

Assignment-2

Mastering Advanced Java with Object-Oriented Programming

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Problem statement 2:

Develop a Java application showcasing interface implementation and dependency injection. Define an interface "Shape" with methods for calculating area and perimeter, implement it in classes like "Circle" and "Rectangle," and demonstrate dependency injection to access their functionalities.

Code:

Interface Shape:

```
1  interface Shape {
2      double calculateArea();
3      double calculatePerimeter();
4  }
```

Classes **Circle** and **Rectangle**:

```
6  class Circle implements Shape {
7      private double radius;
8
9      Circle(double radius) {
10         this.radius = radius;
11     }
12
13     @Override
14     public double calculateArea() {
15         return Math.PI * radius * radius;
16     }
17
18     @Override
19     public double calculatePerimeter() {
20         return 2 * Math.PI * radius;
21     }
22 }
```

```

24  class Rectangle implements Shape {
25      private double length;
26      private double width;
27
28      Rectangle(double length, double width) {
29          this.length = length;
30          this.width = width;
31      }
32
33      @Override
34      public double calculateArea() {
35          return length * width;
36      }
37
38      @Override
39      public double calculatePerimeter() {
40          return 2 * (length + width);
41      }
42  }

```

Dependency Injection:

```

44  class ShapeCalculator {
45      private Shape shape;
46
47      ShapeCalculator(Shape shape) {
48          this.shape = shape;
49      }
50
51      void displayDetails() {
52          System.out.println("Area: " + shape.calculateArea());
53          System.out.println("Perimeter: " + shape.calculatePerimeter());
54      }
55  }

```

Testing:

```

57  public class Main {
58      Run | Debug
59      public static void main(String[] args) {
60          Circle circle = new Circle(radius:7);
61          Rectangle rectangle = new Rectangle(length:4, width:6);
62
63          ShapeCalculator circleCalculator = new ShapeCalculator(circle);
64          ShapeCalculator rectangleCalculator = new ShapeCalculator(rectangle);
65
66          System.out.println(x:"Circle Details:");
67          circleCalculator.displayDetails();
68          System.out.println();
69
70          System.out.println(x:"Rectangle Details:");
71          rectangleCalculator.displayDetails();
72      }
73  }

```

Input:

Radius: Integer (Circle)

Length & breadth : Integer (Rectangle)

Output:

```
Circle Details:  
Area: 153.93804002589985  
Perimeter: 43.982297150257104  
  
Rectangle Details:  
Area: 24.0  
Perimeter: 20.0
```