考 試 科 目	作業系統	系 所 別	資訊科學系	考 試 時 間	2月 18日（一）第 2 節

1. Single choice (45%)

(1) Which of the following statement is false? (a) Microservice is a method to structure the operating system by removing all nonessential components from the kernel and implementing them as system and user-level programs. (b) Microkernel aims to provide minimal process and memory management. (c) Spin lock means the lock that while a process is in its critical section, any other process that tries to enter its critical section must loop continuously in the call to acquire (d) In EDF scheduling, the earlier the deadline, the higher the priority.

(2) To starting up a computer system, the computer locates (a) an OS in ROM and loads it onto RAM (b) an OS in memory and loads it onto storage (c) an OS in storage and loads it into memory (d) a boot manager in ROM and loads it onto RAM.

(3) Which of the following mechanism is used to implement virtual memory? (a) paging (b) segmentation (c) segmentation with paging (d) all of the above.

(4) Which of the following is a multiple-user version of multitasking (a) multiprogramming (b) multiprocessing (c) time-sharing (d) multi-user tasking

(5) Which of the following refers to the concurrent execution of many programs on a multi-user system? (a) multiprogramming (b) multiprocessing (c) time-sharing (d) multi-user tasking

(6) Which of the following process scheduling strategy can cause starvation? (a) FCFS (b) Shortest Job First (c) Round-Robin (d) none of the above.

(7) Which of the following is an incorrect transition of process state? (a) running→ waiting (b) waiting→ running (c) waiting →ready (d) ready →running

(8) Which of the following mechanism has the worst fault tolerance capability? (a) RAID 1 (b) RAID 0 (c) RAID 5 (d) RAID 0+1

(9) Which of the following is true for a hard real-time system but not true for a soft real-time system? (a) each task has a deadline (b) tasks are scheduled according to its deadline (c) missing a deadline results in a failure of the whole system (d) It is mostly used in time-critical applications

(10) When designing the virtual memory sub-system, which of the following factor is not typically used to determine the page size? (a) the size of page table (b) internal fragmentation (c) CPU speed (d) I/O time

(11) Which of the following strategy is preemptive? (a) FCFS (b) SJF (c) Earliest deadline first (d) FCLS

(12) Given that physical memory is 256KB and is partitioned into 8 page frames. If logical memory is 5MB, what is the number of pages needed in virtual memory? (a) 640 (b) 320 (c)160 (d)80

(13) Which of the following is not a condition of deadlock? (a) mutual exclusion (b) hold and wait (c) preemption (d) circular wait

(14) In a paging system with three-level page tables, suppose that the hit rate is 90% and it takes 20 ns to search the TLB and 200 ns to access memory. What is the effective memory-access time? (a) 280ns (b) 260ns (c) 300 ns (d) 240ns

(15) Which of the following mechanism does not implement access matrix? (a) Role Based Access Control (b)

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Global Table (c) Capability Lists for Domain (d) Lock-Key Scheme

2. (10%) Consider the following configuration. Virtual address = 32 bits, page size = 4K bytes, and a page table entry occupies 4 bytes. How many pages should the OS allocates for the page tables of a 12Mbytes process under the following paging mechanisms? Assuming that the number of entries is the same.
   (1) One-level paging
   (2) Two-level paging

3. (20%) Please define the following terms
   (1) System call
   (2) Thrashing
   (3) Context switch
   (4) TCB (trusted computer base)
   (5) Hypervisor

4. (10%) What is man-in-the-middle attack? Please draw a diagram and explain.

5. (15%) Point out and correct the problems when using the following two binary semaphores with S1 =1 and S2=0 to implement a counting semaphore.

wait operation:	signal operation:
wait(S1):	wait(S1);
C--;	C++;
if(C<0) {	If(C<=0)
signal (S1);	signal(S2);
wait(S2);	signal(S1);
}else	
signal(S1);	

備　　註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。