Objects – Rectangle Class

For this project, you will implement a class named Rectangle to represent a geometric rectangle.

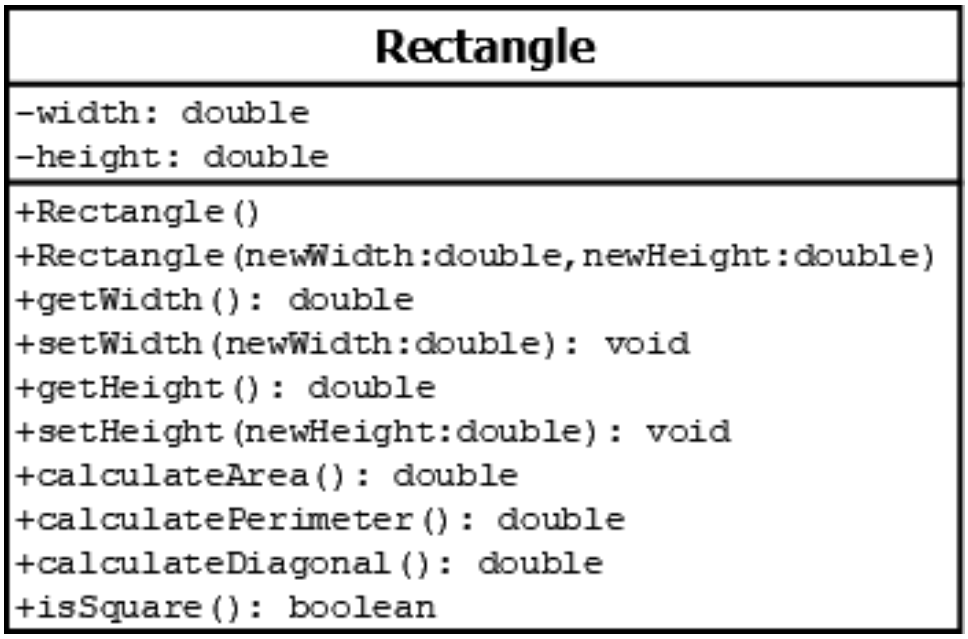

Figure 1 - UML Diagram for Rectangle Class

The Rectangle class will contain:

1. Two private data fields of type double named width and height
2. A no-argument constructor, Rectangle(), that creates a default rectangle by assigning default values to width and height. The default values are 1 for both width and height.
3. A parameterized constructor, Rectangle(double,double), that creates a rectangle with the specified width and height.
4. A public method named calculateArea() that returns the area of this rectangle. The calculation is ->$area = width * height$.
5. A public method named calculatePerimeter() that returns the perimeter of this rectangle. The calculation is -> $perimeter = 2(width + height)$.
6. A public method name calculateDiagonal() that returns the diagonal length. The calculation will use the Pythagorean Theorem -> $diagonal = \sqrt{length^2 + height^2}$.
7. A public method named isSquare() that returns true if the height and width are equal, otherwise false.
8. A public method named getWidth() that returns the width of the rectangle
9. A public method named setWidth() that sets the width of the rectangle
10. A public method named getHeight() that returns the height of the rectangle
11. A public method named setHeight() that sets the height of the rectangle

The Project5 class should contain a main method which performs the following:

1. Creates three Rectangle objects
   a) rectangle1 will be created with the default constructor
   b) rectangle2 will be created with the parameterized constructor using values width = 4.0 and height =4.0
   c) rectangle3 will be created with the default constructor. Then change the rectangle's width and height using the object's setter methods; values width = 3.5 and height =7.0
2. Using the methods supplied by the objects, display the width, height, area, perimeter, and diagonal length of each rectangle. Also display an appropriate message if the rectangle is a square.
3. All messages and results must be neat, appropriately organized, and easily understood by the user. Your output must match mine as closely as possible.

Deliverables

Make sure your code has the required documentation, as outlined in the CISP Java Documentation Policy on the course website.

This is an individual assignment. By submitting your work to D2L, you acknowledge you have read the NESCC Computer and Information Science Department's Honor Code and Documentation Policy and are following its policies to the best of your ability.

Once you are satisfied with your code, compress your src directory with a **.zip** file and upload it the Project 3 D2L drop box. Your **.zip** file should contain the following. Make sure your code is in the following package structure **edu.northeaststate.cs1.projects.project4**.

1. Your source code under the following directory structure: **src\edu\northeaststate\cs1\projects\project4**. Please **do not** include IDE project files such as .iml, .idea, or the out directory. In your **.zip** file, please prune off any unneeded packages such as examples, labs, or other projects.
2. Provide a citation document in Word **.docx** format with links or a write-up if you utilized any outside resources to complete your assignment.

Evaluation

Five factors will be considered in grading your project:

1. **Compiles** (10%): does the Java code compile with no errors?
2. **User Interface** (10%): does the program interact with the user as expected?
3. **Design** (40%): does the code meet functionality requirements and design specifications?
4. **Deliverables** (30%): are all deliverables included, named, commented, and organized appropriately?
5. **Standards** (10%): does the code follow good programming practices and coding standards?

Example Run

```
The area of a rectangle with width 1.0 and height 1.0 is 1.0
The perimeter of this rectangle is 4.0
The diagonal length is: 1.41
This is a square
The area of a rectangle with width 4.0 and height 4.0 is 16.0
The perimeter of this rectangle is 16.0
The diagonal length is: 5.66
This is a square
The area of a rectangle with width 3.5 and height 7.0 is 24.5
The perimeter of this rectangle is 21.0
The diagonal length is: 7.83
This is not a square

Process finished with exit code 0
```

Helpful Links

- Compare two doubles for comparing width to height in isSquare() method - https://www.geeksforgeeks.org/double-compare-method-in-java-with-examples/