**Topic 2B: Select and Install Storage Devices Notes:**

**Mass Storage Devices:**

**SSDs:** Uses **flash memory** which makes it less prone to failures. Faster than **HDDs**. Three types: **Single Level Cell, Multi Level Cell and Triple Level Cell.** Most reliable and expensive is **Single Level Cell.** SSDs comes in **three** sizes or three form factors: 2.**5inch**, **M2 SSDs,** and **NVMe SSDs**. Older SSDs uses **SATA** conenctors which has speed of **600MBps** but now it uses **NVMe** (speed **6.7 GBps**) that connects directly with PCIe bus. And also SATA require external power cable but NVMe does not.

**HDDs:** Uses **spinning metal** or **glass platters** to read/write data. Platter is divided into tracks and each tracks contain sectors (512 bytes). Speed is determined by RPM. 15,000 and 10,000 are high speeds whereas 7,200 and 5,400 are average drives. High-speed has access time below 3ms and typical HDDs has access time around 6ms.

**RAID (Redundant Array of Independent Disks (RAID):**

**Disk Striping:** Means splitting data into smaller blocks and spreading them in multiple disks in the array.

**RAID 0:** Does data striping. Needs two disk at least and the total size is determined by smallest disk used. Has no redundancy means if one disk fails the data in array is completely lost because it does not store parity information. It is mainly used for non-essential task like temporary file storage or caching where speed is more important than data safety.

**RAID 1:** It uses **mirroring** means create an exact copy of the data from disk1 to disk2. That means whenever we write a data, it is **duplicated** on both disks simultaneously. Provides fault tolerance means if one disk fails, another can continue. 50% of the total storage installed will only be used since duplication also needs to be maintained.

Used in situations where data protection is important.

**RAID 5:** Combines striping with parity information to provide both performance and fault tolerance. Data and parity bits are distributed across all disks in the array. Requires a minimum of **three** disks. An equivalent of **one disk** total storage is reserved for parity information. Used in servers and systems where both speed and data protection are important.

**RAID 10:** Combines RAID 0 and RAID 1. So, it includes features of mirroring and striping both. Requires minimum of **four disks.** And since it involves mirroring, 50% of the disk is reserved for redundancy (backup) or duplicates. Used in critical applications like database and business servers where both speed and data protection is crucial.

**Remember:** Thumb Drive means USB drive or pen drive