

## Designing Graphical Objects

CSC 2014 – Java Bootcamp

Dr. Mary-Angela Papalaskari  
Department of Computing Sciences  
Villanova University

Course website:

[www.csc.villanova.edu/~map/2014/](http://www.csc.villanova.edu/~map/2014/)

CSC 2014 - Java Bootcamp - Dr Papalaskari - Villanova University

## Graphical Objects

- Some objects contain information that determines how the object should be represented visually
- Graphical objects
  - data about position, size, and other attributes
  - methods to draw the object
- Let's look at some other examples of graphical objects:

Example 1: SmilingFacePanel

[SmilingFace.java](#)

[SmilingFacePanel.java](#)

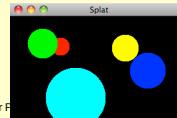


Example 2: SplatPanel

[Splat.java](#)

[SplatPanel.java](#)

[Circle.java](#)



CSC 2014 - Java Bootcamp - Dr F...

```
/*
*****
// SmilingFace.java      Author: Lewis/Loftus
//
// Demonstrates the use of a separate panel class.
***** */

import javax.swing.JFrame;

public class SmilingFace
{
    //-----+
    // Creates the main frame of the program.
    //-----+
    public static void main (String[] args)
    {
        JFrame frame = new JFrame ("Smiling Face");
        frame.setDefaultCloseOperation (JFrame.EXIT_ON_CLOSE);
        SmilingFacePanel panel = new SmilingFacePanel();

        frame.getContentPane ().add(panel);

        frame.pack ();
        frame.setVisible(true);
    }
}
```

CSC 2014 - Java Bootcamp - Dr Papalaskari - Villanova University

```
/*
*****
// SmilingFace.java      Author: Lewis/Loftus
//
// Demonstrates the use of a separate panel class.
***** */

import javax.swing.JFrame;

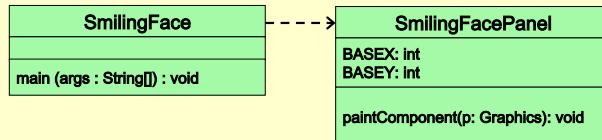
public class SmilingFace
{
    //-----+
    // Creates the main frame of the program.
    //-----+
    public static void main (String[] args)
    {
        JFrame frame = new JFrame ("Smiling Face");
        frame.setDefaultCloseOperation (JFrame.EXIT_ON_CLOSE);
        SmilingFacePanel panel = new SmilingFacePanel();

        frame.getContentPane ().add(panel);

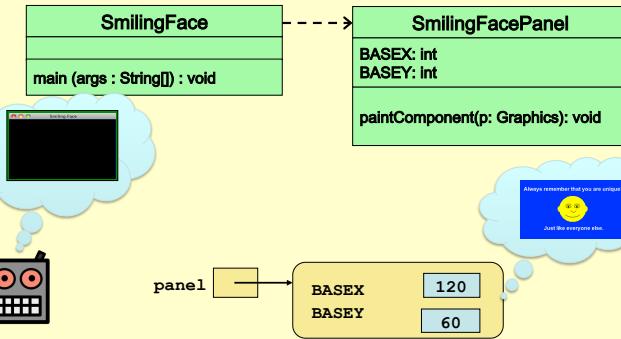
        frame.pack ();
        frame.setVisible(true);
    }
}
```

CSC 2014 - Java Bootcamp - Dr Papalaskari - Villanova University

- The SmilingFace program draws a face by defining the `paintComponent` method of a panel
- A UML class diagram:



- The SmilingFace program draws a face by defining the `paintComponent` method of a panel
- A UML class diagram:



```

//*****SmilingFacePanel.java*****Author: Lewis/Loftus*****
// Demonstrates the use of a separate panel class.
//*****SmilingFacePanel.java*****Author: Lewis/Loftus*****
import javax.swing.JPanel;
import java.awt.*;

public class SmilingFacePanel extends JPanel
{
    private final int BASEX = 120, BASEY = 60; // base point for head

    //-----//
    // Constructor: Sets up the main characteristics of this panel.
    //-----
    public SmilingFacePanel ()
    {
        setBackground (Color.blue);
        setPreferredSize (new Dimension(320, 200));
        setFont (new Font("Arial", Font.BOLD, 16));
    }

    continue
  
```

CSC 2014 - Java Bootcamp - Dr Papalaskari - Villanova University

```

continue
// Draws a face.
//-----
public void paintComponent (Graphics page)
{
    super.paintComponent (page);

    page.setColor (Color.yellow);
    page.fillOval (BASEX, BASEY, 80, 80); // head
    page.fillOval (BASEX-5, BASEY+20, 90, 40); // ears

    page.setColor (Color.black);
    page.drawOval (BASEX+20, BASEY+30, 15, 7); // eyes
    page.drawOval (BASEX+45, BASEY+30, 15, 7);

    page.fillOval (BASEX+25, BASEY+31, 5, 5); // pupils
    page.fillOval (BASEX+50, BASEY+31, 5, 5);

    page.drawArc (BASEX+20, BASEY+25, 15, 7, 0, 180); // eyebrows
    page.drawArc (BASEX+45, BASEY+25, 15, 7, 0, 180);

    page.drawArc (BASEX+35, BASEY+40, 15, 10, 180, 180); // nose
    page.drawArc (BASEX+20, BASEY+50, 40, 15, 180, 180); // mouth
    page.setColor (Color.white);
    page.drawString ("Always remember that you are unique!",
                    BASEX-105, BASEY-15);
    page.drawString ("Just like everyone else.", BASEX-45, BASEY+105);
}
  
```

**Jpanel Class – let's look at Java API**

The SmilingFacePanel class is derived from the JPanel class using inheritance

**Jpanel Class – let's look at Java API**

The SmilingFacePanel class is derived from the JPanel class using inheritance

## Objects with a draw() method

- The next example - Splat - is structured differently
- It draws a set of colored circles on a panel, but each circle is represented as a separate object that maintains its own graphical information
- The `paintComponent` method of the panel "asks" each circle to draw itself
- See [Splat.java](#)
- See [SplatPanel.java](#)
- See [Circle.java](#)

CSC 2014 - Java Bootcamp - Dr Papalaskari - Villanova University

```

//*****Splat.java*****Author: Lewis/Loftus*****
//
// Demonstrates the use of graphical objects.
//*****Splat.java*****Author: Lewis/Loftus*****

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

public class Splat
{
    //-----  

    // Presents a collection of circles.  

    //-----  

    public static void main (String[] args)
    {
        JFrame frame = new JFrame ("Splat");
        frame.setDefaultCloseOperation (JFrame.EXIT_ON_CLOSE);

        frame.getContentPane ().add(new SplatPanel ());

        frame.pack ();
        frame.setVisible(true);
    }
}

```

CSC 2014 - Java Bootcamp - Dr Papalaskari - Villanova University

```

//*****
// Splat.java
// Demonstrates
// ****
import javax.swing.*;
import java.awt.*;

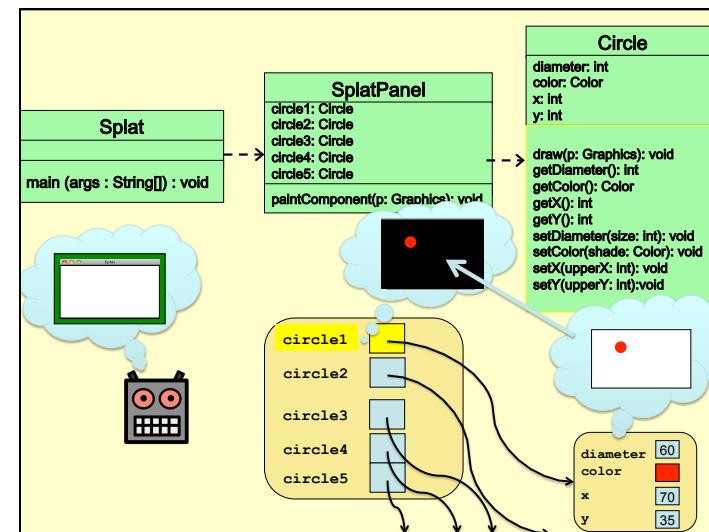
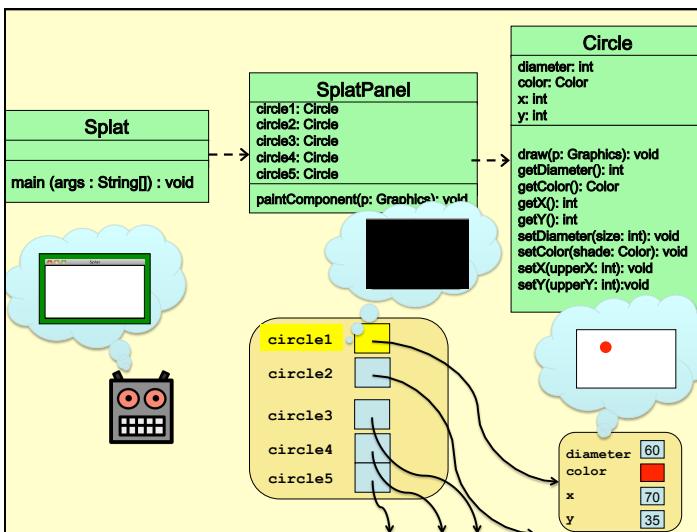
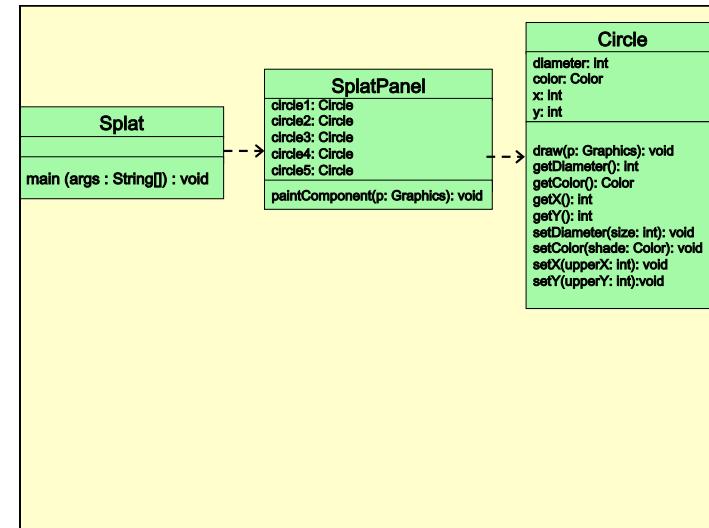
public class Splat {
    //-- Presentations
    public static void main (String[] args) {
        JFrame frame = new JFrame ("Splat");
        frame.setDefaultCloseOperation (JFrame.EXIT_ON_CLOSE);

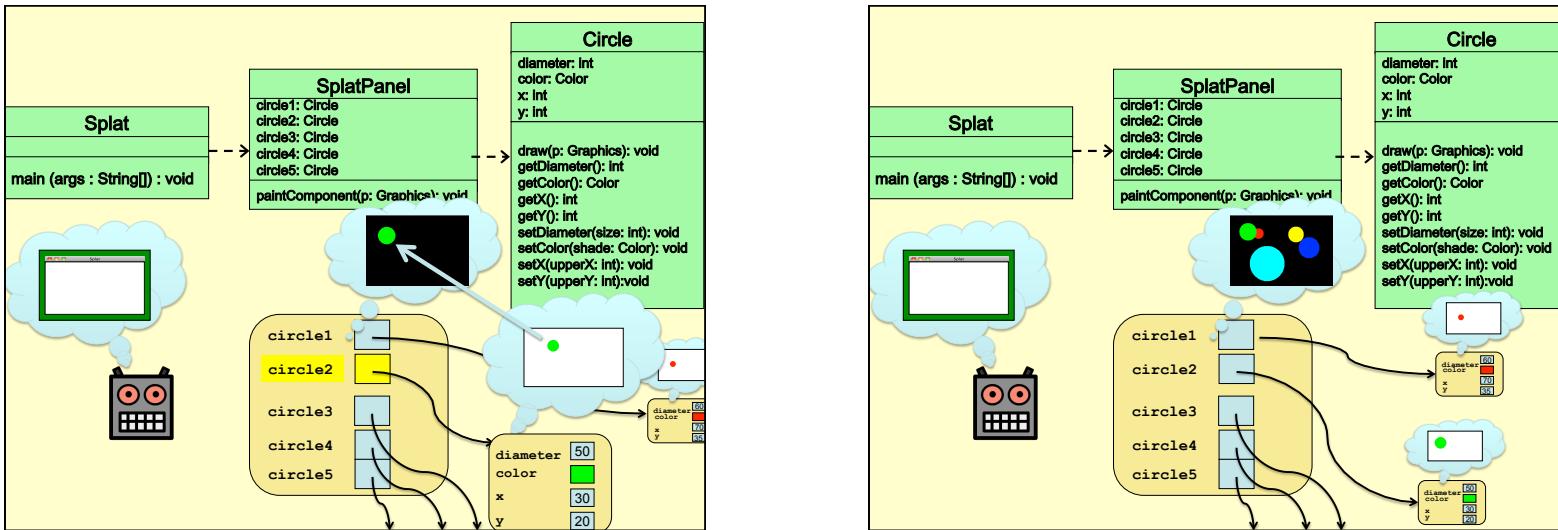
        frame.getContentPane().add(new SplatPanel ());

        frame.pack ();
        frame.setVisible(true);
    }
}

```

CSC 2014 - Java Bootcamp - Dr Papalaskari - Villanova University





```
/*
 * SplatPanel.java      Author: Lewis/Loftus
 *
 * Demonstrates the use of graphical objects.
 */
import javax.swing.*;
import java.awt.*;

public class SplatPanel extends JPanel
{
    private Circle circle1, circle2, circle3, circle4, circle5;

    //-----//
    // Constructor: Creates five Circle objects.
    //-----//
    public SplatPanel()
    {
        circle1 = new Circle (30, Color.red, 70, 35);
        circle2 = new Circle (50, Color.green, 30, 20);
        circle3 = new Circle (100, Color.cyan, 60, 85);
        circle4 = new Circle (45, Color.yellow, 170, 30);
        circle5 = new Circle (60, Color.blue, 200, 60);

        setPreferredSize (new Dimension(300, 200));
        setBackground (Color.black);
    }

    continue
}
```

```
continue

//-----//
// Draws this panel by requesting that each circle draw itself.
//-----//
public void paintComponent (Graphics page)
{
    super.paintComponent(page);

    circle1.draw(page);
    circle2.draw(page);
    circle3.draw(page);
    circle4.draw(page);
    circle5.draw(page);
}
```

CSC 2014 - Java Bootcamp - Dr Papalaskari - Villanova University

```
/*
 * Circle.java      Author: Lewis/Loftus
 */
// Represents a circle with a particular position, size, and color.
//------------------------------------------------------------------------------

import java.awt.*;

public class Circle
{
    private int diameter, x, y;
    private Color color;

    //-
    // Constructor: Sets up this circle with the specified values.
    //-
    public Circle (int size, Color shade, int upperX, int upperY)
    {
        diameter = size;
        color = shade;
        x = upperX;
        y = upperY;
    }

    continue
}
```

CSC 2014 - Java Bootcamp - Dr Papalaskari - Villanova University

```
continue

//-
// Draws this circle in the specified graphics context.
//-
public void draw (Graphics page)
{
    page.setColor (color);
    page.fillOval (x, y, diameter, diameter);
}

//-
// Diameter mutator.
//-
public void setDiameter (int size)
{
    diameter = size;
}

//-
// Color mutator.
//-
public void setColor (Color shade)
{
    color = shade;
}

continue
```

CSC 2014 - Java Bootcamp - Dr Papalaskari - Villanova University

```
continue

//-
// X mutator.
//-
public void setX (int upperX)
{
    x = upperX;
}

//-
// Y mutator.
//-
public void setY (int upperY)
{
    y = upperY;
}

//-
// Diameter accessor.
//-
public int getDiameter ()
{
    return diameter;
}

continue
```

CSC 2014 - Java Bootcamp - Dr Papalaskari - Villanova University

```
continue

//-
// Color accessor.
//-
public Color getColor ()
{
    return color;
}

//-
// X accessor.
//-
public int getX ()
{
    return x;
}

//-
// Y accessor.
//-
public int getY ()
{
    return y;
}
```

CSC 2014 - Java Bootcamp - Dr Papalaskari - Villanova University