

Computer Operating Systems

Problem#1

Define OS kernel. Explain the difference between user and kernel mode. Motivate the need for dual-mode operation. Explain what hardware support is needed to implement it. Define threads. Differentiate between user-level and kernel-level thread implementation. List at least two advantages of one implementation over the other.

Problem #2

Define the Mutual Exclusion Problem. Explain why it is important for OS design and give two examples of mutual exclusion might be needed in OS implementation. Define semaphores. Describe the two semaphore operations. Given these two operations provide pseudocode solution to the mutual exclusion problem.

Problem#3

Define the concept of external and internal storage fragmentation. This concept arises in multiple areas of OS design. Give at least two examples of external vs. internal fragmentation. In each case, explain whether it is beneficial or detrimental to have this kind of fragmentation.