

**January 2008
Preliminary Exams**

Computer Operating Systems (Questions 1-4)

Problem 1

Define process execution context. Define context switch and explain what typical actions are performed in case of a context switch. Differentiate kernel and user mode of process execution. Is context switch performed in kernel or user mode? Explain.

Problem 2

- 1) Define the concept of a thread. Differentiate user-level threads and kernel-level threads.
- 2) Answer **one** of the following questions.
EITHER
 - a) describe many-to-one, one-to-one and many-to-many thread implementation models and compare their relative advantages and disadvantagesOR
 - b) introduce and describe the concept of thread pools.

Problem 3

Motivate the need for hardware support for process synchronization. Give an example (provide pseudocode of operation) of an RMW hardware instruction. Discuss synchronization primitives that OS provides and explain their need for process synchronization. Give an example (provide pseudocode of operation) of implementing synchronization primitives with an RMW instruction.

Problem 4

Describe multilevel indexed block allocation for file system organization. Describe its advantages over the single level indexed, linked-list, and continuous block allocation techniques. Describe extent-based allocation and its advantages over multilevel indexed allocation.