Programming II. Introduction to OOP

Lab #2

Notes

Folder organization for solutions on the student's account:

```
z:\
|
|--Programming02
|----Lab01Problem01
|----Lab01Problem02
|----…
|----Lab02Problem01
|----…
|--Programming01
```

Task #1: "Turtle Graphics: OOP approach" (2.5%)

(from Visual C# 2005: How to Program, Second Edition by H. M. Deitel, Chapter #8).

Implement Problem 01 of Lab01 using object-oriented style

(Turtle Graphics) The Logo language made the concept of turtle graphics famous. Imagine a mechanical turtle that walks around the room under the control of a C# application. The turtle holds a pen in one of two positions up or down. While the pen is down, the turtle traces out shapes as it moves, and while the pen is up, the turtle moves about freely without writing anything. In this problem, you will simulate the operation of the turtle and create a computerized sketchpad.

Use 20-by-20 rectangular array floor that is initialized to 0. Read commands from an array that contains them. Keep track at all times of the current position of the turtle and whether the pen is currently up or down. Assume that the turtle always starts at position (0, 0) of the floor with its pen up and turtle's initial direction is east.

Command	Meaning
1	Pen up
2	Pen down
3	Turn right
4	Turn left

Command	Meaning
5 10	Move forward 10 spaces
6	Display the 20-by-20 array
9	End of data (sentinel)

Suppose that the turtle is somewhere near the center of the floor. The following "application" would draw and display a 12-by-12 square, leaving the pen in the up position:

```
2
5 12
3
5 12
3
5 12
3
5 12
1
6
************........
*..........*........
*..........*........
*..........*........
*..........*........
*..........*........
*..........*........
*..........*........
*..........*........
*..........*........
*..........*........
*..........*........
************........
....................
....................
....................
....................
....................
....................
....................
9
```

As the turtle moves with the pen down, set the appropriate elements of array floor to 1s. When the 6 command (display the array) is given, wherever there is a 1 in the array, display an asterisk or any character you choose. Wherever there is a 0, display a blank.

Write an application to implement the turtle graphics capabilities discussed here. Write several turtle graphics applications to draw interesting shapes.

Notes

- **Use object-oriented approach to create the system described above. Your program has to have classes: Turtle, Field, UserCommand**
- **Output a user friendly error message in case of invalid input data.**

Home Reading: Liang Introduction to Java Programming 8th ed. 8 Chapter