```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * AuthorPane.java
 */

package code;


public class AuthorPane extends LabelPane {

  public static final String AUTHOR_TEXT = "Program Author: Grant Broadwater
    (grbcp5)";

  public AuthorPane() {
    super(AuthorPane.AUTHOR_TEXT);
  }

}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * ButtonMenu.java
 */

package code;

import javafx.scene.control.Button;
import javafx.scene.layout.HBox;
import javafx.event.EventHandler;
import javafx.event.ActionEvent;
import javafx.scene.layout.Priority;
import javafx.geometry.Insets;

public class ButtonMenu extends HBox {

  public static final double DEFAULT_SPACING = 20.0;


  public ButtonMenu() {
    this(ButtonMenu.DEFAULT_SPACING);
  }


  public ButtonMenu(double spacing) {
    this(null, new String[0]);
  }


  public ButtonMenu(EventHandler<ActionEvent> handler, String... buttonTitles)
   {
    this(ButtonMenu.DEFAULT_SPACING, handler, buttonTitles);
  }


  public ButtonMenu(double spacing, EventHandler<ActionEvent> handler,
   String... buttonTitles) {
    super(spacing);

    this.setPadding(new Insets(10, 10, 10, 10));

    this.setButtons(handler, buttonTitles);
  }
```

```java
  public void setButtons(EventHandler<ActionEvent> handler, String...
   buttonTitles) {
    this.removeAllButtons();

    for(int i = 0; i < buttonTitles.length; i++) {
      this.addButton(handler, buttonTitles[i]);
    }
  }


  public void addButton(EventHandler<ActionEvent> handler, String buttonTitle)
   {
      Button b = new Button(buttonTitle);
      b.setOnAction(handler);
      b.setMaxWidth(Double.MAX_VALUE);
      HBox.setHgrow(b, Priority.ALWAYS);
      this.getChildren().add(b);
  }


  public void removeAllButtons() {
    this.getChildren().removeAll();
  }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * ButtonSegmentController.java
 */

package code;

import javafx.scene.layout.BorderPane;
import javafx.event.EventHandler;
import javafx.event.ActionEvent;
import javafx.scene.control.Button;


public class ButtonSegmentController extends BorderPane implements
 EventHandler<ActionEvent> {


  private ButtonMenu buttonMenu;
  private ButtonSegmentControllerDataSource dataSource;


  public ButtonSegmentController(ButtonSegmentControllerDataSource dataSource)
   {
    super();

    this.buttonMenu = new ButtonMenu();
    this.dataSource = dataSource;

    this.setTop(this.buttonMenu);

    this.reloadData();
  }


  public void reloadData() {

    this.buttonMenu.removeAllButtons();

    for(int i = 0; i < this.dataSource.getNumberOfSegments(); i++) {
      this.buttonMenu.addButton(
        this,
        this.dataSource.getTitleForSegment(i)
      );
    }

    if(this.dataSource.getNumberOfSegments() > 0) {
      this.setCenter(
```

```java
        this.dataSource.getPaneForSegment(
          this.dataSource.getTitleForSegment(0)
        )
      );
    }
  }


  @Override
  public void handle(ActionEvent actionEvent) {
    String senderTitle = ((Button)actionEvent.getSource()).getText();

    this.setCenter(this.dataSource.getPaneForSegment(senderTitle));
  }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * ButtonSegmentController.java
 */

package code;

import javafx.scene.layout.BorderPane;
import javafx.event.EventHandler;
import javafx.event.ActionEvent;
import javafx.scene.control.Button;


public class ButtonSegmentController extends BorderPane implements
 EventHandler<ActionEvent> {


  private ButtonMenu buttonMenu;
  private ButtonSegmentControllerDataSource dataSource;


  public ButtonSegmentController(ButtonSegmentControllerDataSource dataSource)
   {
    super();

    this.buttonMenu = new ButtonMenu();
    this.dataSource = dataSource;

    this.setTop(this.buttonMenu);

    this.reloadData();
  }


  public void reloadData() {

    this.buttonMenu.removeAllButtons();

    for(int i = 0; i < this.dataSource.getNumberOfSegments(); i++) {
      this.buttonMenu.addButton(
        this,
        this.dataSource.getTitleForSegment(i)
      );
    }

    if(this.dataSource.getNumberOfSegments() > 0) {
      this.setCenter(
```

```java
      this.dataSource.getPaneForSegment(
        this.dataSource.getTitleForSegment(0)
      )
    );
  }
}


  @Override
  public void handle(ActionEvent actionEvent) {
    String senderTitle = ((Button)actionEvent.getSource()).getText();

    this.setCenter(this.dataSource.getPaneForSegment(senderTitle));
  }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * ButtonSegmentControllerDataSource.java
 */

package code;

import javafx.scene.layout.Pane;

interface ButtonSegmentControllerDataSource {

  public int getNumberOfSegments();
  public String getTitleForSegment(int segmentIndex);
  public Pane getPaneForSegment(String segmentTitle);

}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * CircleDataModel.java
 */

package code;

import java.util.Scanner;
import java.io.File;
import java.io.FileNotFoundException;
import java.util.LinkedList;

public class CircleDataModel {

  private DemoCircle circle1;
  private DemoCircle circle2;

  private DemoCircle[][] testCases;

  public CircleDataModel() {
    this.circle1 = new DemoCircle(50, 50, 10);
    this.circle2 = new DemoCircle(100, 50, 10);

    this.testCases = this.getTestCasesFromFile();
  }

  private DemoCircle[][] getTestCasesFromFile() {
    LinkedList<DemoCircle[]> result = new LinkedList<DemoCircle[]>();;
    Scanner fileScanner;
    Scanner strScanner;

    try {
      fileScanner = new Scanner(new File("data.txt"));
    } catch(FileNotFoundException e) {
      try {
        fileScanner = new Scanner(new File("data/data.txt"));
      } catch(FileNotFoundException f) {
        try {
          fileScanner = new Scanner(new File("data/inFile.txt"));
        } catch(FileNotFoundException g) {
          return new DemoCircle[0][0];
        }
      }
    }


    while(fileScanner.hasNextLine()) {
```

```java
      DemoCircle[] newTestCase = new DemoCircle[2];
      strScanner = new Scanner(fileScanner.nextLine());
      newTestCase[0] = readCircleFromScanner(strScanner);
      newTestCase[1] = readCircleFromScanner(strScanner);
      result.addLast(newTestCase);
    }

    return result.toArray(new DemoCircle[result.size()][2]);
  }


  private DemoCircle readCircleFromScanner(Scanner circleScanner) {
    return new DemoCircle(
      Double.parseDouble(circleScanner.next().replace(",", "")),
      Double.parseDouble(circleScanner.next().replace(",", "")),
      Double.parseDouble(circleScanner.next().replace(",", ""))
    );
  }


  public void setCircleData(String circleData) {
    Scanner circleScanner = new Scanner(circleData);

    this.circle1 = readCircleFromScanner(circleScanner);
    this.circle2 = readCircleFromScanner(circleScanner);
  }


  public void setCircleData(DemoCircle[] circleData) {
    this.circle1 = circleData[0];
    this.circle2 = circleData[1];
  }


  public int getNumTestCases() {
    return this.testCases.length;
  }


  public DemoCircle[] getTestCase(int testCaseIdx) {
    if (0 <= testCaseIdx && testCaseIdx < this.getNumTestCases()) {
      return this.testCases[testCaseIdx];
    }
    return null;
  }


  public javafx.scene.shape.Circle getCircle1() {
    return this.circle1;
  }
```

```java
  public javafx.scene.shape.Circle getCircle2() {
    return this.circle2;
  }


  public String getCircleRelationship() {

    if (this.circle1.equals(circle2)) {
      return "Circles are identical.";
    } else if (this.circle1.isInside(this.circle2)) {
      if(this.circle1.isInternallyTouching(this.circle2)) {
        return "C1 is inside of and touching C2.";
      } else {
        return "C1 is inside of but not touching C2.";
      }
    } else if (this.circle2.isInside(this.circle1)) {
      if(this.circle2.isInternallyTouching(this.circle1)) {
        return "C2 is inside of and touching C1.";
      } else {
        return "C2 is inside of but not touching C1.";
      }
    } else if (this.circle1.isOutside(this.circle2)) {
      if(this.circle1.isExternallyTouching(this.circle2)) {
        return "C1 is outside of and touching C2.";
      } else {
        return "C1 is outside of but not touching C2.";
      }
    }else {
      return "Circles properly overlap.";
    }
  }


  public String toString() {
    return this.circle1.getCenterX()
            + " " + this.circle1.getCenterY()
            + " " + this.circle1.getRadius()
            + " " + this.circle2.getCenterX()
            + " " + this.circle2.getCenterY()
            + " " + this.circle2.getRadius();
  }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * CircleDataPane.java
 */

package code;


import javafx.scene.layout.VBox;
import javafx.scene.control.Label;
import javafx.scene.control.TextField;
import javafx.scene.control.Button;
import javafx.scene.control.ToggleGroup;
import javafx.scene.control.RadioButton;
import javafx.geometry.Insets;
import javafx.event.EventHandler;
import javafx.event.ActionEvent;
import javafx.scene.paint.Color;
import javafx.beans.value.ChangeListener;
import javafx.beans.value.ObservableValue;
import javafx.scene.control.Toggle;


public class CircleDataPane extends VBox implements EventHandler<ActionEvent>,
 ChangeListener<Toggle> {

  public static final double DEFAULT_SPACING = 20;

  private CircleDataModel circleDataModel;

  private EventHandler<ActionEvent> parent;

  private Label lbl_circlesData;
  private TextField tf_circlesData;
  private Button btn_submitChanges;

  private ToggleGroup group;

  private Label lbl_circle1;
  private Label lbl_circle2;

  public CircleDataPane(EventHandler<ActionEvent> parent) {
    super(CircleDataPane.DEFAULT_SPACING);

    this.parent = parent;
    this.circleDataModel = new CircleDataModel();
```

```java
    this.setPrefWidth(300);
    this.setPadding(new Insets(10, 30, 50, 20));

    this.lbl_circlesData = new Label("Circles Data:");
    this.tf_circlesData = new TextField();
    this.tf_circlesData.setOnAction(this);
    this.btn_submitChanges = new Button("Submit Changes");
    this.btn_submitChanges.setOnAction(this);
    this.getChildren().addAll(this.lbl_circlesData, this.tf_circlesData,
     this.btn_submitChanges);

    this.group = new ToggleGroup();
    for(int i = 0; i < this.circleDataModel.getNumTestCases(); i++) {
      RadioButton rb = new RadioButton("Test Case " + (i + 1));
      rb.setToggleGroup(group);
      rb.setUserData(i);
      this.getChildren().add(rb);
    }
    group.selectedToggleProperty().addListener(this);

    this.lbl_circle1 = new Label("Circle 1:\n");
    this.lbl_circle1.setTextFill(Color.RED);
    this.lbl_circle2 = new Label("Circle 2:\n");
    this.lbl_circle2.setTextFill(Color.BLUE);
    this.getChildren().addAll(this.lbl_circle1, this.lbl_circle2);

    this.updateUI();
  }


  @Override
  public void handle(ActionEvent actionEvent) {
    circleDataModel.setCircleData(this.tf_circlesData.getText());
    this.updateUI();

    parent.handle(actionEvent);
  }

  @Override
  public void changed(
      ObservableValue<? extends Toggle> ov,
      Toggle old_toggle,
      Toggle new_toggle
  ) {

    if (group.getSelectedToggle() != null) {
      int idx = (Integer)group.getSelectedToggle().getUserData();

       this.circleDataModel.setCircleData(this.circleDataModel.getTestCase(idx)
       );
      this.updateUI();
```

```java
      parent.handle(null);
    }
  }


  public void updateUI() {

    this.tf_circlesData.setText(this.circleDataModel.toString());

    this.lbl_circle1.setText("Circle 1:\n" +
     this.circleDataModel.getCircle1().toString());
    this.lbl_circle2.setText("Circle 2:\n" +
     this.circleDataModel.getCircle2().toString());

    this.lbl_circlesData.setText(this.circleDataModel.getCircleRelationship());
  }


  public CircleDataModel getModel() {
    return this.circleDataModel;
  }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * CircleDataScrollPane.java
 */

package code;

import javafx.scene.control.ScrollPane;
import javafx.event.EventHandler;
import javafx.event.ActionEvent;
import javafx.scene.control.ScrollPane.ScrollBarPolicy;


public class CircleDataScrollPane extends ScrollPane {

  private CircleDataPane pane;

  public CircleDataScrollPane(EventHandler<ActionEvent> parent) {
    this.pane = new CircleDataPane(parent);
    this.setContent(this.pane);
    this.setHbarPolicy(ScrollBarPolicy.NEVER);
  }


  public CircleDataPane getPane() {
    return this.pane;
  }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * Demo.java
 */

package code;


import javafx.application.Application;
import javafx.scene.Scene;
import javafx.scene.layout.Pane;
import javafx.stage.Stage;


public class Circles extends Application implements
 ButtonSegmentControllerDataSource {

  public static final String AUTHOR_MENU_OPTION = "Author";
  public static final String PROBLEM_MENU_OPTION = "Problem";
  public static final String REFERENCE_MENU_OPTION = "Reference";
  public static final String DEMOS_MENU_OPTION = "Demos";
  public static final String[] MENU_OPTION_TITLES = {
    Demo.AUTHOR_MENU_OPTION,
    Demo.PROBLEM_MENU_OPTION,
    Demo.REFERENCE_MENU_OPTION,
    Demo.DEMOS_MENU_OPTION,
  };

  private ButtonSegmentController segmentController;
  private AuthorPane authorPane;
  private ProblemPane problemPane;
  private ReferencePane referencePane;
  private DemosPane demosPane;


  public static void main(String[] args) {

    System.out.println("CS5405");
    System.out.println("Homework 05");
    System.out.println("Grant Broadwater");
    System.out.println("October 16, 2018");
    System.out.println();

    System.out.println("Starting application.");
    Demo.launch(args);
    System.out.println("Terminating application.");
```

```java
    }


    public void start(Stage primaryStage) {

        this.authorPane = new AuthorPane();
        this.problemPane = new ProblemPane();
        this.referencePane = new ReferencePane();
        this.demosPane = new DemosPane();
        this.segmentController = new ButtonSegmentController(this);

        Scene scene = new Scene(this.segmentController, 750, 600);
        primaryStage.setTitle("Homework 05");
        primaryStage.setScene(scene);
        primaryStage.show();
    }


    public int getNumberOfSegments() {
        return Demo.MENU_OPTION_TITLES.length;
    }


    public String getTitleForSegment(int segmentIndex) {
        return Demo.MENU_OPTION_TITLES[segmentIndex];
    }


    public Pane getPaneForSegment(String segmentTitle) {
        if (segmentTitle.equals(Demo.AUTHOR_MENU_OPTION)) {
            return this.authorPane;
        } else if (segmentTitle.equals(Demo.PROBLEM_MENU_OPTION)) {
            return this.problemPane;
        } else if (segmentTitle.equals(Demo.REFERENCE_MENU_OPTION)) {
            return this.referencePane;
        } else if (segmentTitle.equals(Demo.DEMOS_MENU_OPTION)) {
            return this.demosPane;
        } else {
            return null;
        }
    }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * DemosPane.java
 */

package code;


import javafx.scene.layout.BorderPane;
import javafx.scene.layout.Pane;
import javafx.scene.shape.Circle;
import javafx.event.EventHandler;
import javafx.event.ActionEvent;
import javafx.scene.paint.Color;


public class DemosPane extends BorderPane implements EventHandler<ActionEvent>
 {

  private CircleDataScrollPane circleDataPane;

  private Pane circlePane;
  private Circle c1;
  private Circle c2;

  public DemosPane() {
    super();

    this.circleDataPane = new CircleDataScrollPane(this);
    this.setLeft(this.circleDataPane);

    this.updateUI();
  }


  @Override
  public void handle(ActionEvent actionEvent) {
    this.updateUI();
  }


  public void updateUI() {

    this.circlePane = new Pane();
    this.circlePane.setStyle("-fx-border-color: black");
    this.c1 = circleDataPane.getPane().getModel().getCircle1();
    this.c2 = circleDataPane.getPane().getModel().getCircle2();
```

```java
        this.c1.setFill(new Color(1.0, 0.0, 0.0, 0.5));
        this.c1.setStroke(Color.RED);
        this.c2.setFill(new Color(0.0, 0.0, 1.0, 0.5));
        this.c2.setStroke(Color.BLUE);

        this.circlePane.getChildren().add(this.c1);
        this.circlePane.getChildren().add(this.c2);

        this.setCenter(circlePane);
    }
}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * LabelPane.java
 */

package code;

import javafx.scene.layout.StackPane;
import javafx.scene.control.Label;


public class LabelPane extends StackPane {

  private Label primaryLabel;

  public LabelPane(String labelText) {
    super();

    this.primaryLabel = new Label(labelText);
    this.getChildren().add(this.primaryLabel);
  }

}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * ProblemPane.java
 */

package code;


public class ProblemPane extends LabelPane {

  public static final String PROBLEM_TEXT = "This exercise also extends your
    previous HW04."
      + "\nThis is a variation of ex 14.23 p.590, it is circles instead of
       rectangles."
      + "\nYou are experts on circles.  By now, everyone should be able to do it
       correctly."
      + "\nDo it right, it will be used again.";

  public ProblemPane() {
    super(ProblemPane.PROBLEM_TEXT);
  }

}
```

```java
/*
 * CS5405
 * Homework 05
 * Grant Broadwater (grbcp5)
 * October 16, 2018
 *
 * ReferencePane.java
 */

package code;


public class ReferencePane extends LabelPane {

  public static final String REFERENCE_TEXT
    = "Resources used include lecuture notes, the textbook, as well as Oracle
     Java Documentation.\n(https://docs.oracle.com/javase/8/docs/)";

  public ReferencePane() {
    super(ReferencePane.REFERENCE_TEXT);
  }

}
```