

CSCI 2321 (Principles of Computer Design), Spring 2004

Quiz 5 Solution

1. (10 points) Suppose that at the beginning of a clock cycle the following is true:

- The program counter (PC) has a value of 4.
- The instruction memory's location 4 contains the binary representation of the MIPS assembler instruction `sw $s0, -4($s1)`, namely 1010 1110 0011 0000 1111 1111 1111 1100.
- Register `$s0` contains -1.
- Register `$s1` contains 1008_{16} .

Using Figure 5.19 (p. 360), trace through what happens during the clock cycle. At the point at which values are written into state elements, what values will the following have? Give each in binary form with the appropriate number of bits.

- Inputs of register file:
 - Read register 1: **Solution:** 10001
 - Read register 2: **Solution:** 10000
- Inputs and output of ALU:
 - Input 1: **Solution:** 0000 0000 0000 0000 0001 0000 0000 1000
 - Input 2: **Solution:** 1111 1111 1111 1111 1111 1111 1111 1100
 - Output (value, not Zero): **Solution:** 0000 0000 0000 0000 0001 0000 0000 0100
- Inputs of data memory:
 - Write data: **Solution:** 1111 1111 1111 1111 1111 1111 1111 1111
 - Address: **Solution:** 0000 0000 0000 0000 0001 0000 0000 0100
- ALUSrc control signal: **Solution:** 1
- MemRead control signal: **Solution:** 0
- MemWrite control signal: **Solution:** 1