

臺灣綜合大學系統 107 學年度學士班轉學生聯合招生考試試題

科目名稱	計算機概論	類組代碼	D24
		科目碼	D2401

※本項考試依簡章規定各考科均「不可以」使用計算機

本科試題共計 3 頁

1. Multiple Choice (20pts)

請於答案卷上作答，否則不予計分

- (1). A deadlocked state occurs whenever _____.
 - A. a process is waiting for I/O to a device that does not exist
 - B. the system has no available free resources
 - C. every process in a set is waiting for an event that can only be caused by another process in the set
 - D. a process is unable to release its request for a resource after use
- (2). _____ is the method of binding instructions and data to memory performed by most general-purpose operating systems.
 - A. Interrupt binding
 - B. Compile time binding
 - C. Execution time binding
 - D. Load-time binding
- (3). An address generated by a CPU is referred to as a _____.
 - A. physical address
 - B. logical address
 - C. post relocation register address
 - D. Memory-Management Unit (MMU) generated address
- (4). The mapping of a logical address to a physical address is done in hardware by the _____.
 - A. memory-management-unit (MMU)
 - B. memory address register
 - C. relocation register
 - D. dynamic loading register
- (5). Belady's anomaly states that _____.
 - A. giving more memory to a process will improve its performance
 - B. as the number of allocated frames increases, the page-fault rate may decrease for all page replacement algorithms
 - C. for some page replacement algorithms, the page-fault rate may decrease as the number of allocated frames increases
 - D. for some page replacement algorithms, the page-fault rate may increase as the number of allocated frames increases
- (6). _____ allows the parent and child processes to initially share the same pages, but when either process modifies a page, a copy of the shared page is created.
 - A. copy-on-write
 - B. zero-fill-on-demand
 - C. memory-mapped
 - D. virtual memory fork

臺灣綜合大學系統 107 學年度學士班轉學生聯合招生考試試題

科目名稱	計算機概論	類組代碼	D24
		科目碼	D2401

※本項考試依簡章規定各考科均「不可以」使用計算機 本科試題共計 3 頁

- (7). According to Amdahl's Law, what is the speedup gain for an application that is 60% parallel and we run it on a machine with 4 processing cores?
- A. 1.43
B. 0.7
C. 0.55
D. 1.82
- (8). A RAID structure ____.
- A. is primarily used for security reasons
B. is primarily used to ensure higher data reliability
C. stands for redundant arrays of inexpensive disks
D. is primarily used to decrease the dependence on disk drives
- (9). The ____ is an approximation of a program's locality.
- A. locality model
B. working set
C. page fault frequency
D. page replacement algorithm
- (10). Which of the following scheduling algorithms must be nonpreemptive?
- A. SJF
B. RR
C. FCFS
D. priority algorithms
2. IEEE 754 defines the binary formats of floating-point numbers. With IEEE 754 single precision standard, the base is 2 and the precision is 24 (digits). Give out the following floating-point numbers in scientific format, except for NaN (Not a Number) and $\pm\infty$.
Hint: A single precision floating-point number is of 32 bits. (12 pts)
- (1) The largest positive floating point number (3pts)
(2) The smallest positive floating point number (3pts)
(3) The largest negative floating point number (3pts)
(4) The smallest negative floating point number (3pts)
3. Use K-maps to minimize these sum-of-products expansions. (6pts)
- (1) $xyz + xy\bar{z} + x\bar{y}z + x\bar{y}\bar{z} + \bar{x}yz + \bar{x}\bar{y}z + \bar{x}\bar{y}\bar{z}$ (3pts)
(2) $wx\bar{y}\bar{z} + w\bar{x}yz + w\bar{x}\bar{y}z + w\bar{x}\bar{y}\bar{z} + \bar{w}x\bar{y}\bar{z} + \bar{w}\bar{x}yz + \bar{w}\bar{x}\bar{y}\bar{z}$ (3pts)

臺灣綜合大學系統 107 學年度學士班轉學生聯合招生考試試題

科目名稱	計算機概論	類組代碼	D24
		科目碼	D2401
※本項考試依簡章規定各考科均「不可以」使用計算機		本科試題共計 3 頁	

4. Given a computer system with a 32-bit virtual address, 4KB pages, and 8B per page entry of a page table. Suppose that the number of bits of physical addresses is 48, and the system is byte-addressable. If multiple-level paging is implemented, please answer the following questions: (12pts)
- (1) What is the maximum number of (physical) page frames in the system, where each page frame is the container to store the data of one (virtual) page? What is the maximum number of pages for a process? (3pts, 3pts)
 - (2) Suppose that the multi-level paging is adopted. How many levels do we need? (3pts)
 - (3) According to (2), let the memory access time and TLB access time be 1000ns and 10ns, respectively. What should be the TLB hit ratio such that the effective memory access time is smaller than 1610? (3pts)
5. Please give a regular expression which can accept strings “101” and “11101” but not “1001”. (10pts)
6. Please describe how CSMA/CD works in an Ethernet. (10pts)
7. The following function computes the sum of an array iteratively. Write a recursive version of the function that performs the same task. (15pts)
- ```
int arraySum (const vector & a) {
 int sum = 0; n = a.size();
 for (int i = 1; i < n; i++) sum += a[i];
 return sum; }
```
8. Hamming Code is one of the most common types of error-correcting codes. Please encode the 8-bit data word 11000100 by Hamming Code. (Hint: four parity bits will be included) (15pts)