淡江大學 98 學年度碩士班招生考試試題

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系別：資訊工程學系
資訊工程學系資訊網路與通訊碩士班

科目：作 業 系 統

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1. Short Answers (30%, 5% for each)
   (a) Give two criteria a CPU scheduler tries to maximize. Similarly, give two criteria for the minimization.
   (b) Explain two advantages for the use of virtual memory.
   (c) Why priority and short-job-first scheduling may suffer from starvation. How to solve it?
   (d) Why segmentation with paging is commonly used in memory management?
   (e) Give three file access methods.
   (f) What is remote procedure call (RPC)? When will it be used?

2. In memory management, what is external fragmentation? Give two possible solutions to the external fragmentation problem. (10%)

3. The working-set strategy prevents thrashing while keeping the degree of multiprogramming as high as possible. Explain. (10%)

4. Consider the following page reference string: 1,2,3,4,5,3,4,1,6,7,8,7,8,9,7,8,9,5,4,5,4,2,3,5. Assume initially there are 5 frames as working-set windows.
   (1). Show how many page faults are occurred for the LRU replacement? (5%)
   (2). Show how many page faults are occurred for the Optimal replacement? (5%)
   (3). If the size of working-set windows becomes 4, show the working set when time is just after the second 9. (5%)

5. Consider the following set of processes, with the length of the CPU-burst time and arrival time given in milliseconds. A small priority number implies a higher priority. The time quantum is 2 milliseconds.

Process	Burst time	Arrival time	Priority
P1	10	0	4
P2	4	2	2
P3	2	3	2
P4	5	5	1
P5	1	7	3
P6	3	8	1

   (1). Draw the Gantt chart illustrating the execution of these processes using shortest-job-first scheduling. Similarly, draw the Gantt charts for preemptive priority, and round-robin scheduling. (15%)
   (2). What is the waiting time of P1 and P5 processes for each of the scheduling algorithms in part (1)? (5%)

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6. Consider three transactions T_1, T_2, T_3 and two schedules S_1 and S_2 given below where r_1 stands for read operation in transaction T_1; w_1 stands for write operation in transaction T_1, etc. Determine whether S_1 and S_2 are conflict serializable or not. If a schedule is serializable, write down the equivalent serial schedule. (15%)

T_1: $r_1(X)$; $w_1(X)$; $r_1(Y)$; $w_1(Y)$;

T_2: $r_2(Z)$; $r_2(Y)$; $w_2(Y)$; $r_2(X)$; $w_2(X)$;

T_3: $r_3(Y)$; $r_3(Z)$; $w_3(Y)$; $w_3(Z)$;

S_1: $r_2(Z)$; $r_2(Y)$; $w_2(Y)$; $r_3(Y)$; $r_3(Z)$; $r_1(X)$; $w_1(X)$; $w_3(Y)$; $w_3(Z)$; $r_2(X)$; $r_1(Y)$; $w_1(Y)$; $w_2(X)$;

S_2: $r_3(Y)$; $r_3(Z)$; $r_1(X)$; $w_1(X)$; $w_3(Y)$; $w_3(Z)$; $r_2(Z)$; $r_1(Y)$; $w_1(Y)$; $r_2(Y)$; $w_2(Y)$; $r_2(X)$; $w_2(X)$;