Name: Id#

COE 301/ICS 233, Term 172

Computer Architecture & Assembly Language

Quiz# 3 Solution

 Date: Thursday, March 1, 2018

# **Q1.** Fill in the blank in each of the following questions:

## The pseudo instruction *ble $s2, $s1, Next* is implemented by the following minimum MIPS instructions:

## slt $at, $s1, $s2

 beq $at, $0, Next

## Assume that the instruction *bne $t0, $t1, NEXT* is at address 0x00400020 in the text segment, and the label NEXT is at address 0x00400010. Then, the address stored in the assembled instruction for the label NEXT is (0x00400010-(0x00400020+4))/4=0xfffb.

## Assuming that variable Array is defined as shown below:

Array: .byte 1, 2, -3, 4

After executing the following sequence of instructions, the content of the three registers is $t1=0xfffffffd, $t2=0x000004fd and $t3=0x04fd0201.

la $t0, Array

lb $t1, 2($t0)

lh $t2, 2($t0)

lw $t3, 0($t0)

## The content of register **$t0** after executing the following code is 1+2+3+4=0xa:

li $s1, 0x4321

xor $t0, $t0, $t0

Next:

 andi $t1, $s1, 0xf

 add $t0, $t0, $t1

 srl $s1, $s1, 4

 bne $s1, $0, Next

## **Q2.** Write a MIPS assembly fragment for the following IF statement:

## **if ( [(a == b) || ( c== d) ] && (a < c) ) then b = d ;**

## Assume that variables a, b, c, and d are stored into registers $s0, $s1, $s2, and $s3, respectively.

bge $s0, $s2, exit

beq $s0,$s1, process

bne $s2, $s3, exit

process: Add $s1, $s3, $zero

Exit:

## **Q3.** Write a MIPS assembly fragment for displaying the binary content of register $s0. Note that the system call for printing a an integer in $a0 sets $v0 to 1.

# Initializing loop counter $t3

 li $t3, 32

loop:

 rol $s0, $s0, 1

 andi $a0,$s0, 1

# Print the integer result in a0

 li $v0, 1 # Load the system call number

 syscall

 subi $t3, $t3, 1

 bne $t3, $zero, loop