

Computer Operating Systems

Problem #1

Explain why the task of scheduling secondary storage I/O requests is assigned to the operating system. That is, why application programs do not typically access the disk directly.

Briefly describe the following disk head scheduling algorithms: First-Come-First-Served (FCFS), Shortest-Service-Time-First (SSTF), SCAN, C-SCAN. Name the algorithm(s) that may result in I/O request starvation. Name the most fair algorithm. Explain your answers.

Problem #2

Define fragmentation. Differentiate between external and internal fragmentation. From which fragmentation do segment-based and page-based memory allocation suffer? Explain.

Problem #3

Define CPU burst of a process. Differentiate CPU-bound and I/O bound processes. Briefly describe Shortest-Remaining-Time (SRT) and Round-Robin (RR) CPU scheduling disciplines. For each discipline, state whether it can starve processes. If not, explain why not. If, yes, give a starvation example and explain whether it applies to CPU-bound or to I/O-bound processes.

Problem #4

Define page table. Describe how it is used in virtual memory organization. Explain how the following bits are used.

- valid-invalid bit
- clean/dirty (also called modify) bit
- reference bit