COSC1112/1114: Operating Systems Principles

Tutorial 04 (week 05)

1. Define the difference between preemptive and nonpreemptive scheduling.

2. Why is it important for the scheduler to distinguish I/O-bound programs from CPU-bound programs?

3. Discuss how the following pairs of scheduling criteria conflict in certain settings.
   a. CPU utilization and response time
   b. Average turnaround time and maximum waiting time
   c. I/O device utilization and CPU utilization

4. Consider the following set of processes, with the length of the CPU-burst time given in milliseconds:

process	Burst Time	Priority
P_1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order P_1, P_2, P_3, P_4, P_5, all at time 0.
   a. Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, a nonpreemptive priority (a smaller priority number implies a higher priority), and RR (*quantum* = 1) scheduling.
   b. What is the turnaround time of each process for each of the scheduling algorithms in question a?
   c. What is the waiting time of each process for each of the scheduling algorithms in question a?
   d. Which of the schedules in question a results in the minimal average waiting time (over all processes)?

5. Consider a variant of the RR scheduling algorithm where the entries in the ready queue are pointers to the PCBs
   a. What would be the effect of putting two pointers to the same process in the ready queue?
   b. What would be the major advantages and disadvantages of this scheme?

6. Explain the differences in the degree to which the following scheduling algorithms discriminate in favour of short processes:
   a. FCFS
   b. RR