Laboratory 4

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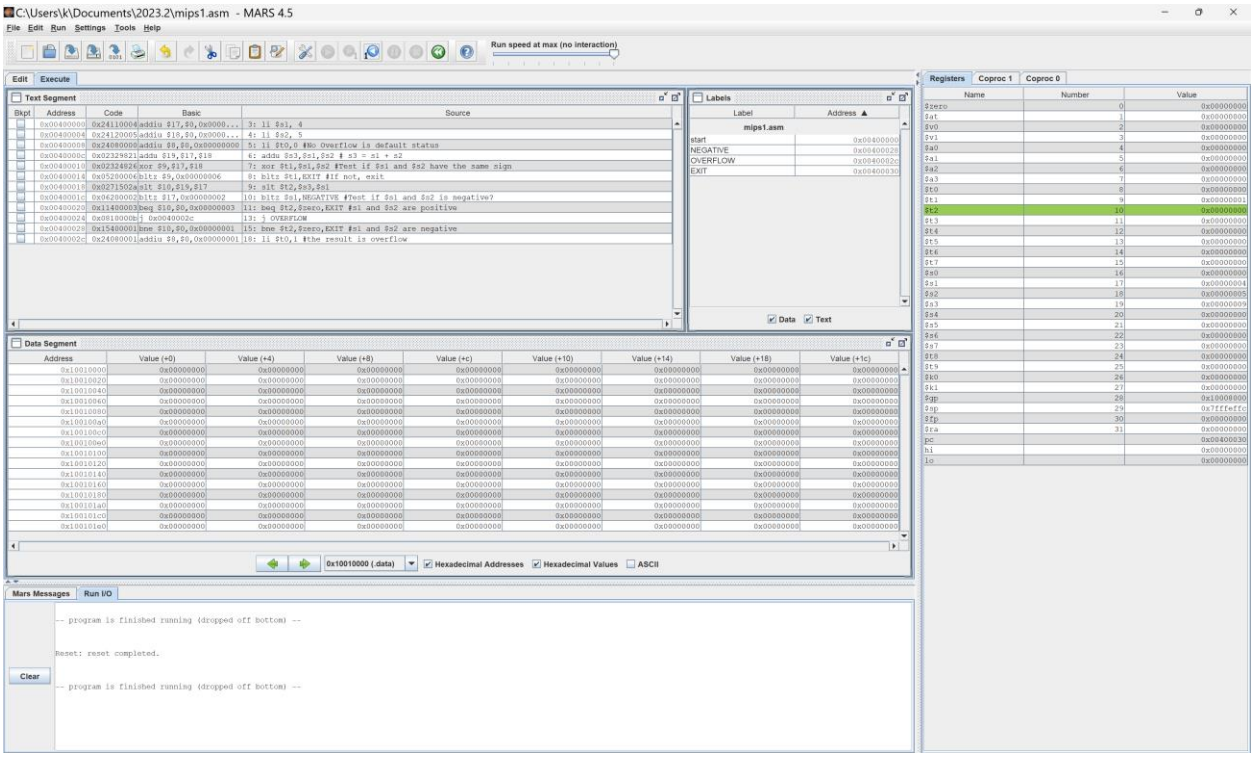
Assignment 1:

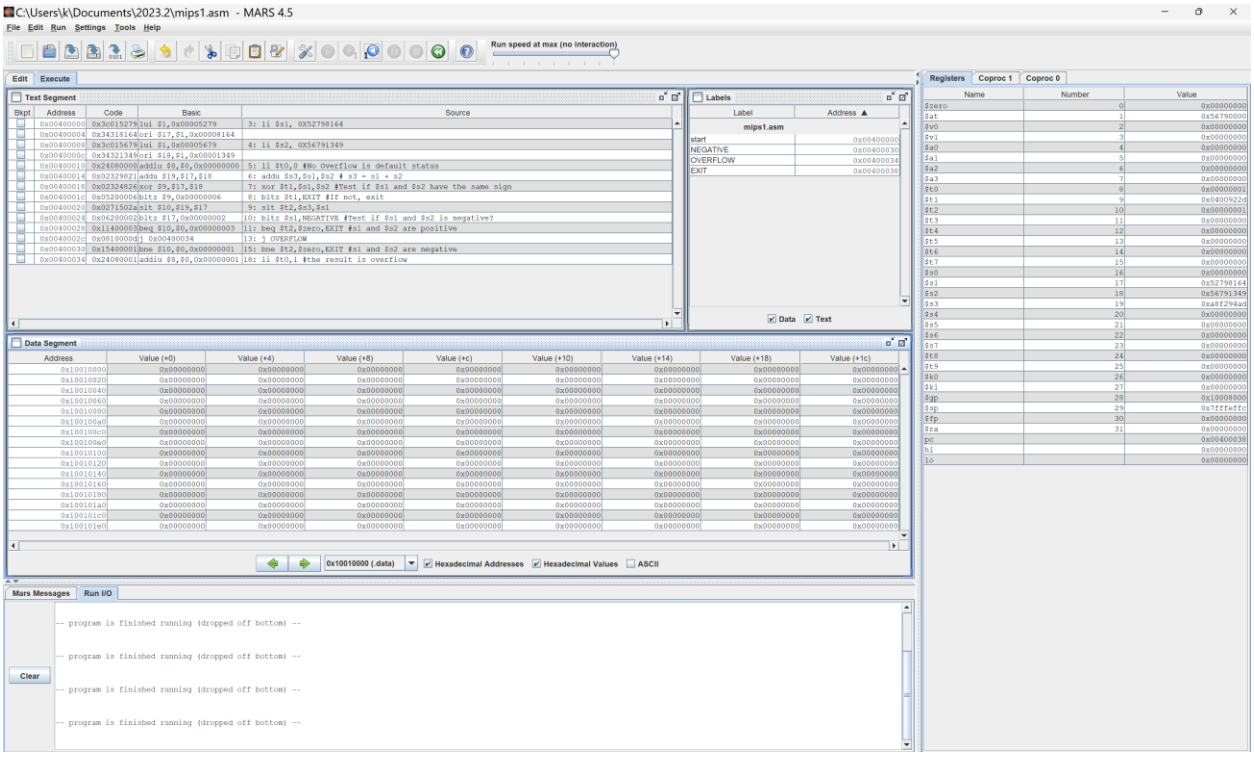
- NOT OVERFLOW:

```
.text
start:
li $s1, 4
li $s2, 5
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:
```



- OVERFLOW:

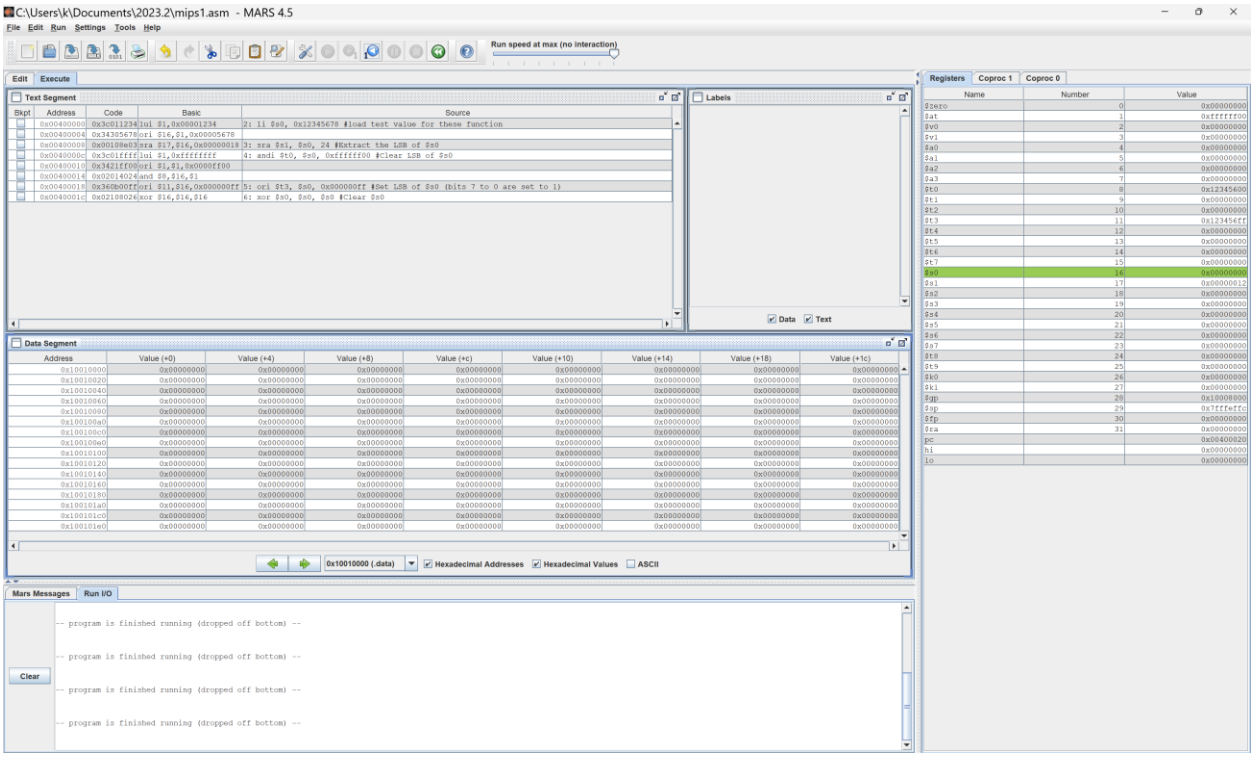
```
.text
start:
li $s1, 0x52798164
li $s2, 0x56791349
li $t0,0 #No Overflow is default status
addu $s3,$s1,$s2 # s3 = s1 + s2
xor $t1,$s1,$s2 #Test if $s1 and $s2 have the same sign
bltz $t1,EXIT #If not, exit
slt $t2,$s3,$s1
bltz $s1,NEGATIVE #Test if $s1 and $s2 is negative?
beq $t2,$zero,EXIT #s1 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:
```



→ Sau khi khởi tạo 2 toán hạng $s1 và $s2, ta thấy đoạn code đã chạy đúng với mã giả của đề bài.

Assignment 2:

```
.text
li $s0, 0x12345678 # load test value for these function
sra $s1, $s0, 24 # Extract the MSB of $s0
andi $t0, $s0, 0xffffff00 # Clear LSB of $s0
ori $t3, $s0, 0x000000ff # Set LSB of $s0 (bits 7 to 0 are set to 1)
xor $s0, $s0, $s0 # Clear $s0
```



Assignment 3:

a.

```
abs    $s0,s1
    s0 <= | $s1 |
```

```
.text
addi $s1, $zero, -9 # Khởi tạo giá trị -9 cho $s1
blez $s1, NEGATIVE # Kiểm tra xem $s1 có là số dương không (<=0)
j EXIT
NEGATIVE:
negu $s1, $s1 # Đảo dấu $s1 để lấy giá trị tuyệt đối
EXIT:
```

b.

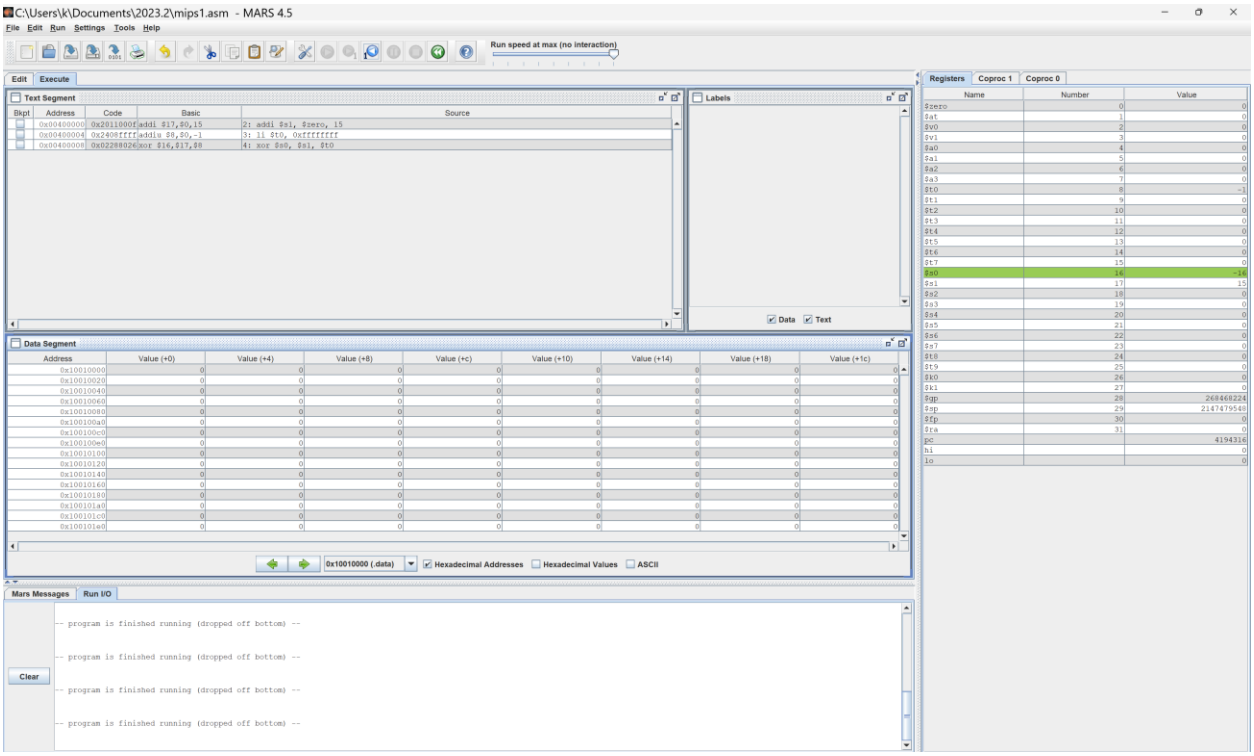
```
move   $s0,s1
    s0 <= $s1
```

```
.text
addu $s0, $zero, $s1
```

c.

```
not    $s0
    s0 <= bit invert (s0)
```

```
.text
addi $s1, $zero, 15
li $t0, 0xffffffff
xor $s0, $s1, $t0
```



d.

```
ble    $s1,s2,L
   if (s1 <= $s2)
         j L
```

.text
slt $at, $s2, $s1 # $at = 1 nếu $s2 < $s1
beq $at, $zero, L # Chuyển đến L nếu $s2 >= $s1

Assignment 4:

.text
li $s1, 0x7fffffff
li $s2, 0x00000001
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 $t1,EXIT # If not, exit ($t1 < 0 là khác dấu, không tràn)
xor $t2,$s1,$s3 # Test if $s1 and $s3 have the same sign
bgtz $t2,EXIT # If not, exit ($t2 > 0 là cùng dấu, không tràn)
li $t0,1 # The result is overflow
EXIT:

Assignment 5:

.text
li $s1, 10 # khởi tạo 1 giá trị bất kì cho thanh ghi $s1

```
li $s2,128 # khởi tạo giá trị lũy thừa (2^7)
loop:
beq $s2, 1, exit # nếu $s2 = 1 chuyển tới exit
sll $s1, $s1, 1 # $s1 * 2
srl $s2, $s2, 1 # $s2 / 2
j loop
exit:
```