考 試 科 目	作業系統	系 所 別	資訊科學系/資訊科學與工程組、智慧計算組	考 試 時 間	2 月 7 日(五) 第 3 節

1. Single choice (45%)

(1) Which of the following statement is true (a) Dynamic loading does not need special support from OS (b) Dynamic linking loads partial program into memory when it is needed (c) Dynamic linking is particularly useful when large amounts of code are infrequently used (d) Dynamic loading prevents duplicated code

(2) The Windows platform provides several data structure for storing Thread-related information. Where the Windows platform stores the Thread Local variables? (a) TEB (b) PEB (c) KTHREAD (d) ETHREAD

(3) Which of the following is not part of the middleware provided by the OS? (a) Threading service (b) Database service (c) Graphics service (d) Multimedia service

(4) Which of the following is true? (a) When the CPU receives a non-maskable interrupt, it stops what it is doing and immediately transfers execution to the interrupt handler (b) I/O controllers emit interrupts via interrupt-request lines (c) In critical sections, the CPU may disables the maskable interrupts permanently (d) In an Intel processor, the interrupt No. 32 is a maskable interrupt

(5) The reason that the interrupt vector is indexed by numbers is to increase _____ (a) Stability (b) Speed (c) Security (d) Scalability

(6) Consider the following clustered system. Which of the following statement is false?
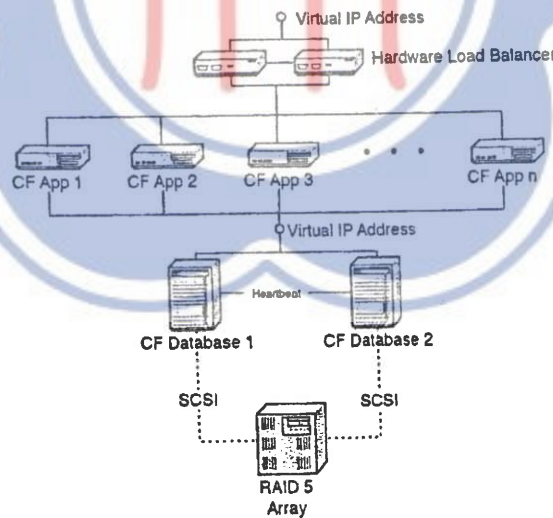
(a) Clustered systems usually share storage using SAN

(b) One of the CF Database 1 and CF Database 2 one machine in hot-standby mode, therefore they are asymmetric cluster

(c) The "+"、"-"、"x" and "/" are all valid operations of the Map task in a Hadoop Cluster

考 試 科 目	作業系統	系 所 別	資訊科學系/資訊科學與工程組、智慧計算組	考 試 時 間	2 月 7 日(五) 第 3 節

(d) Clustering is a technology for supporting horizontal scaling

(7) Which of the following is false: (a) Privileged instructions executed only in kernel mode (b) PSW is the controller used to support dual mode operations (c) The use of VM and VMM may interfered multi-mode operations of the OS (d) The dual mode of operation provides a mean for protecting the OS from errant users

(8) Which of the following statements is false? (a) Darwin is a layered system that serves as the foundation of Mac OS and iOS (b) Mac OS uses BSD system calls (c) Mac OS uses a pure microkernel architecture (d) message passing in Darwin does not require copying of message

(9) A child process ends before the parent calls wait() is called (a) zombie (b) daemon (c) orphan (d) none of the above

(10) Which of the following statement is false? (a) Each process is associated with a PCB (b) In Linux, PCB is usually located at /proc (c) the pointers to the opened files are stored in PCB (d) PCB information such as parent, child, and register values are usually kept in a structure called mm_struct.

(11) When a process being switched out of the CPU, which of the following situations does not cause the process being added to the wait queue? (a) I/O request (b) create child process (c) time slice expired (d) wait for an interrupt

(12) Which of the following statement is false? (a) the Green thread is a Many-to-One threading model (b) The threading model of Linux and Windows are typically Many-to-One (c) Although Many-to-Many threading model is the most flexible, it is too hard to implement in practice (d) Implicit threading is a kind of Many-to-Many threading model

(13) Which of the following is true? (a) cooperative scheduling can result in race condition (b) under preemptive scheduling, the process keeps the CPU until it releases it proactively (c) Most modern OS are now fully cooperative when running in kernel mode (d) the code sections affected by the interrupts must be guarded and prevent from concurrent accesses

(14) Which of the following statement is correct? (a) Base register holds the size of a page table. (b) Limit register holds the size of a process. (c) Base and limit registers can be loaded in user mode. (d) Any attempt by a user program to access memory at an address higher than the base register value results in a trap to the OS.

(15) A significant problem with priority scheduling algorithms is _____. (a) complexity (b) starvation (c) determining the length of the next CPU burst (d) determining the length of the time quantum

考 試 科 目	作業系統	系 所 別	資訊科學系/資訊科學與工程組、智慧計算組	考 試 時 間	2 月 7 日(五) 第 3 節

2. (9%) Consider a computer with 64-bit logical address with single-level paging. Assuming that the page size is 4M and the memory is byte-addressed. The physical memory is 32G. Please answer the following questions.

(1) The maximum number of pages a process can have?

(2) The number of bits for physical memory?

(3) The maximum number of frames?

3. TLB (Translation look-aside buffer):

(1) (3%) Describe the core function of TLB?

(2) (3%) In TLB, some entries are always wired down and never removed, why?

(3) (4%) In some systems, TLB stores ASIDs (Address-space identifier) in each entry. An ASID is typically used to denote which information? Why ASID can be used to speed-up context switch?

4. (6%) Page table is typically implemented on memory, however, this approach leads to more memory accesses. As a result, some systems store page tables in dedicated high speed registers? What is the problem with this approach?

5. (5%) List the correct order of the following system boot sequences: _____

a. The kernel starts systemd

b. The machine's BIOS or boot firmware loads and runs a boot loader.

c. The kernel mounts the root filesystem.

d. The boot loader finds the kernel image on disk, loads it into memory, and starts it.

e. The kernel initializes the devices and its drivers.

6. Thread pool:

(1) (3%) What is a thread pool

(2) (6%) What are the benefits of the thread pool

(3) (6%) What is the purpose of the "work stealing algorithm" used in the Fork-Join pool?

7. (10%) Inverted Page Table:

(1) Please illustrate (explain using a diagram) the structure of the inverted page table

(2) Why inverted page table does not (or hard to) support shared library?

備 註	一、作答於試題上者，不予計分。 二、試題請隨卷繳交。