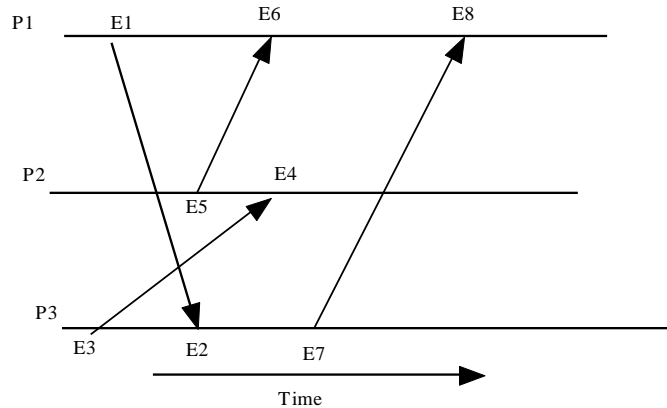


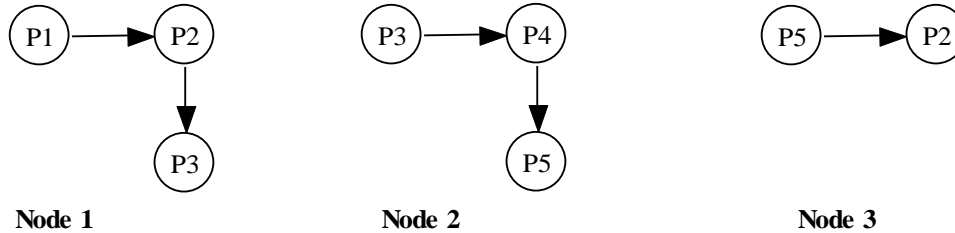
CS471: Operating System Concepts
Fall 2009
(Lecture: TR 9:30-10:45 AM)
Homework #5
Points: 20
Due: November 5, 2009

(1a) Suppose a process P1 with timestamp $TS=250$ is holding a resource R1. At that time two other processes P2 (with $TS=300$) and P3 (with $TS=200$) also make a request for the same resource. Explain the outcome for P1, P2, and P3 in the (i) wait-die scheme (ii) wound-wait scheme.

(1b) Using the following event diagram, determine the happened-before relationship (if it exists) in each pairs of events: (i) $\langle E1, E7 \rangle$ (ii) $\langle E3, E8 \rangle$ (iii) $\langle E6, E4 \rangle$ (In other words, for each pair determine whether or not there is a happened-before relationship; if so how they are related. Justify)



(1c) Given the following wait-for graphs at three nodes of a distributed system, (i) build a global wait-for graph. (ii) Is there a deadlock?



(2) Six processes P1-P6 are in a logical group. P1 has the highest priority (P1>P2>P3>P4>P5>P6) and it is the oldest process. P6 has the lowest priority and it is the youngest process. The process with the highest priority becomes the leader.

(2a) Who is the current leader?

(2b) Show how a new leader is elected if process P3 determines that the current leader is not responding. Assume the Bully Algorithm.

(2c) Answer (c) assuming the ring algorithm. (The ring is arranged as follows: P1 → P6 → P3 → P4 → P2 → P5 → P1)

(3) List some of the fundamental differences between NFS and AFS.