What is BIOS?

BIOS (**B**asic **I**nput/**O**utput **S**ystem) is the program a personal computer's microprocessor uses to get the computer system started after you turn it on. It also manages data flow between the computer's operating system and attached devices such as the hard disk, video adapter, keyboard, mouse and printer.

Where is BIOS?

BIOS is stored on a ROM chip on the motherboard.
A common misconception is that the BIOS is stored in the processor itself. **It isn't!**
[To be more precise, BIOS is held in an EPROM chip, so that it can be updated if the manufacturer discovers bugs[1] or develops upgrades.]

What does it look like?

BIOS varies from one motherboard to another, and also depends on the make and series of processor that motherboard is designed to support.
BIOS is typically controlled through a series of menus. On many motherboards, this is controlled using only the keyboard; on some newer (and more sophisticated) motherboards, BIOS controls may also be navigated using a mouse.
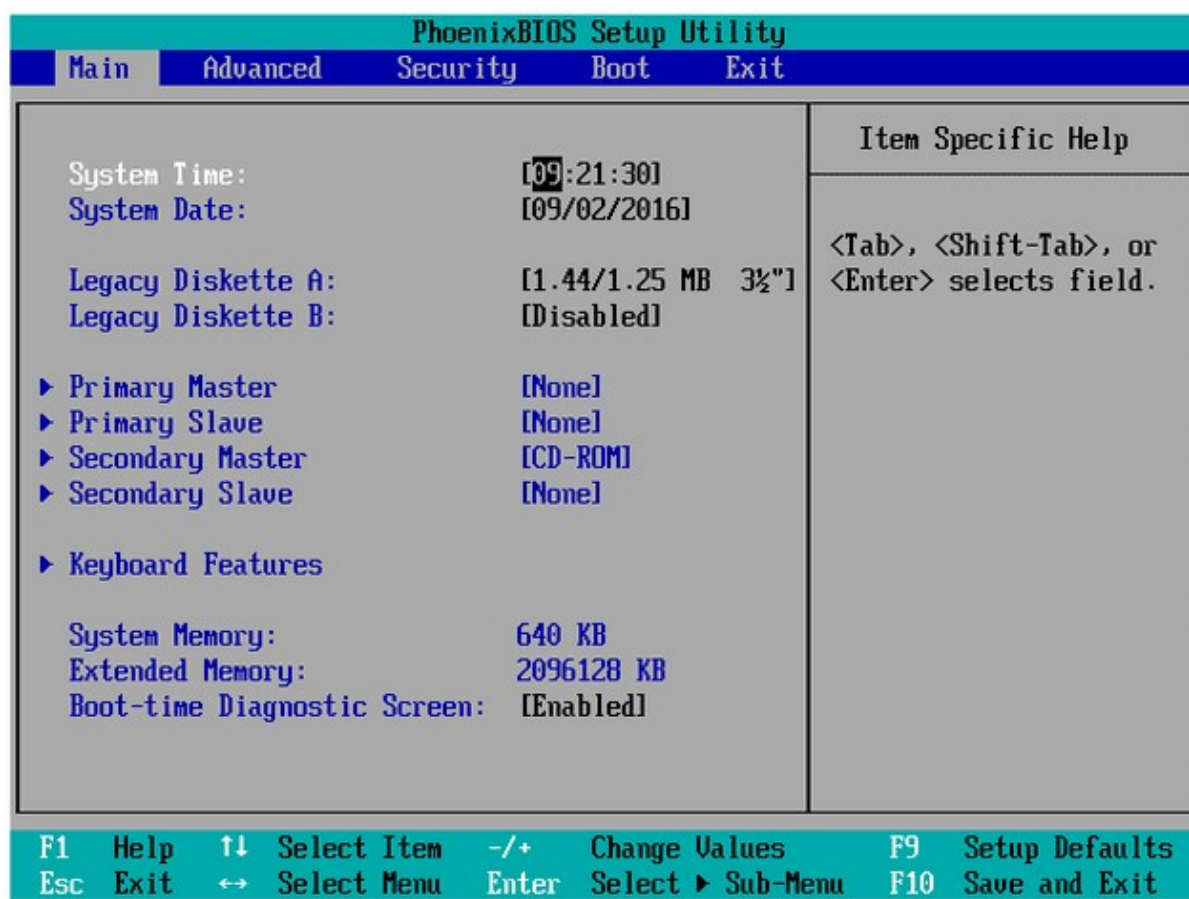

Image 1   A fairly typical BIOS Main menu

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[1] A bug – some kind of error or flaw in computer program code.

On higher-performance, more modern motherboards, the BIOS panel is rather more complex (although it does much the same thing underneath!)
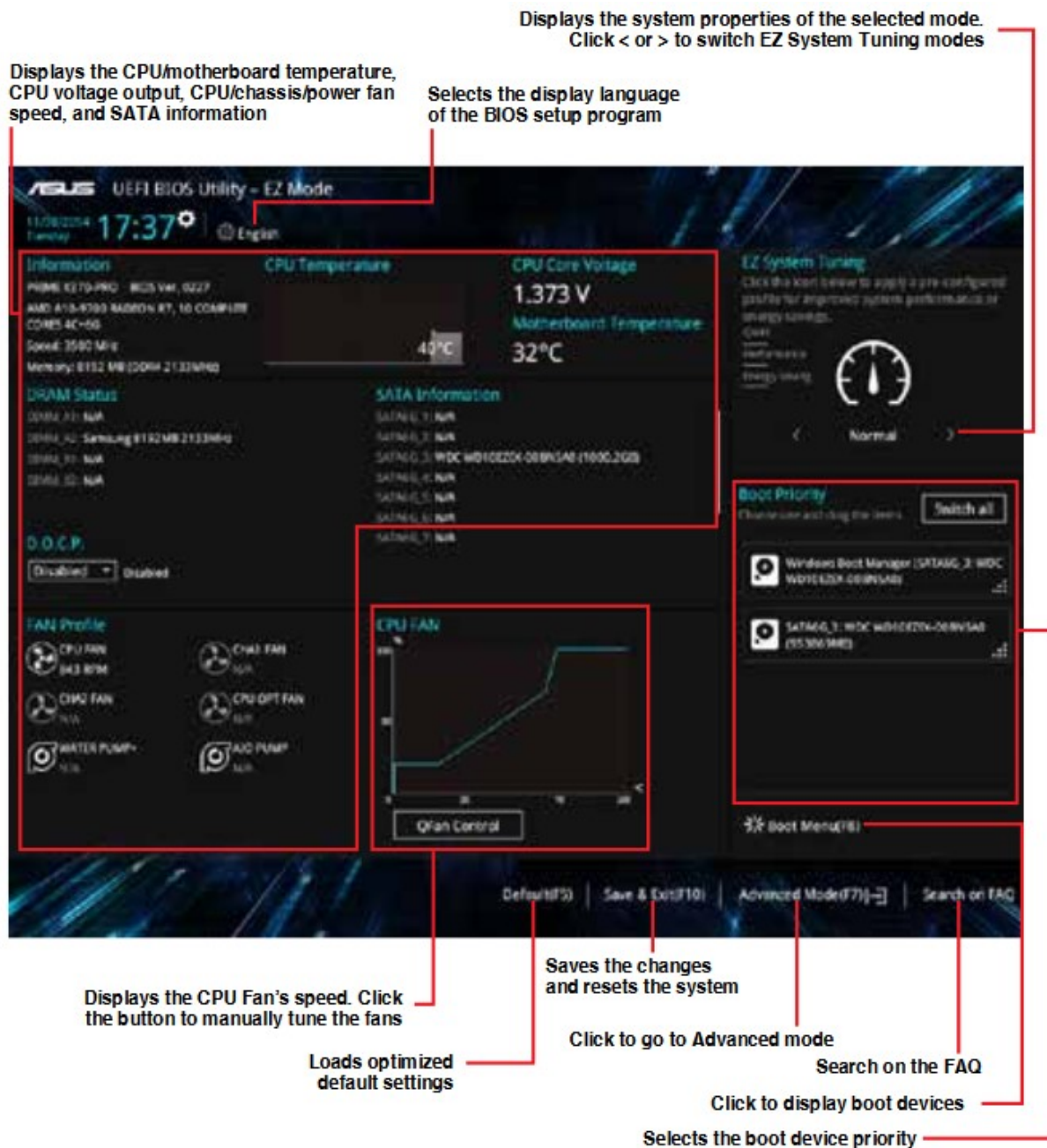

Image 2   BIOS panel from ASUS Prime X370-Pro motherboard

Newer BIOS might include a lot more ways to control CPU temperature, support more SATA devices than the two pairs of ATA[PATA] devices typically provided for on earlier motherboards, and give the user more choice over the balance between how much power the computer uses versus the performance it offers (very useful if you're running on batteries!).

What does it <u>do</u>?

When a PC is first powered-on, before it even gets to the point of **booting**[2] the operating system, it needs to identify configure the basic hardware available. This is done by the BIOS. At start-up, the BIOS will take a quick look around, and identify processor [CPU], keyboard, mouse, memory [RAM], video card, hard drives [HDDs]/solid-state drives [SSDs], CD drives, etc.

If BIOS identifies a problem (this can be anything from "no keyboard connected", "No graphics card present" to "no power in the **clock battery**[3]") it will generate an error signal, often comprising a series of three or four long or short beeps. For every make of motherboard, there will be a list of what those beep patterns mean. In some cases (and assuming video card and display screen can be identified, BIOS might send a message or a simple menu of some kind to the screen.

Beep codes vary greatly between motherboard manufacturers. If you're feeling like a super-nerd, you can check some of them out here:

https://www.computerhope.com/beep.htm

BIOS typically has a number of settings that can be changed by the user (if the user knows what they are doing!). For example, with modern machines, it is possible to buy not only different speeds of processor, but also different speeds of memory. It isn't always possible for the motherboard to identify the maximum speed of the memory [RAM] – although they can all identify how much RAM is present. So, although the BIOS can identify whether a machine has 2GB, 4GB, 8GB … of RAM, it cannot always identify the specification of that RAM, so the user needs to set this.

BIOS settings can also be used when a user wants to "overclock" a machine – an attempt to get the processor to run even faster than the maker intended. Provided the user is also careful to use specialist cooling devices attached to the processor, many modern processors can be overclocked to a significant degree.

BIOS can have defaults set, saying where the PC is to be booted from. For example, if it is set to boot from CD as first choice, or HDD/SSD as second choice, then BIOS will first check the CD drive. If there is a CD in there, and it's a bootable CD, it will use that to boot the PC. If no CD is found, it will switch to the HDD/SSD and tell the PC to boot form that.

A computer might be fitted with more than one hard disk, each containing a different operating system. For example, the user might want to use Linux for work and Windows for playing commercial games. BIOS will allow the user to see a menu whenever they first start their computer, enabling them to choose which disk they want to boot from.

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[2] Booting: the process of starting up the operating system on a computer. Derived from the need to "strap-up one's bootlaces" before one can go for a run (otherwise one might fall over…)
[3] Every PC motherboard has a small battery (usually replaceable) which keeps a clock chip on the motherboard running, even when the computer is switched off and the mains power or main battery removed.

Facts about BIOS

- BIOS is specific to the **motherboard**, not the operating system.
- That is to say, BIOS is installed as motherboard **firmware**[4], and it doesn't matter whether you want to use MS-DOS, Windows 2000 Pro, Windows XP, Windows Vista, Windows 7, Windows 8.0, Windows 8.1, Windows 10, Linux, Unix, or anything else.
- BIOS is outside the operating system, and isn't dependent on it. Think of it a bit like the markings on roads and motorways, together with the Highway Code – whether you're driving a Smart or a Bentley, a motorbike or a juggernaut, a double-decker bus or a hearse, the basic rules, road markings and so on need to be in place.
- When a PC is first switched on, BIOS performs a **POST** – **P**ower-**O**n **S**elf **T**est to check the devices connected, and to make sure that the minimum devices needed for the computer to function normally are all present.
- BIOS is a great friend to the geek or nerd who wants to overclock their computer.
- BIOS brings life to the computer, and the term is a pun on the Greek word βίος, bios meaning "life".

Find out more
There's quite a useful site here:

https://www.lifewire.com/bios-basic-input-output-system-2625820

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[4] Firmware is permanent software programmed into ROM. It provides low-level control of a specific class or type of hardware.