Homework 1

CS5460: Operating Systems, Spring 2018 **Jake Pitkin**
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6.13 **Chapter 5 of OSC discusses possible race conditions on various kernel data structures. Most scheduling algorithms maintain a run queue, which lists processes eligible to run on a processor. On multicore systems, there are two general options: (1) each processing core has its own run queue, or (2) a single run queue is shared by all processing cores. Briefly give at least one advantage and one disadvantage of each of these approaches.**

5.20a **Identify the race condition(s).**

5.20b **Assume you have a mutex lock named mutex with the operations acquire() and release(). Indicate where the locking needs to be placed to prevent the race condition(s).**

5.20c **Could we replace the integer variable "int number_of_processes = 0" with the atomic integer "atomic_t number_of_processes = 0" to prevent the race condition(s)? (Assume here this atomic_t has safe, lock-free, atomic loads and stores and an atomic fetch_and_add/fetch_and_subtract like operation.)**

10.10 **Briefly explain why the OS often uses an FCFS disk-scheduling algorithm when the underlying device is an SSD.**

10.14 **Describe one advantage and two disadvantages of using SSDs as a caching tier compared with using only magnetic disks.**

12.16 **Consider a file system that uses inodes to represent files. Disk blocks are 8 KB in size, and a pointer to a disk block requires 4 bytes. This filesystem has 12 direct disk blocks, as well as one single, one double, and one triple indirect disk blocks entry in its inode. What is the maximum size of a file that can be stored in this file system?**