

August 2008
Preliminary Exams

Computer Operating Systems (Questions 1-4)

Problem 1

Define preemptive and non-preemptive CPU scheduler and compare their advantages and disadvantages. Define CPU burst and how it is related to CPU scheduling. For any kind of scheduler, it is important to predict the length of a CPU burst of a process. Explain how this prediction can be done by the OS.

Problem 2

Motivate the need for process synchronization and the need for OS to assist in this function. Explain why hardware architecture primitives are required for it. Give example of such a primitive and describe (provide pseudocode) its usage.

Problem 3

Define program segments and explain how they are used for memory organization. Define paging and how it is used. Segments and paging seem to be two alternative ways of organizing memory access. Moreover, paging seems to be superior. However, modern OSes combine the two approaches. Explain why and how this combination is done.

Problem 4

As a data center architect, you are given an array of 6 disks of 100 GBytes each. You are required to organize them into a RAID such that it can hold 500 GBytes worth of data and withstand a failure of any single disk without interrupting data service. Define the notion of RAID. Name the RAID level you will have to use, explain how the data will be organized and why your set up can tolerate a disk failure.