JavaFX Basics
(Layout Panes)

Layout Panes

JavaFX provides many types of panes for organizing nodes in a container.

Class	*Description*
`Pane`	Base class for layout panes. It contains the `getChildren()` method for returning a list of nodes in the pane.
`StackPane`	Places the nodes on top of each other in the center of the pane.
`FlowPane`	Places the nodes row-by-row horizontally or column-by-column vertically.
`GridPane`	Places the nodes in the cells in a two-dimensional grid.
`BorderPane`	Places the nodes in the top, right, bottom, left, and center regions.
`HBox`	Places the nodes in a single row.
`VBox`	Places the nodes in a single column.

FlowPane

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

javafx.scene.layout.FlowPane

```
-alignment: ObjectProperty<Pos>
-orientation:
   ObjectProperty<Orientation>
-hgap: DoubleProperty
-vgap: DoubleProperty
```

```
+FlowPane()
+FlowPane(hgap: double, vgap:
   double)
+FlowPane(orientation:
   ObjectProperty<Orientation>)
+FlowPane(orientation:
   ObjectProperty<Orientation>,
   hgap: double, vgap: double
```

The overall alignment of the content in this pane (default: `Pos.LEFT`).
The orientation in this pane (default: `Orientation.HORIZONTAL`).

The horizontal gap between the nodes (default: `0`).
The vertical gap between the nodes (default: `0`).

Creates a default `FlowPane`.
Creates a `FlowPane` with a specified horizontal and vertical gap.

Creates a `FlowPane` with a specified orientation.

Creates a `FlowPane` with a specified orientation, horizontal gap and vertical gap.

MultipleStageDemo

GridPane

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

javafx.scene.layout.GridPane

-alignment: ObjectProperty<Pos>
-gridLinesVisible: BooleanProperty
-hgap: DoubleProperty
-vgap: DoubleProperty

+GridPane()
+add(child: Node, columnIndex: int, rowIndex: int): void
+addColumn(columnIndex: int, children: Node...): void
+addRow(rowIndex: int, children: Node...): void
+getColumnIndex(child: Node): int
+setColumnIndex(child: Node, columnIndex: int): void
+getRowIndex(child:Node): int
+setRowIndex(child: Node, rowIndex: int): void
+setHalighnment(child: Node, value: HPos): void
+setValighnment(child: Node, value: VPos): void

The overall alignment of the content in this pane (default: `Pos.LEFT`).
Is the grid line visible? (default: `false`)

The horizontal gap between the nodes (default: 0).
The vertical gap between the nodes (default: 0).

Creates a `GridPane`.
Adds a node to the specified column and row.

Adds multiple nodes to the specified column.

Adds multiple nodes to the specified row.

Returns the column index for the specified node.

Sets a node to a new column. This method repositions the node.

Returns the row index for the specified node.
Sets a node to a new row. This method repositions the node.

Sets the horizontal alignment for the child in the cell.

Sets the vertical alignment for the child in the cell.

ShowGridPane

BorderPane

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

javafx.scene.layout.BorderPane

```
-top: ObjectProperty<Node>
-right: ObjectProperty<Node>
-bottom: ObjectProperty<Node>
-left: ObjectProperty<Node>
-center: ObjectProperty<Node>
```

```
+BorderPane()
+setAlignment(child: Node, pos: Pos)
```

The node placed in the top region (default: `null`).
The node placed in the right region (default: `null`).
The node placed in the bottom region (default: `null`).
The node placed in the left region (default: `null`).
The node placed in the center region (default: `null`).

Creates a `BorderPane`.

Sets the alignment of the node in the `BorderPane`.

ShowBorderPane

HBox

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

javafx.scene.layout.HBox

```
-alignment: ObjectProperty<Pos>
-fillHeight: BooleanProperty
-spacing: DoubleProperty
```

```
+HBox()
+HBox(spacing: double)
+setMargin(node: Node, value:
   Insets): void
```

The overall alignment of the children in the box (default: `Pos.TOP_LEFT`).

Is resizable children fill the full height of the box (default: `true`).

The horizontal gap between two nodes (default: `0`).

Creates a default `HBox`.

Creates an `HBox` with the specified horizontal gap between nodes.

Sets the margin for the node in the pane.

VBox

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

javafx.scene.layout.VBox

```
-alignment: ObjectProperty<Pos>
-fillWidth: BooleanProperty
-spacing: DoubleProperty
```

```
+VBox()
+VBox(spacing: double)
+setMargin(node: Node, value:
   Insets): void
```

The overall alignment of the children in the box (default: `Pos.TOP_LEFT`).

Is resizable children fill the full width of the box (default: `true`).

The vertical gap between two nodes (default: `0`).

Creates a default `VBox`.

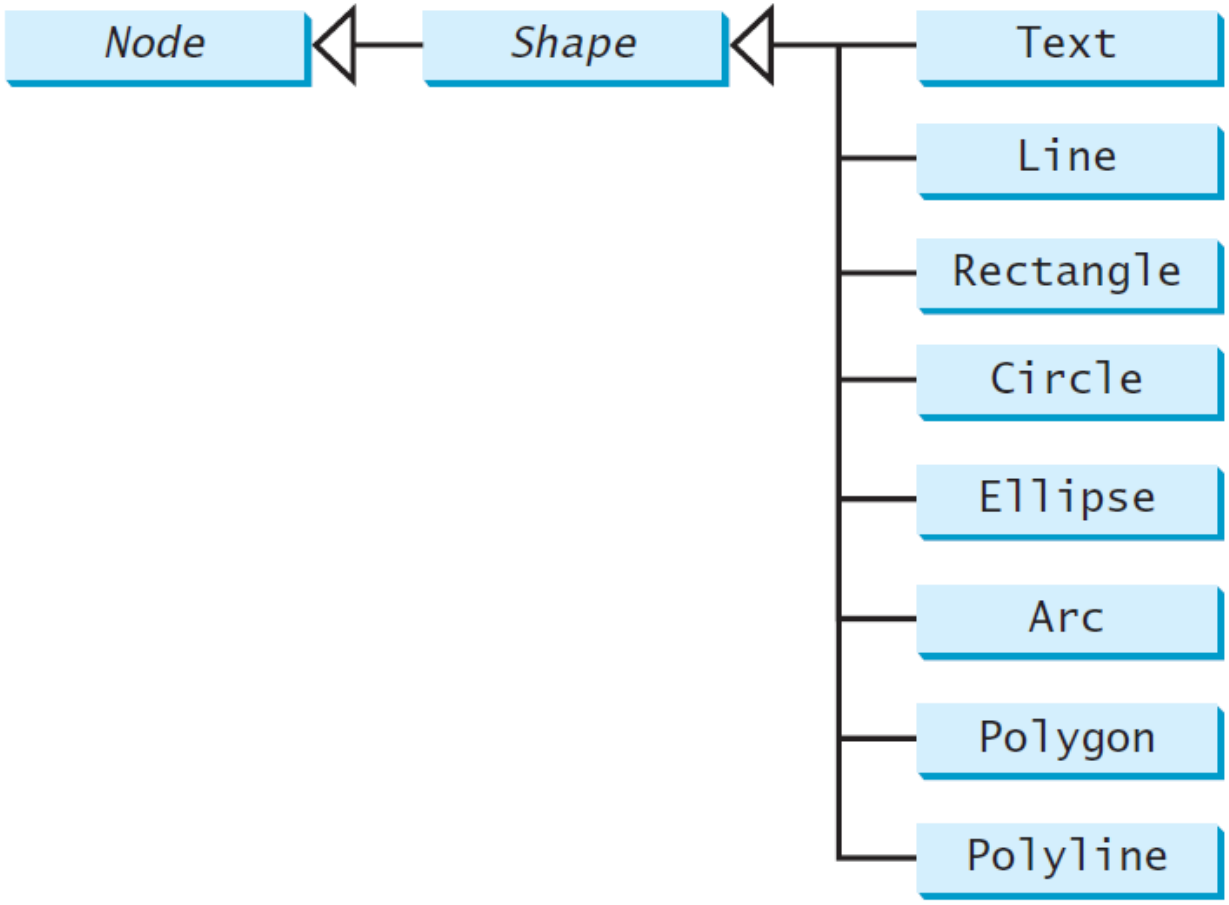
Creates a `VBox` with the specified horizontal gap between nodes.

Sets the margin for the node in the pane.

ShowHBoxVBox

Shapes

JavaFX provides many shape classes for drawing texts, lines, circles, rectangles, ellipses, arcs, polygons, and polylines.



Text

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

javafx.scene.text.Text

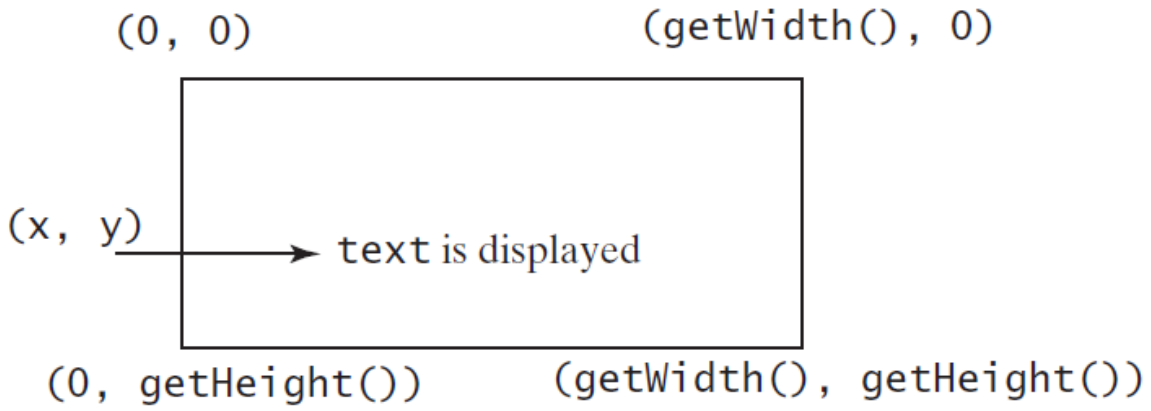
```
-text: StringProperty
-x: DoubleProperty
-y: DoubleProperty
-underline: BooleanProperty
-strikethrough: BooleanProperty
-font: ObjectProperty<Font>
```

```
+Text()
+Text(text: String)
+Text(x: double, y: double,
   text: String)
```

Defines the text to be displayed.
Defines the x-coordinate of text (default 0).
Defines the y-coordinate of text (default 0).
Defines if each line has an underline below it (default `false`).
Defines if each line has a line through it (default `false`).
Defines the font for the text.

Creates an empty Text.
Creates a Text with the specified text.
Creates a Text with the specified x-, y-coordinates and text.

Text Example



(a) Text(x, y, text)

(b) *Three* Text *objects are displayed*

ShowText

Line

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

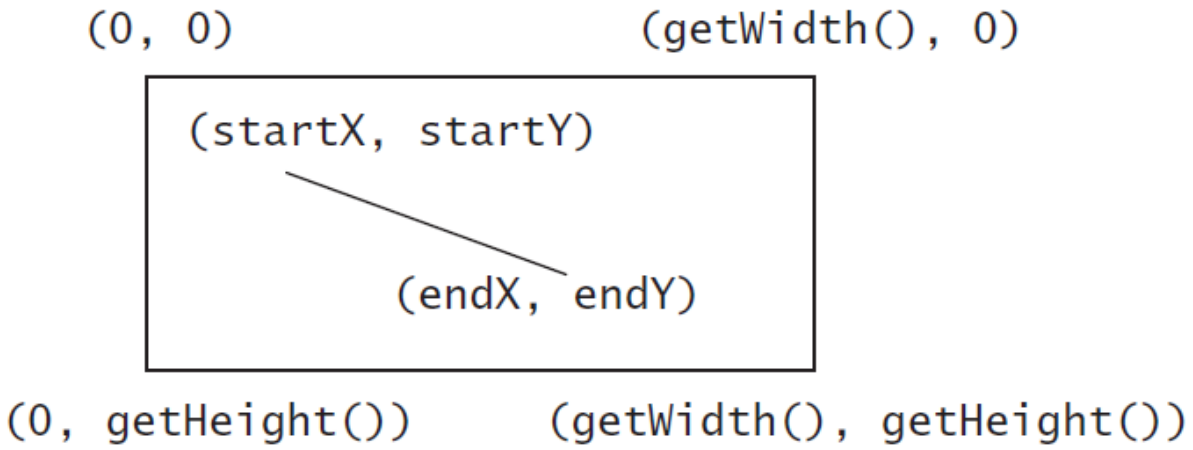
javafx.scene.shape.Line

```
-startX: DoubleProperty
-startY: DoubleProperty
-endX: DoubleProperty
-endY: DoubleProperty
```

```
+Line()
+Line(startX: double, startY:
   double, endX: double, endY:
   double)
```

The x-coordinate of the start point.
The y-coordinate of the start point.
The x-coordinate of the end point.
The y-coordinate of the end point.

Creates an empty `Line`.
Creates a `Line` with the specified starting and ending points.



ShowLine

Rectangle

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

javafx.scene.shape.Rectangle

```
-x: DoubleProperty
-y:DoubleProperty
-width: DoubleProperty
-height: DoubleProperty
-arcWidth: DoubleProperty

-arcHeight: DoubleProperty
```

```
+Rectangle()
+Rectanlge(x: double, y:
   double, width: double,
   height: double)
```

The x-coordinate of the upper-left corner of the rectangle (default 0).

The y-coordinate of the upper-left corner of the rectangle (default 0).

The width of the rectangle (default: 0).

The height of the rectangle (default: 0).

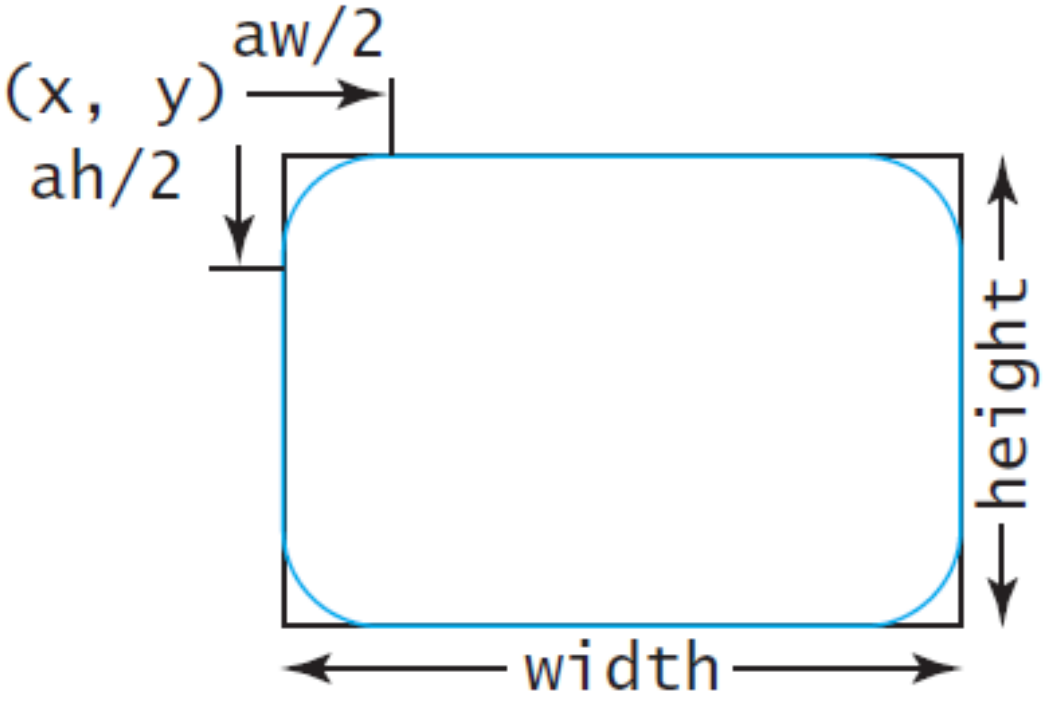
The `arcWidth` of the rectangle (default: 0). `arcWidth` is the horizontal diameter of the arcs at the corner (see Figure 14.31a).

The `arcHeight` of the rectangle (default: 0). `arcHeight` is the vertical diameter of the arcs at the corner (see Figure 14.31a).

Creates an empty `Rectangle`.

Creates a `Rectangle` with the specified upper-left corner point, width, and height.

Rectangle Example



(a) Rectangle(x, y, w, h)

ShowRectangle

Circle

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

javafx.scene.shape.Circle

```
-centerX: DoubleProperty
-centerY: DoubleProperty
-radius: DoubleProperty
```

```
+Circle()
+Circle(x: double, y: double)
+Circle(x: double, y: double,
   radius: double)
```

The x-coordinate of the center of the circle (default 0).

The y-coordinate of the center of the circle (default 0).

The radius of the circle (default: 0).

Creates an empty `Circle`.

Creates a `Circle` with the specified center.

Creates a `Circle` with the specified center and radius.

Ellipse

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

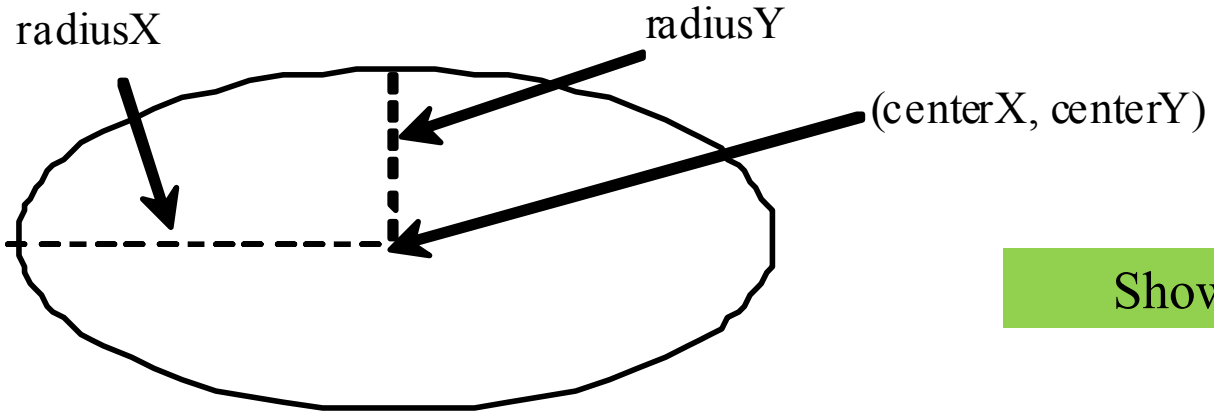
javafx.scene.shape.Ellipse

```
-centerX: DoubleProperty
-centerY: DoubleProperty
-radiusX: DoubleProperty
-radiusY: DoubleProperty
```

```
+Ellipse()
+Ellipse(x: double, y: double)
+Ellipse(x: double, y: double,
   radiusX: double, radiusY:
   double)
```

The x-coordinate of the center of the ellipse (default 0).
The y-coordinate of the center of the ellipse (default 0).
The horizontal radius of the ellipse (default: 0).
The vertical radius of the ellipse (default: 0).

Creates an empty `Ellipse`.
Creates an `Ellipse` with the specified center.
Creates an `Ellipse` with the specified center and radiuses.



ShowEllipse

Arc

The getter and setter methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

javafx.scene.shape.Arc

```
-centerX: DoubleProperty
-centerY: DoubleProperty
-radiusX: DoubleProperty
-radiusY: DoubleProperty
-startAngle: DoubleProperty
-length: DoubleProperty
-type: ObjectProperty<ArcType>
```

```
+Arc()
+Arc(x: double, y: double,
   radiusX: double, radiusY:
   double, startAngle: double,
   length: double)
```

The x-coordinate of the center of the ellipse (default 0).

The y-coordinate of the center of the ellipse (default 0).

The horizontal radius of the ellipse (default: 0).

The vertical radius of the ellipse (default: 0).

The start angle of the arc in degrees.

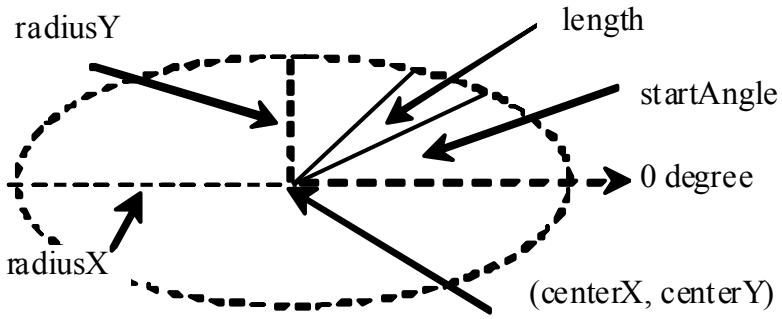
The angular extent of the arc in degrees.

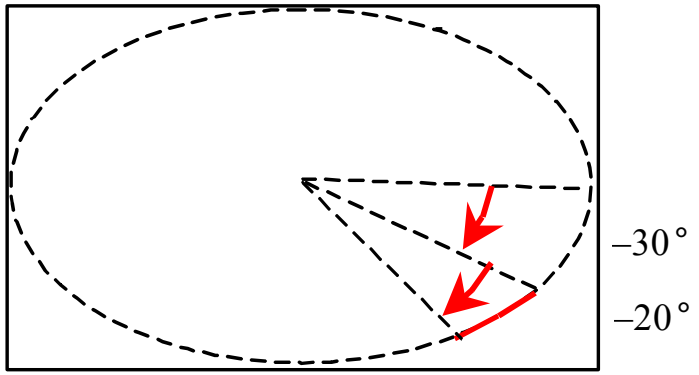
The closure type of the arc (`ArcType.OPEN`, `ArcType.CHORD`, `ArcType.ROUND`).

Creates an empty `Arc`.

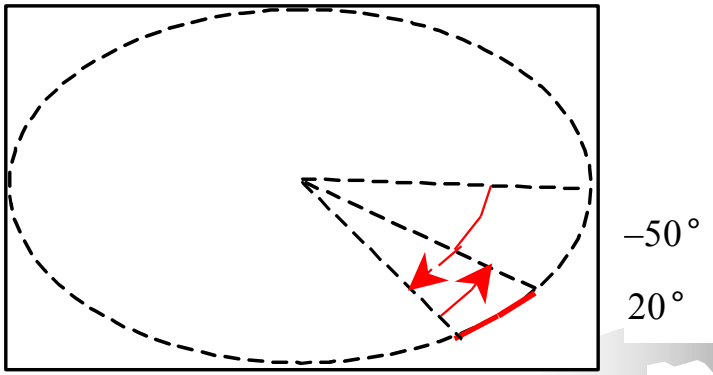
Creates an `Arc` with the specified arguments.

Arc Examples





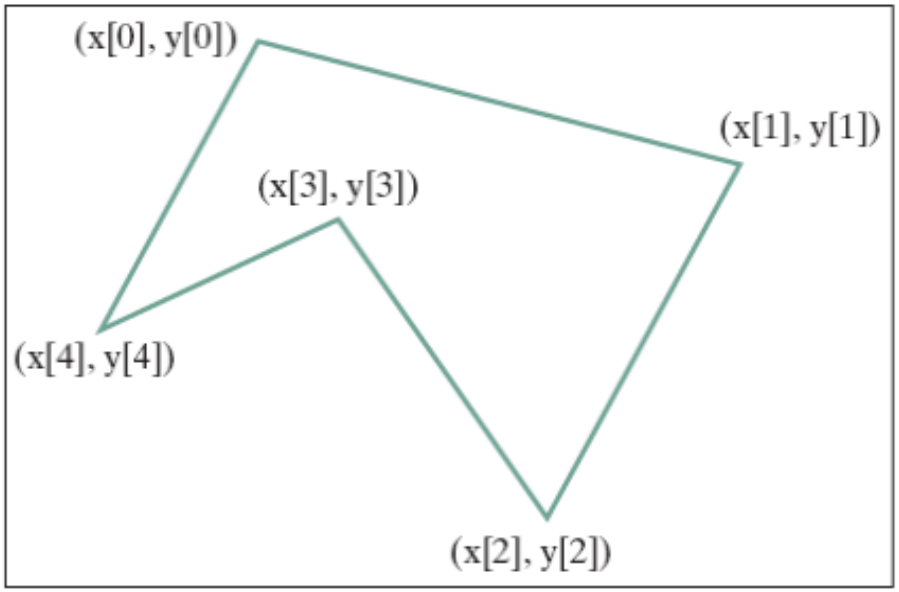
(a) Negative starting angle –30° and negative spanning angle –20°



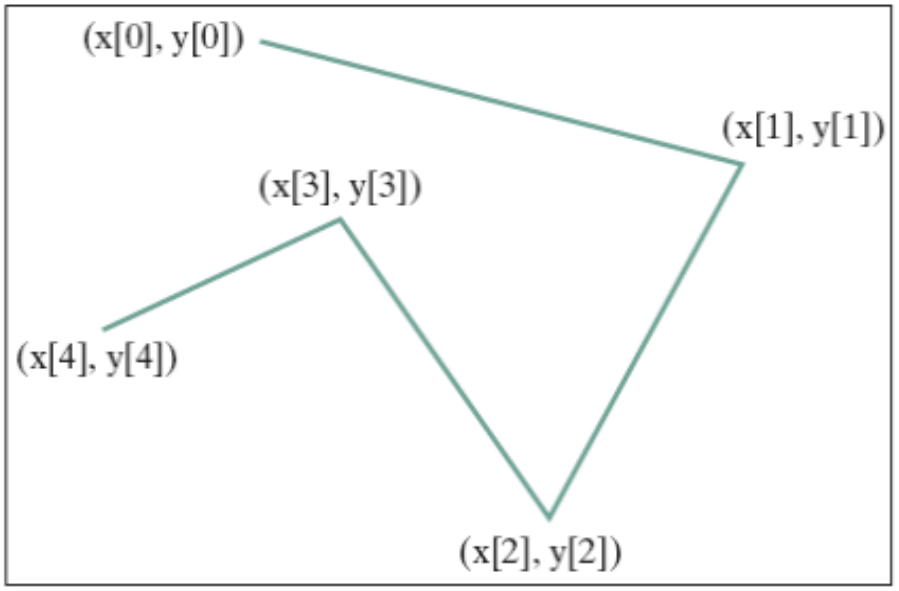
(b) Negative starting angle –50° and positive spanning angle 20°

ShowArc

Polygon and Polyline



(a) Polygon



(b) Polyline

Polygon

javafx.scene.shape.Polygon
+Polygon()
+Polygon(double... points)
+getPoints(): ObservableList<Double>

The `getter` and `setter` methods for property values and a getter for property itself are provided in the class, but omitted in the UML diagram for brevity.

Creates an empty polygon.

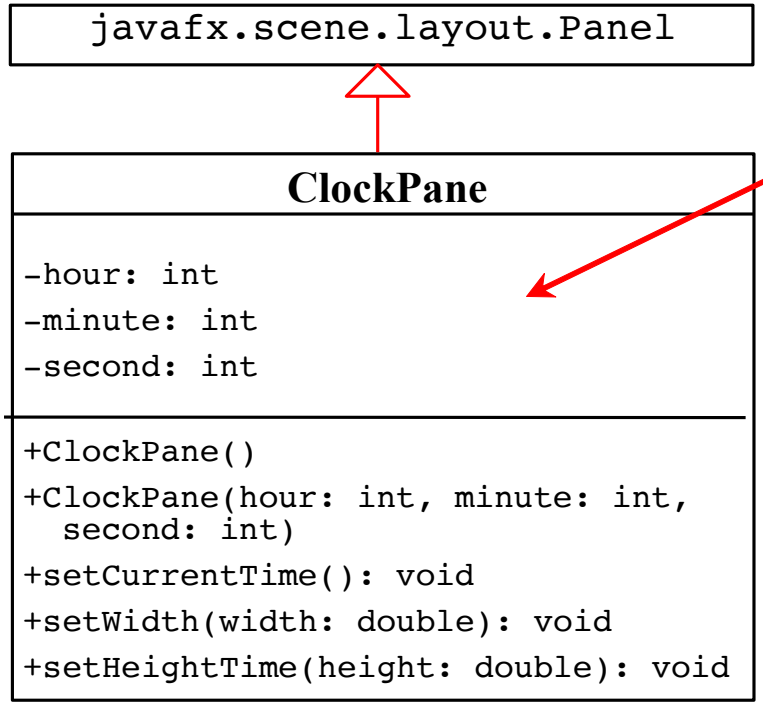
Creates a polygon with the given points.

Returns a list of double values as x- and y-coordinates of the points.

ShowPolygon

Case Study: The ClockPane Class

This case study develops a class that displays a clock on a pane.



The `getter` and `setter` methods for these data fields are provided in the class, but omitted in the UML diagram for brevity.

The hour in the clock.

The minute in the clock.

The second in the clock.

Constructs a default clock for the current time.

Constructs a clock with the specified time.

Sets hour, minute, and second for current time.
Sets clock pane's width and repaint the clock,
Sets clock pane's height and repaint the clock,

ClockPane

Use the ClockPane Class

DisplayClock