

# Firmware

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**Firmware** is a type of software that is etched directly into a piece of hardware. It operates without going through APIs, the operating system, or device drivers—providing the needed instructions and guidance for the device to communicate with other devices or perform a set of basic tasks and functions as intended.

Without **Firmware**, the most basic of devices would not function. That is why it is often stored on a Read-Only Memory (ROM) chip, ensuring it does not get erased by accident, all while remaining as close as possible to the metal of the device.

**Firmware** comes in various complexities and can be found in simple devices, like keyboards and hard drives, to more complex ones, like graphics cards and Basic Input/Output System (BIOS).

In Android operating systems, the **Firmware** is different depending on the manufacture, that is, it is the operating software is device-specific.

When a device is powered on, **Firmware** is the first part to run and starts sending instructions to the device's processor to execute. If the device is as simple as a keyboard, the **Firmware** does not stop working as there is no software to replace it. However, in more complex devices, such as PCs, laptops, and tablets, there are often multiple **Firmware** sets that interact to achieve a common goal; load the operating system.

Regardless of the type of device, **Firmware** can only work with a basic or low level, binary language known as machine language. While the **Firmware's** code could be written in a high level language for ease and versatility, it needs to be translated into a low level language before getting etched into the device.

The same **Firmware** cannot run on processors it was not designed for, as different processors can only identify certain instructions. If a device's firmware were to get corrupted—during an update, for example—it cannot be fixed, as there is no way to communicate with the machine to install a replacement.

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Last update: **2022/02/03 06:21**

