國立成功大學

110學年度碩士班招生考試試題

編　號：173

系　所：電機工程學系

科　目：計算機組織與作業系統

日　期：0202

節　次：第 1 節

備　註：不可使用計算機

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※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. If the data in memory are 10001100 (in binary) which will be loaded into the registers by the following two loads in sequence (RISC-v assembly), show the content of register x1, x2, and x3 in hexadecimal respectively for the following instruction sequence. Assume that all registers are 32 bits. (20 pts)
   a. LB x1, 8(x0) ; load byte signed, x1 = ? (5 pts)
   b. LBu x2, 8(x0) ; load byte unsigned, x2 =? (5 pts)
   c. ADD x3, x1, x2 ; x3? (5pts)
   d. What is the memory address for the data? (5pts)

2. For single cycle implementation of a processor, draw the part of processor datapath for the memory instruction, such as LB, LW etc. (10 pts)

3. For a pipeline processor, answer the following questions:(10pts)
   a. In the pipelined datapath, which components should be connected to the CPU clock? (5 pts.)
   b. What is IPC?(5pts)

4. For the IEEE 754 floating point standard of the single precision format, why is a bias of 127 added in the exponent field?(5pts) What is the data format for 0.0 ?(5 pts)

5. If a system does not employ either a deadlock-prevention or a deadlock-avoidance algorithm, then a deadlock situation may occur. In this environment, the system may provide an algorithm that examines the state of the system to determine whether a deadlock has occurred. If all resources have only a single instance, then we can define a deadlock-detection algorithm that uses a wait-for graph. Please describe the wait-for graph and how it detects deadlock. (10 pts)

6. a. Explain the terms "at most once" and "exactly once" and indicate how they relate to remote procedure calls. (5 pts)
   b. Describe two approaches to the binding of client and server ports during RPC calls. (5 pts)

7. a. Suppose we have the following page accesses: 1 2 3 4 2 3 4 1 2 1 1 3 1 4 and that there are three frames within our system. Using the FIFO replacement algorithm, what will be the final configuration of the three frames following the execution of the given reference string? (5 pts)
   b. Given the reference string of page accesses: 1 2 3 4 2 3 4 1 2 1 1 3 1 4 and a system with three page frames, what is the final configuration of the three frames after the LRU algorithm is applied? (5 pts)

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8. The following processes are being scheduled using a preemptive, round-robin scheduling algorithm. Each process is assigned a numerical priority, with a higher number indicating a higher relative priority. In addition to the processes listed below, the system also has an idle task (which consumes no CPU resources and is identified as Pidle). This task has priority 0 and is scheduled whenever the system has no other available processes to run. The length of a time quantum is 10 units. If a process is preempted by a higher-priority process, the preempted process is placed at the end of the queue.

Process	Priority	Burst	Arrival
P1	40	20	0
P2	30	25	25
P3	30	25	30
P4	35	15	60
P5	5	10	100
P6	10	10	105

a. Show the scheduling order of the processes using a Gantt chart. (5 pts)

b. What is the turnaround time for each process? (5 pts)

c. What is the waiting time for each process? (5 pts)

d. What is the CPU utilization rate? (5 pts)