

Computer Hardware: How a Computer Program Works



ICS3U: Introduction to
Computer Science

What Is Computer Science?

Computers and Programs



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This allowed computers to become general-purpose problem solving machines.

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Typically, a program involves some input and processes some output, but this may not always be true.

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Some programming languages, like C/C++, are compiled. Others, like Java or Python, are interpreted.

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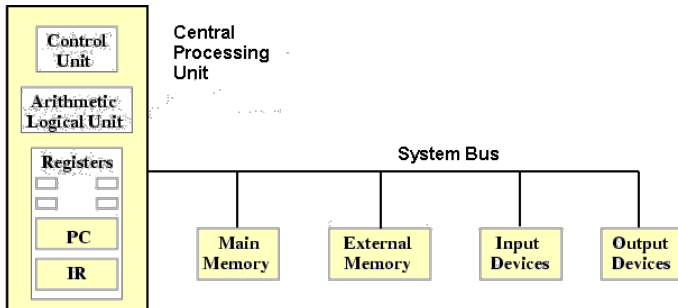


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Von Neumann's architecture describes a computer with four main sections: the *Arithmetic and Logic Unit (ALU)*, the *control circuitry*, the *memory*, and the *input and output (I/O) devices*. These parts are interconnected by wires (referred to as the *bus*).

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- Coordinates control signals between CPU and input/output devices.
- Tells the computer system *how* to execute a program.

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- *General-purpose register* – miscellaneous functions.

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Cache memory is expensive, so most computers have a small cache.

Power-On Self-Test (POST)



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Once all tests have passed, the computer moves on to another chip.

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BIOS is typically stored on a programmable chip on the motherboard, but older systems may have non-programmable chips that use ROM (Read-Only Memory).

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Main memory consists of a series of locations, each of which is associated with a numerical address by which it can be accessed.

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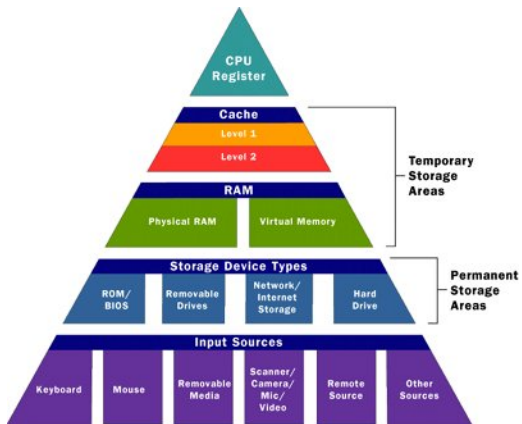
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To remedy this, a computer uses *paging* – a system whereby blocks of a program are transferred into main memory. All blocks are the same size, and are referred to as *pages*.

Memory Hierarchy



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If any input or output are required, data to and from peripheral devices also travels along the bus.

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