HW02

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Tags	Homework

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- hw2.asm → full solution in asm
- hw2.c → solutions to problem in C language
- file.txt → example inputs
- helper_files folder → assembly solutions to some problems. (also they are in hw2.asm file)

General Approach

Helper Files

Helper files contains additional work while trying to implement some functions in assembly

Pseudocode

First, I examine the problem. After that, I try to wrote a solution in C.

This is my solution `Pseudocode`.

```
findLongest(arr):
  resultArr <- Initialize
  resultArrSize = 0
  tempArr <- Initialize
  for i = 0 in arr
    tempArrSize = 0
    tempVal = arr[i]
    for (j = i) in arr
      if (arr[j] > tempVal)
        tempArr[tempArrSize++] = arr[j]
        tempVal = arr[j]

  if (tempArrSize > resultArrSize)
    resultArrSİze = tempArrSize
    resultArr = tempArr

print resultArr
```

Than, I convert this algorithm to MIPS assembly.

MIPS Assembly Problems

While I implementing this to assembly, I faced some issues about register counts. Sometimes register are not enough for me. But eventually I handled them.

Reading File

In helper files folder. It contains some files when implementing functions.

While reading from while, I faced a issue that, MARS compiler can not handle inputs as integer. So I read all file as `string` and convert it to `integer` to hold in an array.

Atoi Function

After reading file, all strings should be converted to integer. I use spaces as new input and used `newline` or `carriage return` to pass new array.

This atoi functions reads char by char, and converts them into integer.

Writing to File

When writing to file, like reading, I have to convert integers to strings to write nicely.

While converting to integers to strings, I coded some parts a bit hardcoded. But It was necessary to handle them.

It converts single values with a corresponding zero on it.

For example, writes `3` as `03` to file. But it is not a problem since it has the same meaning.

Complexity

Time Complexity

My solution has two for loop inside each other.

It is the max complex thing in my algorithm. So my time complexity is `O(n^2)`

Space Complexity

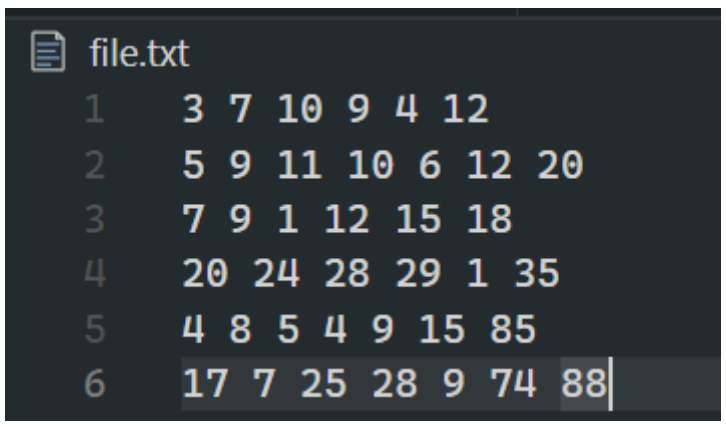
I creating an array for holding longestArr sequence. Also I creating a tempArr to hold every possible sequence.

Both of them could be larger like original array size `n`. So my space complexity is `O(2n)`

Screenshots

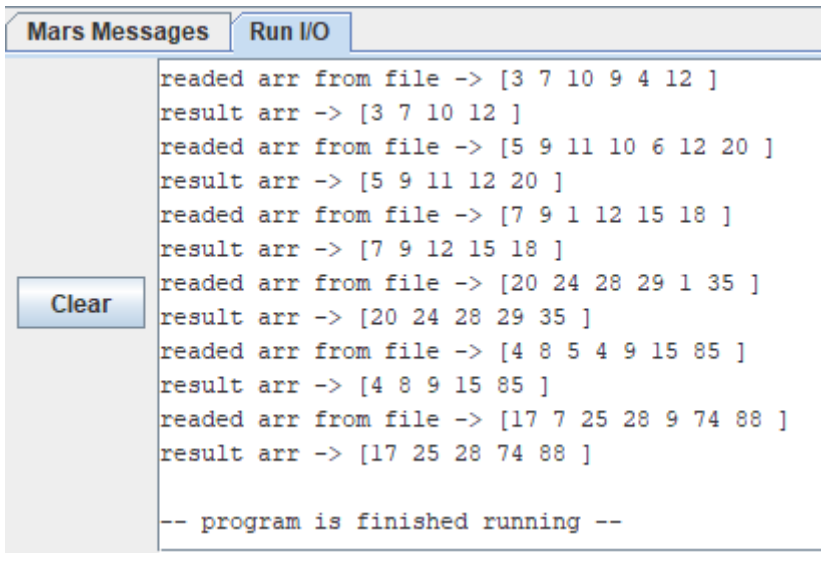
`file.txt` Content

It reads all the file and inserts values to arrays.



Terminal Output

It contains 6 array. It has readed array first, after that, writes the result. And also writes the result to the `out.txt` file.



`out.txt` Content

This is the output of the program.

It contains zero before `1` size numbers. But it is not important since it has the same meaning.