# BÀI BÁO CÁO TUẦN 6

Họ và tên: Nguyễn Trọng Khánh Duy

MSSV: 20210284

## *Assignment 1*

**CODE:**

```
.data
        A: .word
        str1: .asciiz "Nhap so luong phan tu trong mang :"
.text
main:
        la $a0,A
        li $a1,5
        li $v0, 4
        la $a0, str1
        syscall
        li $v0, 5
        syscall
        addi $a1, $v0, 0 # a1 = size
input:
        beq $t5, $a1, exit_input
        sll $t6, $t5, 2
        add $t7, $t6, $a0
```

```
        li $v0, 5
        syscall
        sw $v0, 0($t7)
        addi $t5, $t5, 1
        j input
exit_input:
        j mspfx
        nop
continue:
lock:
        j lock
        nop
end_of_main:
mspfx:
        addi $v0,$zero,0 #initialize length in $v0 to 0
        addi $v1,$zero,0 #initialize max sum in $v1to 0
        addi $t0,$zero,0 #initialize index i in $t0 to 0
        addi $t1,$zero,0 #initialize running sum in $t1 to 0
loop:
        add $t2,$t0,$t0 #put 2i in $t2
        add $t2,$t2,$t2 #put 4i in $t2
        add $t3,$t2,$a0 #put 4i+A (address of A[i]) in $t3
        lw $t4,0($t3) #load A[i] from mem(t3) into $t4
```

```
        add $t1,$t1,$t4 #add A[i] to running sum in $t1
        slt $t5,$v1,$t1 #set $t5 to 1 if max sum < new sum
        bne $t5,$zero,mdfy #if max sum is less, modify results
        j test #done?
mdfy:
        addi $v0,$t0,1 #new max-sum prefix has length i+1
        addi $v1,$t1,0 #new max sum is the running sum
test:
        addi $t0,$t0,1 #advance the index i
        slt $t5,$t0,$a1 #set $t5 to 1 if i<n
        bne $t5,$zero,loop #repeat if i<n
done:
        j continue
mspfx_end:
```

**Kết quả:** Khi nhập vào mảng có 5 phần tử A[-2; 6; -1; 3; -2]

Thu được kết quả $v0= 4; $v1 = 6 => Đúng

| | | |
|---|---|---|
| $v0 | 2 | 4 |
| $v1 | 3 | 6 |

```
Nhap so luong phan tu trong mang :5
-2
6
-1
3
-2
```

## *Assignment 2: Selection Sort*

**CODE:**

```
.data
        A: .word -2,5,7,-23,45,-6,34,2
        Aend: .word
        message1: .asciiz " "
        message2: .asciiz "\n"
.text
main:       la $a0,A            #$a0 = Address(A[0])
        la $a1,Aend
        la $t7,Aend
        addi $a1,$a1,-4    #$a1 = Address(A[n-1])
        j sort          #sort
after_sort:
        li $v0, 10          #exit
        syscall
end_main:
sort:  beq $a0,$a1,done        #single element list is sorted
        j max          #call the max procedure
after_max:
        lw $t0,0($a1)       #load last element into $t0
        sw $t0,0($v0)       #copy last element to max location
        sw $v1,0($a1)       #copy max value to last element
```

```
        addi $a1,$a1,-4    #decrement pointer to last element
print_arr:
        la $t6,A
        j show_arr
end_print:
        j sort          #repeat sort for smaller list
done:       j after_sort
max:  addi $v0,$a0,0     #init max pointer to first element
        lw $v1,0($v0)       #init max value to first value
        addi $t0,$a0,0      #init next pointer to first
loop: beq $t0,$a1,ret    #if next=last, return
        addi $t0,$t0,4      #advance to next element
        lw $t1,0($t0)       #load next element into $t1
        slt $t2,$t1,$v1     #(next)<(max) ?
        bne $t2,$zero,loop        #if (next)<(max), repeat
        addi $v0,$t0,0      #next element is new max element
        addi $v1,$t1,0      #next value is new max value
        j loop              #change completed; now repeat
ret:    j after_max

show_arr:
        li $v0,1
        lw $a0,0($t6)
```

```
syscall
li $v0, 4
la $a0, message1
syscall
addi $t6,$t6,4
bne $t6,$t7,show_arr
li $v0, 4
la $a0, message2
syscall
la $a0,A
j end_print
```

**Kết quả:**

Chuỗi ban đầu được khởi tạo A = [-2,5,7,-23,45,-6,34,2]

Sau khi chạy chương trình kết quả in ra như sau

```
-2 5 7 -23 2 -6 34 45
-2 5 7 -23 2 -6 34 45
-2 5 -6 -23 2 7 34 45
-2 2 -6 -23 5 7 34 45
-2 -23 -6 2 5 7 34 45
-6 -23 -2 2 5 7 34 45
-23 -6 -2 2 5 7 34 45
```

## *Assignment 3: Bubble Sort*

**CODE:**

```
.data
        A: .word -2,5,7,-23,45,-6,34,2
        Aend: .word
        message1: .asciiz " "
        message2: .asciiz "\n"
.text
        la $a0, A
        la $a1, Aend
        la $t7, Aend
        li $s0, 0               # count = 0 (count la bien dem phan tu)
        li $s1, -1              # i = -1 (i trong loopi)

DemPhanTu:
beq  $a1, $a0, Size
        addi $a1, $a1, -4
        addi $s0, $s0, 1
        j DemPhanTu
Size:
addi $t0, $s0, -1           # t0 = So luong phan tu mang A - 1
loop1:
        addi $s1, $s1, 1            # i++
```

```
        li $s2, 0                   # j = 0 (j trong loop2)
        beq $s1, $t0, Exit # Neu i = size - 1 thì thoát
loop2:
        sub $t2, $t0, $s1           # t2 = (size - 1) - i
        beq $s2, $t2, loop1         # Neu j = (size - 1) - i thì nhay loop1
if_swap:
        sll $t3, $s2, 2
        add $s3, $a0, $t3
        lw $v0, 0($s3)
        addi $s3, $s3, 4
        lw $v1, 0($s3)
        sle $t4, $v0, $v1

        beq $t4, $zero, swap
        addi $s2, $s2, 1
        j loop2
swap:
sw $v0, 0($s3)
        addi $s3, $s3, -4
        sw $v1, 0($s3)
        addi $s2, $s2, 1

print_arr:
```

```
        la $t6,A
        j show_arr
end_print:
        j loop2

show_arr:
        li $v0,1
        lw $a0,0($t6)
        syscall
        li $v0, 4
        la $a0, message1
        syscall
        addi $t6,$t6,4
        bne $t6,$t7,show_arr
        li $v0, 4
        la $a0, message2
        syscall
        la $a0,A
        j end_print
Exit:
li $v0, 10
        syscall
```

**Kết quả:**

Chuỗi ban đầu được khởi tạo A = [-2,5,7,-23,45,-6,34,2]

Sau khi chạy chương trình kết quả in ra như sau

```
-2 5 -23 7 45 -6 34 2
-2 5 -23 7 -6 45 34 2
-2 5 -23 7 -6 34 45 2
-2 5 -23 7 -6 34 2 45
-2 -23 5 7 -6 34 2 45
-2 -23 5 -6 7 34 2 45
-2 -23 5 -6 7 2 34 45
-23 -2 5 -6 7 2 34 45
-23 -2 -6 5 7 2 34 45
-23 -2 -6 5 2 7 34 45
-23 -6 -2 5 2 7 34 45
-23 -6 -2 2 5 7 34 45
```

## *Assignment 4: Insertion Sort*

**CODE:**

```
.data
        A: .word -2,5,7,-23,45,-6,34,2
        Aend: .word
        message1: .asciiz " "
        message2: .asciiz "\n"
.text
        la $a0, A
        la $a1, Aend
        la $t7, Aend        #Use to Print Array
        li $s0, 0           # count = 0 (dem phan tu)
        li $s1, 0           # key = 0
        li $s2, 0           # j = 0
        li $s3, 1           # i = 1
DemPhanTu:
        beq  $a1, $a0, Loop
        addi $a1, $a1, -4
        addi $s0, $s0, 1
        j DemPhanTu
Loop:
        beq $s3, $s0, Exit
        sll $t0, $s3, 2
```

```
        add $s4, $a0, $t0
        lw $s1, 0($s4)
        addi $s2, $s3, -1
While:
        slt $t1, $s2, $zero
        sll $t0, $s2, 2
        add $s5, $a0, $t0
        lw $t3, 0($s5)
        sle $t4, $t3, $s1
        add $t1, $t1, $t4
        bne $t1, $zero,  loop_continue
        addi $s5, $s5, 4
        sw $t3, 0($s5)
        addi $s2, $s2, -1
        j While
loop_continue:
        addi $s5, $s5, 4
        sw $s1, 0($s5)
        addi $s3, $s3, 1
print_arr:
        la $t6,A
        j show_arr
end_print:
```

```
        j Loop
show_arr:
        li $v0,1
        lw $a0,0($t6)
        syscall
        li $v0, 4
        la $a0, message1
        syscall
        addi $t6,$t6,4
        bne $t6,$t7,show_arr
        li $v0, 4
        la $a0, message2
        syscall
        la $a0,A
        j end_print
Exit:
        li $v0, 10
        syscall
```

**Kết quả:**

Chuỗi ban đầu được khởi tạo A = [-2,5,7,-23,45,-6,34,2]

Sau khi chạy chương trình kết quả in ra như sau