* **A+ - Installation and Maintenance of Hardware and Its components**

**CompTIA A+ Assignment**

**Module -1, 2 [Hardware and its components]**

• **What is input device?**

**Ans.** Input device is Hardware used to enter data and instruction like a mouse, keyboard, remote, touch-screen etc.

**• What are output device?**

**Ans.** The output device is Hardware that conveys information to a user like a printer, modem, speaker etc.

**• What is CPU?**

**Ans.** “Central Processing Unit” The primary component of a computer that acta as a Control Centre.

**• What are the type of CPU?**

**Ans.** Single-core, dual-core, Quad-core, Hexa-core, Octa-core and Deca-core processors are explained below.

**• What do we need to keep the CPU Healthy?**

**Ans.**  Restart your computer at least once a week, Hygiene your programs, install antivirus Software, Back-up your files, monitor your CPU temperature, Keep your computer clean Etc.

**• Do a practical to remove processor and apply thermal paste in it and install it again.**

**Ans.**

Step 1: Gain Access to CPU Cooler.

Step 2: Remove the CPU Cooler.

Step 3: Wipe Off existing thermal paste.

Step 4: Apply Fresh thermal paste.

Step 5: Mount the CPU Cooler.

Step 6: Assembly is the reverse of disassembly.

**• Do a practical to Identify CPU and its Sockets.**

**Ans.**  You can either Look at the product specification, the packaging, or the CPU itself.

**• What is Memory ?**

**Ans.** It is a store information, such a as data and programs for immediate use in the computer.

**• What are the types of memory ?**

**Ans.** 1. Primary memory(RAM and ROM)

RAM – 1. Static RAM, 2.Dynamic RAM,

ROM – 1. Programmable ROM,

2.Erasable Programmable ROM,

3.Electrically Erasable Programmable ROM.

2. Secondary memory(Hard Drive, CD, etc.)

**• Do a practical to identify memory types.**

**Ans.** 1.RAM(Random Access Memory): Look for “Install Memory” to find the RAM size(in GB).

2. Storage(HDD/SSD): Look for “Drives” or “Storage” to find storage capacity(GB/TB).

**• Do a practical to install memories in system.**

**Ans.** 1. Power Off: Turn off the computer and disconnect the power source.

2. Open Case: Open the computer case using apprppriate tool.

3. Locate Slote: Identify available RAM slot on the motherboard.

4. Insert RAM: Align the RAM module with the slot and gently push until it clicks.

5. Close Case: Secure the computer case and reconnect all cables.

6. Power On: Turn on the computer to check if the new memory is recognized.

**• Do a practical to identify main memory frequencies.**

**Ans.** 1. Check BIOS/UEFI: Access the computer’s BIOS/UEFI during startup (usually by pressing DEL, F2, or F3). Look for memory information, including frequency.

2.Use System Information Tool: In a windows, open the system information tool. Look for “installed Physical Memory(RAM)” and the “Speed” parameter to find the memory frequency.

**• What is BIOS?**

**Ans.** BIOS is the software built into a computer’s motherboard, essential for booting the system and initializing hardware components.

**• Describe working process of BIOS?**

**Ans.** BIOS is firmware on a computer’s motherboard. It starts when you turn on the computer and initializes hardware components, ensuring the system boots properly.

**• Do a practical to reset bios when system is on.**

**Ans.** BIOS is firmware on a computer’s motherboard. It starts when you turn on the computer and initializes hardware components, ensuring the system boots properly.

**• Do a practical of Hard resetting the BIOS.**

**Ans.**

1. Power off: Shut down the computer and disconnect all power sources.
2. Remove Battery(If Application): If applicable, remove the laptop battery.
3. Press Power Button: Hold down the power button for 15-20 seconds.
4. Reconnect Battery/Power: Reinsert the battery or plug in the power cord.
5. Power On: Turn on the notebook. BIOS should be reset.

**• Do a practical of identifying BIOS chip from the motherboard.**

**Ans.**

1. Visual Inspection: Look for a small, rectangular chip on the motherboard, often labelled with “BIOS”, ”UEFI”, or the motherboard manufacture’s name.

2. Check Motherboard Manual: Consult the motherboard manual or visit the manufacture’s websites for specific guidance on identifying the BIOS chips location.

**• What is CMOS?**

**Ans.** CMOS (Complementary Metal-Oxide Semiconductor). It’s a low-power technology used in microchips and batteries to store BIOS settings in computers.

**• What is motherboard?**

**Ans.** The motherboard is the main circuit board in a computer that hold the central processing unit (CPU), memory, and other essential components. It provides connectivity and allows these parts to communicate, enabling the computer to operate.

**• Describe types of motherboard.**

**Ans.** Motherboards in terms in of form factors like ATX, microATX, and mini-ITX, which determine the size and layout of the motherboard, fitting different computer case sizes.

1. **ATX(Advance Technology Extended)**: Standard size with various features, suitable for most desktop PCs.
2. **Micro**-ATX: Smaller than ATX, with fewer expansion slots, ideal for compact PCs.
3. **Mini**-ITX: Very compact, designed form-factor PCs and HTPCs(Home Theater PCs).
4. **EATX(Extended ATX)**: Larger than ATX, offers more features and space for multiple GPUs or storage.
5. **ITx(Information Technology eXtended)**: Compact, designed for specific applications or specialized PCs.

**• Do a practical by identifying parts of motherboard.**

**Ans.**

1. **CPU Socket:** Locate the central processing unit(CPU) socket where the processor in installed.
2. **RAM Slots:** Identify the slots for inserting RAM modules(memory sticks).
3. **PCIe Slots:** Find the PCIe slots for graphics card, wi-fi adapters, and other expansion cards.
4. **SATA Ports:** SATA ports for connecting hard drives and SSDs.
5. **CMOS Battery:** Identify the small coin cell battery providing power connector.
6. **USB Headers:** Locate USB headers for connecting front-panel USB ports.
7. **Power connectors:** Find the main ATX power connector to CPU power connector.
8. **Front panel:** Identify pins for power button, reset button, and LEDs From the case.
9. **Heat Sinks:** Find heat sinks over components like the CPU and voltage regulators.
10. **Motherboard Chipset:** identify the chipset, often a large chip, managing communication between components.

* **Do a practical by removing all removable parts from the motherboard.**

**Ans.** Removing all removable parts from a motherboard, such as RAM, CPU, and expansion cards, requires careful handling and some technical expertise. It’s a practical process often performed during maintenance or upgrades to a computer system.

* **What is system bus.**

**Ans.** The system bus is a communication pathway that connects various hardware components within a computer, allowing them to exchange to exchange data and control signals.

* **What is chipset and types of chipset?**

**Ans.** A chipset is a set of integrated circuits on a motherboard that manages data flow between the CPU, memory, and peripherals. Common types include northbridge(memory & GPU) and Southbridge(I/O)chips, but modern system often have integrated or consolidated chipsets.

* **Describe how does the Northbridge chipset work what is SMPS? And its purpose DO a practical to install SMPS**.

**Ans**. The Northbridge chipset manages data flow between the CPU,RAM, and GPU, controlling memory and PCI Express buses. However, modern system often integrate these functions.

SMPS(Switched-mode power supply) converts AC power to DC for a computer. It ensures stable and efficient power supply

To components.

**Practical to install an SMPS involves:**

1. Ensure safety.
2. Open the computer case.
3. Disconnect old SMPS cables.
4. Remove the old SMPS.
5. Install the new SMPS.
6. Connect power cables.
7. Close the case.
8. Plug in and turn on the computer.

* **How to check SMPS?**

**Ans.**

**1.** Use a multimeter.

**2.** Ensure the SMPS is unplugged and discharged.

**3.** Measure the voltage output on the 24-pin ATX connector using the multimeter.

**4.** Ensure the reading are within the specified voltage ranges for +12v, +5v, and +33v.

**5.** If the voltages are correct, the SMPS is likely functioning.

* **List out the types of storage devices.**

**Ans.** 1. Hard Disk Drive (HDD)

**2.** Solid-State Drive(SSD)

**3.** USB Flash Drive

**4.** Optical Disc Drive(DVD Drive)

**5.** Memory Cards(SD cards)

**6.** Network Attached Storage(NAS)

**7.** External Hard Drive

**8.** Cloud Storage

**9.** Magnetic Tape

**10.** RAM(temporary storage)

* **Describe the working process of storage devices.**

**Ans.** Storage devices work by storing and retrieving data on a computer. Here’s a brief overview of the working process.

1. **Input of Data:** Data is first input into the storage device from a computer or external source.

2. **Conversion to Binary:** The data is then converted into binary code, which consists of 0s and 1s, the fundamental language of computers.

3. **Storage on Media:** The binary code is stored on the storage media, such as a hard disk drive (HDD), solid-state drive (SSD), or optical disc. These devices use various technologies to physically encode and store the binary data.

4. **Retrieval of Data:** When the computer needs to access the stored data, it sends a request to the storage device. The device retrieves the binary code and sends it back to the computer.

5. **Conversion to Usable Data:** The binary code is then converted back into a usable form, such as text, images, or applications, by the computer's central processing unit (CPU) and other relevant components.

* **Do a practical to Remove storage devices and reinstall it and make a GPT disk.**

**Ans.**

1. **Physically Remove the Storage Device:**

Power off your computer

Disconnect the cables from the storage device (HDD, SSD).

Remove the device from its slot (if internal) or disconnect it (if external).

2. **Reinstall the Storage Device:**

If it's an internal device, insert it into the appropriate slot.

Reconnect the cables securely.

For external devices, connect them to the computer.

3. **Boot Up the Computer:**

Power on the computer.

4. **Access Disk Management (Windows) or Disk Utility (Mac):**

On Windows, right-click on the Start button, select "Disk Management."

On Mac, go to "Applications" > "Utilities" > "Disk Utility."

5. **Initialize the Disk:**

In Disk Management or Disk Utility, locate the newly installed disk.

Initialize the disk. For GPT, choose GUID Partition Table as the partition style.

6. **Create Partitions (Optional):**

You can create partitions on the disk if needed. Right-click on unallocated space and select "New Simple Volume" (Windows) or use the "+" button in Disk Utility (Mac).

7. **Format the Disk:**

Format the partitions with the desired file system (e.g., NTFS for Windows, APFS for Mac).

8. **Verify the Changes:**

Ensure that the disk is recognized and formatted correctly.

* **What is SATA?**

**Ans.** SATA(Serial ATA) is a standard interface for connecting storage devices like hard drives and SSDs to computer’s motherboard, offering faster data transfer, thinner cables, and improved compatibility compared to older standards like PATA.

* **Describe the working of SATA.**

**Ans.** SATA (Serial ATA) works by providing a standard interface for connecting storage devices to a computer's motherboard. It uses a serial communication method to transfer data between the storage device and the motherboard. SATA cables transmit data in a sequential fashion, improving speed and efficiency compared to older parallel interfaces. This allows for faster data transfer rates, thinner cables, and better compatibility with modern storage devices.

* **Do a practical to install SATA.**

**Ans.**

1. **Prepare:**

Turn off the computer and disconnect all cables.

Identify an available SATA port on the motherboard.

2. **Attach SATA Cable:**

Connect one end of a SATA data cable to the storage device.

Connect the other end of the SATA cable to an available SATA port on the motherboard.

3. **Power Connection:**

Connect the power cable from the power supply unit to the storage device's power input.

4. **Secure the Drive:**

If the storage device is internal, secure it in the drive bay using screws.

If external, ensure the device is securely connected.

5. **Power On:**

Power on the computer and enter the BIOS/UEFI settings if required.

6. **Check Recognition:**

Verify in the BIOS/UEFI settings that the system recognizes the newly connected SATA device.

7. **Operating System:**

If it's a new drive, you might need to initialize and format it using your operating system's disk management tools.

8. **Verification:**

Open File Explorer (Windows) or Finder (Mac) to confirm the new storage device is listed and accessible

* **What is SCSI storage and type of scsi?**

**Ans.** SCSI (Small Computer System Interface) is a set of standards for connecting and transferring data between computers and peripheral devices, particularly storage devices. There are several types of SCSI:

**SCSI-1:** The original SCSI standard, offering an 8-bit parallel interface with a data transfer rate of up to 5 MB/s.

**SCSI-2:** Improved upon SCSI-1, providing an 8-bit or 16-bit parallel interface with data transfer rates of up to 10 MB/s (8-bit) or 20 MB/s (16-bit).

**Wide SCSI:** An extension of SCSI-2, featuring a 16-bit parallel interface with data transfer rates of up to 20 MB/s.

**Fast SCSI**: Another SCSI-2 extension, offering faster data transfer rates of up to 10 MB/s.

**Fast Wide SCSI:** Combines the features of Wide SCSI and Fast SCSI for higher data transfer rates on a 16-bit interface.

**Ultra SCSI:** An enhancement of Fast SCSI, doubling the data transfer rate to 20 MB/s.

**Ultra Wide SCSI:** Combines the features of Wide SCSI and Ultra SCSI for higher data transfer rates on a 16-bit interface.

**Ultra2 SCSI:** Doubles the data transfer rate of Ultra SCSI to 40 MB/s.

**Ultra3 SCSI (also known as Ultra160 and Ultra320):** Provides data transfer rates of up to 160 MB/s or 320 MB/s.

**Ultra640 SCSI:** An extension of Ultra320 SCSI, doubling the data transfer rate to 640 MB/s.

* **What is I/O ports?**

**Ans.** I/O (Input/Output) ports are connection points on a computer or device that allow you to plug in external devices. Examples include USB ports for keyboards and mice, HDMI ports for monitors, and audio jacks for speakers or headphones. I/O ports enable communication and data exchange between the computer and external peripherals.

* **List out the I/O ports available Do a practical to identify the I/O ports.**

**Ans.** The connection point acts as an interface between the computer and external devices like printers, modems, etc.

1. **Internal Port:** It connects the system’s motherboard to internal devices like hard disk, CD drive, internal Bluetooth, etc.
2. **External Port:** It connects the system’s motherboard to external devices like a mouse, printer, USB, etc.

**Some important types of ports:**

1. **Serial Port:**

Used for external modems and older computer mouse

Two versions-9pin,25pin

Data travels at 115 kilobits per second

2. **Parallel Port:**

Used for scanners and printers

25 pin model

3. **Universal Serial Bus (or USB) Port:**

It can connect all kinds of external USB devices such as external hard disks, printers, scanners, mouse, keyboards, etc.

Data travels at 12 megabits per second.

4. **Firewire Port:**

Transfers large amounts of data at a very fast speed.

Connects camcorders and video equipment to the computer.

Data travels at 400 to 800 megabits per second.

5. **Ethernet Port:**

Connects to a network and high-speed Internet.

Data travels at 10 megabits to 1000 megabits per second depending upon the network bandwidth.

* **What is Boot Process?**

**Ans.** The system testes the hardware, loads and runs the operating system, and configures devices.

The boot process is the sequence of operations that occur when a computer is powered on or restarted.

1. **Power On:** The computer receives electrical power, initiating the boot process.

2. **BIOS/UEFI Initialization:** The Basic Input/Output System (BIOS) or Unified Extensible Firmware Interface (UEFI) firmware is activated. It performs a Power-On Self-Test (POST) to check hardware integrity.

3. **Boot Loader Activation:** The BIOS or UEFI locates and activates the boot loader, a small program that resides on the system's storage device.

4. **Operating System Kernel Loading:** The boot loader loads the operating system kernel into the computer's memory (RAM).

5. **Initialization of the Operating System:** The operating system kernel takes control, initializing system components, loading necessary drivers, and preparing for user interaction.

6. **Login or Desktop Display:** The operating system presents a login screen or desktop environment, allowing the user to interact with the computer.

* **Describe the boot process in Linux?**

**Ans.**

**BIOS/UEFI:** The computer's firmware (BIOS or UEFI) is activated, initiating the boot process.

**Boot Loader (GRUB**): The boot loader, commonly GRUB (Grand Unified Bootloader), is loaded. It presents a menu to choose the Linux kernel and initial RAM disk (initrd).

**Linux Kernel Loading:** The selected Linux kernel is loaded into memory. It is the core of the operating system that manages hardware and resources.

**Initrd (Initial RAM Disk):** The initrd is a temporary file system loaded into memory. It contains essential drivers and utilities needed to mount the actual root file system.

**Root File System Mounting:** The initrd mounts the root file system, transitioning from the temporary initrd to the actual root file system on the storage device.

**Init Process:** The kernel initializes the init process (or its successor, such as systemd). The init process is the first user-space process and is responsible for starting and managing other processes.

**User Space Initialization:** The init process initializes the user space, including essential system services, daemons, and user login processes.

**Login Prompt or Graphical Interface:** Finally, the system presents a login prompt or a graphical user interface, indicating that the Linux system is fully booted and ready for user interaction.

This process may vary slightly depending on the Linux distribution and the specific configuration of the system

* **List out the types of display?**

**Ans.** TFT (Thin Film Transistor)

LCD (Liquid Crystal Display)

OLED (Organic Light-Emitting Diode)

AMOLED Display (Active-matrix organic light-emitting diode)

* **What is printer? And type of printer.**

**Ans.** A printer is a peripheral device that produces a physical copy of text or graphics from a digital document. Common types of printers include:

1. **Inkjet Printer:** Uses liquid ink cartridges to produce high-quality color and black-and-white prints. Suitable for home and small office use.
2. **Laser Printer**: Utilizes toner cartridges and a laser beam to produce fast and precise prints, making it ideal for offices with high-volume printing needs.
3. **Dot Matrix Printer**: An older technology that creates characters and images by striking an ink-soaked ribbon against paper, often used for multipart forms.
4. **Thermal Printer:** Uses heat to transfer color or monochrome images onto specially coated paper. Common in point-of-sale systems and label printers.
5. **3D Printer:** Builds three-dimensional objects layer by layer from digital models, commonly used in prototyping and manufacturing.

* **Do a practical to install the printer.**

**Ans.**

1**. Prepare:**

Ensure the printer is powered on.

Connect the printer to your computer using a USB cable or make sure they are on the same network if it's a wireless printer.

2. **Software Installation:**

For many printers, your computer will automatically detect and install the necessary drivers. If not, use the installation CD or download drivers from the printer manufacturer's website.

3. **Connect to Power:**

Plug in the printer to an electrical outlet and turn it on.

4. **Connect to Computer:**

If using a USB cable, connect one end to the printer and the other to an available USB port on your computer.

For wireless printers, follow the manufacturer's instructions to connect it to your Wi-Fi network.

5. **Driver Installation:**

Allow your operating system to automatically install the printer drivers. If not, run the installation software you downloaded.

6. **Print Test Page:**

Once the drivers are installed, print a test page to ensure the printer is functioning correctly.

7. **Default Printer (Optional):**

Set the newly installed printer as the default printer on your computer if desired.

* **Do a practical to Troubleshoot the improper printing.**

**Ans.**

**Check Connections:**

Ensure all cables (USB, power) are securely connected to the printer and the computer.

Paper Jam:

Check for paper jams in the printer. Remove any stuck paper carefully.

**Ink/Toner Levels:**

Check ink or toner levels. Replace cartridges if they are low or empty.

**Print Queue:**

Check the print queue on your computer. Cancel any stuck or pending print jobs.

**Restart Printer:**

Turn off the printer, wait a few seconds, and turn it back on. This can resolve minor glitches.

**Printer Software:**

Ensure you have the latest printer drivers installed. Update or reinstall drivers if necessary.

**Printer Settings:**

Check printer settings for any errors or misconfigurations.

**Network Connection (Wireless Printers):**

If using a wireless printer, ensure it is connected to the correct network.

**Check for Updates:**

Check for software updates for your operating system and printer firmware.

**Run Troubleshooters:**

Many operating systems have built-in troubleshooters for printers. Run them to identify and fix issues.

**Test Print:**

Print a test page to see if the issue persists.

* **What are the parts of laptop?**

**Ans.**

1. Screen/Display
2. Keyboard
3. Touchpad/Trackpad
4. Battery
5. Processor (CPU)
6. Memory (RAM)
7. Storage (Hard Drive/SSD)
8. Ports (USB, HDMI, etc.)
9. Operating system
10. Fan/Cooling System
11. Speakers
12. Webcam
13. Microphone
14. Chassis/Case
15. Wireless Card

* **Do a practical to disassemble the laptop.**

**Ans.** Disassembling a laptop requires technical expertise and should be done carefully. If you're not experienced with hardware, it's recommended to seek professional assistance. However, if you have the necessary skills and are confident, here's a simplified guide:

**Prepare:**

Power off the laptop and disconnect all cables.

Remove the laptop battery if possible.

**Remove Screws:**

Use appropriate screwdrivers to remove screws from the back cover.

**Access Internal Components:**

Gently pry open the laptop's back cover using a plastic opening tool.

**Disconnect Components:**

Carefully disconnect the battery, hard drive, RAM, and any other components.

**Remove Additional Covers:**

If necessary, remove additional covers to access more internal parts.

**Handle with Care:**

Be cautious with delicate components, like the motherboard and connectors.

**Document the Process:**

Take pictures or make notes to remember the arrangement of internal parts for reassembly.

**Reassemble:**

Put the laptop back together in the reverse order of disassembly.

**Test:**

Power on the laptop to ensure it functions correctly.