Sabanci University

Faculty of Engineering and Natural Sciences
CS204 Advanced Programming
Spring 2018

Homework 1 – Spiral Word Hunt

Due: 14/02/2018, Wednesday, 05:00pm

PLEASE NOTE:

Your program should be a robust one such that you have to consider all relevant user mistakes and extreme cases; you are expected to take actions accordingly!

You can NOT collaborate with your friends and discuss solutions. You have to write down the code on your own. Plagiarism will not be tolerated!

Introduction

The aim of this homework is to recall CS201 material and practice on matrices (two dimensional arrays/vectors). You are asked to find the list of chars (i.e. strings) having a simple property and their locations in a 2D matrix via basic search mechanisms, extract information out of it and process that information.

In this homework, you are going to implement a program that searches a given input matrix of characters and displays the words which satisfies a condition. The details about the homework will be explained in the following sections of this document.

Input

The program prompts for the input file name. Then, it reads the file name from the standard input. A simple input file can be as follows:

```
12
SISIWROIXARJ
IUISIUWIEMWF
IQPRTYBEQUIA
EEREEHSRZIZK
TAUFHWBERSIH
OQIDHBAETIAB
LHEUWFRABSMD
QQYUEEGDCPRO
JKWEETAUDBAS
LKASRPIJKSDL
WOIEERSYGBMA
YQWEETISCROJ
8
EXAM
DORM
NOTFOUND
PREREQUISITE
GRADUATE
MAJOR
QUIZ
NOTINMATRIX
```

Sample Input File

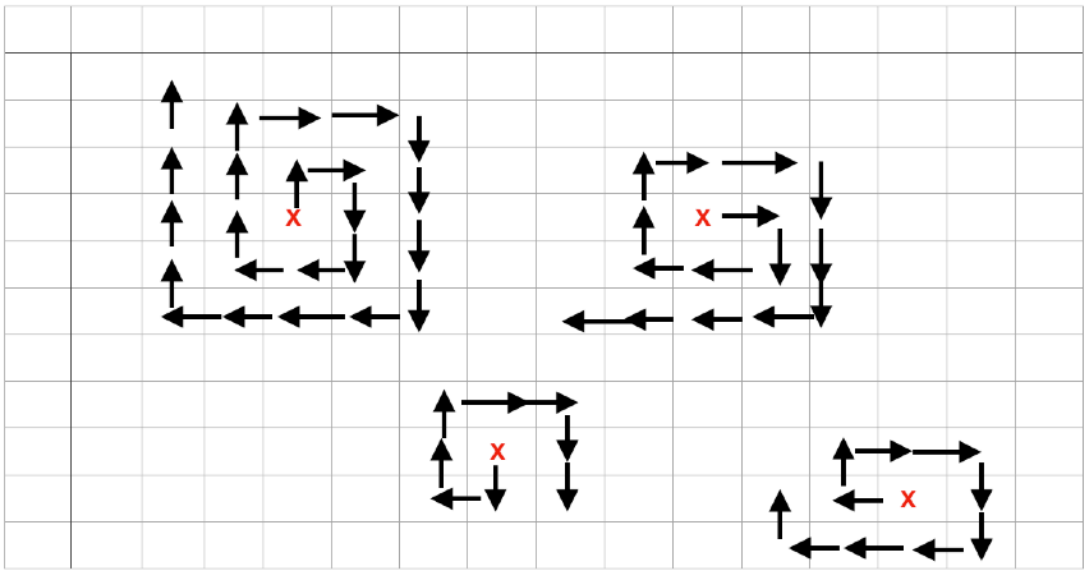
Notice that the input file only contains upper-case letters. This will be true for all the input files that will be used to test your program. First line of the file is matrix's size(n). From the sample input file, the matrix is 12x12. Following n lines contain a (n x n) matrix of letters that is a manifestation of a 2-dimentional matrix. You need to check that each line needs to have the same number of letters and the lines contain only upper-case letters and nothing else. You have to check and take action for any irregularities in the input file, and if the file is valid you need to use an appropriate container to hold this 2-dimensional matrix in memory. Please see sample runs to see some irregularities that may occur in the input files. After the matrix elements, following line gives the number of words to be searched in the matrix. In the sample input file there are 8 words to be searched. The last lines of the input file, you will find the words.

In this homework, you need to develop an algorithm to check if the given words can be found in the matrix in spiral form. For the explanation of the spiral form, please see the search directions. We want you to implement a program that searches the matrix in several directions and displays the words which are found in the matrix. A word found by your program does not need to be a meaningful. Please see sample runs for some examples.

Search Directions

Starting from any coordinate in the matrix, a word can go spirally. Hence, you are expected to search the input file checking all directions from clockwise. For example: If you go up in the first step, you need to go right in the second step, then go down. If you go right in the first step, you will go down in the second and go left in the third step. You can see possible search locations below. You can assume the search words will contain at least 3 letters.

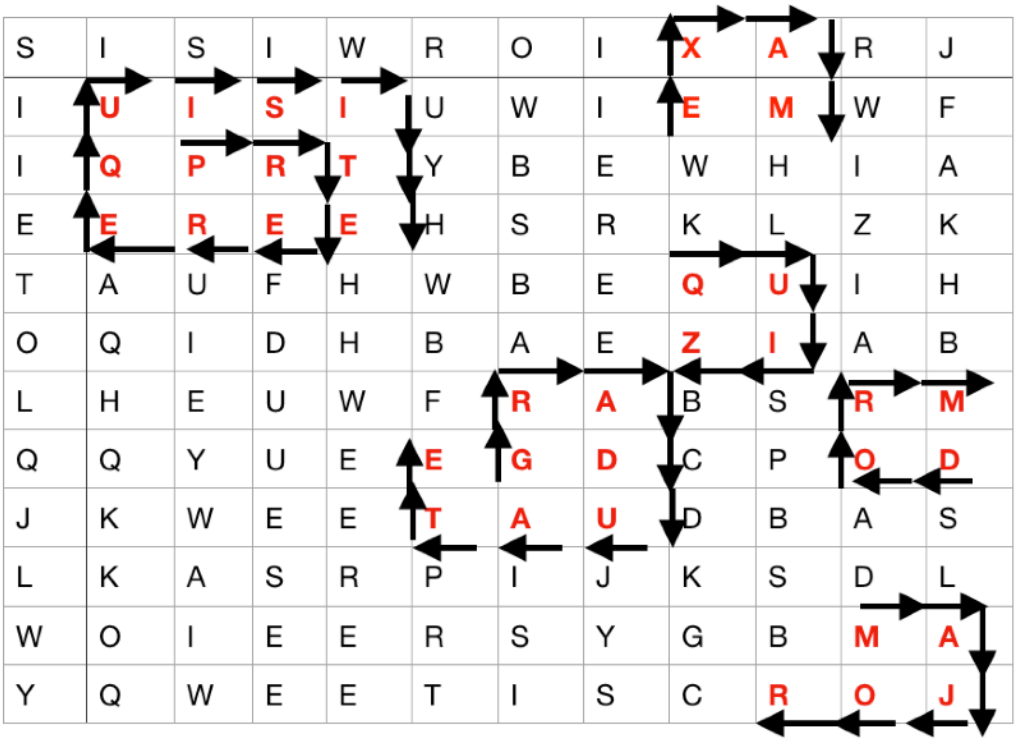
Possible Search Locations



Sample Matrix

S	I	S	I	W	R	O	I	X	A	R	J
I	U	I	S	I	U	W	I	E	M	W	F
I	Q	P	R	T	Y	B	E	W	H	I	A
E	E	R	E	E	H	S	R	K	L	Z	K
T	A	U	F	H	W	B	E	Q	U	I	H
O	Q	I	D	H	B	A	E	Z	I	A	B
L	H	E	U	W	F	R	A	B	S	R	M
Q	Q	Y	U	E	E	G	D	C	P	O	D
J	K	W	E	E	T	A	U	D	B	A	S
L	K	A	S	R	P	I	J	K	S	D	L
W	O	I	E	E	R	S	Y	G	B	M	A
Y	Q	W	E	E	T	I	S	C	R	O	J

Sample Matrix



Sample Runs

To have a better understanding, some sample runs are given below. Note that these are not comprehensive and you must consider all cases.

File: data1.txt

```
5
SISIW
IUISI
IQZRT
EEREE
TAUFH
2
EXAM
QUIZ
```

Output:

```
Enter the name of the file
data.txt
Could not open the file data.txt
Enter the name of the file name
data1.txt
1 Word is Found: QUIZ
Press any key to continue . . .
```

File: data2.txt

```
12
SISIWROIXARJ
IUISIUWIEMWF
IQPRTYBEQUIA
EEREEHSRZIZK
TAUFHWBERSIH
OQIDHBAETIAB
LHEUWFRABSMD
QQYUEEGDCPRO
JKWEETAUDBAS
LKASRPIJKSDL
WOIEERSYGBMA
YQWEETISCROJ
8
EXAM
DORM
NOTFOUND
PREREQUISITE
GRADUATE
MAJOR
QUIZ
NOTINMATRIX
```

Output:

```
Enter the name of the file
data2.txt
6 Words are Found: EXAM DORM PREREQUISITE GRADUATE MAJOR QUIZ
Press any key to continue . . .
```

File: data3.txt

```
8
UIRJFKBM
EYTRKMFS
DJRKLISN
DKMVLPAS
KLSDJFSKDFHSK
3
MAJOR
QUIZ
DORM
```

Output:

Enter the name of the file
data3.txt
Error: Input file is not in correct format!
Press any key to continue . . .

File: data4.txt

```
4
JHJK
7777
WOIE
YQWE
3
MAJOR
QUIZ
STUDENT
```

Output:

Enter the name of the file
data4.txt
Error: Input file is not in correct format!
Press any key to continue . . .

File: data5.txt

```
6
JHJ***
ERKLJU
WOIEEE
YQWEJK
JFKEOT
MFVJEL
2
MIDTERM
FINAL
```

Output:

Enter the name of the file
data5.txt
Error: Input file is not in correct format!
Press any key to continue . . .

Some Important Rules

Although some of the information is given below, first, please read the homework submission and grading policies in the course webpage and lecture notes of the first week. In order to get a full credit, your programs must be efficient and well commented and indented. Presence of any redundant computation or bad indentation, or missing, irrelevant comments may decrease your grades if we detect them. You also have to use understandable identifier names, informative introduction and prompts. Modularity is also important; you have to use functions wherever needed and appropriate.

When we grade your homeworks we pay attention to these issues. Moreover, in order to observe the real performance of your codes, we are going to run your programs in *Release* mode and **we may test your programs with very large test cases**.

What and where to submit (PLEASE READ, IMPORTANT)

You should prepare (or at least test) your program using MS Visual Studio 2015 C++. We will use the standard C++ compiler and libraries of the abovementioned platform while testing your homework. You need to place your first and last name in the program (as a comment line of course).

Submissions guidelines are below. Some parts of the grading process are automatic. Students are expected to strictly follow these guidelines in order to have a smooth grading process. If you do not follow these guidelines, depending on the severity of the problem created during the grading process, 5 or more penalty points are to be deducted from the grade.
Name your cpp file that contains your program as follows:

"SUCourseUserName_YourLastname_YourName_HWnumber.cpp"

Your SUCourse user name is actually your SUNet user name which is used for checking sabanciuniv e-mails. Do NOT use any spaces, non-ASCII and Turkish characters in the file name. For example, if your SUCourse user name is cago, name is Çağlayan, and last name is Özbugsızkodyazaroğlu, then the file name must be :

Cago_Ozbugsizkodyazaroglu_Caglayan_hw2.cpp

Do not add any other character or phrase to the file name. Make sure that this file is the latest version of your homework program. Compress this cpp file using WINZIP or WINRAR programs. Please use "zip" compression. "rar" or another compression mechanism is NOT allowed. Our homework processing system works only with zip files. Therefore, make sure that the resulting compressed file has a zip extension. Check that your compressed file opens up correctly and it contains your cpp file.

You will receive no credits if your compressed zip file does not expand or it does not contain the correct file. The naming convention of the zip file is the same as the cpp file (except the extension of the file of course). The name of the zip file should be as follows:

SUCourseUserName_YourLastname_YourName_HWnumber.zip

For example zubzipler_Zipleroglu_Zubeyir_hw1.zip is a valid name, but

hw1_hoz_HasanOz.zip, HasanOzHoz.zip

are **NOT** valid names.

Submit via SUCourse ONLY! You will received no credits if you submit by other means (e-mail, paper, etc.).

Successful submission is one of the requirements of the homework. If, for some reason, you cannot successfully submit your homework and we cannot grade it, your grade will be 0.

Good Luck!
CS204 Team (Beste Seymen, Kamer Kaya)