中原大學 100 學年度 碩士班 入學考試

3 月 19 日 15:30~17:00　　資訊工程學系

誠實是我們珍視的美德，
我們喜愛「拒絕作弊，堅守正直」的你！

科目：計算機系統　　（共 3 頁第 1 頁）

□不可使用計算機

1. Under what situation of a process, context switch may take place? (10%)

2. Consider the following set of processes, with the length of the CPU burst time given in milliseconds. (15%)

Process	Burst Time	Arrival Time
P1	11	0
P2	2	2
P3	3	3
P4	2	4
P5	6	5

   a. What are the turnaround time and waiting time of P3 for preemptive shortest job first scheduling?
   b. What are the turnaround time and waiting time of P5 for time sharing (time slice=2) scheduling?
   c. Draw the Gantt chart for time sharing (time slice=2) scheduling.

3. Please explain the behaviors of the following program. (10%)

```
pid_t    pid;
pid = fork();
if (pid < 0) {
        printf("Error!");
        exit(-1);
}
else if (pid == 0) {
        execlp("/bin/ls", "ls", NULL);
}
else {
        wait (NULL);
        printf ("Child Complete");
        exit(0);
}
```

4. There are various memory management strategies that have been used in computer systems, please design a well memory management, and explain the operations of this memory management scheme. (15%)

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5. Assume that a computer company is considering enhancing a machine by adding MMX (multimedia extension instruction) hardware to a processor. When a computation is run in MMX mode on the MMX hardware, it is 10 times faster than the normal mode of execution. “Percentage of media enhancement” is defined as the percentage of time that could be spent using the MMX mode. Answer the following question:
   a. What percentage of media enhancement is needed to achieve an overall speedup of 4? (10%)
   b. What percentage of the run-time is spent in MMX mode if a speedup of 4 is achieved? (5%)

6. Please design the “Barrel Shifter”.
   a. Draw the datapath of “Barrel Shifter”. (5 %)
   b. According to your answer in (a), please design the “Barrel Shifter” by Verilog HDL. (5%)

7. The Pipelined MIPS datapath of seven instructions (add, sub, and, or, lw, sw, beq) shown in the Figure 1. There are two lines are cut and marked with “X”.
   a. Please describe the effects of cutting wires. (10 %)
   b. Please describe which instructions can work normally or fail. (5 %)

8. Please describe the “Memory Hierarchy” of a computer system, and then explain why the hierarchy works by using “The Principle of Locality” (10%)

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（共 3 頁第 3 頁）

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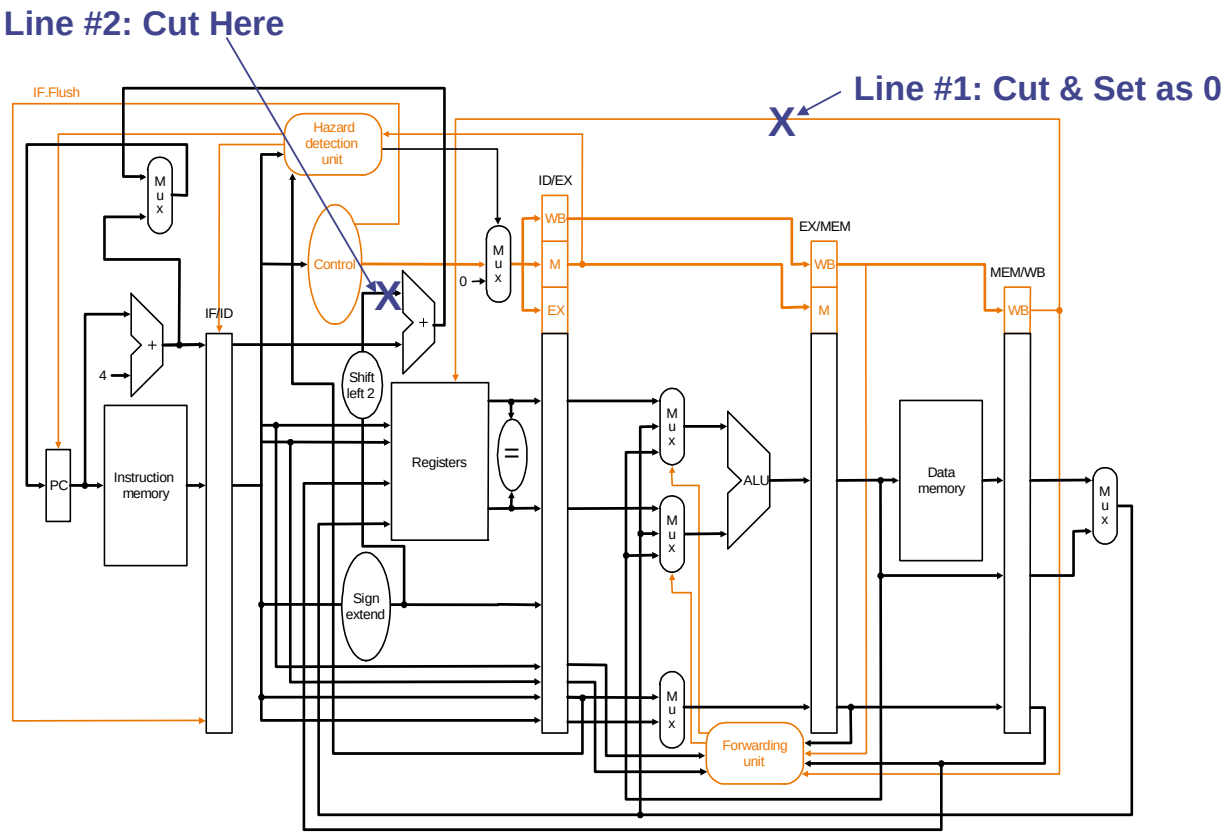

Figure 1