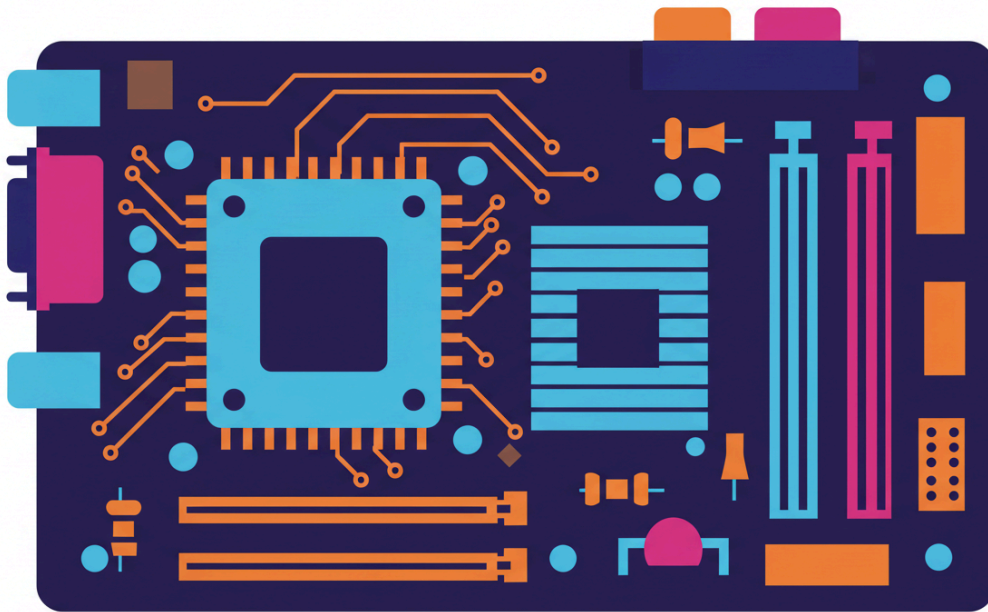


Computer Parts

Textbook

Computer Parts



A computer is a complicated machine made up of many connected parts, each with its own specific job.¹ Knowing about these parts helps us understand how computers work

Central Processing Unit (CPU)

The CPU acts like the "brain" of the computer.² It's responsible for carrying out instructions and processing information. Companies like Intel and AMD make CPUs, and these CPUs can be different in how they're built, how fast they are, and how many "cores" they have.³ Modern CPUs often use multi-core processing, which means they have several independent parts that can process information at the same time.⁴ They might also use hyper-threading, which allows one core to handle two tasks at once, making multitasking better.⁵ The type of socket on the motherboard determines which CPUs will work with it.⁶

Memory (RAM)

RAM is like the computer's temporary workspace.⁷ It holds data that the CPU needs to access quickly.⁸ RAM is "volatile," meaning it loses its information when the computer is turned off.⁹ The speed of RAM (measured in MHz or MT/s) tells you how fast data can move between the RAM and the CPU, and this affects how quickly the computer responds.¹⁰ Having more RAM (for example, 16GB or 32GB) means you can have more programs and data open at the same time, which reduces the need to constantly access slower storage devices.¹¹ RAM temporarily stores instructions for programs, information for the operating system, user data, and temporary files.¹²

Storage Devices

Storage devices, like hard disk drives (HDDs) and solid-state drives (SSDs), keep your data and programs safe for a long time, even when the computer is off.¹³ They work with the CPU and RAM to load and save files.

Motherboard

The motherboard is the main circuit board inside a computer.¹⁴ It connects all the other parts, such as the CPU, RAM, storage, and other expansion cards.¹⁵ It uses pathways called "buses" to allow data to flow between all these components.¹⁶

Graphics Processing Unit (GPU)

The GPU is a special circuit designed to quickly create images, frames, and videos.¹⁷ It's built to handle many tasks at once, which is really important for things like playing video games and using visual applications.

Power Supply Unit (PSU)

The PSU takes the AC electricity from your wall outlet and changes it into the DC electricity that the computer's parts need.¹⁸ It's very important to have a PSU with enough wattage (power) to avoid problems or damage. The PSU must be able to meet the total power needs of all the components.¹⁹ PSUs come in different types: non-modular, semi-modular, and fully modular, which offer different levels of flexibility for managing cables.²⁰ Different connectors are used to power specific parts, like the 20+4 Pin ATX for the motherboard or the 6+2 Pin PCIe for the GPU.

The Relationship Between Drivers, Hardware, and Operating Systems

Hardware refers to the physical parts of a computer, and the Operating System (OS) is the software that manages all the computer's resources.²¹ For the hardware and the OS to work together, they need drivers.²² Drivers are special software programs that translate what the OS wants into instructions that a specific piece of hardware can understand.²³ This allows everything to work smoothly.

Input and Output (I/O)

Input/Output (I/O) describes how data moves in and out of the computer.²⁴

Input devices send data into the computer for processing.²⁵ Examples include:

- **Keyboard:** For typing text.
- **Mouse:** For controlling movement.
- **Microphone:** For recording audio.
- **Webcam:** For capturing video.
- **Scanner:** For turning physical documents into digital images.
- **Touchscreen:** For receiving commands through touch.

Output devices display or send data out from the computer after it's been processed. Examples include:

- **Monitor:** For showing visuals.
- **Speakers:** For playing audio.
- **Printer:** For creating physical copies.

- **Projector:** For displaying images on a large surface.
- **Haptic feedback:** For providing tactile sensations (like vibrations).

Protecting Computer Hardware

To protect computer hardware from being misused or attacked, you need to use both physical and digital security measures. These measures help keep your data safe and ensure the computer system works correctly.

Physical Security: This involves controlling who can physically access your devices through methods like:

- Managing who can enter restricted areas.³¹
- Using lock screens to prevent unauthorized access.³²
- Disabling unused USB ports to stop unwanted devices from connecting.³³
- Using special seals that show if someone has tried to tamper with the device, and secure cases.
- Implementing secure boot features and checking the supply chain to make sure no one has tampered with parts before they reach you.

Digital Security (Cybersecurity Software and Practices): These are essential digital defenses:

- **Antivirus/Anti-malware:** Software that protects against harmful programs and should be updated regularly.³⁴
- **Firewalls:** Programs that control network traffic and block unauthorized attempts to access your computer.³⁵
- **Intrusion Detection/Prevention Systems (IDS/IPS):** Systems that watch for and stop suspicious activities.
- **Regular Updates:** Applying patches to fix security weaknesses in the operating system, applications, and firmware.³⁶
- **Strong Passwords & MFA:** Using complex passwords and multi-factor authentication (requiring more than one way to prove your identity).
- **Data Encryption:** Making data unreadable to unauthorized users, both when it's stored and when it's being sent.³⁷
- **Network Security:** Protecting Wi-Fi and other network connections.³⁸
- **Least Privilege:** Giving users and processes only the necessary access rights they need to do their job, no more.³⁹
- **Regular Audits & Training:** Continuously checking for weaknesses and teaching users about security.
- **Data Backups:** Making copies of your data, which are vital for getting your information back if it's lost or attacked.⁴⁰

By combining these physical and digital methods, the chances of your hardware being exploited are significantly lowered, keeping your data and system safe.

BIOS

When you turn on a computer, the **Basic Input/Output System (BIOS)** or its modern replacement, **Unified Extensible Firmware Interface (UEFI)**, is the first software to run. These systems test the hardware and then load the operating system. Both BIOS and UEFI are found on the **motherboard**, the main circuit board connecting all components.

Motherboard Variations

Motherboards vary greatly, mainly by **size** (like ATX, Micro-ATX, Mini-ITX), which affects the number of **expansion slots** (for graphics cards, etc.) and **input/output (I/O) ports** available. The **CPU socket type** is another key difference, as it must match the specific processor. These variations allow motherboards to fit different computer builds and needs.

Critical Thinking Questions

1. Imagine you just built a new computer, and when you start it up, the screen looks fuzzy, and games run very slowly. What's the first thing you would check with your new graphics card, and why?
2. Why is it important for a computer to have both RAM (which holds temporary information) and a hard drive (which stores information long-term)? What might happen if a computer has a lot of hard drive space but very little RAM?
3. How do the design choices for smartphone components, like the CPU and memory, differ from those in a desktop computer? Think about how factors like size, battery life, and overall performance play a role in these differences.

Questions (5)

1. A user's computer frequently freezes or crashes when they try to run multiple applications simultaneously, even though they have a fast CPU and a large hard drive. Based on the passage, what component is most likely insufficient for their needs?

MULTIPLE CHOICE

Choose the correct answer:

- A. Graphics Processing Unit (GPU)
- B. Power Supply Unit (PSU)
- C. Random Access Memory (RAM)
- D. Motherboard

2. Why does a computer need both RAM (short-term, volatile) and a hard drive (long-term, non-volatile)?

MULTIPLE CHOICE

Choose the correct answer:

- A. RAM stores data for quick CPU access during active use, while a hard drive provides permanent storage for files and programs.
- B. RAM runs the operating system, and the hard drive runs applications.
- C. RAM is for input devices, and the hard drive is for output devices.
- D. They both perform the same function but for different types of data.

3. A company wants to physically secure their sensitive computer hardware in a data center. Which measure would not be considered a physical security safeguard according to the passage?

MULTIPLE CHOICE

Choose the correct answer:

- A. Implementing locks on individual computers.
- B. Managing access to restricted areas.
- C. Using antivirus software on the servers.
- D. Employing tamper-evident seals on enclosures.

4. A user wants to play very demanding video games and work with high-resolution video editing software. Which component should they prioritize for its ability to rapidly create images, frames, and videos, optimized for parallel processing?

MULTIPLE CHOICE

Choose the correct answer:

- A. Central Processing Unit (CPU)
- B. Random Access Memory (RAM)
- C. Graphics Processing Unit (GPU)
- D. Power Supply Unit (PSU)

5. A user types an essay on their keyboard. This action represents which type of data exchange with the computer?

MULTIPLE CHOICE

Choose the correct answer:

- A. Output
- B. Processing
- C. Storage
- D. Input

Answer Keys & Solutions

Questions

1. A user's computer frequently freezes or crashes when they try to run multiple applications simultaneously, even though they have a fast CPU and a large hard drive. Based on the passage, what component is most likely insufficient for their needs?

MULTIPLE CHOICE

Correct Answer:

- A. Graphics Processing Unit (GPU) ✗ Incorrect
- B. Power Supply Unit (PSU) ✗ Incorrect
- C. Random Access Memory (RAM) ✓ Correct
- D. Motherboard ✗ Incorrect

Explanation:

Think about the component responsible for temporary storage of active programs and data.

2. Why does a computer need both RAM (short-term, volatile) and a hard drive (long-term, non-volatile)?

MULTIPLE CHOICE

Correct Answer:

- A. RAM stores data for quick CPU access during active use, while a hard drive provides permanent storage for files and programs. ✓ Correct
- B. RAM runs the operating system, and the hard drive runs applications. ✗ Incorrect
- C. RAM is for input devices, and the hard drive is for output devices. ✗ Incorrect
- D. They both perform the same function but for different types of data. ✗ Incorrect

Explanation:

Consider the distinct purposes of temporary, fast memory versus permanent, slower storage.

3. A company wants to physically secure their sensitive computer hardware in a data center. Which measure would not be considered a physical security safeguard according to the passage?

MULTIPLE CHOICE

Correct Answer:

- A. Implementing locks on individual computers. ✗ Incorrect
- B. Managing access to restricted areas. ✗ Incorrect
- C. Using antivirus software on the servers. ✓ Correct
- D. Employing tamper-evident seals on enclosures. ✗ Incorrect

Explanation:

Distinguish between physical controls and software-based cybersecurity.

4. A user wants to play very demanding video games and work with high-resolution video editing software. Which component should they prioritize for its ability to rapidly create images, frames, and videos, optimized for parallel processing?

MULTIPLE CHOICE

Correct Answer:

- A. Central Processing Unit (CPU) ✗ Incorrect
- B. Random Access Memory (RAM) ✗ Incorrect
- C. Graphics Processing Unit (GPU) ✓ Correct
- D. Power Supply Unit (PSU) ✗ Incorrect

Explanation:

Think about the component specifically designed for visual tasks and parallel processing.

5. A user types an essay on their keyboard. This action represents which type of data exchange with the computer?

MULTIPLE CHOICE

Correct Answer:

A. Output

✗ Incorrect

B. Processing

✗ Incorrect

C. Storage

✗ Incorrect

D. Input

✓ Correct

Explanation:

Consider whether data is being sent into or out of the computer.