

SFDV3001 (Algorithms and Data Structures)

Semester 1, 2008

Due date: October 25, 2008

(10 %)

Description:

In this assignment you are required to write a java program that takes as an input a two-dimensional array whose elements represent cells of certain colors. A cell could be one of two different colors only: either green or white. The color "green" will be used to indicate an abnormal cell, whereas "white" will indicate a normal cell. There should be more normal cells than abnormal ones. The task of the program is to find the number of abnormal cells that are in the same continuous area as a given cell (i.e cell whose coordinates will be specified). Your program should implement a recursive method to achieve this task. This problem is similar to the "blob" example we gave you in Lecture 3. Please note that along with this document, you are provided with three files. That is, you will not have to build your program from scratch; instead you will need to complete the given program.

Sample output:

The following is a sample output of what you are expected to achieve. Your program must behave exactly the same.

(Run 1)

```
Please enter the size of the array
6

--+-+--+--+--+
|g|g|w|w|g|w|
--+-+--+--+--+
|w|w|g|w|w|w|
--+-+--+--+--+
|w|g|g|g|w|g|
--+-+--+--+--+
|w|w|g|w|w|w|
--+-+--+--+--+
|w|w|g|w|w|g|
--+-+--+--+--+
|g|w|g|w|w|w|
--+-+--+--+--+
Please enter the coordinates of the desired cell
x:3
y:2
Number of cells in the blob is: 9
```

(Run 2)

```
Please enter the size of the array
5
--+-+--+--+
| w| w| w| w| g|
--+-+--+--+
| w| w| w| w| w|
--+-+--+--+
| g| w| w| w| w|
--+-+--+--+
| w| w| g| w| w|
--+-+--+--+
| w| w| w| w| g|
--+-+--+--+
Please enter the coordinates of the desired cell
x: 0
y: 1
Number of cells in the blob is: 0
```

As you can see from the above two runs, the user will be asked to specify the size of the two-dimensional array. So if the user inputs the value (5), then the array should be of the size [5][5].

The array will then be displayed showing the color of each cell (“g” for green and “w” for white). The code for drawing the array is provided in one of the given files. However, before you can display the array, of course you have to initialize its elements. The elements of the array are instances of the class “Cell” which is included as one of the three files. This class must have one data field only:

```
private String color;
```

It must also implement the interface “Interface1” which provides all the constants needed and the signatures of the methods that must be implemented by the “Cell” class.

In order to get a better understanding of the assignment requirements, please explore the files provided and read the comments which describe what each method and constant value is used for. Please feel free to ask for clarifications.

Instructions:

- 1- You are not allowed to change anything in the interface "Interface1" such as changing the name of a constant or adding more methods.
- 2- You are not allowed to create more files than what you are already provided. So submit only three files.
- 3- This assignment is to be done individually. Copying the whole or part of someone else's code will be considered cheating and will receive an academic penalty.
- 4- Write your name and student ID in all files at the top of each file.
- 5- Your work will be evaluated based on the following criteria:
 - a- Correctness. Your code compiles and runs without any problems and it achieves the desired output.
 - b- Correct implementation of the recursive method countCells();
 - c- Correct implementation of all the methods declared in the interface "Interface1". The description of each of these methods is provided in the code.
- 6- Overall style and comments. Your code should be easy to read and understand and it should be well commented.

Make sure you test your program for all kinds of inputs. Testing usually helps uncover many problems with your design. You will be told how to submit your assignment later on. The due date for this assignment is Saturday (Oct 25, 2008).

Good luck.....