

# Báo Cáo giữa kì môn Kiến Trúc Máy Tính

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## Phần 1: Bài 2 Tìm Bội

### \*Mã nguồn

```
.data
nhap1:      .ascii "Nhap so nguyen duong N: "
nhap2:      .ascii "Nhap so nguyen duong M: "
msg:        .ascii "\nBoi so chung : "
tich: .ascii " Tich = "
.text
main:
la $a0,nhap1
add $v0,$0,4
syscall
add $v0,$0,5
syscall
add $t0,$0,$v0

la $a0,nhap2
add $v0,$0,4
syscall
add $v0,$0,5
syscall
add $t1,$0,$v0

Tich:
la $a0,tich
add $v0,$0,4
```

```

syscall

mult $t0,$t1

mflo $t3

add $a0,$0,$t3

add $v0,$0,1

syscall

add $s2,$s2,2

FOR:

slt $t4, $t3, $s2 # $t0 = i < n?

bne $t4, $0, END # if !(i < n) goto END

div    $s2, $t0 # divide for N

mfhi   $t2          # get remainder

bne    $t2, 0, remake # if remainder === 0 then print

div    $s2, $t1 # divide for M

mfhi   $t2          # get remainder

beq    $t2, 0, equal  # if remainder === 0 then print

remake:

addi $s2, $s2, 1 # i = i + 1

j FOR

equal:

la     $a0, msg

li     $v0, 4

syscall

li $v0, 1 # service 1 is print integer

    add $a0, $s2, $zero # load desired value into argument register $a0, using pseudo-op

    syscall

```

END:

Ý tưởng: Tính tích của 2 số N,M sau đó cho biến i chạy từ 1 đến M\*N đến khi nào i chia hết cho cả hai số M và N thì ngừng lại và in ra số i.

Kết quả chạy chương trình:

C:\Users\LEMINHUU\OneDrive - Hanoi University of Science and Technology\Documents\giuakiakmt\bai2 phan 1.asm - MARS 4.5

File Edit Run Settings Tools Help

Run speed at max (no interaction)

**Edit Execute**

**Text Segment**

Blkpt	Address	Code	Basic	Source
	0x00400000	0x3c011001	lui \$1,4097	8: la \$a0,nhap1
	0x00400004	0x34240000	ori \$4,\$1,0	
	0x00400008	0x20020004	addi \$2,\$0,4	9: add \$r0,\$0,4
	0x0040000c	0x0000000c	syscall	10: syscall
	0x00400010	0x20020005	addi \$2,\$0,5	11: add \$r0,\$0,5
	0x00400014	0x0000000c	syscall	12: syscall
	0x00400018	0x00024020	add \$8,\$0,\$2	13: add \$t0,\$0,\$r0
	0x0040001c	0x3c011001	lui \$1,4097	15: la \$a0,nhap2
	0x00400020	0x34240000	ori \$4,\$1,25	
	0x00400024	0x20020004	addi \$2,\$0,4	16: add \$r0,\$0,4
	0x00400028	0x0000000c	syscall	17: syscall
	0x0040002c	0x20020005	addi \$2,\$0,5	18: add \$r0,\$0,5

**Data Segment**

Address	Value (+0)	Value (+4)	Value (+8)	Value (+c)	Value (+10)	Value (+14)	Value (+18)	Value (+1c)
0x10010000	1885431886	544174880	2037737326	1679847013	1735250741	540692000	1634225664	1869815920
0x10010020	1969712672	544105849	1852798308	978133095	1107951648	1931503983	1751326931	543649397
0x10010040	536879162	1667847200	540876904	0	0	0	0	0
0x10010060	0	0	0	0	0	0	0	0
0x10010080	0	0	0	0	0	0	0	0
0x100100a0	0	0	0	0	0	0	0	0
0x100100c0	0	0	0	0	0	0	0	0
0x100100e0	0	0	0	0	0	0	0	0
0x10010100	0	0	0	0	0	0	0	0
0x10010120	0	0	0	0	0	0	0	0

**Registers**

Name	Number	Value
\$zero	0	0
\$at	1	268500952
\$v0	2	1
\$v1	3	0
\$a0	4	15
\$a1	5	0
\$a2	6	0
\$a3	7	0
\$t0	8	5
\$t1	9	15
\$t2	10	0
\$t3	11	75
\$t4	12	0
\$t5	13	0
\$t6	14	0
\$t7	15	0
\$a0	16	0
\$a1	17	0
\$a2	18	15
\$a3	19	0
\$t0	20	0
\$a4	21	0
\$a5	22	0
\$a6	23	0
\$a7	24	0
\$t8	25	0
\$t9	26	0
\$k0	27	0
\$k1	28	268468224
\$gp	29	2147479548
\$fp	30	0
\$ra	31	4194476
\$lo		0

**Mars Messages**

Nhap so nguyen duong N: 5  
Nhap so nguyen duong M: 15  
Tich = 75  
Hoi so chung : 15  
-- program is finished running (dropped off bottom) --

30°C  
Cổ máy

VIE 4:35 PM  
5/20/2022

Bội chung của 5 và 15 là 15(chương trình chạy đúng)

Thêm 1 TH nữa

C:\Users\LEMINHUU\OneDrive - Hanoi University of Science and Technology\Documents\giuakiakmt\bai2 phan 1.asm - MARS 4.5

File Edit Run Settings Tools Help

Run speed at max (no interaction)

**Edit Execute**

**Text Segment**

Blkpt	Address	Code	Basic	Source
	0x00400000	0x3c011001	lui \$1,4097	8: la \$a0,nhap1
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	0x00400014	0x0000000c	syscall	12: syscall
	0x00400018	0x00024020	add \$8,\$0,\$2	13: add \$t0,\$0,\$r0
	0x0040001c	0x3c011001	lui \$1,4097	15: la \$a0,nhap2
	0x00400020	0x34240000	ori \$4,\$1,25	
	0x00400024	0x20020004	addi \$2,\$0,4	16: add \$r0,\$0,4
	0x00400028	0x0000000c	syscall	17: syscall
	0x0040002c	0x20020005	addi \$2,\$0,5	18: add \$r0,\$0,5

**Data Segment**

Address	Value (+0)	Value (+4)	Value (+8)	Value (+c)	Value (+10)	Value (+14)	Value (+18)	Value (+1c)
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0x10010060	0	0	0	0	0	0	0	0
0x10010080	0	0	0	0	0	0	0	0
0x100100a0	0	0	0	0	0	0	0	0
0x100100c0	0	0	0	0	0	0	0	0
0x100100e0	0	0	0	0	0	0	0	0
0x10010100	0	0	0	0	0	0	0	0
0x10010120	0	0	0	0	0	0	0	0

**Registers**

Name	Number	Value
\$28 (vaddr)	8	0
\$12 (status)	12	65297
\$13 (cause)	13	0
\$14 (epc)	14	0

**Mars Messages**

Nhap so nguyen duong N: 7  
Nhap so nguyen duong M: 13  
Tich = 91  
Hoi so chung : 91  
-- program is finished running (dropped off bottom) --

30°C  
Cổ máy

VIE 4:56 PM  
5/20/2022

Bội chung của 7 và 13 là 91(chương trình chạy đúng)

## Phần 2: Bài 8 Sắp xếp 2 số âm dương về 2 phía sao cho âm ở đầu dương ở cuối.

.data

input: .ascii "Nhap n: "

Open: .ascii "[ "

Close: .ascii "] = "

output: .ascii "\nMang de bai yeu cau : "

array: .word 0:100 # int array[100]

.text

main:

# nhap n

la \$a0, input

addi \$v0, \$0, 4

syscall

addi \$v0, \$0, 5

syscall

addi \$s0, \$v0, 0 # \$s0 = n

jal NhapMang

jal Sort

j XuatMang

NhapMang:

# khoi tao

addi \$t1, \$0, 0 # \$t1 = 0

la \$a1, array # \$a1 = &array

NhapPhanTu:

# kiem tra so lan lap

slt \$t2, \$t1, \$s0

```
beq $t2, $0, KetThucNhap
```

```
# xuat dau nhac nhap
```

```
la $a0, Open
```

```
addi $v0, $0, 4
```

```
syscall
```

```
addi $a0, $t1, 0
```

```
addi $v0, $0, 1
```

```
syscall
```

```
la $a0, Close
```

```
addi $v0, $0, 4
```

```
syscall
```

```
# nhap so nguyen va luu vao array[i]
```

```
addi $v0, $0, 5
```

```
syscall
```

```
sw $v0, ($a1)
```

```
# tang chi so
```

```
addi $t1, $t1, 1
```

```
addi $a1, $a1, 4
```

```
j NhapPhanTu
```

```
KetThucNhap:
```

```
jr $ra
```

```
## Sap xep
```

```
Sort:
```

```

addi $t0, $0, 1 # $t0 = i = 1

la $a1, array # dia chi a[i] ban dau co gia tri la a[1]

addi $a1, $a1, 4 #

while1:

beq $t0, $s0, end

lw $t1, ($a1) # $t1 = value of $a1

addi $t2, $t0, 0 # $t2 = j = i

la $a2, ($a1)

while2:

blez $t2, cont

la $a3, ($a2)

addi $a3, $a3, -4

lw $t4, ($a3)

ble $t4, $t1, cont

la $a3, ($a2)

addi $a3, $a3, -4

lw $t5, ($a3)

sw $t5, ($a2)

addi $t2, $t2, -1

addi $a2, $a2, -4

j while2

cont:

sw $t1, ($a2)

addi $t0, $t0, 1

addi $a1, $a1, 4

j while1

end:

jr $ra

```

# Xuat

XuatMang:

```
la $a0, output
addi $v0, $zero, 4
syscall
```

```
la $a1, array
addi $t1, $0, 0
```

```
XuatPhanTu:
# kiem tra so lan lap
slt $t2, $t1, $s0
beq $t2, $0, Exit
```

```
# xuat phan tu array[i]
lw $a0, ($a1)
addi $v0, $zero, 1
syscall
```

```
# xuat khoang trang
addi $a0, $0, 0x20
addi $v0, $0, 11
syscall
```

```
# tang i
addi $t1, $t1, 1
addi $a1, $a1, 4
```

```
j XuatPhanTu
```

```
Exit:
addi $v0, $0, 10
syscall
```

Ý tưởng: Mở rộng bài toán: sắp xếp theo thứ tự tăng dần

Dùng thuật toán Insertion Sort để sắp xếp dãy số tăng dần

C:\Users\LEMINHUU\OneDrive - Hanoi University of Science and Technology\Documents\giuakiakmt\bai8 phan 2.asm - MARS 4.5

File Edit Run Settings Tools Help

Run speed at max (no interaction)

**Text Segment**

Offset	Address	Code	Basic	Source
0x00400000	0x3c011001	lui \$1,4097		10: la \$a0, input
0x00400004	0x34240000	ori \$4,\$1,0		
0x00400008	0x20020004	addi \$2,\$0,4		11: addi \$r0, \$0, 4
0x0040000c	0x0000000c	syscall		12: syscall
0x00400010	0x20020005	addi \$2,\$0,5		14: addi \$r0, \$0, 5
0x00400014	0x0000000c	syscall		15: syscall
0x00400018	0x20500000	addi \$16,\$2,0		16: addi \$a0, \$r0, 0 # \$a0 = n
0x0040001c	0xc10000a1	jal 0x0400028		18: jal NhayMang
0x00400020	0x0c100021	jal 0x0400084		19: jal Sort

**Data Segment**

Address	Value (+0)	Value (+4)	Value (+8)	Value (+c)	Value (+10)	Value (+14)	Value (+18)	Value (+1c)
0x10010000	1885431886	540700192	2120448	1025531168	1292501024	543649377	1646290276	2032167265
0x10010020	1663071585	975205725	32	-5	-4	-2	3	7
0x10010040	0	0	0	0	0	0	0	0
0x10010060	0	0	0	0	0	0	0	0
0x10010080	0	0	0	0	0	0	0	0
0x100100a0	0	0	0	0	0	0	0	0

**Mars Messages** | Run I/O

Clear

Nhap n: 5  
[ 0 ] = -2  
[ 1 ] = -5  
[ 2 ] = 3  
[ 3 ] = -4  
[ 4 ] = 7  
Mang de hai you cau : -5 -4 -2 3 7  
-- program is finished running --

30°C Có mây

VIE 5:01 PM 5/20/2022