SE 3313 Software Design and Architecture

Recap of OO Design Concepts

Lab 1

1 Context

SE3313 Software Design and Architecture course heavily depends on object-oriented software design concepts. As a result, your success in this course will somewhat be affected by your understanding of these concepts. This lab practice session is aimed to refresh your OO design concepts knowledge. If you find this exercise difficult, take it as cautionary notice and fill the gaps in your knowledge of oriented software design concepts before the next week's exercise.

2 Problem description

- Define an 3DCalculatable interface with a calculateVolume() method that calculates the volume of 3D shapes.
- Define an 2DCalculatable interface with a calculateArea() method that calculates area of shapes and calculatePerimeter() thet calculates perimeter of shapes.
- Create a Shape abstract class that includes String field for nameOfShapes
- Implement two concrete classes that extend Shape class: TwoDimShapes and ThreeDimShapes that includes String field for shapeTypes.
- You should implement two concrete classes that extend TwoDimShapes: Circle and Rectangle that includes necessary fields (radius, height, width,.....).
- You should implement two concrete classes that extend ThreeDimShapes: Cube and Sphere hat includes necessary fields (edge, radius....)
- 2DCalculatable should be implemented by Circle, Rectangle and Sphere.
- 3DCalculatable should be implemented by Cube and Sphere.

3 Measure of success

As the outcome of the exercise, all shapes should be the children of the Shape supertype, and they should be inheriting (also overriding if necessary) the area,perimeter and volume calculation appropriately in a mathematically correct manner.

4 Output

```
run:
ThreeDimShape{shapeType=3d} Cube{edge=5.0 volume=125.0}
TwoDimShape{shapeType=2d} Rectangle{height=5.0, width=10.0 perimeter=30.0 area=50.0}
ThreeDimShape{shapeType=3d} Sphere{radius=5.0 volume=1570.7963267948967 area=314.1592653589793 perimeter=31.41592653589793}
TwoDimShape{shapeType=2d} Circle{radius=5.0 perimeter=31.41592653589793 area=78.53981633974483}
BUILD SUCCESSFUL (total time: 0 seconds)
```

Figure 1: