**Thực hành kiến trúc máy tính tuần 28**

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Assignment 1

A screenshot of a computer

Description automatically generated

* **Cộng 2 số dương ko tràn, $s1 = 10, $s2 = 5**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | $t0 | $t1 | $t2 | $s3 |
| li $t0,0 | 0x00000000 | 0x00000000 | 0x00000000 | 0x00000000 |
| addu $s3,$s1,$s2 | 0x00000000 | 0x00000000 | 0x00000000 | 0x0000000f |
| xor $t1,$s1,$s2 | 0x00000000 | 0x0000000f | 0x00000000 | 0x0000000f |
| bltz $t1,Exit | 0x00000000 | 0x0000000f | 0x00000000 | 0x0000000f |
| slt $t2,$s3,$s1 | 0x00000000 | 0x0000000f | 0x00000000 | 0x0000000f |
| bltz $s1,Negative | 0x00000000 | 0x0000000f | 0x00000000 | 0x0000000f |
| beq $t2,$zero,Exit | 0x00000000 | 0x0000000f | 0x00000000 | 0x0000000f |

* **Cộng 2 số âm ko tràn, $s1 = -5, $s2 = -10**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | $t0 | $t1 | $t2 | $s3 |
| li $t0,0 | 0x00000000 | 0x00000000 | 0x00000000 | 0x00000000 |
| addu $s3,$s1,$s2 | 0x00000000 | 0x00000000 | 0x00000000 | 0xfffffff1 |
| xor $t1,$s1,$s2 | 0x00000000 | 0x0000000d | 0x00000000 | 0xfffffff1 |
| bltz $t1,Exit | 0x00000000 | 0x0000000d | 0x00000000 | 0xfffffff1 |
| slt $t2,$s3,$s1 | 0x00000000 | 0x0000000d | 0x00000001 | 0xfffffff1 |
| bltz $s1,Negative | 0x00000000 | 0x0000000d | 0x00000001 | 0xfffffff1 |
| beq $t2,$zero,Exit | 0x00000000 | 0x0000000d | 0x00000001 | 0xfffffff1 |

* **Cộng 2 số khác dấu không tràn, $s1 = -10, $s2 = 5**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | $t0 | $t1 | $t2 | $s3 |
| li $t0,0 | 0x00000000 | 0x00000000 | 0x00000000 | 0x00000000 |
| addu $s3,$s1,$s2 | 0x00000000 | 0x00000000 | 0x00000000 | 0xfffffffb |
| xor $t1,$s1,$s2 | 0x00000000 | 0xfffffff3 | 0x00000000 | 0xfffffffb |
| bltz $t1,Exit | 0x00000000 | 0xfffffff3 | 0x00000000 | 0xfffffffb |
| slt $t2,$s3,$s1 | 0x00000000 | 0xfffffff3 | 0x00000000 | 0xfffffffb |
| bltz $s1,Negative | 0x00000000 | 0xfffffff3 | 0x00000000 | 0xfffffffb |
| beq $t2,$zero,Exit | 0x00000000 | 0xfffffff3 | 0x00000000 | 0xfffffffb |

* **Cộng 2 số dương bị tràn số: $s1 = 0x7fffffff, $s2 = 0x00000001**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | $t0 | $t1 | $t2 | $s3 |
| li $t0,0 | 0x00000000 | 0x00000000 | 0x00000000 | 0x00000000 |
| addu $s3,$s1,$s2 | 0x00000000 | 0x00000000 | 0x00000000 | 0x80000000 |
| xor $t1,$s1,$s2 | 0x00000000 | 0x7ffffffe | 0x00000000 | 0x80000000 |
| bltz $t1,Exit | 0x00000000 | 0x7ffffffe | 0x00000000 | 0x80000000 |
| slt $t2,$s3,$s1 | 0x00000000 | 0x7ffffffe | 0x00000001 | 0x80000000 |
| bltz $s1,Negative | 0x00000000 | 0x7ffffffe | 0x00000001 | 0x80000000 |
| beq $t2,$zero,EXIT | 0x00000001 | 0x7ffffffe | 0x00000001 | 0x80000000 |

* **Cộng 2 số âm sẽ tràn số: $s1 = 0x80000000 và $s2 = 0xffffffff**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | $t0 | $t1 | $t2 | $s3 |
| li $t0,0 | 0x00000000 | 0x00000000 | 0x00000000 | 0x00000000 |
| addu $s3,$s1,$s2 | 0x00000000 | 0x00000000 | 0x00000000 | 0x7fffffff |
| xor $t1,$s1,$s2 | 0x00000000 | 0x7fffffff | 0x00000000 | 0x7fffffff |
| bltz $t1,Exit | 0x00000000 | 0x7fffffff | 0x00000000 | 0x7fffffff |
| slt $t2,$s3,$s1 | 0x00000000 | 0x7fffffff | 0x00000000 | 0x7fffffff |
| bltz $s1,Negative | 0x00000000 | 0x7fffffff | 0x00000000 | 0x7fffffff |
| beq $t2,$zero,Exit | 0x00000001 | 0x7fffffff | 0x00000000 | 0x7fffffff |

Assignment 2

.text

# Extract MSB of $s0

li $s0, 0x12345678

andi $t0, $s0, 0xff000000

srl $t0, $t0, 24

# Clear LSB of $s0

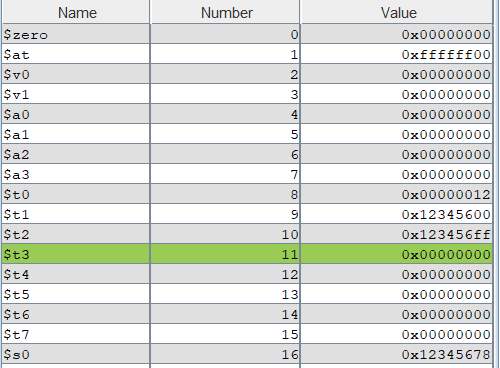
andi $t1, $s0, 0xffffff00

# Set LSB of $s0 (bits 7 to 0 are set to 1)

ori $t2, $s0, 0x000000ff

# Clear $s0 ($s0=0, must use logical instructions)

andi $t3, $s0, 0



Assignment 3

1. **abs $s0,$s1( $s0 <- |$s1|)**

li $t1, -100

bltz $t1, negative

j next

negative:

sub $t1, $0, $t1

next:

add $s0, $t1, $0



1. **move $s0,$s1( $s0 <= $s1)**

addi $s1, $s1, 100

or $s0, $s1, 0

A white rectangular object with blue lines

Description automatically generated

1. **not $s0, $s1**

addi $s1, $s1, 0x12345678

nor $s0, $s1, $s1

A white rectangular object with a black border

Description automatically generated with medium confidence

1. **ble $s1,$s2, label**

addi $s1, $s1, 10

addi $s2, $s2, 7

sub $s0, $s1, $s2 # s1 - s2

blez $s0, label # s1-s2 <= 0

else: addi $t0, $t0, -1 # sai

j exit

label: addi $t0, $t0, 1 # đúng

exit:



**Assignment 4**

start:

li $s1, 0x80000000

li $s2, 0xffffffff

li $t0, 0

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

xor $t1, $s1, $s3 # Test if $s1 and $s3 have the same sign

bgtz $t1, exit

xor $t2, $s2, $s3 # Test if $s2 and $s3 have the same sign

bgtz $t2, exit

j overflow

overflow:

li $t0, 1

exit:

**Kết quả chạy đúng:**

TH1: Giá trị hai thanh ghi $s1, $s2 cùng dấu không tràn (giả sử là -2 và -3)

→ Giá trị của thanh ghi $s3 là -5, giá trị thanh ghi $t1 lớn hơn 0 nên giá trị thanh ghi $t0 là 0, phép tính trên đã không bị tràn số.

A table with numbers and lines

Description automatically generated

• TH2: Giá trị hai thanh ghi $s1, $s2 cùng dấu tràn (giả sử là 0x7fffffff và 0x00000001)

→ Giá trị của thanh ghi $s3 là 0x80000000, giá trị thanh ghi $t1 nhỏ hơn 0 nên giá trị thanh ghi $t0 là 1, phép tính trên đã bị tràn số.

A table with numbers and numbers

Description automatically generated

• TH3: Giá trị hai thanh ghi $s1, $s2 khác dấu thì không tràn (giả sử là 0x7fffffff và 0x80000000)

A screenshot of a data

Description automatically generated

**Assignment 5**

addi $s1, $0, 100 # gán $s1

addi $s2, $s0, 8 # gán $s2

loop:

srl $s2, $s2, 1 # dịch bit $s2 sang phải $s2 / 2

beq $s2, $0, exit # check $s2 = 0 thì exit

sll $s1, $s1, 1 # dịch bit $s1 sang trái $s1 \* 2

j loop

exit:

addi $s3, $s1, 0

-Với $s1 = 100, $s2 = 8

**A screenshot of a computer screen

Description automatically generated**