جامعة الملك فهد للبترول والمعادن
King Fahd University of Petroleum & Minerals

Quiz 3 (Fall 2022) - Solution

Course Name: Computer Organization **Time: 20 mins**

Instructor: Dr. Ayaz ul Hassan Khan

Name: _____ Identification #: _____
Date: _____ Total Marks: 10 Marks Obtained: _____
Signature of Instructor: _____

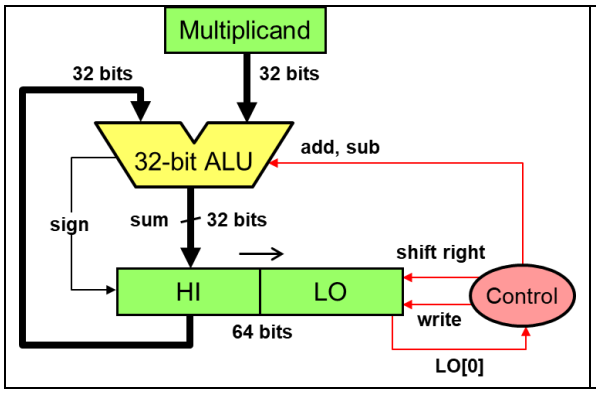
Q#1: Translate the following high-level if-statement into MIPS assembly code. Assume that **a**, **b**, **c** and **d** are signed integers loaded into registers **$t0**, **$t1**, **$t2**, and **$t3** respectively. You can use pseudo-branch instructions if needed. **[6 marks]**

```
if (((a < c) && (b == d)) || (a <= b)) {
      if (c == 0) { a = c; }
      d = a + b;
}
```

Solution:

```
      bge $t0, $t2, L1 # if (a >= c), skip AND
      beq $t1, $t3, IF # if (b == d), skip OR
L1:   bgt $t0, $t1, next # if (a > b), skip IF statement
IF:   movz $t0, $t2, $t2 # interior if statement
      addu $t3, $t0, $t1
next: . . .
```

Q#2: Complete the table below to perform the multiplication of two 4-bits signed numbers 0100 (+4) and 1010 (-6) using the following MIPS hardware. **[4 marks]**



Iter.	Steps	Multiplicand	Sign	Product=HI,LO
0	Initialize	0100		0000 1010
1	No Add			
	Shift			0000 0101
2	Add		0	0100 0101
	Shift			0010 0010
3	No Add			
	Shift			0001 0001
4	Add	1100	1	1101 0001
	Shift			1110 1000