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Chapter 14 Check Point Questions

Section 14.2

▼14.2.1

Explain the evolution of Java GUI technologies.

See the text for a brief discussion from AWT to Swing, and to JavaFX.

Hide Answer Read Answer

▼14.2.2

Explain why this book teaches Java GUI using JavaFX.

This book teaches Java GUI programming using JavaFX for three reasons.
First, JavaFX is much simpler to learn and use for new Java programmers.
Second, JavaFX is a better pedagogical tool for demonstrating object-oriented programming than Swing.
Third, Swing is essentially dead, because it will not receive any further enhancement.
JavaFX is the new GUI tool for developing cross-platform-rich Internet applications on desktop computers, on hand-held devices, and on the Web.

Hide Answer Read Answer

Section 14.3

▼14.3.1

How do you define a JavaFX main class? What is the signature of the start method? What is a stage? What is a primary stage? Is a primary stage automatically created? How do you display a stage? Can you prevent the user from resizing the stage? Can you replace Application.launch(args) by launch(args) in line 22 in Listing 14.1?

You define a JavaFX main class by extending the Application class. The signature of the start method is

```
public void start(Stage primaryStage)
```

A stage is a window to holding a scene. An application may have multiple stages. The primary stage is automatically created when a JavaFX program is launched. To display a stage, invoke its show() method.
You can prevent the user from resizing the stage by invoking stage.setResizable(false).
You can replace Application.launch(args) by launch(args), because the JavaFX main class is a subtype of Application.

Hide Answer Read Answer

▼14.3.2

Show the output of the following JavaFX program.

```
import javafx.application.Application;
import javafx.stage.Stage;

public class Test extends Application {
  public Test() {
    System.out.println("Test constructor is invoked");
  }

  @Override // Override the start method in the Application class
  public void start(Stage primaryStage) {
    System.out.println("start method is invoked");
  }

  public static void main(String[] args) {
    System.out.println("launch application");
    Application.launch(args);
  }
}
```

The output of the program is:

```
launch application
Test constructor is invoked
Start method is invoked
```

Hide Answer Read Answer

Section 14.4

▼14.4.1

How do you create a Scene object? How do you set a scene in a stage? How do you place a circle into a scene?

To create a Scene, use new Scene(parent, width, height) or new Scene(parent). To set a scene in a stage, invoke Stage's setScene(scene) method. To place a circle to a scene, first place the circle into a pane, and then place the pane into the scene.

Hide Answer Read Answer

▼14.4.2

What is a pane? What is a node? How do you place a node in a pane? Can you directly place a Shape or an ImageView into a Scene? Can you directly place a Control or a Pane into a Scene?

A pane is used to hold and organize nodes. A node is a visual component that can be displayed. You can place a node into a pane using the pane.getChildren().add(node). You cannot directly place a Shape or an ImageView into a scene. You can directly place a Control or a Pane into a scene when constructing a Scene using new Scene(Parent, width, height) or new Scene(Parent). Parent is the superclass for Control and Pane.

Hide Answer Read Answer

▼14.4.3

How do you create a Circle? How do you set its center location and radius? How do you set its stroke color and fill color?

You can create a Circle using its no-arg constructor and use its setCenterX, setCenterY methods to set its center location and use its setRadius to set its radius. To set the stroke color, use setStroke(color) method. To set the color, use the setFill(color) method.

Hide Answer Read Answer

▼14.4.4

How do you replace the code in lines 20-21 in Listing 14.4 using one statement?

Pane pane = new Pane(circle);

Hide Answer Read Answer

Section 14.5

▼14.5.1

What is a binding property? What interface defines a binding property? What interface defines a source object? What are the binding object types for int, long, float, double, and boolean? Are Integer and Double binding properties? Can Integer and Double be used as source objects in a binding?

A binding property is the one that binds with a source object. When the contents in the source changes, the binding property values change too. A binding property is an instance of Property and a source object is an instance of ObservableValue. The binding object types for int, long, float, double, and boolean are IntegerProperty, LongProperty, DoubleProperty, and BooleanProperty. Integer and Double are not subtypes of ObservableValue. Hence, they cannot be used as a source object in a binding.

Hide Answer Read Answer

▼14.5.2

Following the JavaFX binding property naming convention, for a binding property named age of the IntegerProperty type, what is its value getter method, value setter method, and property getter method?

The getter method is

```
public int getAge()
```

The setter method is

```
public void setAge(int age)
```

The property getter is

```
public IntegerProperty ageProperty()
```

Hide Answer Read Answer

▼14.5.3

Can you create an object of IntegerProperty using new IntegerProperty(3)? If not, what is the correct way to create it? What will the output if line 8 is replaced by d1.bind(d2.multiply(2)) in Listing 14.6? What will the output if line 8 is replaced by d1.bind(d2.add(2)) in Listing 14.6?

No. IntegerProperty is an abstract class. You have to use new SimpleIntegerProperty(4) to create an instance of IntegerProperty. What will the output if line 8 is replaced by

d1.bind(d2.multiply(2)) in Listing 14.6?

```
d1 is 2.0 and d2 is 2.0
d1 is 140.4 and d2 is 70.2
```

What will the output if line 8 is replaced by d1.bind(d2.add(2)) in Listing 14.6?

```
d1 is 2.0 and d2 is 2.0
d1 is 72.4 and d2 is 70.2
```

Hide Answer Read Answer

▼14.5.4

What is a unidirectional binding and what is bidirectional binding? Are all binding properties capable of bidirectional binding? Write a statement to bind property d1 with property d2 bidirectionally.

A unidirectional binding binds a target with a source. A bidirectional binding binds two objects together. Changes in one object affects the other. Not all binding properties can be bidirectional. The statement to bind d1 with d2 is d1.bindBidirectional(d2). 12.

```
node.setStyle("-fx-border: red");
text.setStyle("-fx-fill: red");
```

Hide Answer Read Answer

Section 14.6

▼14.6.1

How do you set a style of a node with border color red? Modify the code to set the text color for the button to red.

```
node.setStyle("-fx-border: red");
text.setStyle("-fx-fill: red");
```

Hide Answer Read Answer

▼14.6.2

Can you rotate a pane, a text, or a button? Modify the code to rotate the button 15 degrees counterclockwise? How do you test if a point is inside a node? How do you scale up or down a node?

```
Yes.
button.setRotate(-15);
node.contains(x, y);
node.setScaleX(2.0); // Scale x-coordinates up
node.setScaleX(0.2); // Scale x-coordinates down
```

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Section 14.7

▼14.7.1

How do you create a color? What is wrong about creating a Color using new Color(1.2, 2.3, 3.5, 4)? Which of two colors is darker, new Color(0, 0, 0, 1) or new Color(1, 1, 1, 1)?

Does invoking c.darker() change the color value in c?

You can use the Color constructor or static methods in the Color class to create Color objects. new Color(1.2, 2.3, 3.5, 4) is wrong because the parameter values must be between 0 and 1. new Color(0, 0, 0, 1) is darker than new Color(1, 1, 1, 1). Invoking c.darker() returns a new Color. Color is immutable.

Hide Answer Read Answer

▼ **14.7.2**

How do you create a Color object with a random color?

```
new Color(Math.random(), Math.random(), Math.random(), 1)
```

Hide Answer Read Answer

▼ **14.7.3**

How do you set a circle object c with blue fill color using the setFill method and using the setStyle method?

```
c.setFill(Color.BLUE)
c.setStyle("-fx-fill: blue")
```

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Section 14.8

▼ **14.8.1**

How do you create a Font object with font name Courier, size 20, and weight bold?

new Font("Courier", Weight.BOLD, 20)

Hide Answer Read Answer

▼ **14.8.2**

How do you find all available fonts on your system?

Use Font.getFontNames() to return a list of strings for font names.

Hide Answer Read Answer

Section 14.9

▼ **14.9.1**

How do you create an Image from a URL or a filename?

Use new Image(filename) or new Image(url)

Hide Answer Read Answer

▼ **14.9.2**

How do you create an ImageView from an Image, or directly from a file or a URL?

Use new ImageView(image)

Hide Answer Read Answer

▼14.9.3

Can you set an Image to multiple ImageView? Can you display the same ImageView multiple times?

You can set an Image to multiple ImageView, but you cannot display one ImageView multiple times.

Hide Answer Read Answer

Section 14.10

▼14.10.1

How do you add a node to a Pane, StackPane, FlowPane, GridPane, BorderPane, HBox, and VBox? How do you remove a node from these panes?

To add a node to a Pane, StackPane, FlowPane, HBox, and VBox, use pane.getChildren().add(node). To add node to a BorderPane, use the setTop, setBottom, setLeft, setRight, and setCenter methods. To remove a node from these panes, use pane.getChildren().remove(node).

Hide Answer Read Answer

▼14.10.2

How do you set the alignment to right for nodes in a FlowPane, GridPane, HBox, and VBox?

pane.setAlignment(Pos.RIGHT)

Hide Answer Read Answer

▼14.10.3

How do you set the horizontal gap and vertical hap between nodes in 8 pixels in a FlowPane and GridPane and set spacing in 8 pixels in an HBox and VBox?

For a FlowPane and a GridPane, pane.setHGap(8) and pane.setVGap(8). For an HBox and VBox, use pane.setSpacing(8).

Hide Answer Read Answer

▼14.10.4

How do you get the column and row index of a node in a GridPane? How do you reposition a node in a GridPane?

pane.getRowIndex(node) and pane.getColumnIndex(node). To reposition a node in a GridPane, use pane.setRowIndex(node, rowIndex) and pane.setColumnIndex(node, columnIndex).

Hide Answer Read Answer

▼14.10.5

What are the differences between a FlowPane and an HBox or a VBox?

FlowPane can have multiple rows and columns. The nodes in a FlowPane can be placed horizontally or vertically. An HBox can have only one row and an VBox can have only one column.

Hide Answer Read Answer

Section 14.11

▼14.11.1

How do you display a text, line, rectangle, circle, ellipse, arc, polygon, and polyline?

To display a text, line, rectangle, circle, ellipse, arc, polygon, and polyline, create an instance of the Text, Line, Rectangle, Circle, Ellipse, Arc, Polygon, and Polyline and add it to a pane and place the pane into a scene.

Hide Answer Read Answer

▼14.11.2

Write code fragments to display a string rotated 45 degrees in the center of the pane.

```
Text text = new Text("Welcome");
StackPane pane = new StackPane();
pane.getChildren().add(text);
text.setRotate(15);
```

Hide Answer Read Answer

▼14.11.3

Write code fragments to display a thick line of 10 pixels from (10, 10) to (70, 30).

```
Line line = new Line(10, 10, 70, 30);
line.setStrokeWidth(10);
```

Hide Answer Read Answer

▼14.11.4

Write code fragments to fill red color in a rectangle of width 100 and height 50 with the upper-left corner at (10, 10).

```
Rectangle rectangle = new Rectangle(10, 10, 100, 50);
rectangle.setFill(Color.RED);
```

Hide Answer Read Answer

▼14.11.5

Write code fragments to display a round-cornered rectangle with width 100, height 200with the upper-left corner at (10, 10), corner horizontal diameter 40, and corner vertical diameter 20.

```
Rectangle rectangle = new Rectangle(10, 10, 100, 200);
rectangle.setArcWidth(40);
rectangle.setArcHeight(20);
```

Hide Answer Read Answer

▼14.11.6

Write code fragments to display an ellipse with horizontal radius 50 and vertical radius 100.

```
Ellipse ellipse = new Ellipse();
ellipse.setRadiusX(50); ellipse.setRadiusY(100);
```

Hide Answer Read Answer

▼14.11.7

Write code fragments to display the outline of the upper half of a circle with radius 50.

```
Arc arc = new Arc();
arc.setRadiusX(50); arc.setRadiusY(50);
arc.setFill(null);
arc.setStartAngle(0); arc.setLength(180);
arc.setType(ArcType.OPEN);
```

Hide Answer Read Answer

▼14.11.8

Write code fragments to display the lower half of a circle with radius 50 filled with the red color.

```
Arc arc = new Arc();
arc.setRadiusX(50); arc.setRadiusY(50);
arc.setStartAngle(180); arc.setLength(180);
arc.setFill(Color.RED);
arc.setType(ArcType.ROUND);
```

Hide Answer Read Answer

▼14.11.9

Write code fragments to display a polygon connecting the following points: (20, 40), (30, 50), (40, 90), (90, 10), (10, 30), and fill the polygon with green color.

```
Polygon p = new Polygon();
g.getPoints().addAll(20.0, 40.0, 30.0,
50.0, 40.0, 90.0, 90.0, 10.0, 10.0, 30.0);
p.setFill(Color.GREEN);
```

Hide Answer Read Answer

▼14.11.10

Write code fragments to display a polyline connecting the following points: (20, 40), (30, 50), (40, 90), (90, 10), (10, 30).

```
Polyline p = new Polyline();
p.getPoints().addAll(20.0, 40.0, 30.0,
50.0, 40.0, 90.0, 90.0, 10.0, 10.0, 30.0);
```

Hide Answer Read Answer

▼14.11.11

What is wrong in the following code?

```
public void start(Stage primaryStage) {
  // Create a polygon and place it in the scene
  Scene scene = new Scene(new Polygon(), 400, 400);
  primaryStage.setScene(scene); // Place the scene in the stage
```

```
    primaryStage.show(); // Display the stage
  }
```

Polygon is a Shape, which cannot be directly added to a scene. You have to place a shape into a pane and add the pane into the scene.

Hide Answer Read Answer

Section 14.12

▼14.12.1

What will happen if lines 120-130 are removed in Listing 14.21? Run the DisplayClock class in Listing 14.20 to test it.

The getWidth() and getHeight() will return 0 in lines 77-78.

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