Exercício Prático 06 - MIPS

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Parte 1 - Questões

1) A. um arquivo de texto que contém instruções de linguagem de programação.
2) B. uma parte do processador que possui um padrão de bits.
3) A. #
4) C. 32
5) D. parte do processador que contém o endereço da próxima instrução de máquina para ser obtida.
6) C. 4
7) D. uma declaração que diz o montador algo sobre o que o programador quer, mas não corresponde diretamente a uma instrução de máquina.
8) D. um nome usado no código-fonte em linguagem assembly para um local na memória.
9) B. 0x00400000
10) A. operando imediato.
11) B. operação bitwise.
12) D. Cada um dos registradores deve possuir 32 bits.
13) B. Os dados são estendidos em zero à esquerda por 16 bits.
14) C. ori $5, $0, 48
15) B. Sim
16) D. andi $8, $8, 0xFF
17) A. Todos os bits em zero
18) A. Não. Diferentes instruções de máquina possuem campos diferentes.

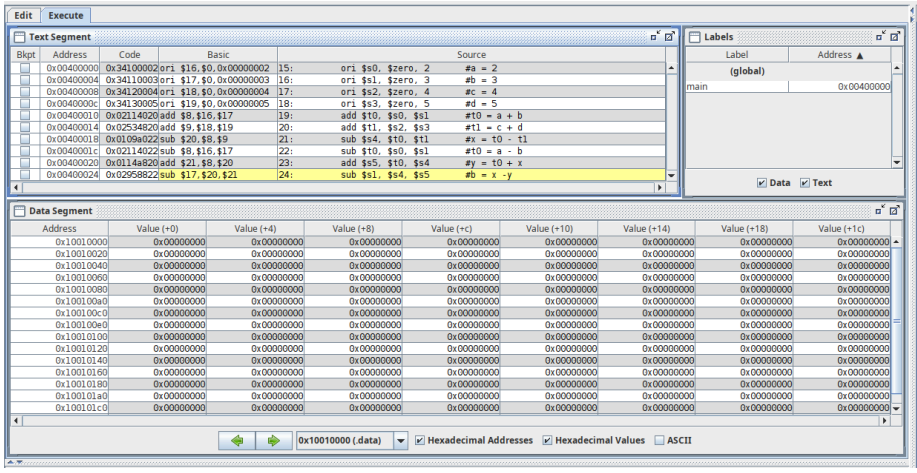
Parte 2 - Implementação no MARS

1)

Edit Execute

mips1.asm

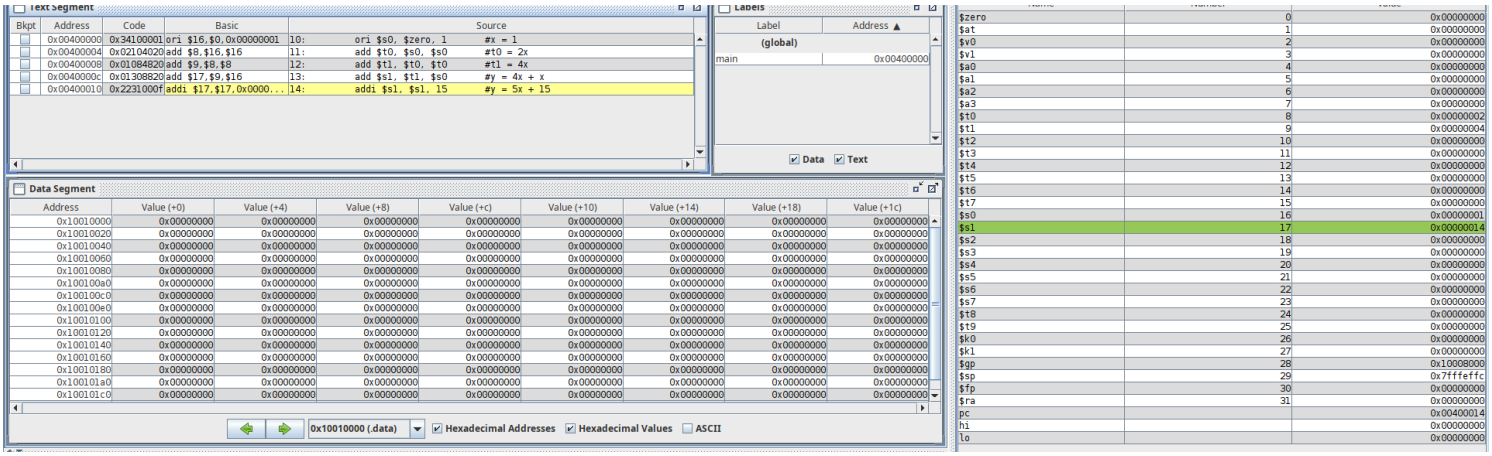
```
#       a=2;
#       b=3;
#       c=4;
#       d=5;
#       x=(a+b)-(c+d);
#       y=a-b+x;
#       b=x-y;

#INICIO

.text
.globl main
main:
        ori $s0, $zero, 2       #a = 2
        ori $s1, $zero, 3       #b = 3
        ori $s2, $zero, 4       #c = 4
        ori $s3, $zero, 5       #d = 5
        add $t0, $s0, $s1       #t0 = a + b
        add $t1, $s2, $s3       #t1 = c + d
        sub $s4, $t0, $t1       #x = t0 - t1
        sub $t0, $s0, $s1       #t0 = a - b
        add $s5, $t0, $s4       #y = t0 + x
        sub $s1, $s4, $s5       #b = x -y

#FIM
```



2)

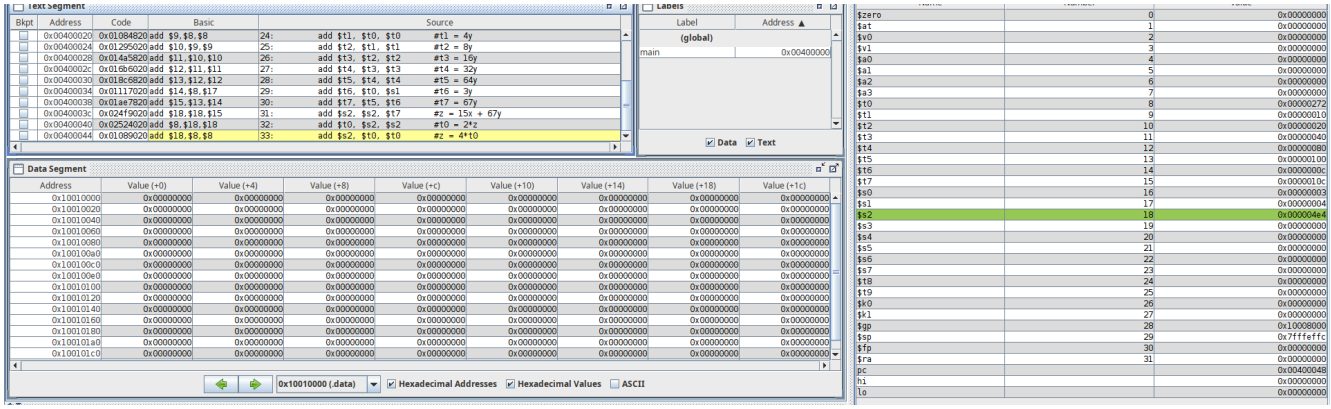
```
1  #       Programa 2
2  #       x=1;;
3  #       y = 5*x + 15;;
4
5  #INICIO
6
7  .text
8  .globl main
9  main:
10         ori $s0, $zero, 1       #x = 1
11         add $t0, $s0, $s0       #t0 = 2x
12         add $t1, $t0, $t0       #t1 = 4x
13         add $s1, $t1, $s0       #y = 4x + x
14         addi $s1, $s1, 15       #y = 5x + 15
15 #FIM
16
```

Line: 16 Column: 1 Show Line Numbers



3)

```
2  #INICIO
3
4  #       Programa 3
5  #       x=3;
6  #       y=4;
7  #       z=(15*x + 67*y)*4
8
9  .text
10 .globl main
11 main:
12         ori $s0, $zero, 3       #x = 3
13         ori $s1, $zero, 4       #y = 4
14         add $t0, $s0, $s0       #t0 = 2x
15         add $t1, $t0, $t0       #t1 = 4x
16         add $t2, $t1, $t1       #t2 = 8x
17         add $t3, $t2, $t2       #t3 = 16x
18         sub $s2, $t3, $s0       #z = 15x
19         add $t0, $s1, $s1       #t0 = 2y
20         add $t1, $t0, $t0       #t1 = 4y
21         add $t2, $t1, $t1       #t2 = 8y
22         add $t3, $t2, $t2       #t3 = 16y
23         add $t4, $t3, $t3       #t4 = 32y
24         add $t5, $t4, $t4       #t5 = 64y
25         add $t6, $t0, $s1       #t6 = 3y
26         add $t7, $t5, $t6       #t7 = 67y
27         add $s2, $s2, $t7       #z = 15x + 67y
28         add $t0, $s2, $s2       #t0 = 2*z
29         add $s2, $t0, $t0       #z = 4*t0
30
31 #FIM
32
33
34
35
Line: 35 Column: 5  Show Line Numbers
```

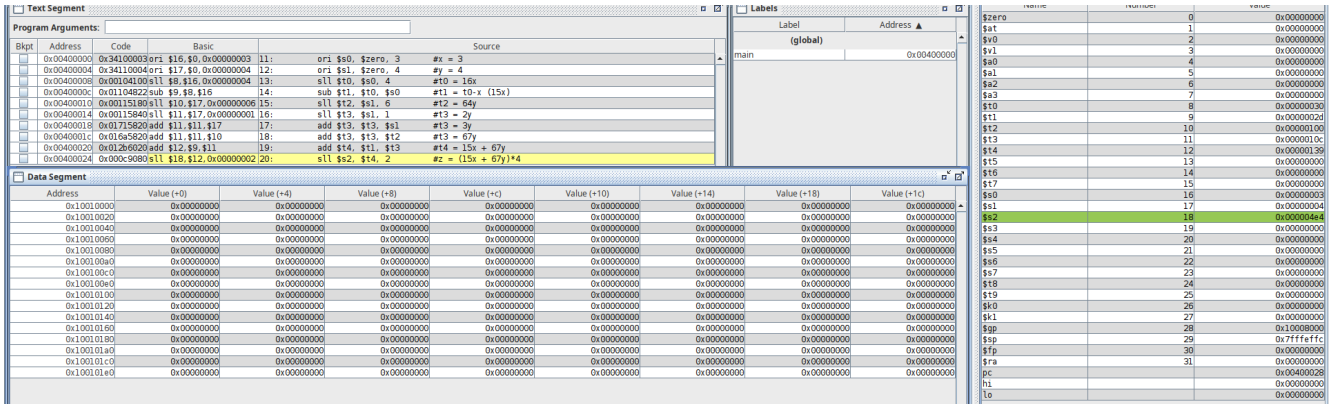


4)

mips6.asm | mips4.asm

```
1  #       Programa 4
2  #       x=3;
3  #       y=4;
4  #       z=(15*x + 67*y)*4
5
6  #INICIO
7
8  .text
9  .globl main
10 main:
11         ori $s0, $zero, 3       #x = 3
12         ori $s1, $zero, 4       #y = 4
13         sll $t0, $s0, 4         #t0 = 16x
14         sub $t1, $t0, $s0       #t1 = t0-x (15x)
15         sll $t2, $s1, 6         #t2 = 64y
16         sll $t3, $s1, 1         #t3 = 2y
17         add $t3, $t3, $s1       #t3 = 3y
18         add $t3, $t3, $t2       #t3 = 67y
19         add $t4, $t1, $t3       #t4 = 15x + 67y
20         sll $s2, $t4, 2         #z = (15x + 67y)*4
21
22 #FIM
23
```

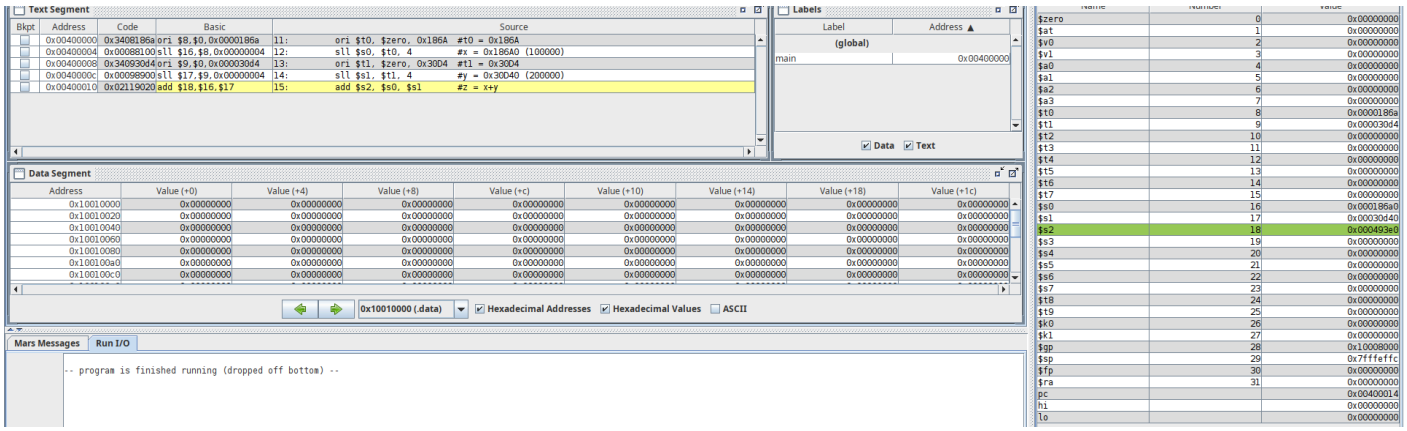
Line: 20 Column: 37 ☑ Show Line Numbers



5)

```
1  #       Programa 5
2  #       x=100000;
3  #       y=200000;
4  #       z=x+y
5
6  #INICIO
7
8  .text
9  .globl main
10 main:
11         ori $t0, $zero, 0x186A  #t0 = 0x186A
12         sll $s0, $t0, 4         #x = 0x186A0 (100000)
13         ori $t1, $zero, 0x30D4  #t1 = 0x30D4
14         sll $s1, $t1, 4         #y = 0x30D40 (200000)
15         add $s2, $s0, $s1       #z = x+y
16
17 #FIM
18
```

Line: 18 Column: 1 Show Line Numbers

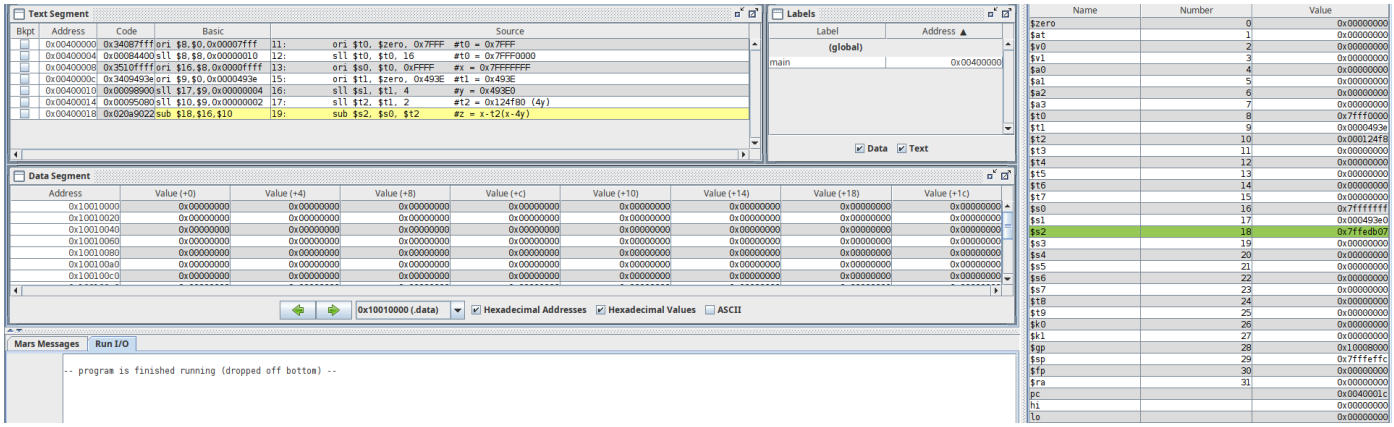


6)

mips6.asm

```
#       Programa 6
#       x=maior inteiro possivel (0x7FFFFFFF);
#       y=300000;
#       z=x-4y

#INICIO

.text
.globl main
main:
        ori $t0, $zero, 0x7FFF  #t0 = 0x7FFF
        sll $t0, $t0, 16        #t0 = 0x7FFF0000
        ori $s0, $t0, 0xFFFF    #x = 0x7FFFFFFF

        ori $t1, $zero, 0x493E  #t1 = 0x493E
        sll $s1, $t1, 4         #y = 0x493E0
        sll $t2, $t1, 2         #t2 = 0x124f80 (4y)

        sub $s2, $s0, $t2       #z = x-t2(x-4y)

#FIM
```

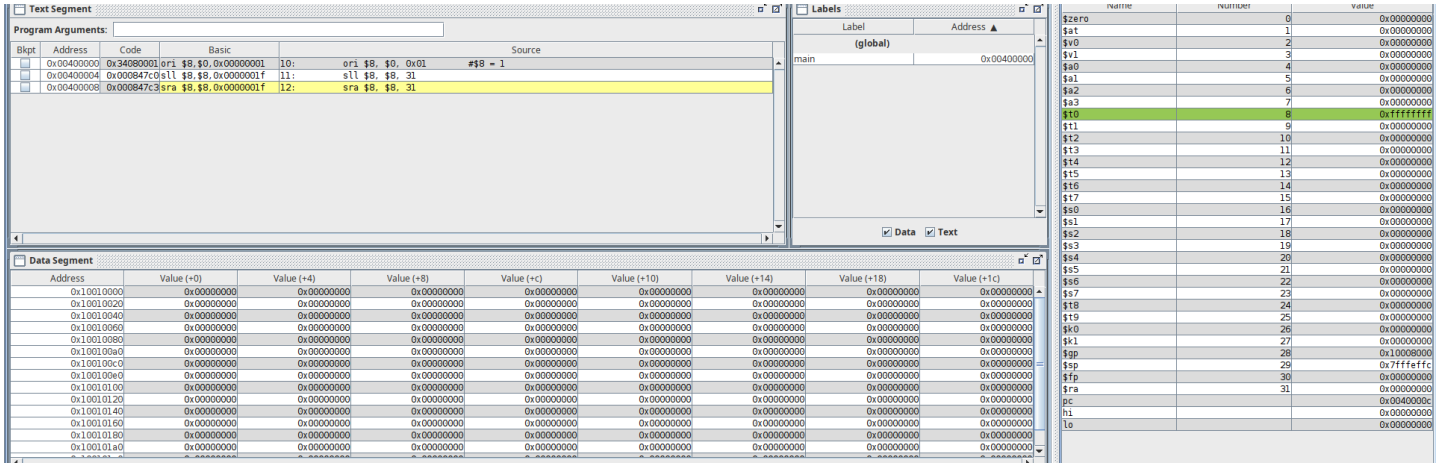
Line: 22 Column: 1 Show Line Numbers



7)

mips7.asm

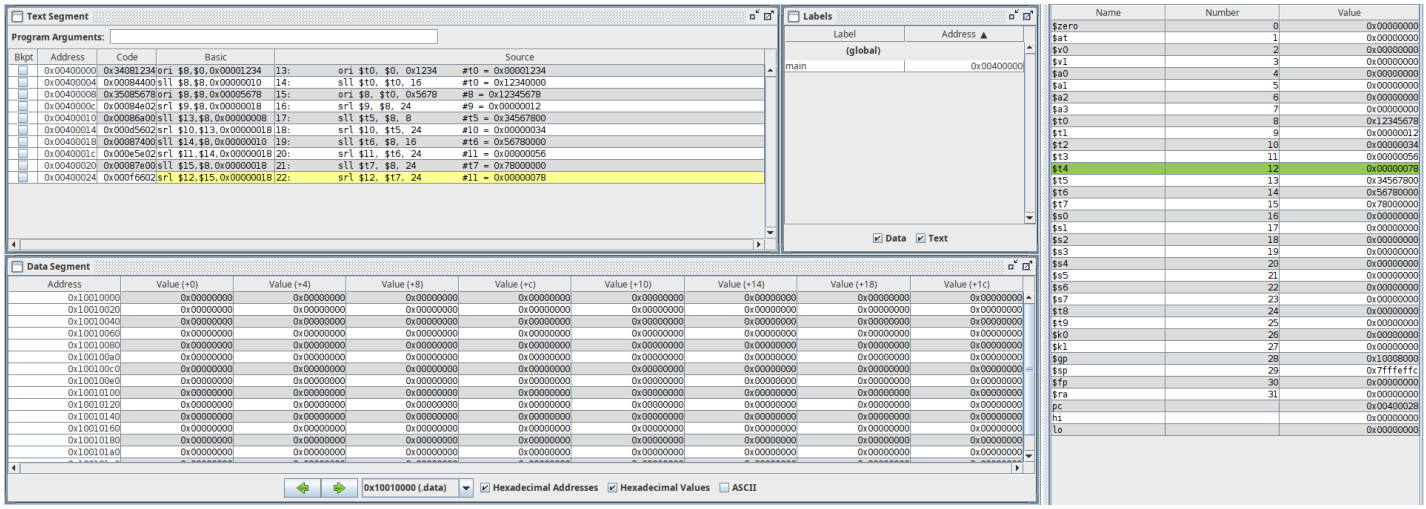
```
1   #       Programa 7
2   #       ori $8, $0, 0x01
3   #       $8 = 0xFFFFFFFF
4
5   #INICIO
6
7   .text
8   .globl main
9   main:
10          ori $8, $0, 0x01        #$8 = 1
11          sll $8, $8, 31
12          sra $8, $8, 31
13  #FIM
14
```



8)

mips8.asm

```
#       Programa 8
#       ori $8, $0, 0x12345678
#       $9 = 0x12
#       $10 = 0x34
#       $11 = 0x56
#       $12 = 0x78

#INICIO

.text
.globl main
main:
        ori $t0, $0, 0x1234     #t0 = 0x00001234
        sll $t0, $t0, 16        #t0 = 0x12340000
        ori $8, $t0, 0x5678     #8 = 0x12345678
        srl $9, $8, 24          #9 = 0x00000012
        sll $t5, $8, 8          #t5 = 0x34567800
        srl $10, $t5, 24        #10 = 0x00000034
        sll $t6, $8, 16         #t6 = 0x56780000
        srl $11, $t6, 24        #11 = 0x00000056
        sll $t7, $8, 24         #t7 = 0x78000000
        srl $12, $t7, 24        #11 = 0x00000078

#FIM
```

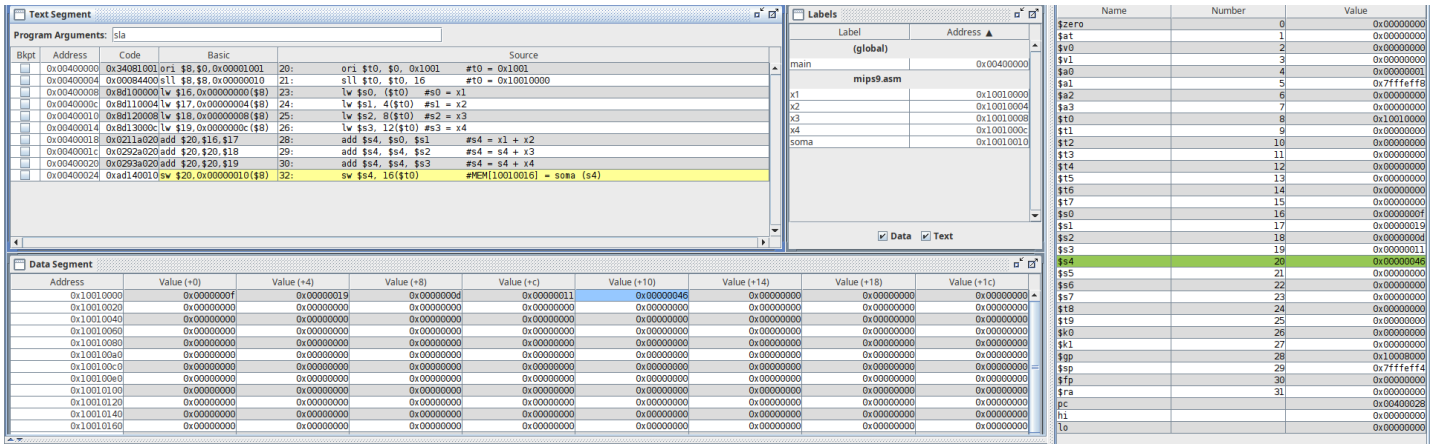


9)

mips9.asm

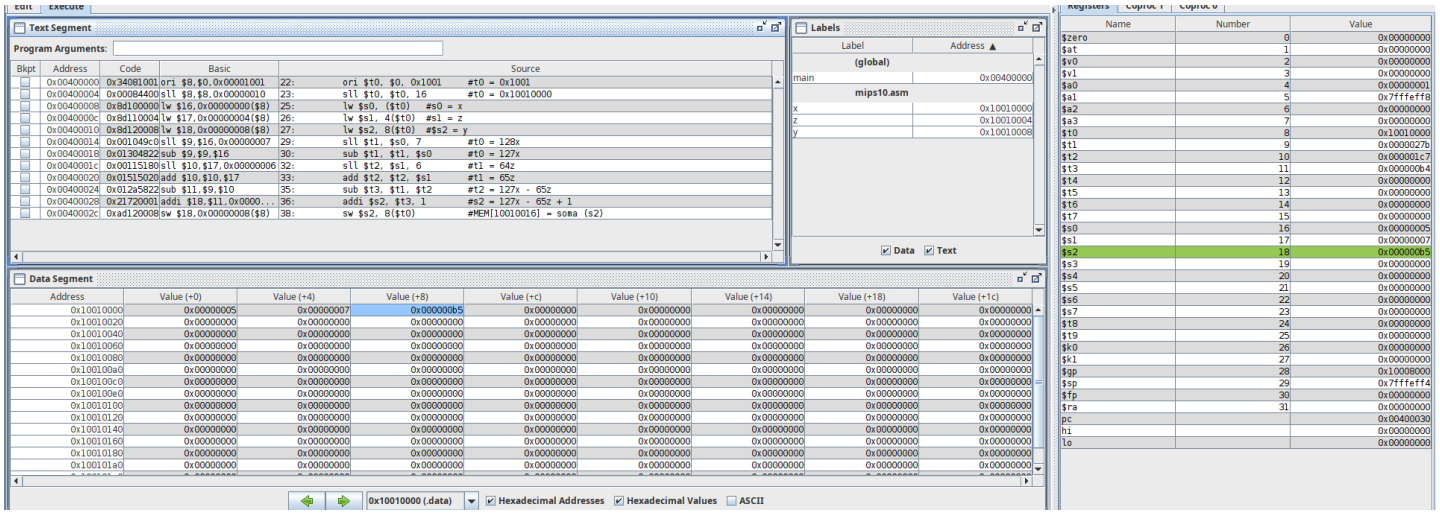
```
#       Programa 9
#       Escrever um programa que leia todos os números,
#       calcule e substitua o valor da variável soma por este valor.

#INICIO

.data
x1: .word 15
x2: .word 25
x3: .word 13
x4: .word 17
soma: .word -1

.text
.globl main
main:
        #t0 -> first address
        #t1 -> offset

        ori $t0, $0, 0x1001     #t0 = 0x1001
        sll $t0, $t0, 16        #t0 = 0x10010000

        lw $s0, ($t0)   #s0 = x1
        lw $s1, 4($t0)  #s1 = x2
        lw $s2, 8($t0)  #s2 = x3
        lw $s3, 12($t0) #s3 = x4

        add $s4, $s0, $s1       #s4 = x1 + x2
        add $s4, $s4, $s2       #s4 = s4 + x3
        add $s4, $s4, $s3       #s4 = s4 + x4

        sw $s4, 16($t0)         #MEM[10010016] = soma (s4)

#FIM
```

Line: 34 Column: 5 ☑ Show Line Numbers



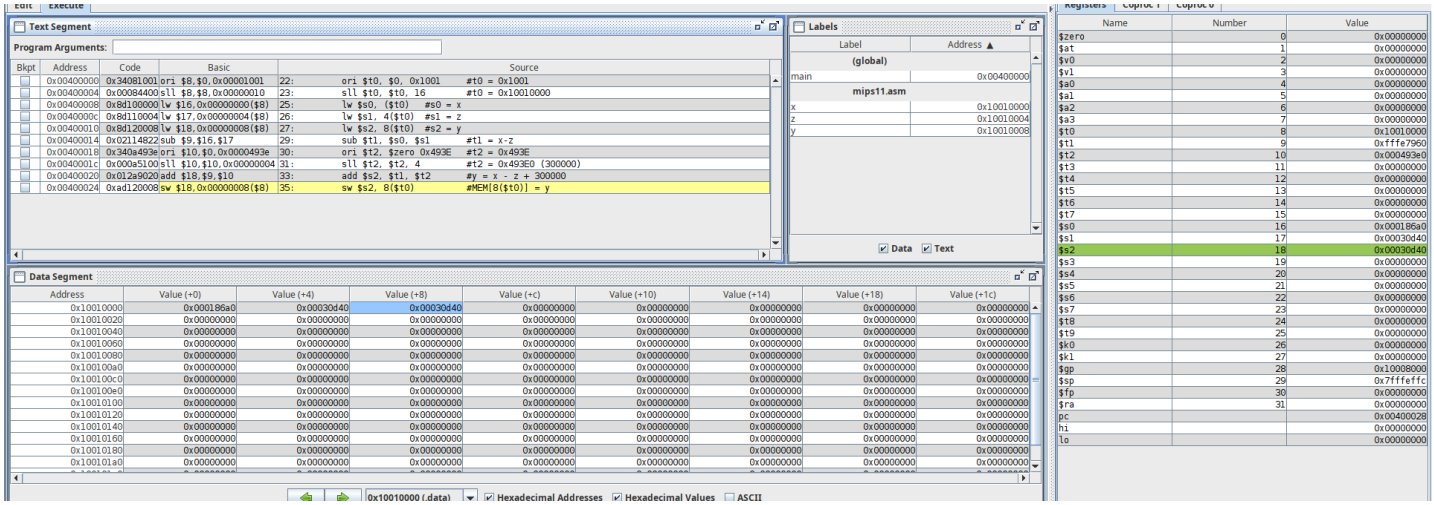
10)

```
#       Programa 10
#       Calcule o valor de y conhecendo os valores de x e z, estes armazenados na memória
#       Substitua o valor de y pelo seguinte programa y = 127x - 65z +1.

#INICIO

.data
x: .word 5
z: .word 7
y: .word 0      #será sobrescrito após execução

.text
.globl main
main:
        #t0 -> first address
        #t1 -> offset

        #x -> $s0
        #z -> $s1
        #y -> $s2

        ori $t0, $0, 0x1001     #t0 = 0x1001
        sll $t0, $t0, 16        #t0 = 0x10010000

        lw $s0, 0($t0)  #s0 = x
        lw $s1, 4($t0)  #s1 = z
        lw $s2, 8($t0)  #$s2 = y

        sll $t1, $s0, 7         #t0 = 128x
        sub $t1, $t1, $s0       #t0 = 127x

        sll $t2, $s1, 6         #t1 = 64z
        add $t2, $t2, $s1       #t1 = 65z

        sub $t3, $t1, $t2       #t2 = 127x - 65z
        addi $s2, $t3, 1        #s2 = 127x - 65z + 1

        sw $s2, 8($t0)          #MEM[10010016] = soma (s2)
#FIM
```



11)

```
1   #       Programa 11
2   #       Calcule o valor de y conhecendo os valores de x e z, estes armazenados na memória
3   #       Substitua o valor de y pelo seguinte programa y = x - z + 300000
4
5   #INICIO
6
7   .data
8   x: .word 100000
9   z: .word 200000
10  y: .word 0      #será sobrescrito após execução
11
12  .text
13  .globl main
14  main:
15          #t0 -> first address
16          #t1 -> offset
17
18          #x -> $s0
19          #z -> $s1
20          #y -> $s2
21
22          ori $t0, $0, 0x1001     #t0 = 0x1001
23          sll $t0, $t0, 16        #t0 = 0x10010000
24
25          lw $s0, 0($t0)  #s0 = x
26          lw $s1, 4($t0)  #s1 = z
27          lw $s2, 8($t0)  #s2 = y
28
29          sub $t1, $s0, $s1       #t1 = x-z
30          ori $t2, $zero 0x493E   #t2 = 0x493E
31          sll $t2, $t2, 4         #t2 = 0x493E0 (300000)
32
33          add $s2, $t1, $t2       #y = x - z + 300000
34
35          sw $s2, 8($t0)          #MEM[8($t0)] = y
36
37  #FIM
38
```



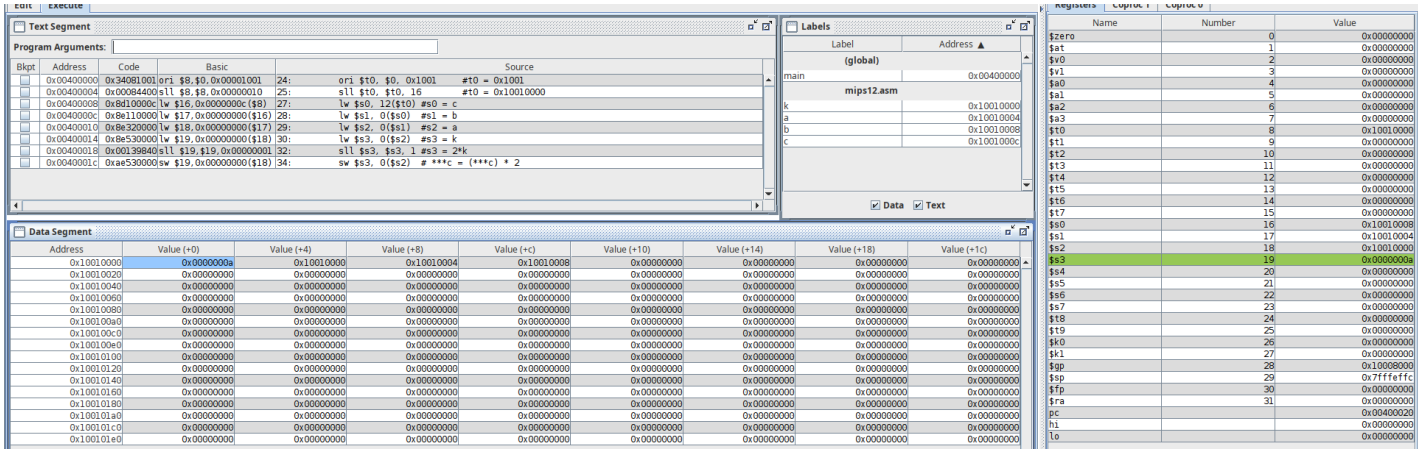
12)

Edit | Execute

mips12.asm

```
#       Programa 12
#       Considere int ***x;
#       A primeira posição da memória é do int, coloque os outros valores em reg's e use endereços de memória
#       O programa deve ler o valor k, multiplicar por 2 e reescrever no local da memoria

#INICIO

.data
k: .word 5
a: .word 0x10010000
b: .word 0x10010004
c: .word 0x10010008

.text
.globl main
main:
        #t0 -> first address

        #k -> $s0
        #a -> $s1
        #b -> $s2
        #c -> $s3

        ori $t0, $0, 0x1001     #t0 = 0x1001
        sll $t0, $t0, 16        #t0 = 0x10010000

        lw $s0, 12($t0) #s0 = c
        lw $s1, 0($s0)  #s1 = b
        lw $s2, 0($s1)  #s2 = a
        lw $s3, 0($s2)  #s3 = k

        sll $s3, $s3, 1 #s3 = 2*k

        sw $s3, 0($s2)  # ***c = (***c) * 2

#FIM
```

Line: 37 Column: 1 ☑ Show Line Numbers

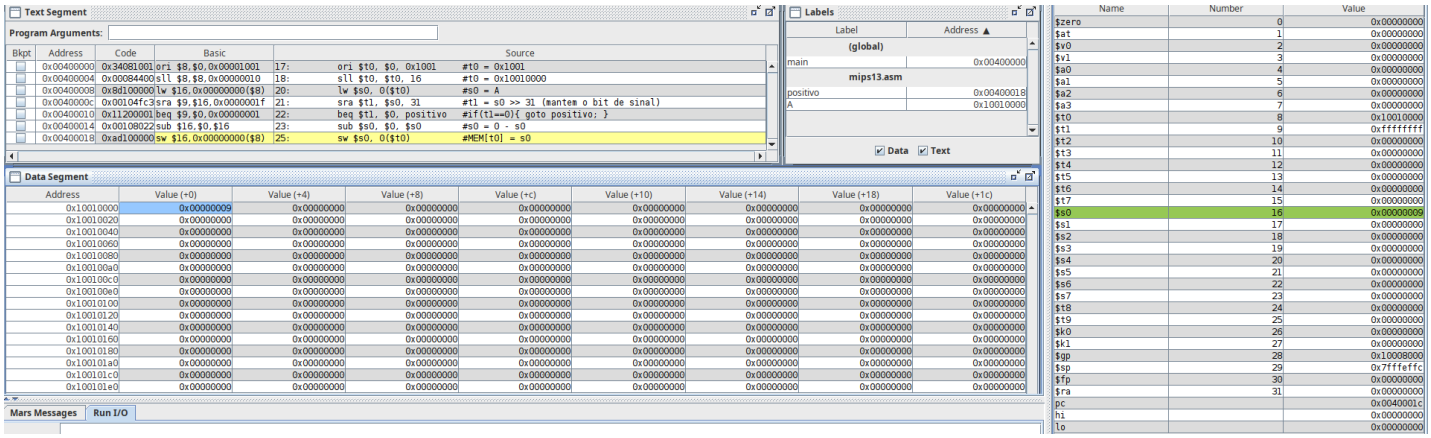


13)

mips13.asm

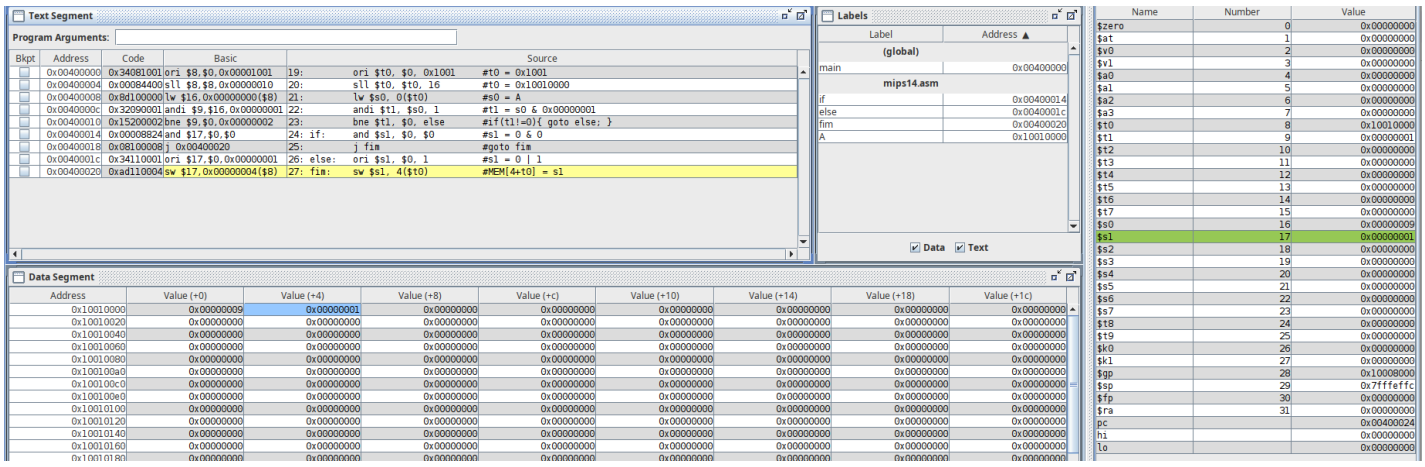
```
#       Programa 13
#       Escreva um programa que leia um valor A da memória, identifique se é negativo ou não e encontre seu modulo
#       O valor deve ser reescrito sobre A

#INICIO

.data
A: .word -9

.text
.globl main
main:
        #t0 -> first address

        #A -> $s0

        ori $t0, $0, 0x1001     #t0 = 0x1001
        sll $t0, $t0, 16        #t0 = 0x10010000

        lw $s0, 0($t0)          #s0 = A
        sra $t1, $s0, 31        #t1 = s0 >> 31 (mantem o bit de sinal)
        beq $t1, $0, positivo   #if(t1==0){ goto positivo; }
        sub $s0, $0, $s0        #s0 = 0 - s0
positivo:
        sw $s0, 0($t0)          #MEM[t0] = s0


#FIM

```

Line: 29 Column: 1 Show Line Numbers



14)

```
1  #       Programa 14
2  #       Escreva um programa que leia um valor da memoria e identifique se é par ou não
3  #       Devera ser escrito na segunda posição da memoria:
4  #       0 para par ou 1 para impar
5
6  #INICIO
7
8  .data
9  A: .word 9
10
11 .text
12 .globl main
13 main:
14         #t0 -> first address
15
16         #A -> $s0
17         #isEven -> $s1
18
19         ori $t0, $0, 0x1001      #t0 = 0x1001
20         sll $t0, $t0, 16         #t0 = 0x10010000
21         lw $s0, 0($t0)           #s0 = A
22         andi $t1, $s0, 1         #t1 = s0 & 0x00000001
23         bne $t1, $0, else        #if(t1!=0){ goto else; }
24 if:     and $s1, $0, $0          #s1 = 0 & 0
25         j fim                    #goto fim
26 else:   ori $s1, $0, 1           #s1 = 0 | 1
27 fim:    sw $s1, 4($t0)           #MEM[4+t0] = s1
28
29 #FIM
30
```

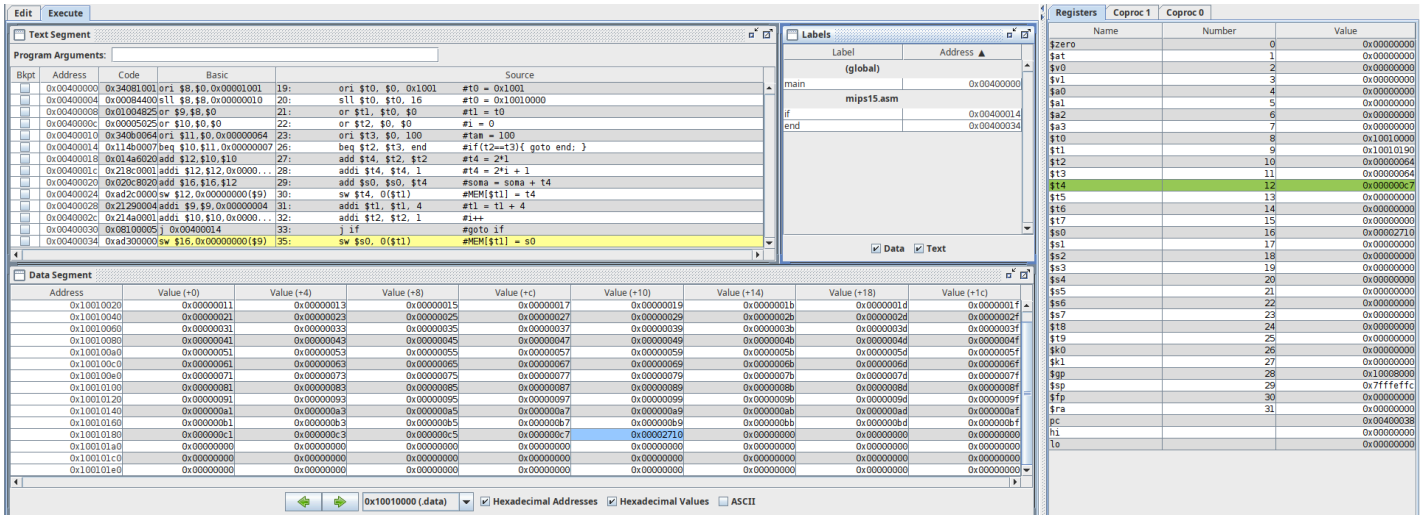


15)

```
#       Programa 15
#       Crie um vetor de 100 elementos, onde v[i] = 2*1+1
#       Apos a ultima posicao, escrever a soma de todos os valores armazenados no vetor

#INICIO

.data
.text
.globl main
main:
        #t0 -> first address
        #t1 -> offset

        #v[i] -> $t4
        #soma -> s1
        #i -> $t2   (0)
        #tam -> $t3 (100)

        ori $t0, $0, 0x1001     #t0 = 0x1001
        sll $t0, $t0, 16        #t0 = 0x10010000
        or $t1, $t0, $0         #t1 = t0
        or $t2, $0, $0          #i = 0
        ori $t3, $0, 100        #tam = 100

if:
        beq $t2, $t3, end       #if(t2==t3){ goto end; }
        add $t4, $t2, $t2       #t4 = 2*1
        addi $t4, $t4, 1        #t4 = 2*i + 1
        add $s0, $s0, $t4       #soma = soma + t4
        sw $t4, 0($t1)          #MEM[$t1] = t4
        addi $t1, $t1, 4        #t1 = t1 + 4
        addi $t2, $t2, 1        #i++
        j if                    #goto if
end:
        sw $s0, 0($t1)          #MEM[$t1] = s0

#FIM
```

Line: 35 Column: 32 Show Line Numbers

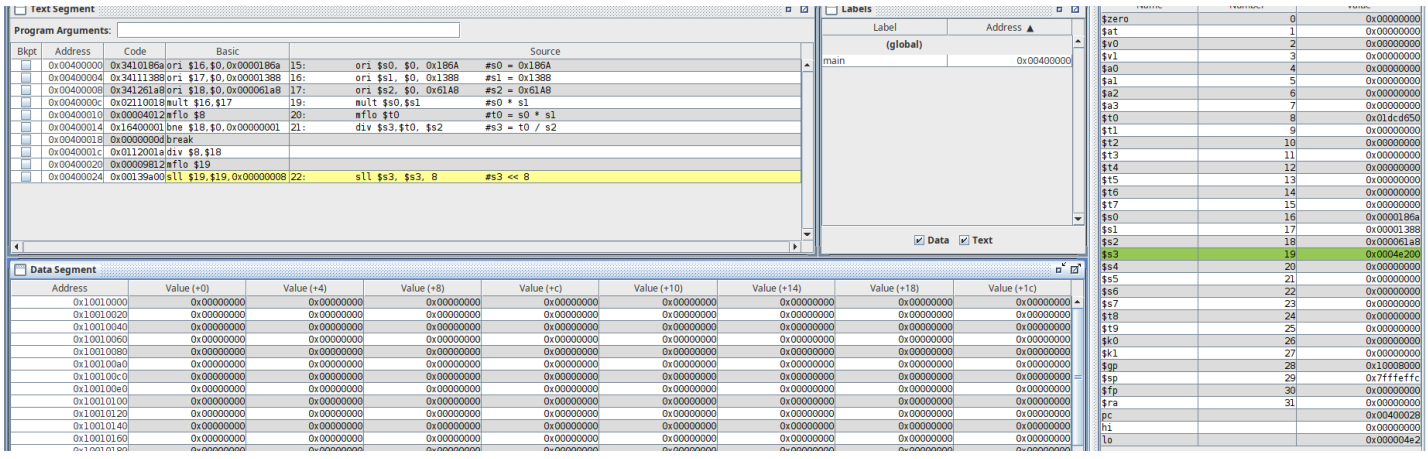
Mars Messages | Run I/O



16)

mips16.asm

```
#       Programa 16
#       Avalie a expressao (x*y)/z
#       Use x=1600000(0x186A00), y=80000(0x13880) e z = 400000(0x61A80), inicialize nos regs

#INICIO

.data
.text
.globl main
main:
        #x -> s0
        #y -> s1
        #z -> s2

        ori $s0, $0, 0x186A     #s0 = 0x186A
        ori $s1, $0, 0x1388     #s1 = 0x1388
        ori $s2, $0, 0x61A8     #s2 = 0x61A8

        mult $s0,$s1            #s0 * s1
        mflo $t0                #t0 = s0 * s1
        div $t0, $s2    #s3 = t0 / s2
        mflo $t1
        sll $s3, $t1, 8         #s3 << 8

#FIM
```

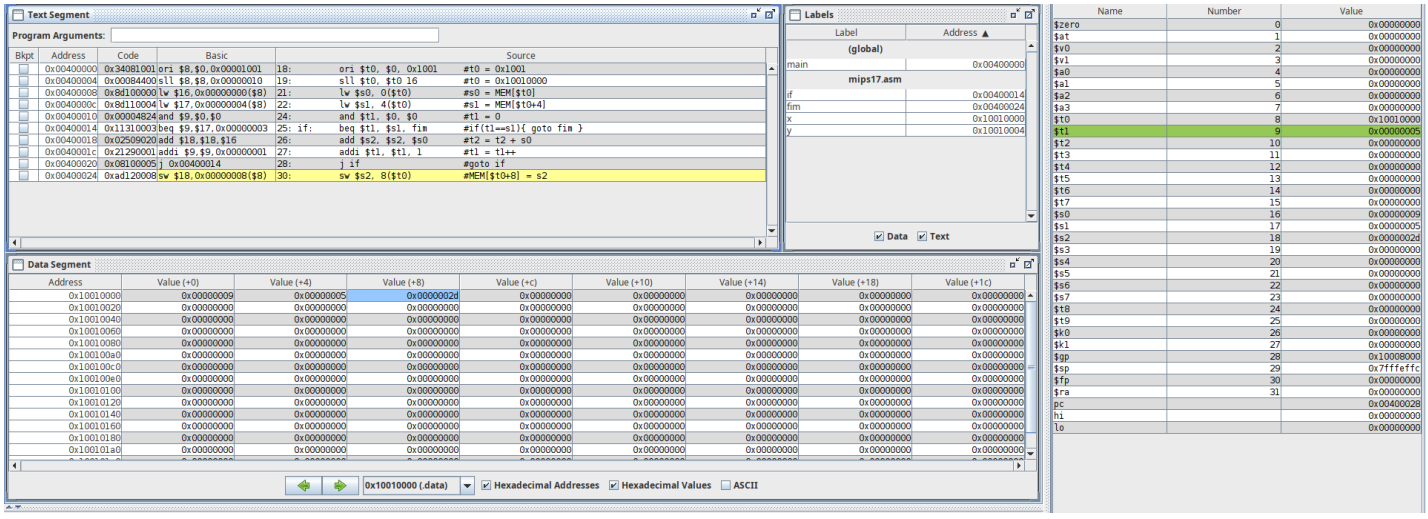


17)

mips17.asm

```
1  #       Programa 17
2  #       k = x * y
3  #       x sera lido da primeira posicao, o y da segunda, o k sera resscrito na terceira
4
5  #INICIO
6
7  .data
8  x: .word 9
9  y: .word 5
10 .text
11 .globl main
12 main:
13         #t0 -> 0x10010000 (first position)
14         #x -> s0
15         #y -> s1
16         #k -> s2
17
18         ori $t0, $0, 0x1001      #t0 = 0x1001
19         sll $t0, $t0 16          #t0 = 0x10010000
20
21         lw $s0, 0($t0)           #s0 = MEM[$t0]
22         lw $s1, 4($t0)           #s1 = MEM[$t0+4]
23
24         and $t1, $0, $0          #t1 = 0
25 if:     beq $t1, $s1, fim        #if(t1==s1){ goto fim }
26         add $s2, $s2, $s0        #t2 = t2 + s0
27         addi $t1, $t1, 1         #t1 = t1++
28         j if                     #goto if
29 fim:
30         sw $s2, 8($t0)           #MEM[$t0+8] = s2
31
32 #FIM
33
```

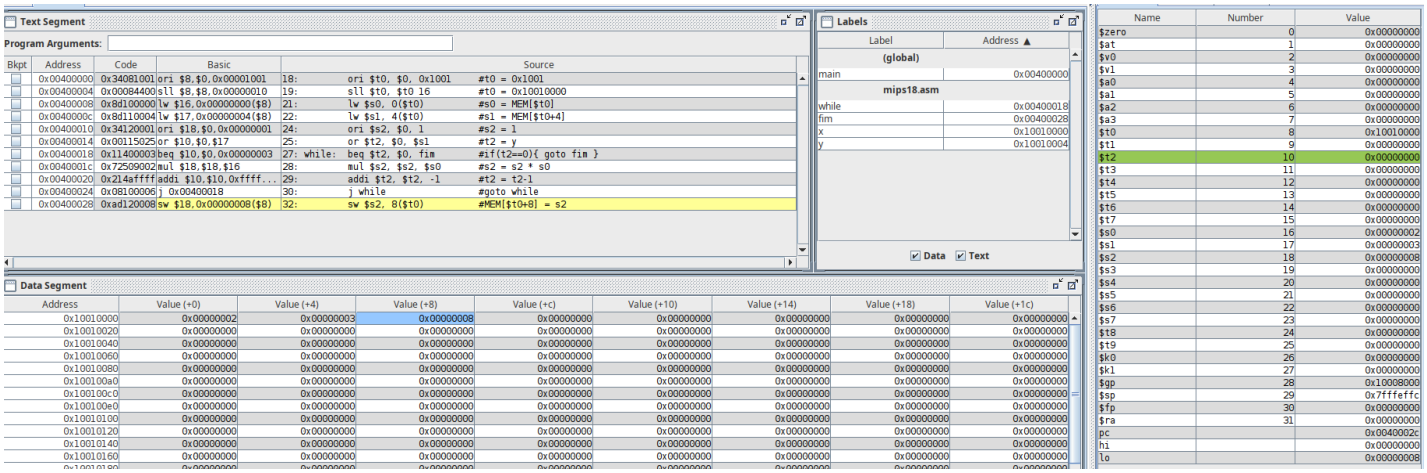
Line: 33 Column: 1 ☑ Show Line Numbers



18)

mips18.asm

```
#       Programa 18
#       k = x^y
#       x sera lido da primeira posicao, o y da segunda, o k sera resscrito na terceira

#INICIO

.data
x: .word 2
y: .word 3
.text
.globl main
main:
        #t0 -> 0x10010000 (first position)
        #x -> s0
        #y -> s1
        #k -> s2

        ori $t0, $0, 0x1001     #t0 = 0x1001
        sll $t0, $t0 16         #t0 = 0x10010000

        lw $s0, 0($t0)          #s0 = MEM[$t0]
        lw $s1, 4($t0)          #s1 = MEM[$t0+4]

        ori $s2, $0, 1          #s2 = 1
        or $t2, $0, $s1         #t2 = y

while:  beq $t2, $0, fim        #if(t2==0){ goto fim }
        mul $s2, $s2, $s0       #s2 = s2 * s0
        addi $t2, $t2, -1       #t2 = t2-1
        j while                 #goto while
fim:
        sw $s2, 8($t0)          #MEM[$t0+8] = s2

#FIM
```



Responda

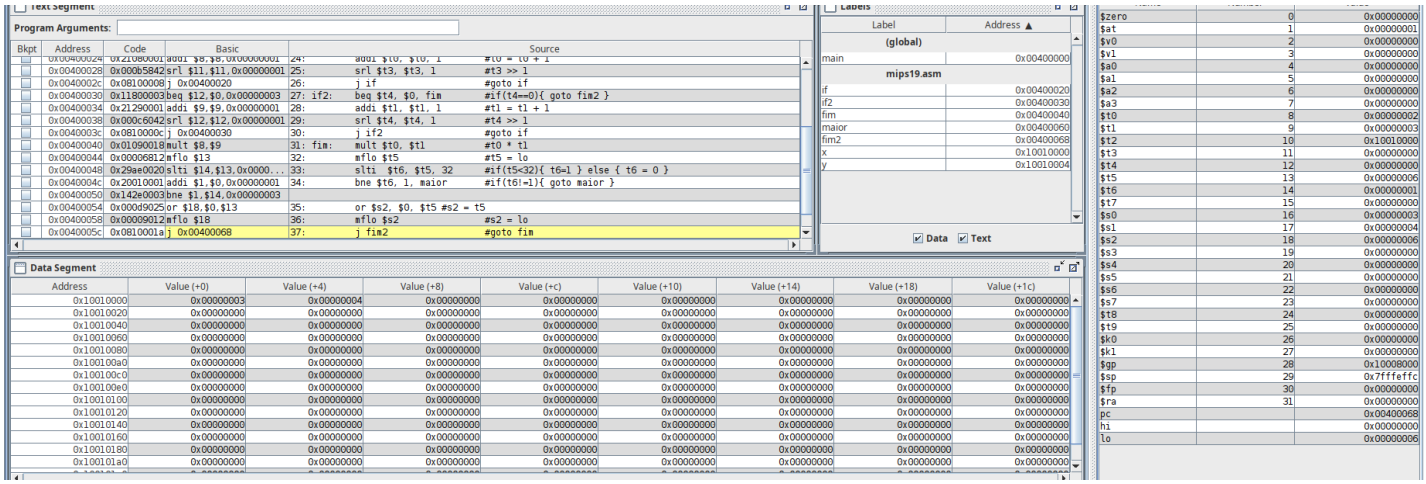
1) C. 64
2) B. hi e lo
3) A. mult
4) C. mflo $8
5) B. 32
6) A. lo
7) D. div
8) B. 0010 0110
9) A. Se o inteiro for unsigned, o shift o divide por 2. Se o inteiro for signed, o shift o divide por 2.
10) A.

```
ori $3, $0, 3
mult $8, $3
mflo $9
addi $9, $9, 7
```

19)

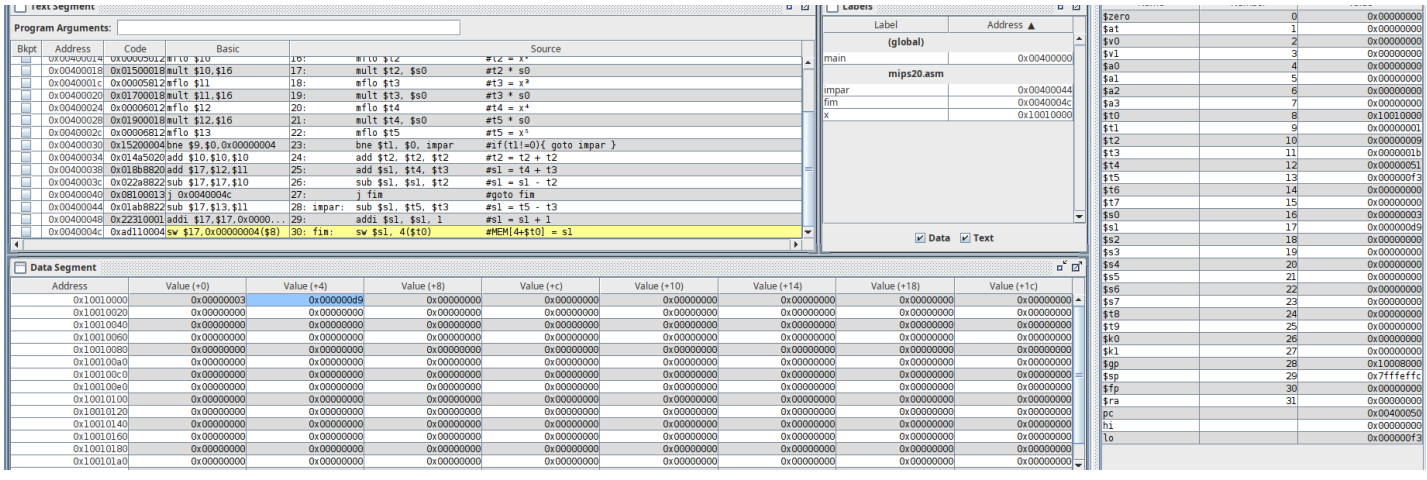
mips19.asm

```
#       Programa 19
#       Ler dois numeros da memoria, determinar qtd de bits
#       significantes de cada um, multiplicar ambos,
#INICIO
.data
x: .word 3
y: .word 4
.text
.globl main
main:
        #t0 -> 0x10010000 (first position)
        #x -> s0
        #y -> s1
        #k -> s2
        ori $t2, $0, 0x1001     #t2 = 0x1001
        sll $t2, $t2 16         #t2 = 0x10010000
        lw $s0, 0($t2)          #s0 = MEM[$t0]
        lw $s1, 4($t2)          #s1 = MEM[$t0+4]
        or $t3, $s0, $0         #t3 = x
        or $t4, $s1, $0         #t4 = y
        or $t0, $0, $0          #t0 = 0 (contador de x)
        or $t1, $0, $0          #t1 = 0 (contador de y)
if:     beq $t3, $0, if2        #if(t3==0){ goto fim1}
        addi $t0, $t0, 1        #t0 = t0 + 1
        srl $t3, $t3, 1         #t3 >> 1
        j if                    #goto if
if2:    beq $t4, $0, fim        #if(t4==0){ goto fim2 }
        addi $t1, $t1, 1        #t1 = t1 + 1
        srl $t4, $t4, 1         #t4 >> 1
        j if2                   #goto if
fim:    mult $t0, $t1           #t0 * t1
        mflo $t5                #t5 = lo
        slti  $t6, $t5, 32      #if(t5<32){ t6=1 } else { t6 = 0 }
        beq $t6, $0, maior      #if(t6!=1){ goto maior }
        or $s2, $0, $t5         #s2 = t5
        mflo $s2                #s2 = lo
        j fim2                  #goto fim
maior:  mfhi $s2                #s2 = hi
        mflo $s3                #s3 = lo
fim2:

#FIM
```



20)

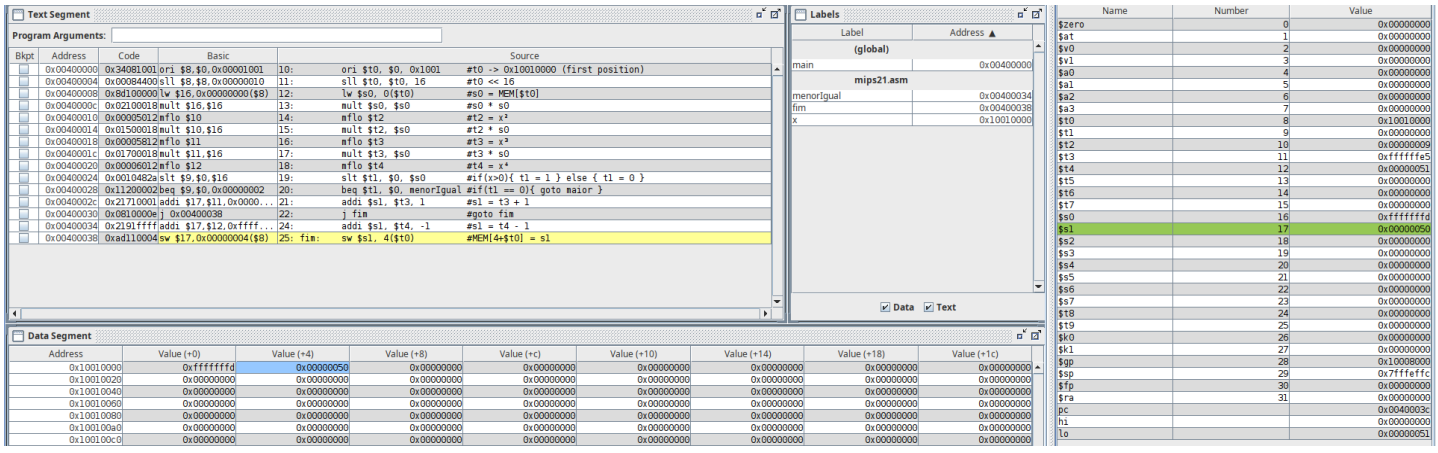
```
1  #       Programa 20
2  #       Ler x da primeira pos da memoria, se x par y = x⁴ + x³ - 2x²
3  #       se x impar y = x⁵ - x³ + 1, escrever y na segunda pos da memoria
4  #INICIO
5  .data
6  x: .word 3
7  .text
8  .globl main
9  main:
10         ori $t0, $0, 0x1001     #t0 -> 0x10010000 (first position)
11         sll $t0, $t0, 16        #t0 << 16
12
13         lw $s0, 0($t0)          #s0 = MEM[$t0]
14         andi $t1, $s0, 1        #t1 = s0 & 1
15         mult $s0, $s0           #s0 * s0
16         mflo $t2                #t2 = x²
17         mult $t2, $s0           #t2 * s0
18         mflo $t3                #t3 = x³
19         mult $t3, $s0           #t3 * s0
20         mflo $t4                #t4 = x⁴
21         mult $t4, $s0           #t5 * s0
22         mflo $t5                #t5 = x⁵
23         bne $t1, $0, impar      #if(t1!=0){ goto impar }
24         add $t2, $t2, $t2       #t2 = t2 + t2
25         add $s1, $t4, $t3       #s1 = t4 + t3
26         sub $s1, $s1, $t2       #s1 = s1 - t2
27         j fim                   #goto fim
28 impar:  sub $s1, $t5, $t3       #s1 = t5 - t3
29         addi $s1, $s1, 1        #s1 = s1 + 1
30 fim:    sw $s1, 4($t0)          #MEM[4+$t0] = s1
31 #FIM
32
```



21)

mips21.asm

```
1  #       Programa 21
2  #       Ler x da primeira pos da memoria, se x>0 y = x³ + 1
3  #       se x<=0 y = x⁴ - 1, escrever y na segunda pos da memoria
4  #INICIO
5  .data
6  x: .word -3
7  .text
8  .globl main
9  main:
10         ori $t0, $0, 0x1001      #t0 -> 0x10010000 (first position)
11         sll $t0, $t0, 16         #t0 << 16
12         lw $s0, 0($t0)           #s0 = MEM[$t0]
13         mult $s0, $s0            #s0 * s0
14         mflo $t2                 #t2 = x²
15         mult $t2, $s0            #t2 * s0
16         mflo $t3                 #t3 = x³
17         mult $t3, $s0            #t3 * s0
18         mflo $t4                 #t4 = x⁴
19         slt $t1, $0, $s0         #if(x>0){ t1 = 1 } else { t1 = 0 }
20         beq $t1, $0, menorIgual  #if(t1 == 0){ goto maior }
21         addi $s1, $t3, 1         #s1 = t3 + 1
22         j fim                    #goto fim
23 menorIgual:
24         addi $s1, $t4, -1        #s1 = t4 - 1
25 fim:    sw $s1, 4($t0)           #MEM[4+$t0] = s1
26
27 #FIM
```



Text Segment

Program Arguments:

Bkpt	Address	Code	Basic	Source
	0x00400000	0x34081001	ori $8,$0,0x00001001	10: ori $t0, $0, 0x1001 #t0 -> 0x10010000 (first position)
	0x00400004	0x00084400	sll $8,$8,0x00000010	11: sll $t0, $t0, 16 #t0 << 16
	0x00400008	0x8d100000	lw $16,0x00000000($8)	12: lw $s0, 0($t0) #s0 = MEM[$t0]
	0x0040000c	0x02100018	mult $16,$16	13: mult $s0, $s0 #s0 * s0
	0x00400010	0x00005012	mflo $10	14: mflo $t2 #t2 = x²
	0x00400014	0x01500018	mult $10,$16	15: mult $t2, $s0 #t2 * s0
	0x00400018	0x00005812	mflo $11	16: mflo $t3 #t3 = x³
	0x0040001c	0x01700018	mult $11,$16	17: mult $t3, $s0 #t3 * s0
	0x00400020	0x00006012	mflo $12	18: mflo $t4 #t4 = x⁴
	0x00400024	0x0010482a	slt $9,$0,$16	19: slt $t1, $0, $s0 #if(x>0){ t1 = 1 } else { t1 = 0 }
	0x00400028	0x11200002	beq $9,$0,0x00000002	20: beq $t1, $0, menorIgual #if(t1 == 0){ goto maior }
	0x0040002c	0x21710001	addi $17,$11,0x0000...	21: addi $s1, $t3, 1 #s1 = t3 + 1
	0x00400030	0x08100004	j 0x00400038	22: j fim #goto fim
	0x00400034	0x2191ffff	addi $17,$12,0xffff...	24: addi $s1, $t4, -1 #s1 = t4 - 1
	0x00400038	0xad110004	sw $17,0x00000004($8)	25: fim: sw $s1, 4($t0) #MEM[4+$t0] = s1

Labels

Label	Address
(global)	
main	0x00400000
mips21.asm	
menorIgual	0x00400034
fim	0x00400038
x	0x10010000

Data Segment

Address	Value (+0)	Value (+4)	Value (+8)	Value (+c)	Value (+10)	Value (+14)	Value (+18)	Value (+1c)
0x10010000	0xfffffffd	0x00000050	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010020	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010040	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010060	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010080	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100a0	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100c0	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000

Name	Number	Value
$zero	0	0x00000000
$at	1	0x00000000
$v0	2	0x00000000
$v1	3	0x00000000
$a0	4	0x00000000
$a1	5	0x00000000
$a2	6	0x00000000
$a3	7	0x00000000
$t0	8	0x10010000
$t1	9	0x00000000
$t2	10	0x00000000
$t3	11	0xfffffffe5
$t4	12	0x00000051
$t5	13	0x00000000
$t6	14	0x00000000
$t7	15	0x00000000
$s0	16	0xfffffffd
$s1	17	0x00000050
$s2	18	0x00000000
$s3	19	0x00000000
$s4	20	0x00000000
$s5	21	0x00000000
$s6	22	0x00000000
$s7	23	0x00000000
$t8	24	0x00000000
$t9	25	0x00000000
$k0	26	0x00000000
$k1	27	0x00000000
$gp	28	0x10008000
$sp	29	0x7fffeffc
$fp	30	0x00000000
$ra	31	0x00000000
pc		0x0040003c
hi		0x00000000
lo		0x00000051