Moving From JFreeChart To JavaFX Charts with *JavaFX Chart Extensions*

JavaOne 2015 Session:

Moving Enterprise Data From JFreeChart To JavaFX Charts

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Projects: https://bitbucket.org/emxsys

# JFreeChart versus JavaFX Charts

JFreeChart

- De facto standard, rich, mature library
- Free, open source; pay for the Developer Guide
- Forum support by author
- Comprehensive collection of chart types
- *Swing-based*

JavaFX Charts

- Cool, new, native
- JavaFX-based
- *Missing key features that are found in JFreeChart*
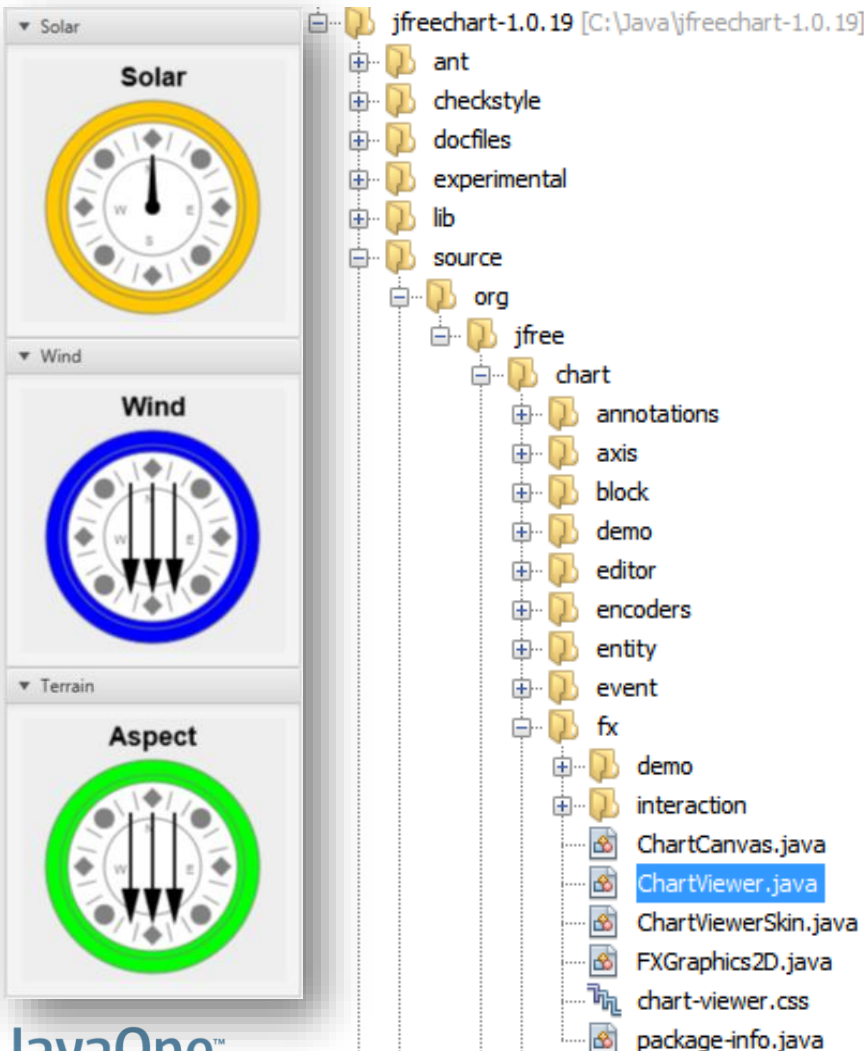
Case Study: WildfireFX Application
JavaFX port of Wildfire Management Tool (WMT)

https://bitbucket.org/emxsys/wildfirefx
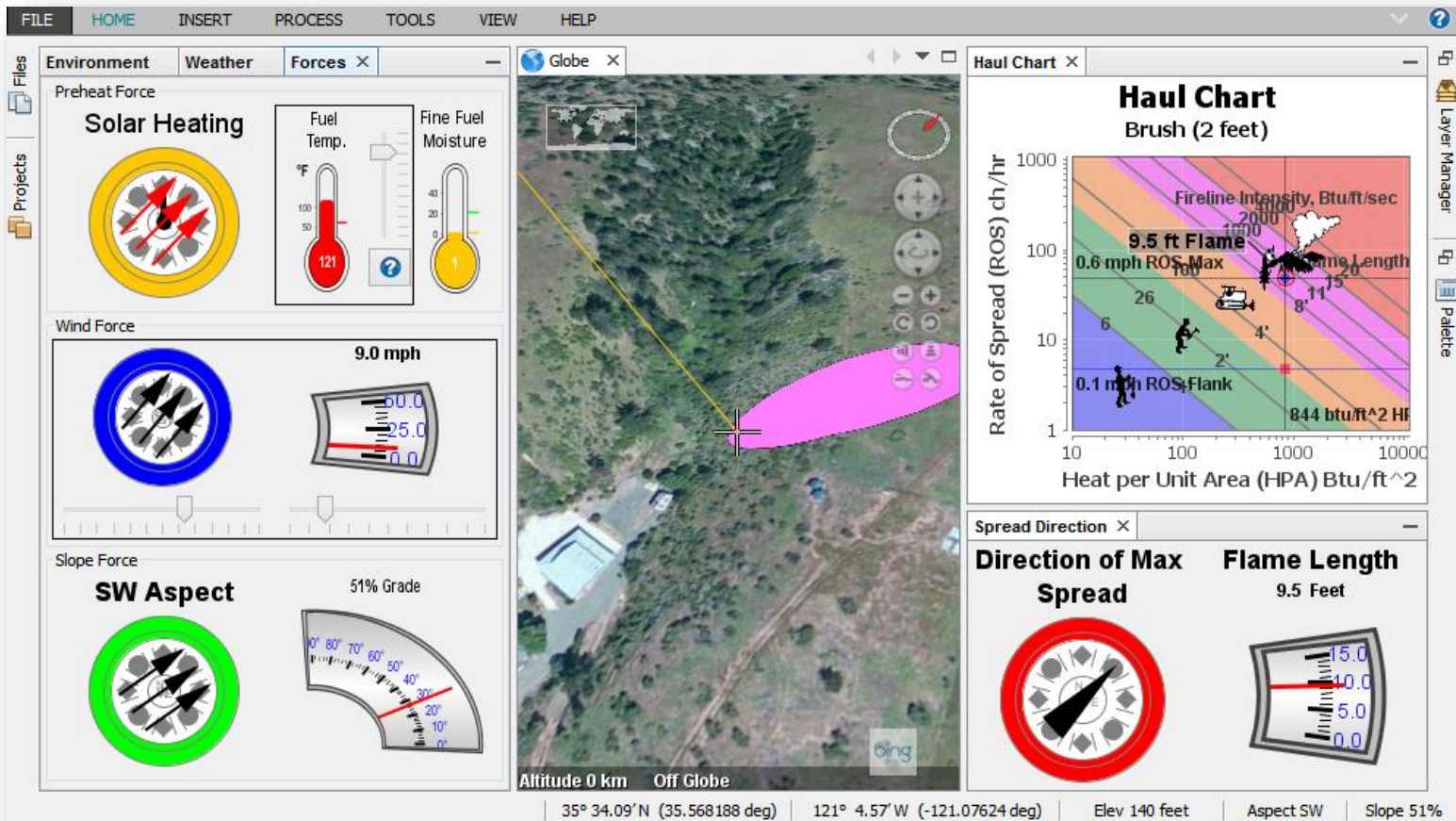
Using JFreeChart's ChartViewer
ChartViewer included in JFreeChart source distribution


```java
// Example
import org.jfree.chart.fx.ChartViewer;
public class FXMLController
        implements Initializable {

  @FXML
  private AnchorPane pane;

  // A JFreeChart!
  private final SolarChart chart
          = new SolarChart("Solar");

  @Override
  public void initialize(
          URL location,
          ResourceBundle resources) {

    pane.getChildren().add(
      new ChartViewer(chart));

  }
}
```
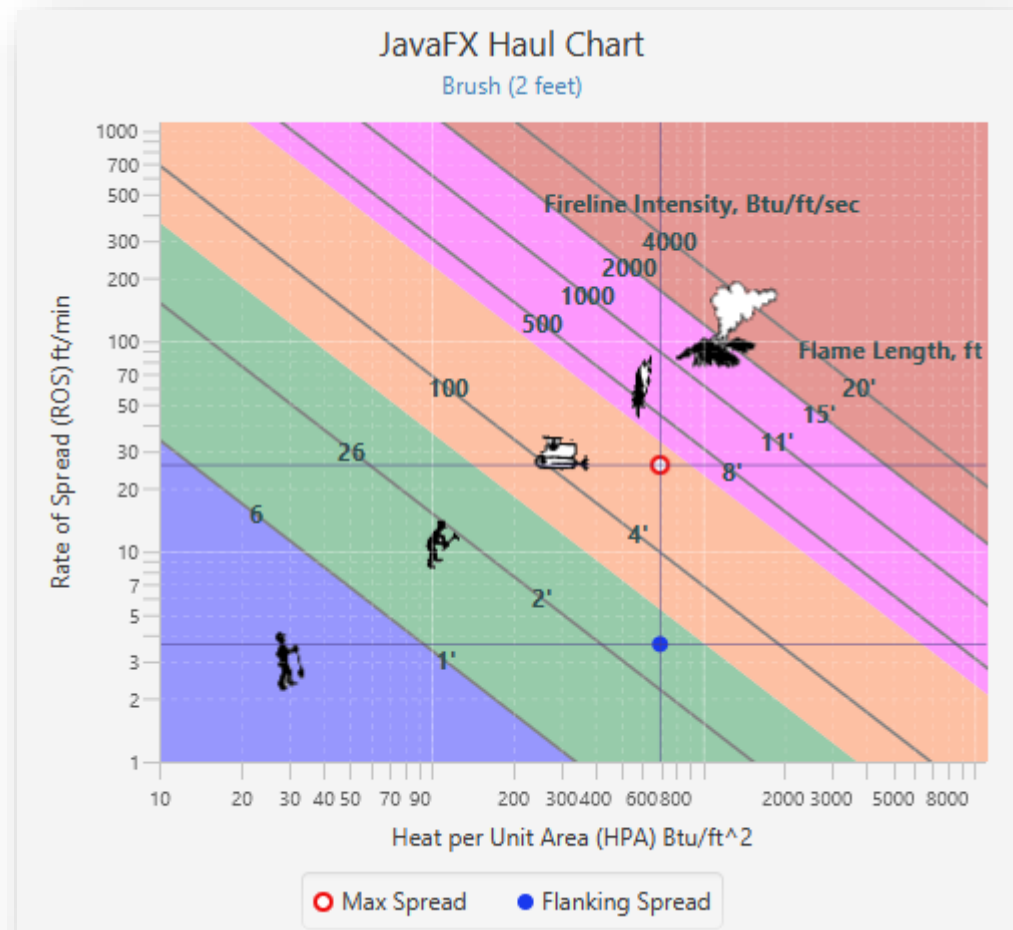
Porting the "Haul Chart" to JavaFX
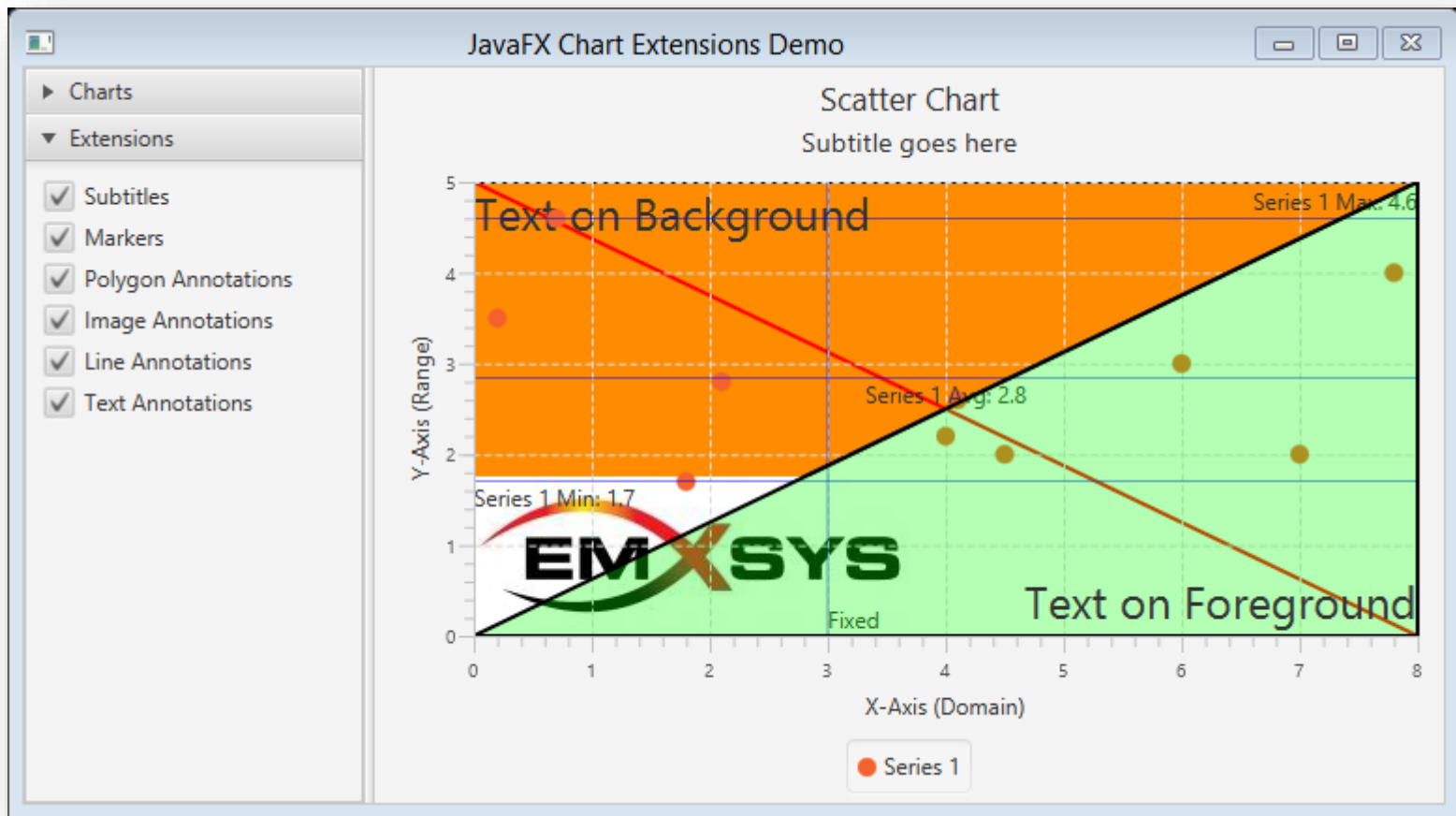*Logarithmic scatter chart depicting wildland fire behavior*

- Logarithmic Axis

- Subtitles

- Value Markers

- Annotations

  - Text

  - Lines

  - Polygons

  - Images

JavaFX Haul Chart
Brush (2 feet)

JavaFX Chart Extensions Library (Free!)
Easier porting of JFreeChart charts to JavaFX Charts

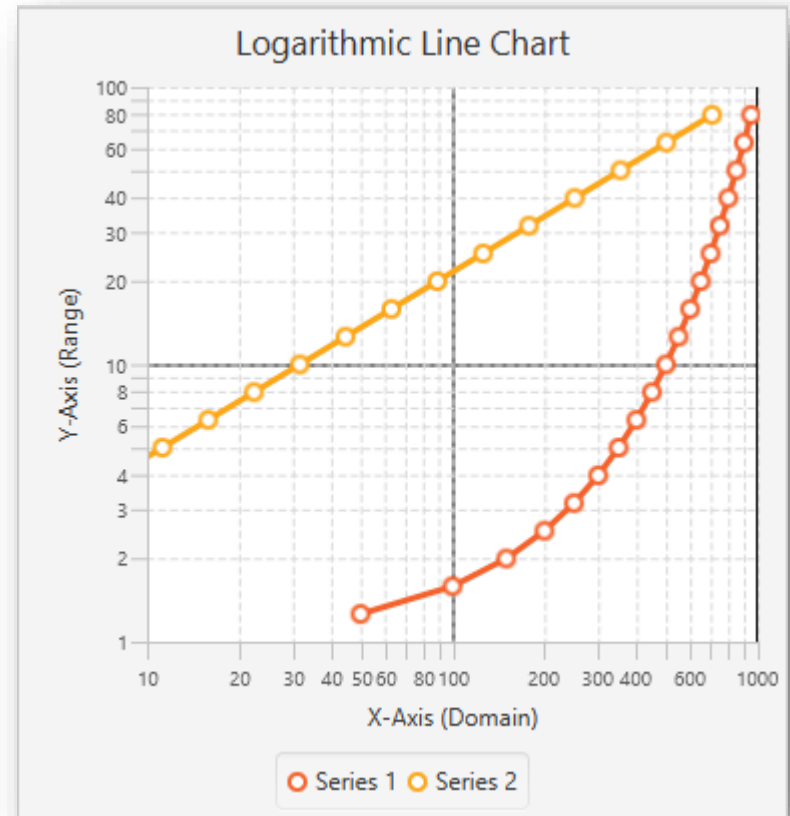https://bitbucket.org/emxsys/javafx-chart-extensions

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LogarithmicAxis
*Creates a **Logarithmic XYChart***

- `LogarithmicAxis`
  - Pass to XYChart axis arguments
- `MajorLogGridlines`
  - Add to XYChart subclass
  - Call `layoutGridlines()`
- CSS:
  - `chart-major-vertical-grid-lines`
  - `chart-major-horizontal-grid-lines`


Logarithmic Line Chart

```
final double MIN_X = 10d;
final double MAX_X = 1000d;
final double MIN_Y = 1d;
final double MAX_Y = 100d;
LogarithmicAxis xAxis = new LogarithmicAxis("Domain", MIN_X, MAX_X);
LogarithmicAxis yAxis = new LogarithmicAxis("Range", MIN_Y, MAX_Y);
LineChart chart = new LineChart(xAxis, yAxis, dataset);
```

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Subtitle Extension
*Adds **subtitle** text to a chart*

- `Subtitle`
  - Add to Chart subclass
  - Call `layoutSubtitle()`
- `setSubtitle("…")`
- CSS Style:
  - `chart-subtitle`

Line Chart
Subtitle goes here
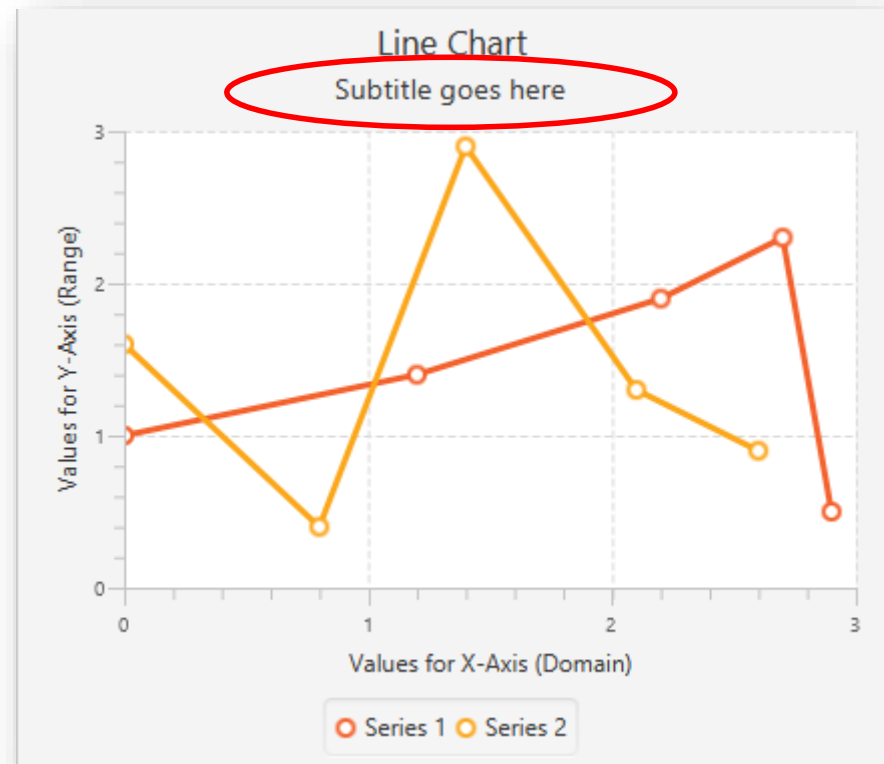
```
// Chart subclass snippet
private Subtitle subtitle;

public void setSubtitle(String text) {
    this.subtitle.setSubtitle(text);
    this.requestLayout();
}
```

Subtitle Implementation

`chart.getChildren()`

- `getChildren()` **returns** `{titleLabel,chartContent,legend}`
- `subtitleLabel` **added to children after** `titleLabel`
- `layoutSubtitle()` **modifies** `chartContent`**'s size**
- **FYI:** `getChartChildren()` **returns** `chartContent`

chartContent

titleLabel

subtitleLabel

yAxis

plotArea

xAxis

legend

plotBackground
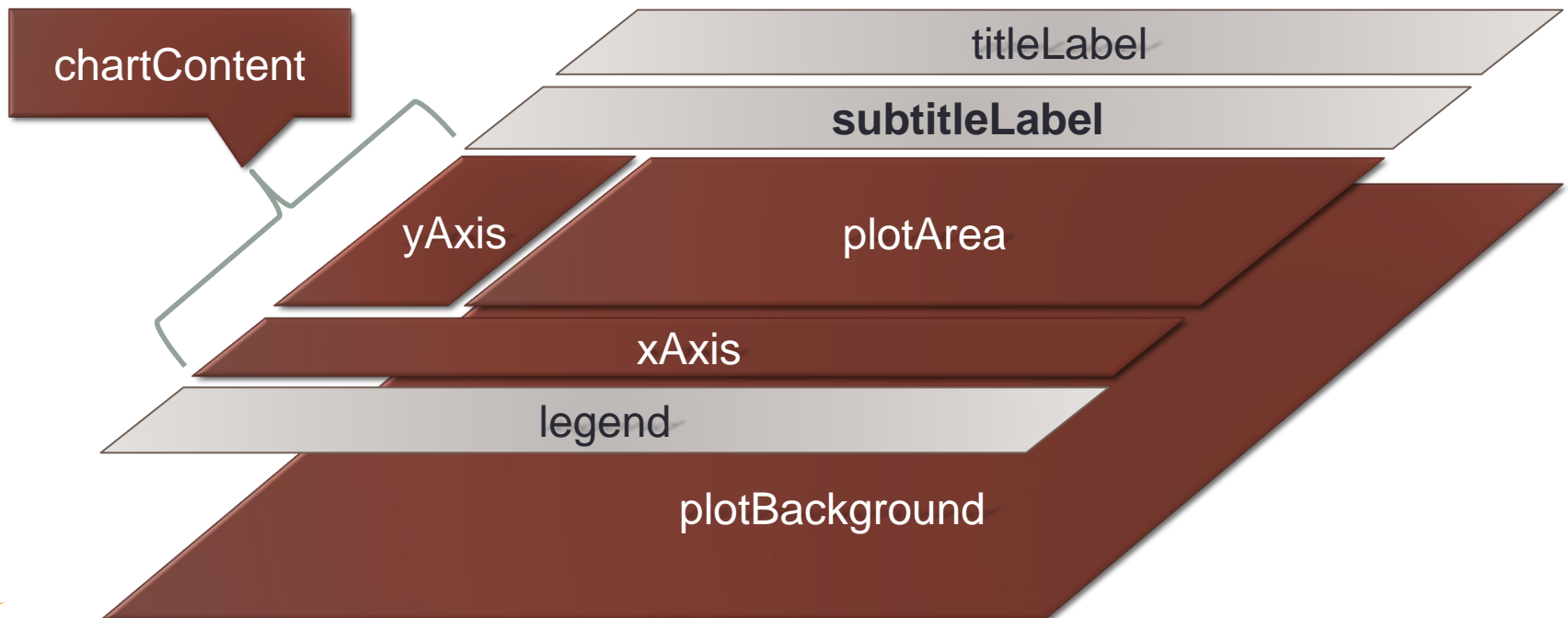
XYMarker Extension
ValueMarkers highlight values with a line and label

- `XYMarkers`
  - Add to XYChart subclass
  - Call `layoutMarkers()`
- `ValueMarker`
  - `Pos` controls label layout
- `addDomainMarker()`
- `addRangeMarker()`
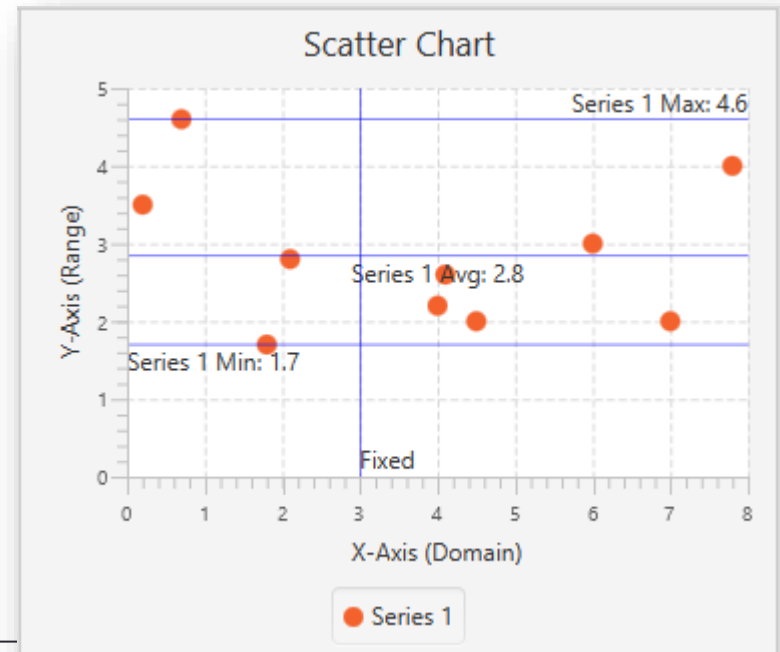

```java
// XYChart subclass snippet
private XYMarkers markers;
public void addMinMaxMarkers(double maxX, double maxY) {
    markers.addDomainMarker(new ValueMarker(
        maxX, String.format("Max: %1$.1f", maxX), Pos.BOTTOM_RIGHT));
    markers.addRangeMarker(new ValueMarker(
        maxY, String.format("Max: %1$.1f"", maxY), Pos.TOP_LEFT));
}
```

XYAnnotations Implementation

`chart.getPlotChildren()` returns `plotArea`

- Layers: Added to `plotArea`
    - Foreground: last entry in plot area
    - Background: first entry in plot area

plotArea

foreground

plotContent

zero lines, gridlines, row fills

background

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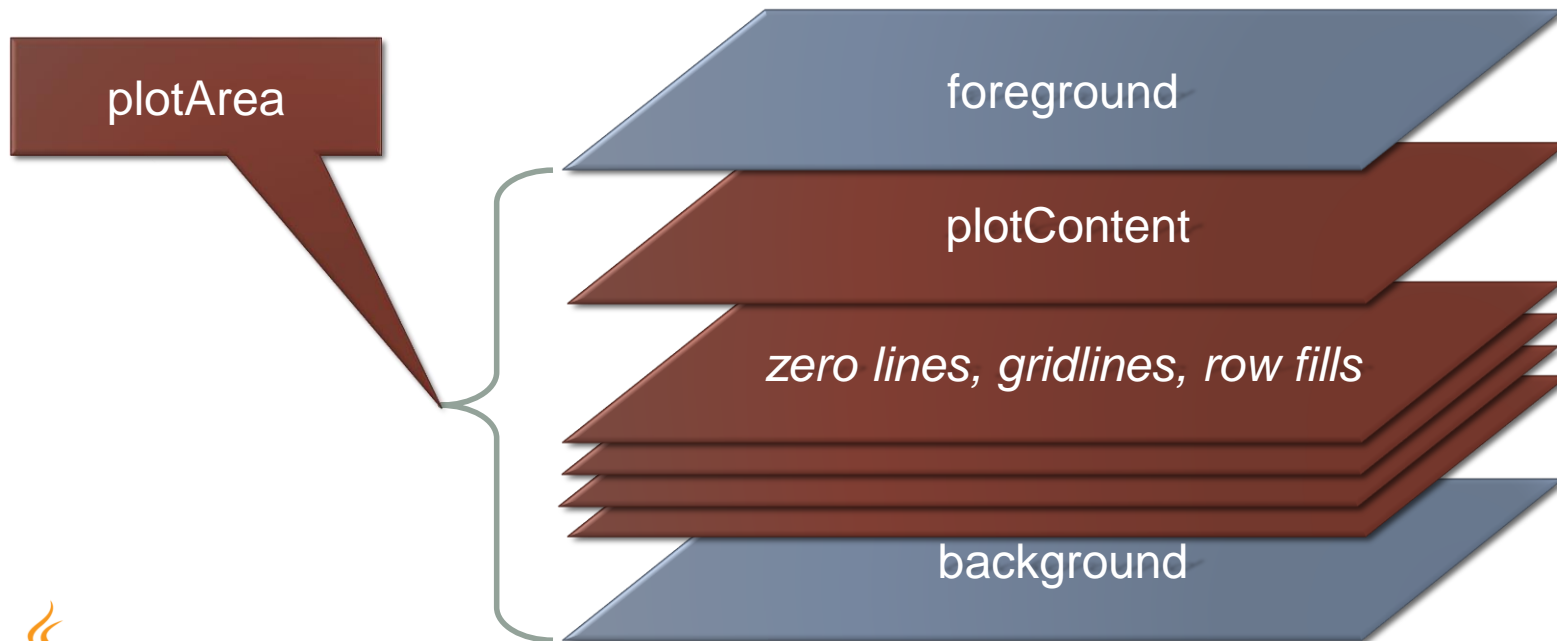
XYTextAnnotation
Draws a label on an XYChart

- `XYAnnotations`
  - Add to XYChart subclass
  - Call `layoutAnnotations()`
- `XYTextAnnotation(…)`
  - **Layer** controls foreground/background
  - **Pos** controls label layout
- `add(XYTextAnnotation)`
- CSS: `chart-text-annotation`

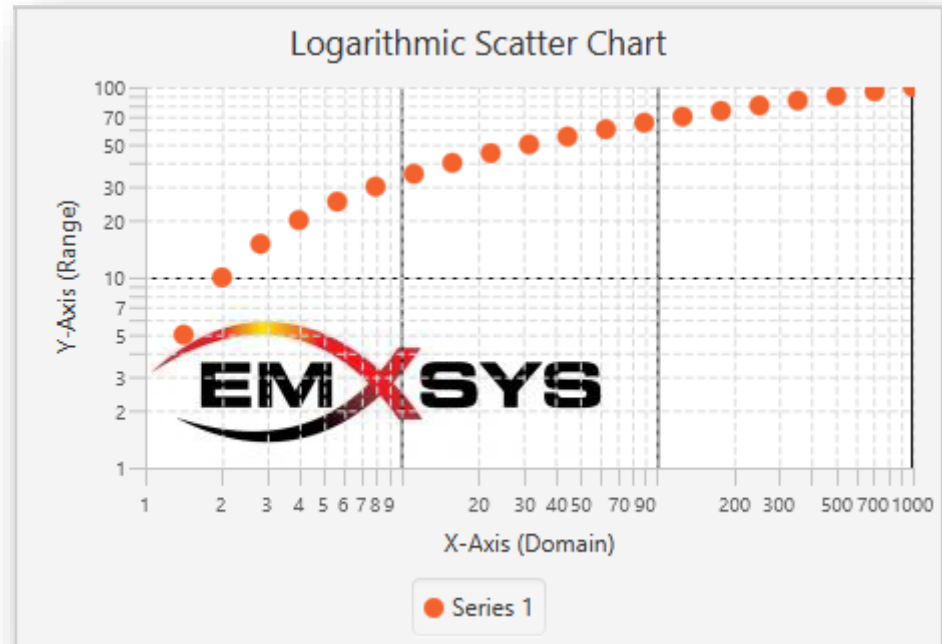

Logarithmic Line Chart
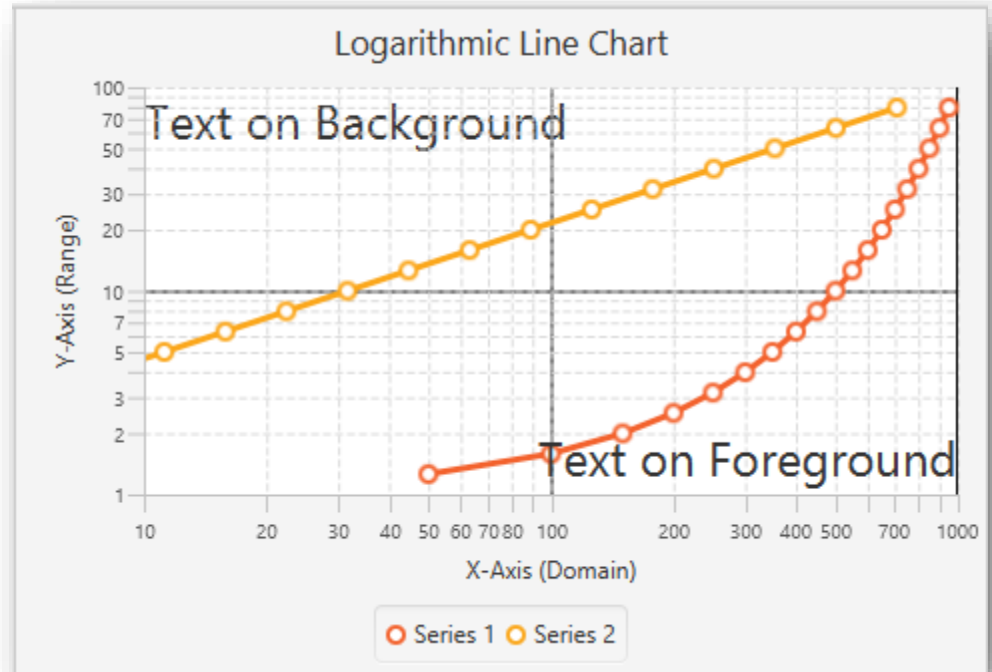
```
// XYChart subclass snippet...
private XYAnnotations annotations;

public void addTextAnnotation(double x, double y, String text) {
    annotations.add(new XYTextAnnotation(
        text, x, y, Pos.TOP_LEFT), Layer.FOREGROUND);
}
```

XYImageAnnotation
Draws an image on an XYChart

- `XYAnnotations`
    - Add to XYChart subclass
    - Call `layoutAnnotations()`
- `XYImageAnnotation(…)`
    - **Layer** controls foreground/background
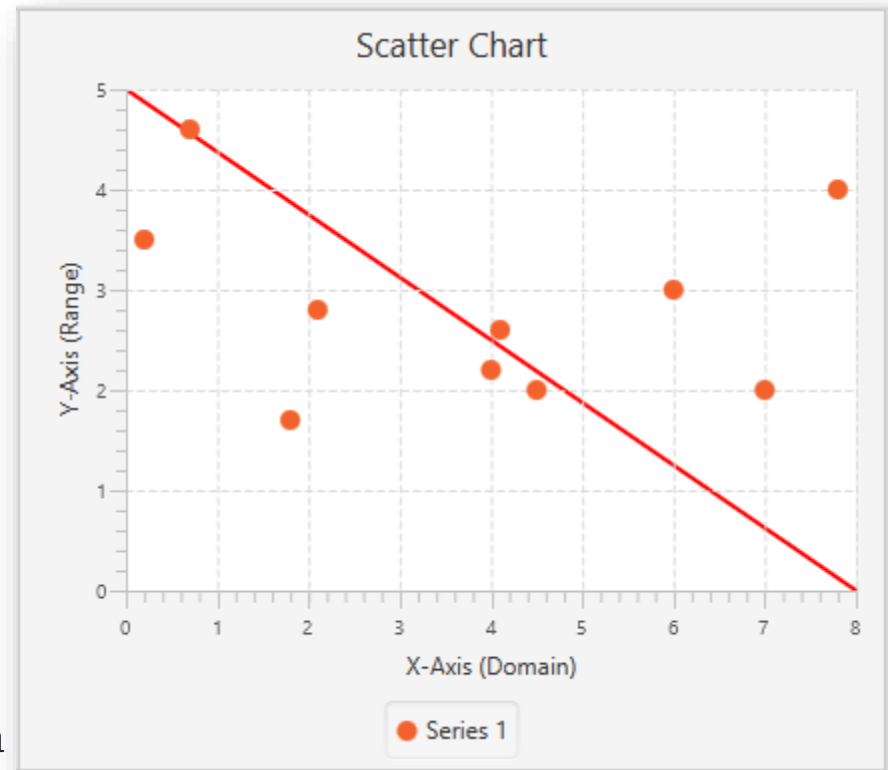   - **Pos** controls image placement
- `add(XYImageAnnotation)`

```java
// XYChart subclass snippet...
private XYAnnotations annotations;

public void addImageAnnotation(double x, double y, String path) {
    Image image = new Image(getClass().getResourceAsStream(path));
    annotations.add(new XYImageAnnotation(
        image, x, y, Pos.CENTER), Layer.FOREGROUND);
}
```

XYLineAnnotation
Draws a line on an XYChart

- XYAnnotations
  - Add to XYChart subclass
  - Call `layoutAnnotations()`
- `XYLineAnnotation(…)`
  - **Layer** foreground/background
  - Optional width and color
- `add(XYLineAnnotation)`
- CSS: `chart-line-annotation`
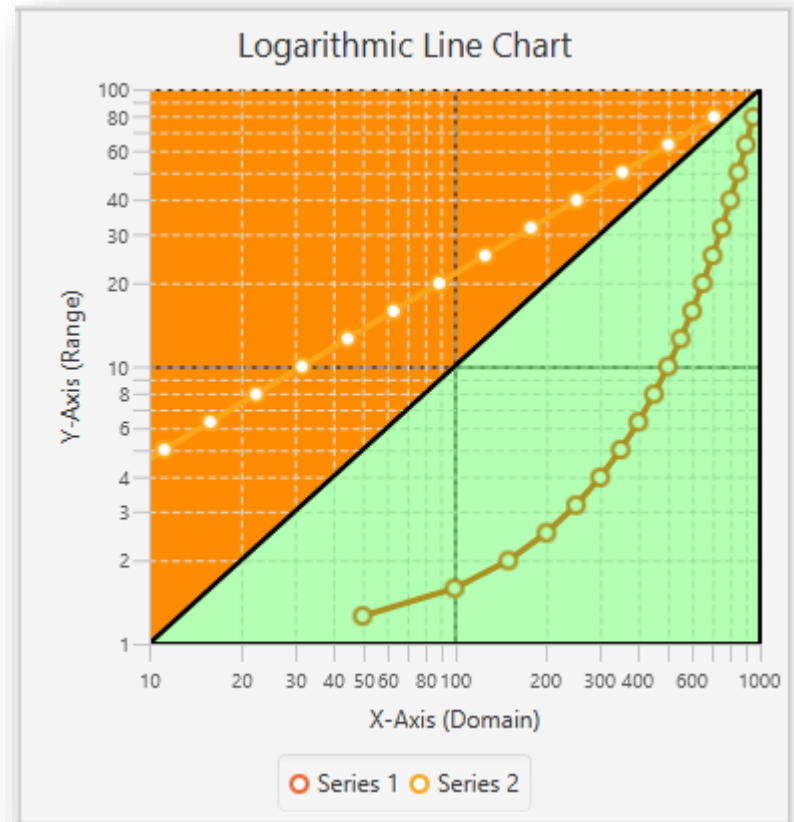

Scatter Chart

```
// XYChart subclass snippet...
private XYAnnotations annotations;

public void addLineAnnotation(double x, double y, double x2, double y2) {
    annotations.add(new XYLineAnnotation(
    x1, y1, x2, y2, 2.0, Color.RED), Layer.FOREGROUND);
}
```

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XYPolygonAnnotation
Draws a polygon on an XYChart

- `XYAnnotations`
  - Add to XYChart subclass
  - Call `layoutAnnotations()`
- `XYPolygonAnnotation(…)`
  - **Layer** foreground/background
  - Optional line width and fill colors
- `add(XYPolygonAnnotation)`
- CSS: `chart-polygon-annotation`

Logarithmic Line Chart

```
// XYChart subclass snippet...
private XYAnnotations annotations;

public void addPolygonAnnotation(double[] xyPoints) {
    annotations.add(new XYPolygonAnnotation(
        xyPoints, 2.0, Color.BLACK, Color.DARKORANGE), Layer.BACKGROUND);
}
```

Closing

- **JavaFX Chart Extensions project**:
  - https://bitbucket.org/emxsys/javafx-chart-extensions
- **WildfireFX project:**
  - https://bitbucket.org/emxsys/wildfirefx

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