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/\*\* This program is a Java class named "Rectangle" that has private attributes for width

\* and height, and a static variable to keep track of the number of rectangles created. The class

\* has a default constructor and a constructor that takes in width and height and assigns them to

\* the instance variables, after validating that the values passed in are greater than 0. It also

\* has setter and getter methods for width and height, and methods to calculate the area and perimeter

\* of the rectangle. If the width or height is set to a negative value, it throws an exception with an

\* error message. It also has a static method to return the number of rectangles created. This class can

\* be used to create rectangle objects with specified width and height, get their width and height, get

\* their area and perimeter, and get the number of rectangles created so far. \*/

// 2023-01-17

public class Rectangle {

private double width;

private double height;

private static int numberOfRectangles;

// default constructor of Rectangle

public Rectangle() {

/\*

width = 1;

height = 1;

numberOfRectangles++;\*/

this(1.0,1.0);

}

// constructor of Rectangle with specified width and height

public Rectangle(double width, double height) {

setWidth(width);

setHeight(height);

numberOfRectangles++;

}

// setter for width

public void setWidth(double width) {

if (width <= 0) {

throw new IllegalArgumentException("Width cannot be negative or zero!");

}else{

this.width = width;

}

}

// getter for width

public double getWidth() {

return width;

}

// setter for height

public void setHeight(double height) {

if (height <= 0) {

throw new IllegalArgumentException("Height cannot be negative or zero!");

}else{

this.height = height;

}

}

// getter for height

public double getHeight() {

return height;

}

// method to calculate area

public double getArea() {

return width \* height;

}

// method to calculate perimeter

public double getPerimeter() {

return 2 \* (width + height);

}

public static int getNumberOfRectangles(){

return numberOfRectangles;

}

}

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/\*\* the program is a driver class named "TestRectangle" that creates three "Rectangle" objects.

\* The first rectangle object is created with width 4 and height 40, the second one with width

\* 3.5 and height 35.9 and the third one request to creat with width -2 and height 20, but raised exception due to negative width.

\* For each rectangle object, it uses the getter methods to get the width, height, area, and perimeter

\* of each rectangle and display them on the console.

\* It also uses the static method "getNumberOfRectangles" to get the number of rectangles created and display it on the console.

\* It also has try-catch blocks for each rectangle object, if the width or height passed in the

\* constructor is negative or zero, an exception will be thrown, and it will be caught by the corresponding

\* catch block and it will print the error message.

\* This way, the program can continue creating and displaying the next rectangle even if an exception occurred

\* with the previous one. \*/

// 2023-01-17

public class TestRectangle {

// Main method

public static void main(String[] args) {

// create rectangle 1 with width 4 and height 40

try {

Rectangle rectangle1 = new Rectangle(4, 40);

System.out.println("Rectangle 1:");

System.out.println("The Width is " + rectangle1.getWidth()

+ " and The Height is " + rectangle1.getHeight() + " .");

System.out.println("The Area is " + rectangle1.getArea()

+ " and The Perimeter is " + rectangle1.getPerimeter() + " .");

System.out.println("-------------------------------------------");

} catch (IllegalArgumentException e) {

System.out.println(e.getMessage());

}

// create rectangle 2 with width 3.5 and height 35.9

try {

Rectangle rectangle2 = new Rectangle(3.5, 35.9);

System.out.println("Rectangle 2:");

System.out.println("The Width is " + rectangle2.getWidth()

+ " and The Height is " + rectangle2.getHeight() + " .");

System.out.println("The Area is " + rectangle2.getArea()

+ " and The Perimeter is " + rectangle2.getPerimeter() + " .");

System.out.println("-------------------------------------------");

} catch (IllegalArgumentException e) {

System.out.println(e.getMessage());

}

// create rectangle 3 with width -2 and height 20

try {

Rectangle rectangle3 = new Rectangle(-2, 20);

System.out.println("Rectangle 3:");

System.out.println("The Width is " + rectangle3.getWidth()

+ " and The Height is " + rectangle3.getHeight() + " .");

System.out.println("The Area is " + rectangle3.getArea()

+ " and The Perimeter is " + rectangle3.getPerimeter() + " .");

System.out.println("-------------------------------------------");

} catch (IllegalArgumentException e) {

System.out.println(e.getMessage());

}

// number of rectangles that program used

System.out.println("Number of rectangles: " + Rectangle.getNumberOfRectangles());

}

}

// Output

Rectangle 1:

The Width is 4.0 and The Height is 40.0 .

The Area is 160.0 and The Perimeter is 88.0 .

-------------------------------------------

Rectangle 2:

The Width is 3.5 and The Height is 35.9 .

The Area is 125.64999999999999 and The Perimeter is 78.8 .

-------------------------------------------

Width cannot be negative or zero!

Number of rectangles: 2

Text

Description automatically generated

**UML of Rectangle**

|  |
| --- |
| Rectangle |
| -width: double  -height: double  -numberOfRectangles: int |
| +Rectangle()  +Rectangle(width : double, height : double)  +setWidth(width : double) : void  +getWidth() : double  +setHeight(height : double) : void  +getHeight() : double  +getArea() : double  +getPerimeter() : double  +getNumberOfRectangles() : int |