UTM UNIVERSITI TEKNOLOGI MALAYSIA

SCHOOL OF COMPUTING
Faculty of Engineering

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Section 10

Assignment : Step by step PC Assembly

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PART A – List of tools needed to assemble a PC

1.0 Screwdrivers

The number-one most important tool for PC building is a Phillips-head screwdriver with a big bit, helpful to avoid stripping the head; a long shaft also aids in keeping the handle out of the way when working in tight spaces—it's a good idea to keep a short screwdriver around as well. Flat-bladed screwdrivers usually aren't much use for unscrewing anything, but they're great for getting extra leverage and prying things apart (but only if there's no better way to access your objective).

2.0 Anti-Static Equipment

Anti-static equipment should be used for any serious PC assembly. Touching a grounded case or another grounded, metal object occasionally will eliminate most risk of electrostatic discharge.

There are several products that can eliminate electro-static discharge (ESD)—an anti-static mat can be placed on the floor of the workspace, allowing unrestricted movement. And the most effective method is to use an ESD wrist strap and either clip it to a grounded object or plug it into the ground socket of any wall outlet.

3.0 Cable Ties

Plastic cable ties are useful for neatly bundling wires and cables away from fans and other components inside the computer.

4.0 Needle-Nosed Pliers

Unfortunately, sometimes the heads of cheap screws get stripped. When this happens, sometimes the only option is to use a pair of pliers (carefully). Needle-nose pliers have a wide variety of uses, and they often include a wire cutter, which can be used to snip the excess off of cable ties. It is very handy for removing and inserting jumpers on motherboards and hard drives.

PART B – Sketch of a mother board layout

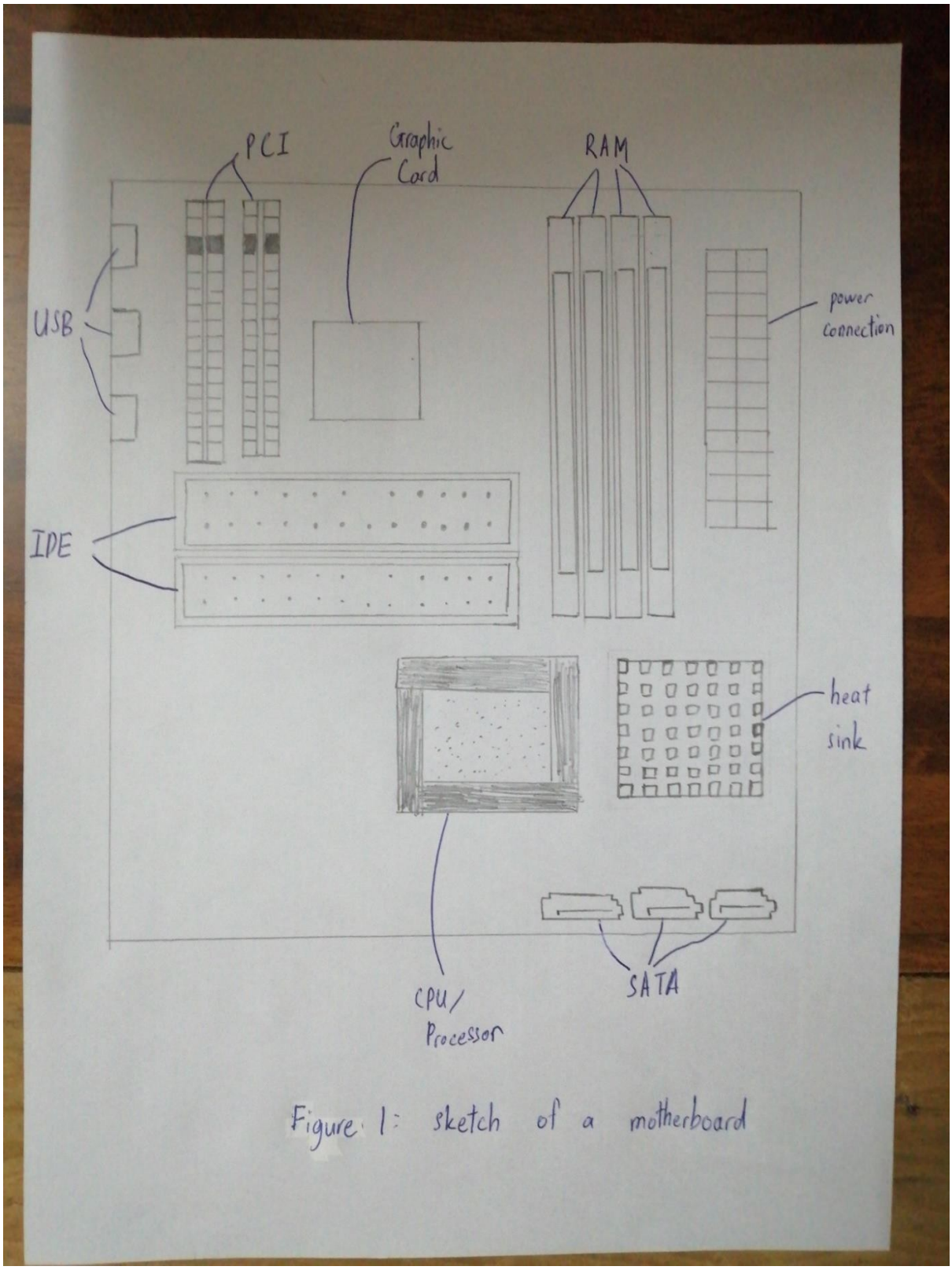
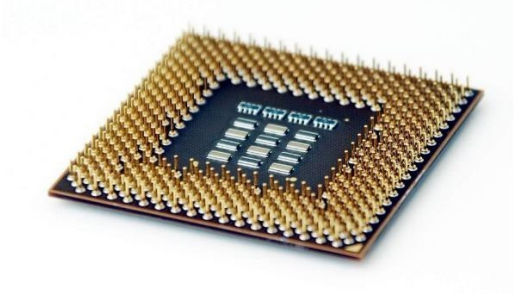
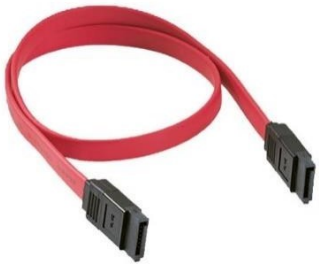


Figure 1: sketch of a motherboard

Keyword	Picture	Function	Models
Graphic card		Allow computers to produce graphic and image more quickly. A graphics card has its own processor, a GPU or graphical processing unit, according to Jason Cross at PC World. The video card connects to the motherboard and the monitor. This allows the card to accept information from the CPU (central processing unit) and send output to the monitor.	- Integrated graphic card - Discrete graphic card
CPU/ Processor		Have four primary function which is fetch, decode, execute and write back. Fetch – is the operation which receives instructions form program memory form a system RAM. Decode – is where the instruction is converted to understand which other parts of the CPU are needed to continue the operation. This is performed by the instruction decoder. Execute – is where the operation is performed. Each part of the CPU that is needed is activated to carry out the instructions. Write back – is a storage method in which data is written into the cache every time a change occurs, but is written into the	- Pentium III - Athlon - K6-3 - Duron - Celeron - Pentium II Xeon - 8088 - 8086 - 286 - 386SX - 386DX - 486SX - AMD K5 - AMD K6 - NexGen Nx586 - IDT Winchip - Rise mP6

		corresponding location in main memory only at specified intervals or under certain conditions.	
Heat sink		Heat sinks help to cool down your computer's processor after it runs multiple programs at once. It is an attachment for a chip that prevent the chip form overheating and in modern computers, it'sasimportantasany other component.	- Passive - Active - aluminum - copper - solid metal - pumped - two-phase - CNC Machined - Forged & Die cast - Zipper Fin - Skived Fin - Bonded Fin - Extruded
CD ROM		A CD-ROM drive operates by using a laser to reflect light off the bottom of the CD or disc. The reflected light pulse are read by a photo detector. These incoming pulse are decoded by the microprocessor and then sent as usable data to rest of the computer where it is processed and used.	- Standard manufactured CDs (CD- DA) - CD-R recordable - CD-RW rewriteable
USB cable		USB device uses the standard A type connector to the USB host or Hub through A type receptacle. The other end of the cable has series B connector which is used to plug into the B type receptacle. A connector is used for the upstream connection towards the host and B connector for the	- USB A-Type - USB B-Type - USB C-Type - Micro-USB A - Micro-USB B - USB Mini-b (5-pin) - USB Mini-b (4-pin) - USB 3.0 A-Type

		downward stream to the USB device. When the device is connected to the PC, it activates the host to recognize it. The PC detects the device and manages a control flow between the device and computer.	
Slots		An expansion slot is a socket on the motherboard that is used to insert an expansion card (or circuit board), which provides additional features to a computer such as video, sound, advanced graphics, Ethernet or memory.	- AGP - AMR - CNR - EISA - ISA - PCI
RAM		Computer random access memory (RAM) is one of the most important components in determining your system's performance. RAM gives applications a place to store and access data on a short- term basis. It stores the information your computer is actively using so that it can be accessed quickly. While SATA drives perform at higher speed, the data they transfer is exactly the same as for the older cables.	- DRAM - SDRAM - DIMM - SO-DIMM - VRAM
SATA cable		SATA cables connect hard drives and optical drives to computers. These cables let the drives exchange data	- SATAII - SATAIII - ESATA - MSATA - SATA

		with the computer through the motherboard.	EXPRESS
IDE cable		IDE, an acronym for Integrated Drive Electronics, is a standard type of connection for storage devices in a computer. Generally, IDE refers to the types of cables and ports used to connect some hard drives and optical drives to each other and to the motherboard.	- 34-pin cable - 40-pin cable
Power supply		A power supply takes the AC from the wall outlet, converts it to unregulated DC, and reduces the voltage using an input power transform er, typically stepping it down to the voltage required by the load. For safety reasons, the transformer also separates the output power supply from the mains input.	- Linear - Switched - Battery-based
Hard disk		store changing digital information in a relatively permanent form. They give computers the ability to remember things when the power goes out.	- SATA - SSD - NVMe

PART C - “Step by Step Basic Desktop PC Assembly”

A desktop computer is a computer that fits on or under a desk. It has a monitor or another display, keyboard, mouse and some other input and output devices**.** Almost everyone uses this kind of pc. A desktop pc can be more powerful and reliable then a laptop. To assemble a pc is not so hard work. One’s just have to follow some instructions to assemble it.

So now, I will write down all the instructions how we can build up or assemble a pc with the very basic and minimum hardware. To build up a pc it needs 2-3 hours and some simple hand tools, such as a screw driver and a pair of pliers.

Step 1: Purchase all the products

First we have to buy all the products that is necessary to build the computer. I am listing the product name below,

1. Processor (CPU)
2. Computer Case
3. Optical Drive (DVD RW and SATA capable)
4. Memory (RAM)
5. Power Supply
6. SATA Cables
7. Motherboard (SATA Capable)
8. Processor Fan
9. Case Fan
10. Hard Drive (SATA Capable)
11. Assortment of case and drive screws (Not Pictured)
12. Flowers

But there is one thing to keep in mind that if we buy INTEL product than we cannot install it with a motherboard of AMD. That means if we buy an Intel product like motherboard, we also need to buy an Intel processor. That means we have to buy these products by maintaining this sequence.

Step 2: Gather Tools and Supplies

Gather the tools you will need for the project:

- Screwdriver (for slotted and Phillips head screws)
- Wire cutters and strippers
- Needle-nosed pliers
- Utility knife
- Small flashlight
- Adjustable wrench
- Small container to hold screws
- Heat sink compound
- Grounding Strap

We may not use every single one of these tools in every installation, but it is best to have all of them on hand in case if we have a use for them.
Warning: We have to use the correct tools every time in order to do the assembly perfectly and not to damage any component.

Step 3: Open the Case

We have to open the case by removing the side panels. We can find the screws that hold the side panels in place and remove them and then we have to slide it backward to open the case.

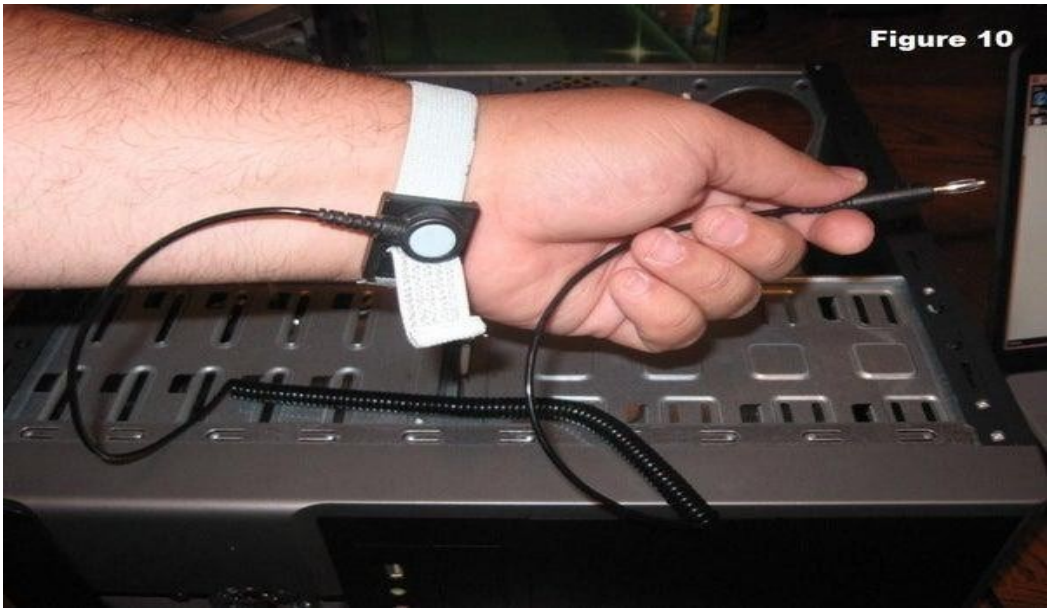
Warning: Some case may have sharp edge, that's why we have to be careful.

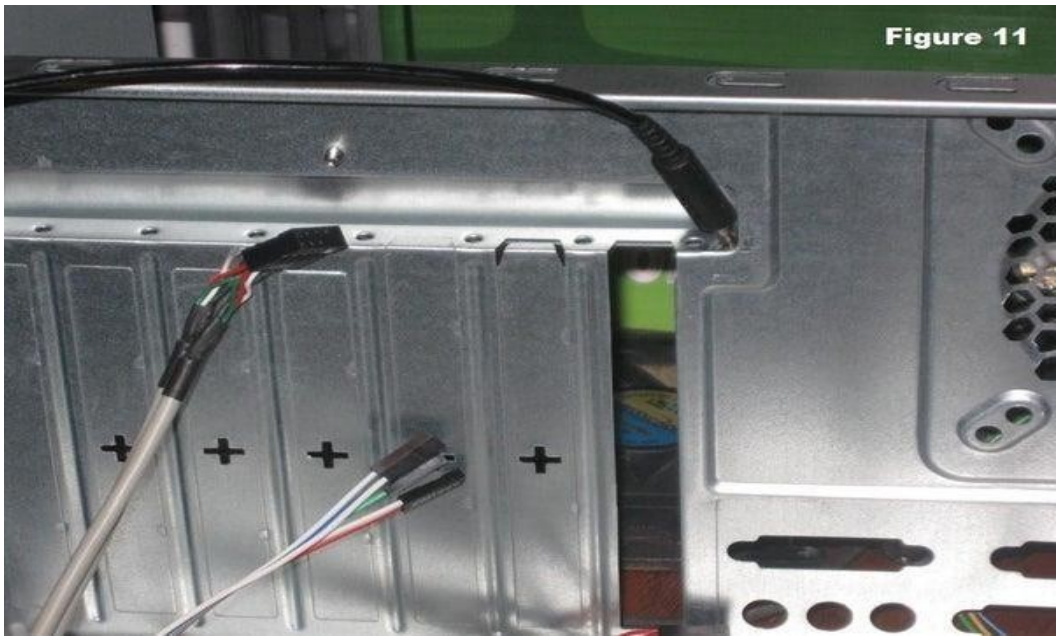
Step 4: Prepare the Case for Assembly

There are some things we need to done before assembly. Such as, we have to unpack materials or remove any parts that may have shipped inside. Remove the cover for the optical drive. We will see the cables pre-installed in the case. These should be front panel connections for features such as the power switch, audio jacks and usb ports. If they are not labeled, consult the manufacturer's documentation and we have to label them now before other parts get installed in the case.

Step 5: Ground Ourself

We have to put the grounding strap on our wrist and connect the other end to the computer case. If our strap is not equipped with a clip to hook to the case, we have to find a place to wedge against the metal. This will prevent any buildup of static electricity on your body from damaging the computer components.





Caution: Static electricity can ruin computer components. Always wear a grounding strap when handling any internal components.

Step 6: Install Motherboard

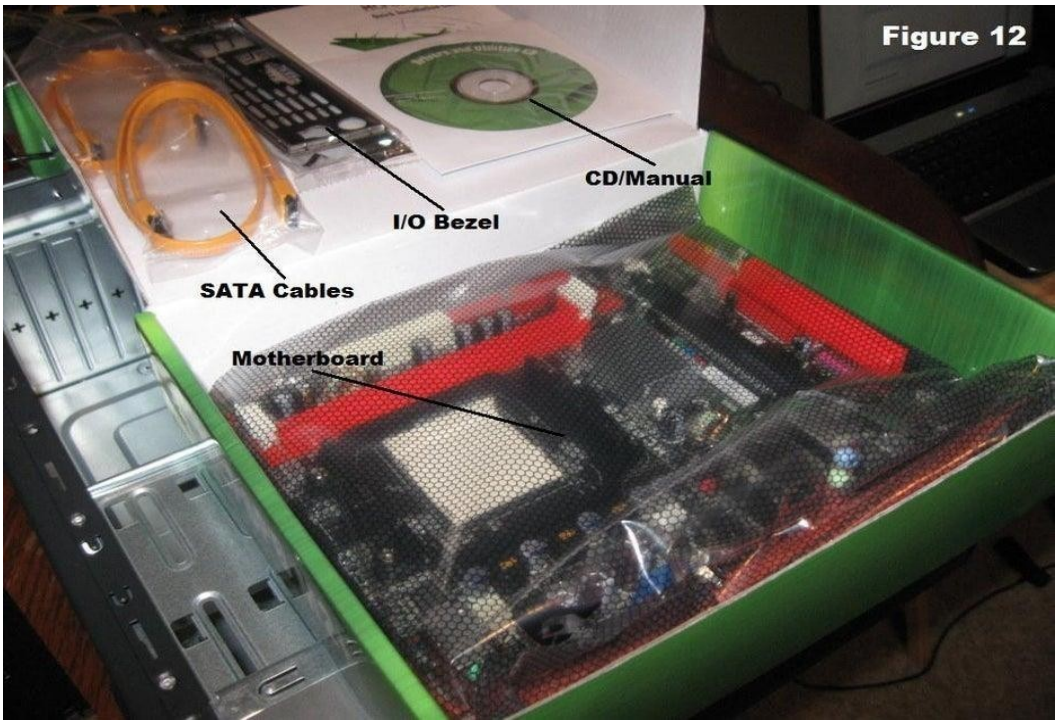
To install the motherboard, we need parts that should have been included with your purchased components:

- I/O Bezel is a trim panel installed in the back of the case that surrounds the interface ports on the motherboard. It should be included with the motherboard.
- Standoffs are installed in the case screw holes to create a riser that separates the case and motherboard. The screws install into the standoffs. Screws and standoffs should be included with the case, but it is a good idea to order these items just in case they aren't included.

So, now we will follow these steps to install the motherboard in the case:

1. Install the I/O bezel plate into the opening in the back of the case. It pushes in from the inside.
2. Install standoffs in the case. The standoffs screw into the motherboard mounting holes. Check the screw hole locations on the motherboard for exact placement.
3. Lower the motherboard into the case and align with the I/O bezel.
4. Install the screws.

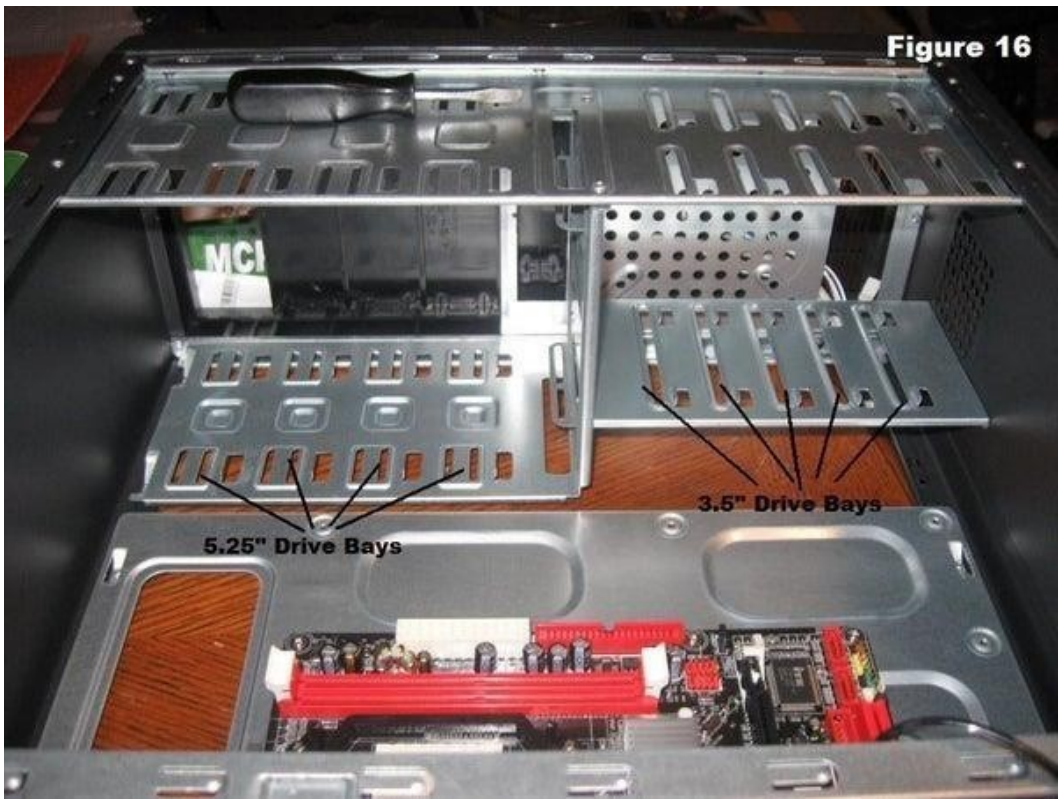
After this we will see the motherboard installed in the case. It works best to leave the screws loose until all of them have been started and the board is aligned with the bezel.



Caution: To prevent damage to the motherboard it must only contact the standoffs and screws. All of the standoffs and screws must be installed.

Step 7: Install Hard Drive

The hard drive is the device that stores all of our data. It is 3.5" wide and needs to be mounted so that you can gain access to the cable connections on the back (figure 16). If that is not possible we may need to connect cables before we install the drive. To mount the drive:



1. We have to find a 3.5" drive bay to install the drive in. If we have trouble finding a place to mount the drive consult with our case documentation for suggestions.
2. Then we have to slide the drive into place until the screw holes on the sides are lined up with the holes in the case.
3. And lastly, we have to install the screws.

Step 8: Install Optical drive

The optical drive is 5.25" wide and is installed in the drive bay that we removed the cover from in a previous step. Cable access considerations apply to this drive also. To install the drive:

1. First, we have to slide the drive into the drive bay until the screw holes are lined up and the front of the drive is flush with the front of the case. We have to make sure that it is orientated correctly.
2. And then we just need to install the screws.

Step 9: Install the CPU

We know that, the CPU is the brain of the computer. It is installed on the motherboard in the socket. To install the CPU is a very easy task like:

1. Find the corner marking that designates pin 1 of the CPU. On this AMD brand processor, the corner is marked with an arrow. We have to consult the manufacturer's documentation for specific information about our processor.
2. Lift the small metal rod next to the socket.
3. We have to find the corresponding marking on the CPU socket and insert the CPU so that the markings are lined up.
4. Last of al, we have to push the rod down to lock the processor in place.
5. And before fit it on the processor, we can add some thermal paste on the CPU for better thermal system.

Figure 19

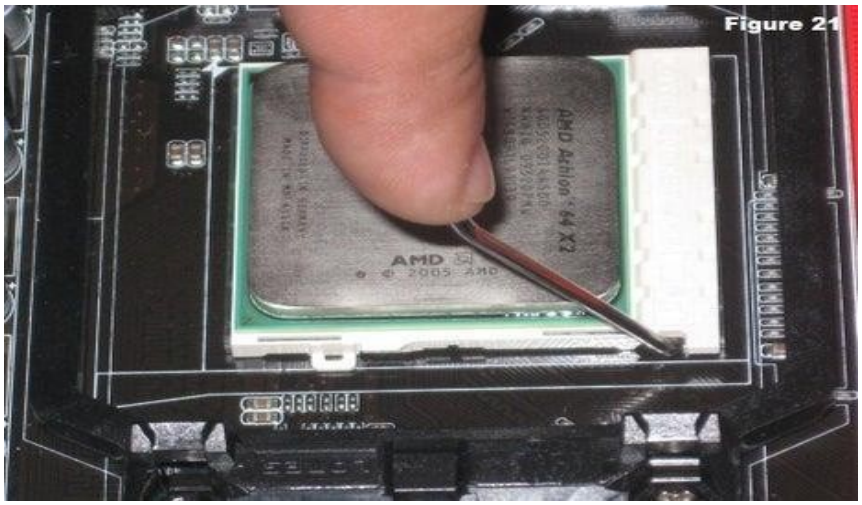
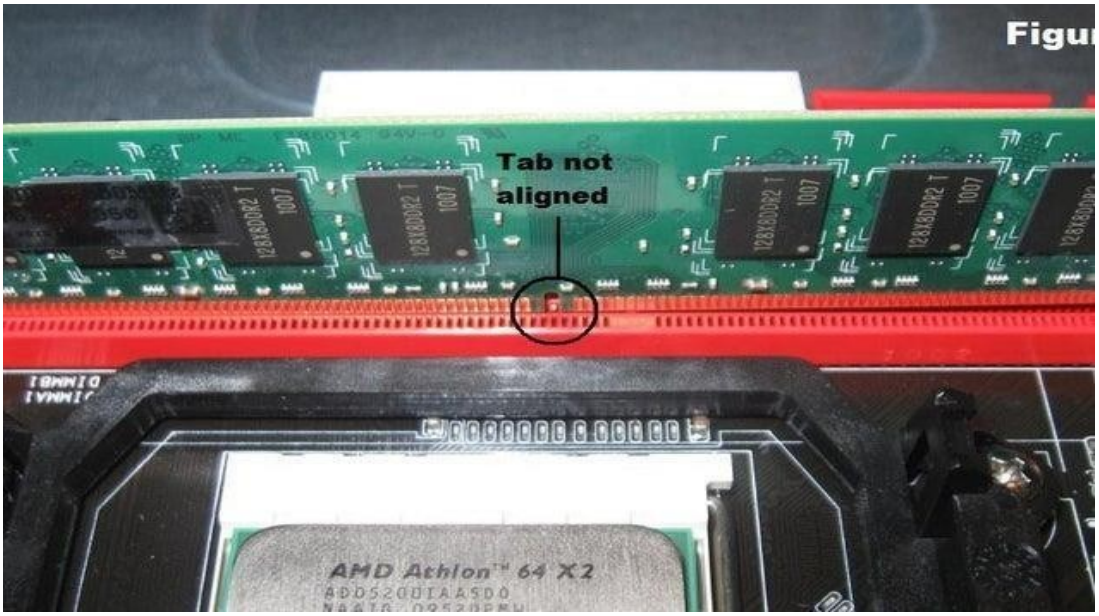
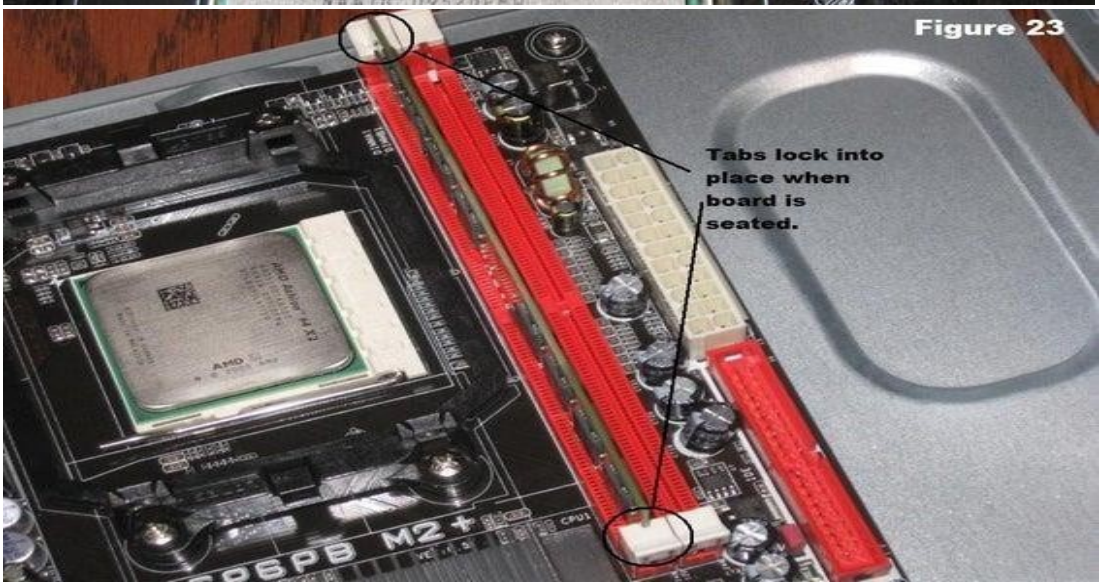


Figure 21

Step 10: Install RAM





The RAM is the temporary memory location that the processor works from. Permanently stored data is pulled from disks and stored in RAM while the processor works with it. The memory is easy to install:

1. We just have to set the RAM board in the socket. Then we have to check to see that the notch in the board is in the correct location. If it is not, we have to turn it around 180º.
2. Then we have to press firmly on both ends of the board to set it into the socket. We have to make sure the tabs lock into place.

Caution: Pressing the boards in when the tab is not aligned could cause damage to the RAM boards as well as the motherboard.

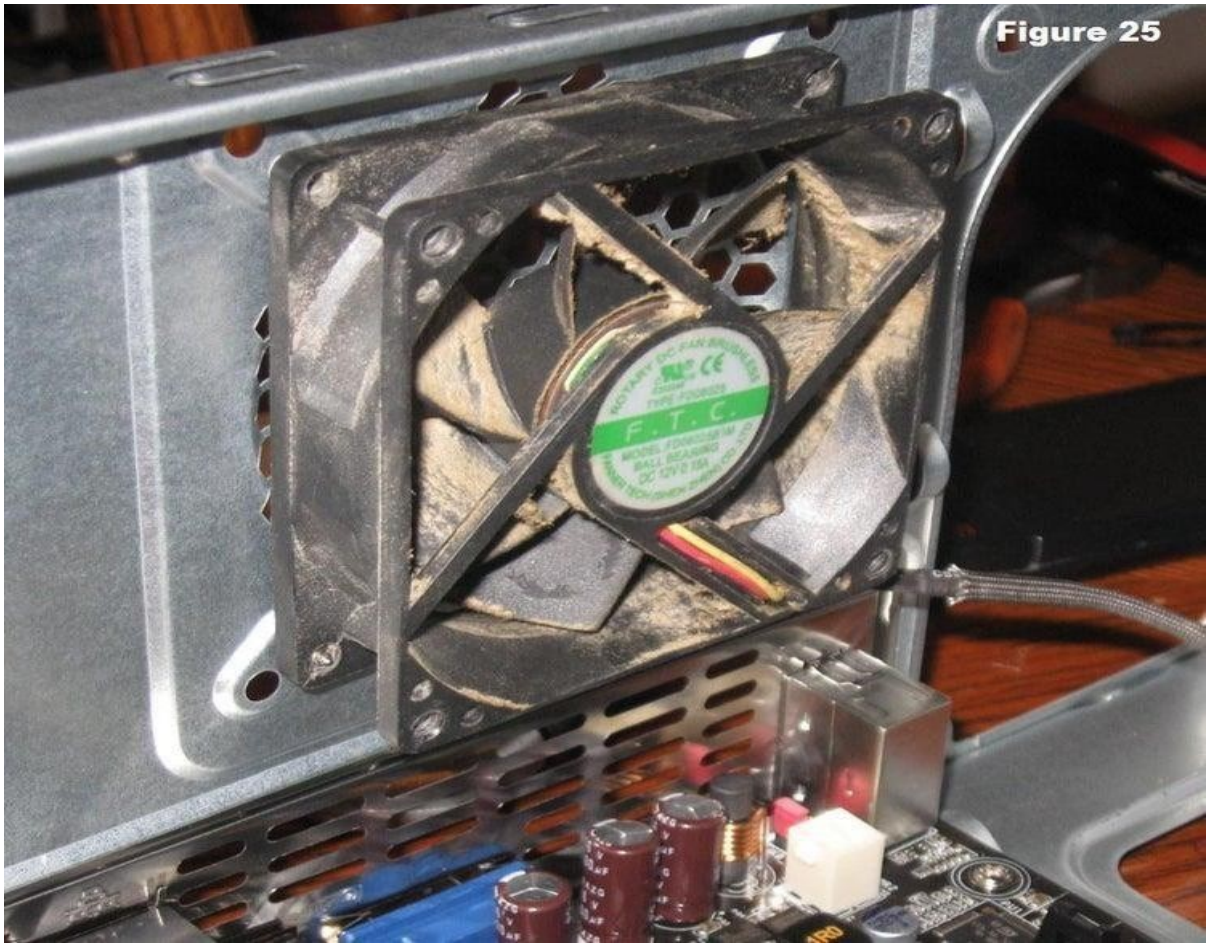
Step 11: Install the CPU Fan

The CPU fan is really a combination of a heat sink and fan together. The unit draws heat away from the CPU. To install the fan:

1. Place thermal compound to the CPU following the instructions provided with the compound.
2. Set the fan assembly on the CPU with mounting tabs aligned.
3. Pull the locking rod down on the fan assembly to lock into place.
4. Connect the fan assembly's power connector to the motherboard. Consult the manual to determine proper placement.

Caution: Failure to apply thermal compound will result in insufficient cooling and will cause damage to the CPU and/or motherboard. So, we have to be very careful.

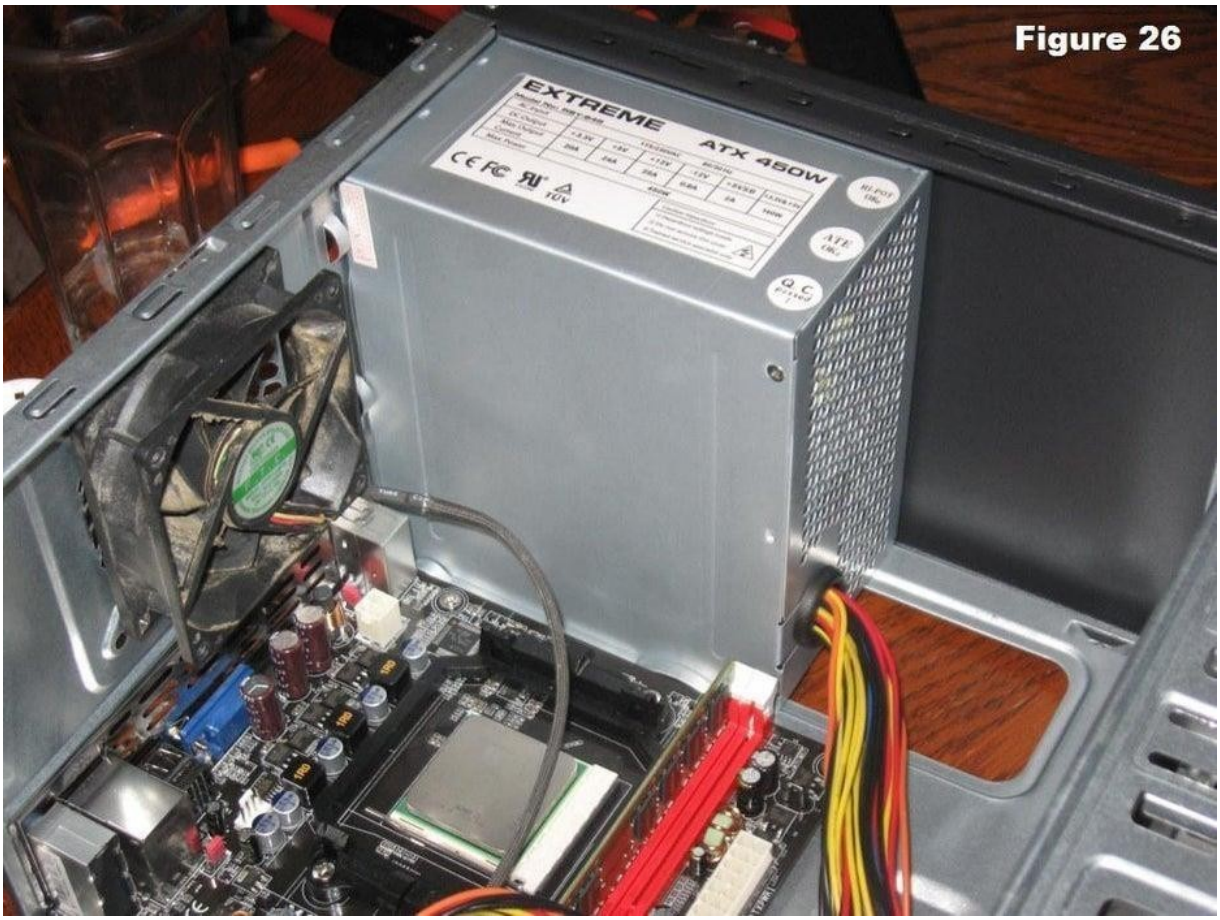
Step 12: Install Case Fan



The case fan is usually installed on the back panel of the case. If the fan mount is not obvious consult the case documentation. But nowadays there are many pc which are assembled with more than one fan. I guess it's made the thermal system better. To mount the fan:

1. Align the mounting holes by holding the fan to the mounting pad on the inside of the case as shown in figure 25. The fan needs to be mounted so thatit blows air out ofthe case.
2. Insert the screws from the outside of the case and tighten.

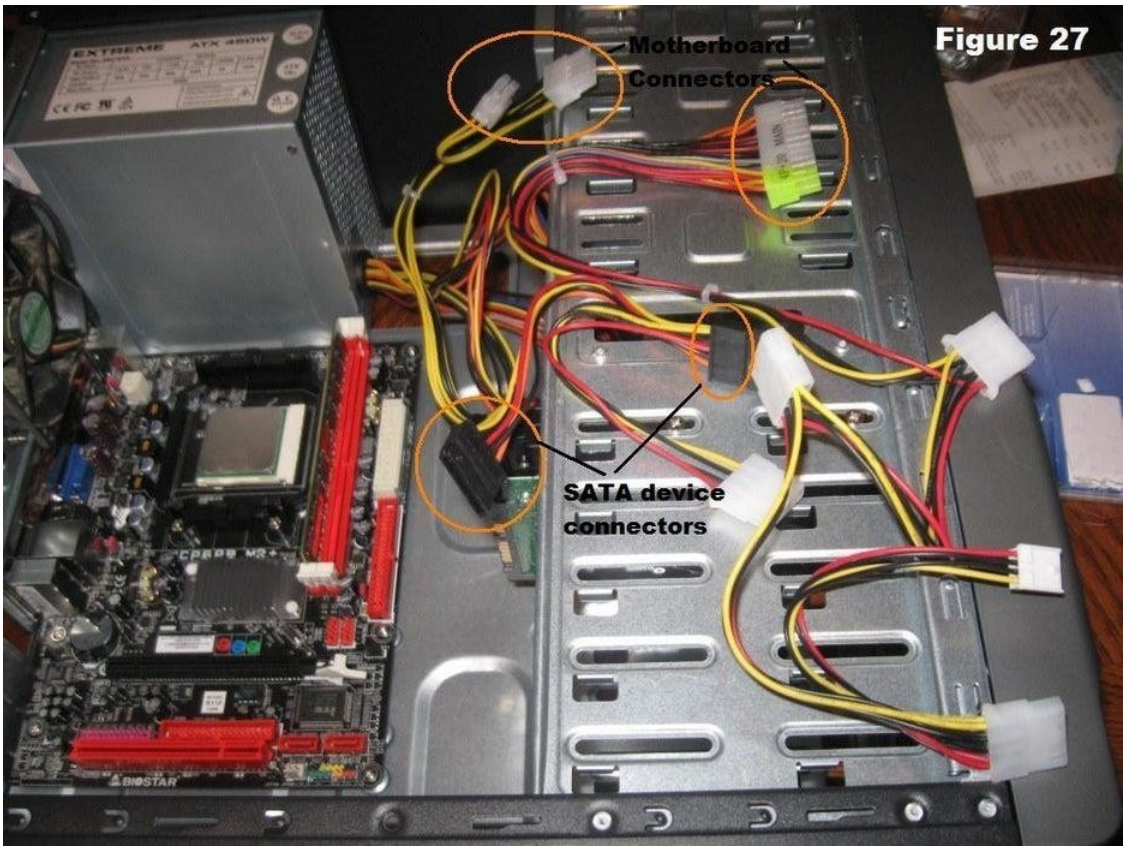
Step 13: Install Power Supply



We have to consult our case documentation for details and then follow these directions to install the power supply:

1. First we have to align the mounting holes in the case and power supply.
2. Then we have to insert screws and tighten.

Step 14: Connect Cables



With all of the components installed in the case, the jungle of wires can be daunting. It is important to consult the motherboard manual in order to make sure proper connections are made. There are two kinds of connections, power and data.

- Every device that has been installed needs power. The power supply connectors are shown. The motherboard has two power connections, and there are two connectors specifically for SATA devices (drives). The other connectors will run fans and other non- SATA devices.
- Data cables connect drives and front panel devices to the motherboard. Then we have to consult the motherboard documentation for the exact placement of connectors.

Warning: Incorrect connections can damage components and cause bodily injury.

Step 15: Wrap-up

Now that the components are completely installed, the last thing to do is to reinstall the side panels on the case. The computer is now ready to be turned on and to have software loaded on it. If the computer has problems starting up, check all component connections and mounting to make sure that one's have hooked everything up correctly. We just have to consult individual component manuals for specific troubleshooting information if problems persist.