Name: _____

Exam #1

Monday 1 October 2007

1. Most modern CPUs provide both user mode and privileged (kernel) mode instructions.

   a. Why is it necessary to differentiate between two sets of instructions in this manner? (10 points)

   b. Explain how the CPU transitions from user mode to kernel mode and vice-versa. (10 points)

2. Define "multiprogramming". (10 points)

3. What is the distinction between application programs, system programs, and the micro-kernel in a micro-kernel-based OS such as Mach? (15 points)

4. Give a few examples to illustrate different reasons for a process to be created. (10 points)

5. Consider the 5-state process model, with the states labeled as **new**, **running**, **ready, waiting** (or blocked), and **terminated**.

   a. At a particular point in time, how many processes can be in each state, assuming a system with a single OS and a single CPU? (10 points)

   b. What is the difference between the ready state and the waiting state? (10 points)

User Running
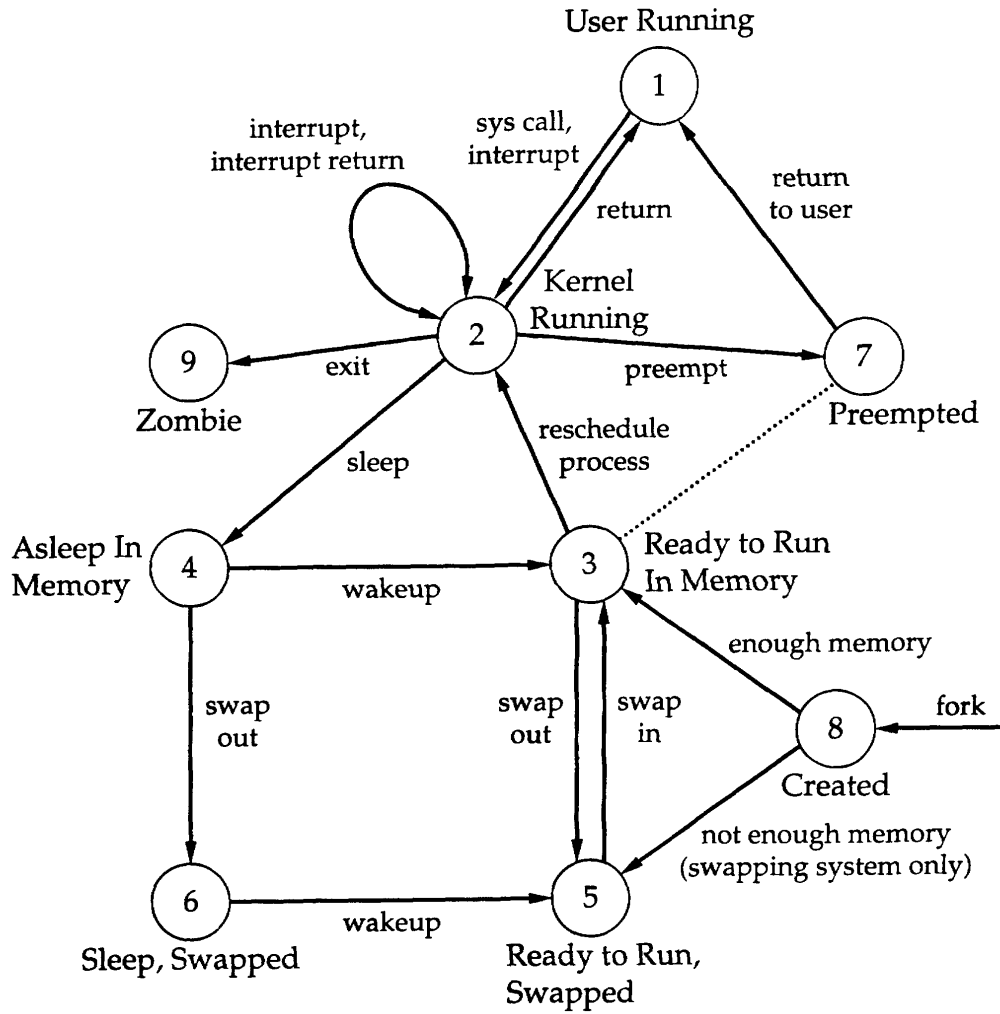
FIGURE 3.16 UNIX process state transition diagram [BACH86]

6. In the UNIX process model, both states 3 and 5 are "ready" states. Why are two ready states needed? (10 points)

7. The name "remote procedure call" (RPC) was chosen to highlight the similarity that mechanism provides to normal procedure calls.

    a. In what way(s) are RPCs similar to normal procedure calls? (5 points)

    a. In what way(s) are RPCs different from normal procedure calls? (10 points)