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How Does a Computer Execute Code?

How does your computer know how to run programs? Learn how it decodes the code from an app into an action? Here's how it works.

JOHN LANE PUBLISHED JUL 1ST

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performing mathematical operations on the input data.

4. **Output:** Output is the final result of data processing. It can be anything from images, video, or audio content, even the words you type using a keyboard. You can also receive the output through a printer or a projector instead of directly through your device.

The Hardware Components of a Computer

hardware components of a computer

The more simple the task a computer has to perform, the easier it is to build. That's why older computers are simplistic compared to their modern counterparts, with limited capabilities.

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The hardware components are everything you can physically touch and see in a computer, including all the input and output devices from keyboards, mics, and mice to screens and speakers.

Hardware is also the physical processing parts like storage, CPU, graphics card, sound card, RAM, and motherboard, all of which play an important role in contemporary computers.

Motherboard

The motherboard is the primary communication hub between the computer's hardware components. It's the main circuit where everything needs to physically connect—except for ones relying on Bluetooth or Wi-Fi. Without a motherboard, it's impossible to have a functioning modern computer.

CPU

If the motherboard is the communications hub, then the CPU is the communications director. It receives and interprets the input and instructions and sends out signals to other components of exactly what to do with the data for the desired output. The more cores a CPU has, the more operations it can perform at the same time.

RAM

The RAM is the CPU's main assistant. Instead of having to fish for data in a considerably large storage unit, RAM stores the data used by the operating system, any running software, and incoming input. The bigger the capacity of the RAM, the more heavy-weight software it can run without slowing down the device.

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HDD/SSD

HDD stands for Hard Disk Drive. It's the component that permanently stores your media and apps, including the operating system (OS). They vary in size and performance from a few hundred gigabytes (GB) to several terabytes (TB).

You may also encounter Solid State Drives (SSDs), which are another type of storage hardware. SSDs and HDDs are useful for different things, and many users combine drives to maximize performance.

Graphics Processing Unit

The Graphics Processing Unit (GPU) is dedicated to processing visual imagery on your computer. Powerful GPUs are essential to rendering high-quality images and graphics or playing video games. Graphics processing can either be its own components or be integrated with the CPU.

Sound Card

Sound cards are responsible for processing auditory data and sending it to your speakers. Similarly, the sound card can either be its separate piece or integrated with the CPU.

The Software Components of a Computer

Windows 10 laptop on a wooden table

Modern computers use a combination of hardware and software components that work together to process complex inputs and outputs.

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Software is a pre-written collection of instructions that tells your computer what to do. It's a digital program, not a physical component that can be seen when opening the cover of a computer or laptop.

And, like your computer hardware, different types of software perform different roles in the functioning of your computer.

Firmware

Firmware is where the line between hardware and software gets blurry. It's software that's physically etched into a piece of hardware.

Firmware is the first thing that kickstarts your computer when you switch it on, a simple program that instructs your computer to launch the OS. Without it, your computer won't launch your operating system or other components, and you'll be stuck with hardware that you can't communicate with.

Operating System (OS)

An operating system is a piece of software that manages your computer's hardware and software resources. Similarly, without an OS, you can't communicate with your computer even using your input devices.

The Future of Computers

Computers that follow the sequential processing model will only get cheaper, smaller, faster, and more efficient. However, conventional computer design and architecture are reaching their limit. Instead, you can expect a rise in modern computing architecture that isn't reliant on technology first designed over 50 years ago, from the prospect of Neuromorphic computers to more accessible Quantum computers.

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