CS 314 Operating Systems, Fall 2018
Quiz #4 on September 19, 2018

List of the possible questions

PART I: Microkernel Architecture

#1: Describe how “micro-kernel architecture” and “non micro-kernel architecture” are different in how system calls issued by user applications will be executed.

#2: What are the advantages in using “micro-kernel architecture”? What is the primary disadvantage in “micro-kernel architecture”?

#3: What are the two processor modes operating systems set?

#4: What is “kernel (system) mode” of a processor?

#5: What are “system calls”?

#6: What is “user mode” of a processor?

#7: Why do operating systems have two processor modes (what problems will happen if there is no “user mode” – all programs run in the kernel (system) mode)?

#8: What is the primary difference between “multi-boot” and “virtual machine”?

PART II: Process Starvation

#9: What is “process starvation”?

#10: Which process scheduling algorithms can cause “process starvation” (select all that apply)?

   (1) FCFS
   (2) RR
   (3) SJF
   (4) SRTF

PART III: Race Condition and Process Synchronization using Semaphores

#11: What is “race condition”?
#12: How can “race condition” happen? Show “how” using an example.

#13: What is “critical section”?  

#18: What is “mutual exclusion”?  

#19: What does “atomic” in “atomic operations” mean?  

#20: What is “a binary (or mutex) semaphore”?  

#21: What are the two primary system calls for manipulating a semaphore?  

#22: Explain how a semaphore can prevent race condition.  

#23: What are the two operations of a semaphore (just name them)?  

#24: What “wait” system call to a semaphore exactly performs?  

#25: What “signal” system call to a semaphore exactly performs?  

#26: Why are the two system calls for semaphores (“wait” and “signal”) must be atomic operations (explain the reason)?  

#27: What are “counting semaphores” (how are “counting semaphores” different from “binary (mutex) semaphores”)?  

#28: Who manages semaphores?  

#29: Operating systems use “queue (FIFO data structure)” for managing processes blocked on a semaphore. Why is FIFO-queue used (the best reason for using FIFO structure)?