Operating System **Hsu PO-CHUN**
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Prof. Pai H. Chou Submitted: Oct. 28, 2017
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Assignment 6

1 Problem 1

[20 points] 5.10 Which of the following scheduling algorithms could result in starvation? Explain.

a. First-come, first-served

b. Shortest job first

c. Round robin

d. Priority

1.1 Answer

b. Shortest job first and **d. Priority** scheduling algorithms could result in starvation. Explain:

a. First-come, first-served: All processes are line-up in the queue and non-preemptive, hence,all the tasks in the queue have the bounded waiting time to be served.

b. Shortest job first: Consider that if there are always shorter jobs admitted in, the longest job could be starved by the preemption of shorter jobs.

c. Round robin: All processes in the system have a fair chance to be served in RR scheduling, so it would not result in starvation.

d. Priority: Same as SJF. Consider that if there are always higher priority jobs admitted in, the lowest priority job could be starved by the preemption of higher priority jobs.

2 Problem 2

[20 points] 5.12 Consider a system running ten I/O-bound tasks and one CPU-bound task. Assume that the I/O-bound tasks issue an I/O operation once for every millisecond of CPU computing and that each I/O operation takes 10 milliseconds to complete. Also assume that the context-switching overhead is 0.1 millisecond and that all processes are long-running tasks. Describe the CPU utilization for a round-robin scheduler when:

a. The time quantum is 1 millisecond

b. The time quantum is 10 milliseconds

2.1 Answer

a. The time quantum is 1 millisecond
Each execution with a time quantum exactly cause one context-switch, thus, the CPU utilization could be simply $\frac{1}{(1+0.1)} = 0.\bar{90} \doteqdot 90.9\%$

b. The time quantum is 10 milliseconds
The CPU-bound task takes 10 milliseconds with 1*0.1 millisecond for one context-switch,that is 10.1 milliseconds.
Ten IO-bound tasks tasks 1 ms with 1*0.1 ms each,and that is 10*1.1 = 11.
As a result, The CPU utilization is $\frac{20}{(10.1+11)} \doteqdot 0.948 = 94.8\%$