



題目1至題目10為多選題，每題5分，每題需全部答對才給分。

1. Which are correct for computer-system organization?
 - (A) Typically, a bootstrap program is stored in ROM or EEPROM.
 - (B) Software may trigger a hardware interrupt by executing a special operation called a system call.
 - (C) Flash memory is another form of electronic disk.
 - (D) A device controller is responsible for moving the data between the peripheral devices and its local buffer storage.
2. Which are correct for operating-system structure?
 - (A) A common approach is to use one monolithic system.
 - (B) The layer approach simplifies debugging and system verification.
 - (C) Mach developed by Carnegie Mellon University used the microkernel approach.
 - (D) The Solaris operating system structure is organized around a core kernel with several types of loadable kernel modules.
3. What information would be saved in a process control block?
 - (A) Process state
 - (B) CPU registers
 - (C) Timer
 - (D) Number of threads
4. Which are correct for multithreaded programming?
 - (A) One of the benefits of multithreaded programming is real-time.
 - (B) The many-to-many model multiplexes many user-level threads to a larger number of kernel threads.
 - (C) Typically, a web-server process is multithreaded.
 - (D) Threads are the fundamental model of program execution in a Java program.
5. Which are correct for process scheduling?
 - (A) The FCFS scheduling algorithm is preemptive.
 - (B) The priority scheduling algorithm is always nonpreemptive.
 - (C) For a multilevel queue scheduling algorithm with five queues, the queues could be listed in order of priority as follows: 1) system processes, 2) interactive editing processes, 3) interactive processes, 4) batch processes, and 5) student processes.
 - (D) The CPU scheduling criteria include CPU utilization, throughput, turnaround time, waiting time, and response time.



6. Which are correct for synchronization?

- (A) Disabling interrupts on a multiprocessor is a feasible way for solving the critical-section problem.
- (B) The TestAndSet() and Swap() instructions are two special hardware instructions for solving the critical-section problem.
- (C) Using spinlocks is a good approach in a multiprocessor system.
- (D) Deadlocks never happen in the implementation of a semaphore with a waiting queue.

7. Which are correct for deadlocks?

- (A) A deadlock situation cannot arise if one of the following four conditions does not hold: 1) mutual exclusion, 2) hold and wait, 3) no preemption, and 4) circular wait.
- (B) The protocols for ensuring that the hold-and-wait condition never occurs in the system also guarantee no starvation.
- (C) In deadlock detection, the wait-for graph scheme for single instance of each resource type also works well in a resource-allocation system with multiple instances of each resource type.
- (D) For the deadlock-avoidance scheme, if a process requests an available resource, we must consider whether the system state is safe or not after allocating the resource to the process.

8. If it takes 20ns to search the TLB and 100ns to access memory, how long is the effective memory-access time for an 80% hit ratio?

- (A) 120ns.
- (B) 140ns
- (C) 160ns.
- (D) 180ns

9. Which are correct for virtual-memory management?

- (A) The three major components of the page-fault service time include 1) service the page-fault interrupt, 2) read in the page, and 3) restart the process.
- (B) When the copy-on-write technique is used, only the pages that are modified by either process are copied.
- (C) The optimal page-replacement algorithm is difficult to implement, because it requires future knowledge of the reference string.
- (D) The cost of using prepaging is always less than the cost of servicing the corresponding page faults.



10. Which are correct for file systems?

- (A) An acyclic graph allows directories to share subdirectories and files.
- (B) The linked allocation cannot solve external fragmentation problems.
- (C) When a process closes a file, the per-process table entry is removed, and the system-wide entry's open count is decremented.
- (D) Caching file data using virtual addresses has the same efficiency as caching through physical disk blocks.

11. Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock-free. (15%)

12. Assume a segmented paged allocation scheme of memory management is implemented on a machine having no special hardware (i.e., all tables are in memory). How many memory references are needed in order for a program to access a data word in memory? Describe the memory references needed. (15%)

13. In each of the following four statements, determine whether it is True or False (2%) and give your reason (3%). (20%)

- (a) In a multiprogramming system, it would rather give priority on the CPU-bound program than on the I/O-bound program when both are in memory.
- (b) I/O instructions are privileged and can be executed in only user mode.
- (c) By layered approach, the bottom layer (layer 0) is the hardware; the highest (layer N) is the user interface.
- (d) The user's address space is limited by the physical memory space on all of computer systems.