptop, desktop, web server, and database server

- Network: Internet, wired network, and wireless network

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Applications, computers, and networks are at the heart of the technology that runs the digital world. Devices such as smartphones, tablets, and e-readers 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.

- An application is a **set of instructions** that runs on a computer to perform a specific task.

- A 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 is a set of instructions that runs 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 is connected to the internet**

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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 and your bank's mobile banking app
- Desktop application – Word processors, web browsers, games, video editing software, and programming tools
- Internet of Things (IoT) application – Applications on a smartwatch or inside a smart refrigerator, and a global positioning system (GPS) navigation application in a car

Components inside a computer

Hardware

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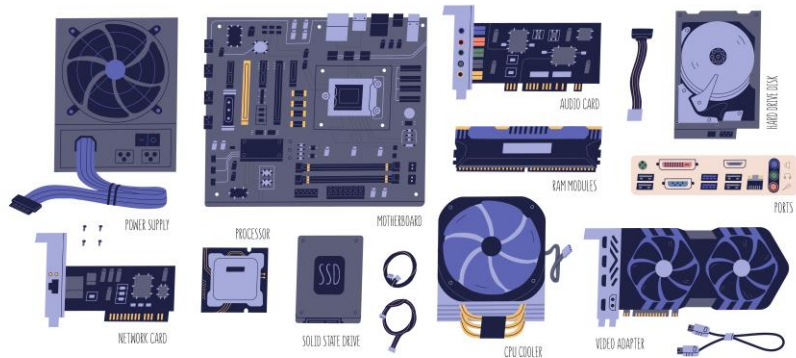
Software

- Operating system (OS)
- Application

Amazon Linux 2

Amazon Shopping
Mobile App

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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 following are the main hardware components inside a computer:
- CPU
- Memory
- Storage drive
- Network card

The following are the main software components:
- OS
- Applications

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

Motherboard

**The motherboard holds all of the core computer hardware components together.**

- Consists of a printed circuit board (PCB)

- Connects directly or indirectly to the following:
  - CPU
  - Memory
  - Storage drive
  - Network card
  - Video card
  - Computer ports

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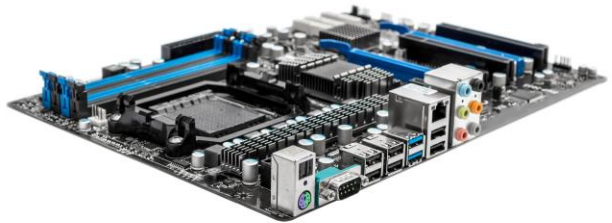
Also called the *system board*, the motherboard holds together all the computer's hardware pieces: random access memory (RAM), CPU, hard drive, network, and video cards.

Central processing unit (CPU)

The CPU is the brain of the computer.
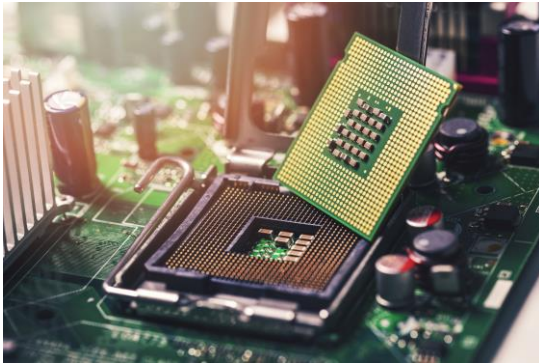
- Runs the instructions that it receives from applications and the OS
  - Arithmetic and logical operations
  - Control and input/output (I/O) operations
- Can have multiple **cores**, which increases performance
- Is also called the **processor**

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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. With this arrangement, the OS can run two separate applications at the same time and, therefore, speed up the system.

Memory

Memory holds program instructions and data for the CPU to run and use.

- The CPU retrieves program instructions from memory.

- The CPU retrieves and stores program data in memory.

- Memory is **temporary storage**. The data is lost when the computer is turned off.

- The 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)**.

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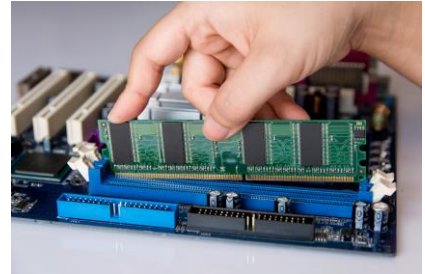
Memory, also called *RAM*, is the hardware component that stores the OS, application programs, and data in current use. By using memory, the CPU can access these resources quickly.

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 1 million bytes, and a GB is approximately 1 billion bytes.

With more memory, the OS can 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

A storage drive stores program files, application data, and user documents.

- The following are 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)**.

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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, but more expensive, than hard disk drives.

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

Computer network

A computer network connects multiple devices to share data and resources.

- Connected devices can be of different types, such as computers, printers, storage drives, and smartphones.

- The following are 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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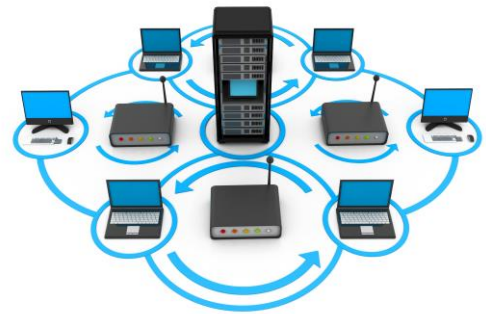
An application that runs on a given computer might interact with other applications that run on different computers to access information and complete its function. For example, mobile apps often communicate with other applications that run on a web server to get data. These different computers can use a computer network to connect and communicate with each other.

In a wired network, computers use wires, typically Ethernet cables, to connect to a *router*. 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

A network interface card connects a computer to a computer network.

- A computer uses it to communicate over a network, such as the internet.

- Different types of network cards provide **wired** or **wireless** connection options.

- The speed of a network card is measured in **gigabits per second (Gbps)**.

- It is also called a **network adapter**.

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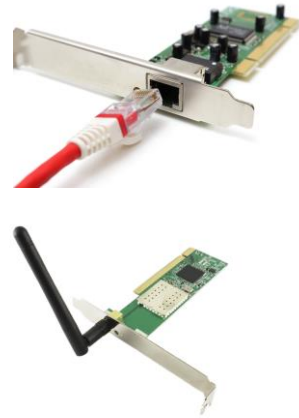
A *network interface card*, also called a *network adapter*, connects a computer to a computer network. It uses a cable that is connected to a hub or switch.

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.

- An OS shares and coordinates the use of CPU, memory, storage, and network by applications.

- An OS provides the user interface:
    - Command line interface
    - Graphical user interface (optional)

- The following are examples:
    - Microsoft Windows
    - macOS
    - Amazon Linux 2
    - iOS
    - Google Android

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Amazon Linux 2

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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

- Applications, computers, and networks run the digital world.

- An application is a computer program. It is 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.

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This module includes the following key takeaways:
- Applications, computers, and networks run the digital world.
- An application is a computer program. It is 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.

Thank you