**Topic 2D: Install and Configure CPUs Notes:**

**CPUs:** Fetch, decode, and execute.

**Registers:** High-speed temporary storage locations which holds the data that are in processing.

**Cache:** High-speed small block of memory that works at the speed of CPU or near to it. It stores frequently accessed data and instructions by the CPU. L1, L2 and L3 are some cache levels.

**X86 Architecture:** 32-bit architecture and can handle 32 bits of data at a time. Can access upto 4GB of RAM. Cannot run 64-bit softwares.

**X64 Architecture: 64-bit** instructions at a time. Can access upto 16 exabytes of RAM. Can run both 32-bit and 64-bit applications.

**Device Drivers:** A device driver is a small piece of software that acts as a translator between the operating system (OS) and a specific hardware device connected to your computer**.**

**ARM CPU Architecture:** It uses **RISC** architecture and often found in mobiles, smartphones.

**CISC (Complex Instruction Set Computing) Architecture:** Process multiple like **1000s** of instruction at a time. Utilize **multiple** clock cycles to perform those calculations. Used in **PCs**.

**RISC(Reduced Instruction Set Computing) Architecture:** Process **single** instructions or fewer instructions like **100s** at a time. Utilize a **single** clock cycle to perform those calculations. Used in **phones**, **tablets**, etc.

**Threads:** Small piece of program that the CPU processes.

**Simultaneous Multithreading:** It is a clever way for CPU to handle **multiple threads** at the same time. It is also called as **Hyperthreading**. In SMT, OS thinks **1** CPU actually as **two** CPUs.

**Symmetric Multiprocessing:** It is the type of processing, where we use two or more than two physical CPUs to process instructions faster. This means that there should be multiple CPU sockets in the motherboard which is quite expensive as well. These type of processing are often used in **servers** and **workstations.** It enables parallel processing.

**Virtualization:** Process to create multiple virtual machines that relies on software called **hypervisior.** The main advantage of virtualization is that we can have multiple OS in the same machine.

**Second Level Address Translation (SLAT):** Feature of virtualization software designed to improve the management of Virtual Memory. Intel calls this **Extended Page Table (EPT)**, and AMD refers to it as **Rapid Virtualization Indexing (RVI)**. These technologies are important for efficient virtualization, especially in systems running many VMs.

**CPU Socket Type: CPU Sockets** are sensitive to Electrostatic Discharge (ESD). Hence use anti-ESD measures like wrist straps or anti-static bags.

**AMD (PGA) CPU Sockets:** Manufactured by AMD. It has pins on the CPU chip.

**Intel (LGA) Sockets:** Pins on the motherboard.

**Symmetric Multiprocessing:** For SMP, identical models of CPU must be used otherwise it stops the boot process. CPUs like CPU A cannot be attached with CPU B to enable SMP.

**Virtualization**: If you are asked like for a system, will the x64 compatible CPU can be used? Then even though it can be used but you should say **No** and answer: For supporting virtualization, you must ensure CPU supports virtualization extensions.