

The Booting Process

Booting (also known as booting up) is the initial set of operations that a computer system performs when electrical power is switched on. The process begins when a computer that has been turned off is re-energized, and ends when the computer is ready to perform its normal operations. On modern general purpose computers, this can take tens of seconds and typically involves performing power-on self-test, locating and initializing peripheral devices, and then finding, loading and starting an operating system. Many computer systems also allow these operations to be initiated by a software command without cycling power, in what is known as a soft reboot, though some of the initial operations might be skipped on a soft reboot. A boot loader is a computer program that loads the main operating system or runtime environment for the computer after completion of self-tests.

The computer term boot is short for bootstrap or bootstrap load and derives from the phrase to pull oneself up by one's bootstraps. The usage calls attention to the paradox that a computer cannot run without first loading software but some software must run before any software can be loaded. Early computers used a variety of ad-hoc methods to get a fragment of software into memory to solve this problem. The invention of integrated circuit Read-only memory (ROM) of various types solved the paradox by allowing computers to be shipped with a start up program that could not be erased, but growth in the size of ROM has allowed ever more elaborate start up procedures to be implemented.

There are numerous examples of single and multi-stage boot sequences that begin with the execution of boot program(s) stored in boot ROMs. During the booting process, the binary code of an operating system or runtime environment may be loaded from nonvolatile secondary storage (such as a hard disk drive) into volatile, or random-access memory (RAM) and then executed. Some simpler embedded systems do not require a noticeable boot sequence to begin functioning and may simply run operational programs stored in read-only memory (ROM) when turned on.