

Exercício 06

Nome do aluno:

Fabio Volkmann Coelho

Objetivo

Consolidar o aprendizado da linguagem Assembly RISC-V e compreender como as instruções de desvio condicional são executadas.

Instruções

1. Abra o simulador de linguagem RISC-V.
2. No editor de texto do simulador, transcreva o código abaixo:

```
# -----
# Exercício 06 - Versão RISC-V
# Trecho em C: for (i = 0; i < 3; i++) j++;
# -----

.text
main:    addi s0, zero, 0      # i = 0
Loop:   slti t0, s0, 3      # se i < 3 então t0 = 1, senão t0 = 0
        beq t0, zero, Exit  # se t0 == 0, pula para Exit
        addi s1, s1, 1      # j++
        addi s0, s0, 1      # i++
        j     Loop          # volta para o início do laço
Exit:   nop               # fim do programa
```

Montagem e Execução

Clique no botão **Assemble** para montar o programa.

The screenshot shows the RISC-V Assembly Debugger (RARS 1.5) interface. The assembly code in the editor window is:

```

1 # -----
2 # Exercicio 06 - Versão RISC-V
3 # Trecho em C: for (i = 0; i < 3; i++) j++;
4 # -----
5
6
7 .text
8 main:
9     addi s0, zero, 0      # i = 0
10    Loop:
11        slti t0, s0, 3    # se i < 3 então t0 = 1, sendo t0 = 0
12        beq t0, zero, Exit # se t0 == 0, pula para Exit
13        addi s1, s1, 1      # j++
14        addi s0, s0, 1      # i++
15        j Loop            # volta para o inicio do laço
16 Exit:
17     nop                 # fim do programa

```

The Registers window shows the initial state of the registers:

Registers	Floating Point	Control and Status
Name	Number	Value
zero		0x00000000
ra		0x00000000
sp		0x7ffffeffc
gp		0x10008000
tp		0x00000000
t0		0x00000000
t1		0x00000000
t2		0x00000000
s0		0x00000000
s1		0x00000000
a0		0x00000000
a1		0x00000000
a2		0x00000000
a3		0x00000000
a4		0x00000000
a5		0x00000000
a6		0x00000000
a7		0x00000000
s2		0x00000000
s3		0x00000000
s4		0x00000000
s5		0x00000000
s6		0x00000000
s7		0x00000000
s8		0x00000000
s9		0x00000000
s10		0x00000000
s11		0x00000000
t3		0x00000000
t4		0x00000000
t5		0x00000000
t6		0x00000000
pc		0x00400000

The Messages window shows the following log:

- Reset: reset completed.
- program is finished running(dropped off bottom) --
- program is finished running(dropped off bottom) --
- program is finished running(dropped off bottom) --

Faça a execução passo-a-passo do programa e, a cada instrução, preencha a tabela abaixo cada vez que o valor de um registrador ou posição da memória de dados for modificado.

Antes da execução da instrução		Depois da execução da instrução		
PC	Instrução	R5 (t0)	R8 (s0)	R9 (s1)
0x00400000	addi s0, zero, 0	0x00000000	0x00000000	0x00000000
0x00400004	slti t0, s0, 3	0x00000001	0x00000000	0x00000000

Antes da execução da instrução		Depois da execução da instrução		
0x00400008	beq t0, zero, Exit			
0x0040000C	addi s1, s1, 1		0x00000001	
0x00400010	addi s0, s0, 1		0x00000001	0x00000001
0x00400014	j Loop			
0x00400004	slti t0, s0, 3	0x0000001		
0x00400008	beq t0, zero, Exit			
0x0040000C	addi s1, s1, 1		0x00000002	
0x00400010	addi s0, s0, 1		0x00000002	0x00000002
0x00400014	j Loop			
0x00400004	slti t0, s0, 3	0x0000001		
0x00400008	beq t0, zero, Exit			
0x0040000C	addi s1, s1, 1		0x00000003	
0x00400010	addi s0, s0, 1		0x00000003	0x00000003
0x00400014	j Loop			
0x00400004	slti t0, s0, 3	0x00000000		
0x00400018	nop			

OBS: Salve o PDF em formato A2 e Paisagem para garantir que todas as informações da página fiquem visíveis

Adicionar linha

Salvar como PDF

Se desejar reiniciar o programa, clique no botão **Reset**.

C:\Users\eduardo\OneDrive\Área de Trabalho\riscv1.asm - RARS 1.5

File Edit Run Settings Tools Help

Run speed at max (no interaction)

Reset memory and registers

Text Segment

Bkpt	Address	Code	Basic	Source
	0x00400000	0x00400313	addi x6,x0,4	10: addi t1, zero, 4 # g = 4
	0x00400004	0x00300393	addi x7,x0,3	11: addi t2, zero, 3 # h = 3
	0x00400008	0x00200e13	addi x28,x0,2	12: addi t3, zero, 2 # i = 2
	0x0040000c	0x00100e93	addi x29,x0,1	13: addi t4, zero, 1 # j = 1
	0x00400010	0x00730f33	add x30,x6,x7	15: add t5, t1, t2 # t5 = g + h
	0x00400014	0x01de0fb3	add x31,x28,x29	16: add t6, t3, t4 # t6 = i + j
	0x00400018	0x41ff02b3	sub x5,x30,x31	17: sub t0, t5, t6 # f = t5 - t6 (resultado em t0)

Data Segment

Address	Value (+0)	Value (+4)	Value (+8)	Value (+c)	Value (+10)	Value (+14)	Value (+18)	Value (+1c)
0x10010000	0x00000000	0x00000000	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
0x100100e0	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010100	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010120	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010140	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010160	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010180	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100101a0	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000

Messages

Run I/O

Reset: reset completed.

Clear

0x10010000 (.data) Hexadecimal Addresses Hexadecimal Values ASCII

Registers Floating Point Control and Status

Name	Number	Value
zero	0	0x00000000
ra	1	0x00000000
sp	2	0x7fffffe0
gp	3	0x10008000
tp	4	0x00000000
t0	5	0x00000000
t1	6	0x00000004
t2	7	0x00000000
s0	8	0x00000000
s1	9	0x00000000
a0	10	0x00000000
a1	11	0x00000000
a2	12	0x00000000
a3	13	0x00000000
a4	14	0x00000000
a5	15	0x00000000
a6	16	0x00000000
a7	17	0x00000000
s2	18	0x00000000
s3	19	0x00000000
s4	20	0x00000000
s5	21	0x00000000
s6	22	0x00000000
s7	23	0x00000000
s8	24	0x00000000
s9	25	0x00000000
s10	26	0x00000000
s11	27	0x00000000
t3	28	0x00000000
t4	29	0x00000000
t5	30	0x00000000
t6	31	0x00000000
pc		0x00400004