國立交通大學試題紙

九十九學年度第一次
博士班資格考

科目：作業系統(A)　　日期： 100 年 1 月 27 日　第 1 頁 共 1 頁

請 "✓" 明　✓不可看書　可看書

* 請將答案依題號順序寫入答案卷

答題時字跡需工整，否則不予計分。Write your answers legibly; otherwise you will get zero score.

1. [10 points] Solaris uses changeable priorities for time-sharing thread scheduling. The dispatch table is as follows. (The 1st column: a higher number indicate a higher priority; the 2nd column: time-quantum for the associated priority; the 3rd and 4th columns indicate the new priority of a thread when its time quantum expired and it returns from sleep.

priority	time quantum	time quantum expired	return from sleep
0	200	0	50
5	200	0	50
10	160	0	51
15	160	5	51
20	120	10	52
25	120	15	52
30	80	20	53
35	80	25	54
40	40	30	55
45	40	35	56
50	40	40	58
55	40	45	58
59	20	49	59

   Please discuss the purpose, advantages and disadvantages of this scheduling method.

2. [10 points] Please briefly introduce how to detect deadlock for a system with resources of multiple instances.

3. [8 points] Assume we use local page replacement and would like to maximize the degree of multi-programing. Please introduce a method to estimate the time-varying minimum page amount for each process.

4. [12 points] Please write and explain your pseudo codes for parallel execution of 5 reader and 5 writer threads. You have to make sure that no reader is kept waiting unless a writer has already obtained the permission to use the share object (the first readers-writers problem). Please explain the usage and purpose of all semaphores and variables.

5. [10 points] Please formulate the effective memory-access time of a system using TLB (translation look-ahead buffer) and a two-level page table architecture. Please define and introduce all parameters in the formula.

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科目：作業系統(B)　　日期： 100 年 1 月 27 日　第 1 頁 共 1 頁

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答題時字跡需工整，否則不予計分。Write your answers legibly; otherwise you will get zero score.

1. (10 points) Disk requests come into the disk driver for cylinders 10, 22, 20, 2, 40, 6, and 38, in that order. Assume that the disk has 100 cylinders. A seek takes 6 ms per cylinder moved. Compute the average seek time for the request sequence given above for
   (1) Shortest Seek Time First (SSTF)
   (2) C-SCAN
   Assume that the arm is initially at cylinder 20.
2. (10 points) Suppose that you have a UNIX file system where the disk block size is 1kB, and an inode takes 128 bytes. Disk addresses take 32 bits, and the inode contains space for 64 bytes of data (a recent optimization), 8 direct addresses, one indirect, one double-indirect and one triple-indirect (the rest of the space in the inode is taken up with other information such as ownership and protection). An index block is the same size as a disk block. How much space (including overhead) do files that are:
   1. 1025 bytes long, and
   2. 65536 (64KB) bytes long require?
3. (10 points) In most file systems, an update to a block of a file is written back to the same block on disk. Some modern high-performance file systems just write the updated block of data into a nearby available disk block. Briefly describe one advantage and one disadvantage of this strategy.
4. (10 points) For each of the following file descriptor data structures (contiguous, linked, UNIX inode, and block group pointers), describe: how efficiently this structure handles sequential access of large files, and why.
5. (10 points) What is an election algorithm for? Explain how the bully algorithm works in details.