COSC2430 Homework 1: Spiral Matrix and Recursion

1. **Introduction**

   You will create a C++ program to gather the clues by decoding and find the right path to the finish line. The purpose of this homework is to get students familiar with the array and recursion.

2. **Input and Output**

   a. Input file

      The input file contains a list of matrices in the similar format:

      i. A string: Label
      ii. Two positive integers for dimension (row and column)
         - No bigger than 9x9
      iii. The file will never be empty
      iv. Not every matrix will be used.
         - If it's not referenced by another matrix then it shouldn't show up in the output
      v. No labels will be duplicated, and no spiral matrices will be duplicated.
         - Only one label will match up with one matrix

   b. Output file

      The output is also a single text file. It contains labels of the matrices line by line in reverse order.

   c. Examples

      i. Example 1

         input01.txt

         start
         2,2
         f o
         r u
         four
         2,3
         r a n
         m o d
         random
         2,3
         f i n
         h s i

         Linux Command:

./recur “input=input01.txt;output=output01.txt”

output01.txt
random
four
start

ii. Example 2
Input02.txt

start
3,3
l a r
r d g
o w e
largeword
5,2
r a
t n
x d
e o
t m
randomtext
2,7
a n o t h e r
x o b t x e t
anothertextbox
3,2
f i
h n
s i

Linux Command:
./recur “input=input02.txt;output=output02.txt”

output02.txt

anothertextbox
randomtext
largeword
start

iii. Example 3
input03.txt

psychopathologically
6,1
f
i
n
i
s
h
start
4,4
a n t i
m i c a
o l a s
n o r t
distraction
2,2
f a
k e
worthinesses
3,5
u n d i s
s h e d t
i u g n i
undistinguished
5,4
p s y c
g i c h
o y a o
l l l p
o h t a
antiastronomical
4,3
w o r
s e t
s s h
e n i

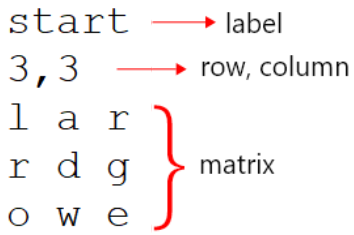
Linux Command:
./recur “input=input03.txt;output=output03.txt”

output03.txt

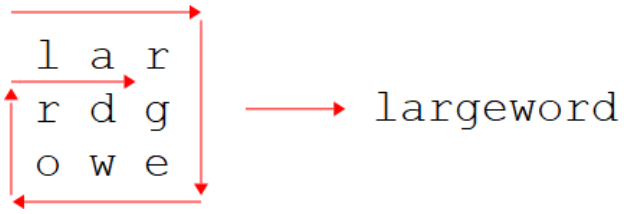
psychopathologically
undistinguished
worthinesses
antiastronomical
start

3. **The Rules and Operations**

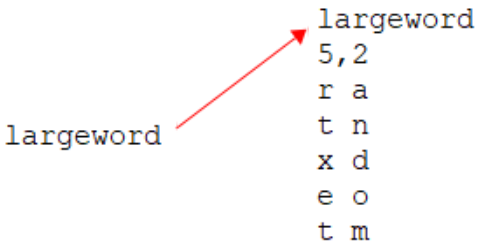
By reading the input file, you should be able to have the label, row and column sizes of each matrix and the matrix itself.



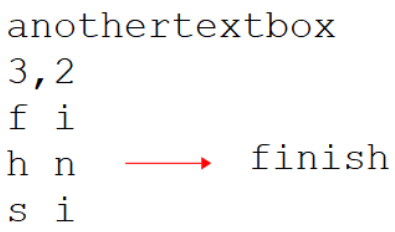
You need to find and begin with “start” matrix, decode it into the original string by traversing in spiral order.



Each string retrieved provides a clue (label) to the next matrix that needs to be decoded.



Until you get the matrix that contains string “finish.”



You will need to output the **labels** (not the decoded strings) of matrices in reverse order to the output file.

```
anothertextbox
randomtext
largeword
start
```

Hint: not every group will be used. If the label of a matrix isn't part of another matrices then it will not be printed out.

In order to print out the labels of all the matrices you **MUST USE RECURSION** to print the labels in reverse order. There is a way to code it without recursion but in order to get full credit you must use recursion. The point of this assignment is to test your knowledge of recursion since it will be necessary later.

4. **Requirements**

   Homework is individual. Your homework will be automatically screened for code plagiarism against code from the other students and code from external sources. Code that is copied from another student (for instance, renaming variables, changing for and while loops, changing indentation, etc, will be treated as copy) will be detected and result in "0" in this homework. The limit is 50% similarity. Here are some previous homework which have been found to copy each other (the main function has been deleted).

5. **Turn in your homework**

   Homework 1 needs to be turned in to our Linux server, follow the link here https://rizk.netlify.app/courses/cosc2430/2_resources/

   Make sure to create a folder under your root directory, name it hw1 (name need to be lower case), only copy your code to this folder, no testcase or other files needed.

   PS: This document may have typos, if you think something illogical, please email TAs for confirmation.