

國立交通大學試題紙

九十六學年度第二次
博士班資格考

科目：作業系統(A)

日期：97年7月25日 第1頁共2頁

請“✓”明 ✓不可看書 可看書

* 請將答案依題號順序寫入答案卷。(1-7題請作答於A答案卷，8-18題請作答於B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. [6 points] In the classical definition of **wait** (see below) of a counting semaphore S, busy waiting is required. Redefine the **wait** and **signal** atomic operations so that they can avoid using busy waiting.

```
wait(S) {  
    while (S ≤ 0)  
        ; // no-op  
    S--;  
}
```

```
signal(S) {  
    S++;  
}
```

2. [6 points] What is the “double buffering” scheme? Explain how it works and why it is useful.
3. [6 points] Explain and compare the differences between (1) blocking system call (2) nonblocking system call, and (3) asynchronous system call.
4. [6 points] What is “process affinity”? Explain it in detail.
5. [10 points] Explain how the “microkernel” approach works. Explain its advantages and disadvantages.
6. [6 points] Explain how the “thread pool” design works. Explain its advantages.
7. [10 points] Explain how the “symmetric multithreading” design works in detail. Does an OS need to be modified to be running with “symmetric multithreading”?

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科目：作業系統(B)

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* 下列題目請作答於B答案卷

8. [5 points] File systems themselves should not be paged out. Explain why.
9. [5 points] Consider virtual-memory system with a TLB. If the page size is inadequately large, then the average memory-access time will be slow. It is also true if the page size is too small. Explain why.
10. [5 points] A new feature of Linux ext4 file system is extent allocation. What are the benefits of using extents?
11. [3 points] In modern file systems, small files are embedded in directories. Discuss how this helps to improve performance of accessing small files.
12. [2 points] Linux kernel 2.6 is capable of asynchronous I/O (AIO). What are the benefits of using AIOs?
13. [5 points] What is Native Command Queuing (NCQ) of disks? How it benefits disk-access performance?
14. [5 points] Many real-time distributed systems use token-based network with a ring topology. Explain why.
15. [5 points] Discuss the pros and cons of stateless file services.
16. [5 points] Briefly describe the Byzantine Generals Problem. How it is mapped to the problem of reaching agreement in distributed systems?
17. [5 points] What is the benefit of using one-time passwords?
18. [5 points] What is Data-Execution Protection (DEP)? How it helps to avoid attacks of stack-buffer overflow?