

HANDS ON SKILLS

BOOTING

The process of starting up a computer is referred to as booting. Booting can also be defined as the initial set of operations that a computer system performs when electrical power is switched on.

There are two types of booting namely: cold and warm booting

1. **Cold booting** - is the process of starting a computer that was originally off

Procedure for cold booting

- a. Switch on electric power from the sockets
- b. Switch on the UPS (when the UPS is on, it shows **GREEN** light, **AMBER** light means there is power coming from the sockets but the UPS is off [on bypass mode] or the UPS is running on battery, **RED** light means the UPS system has malfunctioned, **NO LIGHT** means your system is flat [load has failed])

Also when the UPS produces a peeping sound, it means that there is no power coming from the sockets and its relying on battery or its system has malfunctioned.

- c. Switch on the monitor/Screen
 - d. Switch on the computer casing
 - e. Take a break and wait to **LOGIN** into the system (**login** also called **sign in** into the system is the process of supplying the computer with a username and password for authentication before using its resources)
2. **Warm booting** - is the process of restarting a computer

Procedure for warm booting

Some computers are in-cooperated with a restart button, however most don't, therefore opening way to warm booting using the operating system.



FIGURE 1: WARM BOOTING PROCEDURE

- a) Click start button
- b) Point to the arrow next to shutdown
- c) Click on restart command
- d) Take a break and let the computer cold boot

How computers boot up

- a) When you first press the power button the computer sends a signal to the computer power supply (shown below), which converts the alternating current (AC) into a direct current (DC) to supply the computer and its components with the proper amount of voltage and electricity.



FIGURE 2: POWER SUPPLY UNIT

- b) Once the computer and its components have received ample power and the power supply reports no errors it sends a signal (using transistors) to the motherboard and the computer processor (CPU). While this is happening, the processor will clear any leftover data in the



memory registers and give the CPU program counter that tells the CPU it's ready to process the instructions contained in the basic input/output system (BIOS).

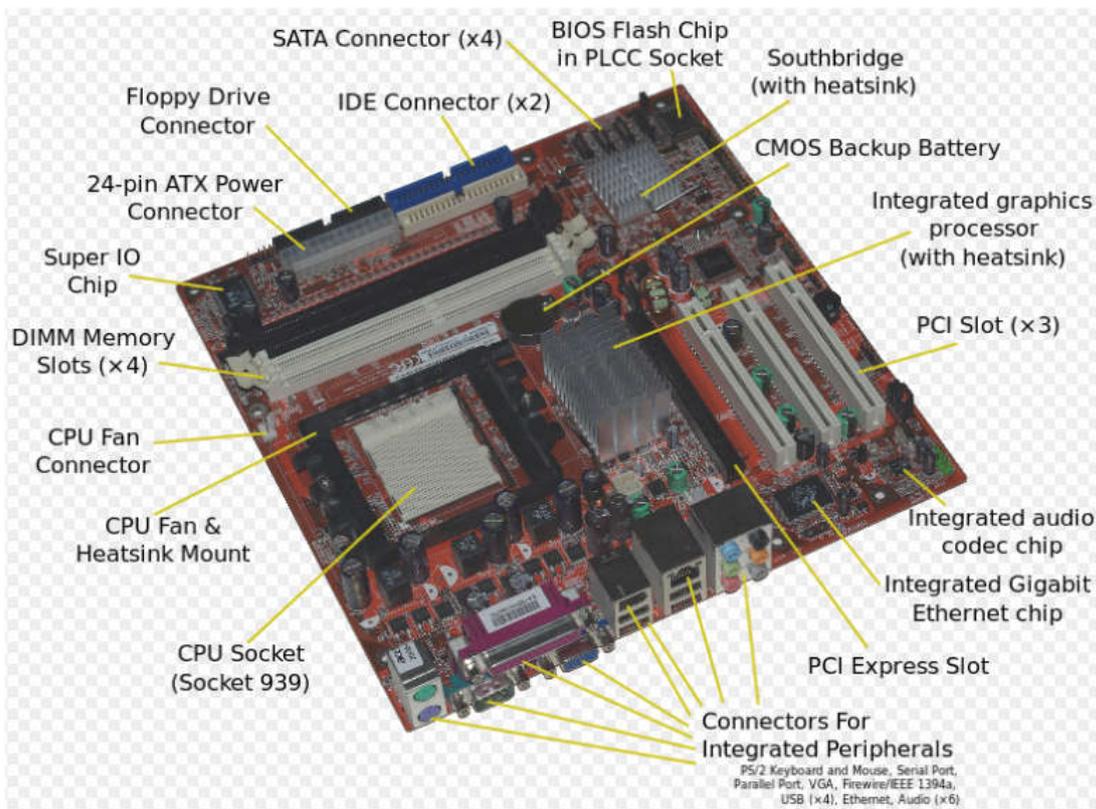


FIGURE 3: MOTHER BOARD

- c) When the computer first looks at the BIOS, it begins the power-on self-test (POST) sequence to make sure the components in the computer are present and functioning properly. If the computer does not pass any of these tests, it will encounter an irregular POST. An irregular POST is a beep code that is different from the standard one or two beeps. For example, an irregular POST could generate no beeps at all or a combination of different beeps to indicate the cause of the failure.
- d) If the computer passes the initial POST, it will next look at the memory located in the complementary metal oxide semiconductor (CMOS) chip, which is kept alive by the CMOS battery even when the computer is turned off. This chip contains information such as the system time and date and information about all the hardware installed in your computer.



- e) After loading the CMOS information, the POST will begin inspecting and comparing the system settings with what is installed in the computer. If no errors are found it will then load the basic device drivers and interrupt handlers for hardware such as the hard drive, keyboard, mouse, floppy drive. These basic drivers allow the CPU to communicate with these hardware devices and allow the computer to continue its boot process.
- f) Next, the POST will check the real-time clock (RTC) or system timer and the computer system bus to make sure both of these are properly working on the computer. Finally, you'll get a picture on your display after the POST has loaded the memory contained on the display adapter and has made it part of the overall system BIOS.
- g) Next, the BIOS will check to see if it's currently performing a cold boot or warm boot (reboot) by looking at the memory address 0000:0472, if it sees 1234h the BIOS knows that this is a reboot and will skip the remainder of the POST steps.
- h) If 1234h is not seen, the BIOS know that this is a cold boot and will continue running additional POST steps. Next, it tests the computer memory (RAM) installed in the computer by writing to each chip. With many computers, you'll know it's performing this step if you see the computer counting the total installed memory as its booting.
- i) Finally, the POST will send signals to the computer floppy, optical, and hard drive to test these drives. If all drives pass the test, the POST is complete and instructs the computer to start the process of loading the operating system.
- j) After the computer has passed the POST, the computer will start the boot process. This process is what loads the operating system and all of its associated files. Because Microsoft Windows is the most commonly used operating system, this section will cover the process of loading Microsoft Windows.

The BIOS first hands control over to the bootstrap loader, which looks at the boot sector of the hard drive. If your boot sequence in CMOS setup is not setup to look at the hard drive first, it



may look at the boot sector on any inserted floppy disk drive or optical disc first before doing this.

- k) After the computer has loaded the operating system, hardware attached to the computer must be able to communicate with the CPU. Hardware communication is done by using an interrupt request (IRQ).

Factors that halts/slows down the booting process

1. **Startup Programs** - Some programs installed in your computer are automatically set to run on startup. They use a lot of memory which is required elsewhere. Such programs include: computer anti-virus, application software and networking software.

Solution: from start menu, click on run command. In the dialog box labeled run, type 'msconfig' command on the open text box then click ok. In the system utility interface box that appears click the startup tab then uncheck those programs you don't need at startup and click ok. Restart your computer for changes to take effect.

2. **Damaged MBR (master boot record)** - The Master Boot Record (MBR) is the information in the first sector of any hard disk or diskette that identifies how and where an operating system is located so that it can be boot (loaded) into the computer's main storage or random access memory.

Solution: Run disk management utilities like '*scandisk*' and '*chkdsk*' commands.

3. **Low (RAM) memory** - insufficient memory in the RAM causes the CPU to fetch one program after another from the virtual memory in the HDD (virtual memory is a memory location in the HDD set aside by the operating system to be used as if it's a RAM). This process delays the CPU in caching start up files.

Solution: upgrading your computer memory by adding higher modules.

4. **Scattered system files**- As files get used daily, they get scattered in the hard disk storage thus taking the CPU a lot of time to fetch them into the RAM. This slows the startup process.

Solution: run disk defragmenter utility.



5. **Full hard disk**– Clear some space in the HDD by deleting unnecessary files to clear space for virtual memory
6. **Computer Viruses** – A virus such as a boot sector virus can damage startup files.
Solution – install anti-virus software, avoid sharing disks especially from outside.
7. **Altered BIOS settings** – if advanced BIOS settings are changed unconditionally, they may cause the computer to have difficulties in starting up.
Solution: Do not make any changes to BIOS settings that you are sure about.
8. **Damaged operating system** – if the operating system is damaged, then it means the computer will not start up properly
Solution – Run *Scandisk* and *CHKDSK* commands, Restore your system to earlier date, reinstall the operating system to repair damaged files

Shutting down a computer

Always follow the correct procedure when shutting down a computer. Failure to do so can result to loss of unsaved information, damaging of the hard disk surface and computer programs.

To shut down a computer proceed as follows:

- i. Save all your work and close all active windows
- ii. Click on **start button** and choose **turn off** computer command
- iii. On the prompt window that occurs click:
 - a) **Shut Down** -to turn off the computer
 - b) **Hibernate** - Saves your open documents and running applications to your hard disk and shuts down the computer, which means once your computer is in Hibernate mode, it uses zero power. Once the computer is powered back on, it will resume everything where you left off.



- c) **Sleep/ Standby** - In contrast with standby mode, hibernation mode saves the computer's state on the hard disk, which requires no power to maintain, whereas standby mode saves the computer's state in RAM, which requires a small amount of power to maintain.
- d) **Restart**- for warm booting which is mostly used when a computer hangs or for software changes to take effect.
- e) **Log Off** - You close your user account but the computer remains on for easy access the next time you log on.
- f) **Switch User** - It allows users to switch between user accounts on a single computer without quitting applications and logging out.
- g) **Lock** - Lock prevents other people from accessing your computer or viewing your work. It's an ideal way to protect your computer when you need to step away to the bathroom or to lunch.

The keyboard Layout;

A keyboard layout is any specific mechanical, visual, or functional arrangement of the keys on the keyboard.

Keyboard setup can be classified in a number of ways including: language setting, country setting, technology, disability, size, manufacturer's preferences and arrangement of keys.

Keyboard layout examples

1. **QWERTY** is a keyboard layout for Latin-script alphabets. The name comes from the order of the first six keys on the top left letter row of the keyboard. The QWERTY design is based on a layout created for the Sholes and Glidden typewriter and sold to Remington in 1873.
2. **An ergonomic keyboard** is a computer keyboard designed with ergonomic considerations to minimize muscle strain and a host of related problems. Typically such keyboards for two-

handed typists are constructed in a V shape, to allow right and left hands to type at a slight angle more natural to the human form.

How to use actual/physical keyboard effectively

1. Sit upright and maintain an alert posture
2. Place the material to be typed in a position you can read without straining
3. Put feet flat on the floor
4. Arch your wrist
5. Keep a good eye line
6. Position hands on home row (left hands: a, s, d, f, right hand: j, k, l,;))
7. Use your left index finger to hit the g, t, r, v, b, 5, and 6 keys.
8. Use your left middle finger to hit the e, c, and the 3 keys
9. Use your left ring finger to hit the w, x, and 2 keys
10. Use your left ring finger to hit the w, x, and 2 keys
11. Use your left pinky to hit the q, z, and the 1 key.
12. Use your right index finger to hit the y, u, h, n, m, 6, 7, and 8 keys.
13. Use your right middle finger to hit the u, <, and 9 keys.
14. Use your right ring finger to hit the o, ., and the 0 keys.
15. Use your thumbs to strike the space bar.
16. Use your right hand on the num pad. Place your index finger on the 4. Your middle finger on the 5. Your ring finger on the 6, and your pinky on the enter key. Place your thumb on the 0. Strike the 7 and 1 with your index finger. Strike the 8 and 2 with your middle finger. Strike the 9 and 3 with your ring finger. Strike the - and + with your pinky.

The Mouse

This is a pointing device that moves the pointer on the screen when pushed/pulled on a flat surface courtesy of the mouse ball and infrared rays as used by actual and optical mice respectively.

How the mouse works

The movement of the mouse on a flat surface corresponds with the direction on the movement of the pointer on the screen. The pointer can change into a cursor when editing text or any other shape depending, which part the pointer is placed on an active window.

When the pointer is placed on an icon, the left button of the mouse is pressed/ clicked to execute a command. A **command** can either be opening, selecting, running etc. some icons need pressing the left button twice in quick succession for a command to take effect depending on how the computer is set. This process is called **double clicking**.

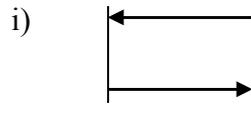
Drag and drop is used to drag windows, pictures and graphs from one position to another and resizing objects. This is possible by clicking on an item using the left button, hold down the button as you move the mouse and then drop the item upon reaching the destination by releasing the button.



HANDS ON SKILLS QUESTIONS

1. 2005 PP1 Q20 (a)

Name and explain the function of the keyboard keys represented by the following symbols.



(2mks)



(2mks)

2. 2001 PP1 Q10 (a)

Describe the functions of the following computer hardware components:

a) Mouse (2 ½ mks)

3. 2003 PP1 Q14 (b)

Name two keys used to delete text in a document (1 Mk)

4. 2007 PP1 Q2

State the functions of the following keys on the computer keyboard (2 mks)

- a) Backspace
- b) Insert (INS)

5. 2007 PP1 Q1

Describe the computer booting process. (2 mks)

6. 2007 PP1 Q3

Jane has noticed the following problems in her computer keyboard

- It is taking longer time to start up;
- It is often hanging;
- Applications are taking longer to load.

State three possible causes of these problems and how they can be solved (3mks)