**Date: 08/Aug/2024 TUESDAY**

**Batch: 2674724 31p**

**Class DEVOPS**

**Time : 8am - 2pm**

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A computer is an electronic device designed to process data and perform a wide range of tasks through programmable instructions. It consists of both hardware and software components that work together to execute operations, from simple calculations to complex problem-solving.

**Key Components of a Computer:**

**Hardware:**

**Central Processing Unit (CPU**): The brain of the computer that executes instructions and performs calculations.

**Memory (RAM):** Temporary storage that the CPU uses to store data and instructions that are actively being used or processed.

**Storage (HDD/SSD**): Permanent storage for data, files, and the operating system.

**Motherboard:** The main circuit board that connects and allows communication between all components.

**Power Supply Unit (PSU):** Provides the necessary power for all components.

**Input Devices:** Devices like keyboard, mouse, and microphone used to input data into the computer.

**Output Devices**: Devices like monitors, printers, and speakers used to display or output data from the computer.

**Software:**

**Operating System (OS):** The software that manages hardware and software resources, providing a user interface and enabling application programs to run (e.g., Windows, macOS, Linux).

**Applications**: Programs designed to perform specific tasks, such as word processing, web browsing, gaming, or graphic design.

**Firmware:** Specialized software stored in hardware components like the BIOS or UEFI that controls basic hardware functions.

**Types of Computers:**

* **Personal Computers (PCs)**: Desktops and laptops used by individuals for everyday tasks.
* **Servers**: Powerful computers that provide services to other computers over a network.
* **Mainframes**: Large, powerful systems used by organizations for critical applications and bulk data processing.
* **Supercomputers**: Extremely fast computers used for complex simulations and research.
* **Embedded Systems**: Specialized computers built into other devices to control specific functions (e.g., in cars, appliances).

The **Central Processing Unit (CPU)** is often referred to as the "brain" of a computer. It is the primary component that performs most of the processing inside a computer. The CPU executes instructions from software and hardware, carries out calculations, and manages data flow within the system.

**Control Unit (CU)**:

* The CU is responsible for directing the operations of the CPU. It fetches instructions from memory, decodes them, and controls the flow of data within the CPU, as well as between the CPU and other parts of the computer.

**Arithmetic Logic Unit (ALU)**:

* The ALU performs all arithmetic (e.g., addition, subtraction) and logical operations (e.g., comparisons) within the CPU. It is a critical component for performing calculations and making decisions based on logic.

**Memory**:

* **Registers**: Small, fast storage locations within the CPU that hold data and instructions currently being processed. Registers are used for immediate operations and are much faster than accessing data from main memory.
* **Cache**: A small amount of high-speed memory located inside the CPU or very close to it. Cache stores frequently accessed data and instructions to speed up processing. There are typically multiple levels of cache (L1, L2, L3), with L1 being the fastest but smallest, and L3 being larger but slower.

**Step-by-Step Process:**

1. **User Request**:
   * You click on the Chrome browser icon or initiate a task. This action sends a request to the operating system (OS).
2. **Operating System Response**:
   * The OS interprets the request and locates the necessary files and data for Chrome on the HDD/SSD.
3. **Loading Data from HDD/SSD**:
   * The OS sends instructions to the storage controller to fetch the necessary data from the HDD/SSD.
   * In an HDD, a mechanical arm reads the data from spinning magnetic disks.
   * In an SSD, data is read from flash memory chips, which is faster because there are no moving parts.
4. **Transfer to RAM**:
   * The data is then transferred to the computer’s Random Access Memory (RAM). RAM is much faster than HDD/SSD, so it serves as a temporary storage area for data that the CPU will use shortly.
   * The process involves the data moving through the system bus (a communication pathway) to reach the RAM.
5. **Fetching by the CPU**:
   * The CPU, through its control unit (CU), fetches the data from RAM. It does this by using memory addresses that point to where the required data is stored.
   * The fetched data is temporarily stored in the CPU’s registers or cache for quick access.
6. **Processing**:
   * The CPU processes the data according to the instructions. For example, if you’re launching Chrome, the CPU will load the program into memory and begin executing the code to display the browser window.
7. **Execution and Output**:
   * The CPU continues to process instructions and handle any user inputs (like typing a URL) while communicating with other components, such as the GPU for rendering visuals.
   * The output is displayed on your mobnvv ddednitor, and any additional data required (like loading a web page) will repeat the above steps as needed.

**Key Points:**

* **Data Flow**: HDD/SSD ➔ RAM ➔ CPU (via Cache/Registers).
* **Speed**: RAM is faster than HDD/SSD, and the CPU cache is even faster than RAM. This hierarchy ensures that data is transferred and processed as efficiently as possible.
* **Bus**: The system bus facilitates data transfer between these components. The speed of the bus can impact overall performance

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