

Computer Operating Systems

Problem#1

Differentiate between a process and a thread. Motivate the use of threads. Differentiate between user thread implementation and kernel thread implementation. Define many-to-one, one-to-one and many-to-many multithreading models and compare their relative advantages and disadvantages. Define and motivate the concept of a thread pool.

Problem #2

Explain why operating system design needs the concept of synchronization primitives, such as semaphores. Define semaphore. Explain the operation of the two semaphore operations: wait() and signal(). Define the critical section (mutual exclusion) problem. Provide a semaphore-based solution (write code) to the critical section problem.

Problem#3

Explain the concept of a page table. Motivate the need for a hierarchical page table. Explain the address lookup diagram if in a two-level hierarchical page table (draw a diagram if necessary).