Chapter 14 Lab
Applets and More

Lab Objectives

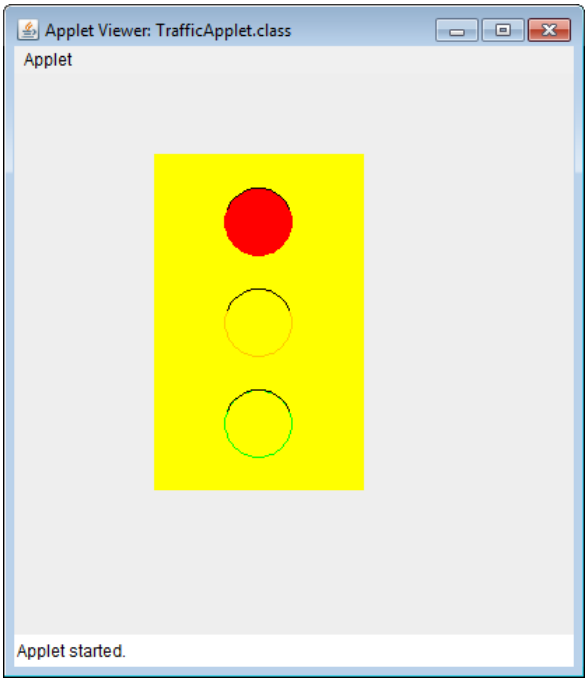
- Be able to write an applet
- Be able to draw rectangles, circles, and arcs
- Be able to override the paint method
- Be able to use a timer

Introduction

In this lab we will create an applet that changes the light on a traffic signal. The applet that you create will draw the outside rectangle of a traffic signal and fill it in with yellow. Then it will draw three circles in one column, to resemble the red, orange, and green lights on the traffic signal. Only one circle at a time will be filled in. It will start will green and cycle through the orange, red, and back to green to start the cycle again. However, unlike a traffic signal, each light will remain on for the same amount of time. To accomplish this cycle, we will use a timer object.

When you have finished your applet should appear as shown in Figure 1, but with the filled in circle cycling up from green to orange to red and starting over in a continuous changing of the traffic light.

Figure 1



Task #1 Create an Applet

1. Copy the file *TrafficApplet.java* (see Code Listing 14.1) from the Student CD or as directed by your instructor.
2. This class currently has all the constants you will need to be able to create your traffic signal. It doesn't have anything else. You will need to change the class heading so that it extends `JApplet`.

Task #2 The `Timer` Object

1. An applet does not have a constructor or a `main` method. Instead, it has a method named **`init`** that performs the same operations as a constructor. The **`init`** method accepts no arguments and has a `void` return type. Write an **`init`** method.
2. Inside the **`init`** method, create a `Timer` object passing in the `TIME_DELAY` constant and a new `TimerListener` (We will be creating the listener class next).
3. Call the `start` method with the `Timer` object to generate action events.

Task #3 The `TimerListener` Class

1. Write a private inner class called `TimerListener` which implements `ActionListener`.
2. Inside this class, write an `actionPerformed` method. This method will check the `status` variable to see whether it is currently red, orange, or green. Since we want the lights to cycle as a traffic signal, we need to cycle in the order: green, orange, red, green, orange, red, and so on. Once the status is determined, the status should then be set to the next color in the cycle.
3. Redisplay the graphics components (to be created next) by calling the **`repaint`** method.

Task #4 Drawing Graphics

1. Draw the traffic signal by overriding the `paint` method. For all graphics, use the named constants included in the class.
2. Call the method that is being overridden in the parent class.
3. Create a yellow rectangle (solid color) for the traffic signal. The constants `X_TRAFFICLIGHT`, `Y_TRAFFICLIGHT`, `TRAFFICLIGHT_WIDTH`, and `TRAFFICLIGHT_HEIGHT` have already been defined for your use.
4. Create round lights of red, orange, and green for the signals. These should be outlines of these colors. The constants `X_LIGHTS`, `Y_REDLIGHT`, `Y_GREENLIGHT`, `Y_ORANGELIGHT`, and `LIGHT_DIAMETER`, have already been defined for your use. Only one light will be filled in at a time, when the status indicates that one has been chosen. You will need to check the status to

determine which light to fill in. Remember, the status is changed only in the `actionPerformed` method (already defined) where the **`repaint`** method is also called.

5. Put the shade hoods above the lights by drawing black arcs above each light. The constants `HOOD_START_ANGLE` and `HOOD_ANGLE_SWEPT` have already been defined for your use.
6. Try out your applet. If time permits, create a web page on which you can display your applet.

Code Listing 14.1 (`TrafficApplet.java`)

```
import java.awt.*;
import java.awt.event.*;
import javax.swing.*;

/**
   This applet displays a timed traffic signal.
*/

public class TrafficApplet
{
   // Constants for the traffic signal
   public final int WIDTH = 300;
   public final int HEIGHT = 400;
   public final int X_TRAFFICLIGHT = WIDTH / 3;
   public final int Y_TRAFFICLIGHT = HEIGHT / 7;
   public final int TRAFFICLIGHT_WIDTH = WIDTH / 2;
   public final int TRAFFICLIGHT_HEIGHT = HEIGHT * 3 / 5;
   public final int LIGHT_DIAMETER =
                    TRAFFICLIGHT_HEIGHT / 5;
   public final int HOOD_START_ANGLE = 20;
   public final int HOOD_ANGLE_SWEPT = 140;
   public final int X_LIGHTS =
                    TRAFFICLIGHT_WIDTH /
                    3 + X_TRAFFICLIGHT;
   public final int Y_REDLIGHT =
                    TRAFFICLIGHT_HEIGHT /
                    10 + Y_TRAFFICLIGHT;
   public final int Y_ORANGELIGHT =
                    TRAFFICLIGHT_HEIGHT * 4 /
                    10 + Y_TRAFFICLIGHT;
   public final int Y_GREENLIGHT =
                    TRAFFICLIGHT_HEIGHT * 7 /
                    10 + Y_TRAFFICLIGHT;
   public final int TIME_DELAY = 1000;
```

```
    private String status = "green"; // Signal status
    private Timer timer;             // Timer object
}
```