

Relatório 09
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Questão 22

The screenshot shows the MARS 4.3 MIPS assembler simulator. The main window displays the assembly code for Rel09.asm. The Text Segment window is active, showing the following code:

```
13: addi $t0,$zero,0x1001 #s8 = 1001
14: sll $t0,$t0,16 #s8 = s8 << 16 = 10010000
15: lw $t1,0($t0) #s16 = Mem[s8] int i;
16: lw $t1,4($t0) #s17 = Mem[s8+4] int j;
17: lw $t1,8($t0) #s17 = Mem[s8+8] int k;
18: jal mult
19: nop
20: add $t1,$zero,$t1 # i = mult (j,k)
21: sw $t1,0($t0) # Mem[s8] = i;
22: j k1
23: add $t1,$zero,$t1 # mlt = j
24: add $t1,$zero,$t1 # mlt = k
25: add $t1,$zero,$t1 # s19 = prod = 0;
26: slt $t1,$zero,$t1 # mlt < 0 = 1 : 0
27: beq $t1,$zero,fim# while(mlt>0)
28: add $t1,$t1,$t1 # prod = prod + mlt;
29: addi $t1,$t1,-1 # mlt = mlt - 1;
30: j while
31: add $t1,$zero,$t1 # return prod
32: jr $t1
33: nop
```

The Registers window shows the state of registers. The \$t0 register contains the value 268500992. The Data Segment window shows the memory addresses and values. The Mars Messages window shows the program finished running.

Questão 23

The screenshot shows the MARS 4.3 MIPS assembler simulator. The main window displays the assembly code for mips1.asm. The Text Segment window is active, showing the following code:

```
13: addi $t0,$zero,0x1001 #s8 = 1001
14: sll $t0,$t0,16 #s8 = s8 << 16 = 10010000
15: lw $t1,0($t0) #s16 = Mem[s8] int i;
16: lw $t1,4($t0) #s17 = Mem[s8+4] int j;
17: lw $t1,8($t0) #s17 = Mem[s8+8] int k;
18: jal sumSquare
19: nop
20: add $t1,$zero,$t1 # i = mult (j,k)
21: sw $t1,0($t0) # Mem[s8] = i;
22: j k1
23: add $t1,$zero,$t1 # x = j
24: add $t1,$zero,$t1 # y = k
25: Addi $sp,$sp,-8 #abre espaco p/ empilhar ra
26: Sw $ra,4($sp) #empilha o ra
27: Sw $a0,8($sp) # empilha o x
28: Jal mult #salta pra mult
29: Lw $ra,4($sp) #restaura o endereço de retorno
30: Lw $a0,8($sp) #restaura o a0
31: Addi $sp,$sp,8 #manda stk pointer pro inicio
32: Add $v1,$v0,$t1 #return mult(x,y)
33: Jr $ra #volta pro main
34: addi $t1,$zero,0 # s19 = prod = 0;
35: slt $t1,$zero,$t1 # mlt < 0 = 1 : 0
36: beq $t1,$zero,fim# while(mlt>0)
37: add $t1,$t1,$t1 # prod = prod + mlt;
38: addi $t1,$t1,-1 # mlt = mlt - 1;
39: j while
40: Addi $sp,$sp,4
41: add $v0,$zero,$t1 # return prod
42: jr $t1 #volta pra sumSquare
43: nop
```

The Registers window shows the state of registers. The \$t0 register contains the value 268500992. The Data Segment window shows the memory addresses and values. The Mars Messages window shows the program finished running.

Questão 24

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File Edit Run Settings Tools Help

Run speed at max (no interaction)

Edit Execute

Text Segment

Bkpt	Address	Code	Basic	Source
	0x00400000	0x20121001	addi \$t8,\$0,4097	11: addi \$s2,\$zero,0x1001 # s2 = 0x 0000 1001
	0x00400004	0x00129400	sll \$t8,\$t8,16	12: sll \$s2,\$s2,16 # s2 << 16= 0x 1001 0000
	0x00400008	0x8e500000	lw \$t0,0(\$t8)	13: lw \$s0,0(\$s2) # s0 = x = Mem[s2]
	0x0040000c	0x8e510004	lw \$t1,4(\$t8)	14: lw \$s1,4(\$s2) # s1 = x1 = Mem[s2+1]
	0x00400010	0x8e530008	lw \$t2,8(\$t8)	15: lw \$s3,8(\$s2) # s3 = x2 = Mem[s2+2]
	0x00400014	0x00102020	add \$t0,\$0,\$t0	18: add \$s0,\$zero,\$s0 # t0 = x
	0x00400018	0x0c100018	jai 0x00400060	19: jai function # salta para funcao
	0x0040001c	0x0020a020	add \$t0,\$0,\$t0	20: add \$s4,\$zero,\$v0 # y = function(x);
	0x00400020	0xae54000c	sw \$t0,12(\$t8)	21: sw \$s4,12(\$s2) # Mem[s2+3]= y ;
	0x00400024	0x00842022	sub \$t4,\$t4,\$t4	22: sub \$s0,\$s0,\$s0
	0x00400028	0x00421022	sub \$t2,\$t2,\$t2	23: sub \$v0,\$v0,\$v0
	0x0040002c	0x00112020	add \$t4,\$0,\$t7	26: add \$s0,\$zero,\$s1 # t0 = x1
	0x00400030	0x0c100018	jai 0x00400060	27: jai function # salta para funcao
	0x00400034	0x0020a020	add \$t2,\$0,\$t2	28: add \$s5,\$zero,\$v0 # y = function(x1);
	0x00400038	0xae550010	sw \$t2,16(\$t8)	29: sw \$s5,16(\$s2) # Mem[s2+3]= y ;
	0x0040003c	0x00842022	sub \$t4,\$t4,\$t4	30: sub \$s0,\$s0,\$s0
	0x00400040	0x00421022	sub \$t2,\$t2,\$t2	31: sub \$v0,\$v0,\$v0
	0x00400044	0x00132020	add \$t4,\$0,\$t9	33: add \$s0,\$zero,\$s3 # t0 = x2
	0x00400048	0x0c100018	jai 0x00400060	34: jai function # salta para funcao
	0x0040004c	0x0020b020	add \$t2,\$0,\$t2	35: add \$s6,\$zero,\$v0 # y = function(x2);
	0x00400050	0xae560014	sw \$t2,20(\$t8)	36: sw \$s6,20(\$s2) # Mem[s2+3]= y ;
	0x00400054	0x00842022	sub \$t4,\$t4,\$t4	37: sub \$s0,\$s0,\$s0
	0x00400058	0x00421022	sub \$t2,\$t2,\$t2	38: sub \$v0,\$v0,\$v0
	0x0040005c	0x0810001d	j 0x00400074	40: j fim
	0x00400060	0x20170005	addi \$t3,\$0,5	46: add \$s7,\$zero,5
	0x00400064	0x00970018	mult \$t4,\$t3	47: mult \$s0,\$s7
	0x00400068	0x00001012	mflr \$v0	48: mflr \$v0
	0x0040006c	0x20420001	addi \$t2,\$t2,1	49: addi \$v0,\$v0,1 # return x
	0x00400070	0x03e00008	jr \$t1	50: jr \$ra # volta pro main

Data Segment

Address	Value (+0)	Value (+4)	Value (+8)	Value (+c)	Value (+10)	Value (+14)	Value (+18)	Value (+1c)
0x10010000	0	1	-1	1	6	-4	0	0

Registers

Name	Number	Value
\$zero	0	0
\$at	1	0
\$v0	2	0
\$v1	3	0
\$a0	4	0
\$a1	5	0
\$a2	6	0
\$a3	7	0
\$t0	8	0
\$t1	9	0
\$t2	10	0
\$t3	11	0
\$t4	12	0
\$t5	13	0
\$t6	14	0
\$t7	15	0
\$s0	16	0
\$s1	17	1
\$s2	18	268500992
\$s3	19	-1
\$s4	20	1
\$s5	21	6
\$s6	22	-4
\$s7	23	5
\$t8	24	0
\$t9	25	0
\$k0	26	0
\$k1	27	0
\$gp	28	268468224
\$sp	29	2147479548
\$fp	30	0
\$ra	31	4194380
pc		4194420
hi		-1
lo		-5

Menu Iniciar » POR 20:55

Questão 26

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Run speed at max (no interaction)

Edit Execute

Text Segment

Bkpt	Address	Code	Basic	Source
	0x00400000	0x20161001	addi \$t2,\$0,4097	8: addi \$s6,\$0,0x1001
	0x00400004	0x0016b400	sll \$t2,\$t2,16	9: sll \$s6,\$s6,16
	0x00400008	0x8ed10000	lw \$t0,0(\$t2)	10: lw \$s1,0(\$s6)
	0x0040000c	0x00112020	add \$t4,\$0,\$t7	11: add \$s0,\$0,\$s1
	0x00400010	0x0c100008	jai 0x00400020	12: jai function
	0x00400014	0x00209020	add \$t8,\$0,\$t2	13: add \$s2,\$0,\$v0
	0x00400018	0xae320004	sw \$t8,4(\$t2)	14: sw \$s2,4(\$s6)
	0x0040001c	0x0810000f	j 0x0040003c	15: j fim
	0x00400020	0x28900000	slti \$t0,\$t0,0	21: slti \$s0,\$s0,0 # s0 < 0
	0x00400024	0x12000003	beq \$t0,\$0,3	22: beq \$s0,\$zero,major # se s0= 0 quer dizer que a maior que 0
	0x00400028	0x00801027	not \$t4,\$t4	23: not \$v0,\$s0 # comp. de 1
	0x0040002c	0x20420001	addi \$t2,\$t2,1	24: addi \$v0,\$v0,1 # comp de 2
	0x00400030	0x03e00008	jr \$t1	25: jr \$ra
	0x00400034	0x00801020	add \$t2,\$t2,\$t0	27: add \$v0,\$s0,\$zero
	0x00400038	0x03e00008	jr \$t1	28: jr \$ra

Data Segment

Address	Value (+0)	Value (+4)	Value (+8)	Value (+c)	Value (+10)	Value (+14)	Value (+18)	Value (+1c)
0x10010000	-3	3	0	0	0	0	0	0

Registers

Name	Number	Value
\$zero	0	0
\$at	1	0
\$v0	2	3
\$v1	3	0
\$a0	4	-3
\$a1	5	0
\$a2	6	0
\$a3	7	0
\$t0	8	0
\$t1	9	0
\$t2	10	0
\$t3	11	0
\$t4	12	0
\$t5	13	0
\$t6	14	0
\$t7	15	0
\$s0	16	1
\$s1	17	-3
\$s2	18	3
\$s3	19	0
\$s4	20	0
\$s5	21	0
\$s6	22	268500992
\$s7	23	0
\$t8	24	0
\$t9	25	0
\$k0	26	0
\$k1	27	0
\$gp	28	268468224
\$sp	29	2147479548
\$fp	30	0
\$ra	31	4194324
pc		4194364
hi		0
lo		0

Menu Iniciar » POR 22:05

Questão 27

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Run speed at max (no interaction)

Registers Coproc 1 Coproc 0

Name	Number	Value
\$zero	0	0
\$at	1	0
\$v0	2	1
\$v1	3	0
\$a0	4	40
\$a1	5	0
\$a2	6	0
\$a3	7	0
\$t0	8	0
\$t1	9	1
\$t2	10	0
\$t3	11	0
\$t4	12	0
\$t5	13	0
\$t6	14	0
\$t7	15	0
\$s0	16	268500992
\$s1	17	40
\$s2	18	1
\$s3	19	0
\$s4	20	0
\$s5	21	0
\$s6	22	0
\$s7	23	0
\$s8	24	0
\$s9	25	0
\$k0	26	0
\$k1	27	0
\$gp	28	268468224
\$sp	29	2147479548
\$fp	30	0
\$ra	31	4194324
pc		4194368
hi		0
lo		0

Menu Iniciar » POR 22:07

25

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Run speed at max (no interaction)

Registers Coproc 1 Coproc 0

Name	Number	Value
\$zero	0	0
\$at	1	0
\$v0	2	0
\$v1	3	0
\$a0	4	0
\$a1	5	0
\$a2	6	0
\$a3	7	0
\$t0	8	5
\$t1	9	-12
\$t2	10	-12
\$t3	11	0
\$t4	12	0
\$t5	13	1
\$t6	14	1
\$t7	15	0
\$s0	16	0
\$s1	17	1
\$s2	18	268500992
\$s3	19	-1
\$s4	20	97
\$s5	21	90
\$s6	22	114
\$s7	23	12
\$s8	24	17
\$s9	25	0
\$k0	26	0
\$k1	27	0
\$gp	28	268468224
\$sp	29	2147479548
\$fp	30	0
\$ra	31	4194380
pc		4194468
hi		-1
lo		-12

Menu Iniciar » POR 22:31