###### Assignment: 1

###### Module - 1: Understanding of Hardware and Its Components

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###### Section 1: Multiple Choice

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###### Which of the following is NOT a component of the CPU?

###### ALU

###### RAM

###### CU

###### 1 and 3 both

###### Ans : 2. RAM

###### What is the function of RAM in a computer?

###### Ans : RAM (Random access memory ) is a volatile memory which temporary stores data and quickly give us back.

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###### Which of the following is a primary storage device?

###### HDD

###### SSD

###### SD card

###### 1 and 2 both

###### Ans : 4. 1 and 2 both

###### What is the purpose of a GPU?

###### Ans : GPU (Graphical Processing Unit) is an another unit added to handle the processing of graphical things such as images , videos & graphics .

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###### Section 2: True or False

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###### True or False: The motherboard is the main circuit board of a computer where other components are attached.

###### Ans : True

###### True or False: A UPS (Uninterruptible Power Supply) is a hardware device that provides emergency power to a load when the input power source fails.

###### Ans : True

###### True or False: An expansion card is a circuit board that enhances the Functionality of a component.

###### Ans : False ( As it extend the functionality of the whole system )

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###### Section 3: Short Answer

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###### Explain the difference between HDD and SSD.

###### Ans :

| HDD. | SDD. |
| --- | --- |
| Hard Disk. Drive. | Solid State Drive |
| Have Moving Mechanical parts (Disc (Platter) Header & motor (magnet)& stores data in sectors through pin type structure) | Not have any moving parts ( It is a simple semiconductor chip on a circuit which stores data as memory card) |
| Handled with care ( because when it falls down the Mechanical parts are damaged easily and results in spoilage of drive) | Easy to use ( There are no any mechanical parts and its very tough in nature ) |
| Slightly Heavier in weight | Lighter is weight |
| Have lower speed of data storage | Have high speed of data storage |
| Comparatively cheaper | Comparatively costlier |

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###### Describe the function of BIOS in a computer system.

###### Ans : BIOS ( Basic Input & Output System) OR Firmware is an one of the important system of the computer. Its main 4 functions :

###### POST (power on self test ) ; in this bios check all the hardware configurations of the system and just test by on the computer . It is done automatically when we switch on the computer. It is done to ensure that no errors should be there before OS loading.

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###### Bootstrap loader : in this bios locate the OS from the memory and loads it by giving controls to the OS.

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###### BIOS Drivers : in this bios drivers are very basic and low level drivers which are required to connect some hardwares with the software controls.

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###### CMOS Setup : in this bios also help us to configure the hardware settings and system settings.

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###### List and briefly explain three input devices commonly used with computers

###### Ans :

###### KEYBOARD :

###### It is an input device used to give typed command / instruction to system . We click any key on the keyboard and accordingly to the pressed key the message is conveyed to the system by connected cable in form of signal and then it gets converted into binary and our system interprets it to give output and shows on the screen.

###### MOUSE :

###### It is an input device used to give touch ( graphical based input ) instruction to system. We click on any icon using the mouse , the signal from the mouse goes inside the system in and system gets in form of binary and we get output on the screen accordingly to input.

###### WEB CAM :

###### It is an input device used to give visual inputs to the system. We on the web cam and through it and that cam takes its pointed out area’s full visual (photo/video) and show the output on screen.

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###### Section 4: Practical Application : To Be Done in LAB.(11 & 12 )

###### Section 5: Essay

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###### Discuss the importance of proper cooling mechanisms in a computer System. Include examples of cooling methods and their effectiveness.

###### Ans. Proper cooling mechanisms in a computer system are critical to ensure the stable operation and longevity of hardware components. As computer systems perform tasks, components like the CPU, GPU, and power supply generate significant heat. Excessive heat can lead to thermal throttling (reduced performance), permanent damage, and even system failure. Therefore, maintaining optimal temperatures through effective cooling solutions is essential for system performance and reliability.

###### Importance of Cooling Mechanisms:

###### 1. Prevents Overheating: Overheating can degrade hardware performance, shorten component lifespan, and cause unexpected shutdowns.

###### 2. Enhances Performance: High temperatures may cause CPUs or GPUs to throttle, reducing their clock speeds to prevent damage. Cooling helps maintain optimal performance.

###### 3. Increases Lifespan: Cooler components experience less wear and tear, leading to a longer hardware lifespan.

###### 4. Ensures Stability: Stable temperatures prevent erratic behavior, such as crashes or corrupted data, particularly under heavy workloads.

###### 5. Supports Overclocking: Efficient cooling is essential for overclocking, which involves pushing the hardware beyond its factory set performance limits.

###### Types of Cooling Methods:

###### 1. Air Cooling:

###### Heat Sinks: Metal components, usually made from aluminum or copper, are placed on heat generating components like the CPU or GPU. They absorb heat and dissipate it through fins, which are cooled by airflow.

###### Effectiveness: Air cooling with heat sinks is efficient for most standard workloads. However, it may not be sufficient for high performance computing or overclocking.

###### Fans: Airflow fans are used to move heat away from components and out of the case. They are commonly used in conjunction with heat sinks to enhance airflow and cooling.

###### Effectiveness: Fans are widely used due to their simplicity and cost effectiveness. However, they can be noisy and less effective in high performance systems.

###### 2. Liquid Cooling:

###### Closed Loop Liquid Cooling (All in One Systems): These systems use a pump to circulate liquid (typically water) through tubes. The liquid absorbs heat from components and dissipates it via a radiator.

###### Effectiveness: Liquid cooling is more efficient than air cooling for high performance systems, as it can transfer heat more effectively and evenly. It also operates more quietly but is more expensive and complex to install.

###### Custom Liquid Cooling: A more advanced version of liquid cooling where users can design their own loops to cool multiple components (e.g., CPU, GPU) with custom tubing and reservoirs.

###### Effectiveness: Custom liquid cooling is highly efficient for extreme overclocking and high performance computing, providing superior cooling at the expense of increased complexity and cost.

###### 3. Thermal Paste:

###### Purpose: Thermal paste is applied between the CPU/GPU and the heat sink to fill in microscopic gaps and enhance heat transfer.

###### Effectiveness: Though a small component, applying high quality thermal paste is essential to maximizing the effectiveness of heat sinks and improving overall cooling efficiency.

###### 4. Passive Cooling:

###### Natural Convection: In systems where minimal heat is generated (such as in low power devices), passive cooling uses large heat sinks and natural airflow without fans or pumps.

###### Effectiveness: Passive cooling is silent and reliable but only suitable for low power systems or components with minimal heat generation.

###### 5. Thermoelectric Cooling:

###### Peltier Coolers: These devices use electricity to move heat from one side of a plate to the other. The hot side is cooled by a heat sink and fan, while the cool side contacts the component.

###### Effectiveness: Peltier coolers can provide extreme cooling but are power hungry and often require additional cooling systems to handle the heat generated by the process itself.

###### 6. Case Ventilation and Airflow Design:

###### Proper airflow design within the computer case is crucial for efficient cooling. Positioning intake and exhaust fans, along with ensuring unobstructed airflow, helps prevent heat buildup inside the case.

###### Effectiveness: Good case ventilation is an inexpensive and highly effective way to enhance overall system cooling.

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###### Explain the concept of bus width and its significance in computer Architecture.

###### Ans. Bus width refers to the number of bits that can be transferred simultaneously over the data bus in a computer system. In a computer architecture, the bus serves as a communication pathway for transferring data between the CPU, memory, and other peripherals. Bus width is typically expressed in bits, such as 8 bit, 16 bit, 32 bit, or 64 bit.

###### Significance of Bus Width:

###### 1. Data Transfer Capacity:

###### The bus width directly affects how much data can be transferred at one time. A wider bus allows more data to be transferred in parallel, increasing the overall data throughput. For example, a 64 bit bus can transfer 64 bits of data in a single operation, whereas a 32 bit bus can transfer only 32 bits.

###### 2. System Performance:

###### A wider bus allows for faster data transfers between components such as the CPU and memory, improving overall system performance. For example, a 64 bit processor with a 64 bit bus can process larger data chunks more quickly than a system with a 32 bit bus.

###### 3. Memory Addressing:

###### The bus width also impacts the amount of memory the system can address. A wider address bus (the part of the bus that handles memory addressing) can access more memory locations. For example, a system with a 32 bit address bus can theoretically address up to 4 GB of RAM, while a 64 bit address bus can address significantly more.

###### 4. Compatibility with Components:

###### The bus width needs to be compatible with the CPU and other components. If a component has a larger bus width than the data bus, the system won’t utilize the component’s full potential, which can lead to bottlenecks. Matching bus widths across the system ensures optimal data flow and reduces inefficiencies.

###### 5. Impact on Data Handling:

###### With a wider bus, the system can handle larger data types (such as 64 bit integers or floating point numbers) more efficiently, leading to improved performance in tasks like gaming, video editing, and scientific computations.

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