

CS 314 Operating Systems
Spring 2024
Quiz #3 on January 25, 2024 (**SOLUTIONS**)

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

Grade: _____

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

Processes differ from programs in the following ways:

- (i) Programs consist of just binary executable codes, while processes consist of binary executable codes, data structures (heap, stack, ... and etc.), and PCB (process control block).
- (ii) Programs are static (they never change themselves no matter how long you have ones), while processes are dynamic (they continuously change themselves (especially their heap, stack and PCB).
- (iii) Programs are in storage devices (USB, hard drives), while processes are in memory (the main RAM memory)

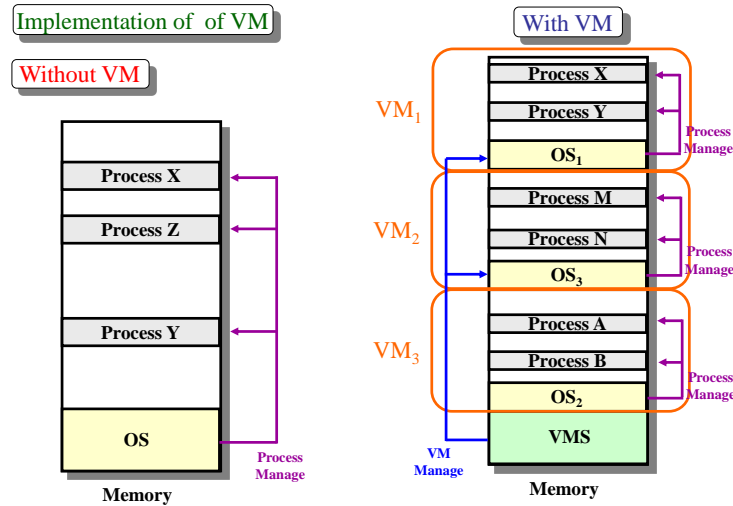
(2) What does “PCB” stand for? Why do operating systems need PCB?

PCB = “Process Control Block”

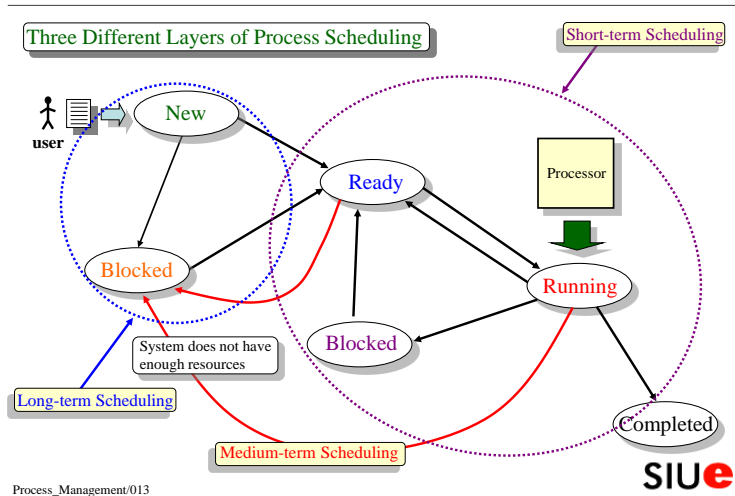
Operating systems need PCB for each process mainly for:

- (i) Keeping track of what each process is doing (waiting for a processor, running using a processor, or waiting for inputs from I/ devices, and etc.)
- (ii) Manage each process (e.g., distinguish each of the multiple processes, all of which are from the same program, determining execution priority, running time, and etc.).

(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) What is “the short-term process scheduling”?

The short-term process scheduling is the act of selecting which process should be assigned a processor (and how long).