Luiza Yeghiazaryan Essay - Computer Architecture

Today's powerful and modern computers rely on carefully engineered systems, and the study of how their components are organized and work together is called computer architecture. It includes both the physical hardware - like the CPU, memory, input/output devices, and the rules that control how these parts interact.

The computer has its own "brain" - the Central Processing Unit (CPU), which is responsible for executing instructions and making decisions. The CPU consists of two key parts: the control unit, which directs the flow of data and the ALU (Arithmetic Logic Unit) which performs calculations and logical operations. The CPU also has tiny, fast storage inside itself, called registers, which store information it needs immediately. This helps the CPU access data much faster than getting it from RAM. Besides RAM, there are other types of computer memory, such as cache and storage. Cache is fast and small for temporary, immediate access, while storage is large but slower. Together, these memory types allow the CPU to work efficiently. Without memory, a CPU would have no place to get instructions or store temporary data and the computer wouldn't function. Just like we forget things we don't use often, the CPU relies on these memory types to decide what to keep handy and what to store away.

To perform any task, the CPU follows a repeated process called the 'fetch-decode execute cycle' - it fetches an instruction from memory, decodes what needs to be done, and then executes it. This cycle happens billions of times per second, allowing the CPU to work and respond quickly to programs.

A computer cannot interact with the world on its own. That's where input devices (keyboards, mice, microphones, cameras) and output ones (monitors, speakers, printers) come in. Input devices allow people to send information to the computer, while output devices allow the computer to respond and share results.

Computer Architecture connects a computer's 'brain', memory and senses into a working system. A good design ensures that the CPU, memory and Input/output devices work together smoothly, so programs run quickly and without any problems. Some programs only work on certain systems because of the way the hardware is built.
Understanding architecture helps engineers create devices that are powerful, reliable and energy-efficient.
The better the architecture, the better the computer can perform its tasks.