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淡江大學 104 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多媒體碩士班

科目：作業系統

考試日期:3 月 8 日(星期日) 第 2 節

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本試題雙面印刷

Section I (30 points) Choose the best answer for each of the following questions. Each problem has three points.

1. During the boot process, a computer obtains its initial bootstrapping information from:
(a) a special "boot block" on disk
(b) the superblock in the root file system
(c) a pre-configured file vmunix within the file system
(d) the /tmp file system
(e) none of the above

2. Three file descriptors associated with every Linux process are:
(a) standard input, standard output, and standard pipe
(b) standard input, standard output, and standard error
(c) standard input, standard output, and standard deviation
(d) standard input, standard output, and standard terminal
(e) standard input, standard output, and standard transmission

3. Counting semaphores:
(a) generalize the notion of a binary semaphore
(b) are used for managing multiple instances of a resource
(c) have increment and decrement operations
(d) can use queueing to manage waiting processes
(e) all of the above

4. User Mode Linux (UML) is an example of a virtual machine environment in which:
(a) Linux runs on top of Windows
(b) Linux runs on top of Linux
(c) Windows runs on top of Linux
(d) Windows runs on top of Windows
(e) none of the above

5. For two processes accessing a shared variable, Peterson's algorithm provides:
(a) mutual exclusion (b) progress
(c) bounded waiting (d) all of the above
(e) none of the above

背面尚有試題

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6. The Banker's Algorithm is an example of a technique for:
(a) deadlock prevention (b) deadlock avoidance
(c) deadlock detection (d) deadlock recovery
(e) all of the above

7. The operation of defragmenting a hard disk:
(a) uses compaction to combat internal fragmentation
(b) uses compaction to combat external fragmentation
(c) uses compression to combat internal fragmentation
(d) uses compression to combat external fragmentation
(e) all of the above

8. Which of the following is true of SSL?
(a) It provides security at the data-link layer.
(b) It is a simple protocol with limited options.
(c) It is commonly used for secure communication on the Internet.
(d) It was designed by Microsoft.

9. DMA controllers _____.
(a) do not utilize an additional, special purpose, processor
(b) are a nonstandard component in PCs of today
(c) can steal memory access cycles from the main CPU
(d) can access main memory at the same time as the main CPU

10. An address generated by a CPU is referred to as a _____.
(a) physical address (b) logical address
(c) post relocation register address
(d) Memory-Management Unit (MMU) generated address

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Section II: 9%

a. Consider a memory system with a cache time of 10ns and a memory access time of 200ns. If the hit rate is 95%, what is the **effective access time**? (4 points)

b. Consider a memory system with a cache access time of 10ns and a memory access time of 200ns. If the *effective access time* is 10% greater than the cache access time, what is the **hit ratio h**?(5 points)

Section III:Processor Scheduling: 21 points

Here is a table of processes and their associated arrival and running times.

Process ID	Arrival Time	Running Time(RT)
P1	0	2
P2	1	3
P3	4	1
P4	7	4
P5	8	3

a. Show the scheduling order for these processes under 3 policies: First Come First Serve (FCFS), Shortest-Remaining-Time-First (SRTF), Round-Robin (RR) with timeslice quantum = 1, by filling in the Gantt chart with ID of the process currently running in each time quantum. *Assume that context switch overhead is 0 and that new RR processes are added to the head of the queue and new FCFS processes are added to the tail of the queue.* **12 points**

Answer:

FCFS											
SRTF											
RR											
Time->	0	1	2	3	4	5	6	7	8	9	…
Note	P1(RT=2)	P2(RT=3)			P3(RT=1)			P4(RT=4)	P5(RT=3)		

b. Compute the response time for each process in each schedule above. **9 points**

Answer:

scheduler	P1	P2	P3	P4	P5
FCFS					
SRTF					
RR					

背面尚有試題

Section IV: Virtual Memory Page Replacement(20 points)

Given the following stream of page references by an application, calculate **the number of page faults** the application would incur with the following page replacement algorithms. Assume demand paging with **three frames**, all pages are initially free.

Reference Stream: A B C D A B E A B C D E B A B

Ans:

(a) FIFO replacement(**10 points**)

(b) LRU replacement(**10 points**)

Section V:Deadlock(12 points)

Deadlock can occur only if four necessary conditions hold simultaneously in the system. What are these conditions? Describe each of these conditions.

Ans:

Section VI: Thread and Process(8 points)

Consider the following code segment:

```
pid_t pid;

pid = fork();
if (pid == 0) { /* child process */
  fork();
  thread_create(...);
}
fork();
```

a. How many unique **processes** are created?

b. How many unique **threads** are created?