

Báo cáo thực hành KTMT Tuần 3

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Assignment 1

```
.data
m: .word 5
n: .word 6

.text

addi $s1, $zero, 6 #khaibao i
addi $s2, $zero, 4 #khaibao j
addi $t1, $zero, 10 #khaibao x
addi $t2, $zero, 10 #khaibao y
addi $t3, $zero, 10 #khaibao z
la $t4, m
lw $s4, 0($t4) #khaibao m
la $t5, n
lw $s5, 0($t5) #khaibao n

start:
#slt $t0, $s1, $s2 #i<j a)
#sge $t0, $s2, $s1 #i>=j b)
#add $s3, $s1, $s2 #khaibao i+j c+d)
#sge $t0, $s3, $zero #i+j>=0 c)
#add $s6, $s4, $s5 #m+n d)
#sgt $t0, $s3, $s6 #i+j>m+n d)

slt $t0, $s2, $s1 #j<i
bne $t0, $zero, else
addi $t1, $t1, 1 #x=x+1
addi $t3, $zero, 1 #z=1
j endif
else:
addi $t2, $t2, -1 #y=y-1
add $t3, $t3, $t3 #z=z*2
endif:
```

The screenshot displays a MIPS simulator interface. The top section shows the assembly code being executed, with instructions like `addi $s1, $zero, 6` and `slt $t0, $s2, $s1`. The middle section shows the memory layout with addresses and values. The bottom section shows the registers, including `$s0` through `$s5`, with their current values.

Label	Address	Value
start	0x0040002c	0x00000000
else	0x00400044	0x00000000
endif	0x10010004	0x00000000
m	0x10010000	0x00000005
n	0x10010004	0x00000006

Register	Value
\$s0	0x00000000
\$s1	0x00000006
\$s2	0x00000004
\$s3	0x0000000a
\$s4	0x00000005
\$s5	0x00000006
\$t0	0x00000000
\$t1	0x0000000a
\$t2	0x0000000a
\$t3	0x00000001
\$t4	0x10010000
\$t5	0x10010004
\$t6	0x00000000
\$t7	0x00000000
\$t8	0x00000000
\$t9	0x00000000
\$t10	0x00000000
\$t11	0x00000000
\$t12	0x00000000
\$t13	0x00000000
\$t14	0x00000000
\$t15	0x00000000
\$t16	0x00000000
\$t17	0x00000000
\$t18	0x00000000
\$t19	0x00000000
\$t20	0x00000000
\$t21	0x00000000
\$t22	0x00000000
\$t23	0x00000000
\$t24	0x00000000
\$t25	0x00000000
\$t26	0x00000000
\$t27	0x00000000
\$t28	0x00000000
\$t29	0x00000000
\$t30	0x00000000
\$t31	0x00000000

- Khởi tạo giá trị $i = 6, j = 4$
- Khởi tạo giá trị $x=y=z=10$
- Do $j < i$ thỏa mãn điều kiện if nên câu lệnh sẽ rẽ nhánh thực hiện câu lệnh $y=y-1$ và $z=z*2$;
- Sự thay đổi giá trị của các thanh ghi

Trạng thái	\$t0	\$t1	\$t2	\$t3
Ban đầu	0x00000000	0x00000000	0x00000000	0x00000000
Sau khi khởi tạo giá trị	-	0x0000000a	0x0000000a	0x0000000a
Sau lệnh slt	0x00000001	-	-	-
Sau lệnh bne	-	-	-	-
Sau endif	-	-	0x00000009	0x00000014

- Như vậy do $j < i$ thỏa mãn điều kiện lên $\$t0 = 1$ nên sau lệnh bne sẽ thực hiện 2 câu lệnh ở lệnh rẽ nhánh cho ra 2 kết quả là 9 và 20 (thỏa mãn)

```
.data
m: .word 5
n: .word 6

.text
addi $s1, $zero, 4 #khaibao i
addi $s2, $zero, 6 #khaibao j
addi $t1, $zero, 10 #khaibao x
addi $t2, $zero, 10 #khaibao y
addi $t3, $zero, 10 #khaibao z
la $t4, m
lw $s4, 0($t4) #khaibao m
la $t5, n
lw $s5, 0($t5) #khaibao n

start:
#slt $t0, $s1, $s2 #i<j a)
#sge $t0, $s2, $s1 #i>=j b)
#add $s3, $s1, $s2 #khaibao i+j c+d)
#sge $t0, $s3, $zero #i+j>=0 c)
#add $s6, $s4, $s5 #m+n d)
#sgt $t0, $s3, $s6 #i+j>m+n d)

slt $t0, $s2, $s1 #j<i
bne $t0, $zero, else
addi $t1, $t1, 1 #x=x+1
addi $t3, $zero, 1 #z=1
j endif
else: addi $t2, $t2, -1 #y=y-1
add $t3, $t3, $t3 #z=z*2
endif:
```

\$t0	8	0x00000000
\$t1	9	0x0000000b
\$t2	10	0x0000000a
\$t3	11	0x00000001

- Với trường hợp khởi tạo $i = 4, j = 6$
- Do $i > j$ nên lệnh slt cho giá trị $\$t0 = 0$ vậy lên chương trình sẽ thực hiện tiếp lệnh tiếp theo trong chương trình trừ là $\$t2$ trừ 1 và thiết lập $\$t3 = 1$ sau đó chương trình sẽ nhảy đến thẻ endif
- Sự thay đổi giá trị thành ghi

Trạng thái	\$t0	\$t1	\$t2	\$t3
Ban đầu	0x00000000	0x00000000	0x00000000	0x00000000
Sau khi khởi tạo giá trị	-	0x0000000a	0x0000000a	0x0000000a
Sau lệnh slt	-	-	-	-
Sau lệnh bne	-	-	-	-
Sau endif	-	0x00000009	-	0x00000001

- Sau chương trình ta thu được kết quả \$t1 = 9 và \$t3 = 1 (thỏa mãn)

Assignment 2

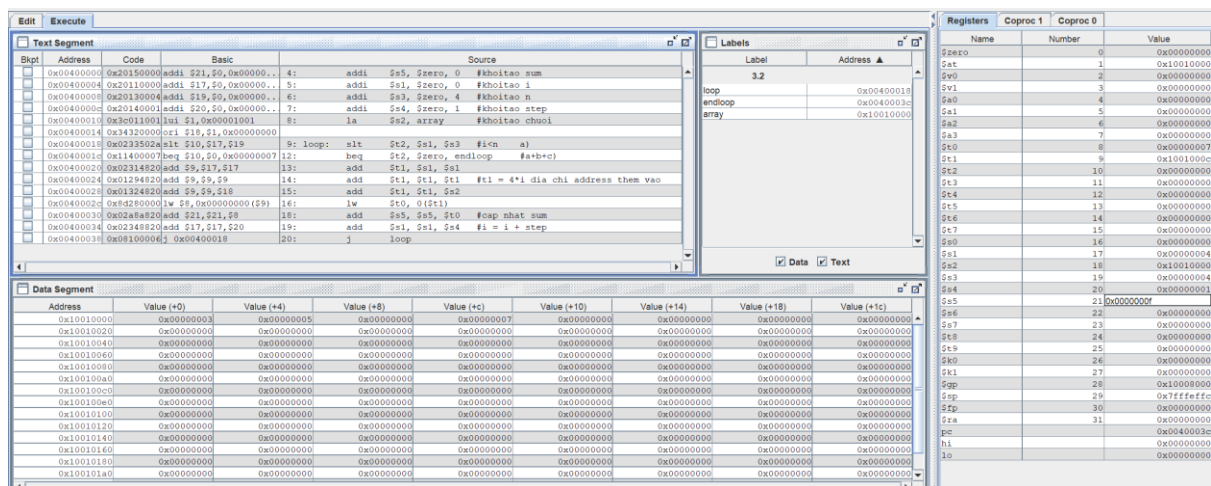
```
.data
array: .word 3, 5, 0, 7,

.text

addi    $s5, $zero, 0    #khoitao sum
addi    $s1, $zero, 0    #khoitao i
addi    $s3, $zero, 4    #khoitao n
addi    $s4, $zero, 1    #khoitao step
la      $s2, array       #khoitao chuoi

loop:   slt     $t2, $s1, $s3    #i<n    a)
        #sle    $t2, $s1, $s3    #i<=n    b)
        beq     $t2, $zero, endloop    #a+b+c)
        add     $t1, $s1, $s1
        add     $t1, $t1, $t1    #t1 = 4*i dia chi address them vao
        add     $t1, $t1, $s2
        lw      $t0, 0($t1)
        #beq     $t0, $zero endloop    #A[i]==0    d)
        add     $s5, $s5, $t0    #cap nhat sum
        #sge     $t3, $s5, $zero    #c)
        #bne     $t3, $zero, endloop    #c)
        add     $s1, $s1, $s4    #i = i + step
        j       loop

endloop:
```



- Khởi tạo 1 chuỗi gồm 4 phần tử có giá trị lần lượt là 3, 5, 0, 7
- Sau khi khởi tạo giá trị cho chuỗi A[i], n, i, sum, step, ta xét đến điều kiện để kết thúc vòng lặp và sau 4 vòng loop ta nhận được giá trị của thanh ghi \$s5 là tổng giá trị của phần tử trong chuỗi
- Sự thay đổi giá trị thanh ghi:

Trạng thái	\$t2	\$t1	\$s5	\$s1
Ban đầu	0x00000000	0x00000000	0x00000000	0x00000000
Vòng loop 1				
Trước khi j loop	0x00000001	0x10010000	0x00000003	0x00000001
Vòng loop 2				
Trước khi j loop	0x00000001	0x10010004	0x00000008	0x00000002
Vòng loop 3				
Trước khi j loop	0x00000001	0x10010008	0x00000008	0x00000003
Vòng loop 4				
Trước khi j loop	0x00000001	0x1001000c	0x0000000f	0x00000004

Vòng loop 5				
Trước khi j loop	0x00000000	-	-	-
Kết thúc loop				

- Như vậy vòng lặp kết thúc khi giá trị thanh ghi \$t2 nhận giá trị 0 và thu được kết quả \$s5 = 15 (thỏa mãn)

Assignment 3

```
.data
    test: .word 1

.text

la      $s0, test
lw      $s1, 0($s0)
li      $t0, 0
li      $t1, 1
li      $t2, 2
beq     $s1, $t0, case_0
beq     $s1, $t1, case_1
beq     $s1, $t2, case_2
j       default

case_0: addi     $s2, $s2, 1
        j       continue

case_1: sub      $s2, $s2, $t1
        j       continue

case_2: add      $s3, $s3, $s3
        j       continue

default:
continue:
```

Text Segment					Labels		Name	Number	Value
Bkpt	Address	Code	Basic	Source	Label	Address			
0x00400000	0x3e011001	lui \$1, 0x00001001	4:	la \$s0, test			\$zero	0	0x00000000
0x00400004	0x34300000	crl \$16, \$1, 0x00000000			3.3		\$at	1	0x10010000
0x00400008	0x24000000	lw \$s1, 0(\$s0)	5:	lw \$s1, 0(\$s0)	case_0	0x00400020	\$v0	2	0x00000000
0x0040000c	0x24000000	addiu \$9, \$0, 0x00000000	6:	li \$t0, 0	case_1	0x00000030	\$a0	4	0x00000000
0x00400010	0x24000000	addiu \$9, \$0, 0x00000000	7:	li \$t1, 1	case_2	0x00400038	\$a1	5	0x00000000
0x00400014	0x24000000	addiu \$9, \$0, 0x00000000	8:	li \$t2, 2	default	0x00400040	\$a2	6	0x00000000
0x00400018	0x32280003	beq \$t1, \$t0, case_0	9:	beq \$s1, \$t0, case_0	continue	0x00400040	\$a3	7	0x00000000
0x0040001c	0x32280003	beq \$t1, \$t0, case_0	10:	beq \$s1, \$t1, case_1	test	0x10010000	\$t0	8	0x00000000
0x00400020	0x32280003	beq \$t1, \$t0, case_0	11:	beq \$s1, \$t2, case_2			\$t1	9	0x00000001
0x00400024	0x00100010	j default	12:				\$t2	10	0x00000002
0x00400028	0x22520001	addi \$s2, \$s2, 1	13: case 0:	addi \$s2, \$s2, 1			\$t3	11	0x00000000
0x0040002c	0x00100010	j continue	14:	j continue			\$t4	12	0x00000000
0x00400030	0x02499002	sub \$18, \$18, \$19	15: case 1:	sub \$s2, \$s2, \$t1			\$t5	13	0x00000000
0x00400034	0x00100010	j continue	16:	j continue			\$t6	14	0x00000000
0x00400038	0x02728000	add \$18, \$18, \$19	17: case 2:	add \$s3, \$s3, \$s3			\$t7	15	0x00000000
0x0040003c	0x00100010	j continue	18:	j continue			\$t8	16	0x00010000
							\$t9	17	0x00000001
							\$a2	18	0xffffffff
							\$a3	19	0x00000000
							\$s4	20	0x00000000
							\$s5	21	0x00000000
							\$s6	22	0x00000000
							\$s7	23	0x00000000
							\$t0	24	0x00000000
							\$t9	25	0x00000000
							\$k0	26	0x00000000
							\$k1	27	0x00000000
							\$ap	28	0x10000000
							\$fp	29	0xffffffff
							\$ra	30	0x00000000
							\$f0	31	0x00000000
							hi		0x00400040
							lo		0x00000000

☒ Data☒ Text

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
0x10010004	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010008	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x1001000c	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010010	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010014	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010018	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x1001001c	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010020	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010024	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010028	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x1001002c	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010030	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010034	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010038	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x1001003c	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010040	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010044	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010048	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x1001004c	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010050	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010054	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010058	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x1001005c	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010060	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010064	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010068	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x1001006c	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010070	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010074	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010078	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x1001007c	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010080	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010084	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010088	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x1001008c	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010090	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010094	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010098	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x1001009c	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100a0	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100a4	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100a8	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100ac	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100b0	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100b4	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100b8	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100bc	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100c0	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100c4	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100c8	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100cc	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100d0	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100d4	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100d8	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100dc	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100e0	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100e4	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100e8	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100ec	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100f0	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100f4	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100f8	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x100100fc	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010100	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000	0x00000000
0x10010104	0x00000000	0x00000000	0x00000000	0x00000000	0x0			

Ban đầu	0x00000000	0x00000000	0x00000000	0x00000000
Sau khi khởi tạo	0x00000001	-	-	0x00400018
Sau beq case_0	-	-	-	0x0040001c
Sau beq case_1	-	0xffffffff	-	0x00400030

- Như vậy do \$s1 = \$t1 = 1 nên lệnh hàm sẽ thực hiện hàm case_1 và thanh ghi pc nhảy đến giá trị của thẻ case_1 là 0x00400030 thực hiện lệnh trừ thanh ghi \$s2 cho 1 ta được \$s2 = -1 (thỏa mãn)

<pre> .data test: .word 0 .text la \$s0, test lw \$s1, 0(\$s0) li \$t0, 0 li \$t1, 1 li \$t2, 2 beq \$s1, \$t0, case_0 beq \$s1, \$t1, case_1 beq \$s1, \$t2, case_2 j default case_0: addi \$s2, \$s2, 1 j continue case_1: sub \$s2, \$s2, \$t1 j continue case_2: add \$s3, \$s3, \$s3 j continue default: continue: </pre>		<table> <tr> <th>Registers</th><th>Coproc 1</th><th>Coproc 0</th></tr> <tr> <th>Name</th><th>Number</th><th>Value</th></tr> <tr><td>\$zero</td><td>0</td><td>0x00000000</td></tr> <tr><td>\$at</td><td>1</td><td>0x10010000</td></tr> <tr><td>\$v0</td><td>2</td><td>0x00000000</td></tr> <tr><td>\$v1</td><td>3</td><td>0x00000000</td></tr> <tr><td>\$a0</td><td>4</td><td>0x00000000</td></tr> <tr><td>\$a1</td><td>5</td><td>0x00000000</td></tr> <tr><td>\$a2</td><td>6</td><td>0x00000000</td></tr> <tr><td>\$a3</td><td>7</td><td>0x00000000</td></tr> <tr><td>\$t0</td><td>8</td><td>0x00000000</td></tr> <tr><td>\$t1</td><td>9</td><td>0x00000001</td></tr> <tr><td>\$t2</td><td>10</td><td>0x00000002</td></tr> <tr><td>\$t3</td><td>11</td><td>0x00000000</td></tr> <tr><td>\$t4</td><td>12</td><td>0x00000000</td></tr> <tr><td>\$t5</td><td>13</td><td>0x00000000</td></tr> <tr><td>\$t6</td><td>14</td><td>0x00000000</td></tr> <tr><td>\$t7</td><td>15</td><td>0x00000000</td></tr> <tr><td>\$s0</td><td>16</td><td>0x10010000</td></tr> <tr><td>\$s1</td><td>17</td><td>0x00000000</td></tr> <tr><td>\$s2</td><td>18</td><td>0x00000001</td></tr> <tr><td>\$s3</td><td>19</td><td>0x00000000</td></tr> <tr><td>\$s4</td><td>20</td><td>0x00000000</td></tr> <tr><td>\$s5</td><td>21</td><td>0x00000000</td></tr> <tr><td>\$s6</td><td>22</td><td>0x00000000</td></tr> <tr><td>\$s7</td><td>23</td><td>0x00000000</td></tr> <tr><td>\$t8</td><td>24</td><td>0x00000000</td></tr> <tr><td>\$t9</td><td>25</td><td>0x00000000</td></tr> <tr><td>\$k0</td><td>26</td><td>0x00000000</td></tr> <tr><td>\$k1</td><td>27</td><td>0x00000000</td></tr> <tr><td>\$gp</td><td>28</td><td>0x10008000</td></tr> <tr><td>\$sp</td><td>29</td><td>0x7ffffefc</td></tr> <tr><td>\$fp</td><td>30</td><td>0x00000000</td></tr> <tr><td>\$ra</td><td>31</td><td>0x00000000</td></tr> <tr><td>pc</td><td></td><td>0x00400040</td></tr> <tr><td>hi</td><td></td><td>0x00000000</td></tr> <tr><td>lo</td><td></td><td>0x00000000</td></tr> </table>	Registers	Coproc 1	Coproc 0	Name	Number	Value	\$zero	0	0x00000000	\$at	1	0x10010000	\$v0	2	0x00000000	\$v1	3	0x00000000	\$a0	4	0x00000000	\$a1	5	0x00000000	\$a2	6	0x00000000	\$a3	7	0x00000000	\$t0	8	0x00000000	\$t1	9	0x00000001	\$t2	10	0x00000002	\$t3	11	0x00000000	\$t4	12	0x00000000	\$t5	13	0x00000000	\$t6	14	0x00000000	\$t7	15	0x00000000	\$s0	16	0x10010000	\$s1	17	0x00000000	\$s2	18	0x00000001	\$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	0x7ffffefc	\$fp	30	0x00000000	\$ra	31	0x00000000	pc		0x00400040	hi		0x00000000	lo		0x00000000
Registers	Coproc 1	Coproc 0																																																																																																															
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\$a3	7	0x00000000																																																																																																															
\$t0	8	0x00000000																																																																																																															
\$t1	9	0x00000001																																																																																																															
\$t2	10	0x00000002																																																																																																															
\$t3	11	0x00000000																																																																																																															
\$t4	12	0x00000000																																																																																																															
\$t5	13	0x00000000																																																																																																															
\$t6	14	0x00000000																																																																																																															
\$t7	15	0x00000000																																																																																																															
\$s0	16	0x10010000																																																																																																															
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\$s7	23	0x00000000																																																																																																															
\$t8	24	0x00000000																																																																																																															
\$t9	25	0x00000000																																																																																																															
\$k0	26	0x00000000																																																																																																															
\$k1	27	0x00000000																																																																																																															
\$gp	28	0x10008000																																																																																																															
\$sp	29	0x7ffffefc																																																																																																															
\$fp	30	0x00000000																																																																																																															
\$ra	31	0x00000000																																																																																																															
pc		0x00400040																																																																																																															
hi		0x00000000																																																																																																															
lo		0x00000000																																																																																																															

- Sự thay đổi giá trị thanh ghi

Trạng thái	\$s1	\$s2	\$s3	pc
Ban đầu	0x00000000	0x00000000	0x00000000	0x00000000
Sau khi khởi tạo	0x00000000	-	-	0x00400018
Sau beq case_0	-	0x00000001	-	0x00400028

- Như vậy do \$s1 = \$t0 = 0 nên lệnh hàm sẽ thực hiện hàm case_0 và thanh ghi pc nhảy đến giá trị của thẻ case_0 là 0x00400028 thực hiện lệnh cộng thanh ghi \$s2 cho 1 ta được \$s2 = 1 (thỏa mãn)

```

.data
    test: .word 2
.text
    la     $s0, test
    lw     $s1, 0($s0)
    li     $t0, 0
    li     $t1, 1
    li     $t2, 2
    beq    $s1, $t0, case_0
    beq    $s1, $t1, case_1
    beq    $s1, $t2, case_2
    j      default
case_0:
    addi   $s2, $s2, 1
    j      continue
case_1:
    sub    $s2, $s2, $t1
    j      continue
case_2:
    add    $s3, $s3, $s3
    j      continue
default:
continue:

```

Registers		
Coproc 1		Coproc 0
Name	Number	Value
\$zero	0	0x00000000
\$at	1	0x10010000
\$v0	2	0x00000000
\$v1	3	0x00000000
\$a0	4	0x00000000
\$a1	5	0x00000000
\$a2	6	0x00000000
\$a3	7	0x00000000
\$t0	8	0x00000000
\$t1	9	0x00000001
\$t2	10	0x00000002
\$t3	11	0x00000000
\$t4	12	0x00000000
\$t5	13	0x00000000
\$t6	14	0x00000000
\$t7	15	0x00000000
\$s0	16	0x10010000
\$s1	17	0x00000002
\$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	0x7ffffcfc
\$fp	30	0x00000000
\$ra	31	0x00000000
pc		0x00400040
hi		0x00000000
lo		0x00000000

- Sự thay đổi giá trị thanh ghi

Trạng thái	\$s1	\$s2	\$s3	pc
Ban đầu	0x00000000	0x00000000	0x00000000	0x00000000
Sau khi khởi tạo	0x00000002	-	-	0x00400018
Sau beq case_0	-	-	-	0x0040001c
Sau beq case_1	-	-	-	0x00400020
Sau beq case_2	-	-	-	0x00400038

- Như vậy do \$s1 = \$t2 = 2 nên lệnh hàm sẽ thực hiện hàm case_2 và thanh ghi pc nhảy đến giá trị của thẻ case_0 là 0x00400038 thực hiện lệnh cộng thanh ghi \$s3 với thanh ghi \$s3 ta được \$s3 = 0 (thỏa mãn)

Assignment 4

- a) $i < j$

		Name	Number	Value
.data		\$zero	0	0x00000000
	m: .word 5	\$at	1	0x10010000
	n: .word 6	\$v0	2	0x00000000
.text		\$v1	3	0x00000000
	addi \$s1, \$zero, 6 #khaibao i	\$a0	4	0x00000000
	addi \$s2, \$zero, 4 #khaibao j	\$a1	5	0x00000000
	addi \$t1, \$zero, 10 #khaibao x	\$a2	6	0x00000000
	addi \$t2, \$zero, 10 #khaibao y	\$a3	7	0x00000000
	addi \$t3, \$zero, 10 #khaibao z	\$t0	8	0x00000000
	la \$t4, m	\$t1	9	0x0000000b
	lw \$s4, 0(\$t4) #khaibao m	\$t2	10	0x0000000a
	la \$t5, n	\$t3	11	0x00000001
	lw \$s5, 0(\$t5) #khaibao n	\$t4	12	0x10010000
start:		\$t5	13	0x10010004
	.slt \$t0, \$s1, \$s2 #i<j a)	\$t6	14	0x00000000
	#sge \$t0, \$s2, \$s1 #i>=j b)	\$t7	15	0x00000000
	#add \$s3, \$s1, \$s2 #khaibao i+j c+d)	\$s0	16	0x00000000
	#sge \$t0, \$s3, \$zero #i+j>=0 c)	\$s1	17	0x00000006
	#add \$s6, \$s4, \$s5 #m+n d)	\$s2	18	0x00000004
	#sgt \$t0, \$s3, \$s6 #i+j>m+n d)	\$s3	19	0x00000000
	.	\$s4	20	0x00000005
	#slt \$t0, \$s2, \$s1 #j<i	\$s5	21	0x00000006
	bne \$t0, \$zero, else	\$s6	22	0x00000000
	addi \$t1, \$t1, 1 #x=x+1	\$s7	23	0x00000000
	addi \$t3, \$zero, 1 #z=1	\$t8	24	0x00000000
	j endif	\$t9	25	0x00000000
else:	addi \$t2, \$t2, -1 #y=y-1	\$k0	26	0x00000000
	add \$t3, \$t3, \$t3 #z=z*2	\$k1	27	0x00000000
endif:		\$gp	28	0x10008000
		\$sp	29	0x7ffffeffc
		\$fp	30	0x00000000
		\$ra	31	0x00000000
		pc		0x00400048
		hi		0x00000000
		lo		0x00000000

```
.text
    addi    $s1, $zero, 6 #khaibao i
    addi    $s2, $zero, 4 #khaibao j
    addi    $t1, $zero, 10 #khaibao x
    addi    $t2, $zero, 10 #khaibao y
    addi    $t3, $zero, 10 #khaibao z

start:
    slt     $t0, $s1, $s2 #i<j    a)
    bne     $t0, $zero, else
    addi    $t1, $t1, 1    #x=x+1
    addi    $t3, $zero, 1    #z=1
    j       endif
else:
    addi    $t2, $t2, -1    #y=y-1
    add     $t3, $t3, $t3    #z=z*2
endif:
b) i >= j
```

	Name	Number	Value
<code>.data</code>			
<code>m: .word 5</code>	\$zero	0	0x00000000
<code>n: .word 6</code>	\$at	1	0x00000001
<code>.text</code>	\$v0	2	0x00000000
	\$v1	3	0x00000000
<code>addi \$s1, \$zero, 6 #khaibao i</code>	\$a0	4	0x00000000
<code>addi \$s2, \$zero, 4 #khaibao j</code>	\$a1	5	0x00000000
<code>addi \$t1, \$zero, 10 #khaibao x</code>	\$a2	6	0x00000000
<code>addi \$t2, \$zero, 10 #khaibao y</code>	\$a3	7	0x00000000
<code>addi \$t3, \$zero, 10 #khaibao z</code>	\$t0	8	0x00000000
<code>la \$t4, m</code>	\$t1	9	0x0000000b
<code>lw \$s4, 0(\$t4) #khaibao m</code>	\$t2	10	0x0000000a
<code>la \$t5, n</code>	\$t3	11	0x00000001
<code>lw \$s5, 0(\$t5) #khaibao n</code>	\$t4	12	0x10010000
<code>start:</code>	\$t5	13	0x10010004
<code>#slt \$t0, \$s1, \$s2 #i<j a)</code>	\$t6	14	0x00000000
<code>sge \$t0, \$s2, \$s1 #i>=j b)</code>	\$t7	15	0x00000000
<code>#add \$s3, \$s1, \$s2 #khaibao i+j c+d)</code>	\$s0	16	0x00000000
<code>#sge \$t0, \$s3, \$zero #i+j>=0 c)</code>	\$s1	17	0x00000006
<code>#add \$s6, \$s4, \$s5 #m+n d)</code>	\$s2	18	0x00000004
<code>#sgt \$t0, \$s3, \$s6 #i+j>m+n d)</code>	\$s3	19	0x00000000
	\$s4	20	0x00000005
<code>#slt \$t0, \$s2, \$s1 #j<i</code>	\$s5	21	0x00000006
<code>bne \$t0, \$zero, else</code>	\$s6	22	0x00000000
<code>addi \$t1, \$t1, 1 #x=x+1</code>	\$s7	23	0x00000000
<code>addi \$t3, \$zero, 1 #z=1</code>	\$t8	24	0x00000000
<code>j endif</code>	\$t9	25	0x00000000
<code>else:</code>	\$k0	26	0x00000000
<code>addi \$t2, \$t2, -1 #y=y-1</code>	\$k1	27	0x00000000
<code>add \$t3, \$t3, \$t3 #z=z*2</code>	\$gp	28	0x10008000
<code>endif:</code>	\$sp	29	0x7ffffc
	\$fp	30	0x00000000
	\$ra	31	0x00000000
	pc		0x00400050
	hi		0x00000000
	lo		0x00000000

```

.text
    addi    $s1, $zero, 6 #khaibao i
    addi    $s2, $zero, 4 #khaibao j
    addi    $t1, $zero, 10 #khaibao x
    addi    $t2, $zero, 10 #khaibao y
    addi    $t3, $zero, 10 #khaibao z

start:
    sge     $t0, $s2, $s1 #i>=j b)
    bne     $t0, $zero, else
    addi    $t1, $t1, 1    #x=x+1
    addi    $t3, $zero, 1  #z=1
    j       endif
else:
    addi    $t2, $t2, -1   #y=y-1
    add     $t3, $t3, $t3  #z=z*2
endif:

```

c) $i + j \geq 0$

	Registers		
	Coproc 1	Coproc 0	
Name	Number	Value	
\$zero	0	0x00000000	
\$at	1	0x00000001	
\$v0	2	0x00000000	
\$v1	3	0x00000000	
\$a0	4	0x00000000	
\$a1	5	0x00000000	
\$a2	6	0x00000000	
\$a3	7	0x00000000	
\$t0	8	0x00000001	
\$t1	9	0x0000000a	
\$t2	10	0x00000009	
\$t3	11	0x00000014	
\$t4	12	0x10010000	
\$t5	13	0x10010004	
\$t6	14	0x00000000	
\$t7	15	0x00000000	
\$s0	16	0x00000000	
\$s1	17	0x00000006	
\$s2	18	0x00000004	
\$s3	19	0x0000000a	
\$s4	20	0x00000005	
\$s5	21	0x00000006	
\$s6	22	0x00000000	
\$s7	23	0x00000000	
\$t8	24	0x00000000	
\$t9	25	0x00000000	
\$k0	26	0x00000000	
\$k1	27	0x00000000	
\$gp	28	0x10008000	
\$sp	29	0x7ffffeffc	
\$fp	30	0x00000000	
\$ra	31	0x00000000	
pc		0x00400054	
hi		0x00000000	
lo		0x00000000	

```

.data
    m: .word 5
    n: .word 6

.text
    addi    $s1, $zero, 6 #khaibao i
    addi    $s2, $zero, 4 #khaibao j
    addi    $t1, $zero, 10 #khaibao x
    addi    $t2, $zero, 10 #khaibao y
    addi    $t3, $zero, 10 #khaibao z
    la      $t4, m
    lw      $s4, 0($t4)    #khaibao m
    la      $t5, n
    lw      $s5, 0($t5)    #khaibao n

start:
    #slt    $t0, $s1, $s2    #i<j    a)
    #sge    $t0, $s2, $s1    #i>=j    b)
    add     $s3, $s1, $s2    #khaibao i+j    c+d)
    sge     $t0, $s3, $zero    #i+j>=0    c)
    #add    $s6, $s4, $s5    #m+n    d)
    #sgt    $t0, $s3, $s6    #i+j>m+n    d)

    #slt    $t0, $s2, $s1    #j<i
    bne     $t0, $zero, else
    addi    $t1, $t1, 1      #x=x+1
    addi    $t3, $zero, 1    #z=1
    j       endif
else:
    addi    $t2, $t2, -1     #y=y-1
    add     $t3, $t3, $t3    #z=z*2
endif:

```

```

.text
    addi    $s1, $zero, 6 #khaibao i
    addi    $s2, $zero, 4 #khaibao j
    addi    $t1, $zero, 10 #khaibao x
    addi    $t2, $zero, 10 #khaibao y
    addi    $t3, $zero, 10 #khaibao z

start:
    add     $s3, $s1, $s2 #khaibao i+j    c+d)
    sge     $t0, $s3, $zero    #i+j>=0    c)
    bne     $t0, $zero, else
    addi    $t1, $t1, 1      #x=x+1
    addi    $t3, $zero, 1    #z=1
    j       endif
else:
    addi    $t2, $t2, -1     #y=y-1
    add     $t3, $t3, $t3    #z=z*2
endif:

```

d) m = 5; n = 6; i + j > m + n

.data

m: .word 5

n: .word 6

.text

```
addi $s1, $zero, 6 #khaibao i
addi $s2, $zero, 4 #khaibao j
addi $t1, $zero, 10 #khaibao x
addi $t2, $zero, 10 #khaibao y
addi $t3, $zero, 10 #khaibao z
la $t4, m
lw $s4, 0($t4) #khaibao m
la $t5, n
lw $s5, 0($t5) #khaibao n
```

start:

```
#slt $t0, $s1, $s2 #i<j a)
#sge $t0, $s2, $s1 #i>=j b)
add $s3, $s1, $s2 #khaibao i+j c+d)
#sge $t0, $s3, $zero #i+j>=0 c)
add $s6, $s4, $s5 #m+n d)
sgt $t0, $s3, $s6 #i+j>m+n d)
```

```
#slt $t0, $s2, $s1 #j<i
bne $t0, $zero, else
addi $t1, $t1, 1 #x=x+1
addi $t3, $zero, 1 #z=1
j endif
```

else:

```
addi $t2, $t2, -1 #y=y-1
add $t3, $t3, $t3 #z=z*2
```

endif:

.data

m: .word 5

n: .word 6

.text

```
addi $s1, $zero, 6 #khaibao i
addi $s2, $zero, 4 #khaibao j
addi $t1, $zero, 10 #khaibao x
addi $t2, $zero, 10 #khaibao y
addi $t3, $zero, 10 #khaibao z
la $t4, m
lw $s4, 0($t4) #khaibao m
la $t5, n
lw $s5, 0($t5) #khaibao n
```

start:

```
add $s3, $s1, $s2 #khaibao i+j c+d)
add $s6, $s4, $s5 #m+n d)
sgt $t0, $s3, $s6 #i+j>m+n d)
```

```
bne $t0, $zero, else
addi $t1, $t1, 1 #x=x+1
addi $t3, $zero, 1 #z=1
j endif
```

else:

```
addi $t2, $t2, -1 #y=y-1
add $t3, $t3, $t3 #z=z*2
```

endif:

Name	Number	Value
\$zero	0	0x00000000
\$at	1	0x10010000
\$v0	2	0x00000000
\$v1	3	0x00000000
\$a0	4	0x00000000
\$a1	5	0x00000000
\$a2	6	0x00000000
\$a3	7	0x00000000
\$t0	8	0x00000000
\$t1	9	0x0000000b
\$t2	10	0x0000000a
\$t3	11	0x00000001
\$t4	12	0x10010000
\$t5	13	0x10010004
\$t6	14	0x00000000
\$t7	15	0x00000000
\$s0	16	0x00000000
\$s1	17	0x00000006
\$s2	18	0x00000004
\$s3	19	0x0000000a
\$s4	20	0x00000005
\$s5	21	0x00000006
\$s6	22	0x0000000b
\$s7	23	0x00000000
\$t8	24	0x00000000
\$t9	25	0x00000000
\$k0	26	0x00000000
\$k1	27	0x00000000
\$gp	28	0x10008000
\$sp	29	0x7ffffeffc
\$fp	30	0x00000000
\$ra	31	0x00000000
pc		0x00400050
hi		0x00000000
lo		0x00000000

Assignment 5

a) $i < n$: **Assignment 2**

b) $i \leq n$

	Name	Number	Value
.data	\$zero	0	0x00000000
array: .word 3, 5, 0, 7,	\$at	1	0x00000001
.text	\$v0	2	0x00000000
addi \$s5, \$zero, 0 #khoitao sum	\$v1	3	0x00000000
addi \$s1, \$zero, 0 #khoitao i	\$a0	4	0x00000000
addi \$s3, \$zero, 4 #khoitao n	\$a1	5	0x00000000
addi \$s4, \$zero, 1 #khoitao step	\$a2	6	0x00000000
la \$s2, array #khoitao chuoi	\$a3	7	0x00000000
loop: #slt \$t2, \$s1, \$s3 #i<n a)	\$t0	8	0x00000000
sle \$t2, \$s1, \$s3 #i<=n b)	\$t1	9	0x10010010
beq \$t2, \$zero, endloop #a+b+c)	\$t2	10	0x00000000
add \$t1, \$s1, \$s1	\$t3	11	0x00000000
add \$t1, \$t1, \$t1 #t1 = 4*i dia chi address them vao	\$t4	12	0x00000000
add \$t1, \$t1, \$s2	\$t5	13	0x00000000
lw \$t0, 0(\$t1)	\$t6	14	0x00000000
#beq \$t0, \$zero endloop #A[i]=0 d)	\$t7	15	0x00000000
add \$s5, \$s5, \$t0 #cap nhat sum	\$s0	16	0x00000000
#sge \$t3, \$s5, \$zero #c)	\$s1	17	0x00000005
#bne \$t3, \$zero, endloop #c)	\$s2	18	0x10010000
add \$s1, \$s1, \$s4 #i = i + step	\$s3	19	0x00000004
j loop	\$s4	20	0x00000001
endloop:	\$s5	21	0x0000000f
	\$s6	22	0x00000000
	\$s7	23	0x00000000
	\$t8	24	0x00000000
	\$t9	25	0x00000000
	\$k0	26	0x00000000
	\$k1	27	0x00000000
	\$gp	28	0x10008000
	\$sp	29	0x7ffffcfc
	\$fp	30	0x00000000
	\$ra	31	0x00000000
	pc		0x00400044
	hi		0x00000000
	lo		0x00000000

```

.data
array: .word 3, 5, 0, 7,

.text
addi $s5, $zero, 0 #khoitao sum
addi $s1, $zero, 0 #khoitao i
addi $s3, $zero, 4 #khoitao n
addi $s4, $zero, 1 #khoitao step
la $s2, array #khoitao chuoi

loop:
#sle $t2, $s1, $s3 #i<=n
beq $t2, $zero, endloop
add $t1, $s1, $s1
add $t1, $t1, $t1 #t1 = 4*i dia chi address them vao
add $t1, $t1, $s2
lw $t0, 0($t1)
add $s5, $s5, $t0 #cap nhat sum
add $s1, $s1, $s4 #i = i + step
j loop

endloop:

```

c) sum >= 0

	Name	Number	Value
.data			
array: .word 3, 5, 0, 7,	\$zero	0	0x00000000
.text	\$at	1	0x00000001
addi \$s5, \$zero, 0 #khoitao sum	\$v0	2	0x00000000
addi \$s1, \$zero, 0 #khoitao i	\$v1	3	0x00000000
addi \$s3, \$zero, 4 #khoitao n	\$a0	4	0x00000000
addi \$s4, \$zero, 1 #khoitao step	\$a1	5	0x00000000
la \$s2, array #khoitao chuoi	\$a2	6	0x00000000
loop: slt \$t2, \$s1, \$s3 #i<n a)	\$a3	7	0x00000000
#sle \$t2, \$s1, \$s3 #i<=n b)	\$t0	8	0x00000003
beq \$t2, \$zero, endloop #a+b+c)	\$t1	9	0x10010000
add \$t1, \$s1, \$s1	\$t2	10	0x00000001
add \$t1, \$t1, \$t1 #t1 = 4*i dia chi address them vao	\$t3	11	0x00000001
add \$t1, \$t1, \$s2	\$t4	12	0x00000000
lw \$t0, 0(\$t1)	\$t5	13	0x00000000
#beq \$t0, \$zero endloop #A[i]==0 d)	\$t6	14	0x00000000
add \$s5, \$s5, \$t0 #cap nhat sum	\$t7	15	0x00000000
sge \$t3, \$s5, \$zero #c)	\$s0	16	0x00000000
bne \$t3, \$zero, endloop #c)	\$s1	17	0x00000000
add \$s1, \$s1, \$s4 #i = i + step	\$s2	18	0x10010000
j loop	\$s3	19	0x00000004
endloop:	\$s4	20	0x00000001
	\$s5	21	0x00000003
	\$s6	22	0x00000000
	\$s7	23	0x00000000
	\$t8	24	0x00000000
	\$t9	25	0x00000000
	\$k0	26	0x00000000
	\$k1	27	0x00000000
	\$gp	28	0x10008000
	\$sp	29	0x7fffffc
	\$fp	30	0x00000000
	\$ra	31	0x00000000
	pc		0x0040004c
	hi		0x00000000
	lo		0x00000000

.data

array: .word 3, 5, 0, 7,

.text

```

addi $s5, $zero, 0 #khoitao sum
addi $s1, $zero, 0 #khoitao i
addi $s3, $zero, 4 #khoitao n
addi $s4, $zero, 1 #khoitao step
la $s2, array #khoitao chuoi
loop: slt $t2, $s1, $s3 #i<n
      beq $t2, $zero, endloop
      add $t1, $s1, $s1
      add $t1, $t1, $t1 #t1 = 4*i dia chi address them vao
      add $t1, $t1, $s2
      lw $t0, 0($t1)
      add $s5, $s5, $t0 #cap nhat sum
      sge $t3, $s5, $zero #c)
      bne $t3, $zero, endloop #c)
      add $s1, $s1, $s4 #i = i + step
      j loop
endloop:

```

d) A[i] == 0 stop; A[i] !=0 loop

```

.data
array: .word 3, 5, 0, 7,

.text

addi $s5, $zero, 0 #khoitao sum
addi $s1, $zero, 0 #khoitao i
addi $s3, $zero, 4 #khoitao n
addi $s4, $zero, 1 #khoitao step
la $s2, array #khoitao chuoi

loop: slt $t2, $s1, $s3 #i<n a)
      #sle $t2, $s1, $s3 #i<=n b)
      beq $t2, $zero, endloop #a+b+c)
      add $t1, $s1, $s1
      add $t1, $t1, $t1 #t1 = 4*i dia chi address them vao
      add $t1, $t1, $s2
      lw $t0, 0($t1)
      beq $t0, $zero endloop #A[i]==0 d)
      add $s5, $s5, $t0 #cap nhat sum
      #sge $t3, $s5, $zero #c)
      #bne $t3, $zero, endloop #c)
      add $s1, $s1, $s4 #i = i + step
      j loop
endloop:

```

Registers	Coproc 1	Coproc 0	
Name	Number		Value
\$zero	0		0x00000000
\$at	1		0x10010000
\$v0	2		0x00000000
\$v1	3		0x00000000
\$a0	4		0x00000000
\$a1	5		0x00000000
\$a2	6		0x00000000
\$a3	7		0x00000000
\$t0	8		0x00000000
\$t1	9		0x10010008
\$t2	10		0x00000001
\$t3	11		0x00000000
\$t4	12		0x00000000
\$t5	13		0x00000000
\$t6	14		0x00000000
\$t7	15		0x00000000
\$s0	16		0x00000000
\$s1	17		0x00000002
\$s2	18		0x10010000
\$s3	19		0x00000004
\$s4	20		0x00000001
\$s5	21		0x00000008
\$s6	22		0x00000000
\$s7	23		0x00000000
\$t8	24		0x00000000
\$t9	25		0x00000000
\$k0	26		0x00000000
\$k1	27		0x00000000
\$gp	28		0x10008000
\$sp	29		0x7fffffc
\$fp	30		0x00000000
\$ra	31		0x00000000
pc			0x00400040
hi			0x00000000
lo			0x00000000

```

.data
array: .word 3, 5, 0, 7,

.text

addi $s5, $zero, 0 #khoitao sum
addi $s1, $zero, 0 #khoitao i
addi $s3, $zero, 4 #khoitao n
addi $s4, $zero, 1 #khoitao step
la $s2, array #khoitao chuoi

loop: slt $t2, $s1, $s3 #i<n
      beq $t2, $zero, endloop
      add $t1, $s1, $s1
      add $t1, $t1, $t1 #t1 = 4*i dia chi address them vao
      add $t1, $t1, $s2
      lw $t0, 0($t1)
      beq $t0, $zero endloop #A[i]==0 d)
      add $s5, $s5, $t0 #cap nhat sum
      add $s1, $s1, $s4 #i = i + step
      j loop
endloop:

```

Assignment 6

```

.data
    arr: .word -5, -15, 6, 4, 5, -9
.text
    addi $s1, $zero, 0 #khoitao i
    la $s2, arr
    addi $s3, $zero, 6 #khoitao n
    addi $s4, $zero, 1 #khoitao step
    addi $s5, $zero, 0 #Max
loop: slt $t2, $s1, $s3 #i<n
    beq $t2, $zero, endloop
    add $t1, $s1, $s1
    add $t1, $t1, $t1 #t1 = 4*i dia chi address them vao
    add $t1, $t1, $s2
    lw $t0, 0($t1)
    start_0: #doi A[i] sang duong
        addi $t4, $t0, 0
        slt $t3, $t4, $zero
        beq $t3, $zero, start_1
        sub $t4, $zero, $t4
    start_1: #doi Max sang duong
        addi $t5, $s5, 0
        slt $t3, $t5, $zero
        beq $t3, $zero, start_2
        sub $t5, $zero, $t5
    start_2:
        slt $t3, $t4, $t5
        bne $t3, $zero, endif
        addi $s5, $t0, 0
    endif:
    add $s1, $s1, $s4 #i = i + step
    j loop
endloop:

```

Registers	Coproc 1	Coproc 0
Name	Number	Value
\$zero	0	0
\$at	1	268500992
\$v0	2	0
\$v1	3	0
\$a0	4	0
\$a1	5	0
\$a2	6	0
\$a3	7	0
\$t0	8	-9
\$t1	9	268501012
\$t2	10	0
\$t3	11	1
\$t4	12	9
\$t5	13	15
\$t6	14	0
\$t7	15	0
\$s0	16	0
\$s1	17	6
\$s2	18	268500992
\$s3	19	6
\$s4	20	1
\$s5	21	-15
\$s6	22	0
\$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	0
pc		4194404
hi		0
lo		0

```

.data

```

```

    arr: .word -5, -15, 6, 4, 5, -9

```

```

.text

```

```

    addi $s1, $zero, 0 #khoitao i

```

```

    la $s2, arr

```

```

    addi $s3, $zero, 6 #khoitao n

```

```

    addi $s4, $zero, 1 #khoitao step

```

```

    addi $s5, $zero, 0 #Max

```

```

loop: slt $t2, $s1, $s3 #i<n

```

```

    beq $t2, $zero, endloop

```

```

    add $t1, $s1, $s1

```

```

    add $t1, $t1, $t1 #t1 = 4*i dia chi address them vao

```

```

add    $t1, $t1, $s2
lw     $t0, 0($t1)
start_0:    #doi A[i] sang duong
            addi    $t4, $t0, 0
            slt     $t3, $t4, $zero
            beq     $t3, $zero start_1
            sub     $t4, $zero, $t4
start_1:    #doi Max sang duong
            addi    $t5, $s5, 0
            slt     $t3, $t5, $zero
            beq     $t3, $zero start_2
            sub     $t5, $zero, $t5
start_2:
            slt     $t3, $t4, $t5
            bne     $t3, $zero, endif
            addi    $s5, $t0, 0
endif:
add     $s1, $s1, $s4 #i = i + step
j       loop
endloop:

```