國立高雄大學一百學年度研究所碩士班招生考試試題

科目：計算機結構與作業系統　系所組別：資訊工程學系　是否使用計算機：否
考試時間：100 分鐘　本科原始成績：100 分

I. [20%] 單選題 (每題 2 分，共 10 題)

1. Given a floating point number -0.9375_{ten}, what is the representation in the IEEE 754 single precision?
   (A) 1 01111110 11110000000000000000000　(B) 1 01111110 11100000000000000000000
   (C) 1 01111111 11100000000000000000000　(D) 1 01111110 11111000000000000000000
2. Which means that the smallest amount of information that is read or written on the disk? (A) registers (B) tracks (C) cylinders (D) sectors
3. Which means that the hardware cannot support the combination of instructions that we want to execute in the same clock cycle? (A) Control hazard (B) Data hazard (C) Structural hazard (D) Stall
4. A cache has 4K blocks with 4-word block size (1 word has 4 bytes) and is 2-way set associative. What is the size of the tag field? (A) 10 (B) 12 (C) 17 (D) 18
5. A machine has three classes of instructions (A, B, and C) in the instruction set. The average number of cycles for each instruction class and their frequencies (for a typical program) are as follows:

Instruction Class	Cycles/InstructionClass	Frequency
A	1	60%
B	2	30%
C	4	10%

   What is the average CPI for the machine? (A) 1.6 (B) 7/3 (C) 4 (D) 7
6. Which is the composite measure of a system's efficiency that counts the number of jobs served in a given unit of time? (A) turnaround time (B) waiting time (C) bandwidth (D) throughput
7. Which system call parameter passing is taken by Linux? (A) Pass parameters in registers (B) Push parameters onto the stack (C) Store parameters in a block and pass its address as a parameter in a register (D) Store parameters in the pre-allocated block
8. FAT, the disk-space allocation used by MS-DOS, is based on (A) contiguous allocation (B) linked allocation (C) indexed allocation (D) extent-based allocation
9. Which multithreading model is most likely to have a process blocked if one of its threads is blocked? (A) many-to-one (B) one-to-one (C) many-to-many (D) two-level
10. Which is the disk scheduling algorithm whose arm only goes as far as the last request in each direction, then reverses direction immediately, without first going all the way to the end of the disk? (A) SSTF (B) SCAN (C) C-SCAN (D) C-LOOK

II. [20%] 填充題：填入適當的**英文**術語 (每題 2 分，共 10 題)

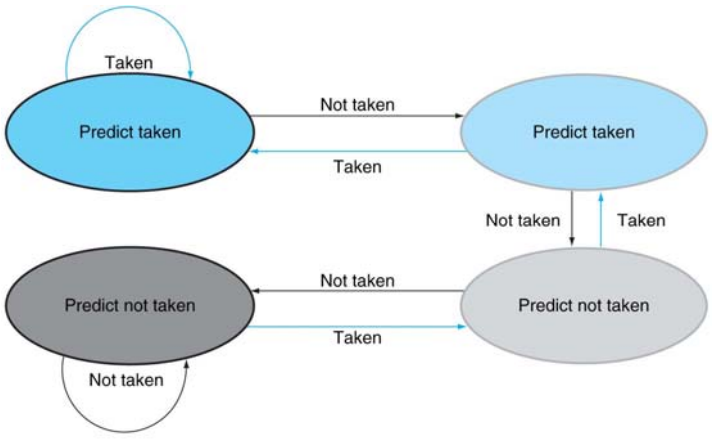
1. ___1___ states that the performance enhancement possible with a given improvement is limited by the amount that the improved feature is used.
2. ___2___ are caused when the cache cannot contain all the blocks needed during execution of a program.
3. ___3___ resolves a data hazard by retrieving the missing data element from internal buffers rather that waiting for it to arrive from programmer-visible register or memory.

背面尚有試題

4. ___4___ is a small memory that is indexed by the lower portion of the address of the branch instruction and that contains one or more bits indicating whether the branch was recently taken or not.
5. ___5___ is an approach that allows the compiler or the processor to “guess” the outcome of an instruction to remove it as dependence in executing other instruction.
6. A ___6___ abstracts the hardware of a single computer into several different execution environments; it treats hardware and the OS kernel as though they were all hardware. It provides an interface identical to the underlying bare hardware.
7. ___7___ is the result that page fault rate increases as the number of allocated frames increases.
8. ___8___ is the address binding technique that usually has stub code to locate the appropriate memory-resident library routine and to postpone linking until execution time.
9. To handle deadlock, ___9___ is the method that requires additional information about how resources are to be requested so that the system can decide for each request whether or not the process should wait in order to avoid a possible future deadlock.
10. ___10___ are a high-level abstraction that provides a convenient and effective mechanism for process synchronization by ensuring that only one process may be active within it at a time.

III. [60%] 問答題 (每題 10 分，共 6 題)

1. Explain the following terms: (a) out-order execution (b) RAID 5 (c) Data hazard (d) Write through cache (e) Average Memory Access Time
2. A cache has 8 blocks with 4-word block size (1 word has 4 bytes) and is two-way set associative. Given the following word address references: 1, 4, 8, 5, 17, 32, 19, 1, 56, 9, 25, 58. Please list if each reference is a hit or a miss, assuming the cache is initially empty. (Note: The first word address of each block is a multiple of 4 and the LRU policy is used.)
3. Given the following repeating pattern (e.g., in a loop) of branch outcomes：T, T, T, NT, NT.
   A. What is the accuracy of always-taken and always-not-taken predictor for the sequence of branch outcomes?
   B. What is the accuracy of the two-bit predictor if this pattern is repeated forever? The states of the predictor are shown in the following figure and the predictor starts off in the bottom left state in the figure.



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4. Consider the following processes with arrival time and CPU burst time given in milliseconds. For each of the (a) first-come first-served (FCFS) and (b) preemptive shortest job first (SJF) scheduling algorithms, draw the Gantt chart and determine the average waiting time for a **dual-core** CPU.

Process	P1	P2	P3	P4	P5	P6	P7	P8
Burst Time	2	13	9	6	5	9	6	3
Arrival Time	0	1	3	4	6	7	9	10

5. Memory-mapping is a common technique widely used in I/O systems.
   A. What is memory-mapped I/O? What is memory-mapped file access?
   B. Discuss the strengths and the weaknesses of the above two techniques.
6. Hashed page tables and inverted page tables are two specific structures of page tables in modern operating systems.
   A. Explain how hashed page tables and inverted page tables work.
   B. Compared to traditional hierarchical paging, discuss when the cases that hashed paging and inverted paging are suitable correspondingly.