Laboratory Exercise 6

**Assignment 1**

.data

A: .word -2, 6, -1, 3, -2

.text

main:

la $a0,A

li $a1,5

j mspfx

nop

continue:

lock:

li $v0, 10#exit

syscall

end\_of\_main:

#-----------------------------------------------------------------

#Procedure mspfx

# @brieffind the maximum-sum prefix in a list of integers

# @param[in] a0the base address of this list(A) need to be processed

# @param[in] a1the number of elements in list(A)

# @param[out] v0the length of sub-array of A in which max sum reachs.

# @param[out] v1the max sum of a certain sub-array

#-----------------------------------------------------------------

#Procedure mspfx

#function: find the maximum-sum prefix in a list of integers

#the base address of this list(A) in $a0 and the number of

#elements is stored in a1

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:**

Graphical user interface, application, table

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**Assignment 2**

**Sắp xếp theo tăng dần**

.data

A: .word 7, -2, 5, 1, 5,6,7,3,6,8,8,59,5

Aend: .word

.text

main:

la $a0,A #$a0 = Address(A[0])

la $a1,Aend

addi $a1,$a1,-4 #$a1 = Address(A[n-1])

j sort #sort

after\_sort:

li $v0, 10#exit

syscall

end\_main:

#--------------------------------------------------------------

#procedure sort (ascending selection sort using pointer)

#register usage in sort program

#$a0 pointer to the first element in unsorted part

#$a1 pointer to the last element in unsorted part

#$t0 temporary place for value of last element

#$v0 pointer to max element in unsorted part

#$v1 value of max element in unsorted part

#--------------------------------------------------------------

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

j sort#repeat sort for smaller list

done:

j after\_sort

#------------------------------------------------------------------------

#Procedure max#function: fax the value and address of max element in the list

#$a0 pointer to first element

#$a1 pointer to last element

#------------------------------------------------------------------------

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

**Kết quả:**

Graphical user interface, application, table, Excel

Description automatically generated

Table

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**Sắp xếp theo giảm dần**

.data

A: .word 7, -2, 5, 1, 5,6,7,3,6,8,8,59,5

Aend: .word

.text

main:

la $a0,A #$a0 = Address(A[0])

la $a1,Aend

addi $a1,$a1,-4 #$a1 = Address(A[n-1])

j sort #sort

after\_sort:

li $v0, 10#exit

syscall

end\_main:

#--------------------------------------------------------------

#procedure sort (ascending selection sort using pointer)

#register usage in sort program

#$a0 pointer to the first element in unsorted part

#$a1 pointer to the last element in unsorted part

#$t0 temporary place for value of last element

#$v0 pointer to max element in unsorted part

#$v1 value of max element in unsorted part

#--------------------------------------------------------------

sort:

beq $a0,$a1,done#single element list is sorted

j min#call the min procedure

after\_min:

lw $t0,0($a1)#load last element into $t0

sw $t0,0($v0)#copy last element to min location

sw $v1,0($a1)#copy max value to last element

addi $a1,$a1,-4 #decrement pointer to last element

j sort#repeat sort for smaller list

done:

j after\_sort

#------------------------------------------------------------------------

#Procedure max#function: fax the value and address of min element in the list

#$a0 pointer to first element

#$a1 pointer to last element

#------------------------------------------------------------------------

min:

addi $v0,$a0,0 #init min pointer to first element

lw $v1,0($v0) #init min 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 $t2,$v1,$t1 #(next)>(min) ?

bne $t2,$zero,loop#if (next)>(min), repeat

addi $v0,$t0,0#next element is new min element

addi $v1,$t1,0#next value is new min value

j loop#change completed; now repeat

ret:

j after\_min

**Kết quả:**

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**Assignment 3**

**Tăng dần**

.data

A: .word 7, -2, 5, 1, 5,6,7,3,6,8,8,59,5

Aend: .word

.text

main:

la $a0,A #$a0 = Address(A[0])

la $a1,Aend

j sort #sort

after\_sort:

li $v0, 10#exit

syscall

end\_main:

sort:

addi $a1,$a1,-4 #$a1 = Address(A[n-1])

beq $a0,$a1,after\_sort#single element list is sorted

addi $t0,$a0,0 #init next pointer to first

loop:

beq $t0,$a1,sort

lw $t1,0($t0) # $t1 = a(i)

lw $t2,4($t0) # $t2 = a(i+1)

slt $t3,$t2,$t1 #(i+1)<(i) ?

beq $t3,$zero,next#if (i)<=(i+1), repeat

sw $t1,4($t0) # a(i+1)= $t1

sw $t2,0($t0) # a(i)= $t2

j loop

next:

addi $t0,$t0,4 #advance to next element

j loop

**Kết quả:**

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**Giảm dần**

.data

A: .word 7, -2, 5, 1, 5,6,7,3,6,8,8,59,5

Aend: .word

.text

main:

la $a0,A #$a0 = Address(A[0])

la $a1,Aend

j sort #sort

after\_sort:

li $v0, 10#exit

syscall

end\_main:

sort:

addi $a1,$a1,-4 #$a1 = Address(A[n-1])

beq $a0,$a1,after\_sort#single element list is sorted

addi $t0,$a0,0 #init next pointer to first

loop:

beq $t0,$a1,sort

lw $t1,0($t0) #$t1 = a(i)

lw $t2,4($t0) #$t2 = a(i+1)

slt $t3,$t1,$t2 #(i)<(i+1) ?

beq $t3,$zero,next#if (i+1)<=(i), repeat

sw $t1,4($t0) # a(i+1)= $t1

sw $t2,0($t0) # a(i) = $t2

j loop

next:

addi $t0,$t0,4 #advance to next element

j loop

**Kết quả:**

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