淡江大學 102 學年度碩士班招生考試試題

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

考試日期：3 月 10 日(星期日) 第 2 節

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本試題雙面印刷

1. Consider the following software systems.
   A) MS Office B) Linux C) Android D) MS Windows XP E) MS-DOS
   (a) Which one is **NOT** an Operating System (OS)? (3%)
   (b) Which one is called an OS but does **NOT** contain a "kernel"? (3%)
   (c) Which one consists of kernel only? (3%)
   (d) Which one is an OS but not time-sharing? (3%)

2. About Deadlock Problem:
   (a) What are the four necessary conditions for causing deadlock situation among processes? (4%)
   (b) There are two main approaches to "solve" deadlock problem. What are they? And what are the differences between them? (4%)
   (c) Some Unix-like Operating Systems use the ignorance approach to treat Deadlock problem, that is, deadlocks never occur in the system and hence there is no need of treatment for them. Please comment the ignorance approach. (6%)

3. Match the items in the following two groups. The first group consists of algorithms that you have learned or heard in your OS course, and the second group is a list of problems encountered in OS design and development. Find the problem in Group 2 which is intended to be solved by each of algorithms in Group 1. (12%)
   Group 1 : 1) banker's algorithm 2) Dekker's algorithm 3) bakery algorithm
   Group 2 : A) Critical Section B) Process Synchronization C) Deadlocks
   D) Thrashing

4. Consider the following set of processes with priorities and a set of CPU burst and arrive time in millisecond as follows

Process	Priority	Arrive Time	Burst Time
P1	3	5	5
P2	4	4	1
P3	2	2	3
P4	1	3	4

   Compute the average turnaround time for each of the following scheduling algorithms. (Showing details of your calculation is necessary.)
   (a) First-Come-First-Serve (FCFS) without priority, (4%)
   (b) Preemptive Priority, larger number higher priority, (4%)
   (c) Round-Robin (RR), non-priority and with 2 millisecond time slice. (4%)

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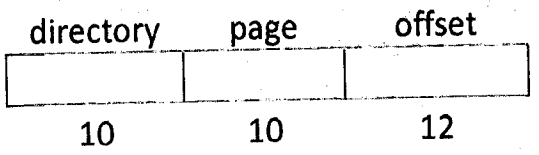
5. About Paged Virtual Memory System:

(a) In Intel 80386 a 32-bit linear address is decomposed as



where 10, 10, and 12 are numbers of bits of the directory, page and offset fields, respectively. What is the page size of the virtual memory system? Totally how many pages could be in this structure? (8%)

(b) Use simple words to explain what "Page-Fault" means. (4%)

(c) Consider the following page-number reference sequence

1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5.

Assume FIFO Page-Replacement Algorithm is used. Compute the number of page faults with three and four available frames respectively. (4%)

(d) Use your answer in preceding sub-problem (c) to explain what *Belady's Anomaly* is. (4%)

6. About File System:

(a) List at least 4 file operations. (4%)

(b) Files can be accessed by *sequential*, *direct*, *random*, and *associative* methods depending on the nature of the storage devices. Give a typical device which is suitable for each of the above access methods. (8%)

(c) What does it mean that "Everything is a file in Unix"? (4%)

7. How do ***threads*** and ***processes*** share (or interchange) information, respectively? (Keep your answer as concise as possible) (6%)

8. Suppose we have two processes P_i and P_j. Consider the following two structures of Process P_i (and P_j by interchanging *i* with *j*) of algorithms for achieving mutual exclusion of execution of the critical sections of P_i and P_j.

```
repeat
    while turn ≠ j do no-op ;
    critical section
    turn = j ;
    remainder section
until false;
```

Algorithm-1

```
repeat
    flag[i] = true ;
    while turn ≠ j do no-op ;
    critical section
    flag[i] = true ;
    remainder section
until false;
```

Algorithm-2

(a) Can ***Algorithm-1*** really force only one process (P_i or P_j) entering its critical section at a time? Explain your answer. (4%)

(b) ***Algorithm-2*** is designed to solve what kind of drawback of ***Algorithm-1***? (4%