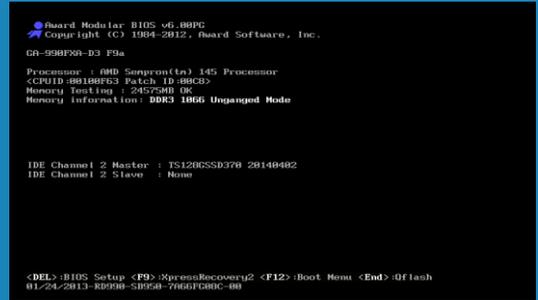


BIOS Demonstration



Most BIOS have hot key to access boot menu

ITFREETRAINING QUICK TIP

0:22 You will notice that when this computer starts up, a logo screen is displayed. This may give you some information about the manufacturer and also some information about the BIOS. If the logo screen is disabled, you will be given a text screen instead which will give you some information. At the bottom of the screen, notice that there are a number of different hot keys. These allow access to different things.

You will notice on the far right, if the end key is pressed, this will launch the flash software that is used to update the BIOS. Keep in mind that each different BIOS may require a different key to be pressed. Some may not have a key to access the flash software. To access the flash utility, you may need to go into the BIOS setup.

Notice to the left of this option is the F12 key for the boot menu. This can vary from BIOS to BIOS. If pressed, this will bring up a boot menu allowing you to decide which device to boot from. This is often useful if you need to perform a one-off boot from an optical drive or USB device.

To the left of this, notice the option F9 for “xpress recovery 2”. If this is configured on your computer, this will allow the administrator to restore a computer if the operating system becomes corrupt, lost or damaged.

To the left of this, the BIOS setup can be accessed by pressing the delete key. I will press this in a moment, but before that I want to point out to the left of this is the tab key for the post

screen. If I press the tab key, notice that the BIOS changes to a text-based screen. With older computers this was always what was displayed, there was no graphic screen. On modern computers, you will see a graphical screen unless it is disabled or you press a key to access the text-based screen.

This screen gives us some additional information, such as the type of motherboard, CPU info, amount of memory and storage devices installed. Notice at the bottom of the screen, the keys are still listed which are required to access different options. To access the BIOS setup, I will now press the delete key.

Once in the setup, I will be given a text menu. Most BIOS based systems you will find will be text based, you may however find the odd one that is graphically based. I won't go through every option, just the main ones and those that you may come across when troubleshooting.

The top option is "MB Intelligent Tweaker". If I go into this option, this will display settings that can be configured to fine tune the speed and voltage of the computer. I would recommend leaving this setting on the default. If you're into overclocking your computer, you may want to change some of these settings, but most users should not have the need to change anything here.

The top option, "CPU Clock Ratio" I will select. I am not planning on changing it, but it illustrates how computers operate. You will notice that other than auto, a clock ratio can be selected from five through to eight.

The motherboard has a clock on it which I will cover in more detail later in the course. Essentially what happens is the CPU will run a number of times faster than the internal clock. This is called the multiplier. So if the multiplier is set to five, this means the CPU will run five times faster than the motherboard. Unless you have good reason to, you should leave this setting on auto.

If I scroll down, the next setting I want to look at is "Set Memory Clock". This will configure the clock rate the memory will use. In modern computers, the BIOS can read these settings from the memory modules and thus there should be no need to set these settings. Generally, the only time with modern memory that you would change these settings is if you were overclocking the memory modules or you were having stability problems with the memory.

You may find that on some of the older motherboards, the memory modules may not be detected correctly. This is usually fixed with a BIOS update, but if you are experiencing problems or have memory modules that are not supported by the motherboard, you may need to manually configure this option.

If I cursor down, the next option I will look at is “DRAM Configuration”. There are a lot of different options that can be configured in here. I will cursor down to “DCTs Mode”. DCT or dual-channel DRAM Controller, allows the controller to be separated into two or run as one.

The setting is currently set to “Unganged”. This can also be configured to ganged mode. Later in the course I will cover this in more detail. Essentially what happens is there are two memory controllers that can access memory for the CPU. In ungangned mode these two memory controllers run independently. If configured to ganged mode they are combined to run as one. In most cases, ungangned mode will give you better performance. However, if you are running single thread applications, you may get better performance in ganged mode.

If I cursor down, the next option is “DDR3 Timing Items”. You will notice under this there are a lot of grayed out options that can be configured. Modern memory modules allow the BIOS to read the settings from the memory modules, so you should be able to leave this setting on auto. I have previously had problems where I had memory modules that were crashing a computer. To fix the problem I increased the latency of some of the settings. This made the memory modules more stable and fixed the problem. Problems like these however should be rare and unless you are overclocking you should be able to leave these settings on the default.

I will now exit out of here and select “System Voltage Control”. This option allows the voltage to be changed. If you are overclocking a system, increasing the speed of the computer can cause your system to crash. To fix some of these problems, you can try increasing the voltage. This may correct the problem, however increasing the voltage will also increase how hot the components in your computer will get. If you are planning on doing this, I would recommend looking into better cooling systems than the standard factory fans and heat syncs.

If I now go back to the previous menu, I will next select “Standard CMOS Features”. Once I select it, there is not too much to configure in here. It will show you the current date and time, the storage devices installed and the total amount of memory installed.

Of important note here is the option “Halt On”. If I select it, notice that I can have the computer halt on all errors, no errors or all but keyboard. If the computer is being setup as a server, you may want to configure this option to “all, but keyboard or no errors”. This is because, if the server was to unexpectedly reboot, you most likely don’t want the server to not boot up because of a missing keyboard. I have had people remove keyboards from a server to use elsewhere. The last thing you want

happening in a remote office is for the server not to start up because of a missing keyboard. If the server does not start up you won't be able to control it remotely without special hardware and software. If, however the computer is an end user's computer, you will most likely want to have this setting configured to "all errors", so the computer will stop during boot if there is a problem.

I will now exit out of here and go back to the main menu. The next option that I will look at is "Advanced BIOS features". There are a lot of options in here, a few of which you should be aware of, the others (unless you have good reason to) should remain on the default settings.

If I select the virtualization setting, you can see that this setting is set to disabled by default. If you are running Hyper-V or another virtualization software you will need to enable this. If this setting is missing, either your CPU does not support this setting or you may need to update your BIOS. Since I may use virtualization in the future I will enable it.

I will now cursor down to "Hard Disk Boot Priority". If you have multiple storage devices, including solid-state drives, you may need to configure this setting so the BIOS knows which storage device to boot from.

In this computer, there is only the one storage device. If you have multiple storage devices they will appear here. You can change the order to determine which storage device the BIOS will attempt to boot from first. If you remove or add a storage device, you may need to change the boot order in order for the computer to start booting.

Keep in mind that in some cases the computer may boot off one storage device but the operating system may be installed on another device. This is because the storage device contains a boot sector. What essentially the BIOS is asking is, which storage device contains the boot sector (also known as an active drive) If you have installed multiple operating systems on different storage devices, it is possible that the storage device that is booted from will be different from the storage device that contains the operating system. Keep this in mind if you change the boot order and your system becomes unbootable. You may need to change the boot order or move the boot sector to another storage device.

Under this notice is the option for "Bootable Add-in Cards". If you have storage attached to additional storage cards, for example a SCSI RAID controller, you will need to make sure this option appears first in the boot order.

I will now exit out of here and go down to the next option "EFI CD/DVD Boot Option". This is not an UEFI BIOS; however, having this option enabled allows it to access EFI

optical media. For example, if you are using a Windows install DVD that is over 2.2 Terabytes in size, you will find that some BIOS' may have some limited UEFI functionality.

Under this, you will notice the option for "First Boot Device". This determines which device the BIOS will attempt to boot from first. In this case, the option has been set to "Hard Disk" and therefore the BIOS will attempt to boot from the storage devices that are listed in "Hard Disk Boot Priority".

You will notice that the next option down is "CDROM". This is common for the default setup in many BIOS. The BIOS will first attempt to boot from the first storage device. If it fails, it will try the second boot device followed by the third boot device. Many BIOS default to the first storage device being the CDROM drive. The logic behind this, is that if no operating system is installed you will most likely want to install one from the CDROM. Once installed, you won't want to boot from the CDROM so you would remove it. If the operating system was to fail, you most likely would want to boot from a recovery CDROM and would put a bootable optical disk in the CDROM drive. So you can see the logic here. No bootable CDROM found, the computer will boot from a hard disk or solid-state drive.

In some cases, you may want to change which device you want to boot from. For example, you may want to install an operating system from a USB device. Maybe you want to boot from a CDROM to run a live operating system installed on the CDROM. When this occurs, one option you have is to change the boot order here, so the CDROM is the first device that is booted from. The problem with this approach is that after you have finished doing this you will need to go back into the BIOS and change the settings. Rather than doing this, most BIOS have the option to press a hot key when the computer starts up. This will allow you to choose which device to boot from. If you want to do a one-off boot from a device (for example, maybe you need to boot from a recovery CD to fix a problem), this is generally a better option than changing the BIOS settings and afterwards having to change them back.

I will now move down to "HDD S.M.A.R.T. Capability". This is current set to disabled. Smart is a technology that is found in storage devices, traditionally designed for hard disks and allows the administrator to monitor the performance and reliability of the drive. For example, there are a number of variables that can be read from a storage device. These variables give an indication if the storage device is starting to fail. If you are running Smart monitoring software on your computer, you will need to enable this option so that the software can access the Smart variables on the storage device.

I will now move down to the option "Full Screen LOGO Show". If this option is enabled, when the computer starts up, you will be shown a graphical logo like the

one shown. If this option is disabled, you will instead get a text screen. The choice of which you want depends on the preference of the administrator.

I will next select the option “Init Display First”. This option determines which slot the BIOS will check for a graphics card. Hopefully if the BIOS does not detect a graphics card in the specific slot, it will check the other slots for a graphics card. This setting will determine which graphics card will be used on start up. In other words, which graphics card will display the BIOS screen and settings. In some cases, you may want to change this. For example, you have two monitors. One may not be viewable from the computer, for example, if it is attached to an electronic billboard. In this case, you may want to change this option so when the computer starts up, you can access the BIOS on a specific monitor.

If I now exit out of here to the main menu, I will next select the option “Integrated Peripherals”. The integrated peripherals screen essentially allows different hardware to be enabled and disabled and some configuration to be performed.

The first option is, “OnChip SATA Controller”. This allows you to enable or disable the SATA controller. You may want to enable this option if you install a RAID controller or are booting from a USB device. In most cases you would want to leave this enabled.

The next option down is “OnChip SATA Type”. You can see that there are three options available here. If you are planning on using options like hardware RAID, you will need to change this option. Changing this option will also change which device drivers an operating system will use to access the storage device. In some cases, the operating system may have problems with a particular type and will need to be changed to another option to fix the problem. This is generally caused by problems with the device driver and should not occur with newer operating systems.

The next option down is “OnChip SATA3.0 Support”. Options like these, I would recommend leaving enabled unless you have a specific reason to disable them. Perhaps you are working in a secure environment where you want to prevent an attacker from plugging in their own hard disk, so you want to disable unneeded ports and features.

The next option “Onboard LAN Function” essentially determines if the network adapter on the computer is enabled. If you install an extra network card, you may want to disable the onboard network adapter under certain circumstances.

The next option, “Onboard LAN Boot ROM” determines if the network adapter will be able to boot from the network. In some cases, you will want to enable this option. For example, you are using a remote network installation service to install an

operating system on the computer.

The next option, “Onboard Audio Function” determines if the onboard audio is enabled or not. If you do not require audio, you can switch this option off. Perhaps you have another audio solution, for example, USB headphones or you have added a sound card. Disabling options like this disables the device and therefore prevents it from being detected by the operating system. Thus from a user’s perspective, they see less devices and thus less options making it easier for them to select the right one.

The next option is “R_USB30 Controller”. This setting determines if the USB 3.0 controller is enabled or not. Most of these options, unless you have specific reason to disable them, I would leave enabled.

The next option is “USB Controllers”. This will determine if USB will operate at all. Remember that devices like keyboards and mice use USB, so generally it is not a good idea to switch this option off. However, I have seen in highly secure environments where USB has been switched off and they have instead used PS2 keyboards and mice. This was done to prevent an attacker from using a USB storage device to copy confidential data from the computer.

The next option is “USB Legacy Functions”. This option allows access to older legacy devices; this refers to older low speed devices like keyboards and mice.

The next option is “USB Storage Function”. This setting determines if legacy USB mass storage devices will be allowed to be used. Don’t be fooled by this option; this only prevents devices being used that declare themselves to the computer as being mass storage devices. A lot of new devices on the market don’t appear as mass storage devices when plugged into the computer. For example, a lot of smart devices will appear in Windows Explorer as the name of the device rather than as a mass storage device. This option will only prevent older devices from being used or new devices that have been configured to declare themselves as a legacy mass storage device.

The last option is “Onboard Serial Port 1”. This allows the port and interrupt of the serial port to be changed. You may also have options in the BIOS for other serial ports and a parallel port. This is a legacy option and you will only need to configure this if you are using very, very old software. I would not change this option unless you have good reason to.

I will now go back to the main menu and go to the option “Power Management Setup”. This option shows settings that are related to the power management of the computer. The option “USB Wake Up from S3” refers to allowing a USB device to

wake the computer while it is in standby mode.

The option “Modem Ring Resume” refers to the old days when modems were in use. Essentially this option allows the computer to be woken up if the telephone rings. It should be incredible rare

nowadays to be using a modem, so you can ignore this option.

The next option “PME Event Wake UP” (PME standing for Power Management Event), allows the computer to be woken up or started after a PME event. For example, certain network cards have the ability to receive power management events. The best example of this being used in practice is for an administrator to configure a PME event in the middle of the night to start up a group of computers in order to apply an update. If the update is very large, it makes sense to start the computers up a few hours before people arrive at work, giving it time to apply rather than the update being applied when the users start arriving for work.

I will now go back to the main menu and select the option “PC Health Status”. This option refers to a number of settings that can be applied to alert the administrator to problems with the computer itself.

The first option, “Hardware Thermal Control” allows the computer to reduce the voltage of the CPU if the temperature gets too high. This helps protect the CPU from overheating. If you are overclocking the computer you may want to switch this option off. However, in most cases you will want to leave this enabled.

The option “Reset Case Open Status” detects if the case of the computer has been opened or not. In some computers, there is a sensor that can detect if the case of the computer has been opened. In secure environments, often this will be configured as a way of trying to prevent unauthorized opening of the computer.

The next option down is “CPU Warning Temperature”. This shows why it is a good idea, particularly on computers you start supporting, to check the BIOS settings. There may be settings which have been switched off that should actually be on.

In this case, if the temperature of the CPU gets too high no warning will be given as it has been disabled. If enabled, if the CPU temperature gets too high, an audible beep will come from the computer. On most computers, if the CPU temperature gets too high, something has gone wrong with the cooling of the CPU and should be fixed to prevent possible damage to it.

In this case, I will configure the alert to the lowest setting. If I find this setting is too

low, I can always increase it. However, unless you are overclocking, the temperature of the CPU should be quite low. If not, there may be a problem with the cooling system in your computer.

The next option down is “CPU FAN Fail Warning”. This option will alert you if the CPU fan is not working. Assuming you have a CPU fan installed, a stopped fan will often be caused by dust or a cable preventing the fan from spinning. When this occurs, you should fix the problem, otherwise the CPU temperature will increase.

The next two options relate to when you have system fans installed in the computer. For example, an extra fan in the case. I don’t have any of these fans, so I will leave these options disabled.

The next option is “POWER FAN Fail Warning”. If enabled, this will give an alert if the fan inside the power supply were to fail. If the fan in the power supply were to fail or stop, this can cause the power supply to overheat and the computer will switch off. For this reason, it is generally a good idea to have this option on.

The last option is “CPU Smart FAN Control”. This option will allow the computer to adjust the speed of the fan depending on how hot the CPU is. You may have noticed that when you switch some computers on you will hear the fans on the computer spin up to full speed for a few seconds before slowing down. This is a test of the fans to make sure they are working. If you don’t have this option enabled, the CPU fans will always run at full speed and can be quite loud. Unless you are overclocking or running very CPU intensive applications all the time, I would suggest leaving this option enabled.

I will now go back to the main menu. The next option “Load Fail-Safe Defaults” will load settings that are least likely to cause problems. If you are experiencing a lot of crashes or other problems, you may try this option. This option will disable some features but hopefully get your computer to a bootable state – not the fastest options with the most features, but the settings that should make the computer the most stable.

The next option, “Load Optimized Defaults” will configure the BIOS to settings that are more performance based rather than those focused on stability. It does not load settings that would be considered to be overclocking or unstable, but are more designed for the person who wants to get a bit of performance out of the computer, but to have settings that should still be quite stable. Remember however, these settings are just to get you started with something, you should go through the settings and make sure that there are no other settings that you need to switch on or off.

The next option, “Set Supervisor Password” allows a password to be configured on the BIOS. Essentially this means that when an attempt is made to enter the BIOS setup, it will require a password to be entered. An administrator will often configure this option if they don’t want users to go into the BIOS and change settings. This will most often happen in secure environments. For example, the administrator disables the USB ports to prevent devices being installed. In this case, they do not want someone going into the computer and enabling the USB ports.

The next option, “Set User Password”, allows a password to be configured that will require the user to enter in a password when the computer is started up. This is often used by companies to make it difficult for someone to access a computer if that computer is stolen. Of course, an attacker can reset the BIOS settings, removing the password and so this offers limited security. If, however, this is used with other technology like BitLocker, a change in the startup process will be detected and the operating system will not boot.

Once you have made all your changes, select the option at the bottom “Save and Exit Setup” to save the changes.

At the bottom of the screen, you will also notice there are a number of hot keys. If you press F8, this will launch the flash software that will allow you to upgrade the BIOS.

Notice also, you can save the BIOS settings by pressing the F10 key. Once you select the option to save the settings, the settings will be available to the computer even after the power has been switched off. If you do not save the settings, they will be lost.

Notice, you also have the option to save the CMOS to BIOS. This setting will allow you to save the settings to a profile or a device. If you are testing different settings, it is a good idea to save the settings before you make changes. If the new settings don’t work you can always restore the settings by using the option below “Load CMOS from BIOS”. Since these options allow you to load and save the settings to a file, if you have a lot of computers that you are deploying that all require the same settings, a quick way to achieve this is to configure one computer, save the settings and use those settings on the other computers.

Once I have completed the changes I want, I will select the save option and will be prompted if I want to save the changes.

That concludes all the settings I want to have a look at in the BIOS. To end this video, I

will have a quick look at a UEFI setup running on a computer with an Intel CPU. I won't go through all the settings as a lot of them are similar, but it will give you an idea what you may expect from different setups.

UEFI Demonstration

59:59 On this computer, notice that when the computer starts up, at the bottom right is a list of all the hot keys. The hot keys change from setup to setup, but notice in particular the hot key for the boot menu has changed from F10 to F11. To access the setup, I will press the delete key.

Once in setup, the first screen gives me a lot of information. To configure anything, I need to select the option at the top right for advanced mode. In advanced mode I can configure a lot of the settings.

When I select the option “OC Tweaker” you can see this is where you would configure a lot of the overclocking settings. For example, if you wanted to change the voltage or timings for the memory, you would do it here.

I will now select the advanced option. A lot of options can be configured in here. I will select “CPU Configuration” at the top. In here, you can configure a number of options for the CPU including disabling processor cores if you had a particular need to. Sometimes when overclocking, some cores will need to be disabled in order to reduce heat in the CPU and increase the speed the CPU can run at.

At the bottom, notice the option for “Intel Virtualization Technology”. This will need to be enabled to run Hyper-V and other virtualization solutions. Intel and AMD call it different names and different setups will have it in different locations. Sometimes you will have to go searching to find the option you need.

I will exit out of here and next select the option “Chipset Configuration”. Here you can configure a lot of different options including enabling and disabling hardware. For example, I could disable the network adapter and audio device if I wanted to.

I will next select the tool option. This will have options to update the UEFI. Unlike BIOS, UEFI setup will often be able to connect to the internet and download an update. By default, DHCP will be used to configure the network adapter; however, you can manually configure it by selecting “Network Configuration”. On some UEFI setups, remote administration is supported. If your UEFI supports remote administration, depending on your network setup, it may be worth setting up a static IP Address.

Next, I will select the option “H/W Monitor”. This will show you the current temperatures, CPU speed and voltages. If I scroll right down the bottom, notice the option “Case Open Feature”. As with BIOS, if the case has a case sensor installed, it will be able to detect if the case has been opened. You will find a lot of the same features to be available between different setups, whether BIOS, UEFI and other manufacturers, but sometimes you will need to hunt around to find them.

I will next select the “Security” option. As with BIOS, you can configure a supervisor and a user password. There is also an option called secure boot. Secure boot is a UEFI option that allows checking of the operating system and device drivers during boot to ensure they have not been tampered with.

Notice the option below this; “Intel® Platform Trust Technology”. If you are running drive encryption software like BitLocker, this allows the keys for such software to be installed on a chip on the motherboard. This helps protect the computer’s data if it is stolen. In order to use software like BitLocker, you would first need to enable it here.

In some cases your motherboard may support a Trusted Platform Module or TPM. Keep in mind that if it does support a TPM, the TPM chip may not be installed in the motherboard by default and may need to be purchased.

Next, I will select the option for “Boot”. As with BIOS, you would configure the boot order here if you needed to. You can also configure options like disabling the logo screen. The boot from LAN option is available here, which is in a totally different location to that of BIOS. This just shows that you really need to hunt around for these settings as they can sometimes be in places you would not expect.

I will now select the exit option. Here I can save the settings just like BIOS. However, notice the option “Launch EFI Shell from filesystem device”. UEFI has the ability to run

a shell that can perform certain tasks. Basically, like a command prompt or terminal shell, this can be run rather than booting into the operating system. This shell allows scripting and other functions including booting operating systems and troubleshooting.

This concludes this video on BIOS and UEFI setups. I hope this video helps you configure and locate settings on your computer. Until the next video from us, I would like to thank you for watching.

References

“CompTIA A+ Certification exam guide. Tenth edition” Pages 316 - 319

Credits

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Voice Talent: HP Lewis <http://hplewis.com>