

BÁO CÁO THỰC HÀNH TUẦN 3

Load/Store, Jump & Branch instructions

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Bài 1.

- Mã nguồn

```
1  #Assignment 1
2  .data
3      X: .word 5
4      Y: .word 2
5      Z: .word 3
6      i: .word 10
7      j: .word 5
8  .text
9      la $t4, X
10     la $t5, Y
11     la $t6, Z
12     la $t7, i
13     la $t8, j
14     lw $s1, 0($t7)
15     lw $s2, 0($t8)
16     lw $t1, 0($t4)
17     lw $t2, 0($t5)
18     lw $t3, 0($t6)
19
20 start:
21     slt $t0, $s2, $s1    #s2<s1 -> t0=1
22     bne $t0, $zero, else #ktra gtri t0
23     addi $t1, $t1, 1
24     addi $t3, $zero, 1
25     j endif              #skip "else" part
26 else:
27     addi $t2, $t2, -1
28     add $t3, $t3, $t3
29 endif:
30
```

- Kết quả

Text Segment					Labels				
Offset	Address	Code	Basic	Source	Label	Address	Name	Number	Value
0x00400000	0x3e011001	lui	\$t1, 4097	9:	la	\$t4, X	\$zero	0	0
0x00400004	0x342c0000	ori	\$t2, \$t1, 0				\$at	1	268500992
0x00400008	0x3e011001	lui	\$t1, 4097	10:	la	\$t5, Y	\$v0	2	0
0x0040000c	0x342d0004	ori	\$t3, \$t1, 4				\$v1	3	0
0x00400010	0x3e011001	lui	\$t1, 4097	11:	la	\$t6, Z	\$a0	4	0
0x00400014	0x342e0008	ori	\$t4, \$t1, 8				\$a1	5	0
0x00400018	0x3e011001	lui	\$t1, 4097	12:	la	\$t7, i	\$a2	6	0
0x0040001c	0x342f000c	ori	\$t5, \$t1, 12				\$a3	7	0
0x00400020	0x3e011001	lui	\$t1, 4097	13:	la	\$t8, j	\$t0	8	1
0x00400024	0x34300010	ori	\$t4, \$t1, 16				\$t1	9	5
0x00400028	0x8df10000	lw	\$s1, 0(\$t5)	14:	lw	\$s1, 0(\$t7)	\$t2	10	1
0x0040002c	0x8f120000	lw	\$s2, 0(\$t4)	15:	lw	\$s2, 0(\$t8)	\$t3	11	6
0x00400030	0x8d890000	lw	\$s3, 0(\$t2)	16:	lw	\$t1, 0(\$t4)	\$t4	12	268500992
							\$t5	13	268500996
							\$t6	14	268501000
							\$t7	15	268501004
							\$a0	16	0
							\$a1	17	10
							\$a2	18	5
							\$a3	19	0
							\$a4	20	0
							\$a5	21	0
							\$a6	22	0
							\$a7	23	0
							\$a8	24	268501008
							\$a9	25	0
							\$a0	26	0
							\$a1	27	0
							\$a2	28	268468224
							\$a3	29	2147479548
							\$a4	30	0
							\$a5	31	0
							\$a6		4194392
							\$a7		0
							\$a8		0
							\$a9		0

Bài 2.

- Mã nguồn

```

1  #Assignment 2
2  .data
3      A: .word 1, 2, 3, 4, 5, 6, 7, 8, 9
4  .text
5      li $s1, -1      #i=-1
6      la $s2, A        #a2 stores the address of array A
7      li $s3, 9        #number of elements of A
8      li $s4, 1        #step=1
9      li $s5, 0        #sum=0
10 loop:
11      add $s1,$s1,$s4  #i=i+step
12      #sll $t1, $s1, 2
13      add $t1,$s1,$s1  #t1=2*s1
14      add $t1,$t1,$t1  #t1=4*s1
15      add $t1,$t1,$s2  #t1 store the address of A[i]
16      lw $t0,0($t1)   #load value of A[i] in $t0
17      add $s5,$s5,$t0  #sum=sum+A[i]
18      bne $s1,$s3,loop #if i != n, goto loop

```

- Kết quả

Text Segment					Labels		Name			Number		Value	
Bkpt	Address	Code	Basic	Source	Label	Address							
<input type="checkbox"/>	0x00400000	0x2411ffff	addiu \$t7,\$0,-1	5: li \$a1, -1 #i=-1	assign2.asm			\$zero	0		0		
<input type="checkbox"/>	0x00400004	0x3c011001	lui \$t1,0x1	6: la \$a2, A #a2 stores the address of array A			\$at	1		268500992			
<input type="checkbox"/>	0x00400008	0x34320000	ori \$t6,\$t1,0		loop	0x00400001		\$v0	2		0		
<input type="checkbox"/>	0x0040000c	0x24130009	addiu \$t9,\$0,9	7: li \$a3, 9 #number of elements of A				\$a0	3		0		
<input type="checkbox"/>	0x00400010	0x24140001	addiu \$t20,\$0,1	8: li \$a4, 1 #step=1				\$a2	4		0		
<input type="checkbox"/>	0x00400014	0x24150000	addiu \$t21,\$0,0	9: li \$a5, 0 #sum=0				\$a3	5		0		
<input type="checkbox"/>	0x00400018	0x02348820	add \$t7,\$t7,\$t20	11: add \$a1,\$a1,\$a4 #i=i+step				\$a4	6		0		
<input type="checkbox"/>	0x0040001c	0x02348820	add \$9,\$t7,\$t7	13: add \$t1,\$t1,\$t1 #t1=2*a1				\$a5	7		0		
<input type="checkbox"/>	0x00400020	0x01294820	add \$9,\$9,\$9	14: add \$t1,\$t1,\$t1 #t1=4*a1				\$t0	8		0		
<input type="checkbox"/>	0x00400024	0x01324820	add \$9,\$9,\$t8	15: add \$t1,\$t1,\$t2 #t1 store the address of A[i]				\$t1	9		268501028		
<input type="checkbox"/>	0x00400028	0x02020000	lw \$t5,0(\$t1)	16: lw \$t5,0(\$t1) #load value of A[i] in \$t5				\$t2	10		0		
<input type="checkbox"/>	0x0040002c	0x02a8a820	add \$t1,\$t1,\$t5	17: add \$a5,\$a5,\$t5 #sum=sum+A[i]				\$t3	11		0		
<input type="checkbox"/>	0x00400030	0x1633ffff	bne \$t7,\$t9,-7	18: bne \$a1,\$a3,loop #if i != n, goto loop				\$t5	12		0		
<input type="checkbox"/>								\$t6	13		0		
<input type="checkbox"/>								\$t7	14		0		
<input type="checkbox"/>								\$t8	15		0		
<input type="checkbox"/>								\$t9	16		0		
<input type="checkbox"/>								\$t1	17		9		
<input type="checkbox"/>								\$t2	18		268500992		
<input type="checkbox"/>								\$t3	19		9		
<input type="checkbox"/>								\$t4	20		1		
<input type="checkbox"/>								\$t5	21		45		
<input type="checkbox"/>								\$t6	22		0		
<input type="checkbox"/>								\$t7	23		0		
<input type="checkbox"/>								\$t8	24		0		
<input type="checkbox"/>								\$t9	25		0		
<input type="checkbox"/>								\$t0	26		0		
<input type="checkbox"/>								\$t1	27		0		
<input type="checkbox"/>								\$t2	28		268468224		
<input type="checkbox"/>								\$t3	29		2147479548		
<input type="checkbox"/>								\$t4	30		0		
<input type="checkbox"/>								\$t5	31		0		
<input type="checkbox"/>								\$t6	32		0		
<input type="checkbox"/>								\$t7	33		0		
<input type="checkbox"/>								\$t8	34		0		
<input type="checkbox"/>								\$t9	35		0		
<input type="checkbox"/>								\$t0	36		0		
<input type="checkbox"/>								\$t1	37		0		
<input type="checkbox"/>								\$t2	38		0		
<input type="checkbox"/>								\$t3	39		0		
<input type="checkbox"/>								\$t4	40		0		
<input type="checkbox"/>								\$t5	41		0		
<input type="checkbox"/>								\$t6	42		0		
<input type="checkbox"/>								\$t7	43		0		
<input type="checkbox"/>								\$t8	44		0		
<input type="checkbox"/>								\$t9	45		0		
<input type="checkbox"/>								\$t0	46		0		
<input type="checkbox"/>								\$t1	47		0		
<input type="checkbox"/>								\$t2	48		0		
<input type="checkbox"/>								\$t3	49		0		
<input type="checkbox"/>								\$t4	50		0		
<input type="checkbox"/>								\$t5	51		0		
<input type="checkbox"/>								\$t6	52		0		
<input type="checkbox"/>								\$t7	53		0		
<input type="checkbox"/>								\$t8	54		0		
<input type="checkbox"/>								\$t9	55		0		
<input type="checkbox"/>								\$t0	56		0		
<input type="checkbox"/>								\$t1	57		0		
<input type="checkbox"/>								\$t2	58		0		
<input type="checkbox"/>								\$t3	59		0		
<input type="checkbox"/>								\$t4	60		0		
<input type="checkbox"/>								\$t5	61		0		
<input type="checkbox"/>								\$t6	62		0		
<input type="checkbox"/>								\$t7	63		0		
<input type="checkbox"/>								\$t8	64		0		
<input type="checkbox"/>								\$t9	65		0		
<input type="checkbox"/>								\$t0	66		0		
<input type="checkbox"/>								\$t1	67		0		
<input type="checkbox"/>								\$t2	68		0		
<input type="checkbox"/>								\$t3	69		0		
<input type="checkbox"/>								\$t4	70		0		
<input type="checkbox"/>								\$t5	71		0		
<input type="checkbox"/>								\$t6	72		0		
<input type="checkbox"/>								\$t7	73		0		
<input type="checkbox"/>								\$t8	74		0		
<input type="checkbox"/>								\$t9	75		0		
<input type="checkbox"/>								\$t0	76		0		
<input type="checkbox"/>								\$t1	77		0		
<input type="checkbox"/>								\$t2	78		0		
<input type="checkbox"/>								\$t3	79		0		
<input type="checkbox"/>								\$t4	80		0		
<input type="checkbox"/>								\$t5	81		0		
<input type="checkbox"/>								\$t6	82		0		
<input type="checkbox"/>								\$t7	83		0		
<input type="checkbox"/>								\$t8	84		0		
<input type="checkbox"/>								\$t9	85		0		
<input type="checkbox"/>								\$t0	86		0		
<input type="checkbox"/>								\$t1	87		0		
<input type="checkbox"/>								\$t2	88		0		
<input type="checkbox"/>								\$t3	89		0		
<input type="checkbox"/>								\$t4	90		0		
<input type="checkbox"/>								\$t5	91		0		
<input type="checkbox"/>								\$t6	92		0		
<input type="checkbox"/>								\$t7	93		0		
<input type="checkbox"/>								\$t8	94		0		
<input type="checkbox"/>								\$t9	95		0		
<input type="checkbox"/>								\$t0	96		0		
<input type="checkbox"/>								\$t1	97		0		
<input type="checkbox"/>								\$t2	98		0		
<input type="checkbox"/>								\$t3	99		0		
<input type="checkbox"/>								\$t4	100		0		
<input type="checkbox"/>								\$t5	101		0		
<input type="checkbox"/>								\$t6	102		0		
<input type="checkbox"/>								\$t7	103		0		
<input type="checkbox"/>								\$t8	104		0		
<input type="checkbox"/>								\$t9	105		0		
<input type="checkbox"/>								\$t0	106		0		
<input type="checkbox"/>								\$t1	107		0		
<input type="checkbox"/>								\$t2	108		0		
<input type="checkbox"/>								\$t3	109		0		
<input type="checkbox"/>								\$t4	110		0		
<input type="checkbox"/>								\$t5	111		0		
<input type="checkbox"/>								\$t6	112		0		
<input type="checkbox"/>								\$t7	113		0		
<input type="checkbox"/>								\$t8	114		0		
<input type="checkbox"/>								\$t9	115		0		
<input type="checkbox"/>								\$t0	116		0		
<input type="checkbox"/>								\$t1	117		0		
<input type="checkbox"/>								\$t2	118		0		
<input type="checkbox"/>								\$t3	119		0		
<input type="checkbox"/>								\$t4	120		0		
<input type="checkbox"/>								\$t5	121		0		
<input type="checkbox"/>								\$t6	122		0		
<input type="checkbox"/>								\$t7	123		0		
<input type="checkbox"/>								\$t8	124		0		
<input type="checkbox"/>								\$t9	125		0		
<input type="checkbox"/>								\$t0	126		0		
<input type="checkbox"/>								\$t1	127		0		
<input type="checkbox"/>								\$t2	128		0		
<input type="checkbox"/>								\$t3	129		0		
<input type="checkbox"/>								\$t4	130		0		
<input type="checkbox"/>								\$t5	131		0		
<input type="checkbox"/>								\$t6	132		0		
<input type="checkbox"/>								\$t7	133		0		
<input type="checkbox"/>								\$t8	134		0		
<input type="checkbox"/>								\$t9	135		0		
<input type="checkbox"/>								\$t0	136		0		
<input type="checkbox"/>								\$t1	137		0		
<input type="checkbox"/>								\$t2	138		0		
<input type="checkbox"/>								\$t3	139		0		
<input type="checkbox"/>								\$t4	140		0		
<input type="checkbox"/>								\$t5	141		0		
<input type="checkbox"/>								\$t6	142		0		
<input type="checkbox"/>								\$t7	143		0		
<input type="checkbox"/>								\$t8	144		0		
<input type="checkbox"/>								\$t9	145		0		
<input type="checkbox"/>								\$t0	146		0		
<input type="checkbox"/>								\$t1	147		0		
<input type="checkbox"/>								\$t2	148		0		
<input type="checkbox"/>								\$t3	149		0		
<input type="checkbox"/>								\$t4	150		0		
<input type="checkbox"/>								\$t5	151		0		
<input type="checkbox"/>								\$t6	152		0		
<input type="checkbox"/>								\$t7	153		0		
<input type="checkbox"/>								\$t8	154		0		
<input type="checkbox"/>								\$t9	155		0		
<input type="checkbox"/>								\$t0	156		0		
<input type="checkbox"/>								\$t1	157				

Bài 3.

- Mã nguồn

```

1  #Assignment 3
2  .data
3      test: .word 5
4  .text
5      la $s0, test    #load the address of test variable
6      lw $s1, 0($s0)  #load the value of test to register t1
7      li $t0, 2
8      li $t1, 3
9      li $t2, 5
10     beq $s1, $t0, case_0
11     beq $s1, $t1, case_1
12     beq $s1, $t2, case_2
13     j default
14 case_0:
15     addi $s2, $s2, 1    #a=a+1
16     j continue
17 case_1:
18     sub $s2, $s2, $t1    #a=a-1
19     j continue
20 case_2:
21     add $s3, $s3, $s3    #b=2*b
22     j continue
23 default:
24     continue:

```

- Kết quả

Text Segment					Labels				
Bkpt	Address	Code	Basic	Source	Label	Address	Name	Number	Value
	0x00400000	0x3c011001	lui \$t1,4097	5: la \$a0, test #load the address of test variable			\$zero	0	0
	0x00400004	0x34300000	ori \$t6,\$t1,0				\$t6	1	268500992
	0x00400008	0x9e110000	lw \$t1,0(\$t6)	6: lw \$a1, 0(\$a0) #load the value of test to register t1			\$v0	2	0
	0x0040000c	0x24090002	addiu \$t5,\$t0,2	7: li \$t0, 2			\$v1	3	0
	0x00400010	0x24090003	addiu \$t9,\$t0,3	8: li \$t1, 3			\$a0	4	0
	0x00400014	0x240e0005	addiu \$t0,\$t0,5	9: li \$t2, 5			\$a1	5	0
	0x00400018	0x12280003	beq \$t1,\$t0,case_0	10: beq \$a1, \$t0, case_0			\$a2	6	0
	0x0040001c	0x12290004	beq \$t1,\$t0,4	11: beq \$a1, \$t1, case_1			\$a3	7	0
	0x00400020	0x122a0005	beq \$t1,\$t0,5	12: beq \$a1, \$t2, case_2			\$t0	8	2
	0x00400024	0x08100010	j default	13: j default			\$t1	9	3
	0x00400028	0x22520001	addi \$t8,\$t8,1	15: addi \$a2, \$a2, 1 #a=a+1			\$t2	10	5
	0x0040002c	0x08100010	j continue	16: j continue			\$t3	11	0
	0x00400030	0x02499022	sub \$t8,\$t8,\$t9	18: sub \$a2, \$a2, \$t1 #a=a-1			\$t4	12	0
							\$t5	13	0
							\$t6	14	0
							\$t7	15	0
							\$a0	16	268500992
							\$a1	17	5
							\$a2	18	0
							\$a3	19	0
							\$a4	20	0
							\$a5	21	0
							\$a6	22	0
							\$a7	23	0
							\$a8	24	0
							\$a9	25	0
							\$t0	26	0
							\$t1	27	0
							\$t2	28	268468224
							\$t3	29	2147479540
							\$t4	30	0
							\$t5	31	0
							\$t6		4194368
							\$t7		0
							\$t8		0
							\$t9		0
							\$t10		0

Bài 4.

- i<j
- Mã nguồn

```

1  #Assignment 4a
2  .data
3      X: .word 5
4      Y: .word 2
5      Z: .word 3
6  .text
7      la $t4, X
8      la $t5, Y
9      la $t6, Z
10     lw $t1, 0($t4)
11     lw $t2, 0($t5)
12     lw $t3, 0($t6)
13     li $s1, 2
14     li $s2, 4
15
16 start:
17     sle $t0, $s2, $s1      #s2<=s1 -> t0=1
18     bne $t0, $zero, else   #ktra gtri t0
19     addi $t1, $t1, 1
20     addi $t3, $zero, 1
21     j endif                #skip "else" part
22 else:
23     addi $t2, $t2, -1
24     add $t3, $t3, $t3
25 endif:

```

- Kết quả

Text Segment

Bkpt

Address

Code

Basic

Source

0x00400000

0x3c011001

lui \$t1, 4097

7:

la \$t4, X

0x00400004

0x342c0000

ori \$t2, \$t1, 0

0x00400008

0x3c011001

lui \$t1, 4097

8:

la \$t5, Y

0x0040000c

0x342d0004

ori \$t3, \$t1, 4

0x00400010

0x3c011001

lui \$t1, 4097

9:

la \$t6, Z

0x00400014

0x342e0008

ori \$t4, \$t1, 8

0x00400018

0x8d900000

lw \$s1, 0(\$t2)

10:

lw \$t1, 0(\$t4)

0x0040001c

0x8daa0000

lw \$t2, 0(\$t3)

11:

lw \$t2, 0(\$t5)

0x00400020

0x8ddcb0000

lw \$t3, 0(\$t4)

12:

lw \$t3, 0(\$t6)

0x00400024

0x24110002

addiu \$t7, \$t2, 2

13:

li \$s1, 2

0x00400028

0x24120004

addiu \$t8, \$t2, 4

14:

li \$s2, 4

0x0040002c

0x0232402a

slt \$s2, \$t7, \$t8

17:

slt \$t0, \$s2, \$s1 #s2<=s1 -> t0=1

0x00400030

0x34010001

ori \$t1, \$t0, 1

Labels

Label

Address

assign4.asm

start

0x00400002

else

0x00400004

endif

0x00400005

X

0x10010000

Y

0x10010000

Z

0x10010000

- b. $i \geq j$
- Mã nguồn

```

1  #Assignment 4b
2  .data
3      X: .word 5
4      Y: .word 2
5      Z: .word 3
6  .text
7      la $t4, X
8      la $t5, Y
9      la $t6, Z
10     lw $t1, 0($t4)
11     lw $t2, 0($t5)
12     lw $t3, 0($t6)
13     li $s1, 2
14     li $s2, 4
15
16 start:
17     slt $t0, $s1, $s2      #s1<s2 -> t0=1
18     bne $t0, $zero, else  #ktra gtri t0
19     addi $t1, $t1, 1
20     addi $t3, $zero, 1
21     j endif               #skip "else" part
22 else:
23     addi $t2, $t2, -1
24     add $t3, $t3, $t3
25 endif:

```

- Kết quả

Text Segment					Labels		Name		
Offset	Address	Code	Basic	Source	Label	Address		Number	Value
0x00400000	0x3c011001	lui \$t1, 4097	7:	la \$t4, X			\$zero	0	0
0x00400004	0x342c0000	ori \$t2, \$t1, 0					\$t2	1	268500992
0x00400008	0x3c011001	lui \$t1, 4097	8:	la \$t5, Y			\$v0	2	0
0x0040000c	0x342d0004	ori \$t3, \$t1, 4					\$v1	3	0
0x00400010	0x3c011001	lui \$t1, 4097	9:	la \$t6, Z			\$a0	4	0
0x00400014	0x342e0008	ori \$t4, \$t1, 8					\$a1	5	0
0x00400018	0x8d890000	lw \$s7, 0(\$t2)	10:	lw \$t1, 0(\$t4)			\$a2	6	0
0x0040001c	0x8daa0000	lw \$t0, 0(\$t3)	11:	lw \$t2, 0(\$t5)			\$a3	7	0
0x00400020	0x8dab0000	lw \$t1, 0(\$t4)	12:	lw \$t3, 0(\$t6)			\$t0	8	1
0x00400024	0x24110002	addiu \$t7, \$t0, 2	13:	li \$s1, 2			\$t1	9	5
0x00400028	0x24120004	addiu \$t8, \$t0, 4	14:	li \$s2, 4			\$t2	10	1
0x0040002c	0x0232402a	slt \$s7, \$t1, \$s1	17:	slt \$t0, \$s1, \$s2 #s1<s2 -> t0=1			\$t3	11	6
0x00400030	0x15000003	bne \$s7, \$t0, 3	18:	bne \$t0, \$zero, else #ktra gtri t0			\$t4	12	268500992
							\$t5	13	268500996
							\$t6	14	268501000
							\$t7	15	0
							\$a0	16	0
							\$a1	17	2
							\$a2	18	4
							\$a3	19	0
							\$a4	20	0
							\$a5	21	0
							\$a6	22	0
							\$a7	23	0
							\$s7	24	0
							\$s8	25	0
							\$t0	26	0
							\$t1	27	0
							\$t2	28	268468224
							\$t3	29	2147475648
							\$t4	30	0
							\$t5	31	0
							\$t6		4194376
							\$t7		0
							\$a0		0

- c. $i+j \leq 0$
- Mã nguồn

```

1  #Assignment 4c
2  .data
3      X: .word 5
4      Y: .word 2
5      Z: .word 3
6  .text
7      la $t4, X
8      la $t5, Y
9      la $t6, Z
10     lw $t1, 0($t4)
11     lw $t2, 0($t5)
12     lw $t3, 0($t6)
13     li $s1, 2
14     li $s2, 4
15
16 start:
17     add $s7, $s1, $s2
18     slt $t0, $zero, $s7    #0<s7 -> t0=1
19     bne $t0, $zero, else  #ktra gtri t0
20     addi $t1, $t1, 1
21     addi $t3, $zero, 1
22     j endif               #skip "else" part
23 else:
24     addi $t2, $t2, -1
25     add $t3, $t3, $t3
26 endif:

```

- Kết quả

Text Segment					Labels		Name		
Bkpt	Address	Code	Basic	Source	Label	Address	Number	Value	
	0x00400000	0x3c011001	lui \$t1, 0x97	7: la \$t4, X			0	0	\$zero
	0x00400004	0x342c0000	ori \$t2, \$t1, 0				1	268500992	\$t2
	0x00400008	0x3c011001	lui \$t1, 0x97	8: la \$t5, Y			2	0	\$v0
	0x0040000c	0x342d0004	ori \$t3, \$t1, 4				3	0	\$v1
	0x00400010	0x3c011001	lui \$t1, 0x97	9: la \$t6, Z			4	0	\$a0
	0x00400014	0x342e0008	ori \$t4, \$t1, 8				5	0	\$a1
	0x00400018	0x8d950000	lw \$s9, 0(\$t2)	10: lw \$t1, 0(\$t4)			6	0	\$a2
	0x0040001c	0x8daa0000	lw \$t0, 0(\$t3)	11: lw \$t2, 0(\$t5)			7	0	\$a3
	0x00400020	0x8da90000	lw \$t1, 0(\$t4)	12: lw \$t3, 0(\$t6)			8	1	\$t0
	0x00400024	0x24110002	addiu \$t7, \$t0, 2	13: li \$s1, 2			9	5	\$t1
	0x00400028	0x24120004	addiu \$t8, \$t0, 4	14: li \$s2, 4			10	1	\$t2
	0x0040002c	0x0232b820	add \$t3, \$t7, \$t8	17: add \$a7, \$s1, \$s2			11	6	\$t3
	0x00400030	0x0017402a	sllt \$t0, \$zero, \$s7	18: sllt \$t0, \$zero, \$s7 #0<\$s7 -> t0=1			12	268500992	\$t4
							13	268500996	\$t5
							14	268501000	\$t6
							15	0	\$t7
							16	0	\$s0
							17	2	\$s1
							18	4	\$s2
							19	0	\$a3
							20	0	\$a4
							21	0	\$a5
							22	0	\$a6
							23	6	\$a7
							24	0	\$s8
							25	0	\$s9
							26	0	\$t0
							27	0	\$t1
							28	268468224	\$pp
							29	2147479648	\$sp
							30	0	\$fp
							31	0	\$ra
								4194380	\$pc
								0	\$hi
								0	\$lo

- d. $i+j > m+n$
- Mã nguồn

```

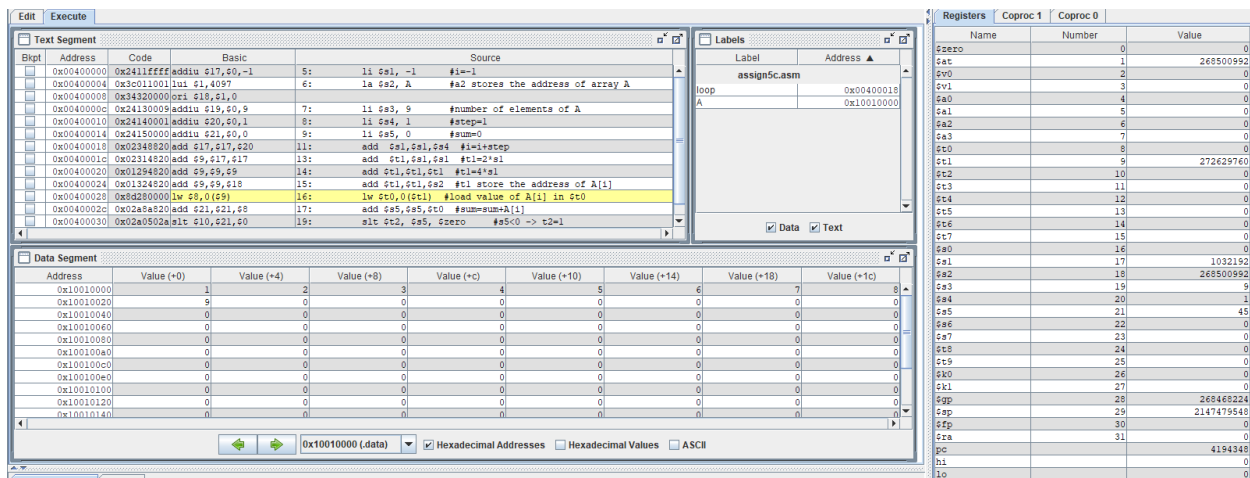
1  #Assignment 4d
2  .data
3      X: .word 5
4      Y: .word 2
5      Z: .word 3
6  .text
7      la $t4, X
8      la $t5, Y
9      la $t6, Z
10     lw $t1, 0($t4)
11     lw $t2, 0($t5)
12     lw $t3, 0($t6)
13     li $s1, 2
14     li $s2, 4
15     li $s3, 3
16     li $s4, 5
17
18 start:
19     add $s7, $s1, $s2      #s7=i+j
20     add $s6, $s3, $s4      #s6=m+n
21     sle $t0, $s7, $s6      #s7<=s6 -> t0=1
22     bne $t0, $zero, else   #ktra gtri t0
23     addi $t1, $t1, 1
24     addi $t3, $zero, 1
25     j endif                #skip "else" part
26 else:
27     addi $t2, $t2, -1
28     add $t3, $t3, $t3
29 endif:

```

- Kết quả

b. $i \leq n$
- Mã nguồn

- Kết quả



- d. $A[i] == 0$
- Mã nguồn

```

1  #Assignment 5
2  .data
3      A: .word 1, 2, 3, 4, 5, 6, 7, 8, 9
4  .text
5      li $s1, -1      #i=-1
6      la $s2, A        #a2 stores the address of array A
7      li $s3, 9        #number of elements of A
8      li $s4, 1        #step=1
9      li $s5, 0        #sum=0
10 loop:
11      add $s1,$s1,$s4  #i=i+step
12      #sll $t1, $s1, 2
13      add $t1,$s1,$s1  #t1=2*s1
14      add $t1,$t1,$t1  #t1=4*s1
15      add $t1,$t1,$s2  #t1 store the address of A[i]
16      lw $t0,0($t1)    #load value of A[i] in $t0
17      add $s5,$s5,$t0  #sum=sum+A[i]
18
19      bne $t0, $zero, loop

```

- Kết quả

Text Segment					Labels				
Bkpt	Address	Code	Basic	Source	Label	Address	Name	Number	Value
<input type="checkbox"/>	0x00400000	0x2411ffff	addiu \$17,\$0,-1	5: li \$a1, -1 #i=-1			\$zero	0	0
<input type="checkbox"/>	0x00400004	0x3c011001	lui \$1,4097	6: la \$a2, A #a2 stores the address of array A			\$a0	1	268500992
<input type="checkbox"/>	0x00400008	0x34320000	ori \$18,\$1,0				\$v0	2	0
<input type="checkbox"/>	0x0040000c	0x24130009	addiu \$19,\$0,9	7: li \$a3, 9 #number of elements of A			\$v1	3	0
<input type="checkbox"/>	0x00400010	0x24140001	addiu \$20,\$0,1	8: li \$a4, 1 #step=1			\$a0	4	0
<input type="checkbox"/>	0x00400014	0x24150000	addiu \$21,\$0,0	9: li \$a5, 0 #sum=0			\$a1	5	0
<input type="checkbox"/>	0x00400018	0x02348820	add \$17,\$17,\$20	11: add \$a1,\$a1,\$a4 #i=i+step			\$a2	6	0
<input type="checkbox"/>	0x0040001c	0x02314820	add \$9,\$17,\$17	13: add \$t1,\$a1,\$a1 #t1=2*s1			\$a3	7	0
<input type="checkbox"/>	0x00400020	0x02294820	add \$9,\$9,\$9	14: add \$t1,\$t1,\$t1 #t1=4*s1			\$t0	8	0
<input type="checkbox"/>	0x00400024	0x01324820	add \$9,\$9,\$18	15: add \$t1,\$t1,\$a2 #t1 store the address of A[i]			\$t1	9	268501028
<input type="checkbox"/>	0x00400028	0x0d280000	lw \$6,0(\$9)	16: lw \$t0,0(\$t1) #load value of A[i] in \$t0			\$t2	10	0
<input type="checkbox"/>	0x0040002c	0x02a9a820	add \$21,\$21,\$8	17: add \$a5,\$a5,\$t0 #sum=sum+A[i]			\$t3	11	0
<input type="checkbox"/>	0x00400030	0x1500ffff	bne \$8,\$0,-7	19: bne \$t0, \$zero, loop			\$t4	12	0
					<input checked="" type="checkbox"/> Data <input checked="" type="checkbox"/> Text		\$t5	13	0
							\$t6	14	0
							\$t7	15	0
							\$a0	16	0
							\$a1	17	9
							\$a2	18	268500992
							\$a3	19	9
							\$a4	20	1
							\$a5	21	45
							\$a6	22	0
							\$a7	23	0
							\$t0	24	0
							\$t5	25	0
							\$t0	26	0
							\$t1	27	0
							\$fp	28	268488224
							\$fp	29	2147479540
							\$fp	30	0
							\$ra	31	0
							\$PC		4194356
							\$t1		0
							\$t0		0

Bài 6.

- Mã nguồn

```

1 #Assignment 6
2 .data
3     A: .word 1, 2, 3, 4, 5, 6, 7, 8, 9
4 .text
5     li $s1, 1      #i=1
6     la $s2, A      #get address of array A
7     li $s3, 9      #number of elements
8     li $s4, 1      #step=1
9     li $s5, 0      #max=0
10    li $s6, 1
11    li $t8, -1
12 loop:
13    add $s1, $s1, $s4    #i=i+step
14    add $t1, $s1, $s1    #t1=2*s1
15    add $t1, $t1, $t1    #t1=4*s1
16    add $t1, $t1, $s2    #t1 store the address of A[i]
17    lw $t0, 0($t1)      #load value of A[i] in $t0
18 start:
19    slt $t4, $t0, $zero  #A[i]<0 -> t4=1
20    bne $t4, $zero, else
21    mul $s7, $t0, $s6
22    j endif
23 else:
24    mul $s7, $t0, $t8
25 endif:
26
27 starts:
28    slt $t5, $s7, $s5    #s7<s5 -> t5=1
29    bne $t0, $zero, else
30    mul $s5, $s7, $s6
31    j endifs
32 else:
33    mul $s5, $s5, $s6
34 endifs:
35    bne $s1, $s3, loop

```

- Kết quả

Text Segment

Bkpt	Address	Code	Basic	Source
<input type="checkbox"/>	0x00400000	0x24110001	addiu \$17,\$0,1	5: li \$a1, 1 #i=1
<input type="checkbox"/>	0x00400004	0x3c011001	lui \$1,4097	6: la \$a2, A #get address of array A
<input type="checkbox"/>	0x00400008	0x34320000	ori \$18,\$1,0	
<input type="checkbox"/>	0x0040000c	0x24130009	addiu \$19,\$0,9	7: li \$a3, 9 #number of elements
<input type="checkbox"/>	0x00400010	0x24140001	addiu \$20,\$0,1	8: li \$a4, 1 #step=1
<input type="checkbox"/>	0x00400014	0x24150000	addiu \$21,\$0,0	9: li \$a5, 0 #max=0
<input type="checkbox"/>	0x00400018	0x24160001	addiu \$22,\$0,1	10: li \$a6, 1
<input type="checkbox"/>	0x0040001c	0x2410ffff	addiu \$24,\$0,-1	11: li \$t8, -1
<input type="checkbox"/>	0x00400020	0x0234820	add \$17,\$17,\$20	13: add \$a1,\$a1,\$a4 #i=i+step
<input type="checkbox"/>	0x00400024	0x02314820	add \$9,\$17,\$17	14: add \$t1,\$a1,\$a1 #t1=2*a1
<input type="checkbox"/>	0x00400028	0x01294820	add \$9,\$9,\$9	15: add \$t1,\$t1,\$t1 #t1=4*a1
<input type="checkbox"/>	0x0040002c	0x01324820	add \$9,\$9,\$18	16: add \$t1,\$t1,\$a2 #t1 store the address...
<input type="checkbox"/>	0x00400030	0x0d280000	lw \$9,0(\$9)	17: lw \$t0, 0(\$t1) #load value of A[i] in \$t0

Labels

Label	Address
assign6.asm	
loop	0x00400020
start	0x00400030
else	0x00400040
endif	0x00400040
starts	0x00400040
elses	0x00400050
endfs	0x00400050
A	0x10010000

Data Segment

Address	Value (+0)	Value (+4)	Value (+8)	Value (+c)	Value (+10)	Value (+14)	Value (+18)	Value (+1c)
0x10010000	1	2	3	4	5	6	7	
0x10010020	9	0	0	0	0	0	0	
0x10010040	0	0	0	0	0	0	0	
0x10010060	0	0	0	0	0	0	0	
0x10010080	0	0	0	0	0	0	0	
0x100100a0	0	0	0	0	0	0	0	
0x100100c0	0	0	0	0	0	0	0	
0x100100e0	0	0	0	0	0	0	0	
0x10010100	0	0	0	0	0	0	0	
0x10010120	0	0	0	0	0	0	0	
0x10010140	n	n	n	n	n	n	n	

0x10010000 (data)

☒ Hexadecimal Addresses ☐ Hexadecimal Values ☐ ASCII

Name	Number	Value
\$zero	0	0
\$t0	1	268500992
\$v0	2	0
\$v1	3	0
\$a0	4	0
\$a1	5	0
\$a2	6	0
\$a3	7	0
\$a0	8	0
\$t1	9	268501028
\$a2	10	0
\$t3	11	0
\$t4	12	0
\$t5	13	0
\$t6	14	0
\$t7	15	0
\$a0	16	0
\$a1	17	9
\$a2	18	268500992
\$a3	19	9
\$a4	20	1
\$a5	21	0
\$a6	22	1
\$a7	23	0
\$t8	24	-1
\$t9	25	0
\$t0	26	0
\$t1	27	0
\$gp	28	26848224
\$sp	29	2147479548
\$fp	30	0
\$ra	31	0
pc		4194400
\$1		0
\$0		0