



COMP 346 - Winter 2015 Theory Assignment 3

Answer all questions

Question # 1

Consider the page reference string $R=\{0, 1, 2, 0, 1, 2, 0, 1, 2, 3, 6, 7, 6, 7, 0, 1, 2, 3, 4\}$ for a given process.

- (a) Show the memory representation of the pages using the LRU algorithm and an allocation of 3 frames. How many page faults are there?
- (b) Show the memory representation of the pages using the Belady Optimal algorithm and an allocation of 3 frames. How many page faults are there?
- (C) Show the memory representation of the pages using the working set model with a window size $\Delta=3$. How many page faults are there?

Question # 2

Consider a system that would implement the page table on the CPU if feasible.

- (a) Give an advantage of this strategy.
- (b) Give a disadvantage of this strategy.

Question # 3

Explain (i) an advantage and (ii) a disadvantage that a global page replacement algorithm has over a local page replacement algorithm.

Question # 4

Consider a system that adjusts the degree of multiprogramming by monitoring the mean time between page faults (i.e. T_{pf}) and the mean time to service a page fault (i.e. T_{fs}). Describe the performance of the paging system in terms of the degree of multiprogramming when (i) T_{pf} is greater than T_{fs} , (ii) T_{pf} is less than T_{fs} and (iii) T_{pf} is equal to T_{fs} .

Question # 5

- a) What is the difference between preemptive and non-preemptive scheduling? Why is strict non-preemptive scheduling unlikely to be used in a computer system that provides both batch and timesharing service?
- b) What is the trade-off used to select the quantum size, say, in pure Round-Robin scheduling?

Question # 6

What advantage is there in having different values of the scheduling quantum on different levels of a multilevel feedback queuing system? Your answer should consider all aspects such as fairness, starvation, efficiency, etc.

Question # 7

Some systems automatically open a file when it is referenced for the first time and close the file when the job terminates. Discuss the advantages and disadvantages of this scheme as compared to the more traditional one, where the user has to open and close the file explicitly.

Question # 8

Consider the following set of prioritized processes, where a smaller priority value represents a higher priority.

Process	Service Time	Priority
0	20	3
1	15	1
2	22	3
3	6	4
4	12	2

Assume that all processes arrived at the same time, however they are inserted in the ready list in the order indicated in the above table.

- a) Draw Gantt charts for the execution scenarios assuming:
 - FCFS scheduling
 - Non-preemptive SJF scheduling
 - Non-preemptive priority scheduling
 - Pure Round-Robin scheduling with the quantum = 3
- b) What is the waiting time of each process in each case?
- c) What is the response time of each process in each case?
- d) What is the turn-around time of each process in each case?