**What is the boot process of a computer and what is a BIOS?**

Booting is basically the process of starting the computer. When the CPU is first switched on it has nothing inside the Memory. In order to start the Computer, load the Operating System into the Main Memory and then Computer is ready to take commands from the User.

Booting can be done either through hardware (pressing the start button) or by giving [software](https://www.toppr.com/guides/computer-aptitude-and-knowledge/basics-of-computers/hardware-and-software/) commands. Therefore, a boot device is a device that loads the operating system. Moreover, it contains the instructions and files which start the computer. Examples are the hard drive, floppy disk drive, CD drive, etc. Among them, the hard drive is the most used one.

**Types of booting**

***Cold booting***

When the computer is started from its initial state by pressing the power button it is called cold boot. The instructions are read from the ROM and the operating system is loaded in the main memory.

***Warm booting***

The computer does not start from the initial state. When the system gets stuck sometimes it is required to restart it while it is ON. Therefore, in this condition the warm boot takes place. Restart button or CTRL+ALT+DELETE keys are used for warm boot.

**How operating system works? List down 5 tasks of an OS.**

An operating system is a program on which application programs are executed and acts as a communication bridge (interface) between the user and the computer hardware.

The main task an operating system carries out is the allocation of resources and services, such as the allocation of memory, devices, processors, and information. The operating system also includes programs to manage these resources, such as a traffic controller, a scheduler, memory management module, I/O programs, and a file system.

***Important functions of an operating System:***

* **Security**
* **Control over system performance**
* **Job accounting**
* **Error detecting aids**
* **Coordination between other software and users**
* **Memory Management**
* **Processor management**
* **Device Management**
* **File Management.**

***Tasks of operating system***

***Memory Management***

Keeps tracks of primary memory, i.e., what part of it are in use by whom, what part are not in use.

In multiprogramming, the OS decides which process will get memory when and how much.

Allocates the memory when a process requests it to do so.

De-allocates the memory when a process no longer needs it or has been terminated.

***Processor Management***

Keeps tracks of processor and status of process. The program responsible for this task is known as traffic controller.

Allocates the processor (CPU) to process.

De-allocates processor when a process is no longer required.

***Device Management***

Keeps track of all devices. Program responsible for this task is known as the I/O controller.

Decides which process gets the device when and for how much time.

Allocates the device in the efficient way.

De-allocates devices.

***File Management***

* Keeps track of information, location, uses, status etc. The collective facilities are often known as file system.
* Decides who gets the resources.
* Allocates the resources.
* De-allocates the resources.
* Security-By means of password and similar other techniques, it prevents unauthorized access to programs and data.
* Control over system performance − Recording delays between request for a service and response from the system.
* Job accounting − Keeping track of time and resources used by various jobs and users.
* Error detecting aids − Production of dumps, traces, error messages, and other debugging and error detecting aids.
* Coordination between other softwares and users − Coordination and assignment of compilers, interpreters, assemblers and other software to the various users of the computer systems.

**What is single board computers (SBC)? List down 5 examples?**

An SBC is a computer that only has one main circuit board. All the other components are either built into the board or connected to it via cables. This makes for a much more compact and efficient design than a standard computer, which has multiple boards and components that can be spread out across a large case.

A Single Board Computer (SBC) is a complete computer built on a single circuit board. Like a standard Desktop or Laptop computer, [Single Board Computers](https://thesecmaster.com/what-are-single-board-computers-sbcs-and-why-you-should-buy-single-board-computers/)also have peripherals, including Ethernet, USB, serial ports, and audio/video outputs, but everything is embedded on a single board. Some Single Board Computers also have expansion slots which allow for the addition of additional I/O or storage devices.

***Example:***

***Raspberry Pi:***The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the [Raspberry Pi](https://www.thesecmaster.com/how-set-up-a-raspberry-pi-for-the-first-time/) Foundation to promote the teaching of basic computer science in schools and developing countries.

1. ***Odroid :***  [Odroid](https://www.hardkernel.com/)is a range of single-board computers and tablet computers created by Hardkernel Co., Ltd., an open-source hardware company located in South Korea.
2. ***Pine64:*** The [Pine64](https://www.pine64.org/) Single Board Computer (SBC) is a low-cost ARM 64-bit platform that can run a variety of operating systems, including Linux, Android, and BSD.
3. ***Banana Pi:***  [Banana Pi](https://www.banana-pi.org/) is a line of low-cost credit card-sized single-board computers produced by the Chinese company Shenzhen SINOVOIP Co. Ltd.
4. ***Cubieboard***:  The [CubieBoard](http://cubieboard.org/" \t "_blank) is a small (10x6cm), open-source development board based on Allwinner A20 dual-core processor with 1 GB RAM. It supports various Linux distributions such as Lubuntu, [Ubuntu](https://www.thesecmaster.com/introduction-to-ubuntu/), Debian, and Android.

**What is Real time operating system?**

**A real-time operating system (RTOS)** is a special-purpose operating system used in computers that has strict time constraints for any job to be performed. It is employed mostly in those systems in which the results of the computations are used to influence a process while it is executing. Whenever an event external to the computer occurs, it is communicated to the computer with the help of some sensor used to monitor the event. The sensor produces the signal that is interpreted by the operating system as an interrupt. On receiving an interrupt, the operating system invokes a specific process or a set of processes to serve the interrupt.