SOLID Principles Assignment

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EmpCode: 1868

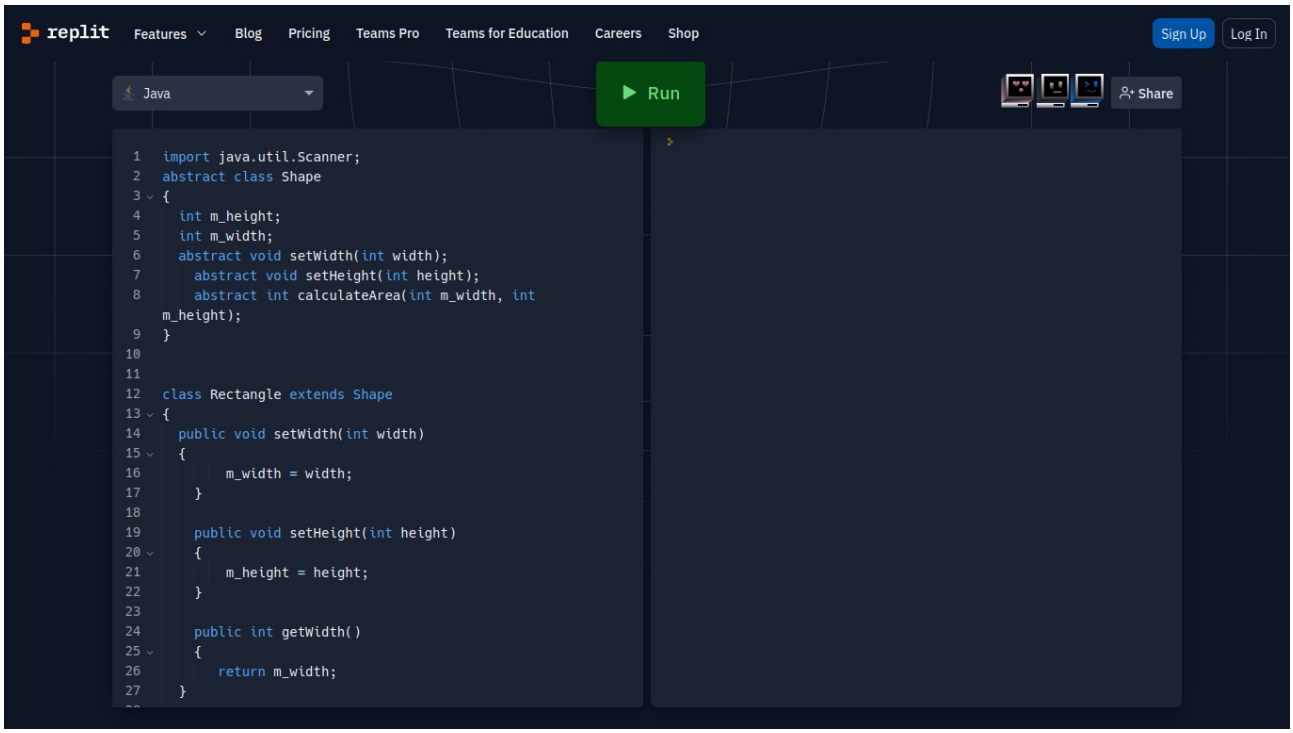
---------Liskov Substitution Principle----------

Explanation of why the code violates LSP

The code violates the Liskov Substitution Principle because the behavior of the derived class differs from the behavior of the base class in a way that can lead to unexpected results when substituting Square objects for Rectangle objects in client code. The problem is that the Square class does not conform to the rectangle definition, which allows the width and height to be set independently.

if code expects to be able to set the width and height of a rectangle independently, but instead receives a Square object, the client code may behave incorrectly because the setHeight and setWidth methods of the Square class have different behavior than the same methods in the Rectangle class.

Corrected code with output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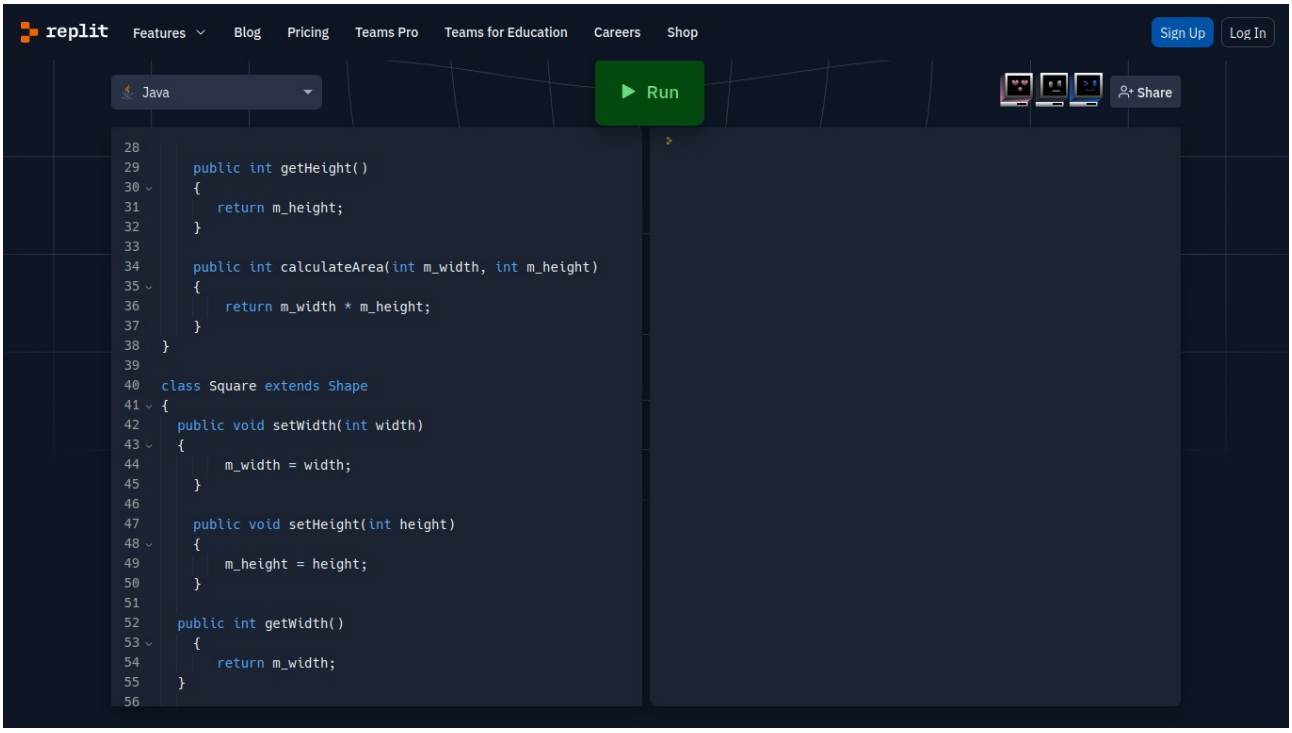
1 import java.util.Scanner;
2 abstract class Shape
3 {
4 int m_height;
5 int m_width;
6 abstract void setWidth(int width);
7 abstract void setHeight(int height);
8 abstract int calculateArea(int m_width, int
m_height);
9 }
10
11
12 class Rectangle extends Shape
13 {
14 public void setWidth(int width)
15 {
16 m_width = width;
17 }
18
19 public void setHeight(int height)
20 {
21 m_height = height;
22 }
23
24 public int getWidth()
25 {
26 return m_width;
27 }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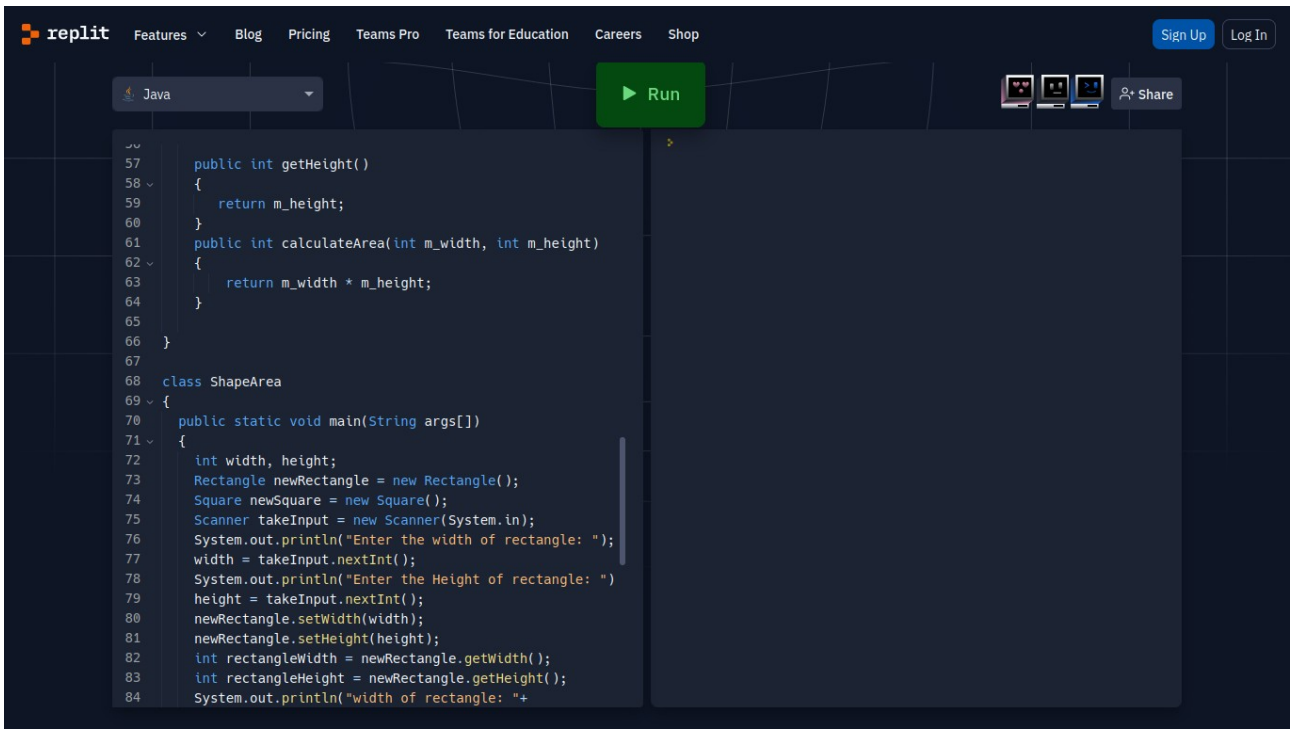
28
29 public int getHeight()
30 {
31 return m_height;
32 }
33
34 public int calculateArea(int m_width, int m_height)
35 {
36 return m_width * m_height;
37 }
38 }
39
40 class Square extends Shape
41 {
42 public void setWidth(int width)
43 {
44 m_width = width;
45 }
46
47 public void setHeight(int height)
48 {
49 m_height = height;
50 }
51
52 public int getWidth()
53 {
54 return m_width;
55 }
56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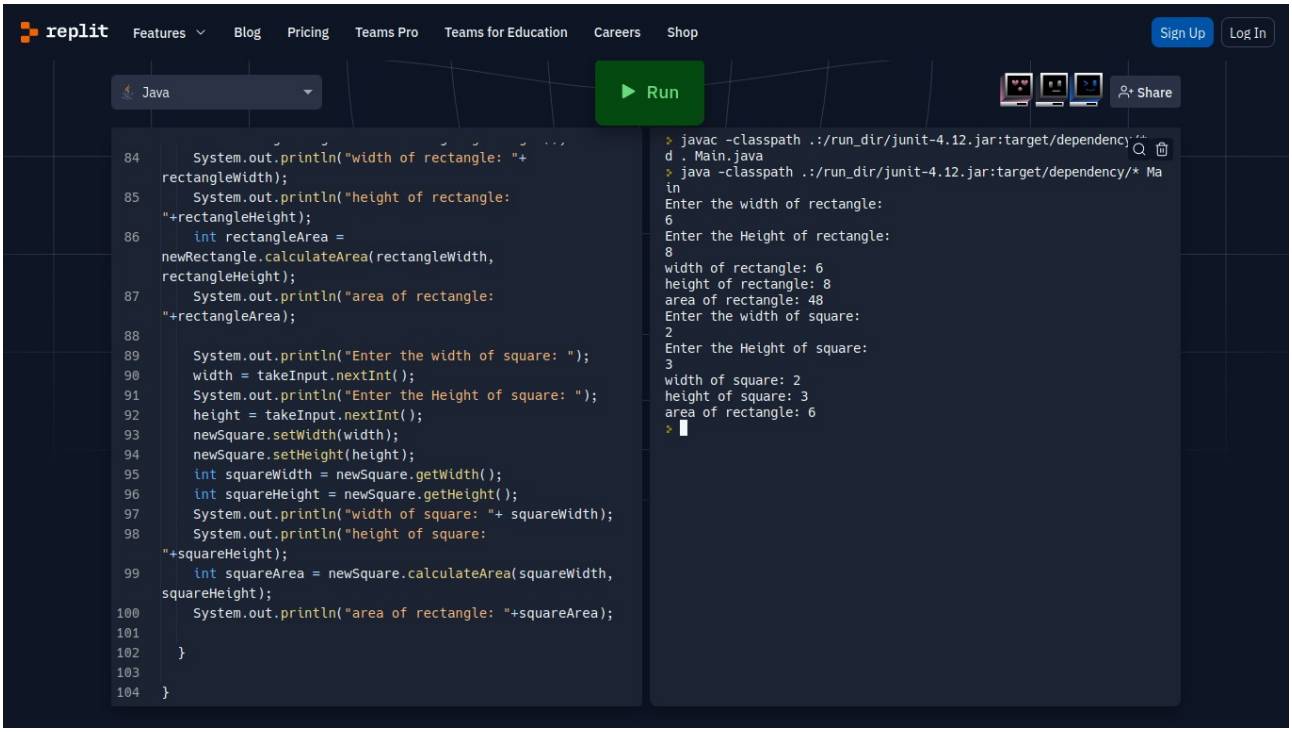
public int getHeight()
{
return m_height;
}
public int calculateArea(int m_width, int m_height)
{
return m_width * m_height;
}
}
class ShapeArea
{
public static void main(String args[])
{
int width, height;
Rectangle newRectangle = new Rectangle();
Square newSquare = new Square();
Scanner takeInput = new Scanner(System.in);
System.out.println("Enter the width of rectangle: ");
width = takeInput.nextInt();
System.out.println("Enter the Height of rectangle: ")
height = takeInput.nextInt();
newRectangle.setWidth(width);
newRectangle.setHeight(height);
int rectangleWidth = newRectangle.getWidth();
int rectangleHeight = newRectangle.getHeight();
System.out.println("width of rectangle: "+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System.out.println("width of rectangle: "+
rectangleWidth);
System.out.println("height of rectangle:
"+rectangleHeight);
int rectangleArea =
newRectangle.calculateArea(rectangleWidth,
rectangleHeight);
System.out.println("area of rectangle:
"+rectangleArea);
System.out.println("Enter the width of square: ");
width = takeInput.nextInt();
System.out.println("Enter the Height of square: ");
height = takeInput.nextInt();
newSquare.setWidth(width);
newSquare.setHeight(height);
int squareWidth = newSquare.getWidth();
int squareHeight = newSquare.getHeight();
System.out.println("width of square: "+ squareWidth);
System.out.println("height of square:
"+squareHeight);
int squareArea = newSquare.calculateArea(squareWidth,
squareHeight);
System.out.println("area of rectangle: "+squareArea);
}
}
javac -classpath .:/run_dir/junit-4.12.jar:target/dependency
d . Main.java
java -classpath .:/run_dir/junit-4.12.jar:target/dependency/* Ma
in
Enter the width of rectangle:
6
Enter the Height of rectangle:
8
width of rectangle: 6
height of rectangle: 8
area of rectangle: 48
Enter the width of square:
2
Enter the Height of square:
3
width of square: 2
height of square: 3
area of rectangle: 6

Thank You!