CS 314 Operating Systems
Spring 2024
Quiz #4 on February 1, 2024 (SOLUTIONS)

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

Grade: _____

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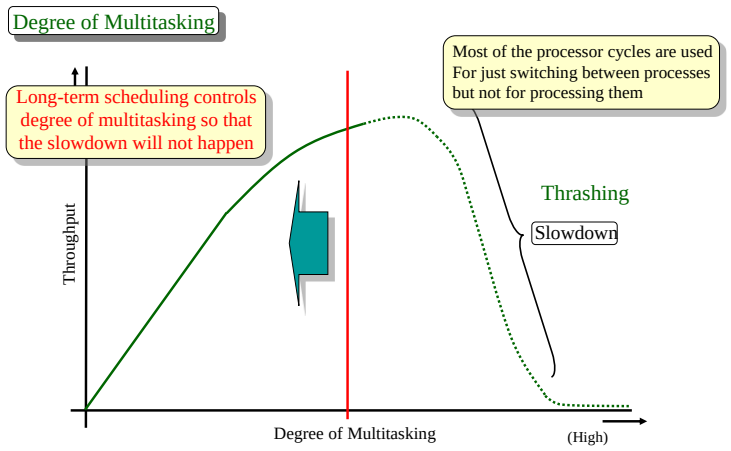
(1) What is "thrashing"? Technically explain how does "thrashing" occur (as we discussed on January 30th)?

Thrashing is a situation where most of the processor resource is used for performing (a large number of) context-switching. When a thrashing happens, processes do not use a processor for getting their jobs. Thrashing often happens when the degree of multitasking is high.



(2) What is "non-preemptive process scheduling"?

Non-preemptive process scheduling algorithms are a group of processing scheduling algorithms where a processor can be taken away from a process that currently holds a processor only in one of the following two cases:

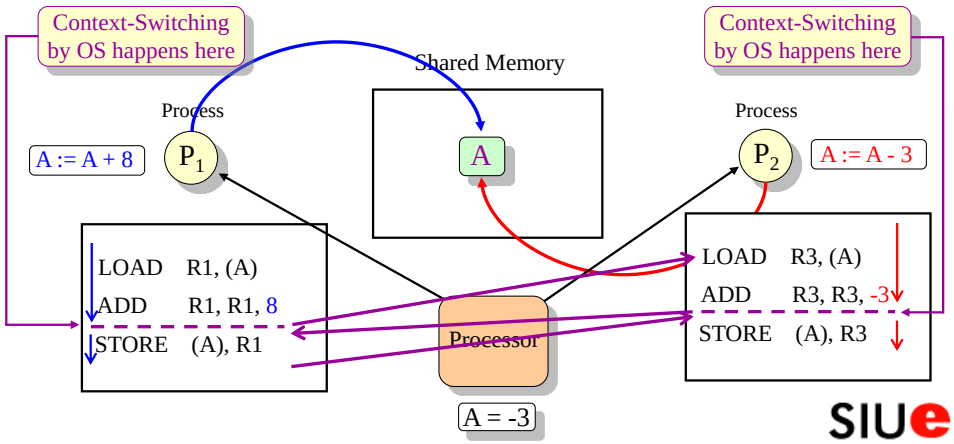
(i) a process finishes (finishes running)

(ii) a process can not use a processor (e.g., starts waiting for user inputs)

(3) How can "race condition" happen? Show "how" using an example.

Race condition can happen when a process is updating a shared object (e.g., a variable in a shared memory), but a process is preempted by an unpredictable context-switching before the process finishes updating the (shared variable).

Example:



Note: it is expected that your example shows "context switching"

(4) What is "critical section"?

A critical section is a set of (contiguous) instructions (or statements) in a program (a) that can cause a race condition or (b) where at most one process can be active at a time.

Note: either (a) or (b) is required for full credit.

(5) What is "process starvation"?

Process starvation is a situation where it can happen that a process (or processes) can never be executed ("never has a chance to be assigned a processor).