

國立中山大學資訊工程學系
104 學年度第 2 學期博士班資格考試

科目：作業系統

1. Process (15%):

- (1) Please give the seven components of a process control block. (7%)
- (2) What are the four situations to cause a process to be terminated? (4%)
- (3) Given five processes with burst time 10, 1, 2, 1, 5 and priority 3, 1, 3, 4, 2, respectively, compute the average waiting time of four methods: FCFS (first-come first-serve), SJF (shortest job first), RR (round-robin), and non-preemptive priority (smaller number means a higher priority). You should give your calculation. (4%)

2. Synchronization & Deadlocks (15%):

- (1) What is the race condition? How to solve it? (3%)
- (2) What are conflicting operations? (2%)
- (3) Is the 2-phase locking protocol deadlock-free? Why or why not? (2%)
- (4) Please explain the deadlock prevention scheme. (8%)

3. Memory Management (15%):

- (1) What is the difference between static and dynamic linking to libraries? (4%)
- (2) What is 50-percent rule? (2%)
- (3) Please compare the rationales of LFU and MFU page-replacement algorithms. (4%)
- (4) How does Win32 API implement shared memory? (5%)

4. I/O & Storage (15%):

- (1) Please explain the four common registers for an I/O device. (8%)
- (2) What are the two parts of random-access time in a disk? (2%)
- (3) What is a system disk? (2%)
- (4) Explain spooling and give an example of I/O devices that support spooling. (3%)

5. Protection & Security (15%):

- (1) Please give four advantages of using compiler-based enforcement. (8%)
- (2) How to launch a stack and buffer overflow attack? (4%)
- (3) Please explain three reasons why we need to separate authentication algorithms from encryption ones. (3%)

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6. Distributed Systems (15%):

- (1) Please give five reasons of using process migration. (5%)
- (2) What is the difference between location transparency and location independence for a distributed file system? (4%)
- (3) Please explain the three rules of the happened-before relation. (3%)
- (4) Please explain three common cache-update policies in a distributed system. (3%)

7. File Systems (10%):

Please explain five common free-space management methods in a file system.
(10%)