

1. **In fdisk, what does "sector" refer to?**

A **sector** is the smallest addressable storage unit on a disk, typically 512 bytes or 4096 bytes.

2. **Partitioning recommendations:**

- **Linux desktop systems:**

One partition for root (/), and optionally separate ones for /home and swap.

- **Database/web servers with logging:**

Separate partitions for /var (logs), /home, /, and swap.

- **University/staging servers:**

Separate /home for user data, /, and swap; optional /var if logs are important.

3. **OS memory and process management summary:**

- **CPU Scheduling:**

Uses scheduling algorithms (like round-robin, priority) to switch between processes.

- **Data in RAM:**

Only needed parts (pages) of a process are loaded into RAM on demand.

- **Insufficient RAM:**

OS moves inactive pages to disk (swap space).

- **Paging & Swapping:**

Paging moves memory pages; **swapping** moves entire processes to/from disk.

- **Memory strategies:**

Includes **demand paging** (load pages when accessed).

- **Full page load?:**

No; only needed pages are loaded (not all).

4. **What is the TLB?**

The **Translation Lookaside Buffer** is a cache that stores recent virtual-to-physical address translations to speed up memory access.

5. **Definitions & Effects:**

- **Page:** Fixed-size block of memory (e.g., 4KB).

- **Virtual Page:** A page in virtual memory, mapped to physical memory via page tables.

- **Context Switch:** Switching CPU from one process to another.

- **Swap space & context switches:**

Larger swap can slow performance if used heavily, increasing context-switch overhead.

- **Page size effect:**

Larger pages reduce TLB misses but may increase fragmentation; affects switching time and efficiency.

6. **What is a huge page?**

A **huge page** is a large memory page (e.g., 2MB or 1GB) used to reduce TLB misses and overhead, often in high-performance computing or databases.

7. **Memory fragmentation in RAM:**

Fragmentation is inefficient RAM usage due to scattered free memory blocks. It can cause allocation failures even when free memory exists.