103011227 周延儒

1. [20 points] 5.10 Which of the following scheduling algorithms could result in starvation? Explain.
    a. First-come, first-served
    b. <u>Shortest job first</u>
    c. Round robin
    d. <u>Priority</u>

    Ans:
    Shortest job first and priority-based scheduling algorithms could result in starvation.

    This is because for shortest job first, longer processes will have more waiting time, eventually they'll suffer starvation. In addition, for preemptive priority scheduling, a higher priority process can execute ahead of an already executing lower priority process. If lower priority process keeps waiting for higher priority processes, starvation occurs.

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:

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a. The time quantum is 1 millisecond:
   The scheduler incurs a 0.1 millisecond context-switching cost for every context-switch.
   CPU utilization =1/1.1 * 100 = 90.9%
b. The time quantum is 10 milliseconds
   Firstly, the I/O-bound tasks occur a context-switch after using up only 1 millisecond of the time quantum.
   The, the time required to cycle through all the processes is 10*1.1(every I/O bound task takes 1 ms and incur the context-switch) + 10.1 (the CPU-bound task executes for 10 ms before the context switch). The CPU utilization = 20/21.1 * 100 = 94.7%.