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Subject: Technology and Information Systems (SECP1513)

Section: 04

Assignment: Step by step PC Assembly

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**PART A – Tools Needed**

1.0 Screwdrivers



The screwdrivers are used to remove or install screws in the PC. It is important to tighten the installed screws or else the motherboard may just randomly fall and break or the PC will not function properly.

2.0 Thermal paste



Thermal paste was applied to a processor before installing a cooling solution. It is important because it allows for an efficient transfer of heat from the IHS of the processor to the base plate or water block of the CPU cooler that is designed to dissipate the heat.

### 3.0 Wire cutters and strippers



Wire cutters and strippers are used to remove the insulation from electric wires in order to make contact and to cut copper, brass, iron, aluminium, and steel wire. Wire cutters and strippers are important to make sure it connects with the other wires or to the terminals and to cut the access wires.

### 4.0 Needle-nosed pliers



Needle-nosed pliers are used to grip small objects, reach awkward places, holding and shaping wires, bend loops, and attach wires. It is important so that the items placed in the motherboard will be more precise in order to make it function properly.

## 5.0 Small flashlight



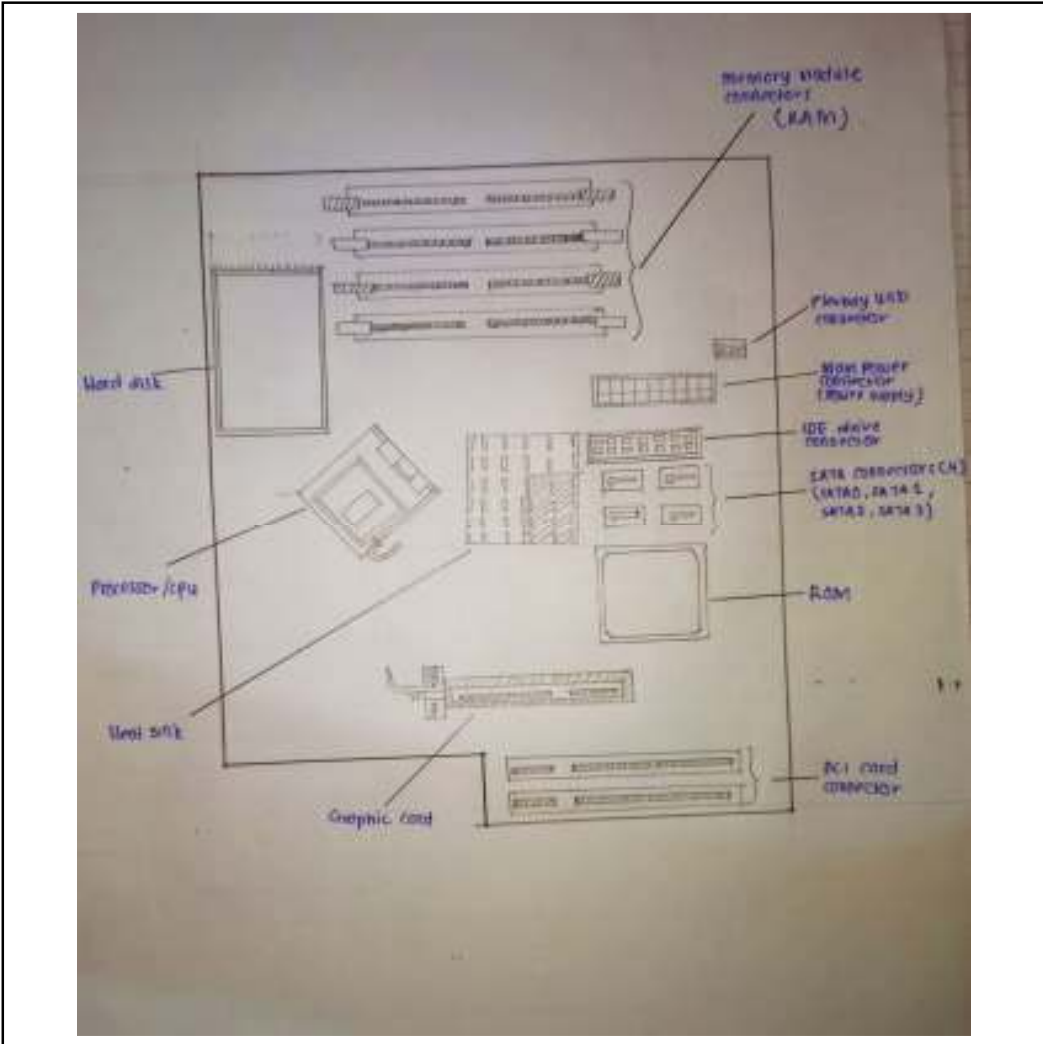
The main function of a flashlight is to provide light when there is no stationary, permanent light source in the observing area. Small flashlight is important to provide light in the smaller area of the PC so that the parts will not be wrongly installed.

## 6.0 Grounding strap



The function of ground straps is to protect individuals and equipment by serving as that safe path to grounding a live current. It is important to prevent electrical damage which occurs with a short circuit or surge because it provides a designated and safe path for electrical energy to flow to ground without harm.

**PART B – 1.0 Sketch of A Motherboard Layout**



The diagram above shows a sketch of motherboard layout

**PART B – 2.0 Basic Components of CPU (Function & Example)**

Components	Functions	Example of Models
<p>1. Graphic Card</p> 	<ul style="list-style-type: none"> <li>- Also known as video card, display adapter, video board and so on</li> <li>- An expansion card that connects to a computer motherboard.</li> <li>- A piece of hardware that processes and creates images and videos on a display</li> </ul>	<ul style="list-style-type: none"> <li>• AGP Graphic Card (Older Model)            </li> <li>• PCI Express Graphic Card (More modern Model)            </li> </ul>
<p>2. CPU / Processor</p> 	<ul style="list-style-type: none"> <li>- Also known as central process</li> <li>- Abbreviation of Central Processing Unit</li> <li>- Receives instructions from hardware and interpret the needs such as keyboard, mouse, etc., as well as computer program</li> <li>- Display information and perform the needs</li> </ul>	<ul style="list-style-type: none"> <li>• AMD Processor            </li> <li>• Intel Processor            </li> </ul>

### 3. Heat Sink



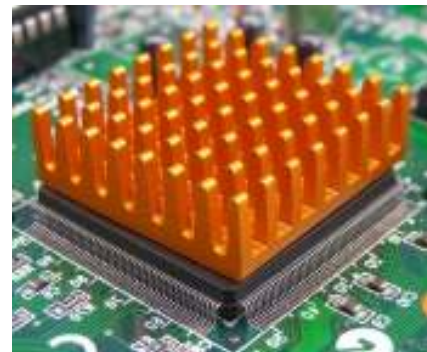
- To reduce the hardware component's temperature in cooperation with a fan or other mechanism
- The common components that generate high heat in computer are CPU, graphic card and power supply
- Available in multiple lengths and be determined regarding to the devices' speed

#### • Active Heat Sink



- Requires mechanical component and computer's power supply

#### • Passive Heat Sink



- Works in the presence of airflow that moves across its aluminum finned radiator

#### 4. CD-ROM



- Abbreviation of Compact Disc Read-Only Memory
- An optical media that contains read-only memory of audio or software data
- Requires a device called CD-ROM Drive to read it
- CD-ROM Drive has speed ranging from single speed(1×) to seventy-two speed(72×)

#### • CD-ROM



- Other examples of optical media:
  - DVD-ROM
  - CD-R
  - DVD-R
  - CD-RW
  - DVD-RW

#### 5. USB Cable



- USB, an abbreviation of Universal Serial Bus
- Used to connect peripheral and other devices to the computer
- Also be used to send power supply to electronic devices
- Two USB cables can be connected by using USB Hubs
- Different types of USB cable for different transfer speeds

#### • Mini-USB



#### • Micro-USB



#### • USB Type-C





## 6. Slots (IDE, PCI)

- IDE slots



- PCI slots



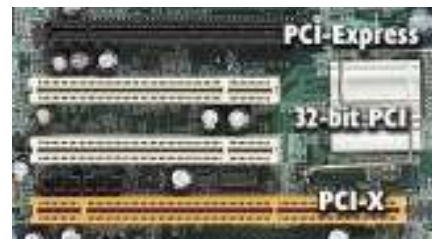
- IDE is an abbreviation of Integrated Drive Electronics
- IDE is an expansion slots that are at the front of motherboard and are used to connect storage devices to computer such as Hard Drives, Optical Drives, etc.
- PCI is an abbreviation of Peripheral Component Interconnect
- PCI is an expansion slots that are lined up along the back of motherboard and are used to attach more hardware to computer such as graphics cards, sound cards, network cards, etc.
- Commonly have 1 to 3 PCI ports on a motherboard

- IDE slots



- The first slot is known as IDE 1, which is the 'primary' interface
- The second slot is known as IDE 2, which is the 'secondary' interface

- PCI slots



- PCI slots come in both 32-bit and 64-bit versions
- It then advances to PCIe (PCI-Express) that uses a serial bus
- In the middle of the evolution to PCIe, there is also PCI-X in PCI slot's development

## 7. RAM



- An abbreviation of Random-Access Memory
- Also known as main memory, primary memory or system memory
- Allows users to retrieve and store data in a computer
- Being accessed randomly and faster access time
- Its capacity affects the computer's performance, that is, the larger the RAM, the faster the operating system and programs can process

- Dual In-line Memory Module (DIMM) – Have 168-pin



- Small Outline Dual In-line Memory Module (SO-DIMM) – Have both 72-pin and 144-pin



- Trademark of Rambus incorporated for Direct RDRAM modules (RIMM) – Have 184-pin



- Rambus memory used in laptop computers (SO-RIMM) – Have 160-pin



- Single In-line Memory Module (SIMM) – Have both 30-pin and 72-pin



## 8. SATA Cable

- SATA Power Cable



- SATA Data Cable



- SATA, an abbreviation of Serial AT Attachment
- SATA Power Cable is used for supplying power to hard disk and data drives
- SATA Power Cable has 15 pins
- SATA Data Cable is used for transmitting data between the drives as well as to help make cable routing easier and offers better airflow in computer
- SATA Data Cable has 7 pins

- SATA Power Cable and Data Cable



## 9. IDE Cable



- Connects some hard drives and optical drives to each other and to the motherboard
- Have three connection points
- One end for connecting the cable to motherboard, the remaining two ends are for attaching devices to computer
- One edge with red stripe refers to 1<sup>st</sup> pin

- 34-pin IDE ribbon cable



- Used for floppy drives

- 40-pin IDE ribbon cable



- Used for hard drives and optical drives

## 10. Power Supply



- A hardware component that supplies power to all other components in computer
- It converts alternating current into direct current
- Usually located at the top-back of computer
- Parts found inside a power supply (Function as the following order)
  - a) A transformer (Controls incoming voltage)
  - b) A rectifier (Converts current)
  - c) A filter (Smooths out current coming from rectifier)
  - d) A voltage regulator (Controls current's output to computer hardware)
- Fan inside a power supply will always be spinning

### • 300W Power Supply



### • 400W Power Supply



### • 600W Power Supply



### • 750W Power Supply



## 11. Hard Disk



### Jumper



- An electromechanical data storage device that stores and retrieves digital data
- A non-volatile primary and secondary storage device
- Essential for installation of a computer operating system and other programs
- Can be connected internally and externally
- A hard disk's master or slave role is depending on the rectangular piece of plastic called jumper's position on a series of pins of the hard disk

- Seagate U Series or Barracuda ATA Drive



- It is a slave drive if there is no jumper on the pins
  - It is a master drive if there is a jumper on pins seven and eight
- 2.5-inch Western Digital EIDE drive



- It is a master drive if there is no jumper on the pins
  - It is a slave drive if there is a jumper connects pins A and B
- 3.5-inch Western Digital EIDE drive



- It is a master drive if there is a jumper connects pins five and six (center pins)
- It is a slave drive if there is jumper connects pins three and four



## PART C – Step by Step PC Assembly



### Step 1. Open the computer case

By removing the side panels, open your machine case. Find and detach the screws holding the side panels. The panel is removed by sliding it back first then lifting it away from the case.

Caution: Maybe the case has sharp edges. To prevent injury, treat with caution.



### Step 2. Prepare the Case for Assembly

Until assembly starts, three things need to be done: Remove any pieces that could have been shipped inside the case or any packing materials.

Remove the optical drive cover. In our case, as seen, we will remove the cover on the tallest drive bay to install our DVD drive. Do this by clicking the displayed retention tabs. Take note of the pre-installed wires in the case. For features like the power switch, audio jacks and USB ports, these should be front panel connections. Consult the manufacturer's documentation if they are not numbered and mark them yourself now before other pieces are mounted in the case.



### Step 3. Ground Yourself

On your hand, place the grounding strap and attach the other end to the case of the device. Find a spot to wedge against the metal if your strap is not fitted with a clip to hook to the case, as seen. This will prevent the computer parts from being affected by the accumulation of static electricity on your body.

Caution: Computer parts can be ruined by static electricity. When handling any internal parts, always wear a grounding strap.



### Step 4. Install Motherboard

We need parts that should have been included with your purchased components to mount the motherboard:

The I/O Bezel is a trim panel mounted on the back of the case covering the motherboard interface ports. The motherboard should be included with it. Show the contents of the box on the motherboard.

In order to create a riser separating the case and motherboard, standoffs are mounted in the case screw holes. As seen the screws fit into the standoffs. The case should contain screws and standoffs, but it is a good idea to order these things just in case they aren't included.

To mount the motherboard in a case, follow these steps:

1. Push the I/O bezel plate from the inside into the opening in the back of the case.

2. Install on-case standoffs. The standoffs are screwed into the shown motherboard mounting holes. For exact positioning, search the screw hole positions on the motherboard.
3. Lower the motherboard and align it with the I/O bezel in the case.
4. Have the screws mounted.
5. Show the mounted motherboard in the case. When all of them have started and the board is aligned with the bezel, it works best to keep the screws loose.

Caution: It is only important to touch the standoffs and screws to avoid damage to the motherboard. You must mount all of the standoffs and screws.



#### Step 5. Install Hard Drive

The hard drive is the computer where all your information is stored. It is 3.5" wide and needs to be mounted so that the cable connections on the back can be accessed. You may need to connect cables before installing the drive if that is not possible. To mount the drive:

1. Find a 3.5' drive bay in which to mount the drive. For ideas, check your case documentation if you have difficulty finding a place to install the drive.
2. Slide the drive into place until the holes in the case are lined up with the screw holes on the sides.
3. Have the screws mounted.





#### Step 6. Install Optical Drive

The optical drive is 5.25" wide and is installed in the drive bay from which we removed the cover in the previous step. This drive is also subject to cable access considerations. To install the drive:

1. Until the screw holes are lined up and the front of the drive is flush with the front of the case, slide the drive into the drive bay. Make sure that it is correctly oriented.
2. Have the screws mounted.



#### Step 7. Install the CPU

The CPU is the computer's memory. In the socket shown, it is mounted on the motherboard. Installing a CPU:

1. As seen, find the corner marking that designates pin 1 of the CPU. The corner is labelled with an arrow on this AMD brand processor. For detailed information about your processor, check the manufacturer's documentation.
2. Next to the socket, raise the small metal rod as shown in.
3. On the CPU socket, locate the corresponding marking and insert the CPU so that the markings are lined up.
4. To lock the processor in place, force the rod down.



### Step 8. Install RAM

The RAM is the temporary location of memory from which the processor operates. Data stored permanently is pulled from disks and stored in RAM as the processor runs with it. The memory is straightforward to install:

As demonstrated, placed the RAM board in the socket. Check to see if the notch is in the right position on the surface. Turn it about 180 if it is not.

To set it into the socket, press firmly on both ends of the board. Make sure that as shown the tabs lock into place.

Caution: When the tab is not aligned, pressing the boards in could cause damage to both the RAM boards and the motherboard.



### Step 9. Install the CPU Fan

The CPU fan is essentially a mixture of a heat sink and a fan. The heat is pulled away from the CPU by the machine. Installing the fan:

1. Following the instructions given with the compound, place the thermal compound on the CPU.
2. Set up the fan assembly on the CPU with aligned mounting tabs.
3. Pull the locking rod down to lock into position on the fan assembly.
4. Attach the energy connector of the fan assembly to the motherboard. To decide the correct positioning, consult the manual.

Caution: Failure to apply a thermal compound will result in inadequate cooling and the CPU and/or motherboard will be damaged.



#### Step 10. Install Case Fan

The case fan is normally mounted on the case's back panel. Refer to the case documentation if the fan mount is not visible. Mounting the ventilator:

1. Align the mounting holes by keeping, as shown the fan on the inside of the case to the mounting pad. It is important to install the fan so that it blows air out of the case.
2. From the outside of the case, insert the screws and tighten.



#### Step 11. Install Power Supply

For information check your case documentation and then follow these instructions to install the power supply:

1. Align, as shown the mounting holes in the case and power supply.
2. Tighten and attach screws.



## Step 12. Connect Cables

The jungle of wires can be overwhelming with all of the components mounted in the case. In order to ensure that proper connections are made, it is necessary to consult the motherboard manual. Two kinds of relations, power and data, exist.

Every installed device requires power. The connectors of the power supply are seen. There are two power connections on the motherboard and two connectors are exclusively available for SATA applications (drives). Fans and other non-SATA appliances can run on the other connectors.

Data cables link the motherboard to drives and front panel computers. For the precise location of the connectors, please review the motherboard documentation.

Caution: Incorrect links will destroy parts and cause bodily injury.



## Step 13. Wrap-up

The last thing to do now that the components are entirely assembled is to reinstall the side panels on the case. Now the device is ready to be turned on and to be loaded with applications. Check all part connections and mounting to ensure that you have correctly hooked it up if the device has trouble starting up. For basic troubleshooting material, consult individual part manuals if problems persist.

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