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Video 1 BIOS- Basic Input/Output System

The BIOS- Basic Input/Output System is software used to start your computer (even without an operating system)

-also known as the system bios, rom bios, or the firmware, rom, or flash memory

What it does, is it initializes your system, it makes sure you have all the hardware components needed to continue with loading an operating system

It makes sure you have a CPU installed and that it is operating properly, it checks the memory to make sure you have memory installed on the mother board and it does a basic check of the hardware

We call this check a power on self-test or a post and if any of these hardware checks fail it will notify us theirs a problem with the CPU or memory and prompts u to fix the problem

Once it finishes it goes to your storage devices and looks for a bootloader that it can use to hand off to the operating system to allow your operating system to load up properly

When starting up a computer there are 1 of 2 different kinds of bios that can be run

1. Legacy BIOS

* The original / traditional BIOS has been around for more than 25 years allows you to configure different settings inside of the hardware from the front end
* Older operating systems talked to hardware through the BIOS instead of accessing hardware directly, although these days the operating system use device drivers to communicate with the hardware
* Limited hardware Legacy BIOS will understand, it won’t know a network card is connected to your system for example supports no drivers for modern network video and storage devices, can’t browse the internet or download files because there is no way to do it inside a Legacy BIOS

1. Unified Extensible Firmware Interface UEFI BIOS (modern kind of BIOS)

* Based on Intel’s EFI (extensible Firmware Interface
* Manufacturers will take this standard and create a basic input / output system, front end specific to their hardware what they do is following the standard that is being used across all manufacturer systems. (a defined standard implemented by the manufacturers)
* This is intended to replace the Legacy BIOS completely So that the UEFI BIOS is used from now on for all modern systems

UEFI Advantages

* Booting from larger storage systems (>2.2TB) with very large hard drives and very large storage systems having a BIOS to be able to support these large GUID partition table also known as GPT disks is extremely important, the BIOS can also support the Legacy FAT formats and removable media capabilities that weren’t available to Legacy BIOS

What is GUID Partition Table (GPT) (researched google)

The GUID Partition Table (GPT) is a modern standard for the layout of partition tables on a physical hard drive, acting as a map to organize and manage data on storage devices. It replaces the older Master Boot Record (MBR) scheme, offering several advantages, particularly for large storage devices. GPT was introduced as part of the Extensible Firmware Interface (EFI) initiative, now managed by the Unified EFI Forum as the Unified Extensible Firmware Interface (UEFI) specification

What is Legacy File allocation Table Formats (researched google)

The FAT (File Allocation Table) file system, developed for personal computers, has evolved through several versions as storage capabilities increased.

The primary legacy FAT formats include:

* FAT12: The earliest version, designed for floppy disks and smaller storage devices. It utilized 12-bit entries in the file allocation table.
* FAT16: An upgrade to FAT12, supporting larger volumes and files with 16-bit entries.
* FAT32: The most common version, supporting even larger drives and files with 32-bit entries (28 bits are actually used).

While FAT has been succeeded by NTFS as the default file system on Microsoft operating systems beginning with Windows XP, FAT remains widely used for removable storage devices like SD cards, USB drives, and [Memory Sticks](https://www.ituonline.com/tech-definitions/what-is-fat-filesystem/) due to its compatibility and ease of implementation

The UEFI also includes a pre-boot environment this is something we can use when troubleshooting the computer even before the operating system is even loaded if were having problems with the operating system we can use this pre-boot environment to go to a command line to transfer files to a storage device, or even bring up a browser and browse the internet to be able to communicate over the network. Has some remote diagnostics so someone can start their UEFI BIOS and connect to it remotely to see what’s going on inside of the computer without any additional software or operating system

* This isn’t an operating system
* Has its own shell, drivers, and applications
* Browse the internet, back up and storage drive
* Remote diagnostics, even without an OS

Nonvolatile BIOS memory

* When your making all of these configuration settings in your BIOS their needs to be a place where you can store all these configuration settings we traditionally did this by storing it in Nonvolatile BIOS memory this takes all your settings and keeps them inside of your computer
* This used to be saved to a type of memory called complementary metal-oxide semiconductor (CMOS)
* A disadvantage of CMOS is that you have to have some type of power source to always keep your configuration settings active inside the memory if you lost the power you lost the settings
* Now we use flash memory to store this information because it doesn’t need a constant power source and is much more flexible and reliable when storing our BIOS configurations

The “CMOS” battery

* If your working with an older mother board you will see a CMOS battery this was used so even if the power of your device turned off it kept your BIOS settings active as long as the battery was still working
* even on newer motherboards you will see the battery somewhere used to maintain the date and time so its not needed to reset when you turn on your computer
* if the battery goes bad will notify you that you will need to reconfigure your bios correctly so you can start your computer

In older systems you were able to reset everything in the bios by simply removing the battery if you wanted to reset the BIOS due to a mistake made in the bios or wanted to remove some of the passwords stores inside the bios that was a great way to get everything to restore back to to factory defaults