CMSC 412 Discussion Exercise Spring 2010

Practice with process synchronization

The Dreamers Problem. There are *n* dreamers in a room with one pad of paper and one pen. Dreamers spend much of their time sleeping, but occasionally they wake up. If a dreamer wakes up, he will write down his dream on the paper with the pen; if the paper is not available, the dreamer will use the pen to write the dream on his hand. After writing down the dream, the dreamer will go back to sleep. The next time he wakes up he will read what the other dreamers have written on the paper, and then go back to sleep.

Your task is to write a block of code that models this behavior. Use the space below:

```
// initialization of global variables
Semaphore mutex = 1, paper = 1, pen = 1, reader = 1;
bool reading = false;

while (1) {
  sleep(rand()); // the dreamer is sleeping
  // the dreamer has woken up. write down the dream

  P(pen);
  P(mutex);
  if (reading == true) {
    V(mutex);
    Write on hand;
  } else {
    P(paper);
    /* don't need to set reading variable because only
     * 1 reader and 1 writer are allowed at a time
     */
    Write on paper;
    V(paper);
    V(mutex);
  }
  V(pen);

  sleep(rand()); // going back to sleep
  // dreamer has woken up. read the paper

  P(reader);
  P(mutex);
  reading = true; // set the flag and acquire the paper atomically
  P(paper);
  V(mutex);
  Read the paper;
  P(mutex);
  reading = false; // set the flag and release the paper atomically
  V(paper);
  V(mutex);
  V(reader);
}
```