

Computer Organization and Architecture

Sheet 4

Q1: True/False Questions

1. With the MIPS processor, it is not possible for the contents of an instruction (the output of instruction memory) to be directly written to a register.
2. MIPS instructions will load at least two register from the register file.
3. In the MIPS processor all instructions are 32-bits wide.
4. The format of MIPS instructions varies, but the length stays the same.
5. In MIPS four instructions are taken to add four variables together?
6. In MIPS the add instruction requires Three variables?
7. MIPS supports negative constants, so there is no need for subtract immediate in MIPS.

Q2. Choose the correct answer

1. $a = a + b$; compiles to the following MIPS instructions:
A) add \$s2, \$s1, \$s1
B) add \$t1, \$s1, \$s2
C) add \$s1, \$s1, \$s2
D) add \$s1, \$s2, \$s3
2. The instruction: beq rs, rt, L1 Means...
A) if (rs != rt) branch to instruction labeled L1;
B) unconditional jump to instruction labeled L1
C) if (rs == rt) branch to instruction labeled L1
D) if (rs >= rt) branch to instruction
3. C Code for:
bne \$s3, \$s4, Else
add \$s0, \$s1, \$s2
j Exit
Else: sub \$s0, \$s1, \$s2
Exit: ...
Means...
A) if (i>=j) f = g+h; else f = g-h;
B) if (i==j) f = g-h; else f = g+h;
C) if (i==j) f = g+h; else f = g-h;
D) if (i!=j) f = g+h; else f = g-h;
4. The command: sll \$t0, \$t1, 4 does...
A) Multiplies the value in \$t0 by 16 and puts it in \$t1
B) Multiplies the value in \$t1 by 16 and puts it in \$t0
C) Adds 4 to the value in \$t1 and puts it in \$t0
D) Multiplies the value in \$t1 by 4 and puts it in \$t0
5. bne \$t3, \$zero, loop1 means...
A) Stores 0 in \$3 and branches to loop1

- B) Branches to loop1 if \$t3 holds the value 0
- C) Branches to loop1 if \$t3 holds other than the value 0
- D) Branches to Loop1 only if \$t3 is negative

Answer the following Questions

1. What does lb and lbu do in MIPS?
2. What are the different types of instruction formats used in MIPS? And what are they used for?
3. In C: $f = (g+h) - (i+j)$ What would it look like in MIPS?
4. Write the MIPS assembly code that creates the 32-bit constant 0010 0000 0000 0001 0100 1001 0010 0100 and stores that value to register \$t1.
5. Write a MIPS assembly code that places the sum of the four integer variables b, c, d, and e into integer variable a, then subtracts integer variable f from a and puts the result in integer variable g

C code

$a = b + c + d + e;$

$g = a - f;$

6. Registers \$s1 and \$s2 of a computer contain the decimal values 1200 and 4600. What is the effective address of the memory operand in each of the following instructions? And explain their action.
 - lw \$s4,20(\$s1)
 - sw \$s5, 1000(\$s2)
7. assume that the base address of the integer array d is in register \$s4 and a value is in register \$s1, Compile the following C statement into MIPS assembly code:
 $d[3] = d[2] + a;$
8. Write the MIPS assembly program that add two integer numbers
9. Write the MIPS assembly program to average the given three numbers 10,9,2.