CSE 331 COMPUTER ORGANIZATION

#HW2

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Pseudocode:

for : int i=0 to size

for: int j=i+1 to size

subSize=0 // Each Subsequent we need to set size 0.

subArr[subSize++]=arr[i] // If the size is 0 next element add unconditional.

if arr[j] >= subArr[subSize-1] // Checking if the next element is bigger than subsequent's last element

subArr[subSize++]=arr[j] // adding new element

for: int k=j+1 to size

if arr[k]>=subArr[subSize-1] //Checking if the next element is bigger than subsequent's last element

subArr[subSize++]=arr[k] // adding new element

printSubSequences(subArr,subSize)

if subSize>=max //If the new subsequent's size bigger than last then it's the current longest increasing sequence

max=subSize

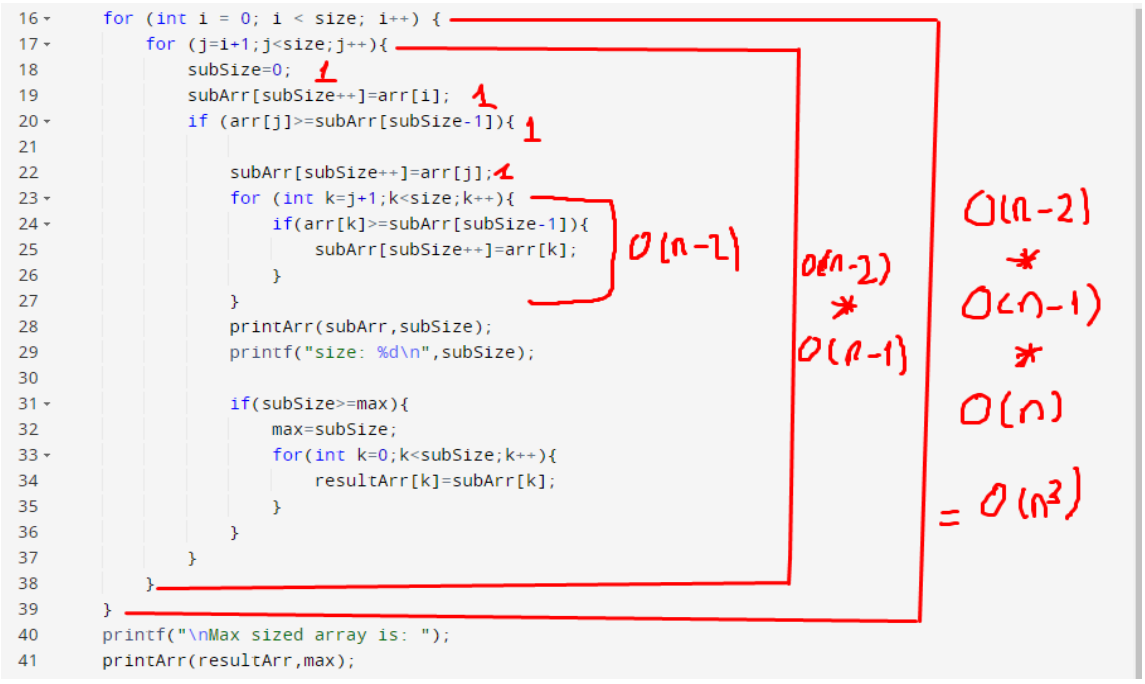
for: int m=0 to subSize

resultArr[m]=subArr[m]

print("Longest Subsequence Is :")

printResult(resultArr,max)

Time complexity:

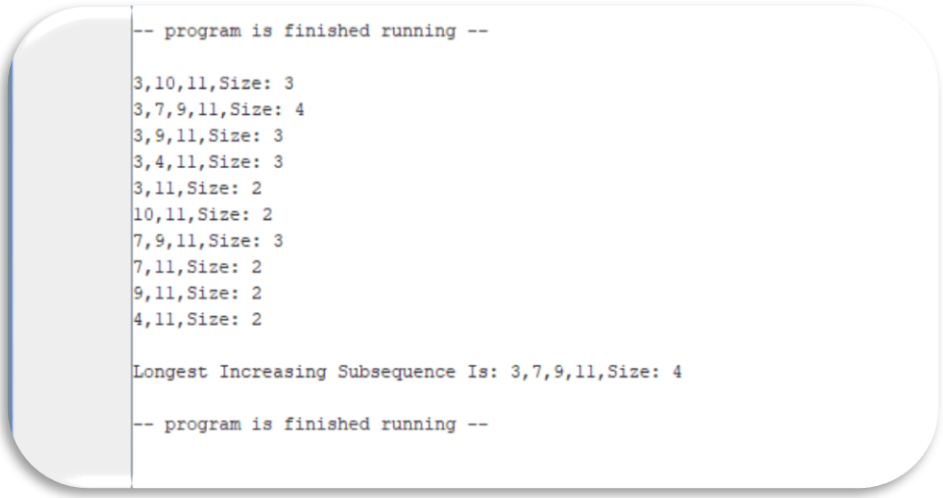


Space Complexity:

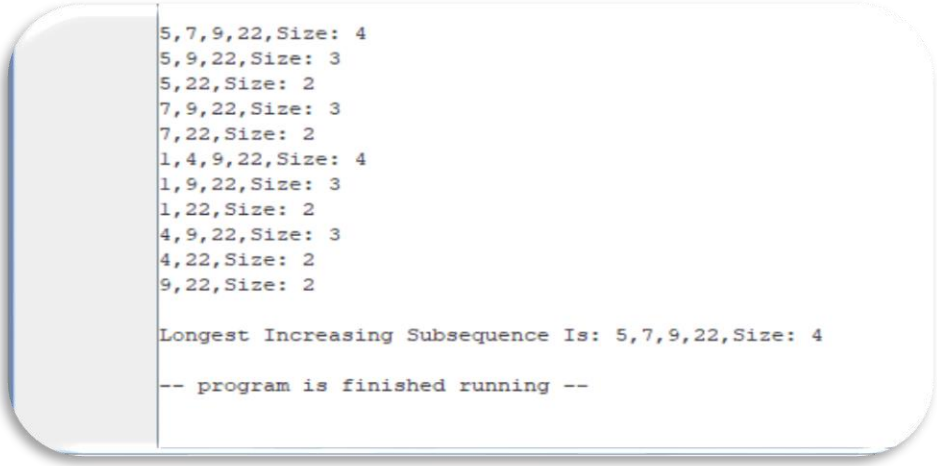
-Since the auxillary space that is used here has a strict upper bound that is independent on the input. So, space complexity is Q(1).

Test Cases:

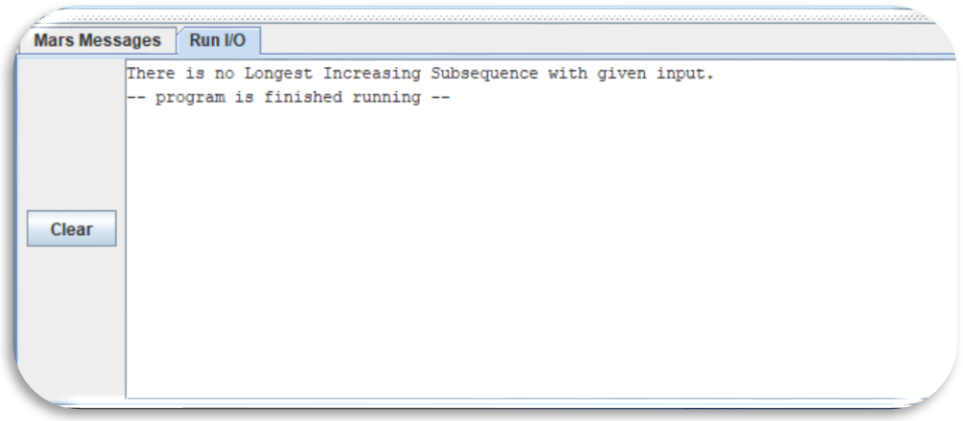
Array = {3,10,7,9,4,11}



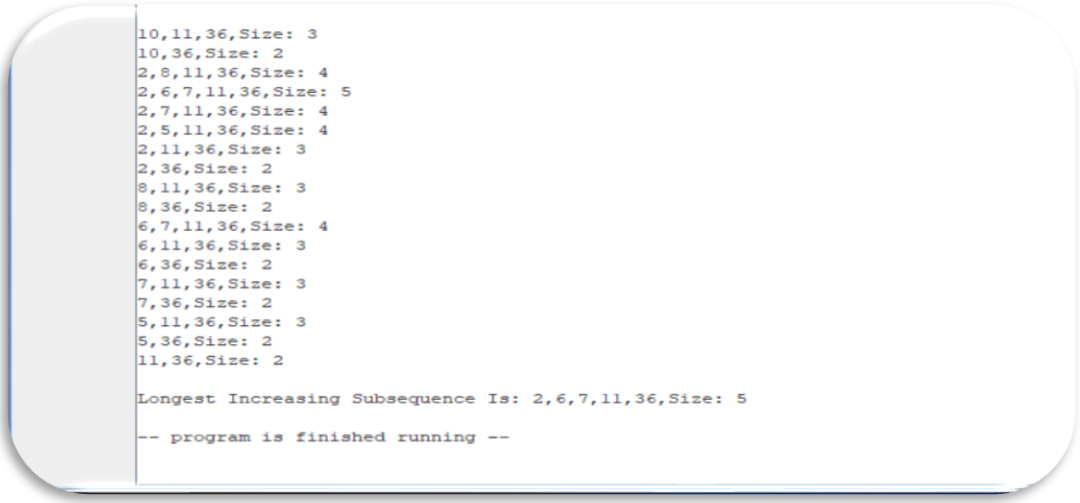
Array={5,7,1,4,9,22}



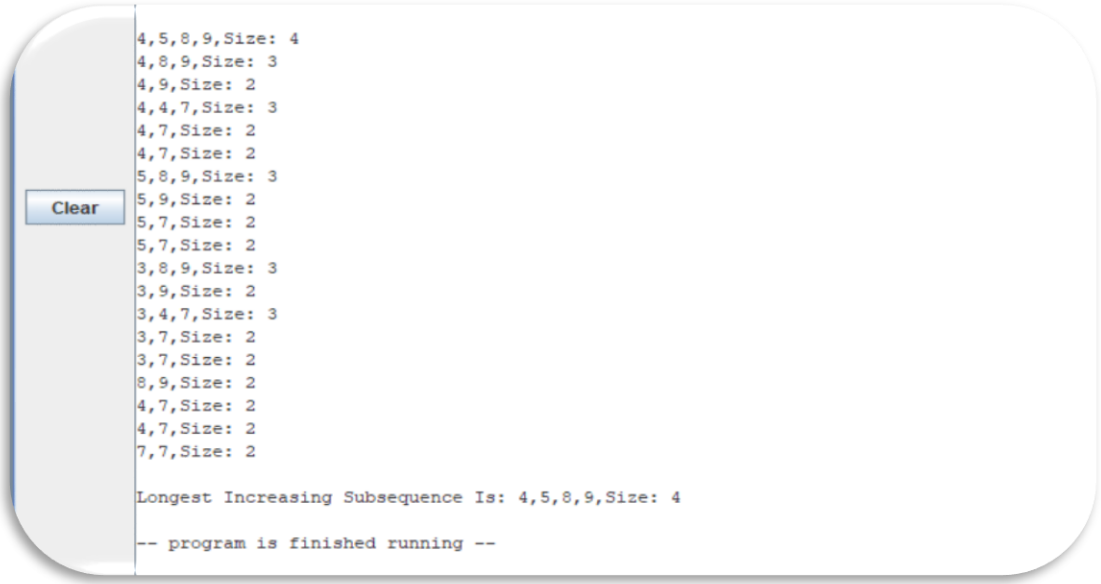
Array={9,8,7,5,4,3,2,1}



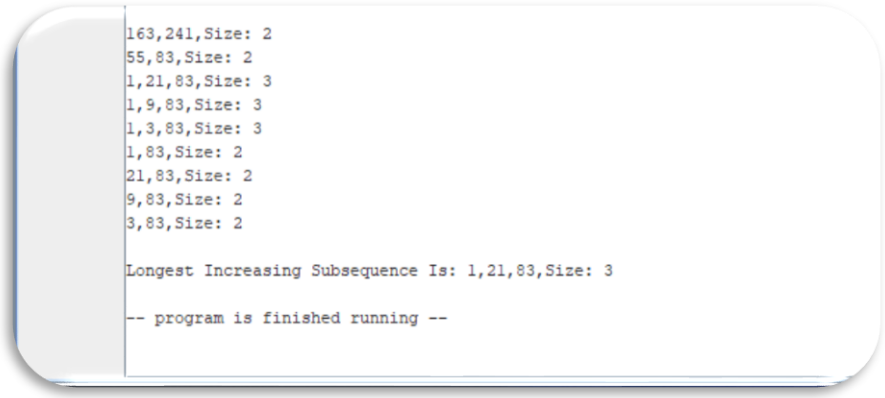
Array={10,2,8,6,7,5,11,36}



Array={4,5,3,8,9,4,7,7}



Array={163,241,55,1,21,9,3,83}



```
163,241,Size: 2
55,83,Size: 2
1,21,83,Size: 3
1,9,83,Size: 3
1,3,83,Size: 3
1,83,Size: 2
21,83,Size: 2
9,83,Size: 2
3,83,Size: 2

Longest Increasing Subsequence Is: 1,21,83,Size: 3

-- program is finished running --
```

- File reading & writing are missing.
- Inner results are provided.
- Commentation of code provided in pseudocode
- I have implemented the input array manually. All test cases performed manually. Array and array size can be changed on the top of the asm file.

```
.data
        arr: .word 163,241,55,1,21,9,3,83
        tempArr: .space 400
        resultArr: .space 400
        newLine: .asciiz "\n"
        comma: .asciiz ","
        size : .asciiz "Size: "
        result: .asciiz "Longest Increasing Subsequence Is: "
        specialCaseText: .asciiz "There is no Longest Increasing Subsequence with given inpu
.text
        .globl main
        main:
                li $s0,32 # size of array
```