CS 314-001 Operating Systems
Spring 2018
Quiz #2 on January 25, 2018 (SOLUTIONS)

Your Last Three Digits: ________________
(please do NOT write all of your student ID or your name)

Grade: ______

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(1) Describe how processes differ from programs by mentioning at least three differences between them.

① Their locations: programs are found in storage devices (mostly in hard drives), while processes are usually found in the main memory.

② Their internal components: each program mainly consists of “program codes”, which are binary machine codes, while each process consists of program codes and its necessary extra data space, such as heap and stack areas.

③ State-less vs. state-full: programs are static (they do not change as time goes) and therefore, each program is not associated with its own state (“state-less”). Processes are dynamic.

Note: other solutions are possible.

(2) What does “PCB” stand for? Why do operating systems need PCB?

PCB stands for “Process Control Block”.

Operating systems need a PCB for each process for managing processes. For example, without a PCB, we will face the following issues:

- We can not start more than one process for each program.
- We can not track how much processor resource each process uses (or have used).
- It’s hard to track the current state of each process.
(3) Sketch how VM is implemented in memory.

(4) Show a sketch of the integration of the short-term, medium-term, and long-term process scheduling as a directed state-transition diagram.

(5) Look up the meaning of the following word using your textbook: “OS kernel”.

The OS kernel is a computer program that is the core of a computer's operating system.