UTM
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Section: 4

Assignment: Step by step PC Assembly

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Installing PC step by step

PART A

1.0 Screwdrivers

Name: Screwdrivers

Function: Used to tighten and loosen screws.

Importance: Important to tighten screws of the PC

Additional Tips: Screwdriver with a magnetic tape will be more useful but it's not necessary. Also the longer the screwdriver the better

2.0 Zip Ties

Name: Zip Ties

Function: Used to hold wires together.

Importance: will be used to hold wires together in the PC which makes the whole PC setup much cleaner and organized while making the wires less likely to get damaged.

3.0 Snip Side Cutter

Name: Snip Side Cutter

Function: Used to cut things

Importance: Important to cut excessive plastic when holding wires together using zip ties.

4.0 Magnetic Screw Holder

Name: Magnetic Screw Holder

Function: Used to keep the screws in safe place.

Importance: Important to avoid losing the screws and the magnet makes it easier.

5.0 Alcohol

Name: Alcohol

Function: Cleaning and disinfecting hard surfaces

Importance: To clean the CPU, RAM and other components before attaching to the motherboard.

6.0 Thermal Paste

Name: Thermal Paste

Function: applied on the CPU

Importance: Make the heat dissipation process better.

7.0 Micro Fibber Cloth

Name: Micro Fibber Cloth

Function: Clean dust from hard surfaces

Importance: Clean different PC components and the motherboard before assembling the PC
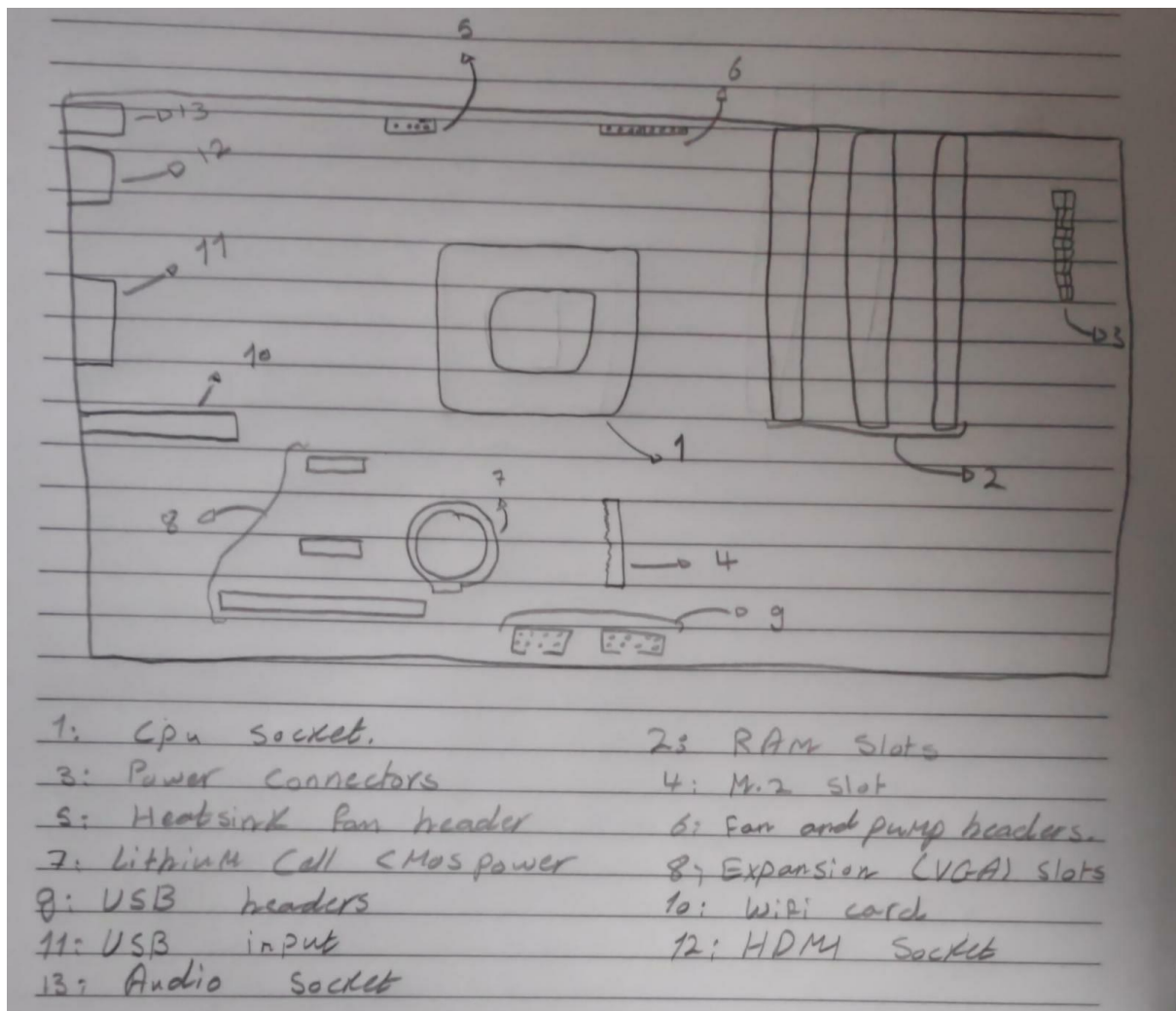
8.0 Flash Light

Name: Flashlight

Function: Provide Light in Dark Spaces

Importance: To be able to see the tight places that are usually dark in the case

PART B

1.0 Motherboard Layout/Drawing

1: Cpu Socket.
2: RAM Slots
3: Power Connectors
4: M.2 Slot
5: Heatsink Fan header
6: Fan and pump headers.
7: Lithium Cell CMos power
8: Expansion (VGA) Slots
9: USB headers
10: Wifi card
11: USB input
12: HDMI Socket
13: Audio Socket

2.0 Components Explanation

IDE cables used to connect some hard drives and optical drives to each other and to the motherboard. The two most used types of IDE ribbon cables are the 34-pin cable used for floppy drives and the 40-pin cable for hard drives and optical drives.
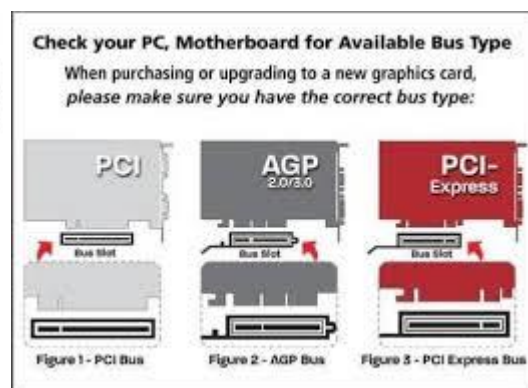
Graphic card produces the image you see on a monitor. It also responsible for rendering an image to your monitor. Graphic Video cards come in three different connector types. There are PCI, AGP, and PCI Express.

Universal Serial Bus (USB) cable are used to connect from computer units to perpheral devices (mobile phones, camera, camcorders, printers or scanners). The main function is to effectively and quickly gather or transfer data from one device to another.

Passive Heat Sink

Active Heat Sink

The function of heat sink is to flow away the heat from a hot devices, so that the performance of the desktop is will be stable. It accomplished by increasing the device's working surface area and the amount of low-temperature fluid that moves across its enlarged surface area. We can divide the type of it by two type, whether it's active or passive, and is it material from aluminium or cooper.

Central processing unit is known as CPU or processor is a main part of any digital computer system. The processor is also called the brain of any system which incorporates computers, laptops, smartphones, embedded systems, and so on. The main functions are fetching, decoding, executing, and write back the operations of an instruction. There are five types of general-purpose processors they are, Microcontroller, Microprocessor, Embedded Processor, DSP and Media Processor.

Types of Optical Storage Devices

(Compact Disc-Read Only Memory) A type of CD disc or storage that can only be read, but not recorded. Used to store programs and data files, it holds only about 650MB - 700MB.

Types of Power Supplies

EU PLUG

PEAK POWER : 850W
RATED POWER : 650W
FOR ATX POWER SUPPLY

- ATX – has 20 pin connector and extra 3.3 volt rail
- ATX12 2.0 changed the 20 pin connector to 24 pin connector
- EPS12v – the cpu connector is now an 8 pin instead of 4 pin

PSU or Power Supply Unit is the one of the most important component for building PC, without it we can't turn on our PC. It procedure is to convert AC power to low-voltage DC power in order the other components of a PC would be working properly. There are three types of PSU: AT, ATX, and ATX-2. Most used nowadays is ATX-2.

DIMM Type	Size (L x H mm)	
DDR4	Standard	133.35 x 31.25
	VLP (Very Low Profile)	133.35 x 18.75
DDR3	Standard	133.35 x 30
	VLP	133.35 x 18.28 to 18.79
	ULP (Ultra-Low Profile)	133.35 x 17.78 to 18.28
DDR2	Standard	133.35 x 30
	VLP	133.35 x 18.28 to 18.79
DDR	Standard	133.35 x 30
	VLP	133.35 x 18.28 to 18.79
SDRAM	Standard	133.35 x 25.4 to 43.18

Random Accessible Memory or RAM is an essential part of a computer's hardware because it stores data for programs when they are processed by the CPU. The data only stored temporary (short term), so when we turned off the PC, data which stored in RAM will be closed. And there are several types of RAM : SRAM (Static random-access memory), SDRAM (Synchronous DRAM), and DDR SDRAM, which DDR refers to *double data rate.* And DDR comes with 4 models, DDR only until DDR4.

Hard disk is the main components to store data for long-term period, or permanently. The amount of the data that can be stored is depend on the capacity of the hard disk itself. SATA (Serial Advanced Technology Attachment), HDD (Hard Disk Drive), and SSD (Solid State Drive) are the types of hard disk which commonly used right now.

Type of SATA Cable	Definition	Uses & Applications
e-SATA	Cable available in lengths ranging from 0.5-2m	External connection to PCs
Low Profile SATA	Ultra-thin SATA cables with low profile connectors	Graphics cards
Micro SATA	SATA data cable	Internal drives and backplane applications
SATA Bracket	Dual-port e-SATA expansion brackets	Compatibility between computer outputs and e-SATA drives
SATA Bridge	SATA interface acting as a bridge between devices	Connecting ATA devices to SATA motherboards or PCI cards
SATA Power	SATA interface power cable	Connecting power adaptors, extensions and splitters for SATA power and data cables
SATA-SATA	Standard SATA cables available in a variety of lengths	Standard SATA applications

Serial Advanced Technology Attachment (SATA) cable is the next componient to build PC. It is used to connect devices, including Hard Drives, Optical Drives, and SSD. Actually there are two kind of cable are used for PC assembly, PATA and SATA. PATA or Parallel Advanced Technology Attachment, are the previous one, but because it slower than SATA, this cable are rarely used nowadays.
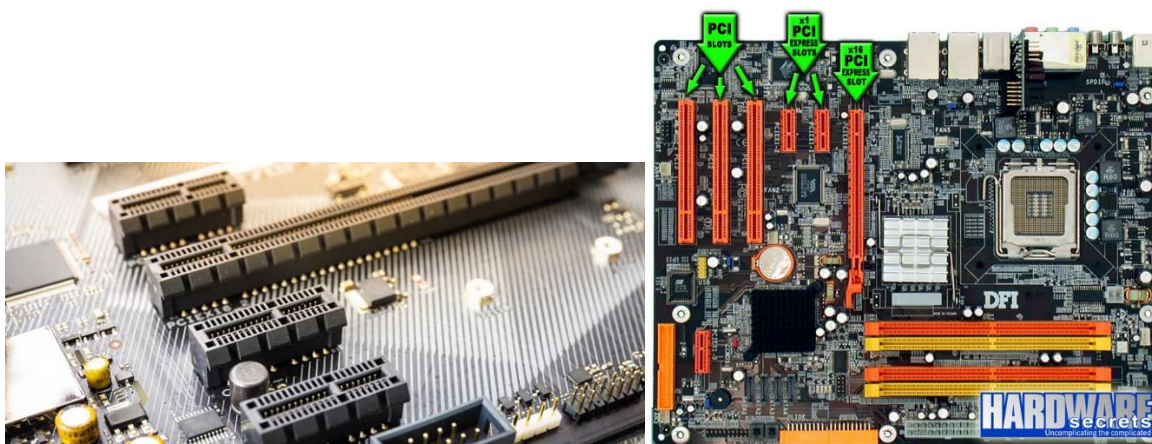
PCie slots are slots commonly exist at motherboard, that comes in different sizes x1, x4, x8, x16 and different generations as well. The number after the x mean how many lanes (data travels to and from the PCIe card) that PCIe slot has. A PCIe x1 slot has one lane and can move data at one bit per

cycle, and so on. It is used to attach things to the motherboard for example ssd drive or graphics card.

Part C Step-By-Step Assembly

1.0 Installing Processor (CPU)

Whether you are going with an Intel or and AMD build, the first step is to release the tension lever on the CPU so that you can drop the processor into the CPU socket

We know that the CPU is the brain of the computer. It is installed on the motherboard in the socket. The arrow / triangle at the top of the CPU on the socket cap should line up. Be careful not to point the arrow in the wrong direction, otherwise the board or both will be damaged. Once the CPU and socket are properly aligned, you can leave the chip in place, and it will snap into the socket under its weight. If it does not, then choose the CPU and reinstall it. Once the CPU is properly installed into the socket, press the tension lever down (on Intel motherboards like the one in the image below)

Once the coolant is installed, connect the fan connector to its head on the motherboard. This is usually somewhere near the CPU socket and calls it something like CPU_FAN.
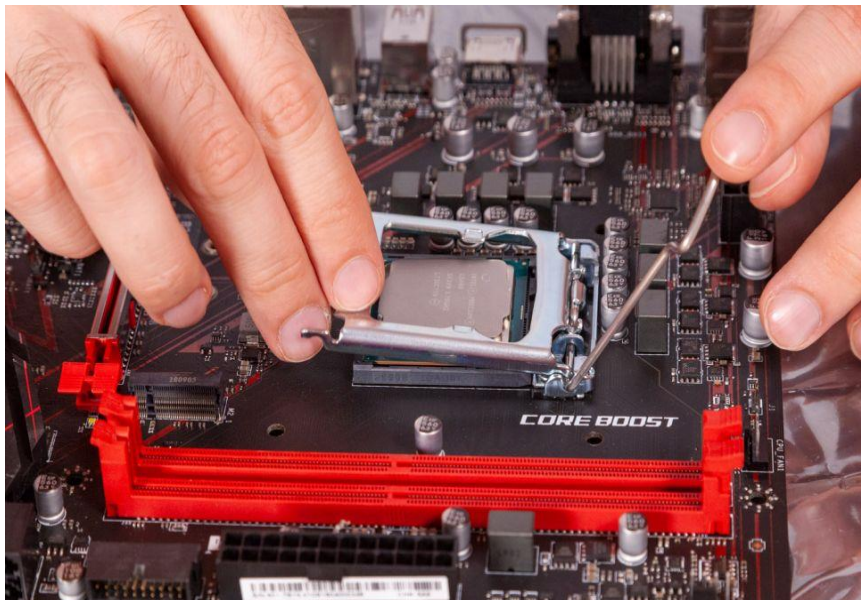
2.0 The Cooler

Many processors come with coolers in the box. Although a lot of builders also like to purchase more powerful (and often quieter) aftermarket coolers, which may also be more attractive.

If you decide to use a stock cooler, you will find that it already has a thermal paste applied. With aftermarket coolers, you will generally need to apply your own thermal paste. You do not need a lot - just an amount of as small as beans applied to the center of the CPU will spread out when you apply the cooler.
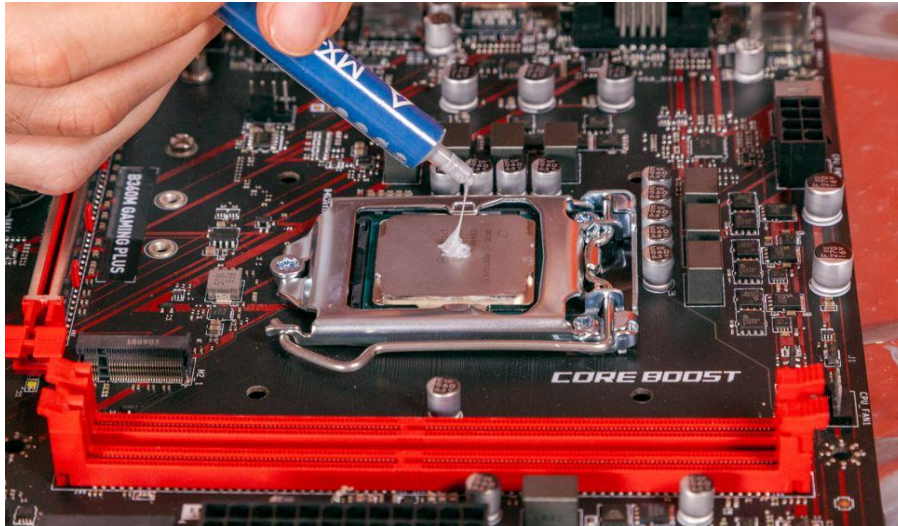
Intel processors' stock coolers use push pins that run through holes in the motherboard. We recommend pushing the opposite corners in to spread the thermal paste evenly, and to avoid uneven stress on one side of the CPU. AMD stock coolers have metal levers that stick notches on a plastic holder on either side of the socket. Aftermarket coolers are installed in different ways, so be sure to refer to the instruction manual, as installing aftermarket coolers can be surprisingly complicated and often includes a large back panel that must be installed behind the motherboard**.**
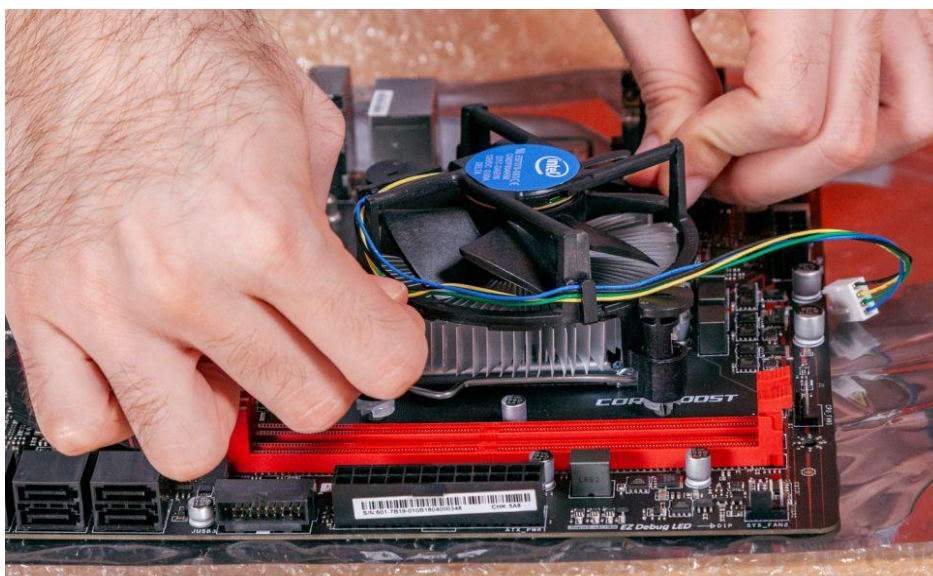
3.0 Installing Memory (RAM)

Installing RAM, first make sure that each memory slot is unlocked. Some boards have a latch on the front and some on the side, once the latches are opened, look at each DIMM and place it over the slot so that the small hole under the RAM stick is aligned with the corresponding protrusion on the board. Finally, press the DIMM on each edge until it snaps into place, causing the latches to close on their own. The process requires a little force but be careful to place the piece in the wrong place.

If you are installing two RAM modules in a four-slot board, check the motherboard manual to make sure the DIMMs are installed in the correct slots. If you put it in the wrong slots, it may not get the best possible performance, or the motherboard / OS may not recognize one of the sticks.
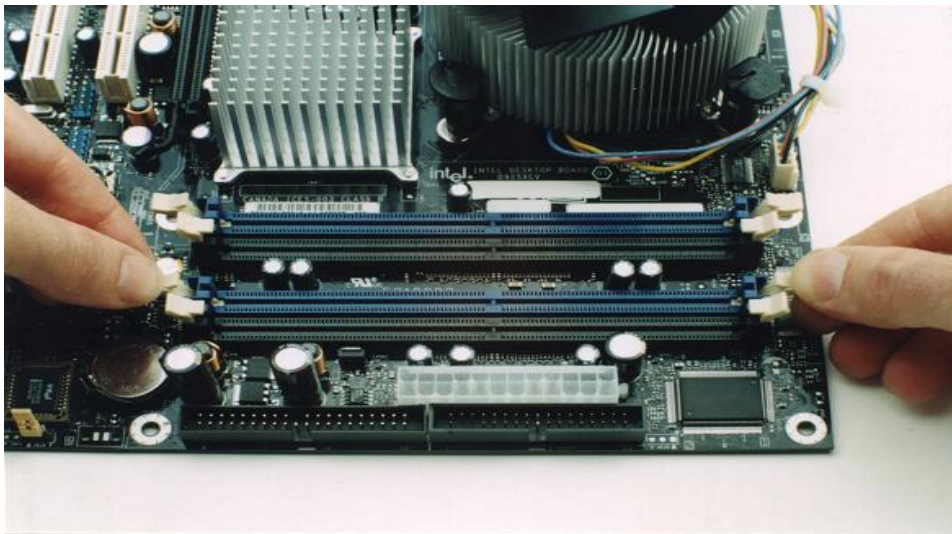
### 4.0 Putting the Motherboard in the Case

Now that we have built the primary system, we will install the CPU and motherboard equipped with RAM in the box. Remove the side panels to install them. If you do not or are able to do so, do not worry there are some screws that you remove will be able to unscrew the side panel easily
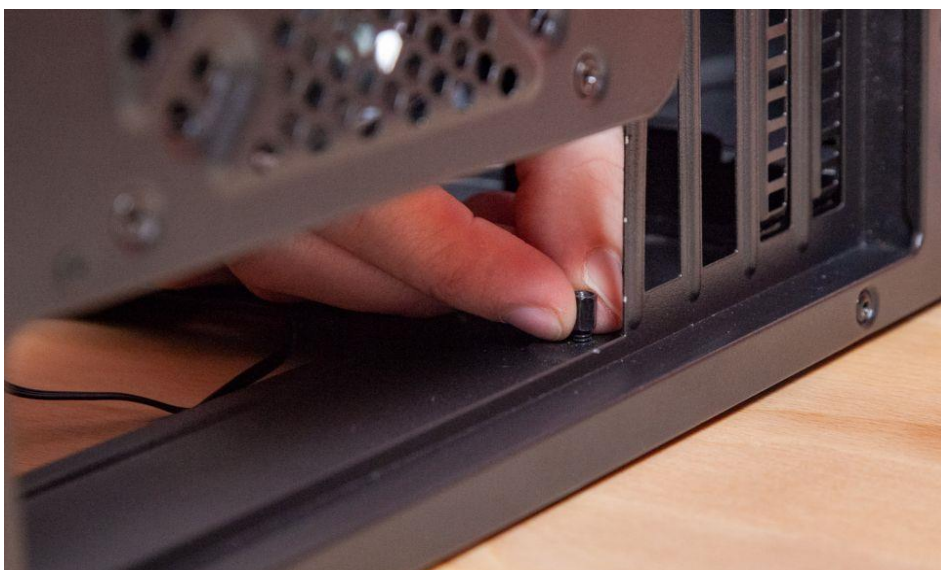
The I/O shield, which covers the area around the rear ports, comes with the motherboard. You will need to mount the shield into the chassis before installing the motherboard itself, making sure it is on the right side up so that the motherboard ports fit the slots once both are installed. You will have to use some force to hold the four corners in place. Be careful of the sharp edges to not cut yourself as well as metal parts that can block the vents - especially if you have an economical motherboard.

The exceptions are some premium panels, which ship with this pre-included shield, but you won't find that on most panels.

Now, it is time to put the motherboard in. Make sure the holes on the motherboard line up with the standoffs you installed and that the ports line up with the cutouts on the I / O shield. Once the board is in, put the screws into the standoffs to anchor the motherboard in place.
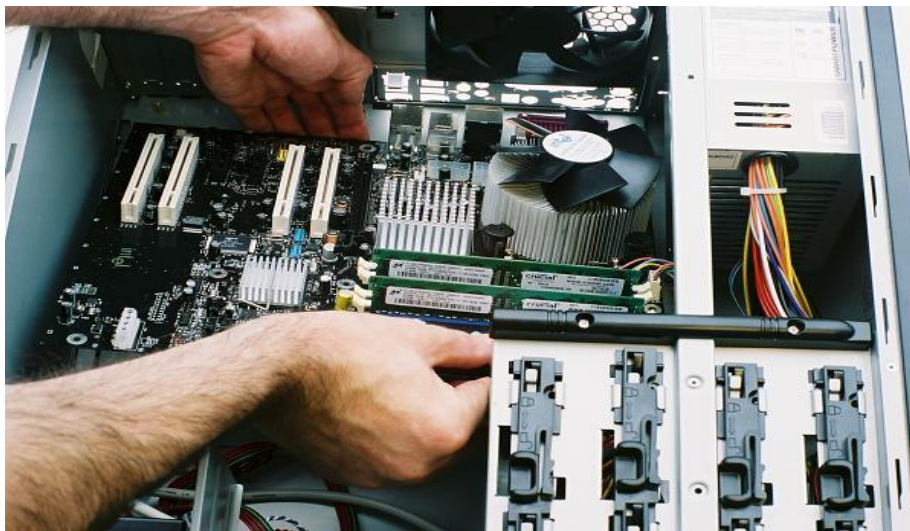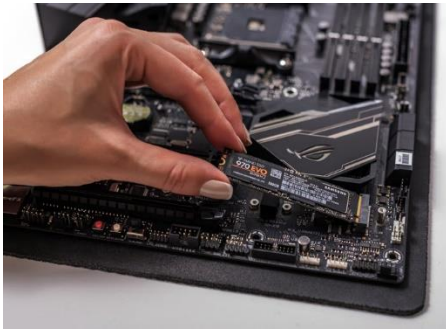

5.0 Adding the Storage Device

The storage device can be of different type for example SSD or HDD for HDD it is usually connected by a cable and for SSD it is usually connected on the mother board directly.

The SSD drive socket looks like this

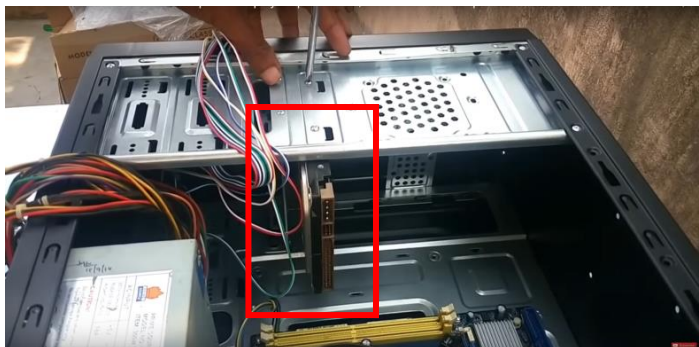And the SSD is installed like this by attaching the SSD to the socket

After installing the SSD there is a hole in the back of the SSD and there is a hole in the motherboard to add a screw so that the SSD become stable and don't move or get out of the socket.

This is the SSD with the screw.

For the HDD
You start by placing the HDD in the specified place

After that you start adding the screws to hold the device in place.

Then you connect the HDD with the motherboard using an IDE ribbon cable or SATA cable depending on the type of your HDD. This is what IDE ribbon cable looks like.
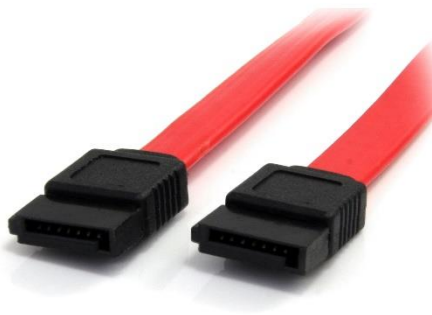

You connect one end to the HDD and the other to the motherboard. The end with pointy metals is called the male end and the other one is called the female end. The male end is attached to the HDD and the female end is attached to the motherboard.

This is what the socket looks like on the motherboard

For SATA cable this is what the cable looks like

Both ends are the same. You attach one end to the motherboard and the other one to the HDD

This is what the socket looks like in the motherboard.

6.0 Adding the CD ROM (optional)
CD ROMs are not necessary in every PC but you can install a CD ROM
First of all you start adding the CD ROM to the case by pushing it from the outside like this

And as you did with the HDD you make the CD ROM stable by adding screws
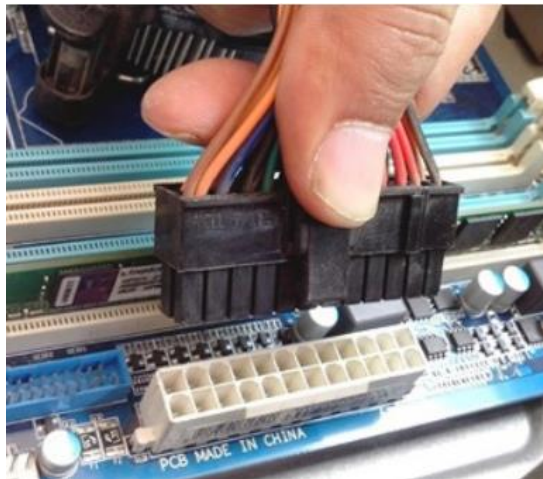

Then you connect the CD ROM. CD ROMs can be SATA or IDE for IDE you connect the cable to the motherboard using SMPS 12 pin connector or ATX 24 pin connector or ATX 4 pin connector.

SMPS 12pin:
When connecting make sure that the black cables in on the inside.

ATX 24pin:

ATX 4pin:

For SATA CD ROMs the installing method is the same as for HDD.

7.0 Attaching the cabinet connectors

Before closing the case you have to attach the cabinet connectors. Those are the power and reset button, HDD and power indicators, audio and USB ports, etc…

When installing you can read on the motherboard the no and socket purpose this for example is the F_USB2.0 which is front USB port.
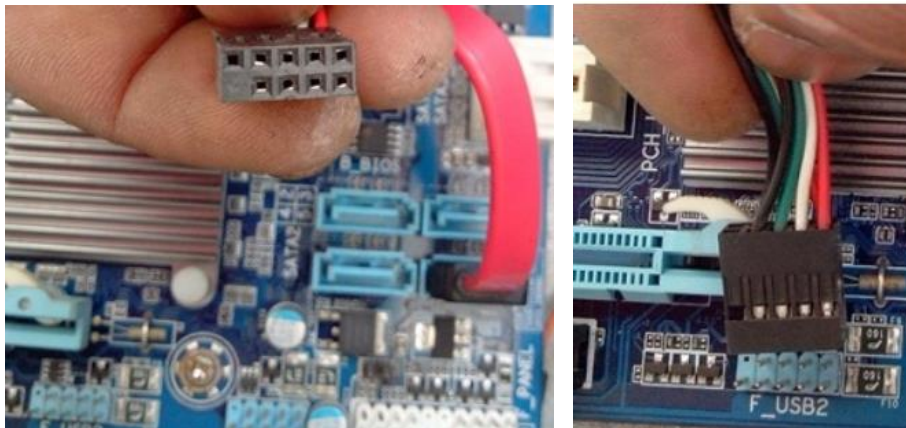
When you are done connecting all the cabinet connectors you are ready for the final step which is closing the case and testing.

8.0 Closing the case and testing

After you are done attaching all the main components. Check for cables and hold all cables together using zip ties and make sure to cut the extra plastic from the zip ties.

After you make sure that there are no cables that's not organized, start closing the case screwing all the screws in place. Then you can connect the PC to a screen, a keyboard, and a mouse to start testing the case.