Lab Four: Final Examples

In this lab, I’ve included two more examples of Java programs: one makes use of a simple menu from the Java Choice class, and the other implements a fancier Hello World. Both require a full Java environment that can handle graphics.

```java
/*
 * 7/30/2020 Walter Carlip Fancy Version of Hello World
 */
import java.awt.*;
public class HelloClass extends Frame{
    static final String message = " Hello Class!";
    private static Font myFont;
    private static Color myColor;
    private static Color myOtherColor;

    public void init() {
        myFont = new Font("serif", Font.ITALIC, 48);
        myColor = Color.yellow;
        myOtherColor = new Color(0,0,25);
    }
    public void paint( Graphics g ) {
        g.setColor(myColor);
        g.fillOval(110,110,330,100);
        g.setColor(Color.blue);
        g.drawOval(110,110,330,100);
        g.drawOval(109,109,332,102);
        g.drawOval(108,108,334,104);
        g.drawOval(107,107,336,106);
        g.drawOval(106,106,338,108);
        g.setColor(Color.black);
        g.setFont(myFont);
        g.drawString( message, 140, 175 );
    }
    public static void main(String s[]){
        HelloClass mf = new HelloClass();
        mf.init();
        mf.setSize(600, 300);
        mf.setVisible(true);
        Thread.sleep(5000);
        myColor = Color.red;
        mf.repaint();
        Thread.sleep(5000);
        System.exit(0);
    }
}
```

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1. Enter and run this program. Does it work as expected? (Probably not if using jdoodle. Try installing Java on your own machine and running this program. On a Macintosh, you may be able to compile and run using javac and java from a Terminal.)
import java.awt.*;
import java.awt.event.*;
public class TestFrame extends Frame implements ActionListener{
    static TextArea textarea;
    static Button go;
    static Button quit;
    static Choice myChoice;
    static String myString;
    static TestFrame mf;

    public void init() {
        this.setSize(600, 800);
        this.setLayout(new FlowLayout());
        this.add(new Label("Make Some Choices"));
        myChoice = new Choice();
        myChoice.addItem("Christmas");
        myChoice.addItem("Birthday");
        myChoice.addItem("Fourth of July");
        myChoice.addItem("New Years Day");
        textarea = new TextArea(15,50);
        go = new Button("Do It!");
        quit = new Button("Quit");
        this.add(textarea);
        this.add(myChoice);
        this.add(go);
        this.add(quit);
        go.addActionListener(this);
        quit.addActionListener(this);
        repaint();
    }
    public void actionPerformed(ActionEvent e) {
        if (e.getActionCommand().equals("Quit")) {
            System.exit(0);
        } else {
            myString = myChoice.getSelectedItem();
            if (myString == "Christmas") {
                textarea.append("Merry Christmas!
");
            } else if (myString == "Birthday") {
                textarea.append("Happy Birthday
");
            } else if (myString == "Fourth of July") {
                textarea.append("Go see the fireworks!
");
            } else if (myString == "New Years Day") {

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textarea.append("Make your resolutions!\n");
        repaint();
    }
}
public static void main(String[] args) throws Exception {
    mf = new TestFrame();
    mf.init();
    mf.setVisible(true);
    mf.repaint();
}
}

1. Enter and run this program. Does it work as expected? Try some experimental modifications.
Some Problems

Exercise. Write a program that computes the day of the week that any entered date (such as a birthday) occurred by using the following formula:

$$ W \equiv k + \lfloor 2.6m - .02 \rfloor - 2C + Y + \lfloor Y/4 \rfloor + \lfloor C/4 \rfloor + 7 \pmod{7}, $$

where $k$ represents the day of the month, $m$ the number of the month according to the table below, $C$ the century (e.g., 20 currently, 19 four years ago), $Y$ the year of the century, and $W$ the day of the week as numbered in the table below. For the purposes of the computation above, if the month is January or February, the year used should be the prior year. Here the number $\lfloor n \rfloor$ is the greatest integer less than or equal to $n$, also known as the “floor”, and is obtained by dropping the fractional part (when $n$ is positive).

Here are some suggestions.

1. Define integer variables $k$, $m$, $C$, and $Y$.

2. Initialize the variables in your `init()` method. Take the day $k$ from a `TextField` and convert it to an integer. Take the entire year from a `TextField` and find the quotient and remainder on division by 100 to find the century $C$ and year $Y$. Use a `Choice` menu to allow the user to select the month, and then use the table to assign the correct value to $m$.

3. Compute the value of $W$ using Java operations. The floor can be computed by using the method `Math.floor()` from the `Math` class.

<table>
<thead>
<tr>
<th>Month</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>11 (prior year)</td>
</tr>
<tr>
<td>February</td>
<td>12 (prior year)</td>
</tr>
<tr>
<td>March</td>
<td>1</td>
</tr>
<tr>
<td>April</td>
<td>2</td>
</tr>
<tr>
<td>May</td>
<td>3</td>
</tr>
<tr>
<td>June</td>
<td>4</td>
</tr>
<tr>
<td>July</td>
<td>5</td>
</tr>
<tr>
<td>August</td>
<td>6</td>
</tr>
<tr>
<td>September</td>
<td>7</td>
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<tr>
<td>October</td>
<td>8</td>
</tr>
<tr>
<td>November</td>
<td>9</td>
</tr>
<tr>
<td>December</td>
<td>10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Day</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
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<tr>
<td>Monday</td>
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<tr>
<td>Tuesday</td>
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<tr>
<td>Friday</td>
<td>5</td>
</tr>
<tr>
<td>Saturday</td>
<td>6</td>
</tr>
</tbody>
</table>

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