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Computing and IT

The focus of this article is computer hardware, mainly processors or processing units in computer science and computers. These electrical components, which often function as microprocessors on computer chips, operate on external data sources, usually memory or data streams. The term can also apply to different processors, such as graphics processing units, even though it is frequently used to refer to the central processing unit. Graphene, carbon nanotubes, and quantum computers that use quantum superposition for advanced computing have all been investigated as alternatives to silicon-based traditional CPUs. Gordon Moore's law, which states that integrated circuit transistor counts will double every two years, is the foundation for processor development.

There are many different processor types that can be used for various tasks, including central processing units for general computing, graphics processing units for graphics and machine learning, AI accelerators like vision processing units and tensor processing units, sound chips, digital signal processors, deep learning processors, physics processing units, and more. In addition, processors now come in a variety of circuit technologies, such as quantum processors and photonic processors that compute with light.

A crucial component of a computer, the central processing unit carries out input/output, logic, control, and mathematical tasks as directed by computer programs. Other parts like main memory and specialist coprocessors like graphics processing units are not necessary for it to function. Microprocessor chips may contain memory and external interfaces on a single integrated circuit chip, some of which have many cores. Alternative methods of computing that emphasize parallel and resource separation, for example, are array processors and virtual CPUs.

Early computers like the ENIAC computer had the ability to be rewired to carry out different tasks, earning them the title of "fixed-program computers." Since 1955, a computer's "central processing unit” has been referred to as a machine that runs software. John von Neumann's 1945 work introduced the idea of a stored-program computer, which eventually led to the development of the EDVAC in 1949. EDVAC was easier to change than older computers because it stored programming in high-speed memory rather than depending on physical wiring. Custom-built for particular purposes were widespread at first, but as integrated circuit technology advanced, they made way for standard, mass-produced multipurpose processors. Due to standards and small size, these CPUs are now widely used in modern society, appearing in everything from automobiles to cell phones.

Since the invention, microprocessors have replaced other types of CPUs as the most common. The first available-for-sale processor was the Intel 4004 in 1971, and the Intel 8080, introduced in 1974, saw widespread adoption. In response to the rise of personal computers, makers of mainframe and minicomputers created instruction set compatible microprocessors that worked with their older hardware and software. Today, processors and CPUs are almost interchangeable terms. Due to their lower size, processors which are CPUs made on a single integrated circuit offer faster switching times. Moore's law has fueled this miniaturization, resulting in increasingly complex CPUs with higher transistor counts and clock rates. The basic von Neumann stored-program architecture has not changed much, but the fact that CPU complexity and design have greatly changed.