Assignment (MMAN) 13

Course: 20441 - Introduction to Computer Science and the Java Language

Task object: loops and arrays

Study material for the assignment: units 5 - 6

Task weight: 5 ÿcodes

Number of questions: 4

Deadline for submission: 2021.12.11

Semester: 2022 a

In this task ÿPlay a little game Sudoku

Sudoku To do this ÿSet 2 classes: Square3x3 and Sudoku

(25%) 1 question

Write the class Square3x3 which represents a quadratic two-dimensional array of integers in size

3 × 3. The department has the following interface (in short):

ÿÿÿÿÿÿ:

Constructor Summary
Square3x3() Constructor for objects of class Square3X3. Constructs and initializes a 2-dimensional array of the size 3X3, with the values of –1 in each cell.
Square3x3(int[][]array) Constructs a 2-dimensional array of the size 3X3, whose values are taken from the given array. If the given array's size is bigger than 3X3, only the first 3X3 cells are taken. If the given array is smaller, the rest of the cells are initialized to –1. Note that the given array may be non-symmetrical, or may even have rows of different lengths (!!). Make sure to initialize cells to –1 if and only if the corresponding cell in the given array does not exist. You may assume the array is NOT null.
Square3x3(Square3x3 other) Copy constructor. Constructs a 2-dimensional array of the size 3X3, whose values are taken from the array of the given Square3x3 object.

The methods you need to practice in the Square3X3 class are:

Method Summary	
int	getCell(int row, int col) Returns the value in the (row, col) cell. If the row and/or col are out of the array bounds, returns –1. Legal values for row/col are 0,1,2.
void	setXY(int row, int col, int value) Sets the cell (row, col) in the array to the given value. If the row and/or col are out of the array bounds – does nothing. Legal values for row/col are 0,1,2.
String	toString() Returns a String representation of the array. For example: The square 4 2 4 8 3 5 7 6 2 will be represented like this: 4 2 4 8 3 5 7 6 2

pay attention! In the toString method the digits must be printed exactly (!!) in the specified manner. In each line, will appear Three digits, where all two digits are separated by a tab ("t. (" \

That is, in the written example, the three lines will be printed using the following three strings:

"4\t2\t4\n"

"8\t3\t5\n"

"7\t6\t2\n"

For the avoidance of doubt, do not add punctuation marks and additions!

This class has only one private property - a two-dimensional array of 3 × 3 integers .

(25%) 2 question

Add the following methods to the Square3x3 class, and implement them:

• A Boolean method called allThere .This method will check whether in the array of the class ÿ there are any

The numbers are from 1 to 9. It will return true if so, and false otherwise.

The signature of the method is:

```
public boolean allThere()
```

• A method called whosThereRow and its signature is:

```
public void whosThereRow (int row, boolean[] values )
```

How the method works: The method receives a row number (from the values 2,1,0) and a Boolean array

Size 10. For each number between 9-1 that appears in the corresponding row in the two-dimensional array of

The method class will place a true value in the corresponding cell in the values array. The other cells in the array

Will be left without shiui.

For example, if the array values ÿSend this method with the following content:

{false, true, true, false, false, true, false, false, false, true}

And in the row row the digits 7 8 and 9 appear, then the contents of the array values after the return

From the method will be

{false, true, true, false, false, true, false, true, true, true}

That is, places 7 8 9 in the lineup are now true, and the others have not changed.

~~If the number 7 appears in one of the cells in the corresponding row, the method will place true in the owner cell~~

IDEX 7 in the array. Note that the cell with the IDEX 0 in the values array is not in use~~.~~

~~The method will get a row number and a Boolean array whose entire cells are initialized to false. For each number~~

~~Which appears in the row row, the method will place true in the corresponding cell in the value array).~~

~~ÿYou can set the values set to size 10, and refer only to cells 1 to 9. (~~

• A method called whosThereCol and its signature is:

```
public void whosThereCol (int col, boolean[] values )
```

The method works like the previous method, only it does the test for a column, not a row.

(20%) 3 question

· **Write a class called Sudoku**

This class will represent a board of the game Sudoku as a 3x3 square two-dimensional array of type objects Square3x3. Note that the burn is not a 9 × 9 int array, but a 3 × 3 array.

That each of its members is an object of the Square3x3 class! **This two-dimensional array is the intention The unit of the department.**

~~The class will have 2 islands: an empty island that will initialize the entire board to 1, and an island that will receive a 3x3 array as a parameter Of objects of class Square3x3 and produced on it the board.~~

The department will have the following:

1. In a blank island that will initialize the sudoku board so that it is composed of objects of the class Square3x3 which are all filled with values 1) -as created by the blank bÿi of the class (.Square3x3

2. Do not accept as a parameter a 3x3 array of objects of the Square3x3 class, and copy the The values in these objects to the new sudoku board.

The following signatures:

public Sudoku()

public Sudoku(Square3x3[][] square3x3Array)

(30%) 4 question

Implement the Sudoku class isValid method. This method will check if the sudoku board is valid. If so - return true. If the board is invalid, there is no need to print why it is invalid - but return

false only.

Signature of the method:

public Boolean isValid()

In order to implement the method, use the methods you wrote in question 3. It is also recommended to write auxiliary methods

Privacy that will be used by you.

Reminder - A sudoku board is valid if each row has all the numbers from 1 to 9, as well as each column

All numbers from 1 to 9 appear, and also in each of the nine squares that make up the board appear

All numbers from 1 to 9. For example, the following table is invalid:

1	9	8	9	2	3	4	5	7
7	3	2	6	5	4	1	8	9
5	6	4	8	1	7	2	3	6
3	1	9	2	8	5	7	6	4
8	4	7	1	3	6	5	9	2
2	5	6	4	7	9	8	1	3
4	8	5	3	6	2	9	7	1
6	2	1	7	9	8	3	4	5
9	7	3	5	4	1	6	2	8

Because in the first line the number 9 appears twice, and in the numbered number line, the number

6 appears twice. The method will return that the board is invalid because there is a number in the first row that appears

Twice (no n~~eed to "disc~~over" all the mistakes on the board, just find the first one and print and return

.(false

If you switch between the sixth cell in the first row (9) with the sixth cell in the third row (6)

(You are invited to check).

Be careful not to perform aliasing in the deadlines. It is permissible to add additional (private) methods, as you see fit. **You need to write your own API for the department, proponents and methods according to the thinking in writing the API.**

pay attention,

On the course website you will also find a tester to check the spelling and parameters of the names of the methods and classes you need to write. You must check the classes you wrote in this tester, and submit them only if the tester is compiled. Note that the tester does not cover all the options, and in particular not the end cases. It only checks the names of the methods in the classes i.e. compilation errors. It is highly recommended to add tests to it.

submission

1. The submission of the financial statement was done only electronically, through the task sending system.
2. Be sure to document in a physical documentation and in the API - all the methods available in the equivalent departments.
3. Make sure that the names of the methods are exactly as written in the assignment. And that the prints will be accurate As shown in the assignment.
4. You must submit the java.Square3x3, java.Sudoku files, wrap them in a zip file and send. Do not send files and extensions.

Successfully