PS 4 - CMPE 160.01: Introduction to Object Oriented Programming

Introduction to OOP:

01/04/2022

1 Introduction to OOP:

1.1 Shape Classes:

We will write classes 'circle' and 'square'.

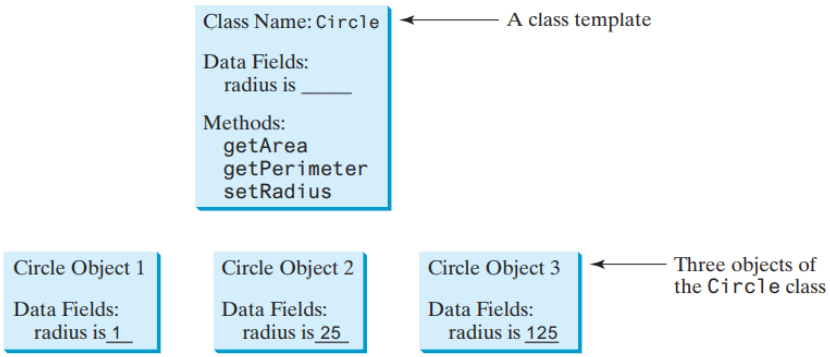

Figure 1: Circle class template

Circle class can be defined with the following code:

```
class Circle {

   /** The radius of this circle */
   private double radius;

   /** Construct a circle object */
   Circle() {
      this.radius = 1;
   }

   /** Construct a circle object with its radius*/
   Circle(double radius) {
      this.radius = radius;
   }
```

```
   /** Return the area of this circle */
   double getArea() {
      return radius * radius * Math.PI;
   }

   /** Return the perimeter of this circle */
   double getPerimeter() {
      return 2 * radius * Math.PI;
   }

   /** Getters and Setters */
   public double getRadius() {
      return radius;
   }

   public void setRadius(double radius) {
      this.radius = radius;
   }

   /** String representation of the object */
   @Override
   public String toString() {
      return "Circle [radius=" + radius + "]";
   }
}
```

TODO: Write rectangle class similar to circle, with attributes 'width' and 'height'. Write getArea and getPerimeter method as well as isSquare method, that returns true if the given rectangle is a square. Also, add two new attributes: x and y. These will show the coordinates of the top left corner of the given rectangle. Write 'translate' method to move the rectangle. Call this new method like this:

rectangleObject.translate(15, 25);

This method will move the rectangle by 15 units in the x and 25 units in the y. Note that this does not change the width and height of the rectangle but the top left coordinates should be updated accordingly.

1.2 TV Class:

We can write TV class with given attributes and methods:

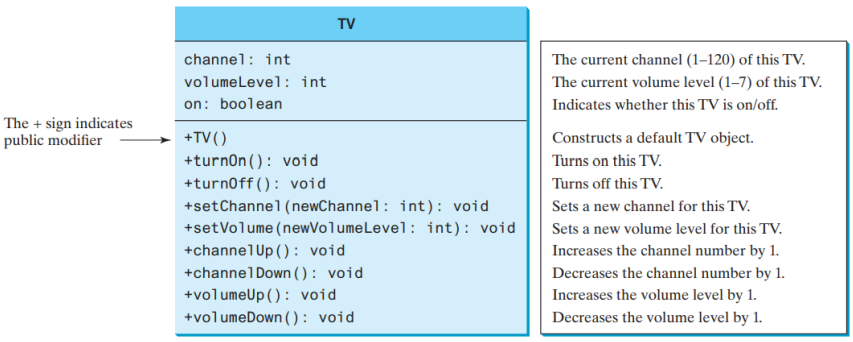

Figure 2: Class diagram for TV

TV Class can be defined with the following code:

```
public class TV {
   private int channel = 1; // Default channel is 1
   private int volumeLevel = 1; // Default volume level is 1
   private boolean on = false; // TV is off

   public TV() {
   }

   public void turnOn() {
      on = true;
   }

   public void turnOff() {
      on = false;
   }

   public void setChannel(int newChannel) {
      if (on && newChannel >= 1 && newChannel <= 120)
         channel = newChannel;
   }

   public void setVolume(int newVolumeLevel) {
      if (on && newVolumeLevel >= 1 && newVolumeLevel <= 7)
         volumeLevel = newVolumeLevel;
   }

   public void channelUp() {
      if (on && channel < 120)
         channel++;
   }

   public void channelDown() {
      if (on && channel > 1)
         channel--;
   }
```

```
   public void volumeUp() {
      if (on && volumeLevel < 7)
         volumeLevel++;
   }

   public void volumeDown() {
      if (on && volumeLevel > 1)
         volumeLevel--;
   }
}
```