CA22 - PRACTICE PROBLEMS – WEEK 3

1. It is found that a program has 75% of its calculations that can be parallelized. Compute the speedup observed on a 4 processor system. Also compute the maximum theoretical speedup possible for the program.

1.a. 1 / ( 0.25 + 0.75/4) = 2.29

1.b. 4

2.

Translate given C code into MIPS instructions

a. f=(a-b-c)

b. f=(a+(b-c))-(e-d)

Assume that variable a to f are present in $S1 to $S6

c. a = b && (c > d)

Assume the following register mappings (a: t0, b:t1, c:t2, d:t3)

**Sol:**

For a. sub $S1, $S1, $S2

sub $S1, $S1, $S3

move $S1, $s6

For b. sub $t0, $s2, $s3

Add $t1, $s1, $t0

Sub $t2, $s5, $s4

Sub $t3, $t1, $t2

move $t3, $s6

For c. li $t0, 0 # assume a if false

beq $t1, $0, L1 # if b is false then L1 (a is false)

ble $t2, $t3, L1 # if ( c < d) then L1 (a is false)

li $t0, 1 # b && (c > d) is true, so a is true(1)

L1:…

3.Represent the following MIPS instructions in MIPS machine code (hexadecimal)

1. addi $s0, $t1, 64
2. sll $t2, $t3, 16
3. lw $t4, 32($s1)

**MIPS Instructions Formats**

|  |  |  |  |
| --- | --- | --- | --- |
| R-format |  | Opcodes:  addi: (op=8)  sll: (op=0, funct=0)  lw: (op=0x35) |  |
| I-Format |  |

**Sol:**

i) I format - 21300040H

ii) R format - 000B5400H

iii) I format - 8E2C0020H

4. Suppose register $s0 has the binary number 1111 1101 1111 1110 1111 1010 1111 1111 and register $s1 has 0000 0000 0000 0100 1100 0010 0000 0001 what are the values of registers $t0 and $t1 after these two instructions?

sll $t1, $s0,4

srl $t0, $s1,4

**Sol:**

sll $t1, $s0, 4

**1101 1111 1110 1111 1010 1111 1111 0000 =**

srl $t0, $s1,4

**0000 0000 0000 0000 0100 1100 0010 0000 = 19488**

5. Find the content of register $t0 after executing the following command.

or $t0, $t1, $t2

Assume $t1= (21467865)10 and $t2= (efdcaabb)H

**Sol:**

0000 0001 0100 0111 1001 0010 1101 1001

1110 1111 1101 1100 1010 1010 1011 1011‬

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1110 1111 1101 1111 1011 1010 1111 1011

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