COP6611: Operating Systems

Final Exam

There are four questions in this exam

Dec 6, 2017. 7:30-9:30 AM

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Name:

Please sign the following honor pledge.

On my honor, as a student, I have neither given nor received unauthorized aid on this academic work.

Signature:

Total Score:

Problem 1 (5 pts)

Explain the difference between function call/return and system call/return.

Problem 2 (5 pts)

Explain the difference between process and thread.

Problem 3 (5 pts)

Some earlier OSes do not provide preemption mechanisms for threads (i.e., there is no timer interrupt). Rather, threads call the "yield" function to voluntarily suspend execution. In this case, do we still need synchronization mechanisms to protect critical sections? Explain fully your rationale, reasoning, and any assumptions you need to make.

Problem 4 (10 pts)

In order to protect a critical memory location from misuse by attacker, you need to implement a "shadow memory" that will record all the memory write operations on that location in a separate kernel space (shadow memory). This shadow memory can then be used to 1) determine whether a memory update can be allowed by comparing the new value against the previous values of the location, 2) to perform forensics analysis on the process in case the process is compromised by a malicious user. Explain how you would implement such shadow memory in an OS kernel, and all design considerations that you think are important. Be as complete as possible.