**Computer Architecture Lab Report Week 4**

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Assignment 1

* TH1: Khởi tạo $s1 = $s2 = 100(0x00000064)

#Laboratory Exercise 4, Home Assignment 1

.text

li $s1 100

li $s2 100

start:

li $t0,0 #No Overflow is default status

addu $s3,$s1,$s2 # s3 = s1 + s2

xor $t1,$s1,$s2 #Test if $s1 and $s2 have the same sign

bltz $t1,EXIT #If not, exit

slt $t2,$s3,$s1

bltz $s1,NEGATIVE #Test if $s1 and $s2 is negative?

beq $t2,$zero,EXIT #s1 and $s2 are positive

# if $s3 > $s1 then the result is not overflow

j OVERFLOW

NEGATIVE:

bne $t2,$zero,EXIT #s1 and $s2 are negative

# if $s3 < $s1 then the result is not overflow

OVERFLOW:

li $t0,1 #the result is overflow

EXIT:

* Chương trình chạy đúng kết quả mong đợi: $t0 = 0 (không OVERFLOW)
* TH2: Khởi tạo $s1 = $s2 = -100(0xffffff9c)

#Laboratory Exercise 4, Home Assignment 1

.text

li $s1 -100

li $s2 -100

start:

li $t0,0 #No Overflow is default status

addu $s3,$s1,$s2 # s3 = s1 + s2

xor $t1,$s1,$s2 #Test if $s1 and $s2 have the same sign

bltz $t1,EXIT #If not, exit

slt $t2,$s3,$s1

bltz $s1,NEGATIVE #Test if $s1 and $s2 is negative?

beq $t2,$zero,EXIT #s1 and $s2 are positive

# if $s3 > $s1 then the result is not overflow

j OVERFLOW

NEGATIVE:

bne $t2,$zero,EXIT #s1 and $s2 are negative

# if $s3 < $s1 then the result is not overflow

OVERFLOW:

li $t0,1 #the result is overflow

EXIT:

* Chương trình chạy đúng kết quả mong đợi: $t0 = 0 (không OVERFLOW)
* TH3: Khởi tạo $s1 = 2147483647(0x7fffffff), $s2 = 1(0x00000001)

#Laboratory Exercise 4, Home Assignment 1

.text

li $s1 2147483647

li $s2 1

start:

li $t0,0 #No Overflow is default status

addu $s3,$s1,$s2 # s3 = s1 + s2

xor $t1,$s1,$s2 #Test if $s1 and $s2 have the same sign

bltz $t1,EXIT #If not, exit

slt $t2,$s3,$s1

bltz $s1,NEGATIVE #Test if $s1 and $s2 is negative?

beq $t2,$zero,EXIT #s1 and $s2 are positive

# if $s3 > $s1 then the result is not overflow

j OVERFLOW

NEGATIVE:

bne $t2,$zero,EXIT #s1 and $s2 are negative

# if $s3 < $s1 then the result is not overflow

OVERFLOW:

li $t0,1 #the result is overflow

EXIT:

* Chương trình chạy đúng kết quả mong đợi: $t0 = 1 (OVERFLOW)
* TH4: Khởi tạo $s1 = -2147483648(0x80000000), $s2 = -1(0xffffffff)

#Laboratory Exercise 4, Home Assignment 1

.text

li $s1 -2147483648

li $s2 -1

start:

li $t0,0 #No Overflow is default status

addu $s3,$s1,$s2 # s3 = s1 + s2

xor $t1,$s1,$s2 #Test if $s1 and $s2 have the same sign

bltz $t1,EXIT #If not, exit

slt $t2,$s3,$s1

bltz $s1,NEGATIVE #Test if $s1 and $s2 is negative?

beq $t2,$zero,EXIT #s1 and $s2 are positive

# if $s3 > $s1 then the result is not overflow

j OVERFLOW

NEGATIVE:

bne $t2,$zero,EXIT #s1 and $s2 are negative

# if $s3 < $s1 then the result is not overflow

OVERFLOW:

li $t0,1 #the result is overflow

EXIT:

* Chương trình chạy đúng kết quả mong đợi: $t0 = 1 (OVERFLOW)
* TH5: Khởi tạo $s1 =100(0x00000064), $s2 = -100(0xffffff9c)

#Laboratory Exercise 4, Home Assignment 1

.text

li $s1 100

li $s2 100

start:

li $t0,0 #No Overflow is default status

addu $s3,$s1,$s2 # s3 = s1 + s2

xor $t1,$s1,$s2 #Test if $s1 and $s2 have the same sign

bltz $t1,EXIT #If not, exit

slt $t2,$s3,$s1

bltz $s1,NEGATIVE #Test if $s1 and $s2 is negative?

beq $t2,$zero,EXIT #s1 and $s2 are positive

# if $s3 > $s1 then the result is not overflow

j OVERFLOW

NEGATIVE:

bne $t2,$zero,EXIT #s1 and $s2 are negative

# if $s3 < $s1 then the result is not overflow

OVERFLOW:

li $t0,1 #the result is overflow

EXIT:

* Chương trình chạy đúng kết quả mong đợi: $t0 = 0 (không OVERFLOW)

Assignment 2

.text

li $s0, 0x12345678

andi $t0, $s0, 0xff000000 #mask to extract MSB

srl $t0, $t0, 24 #shift right 24 bits

andi $t1, $s0, 0xffffff00 #Clear LSB

ori $t2, $s0, 0x000000ff #LSB of $s0 turns into bits of 1

andi $t3, $s0, 0

* Trích xuất bits MSB của $s0: Kết quả lưu ở $t0
* Clear LSB của $s0: Kết quả lưu ở $t1
* Biến LSB của $s0 thành dãy bit 1: Kết quả lưu ở $t2
* Clear $s0: Kết quả lưu ở $t3

Assignment 3

1. abs $s0, $s1

sra $at, $s1, 0x0000001f

xor $s0, $at, $s1

subu $s0, $s0, $at

1. move $s0, $s1

addu $s0, $0, $s1

1. not $s0, $s1

nor $s0, $s1, $0

1. ble $s1, $s2, label

slt $at, $ s2, $s1

beq $at, $0, label

Assignment 4

.text

li $s1, 0x7fffffff

li $s2, 1

START:

li $t0, 0 #default status: No OVERFLOW

addu $s3, $s1, $s2 # $s3 = $s1 + $s2

xor $t1, $s1, $s2 #Test if $s1 and $s2 have the same sign

bltz $t1, EXIT #If not, exit

xor $t2, $s1, $s3 #Test if $s1 and $s3 have the same sign

bgtz $t2, EXIT #If yes, EXIT

OVERFLOW:

li $t0,1 #the result is overflow

EXIT:

* TH1: Khởi tạo $s1 = 2147483647(0x7fffffff), $s2 = 1(0x00000001)
* Kết quả khớp với mong đợi
* TH2: Khởi tạo $s1 = -2147483648(0x80000000), $s2 = -1(0xffffffff)
* Kết quả khớp với mong đợi
* TH3: Khởi tạo $s1 =100(0x00000064), $s2 = -100(0xffffff9c)
* Kết quả khớp với mong đợi

Assignment 5

.text

li $s0, 6 # a = 6

li $s1, 2 # b = 8

andi $t1, $s1, 0xffffffff # tmp = 8

li $t2, 1 # value 1

andi $s2, $s0, 0xffffffff # res = $s0

loop:

beq $t1, $t2, endloop # endloop if tmp = 1

srl $t1, $t1, 1 # temp/=2

sll $s2, $s2, 1 # res\*=2

j loop

endloop:

* TH1: Khởi tạo $s0 =6, $s2 = 8, với kết quả mong đợi $s2 = 48(0x00000030)
* Kết quả khớp với mong đợi
* TH2: Khởi tạo $s0 =6, $s2 = 2, với kết quả mong đợi $s2 = 12(0x0000000c)
* Kết quả khớp với mong đợi