



LESSONS LEARNED DEVELOPING IN JAVAFX



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Code structure

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Lambda's



JavaFX

Yet another UI framework?



F3 / JavaFX script

```
import f3.ui.*;  
  
class X {  
    attribute nums: Number*;  
}  
  
trigger on new X {  
    insert [3,4] into this.nums;  
}  
  
var x = new X();  
  
System.out.println(x.nums == [3,4]);
```



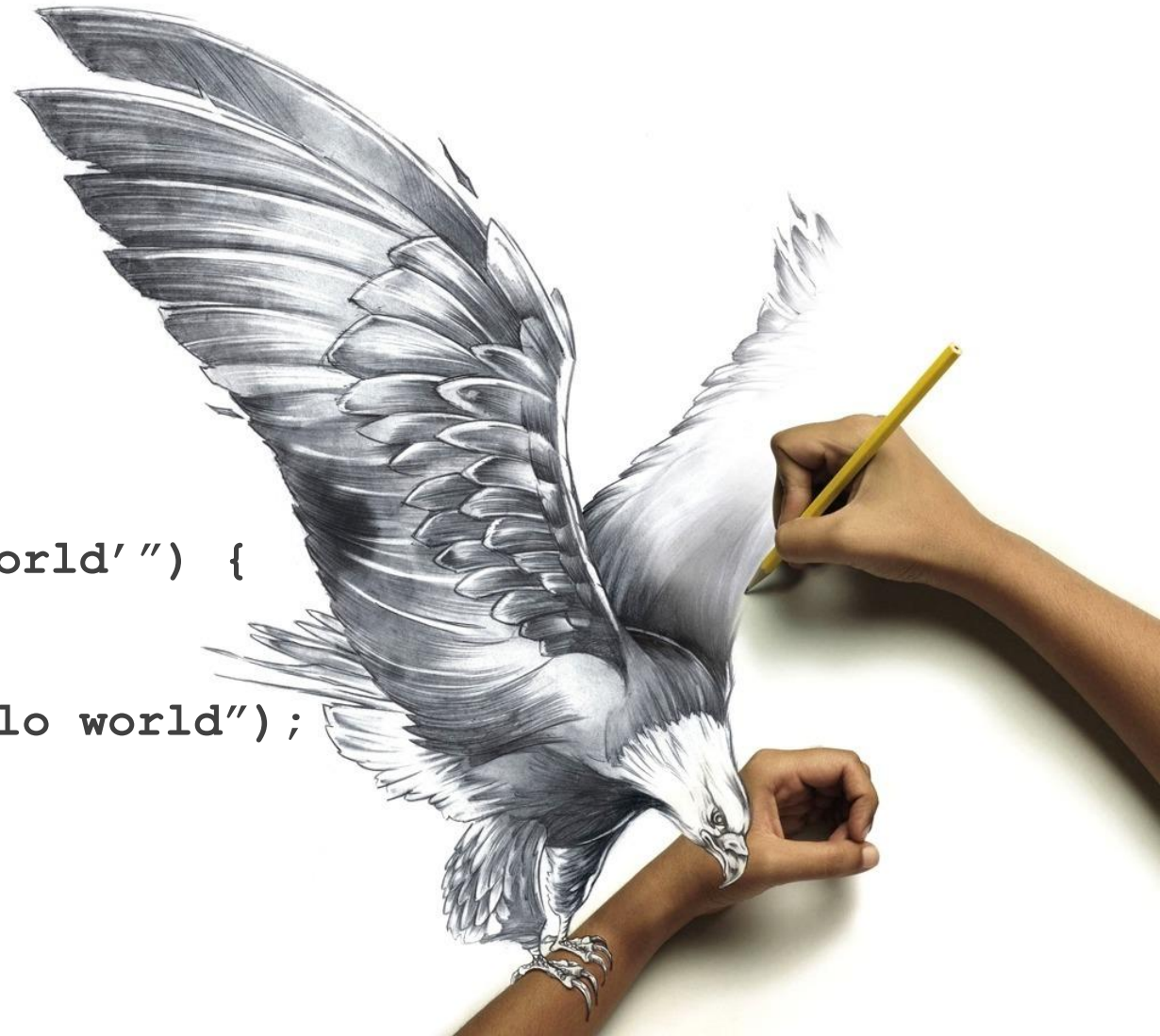
JavaFX 2.x+

```
public void start(Stage primaryStage) {  
    Button btn = new Button();  
    btn.setText("Say 'Hello World'");  
    btn.setOnAction( () -> {  
        System.out.println("Hello World!");  
    });  
    StackPane root = new StackPane();  
    root.getChildren().add(btn);  
    primaryStage.setScene(new Scene(root, 300, 250));  
    primaryStage.show();  
}
```



GroovyFX

```
GroovyFX.start {  
    stage(width: 300, height: 250) {  
        scene {  
            stackPane {  
                button("Say 'Hello world'") {  
                    onAction { e ->  
                        println("Hello world");  
                    }  
                }  
            }  
        }  
    }  
}
```

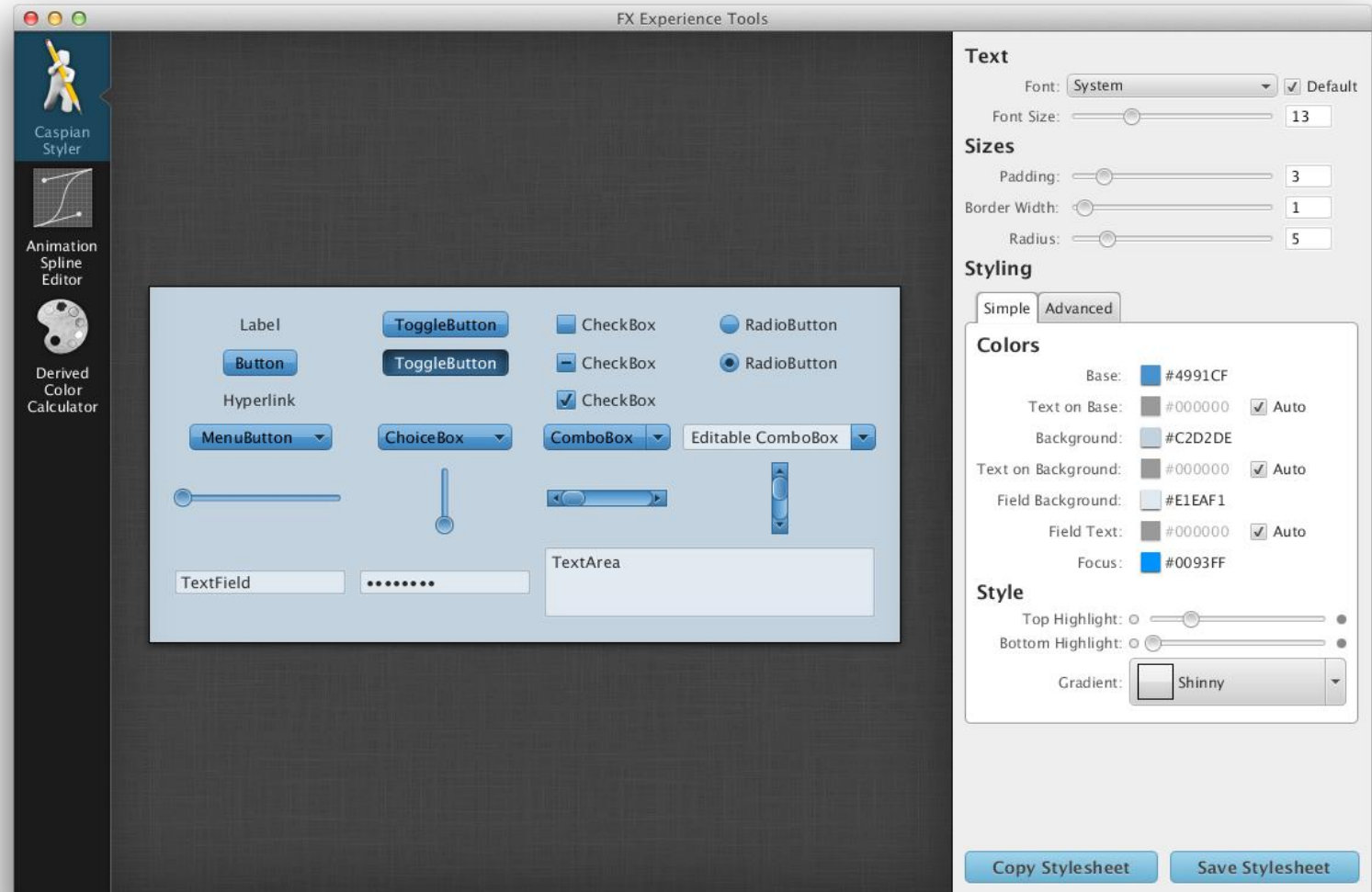
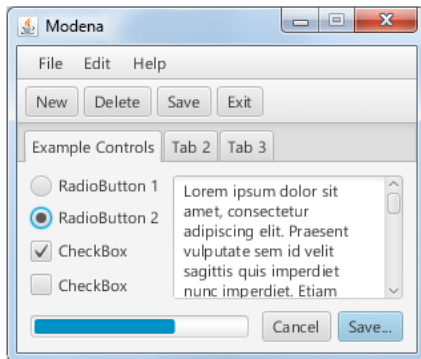
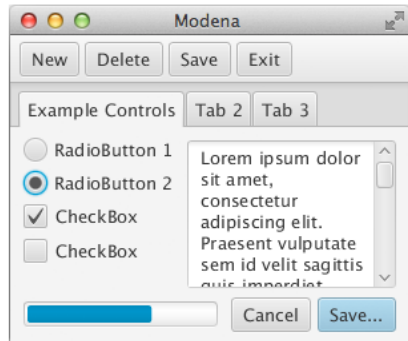


JavaFX examples

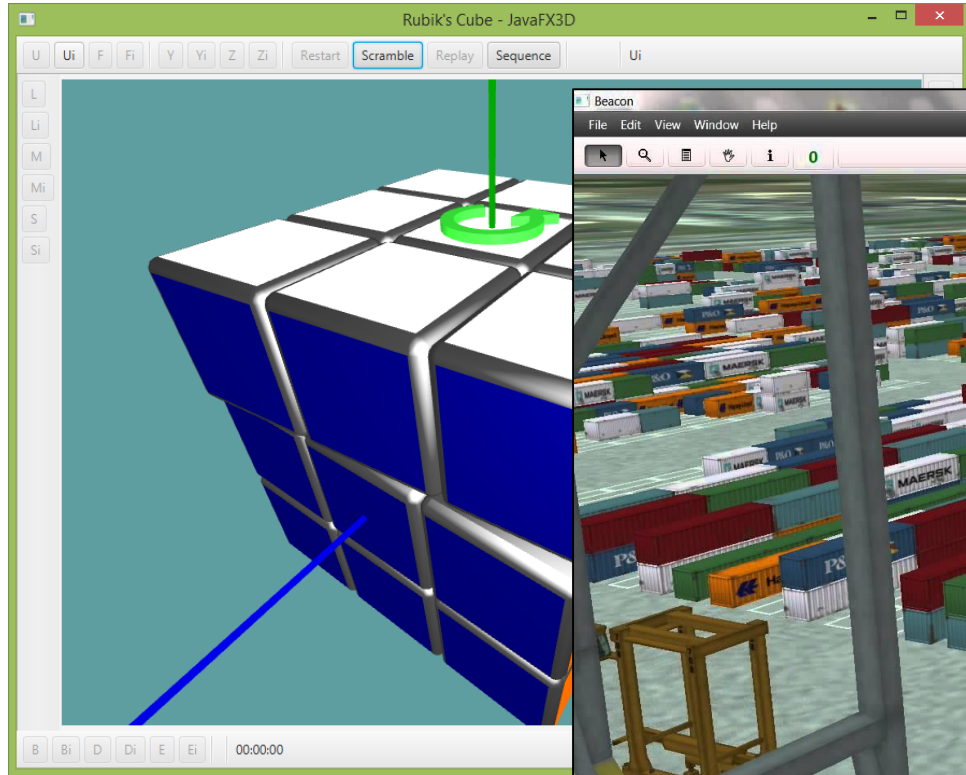
The image displays four distinct JavaFX applications:

- Music Player:** A dark-themed interface with a track display showing "Track: 1/10", "Remaining: 1:30 Total: 3:34", and "09...their_finest_hour_vol1-vo1fo". It includes playback controls (Previous, Play/Pause, Next), a volume knob, and a "POWER" button.
- Data Processing Workflow:** A visual programming interface with three main components:
 - ReadFile:** A "read()" node with "File Name: l--lmac-27-linux.txt" and an "invoke" button.
 - Filter:** A "filterNumBalls()" node with a "List" of integers from 500 to 5000 and an "invoke" button.
 - Lists2Trajectories:** A "convert()" node with "Trajectories" output and an "invoke" button.Yellow arrows indicate the data flow between these nodes.
- 2D Game:** A top-down view of a game world with a character, trees, rocks, and a body of water.
- Line Chart:** A graph titled "Trajectories" showing data for 10 different ball counts (500 to 5000). The x-axis ranges from 0 to 200, and the y-axis from 0 to 250. A legend at the bottom identifies the lines for each ball count.

JavaFX control examples



JavaFX 3D examples



JavaFX

Yet another UI framework?

2D & 3D & controls in one

Effects & animation first class citizens

CSS style able

Code first

Swing vs JavaFX

Windows, Mac, Android, iOS, Raspberry Pi, ...
(performance varies)



JFXtras

Add missing things to JavaFX

Unify open source JavaFX development

Februari 2012

JavaFX 2.x

JFXtras-labs and JFXtras

2.2-r1[-SNAPSHOT]

JFXtras 8.0 March 2014

common, control, layout, fxml, windows, agenda and labs



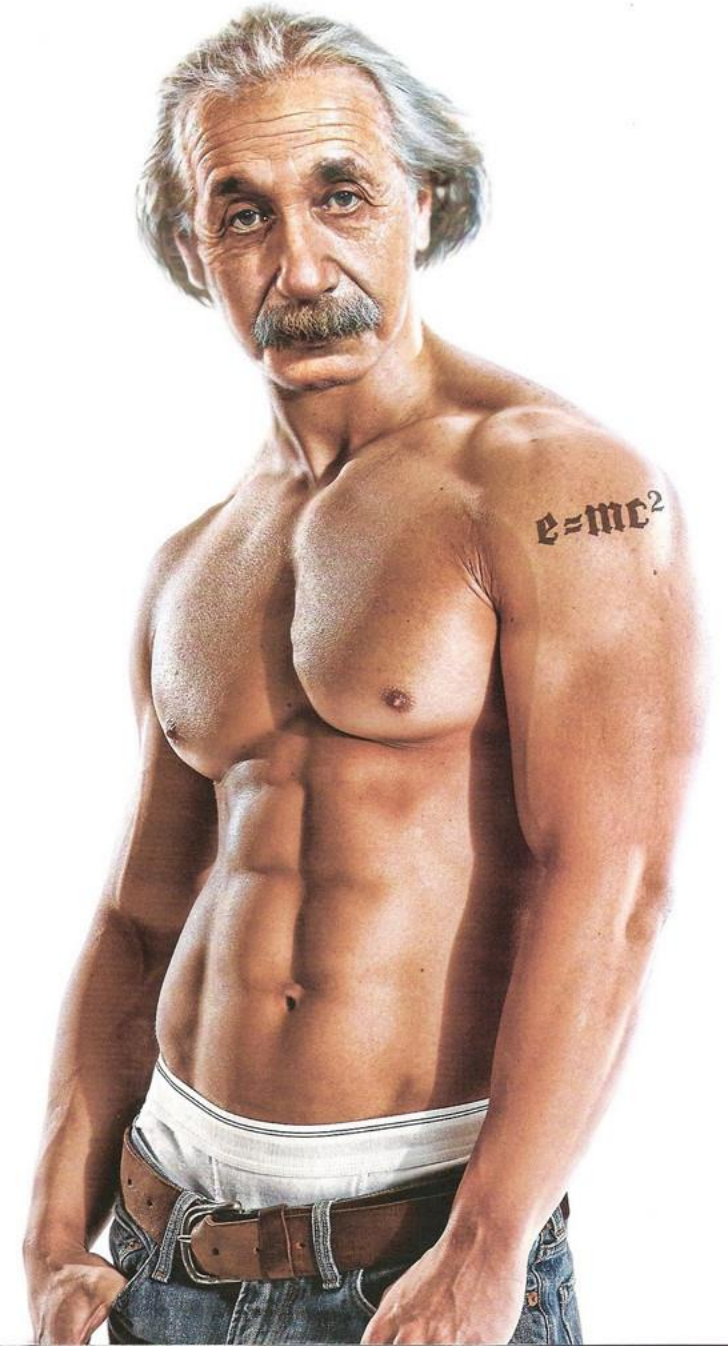
@TBEERNOT

JFXtra's 14th commit (Februari 2012)

- ListSpinner
- CalendarPicker

And more...

- CalendarTextField
- TimePicker
- LocalDate / LocalDateTime / LocalTime
- CircularLayout
- CornerMenu, CircularPopupMenu
- Fluent layout API
- Agenda
- Gauges



Samples

Let's take a peek



JFXtras – what to examine closer?

Things I like



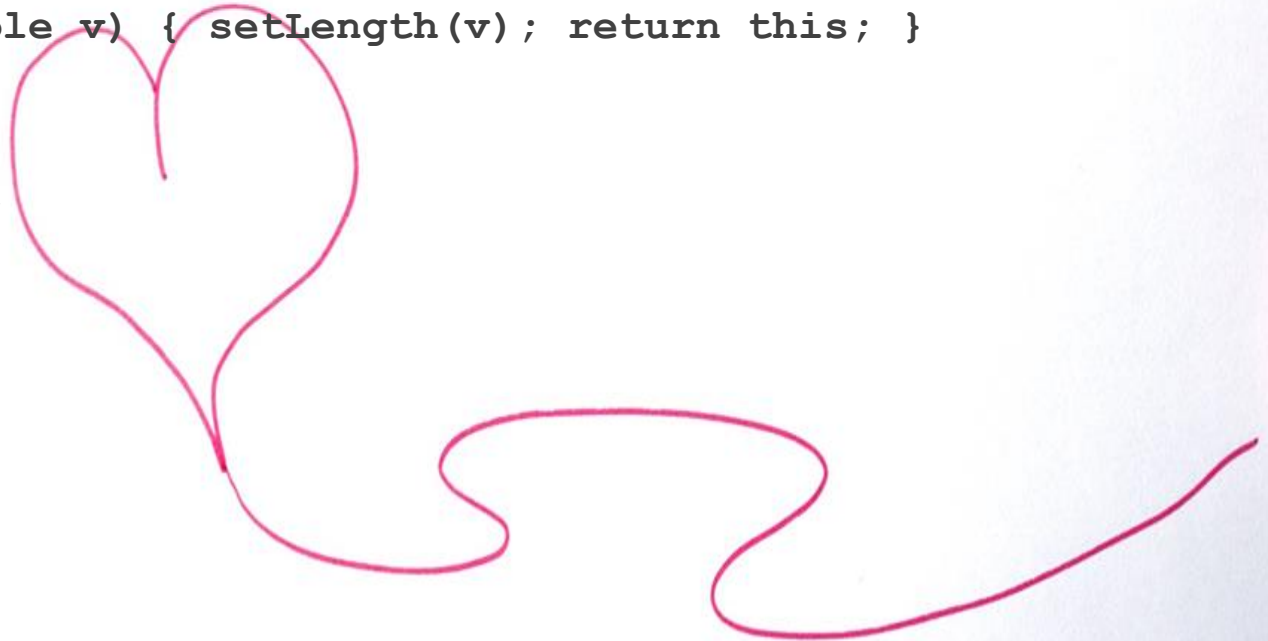
Things I do not like



JavaFX properties

```
final private DoubleProperty lengthProperty = new SimpleDoubleProperty(0);  
public DoubleProperty lengthProperty() { return lengthProperty; }  
public Double getLength() { return lengthProperty.get(); }  
public void setLength(Double v) { lengthProperty.set(v); }  
public Object withLength(Double v) { setLength(v); return this; }
```

Integer, String, Object<X>, ...



JavaFX properties

`propertyA.bind(propertyB);`

`propertyA.bindBidirectional(propertyB);`

`propertyA.bind(propertyB.add(2).multiply(7));`

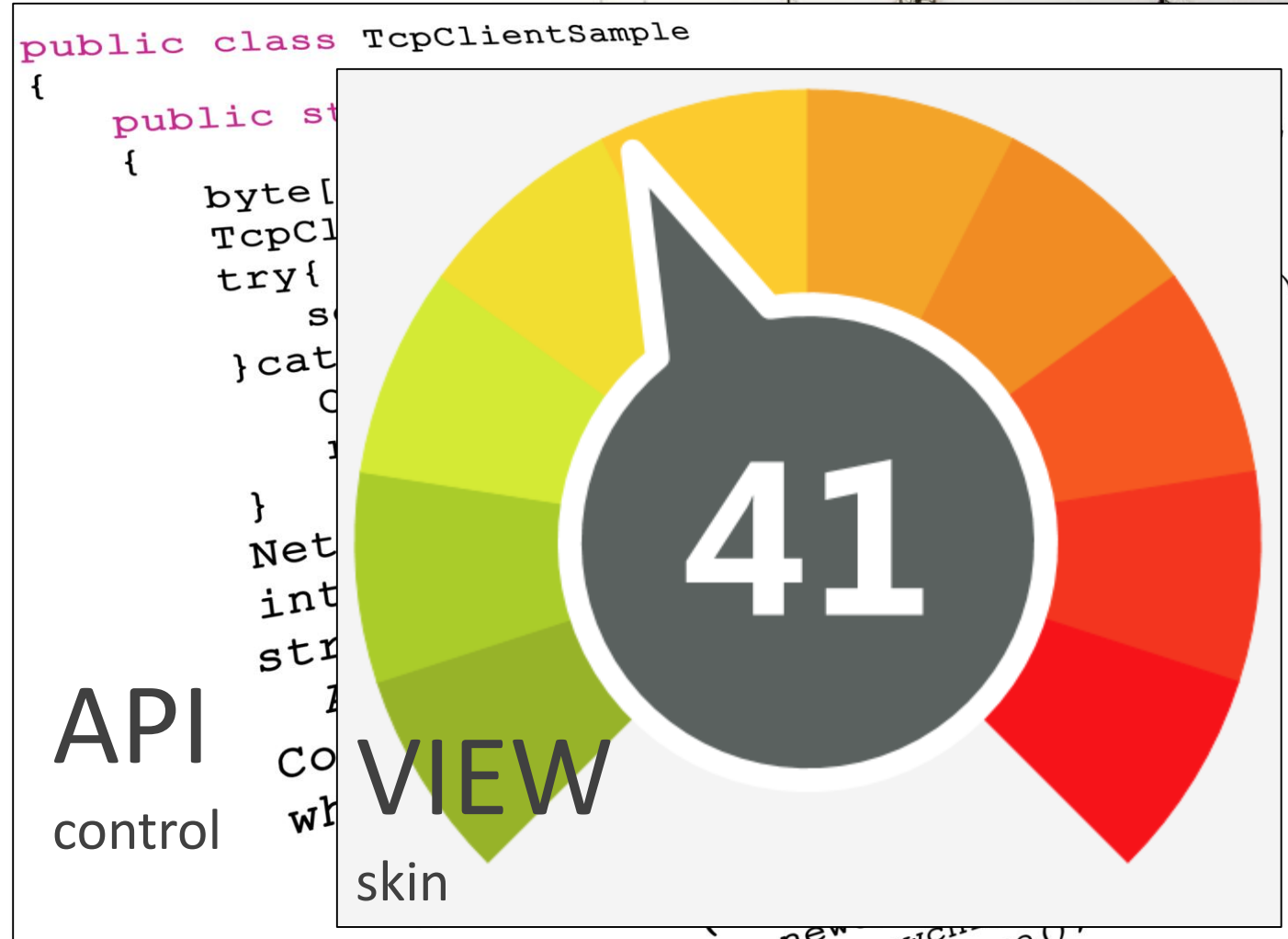
`propertyA.bind(propertyB.add(propertyC).multiply(7));`

Invalidation event vs Change event

CSS styleable (settable)



A JavaFX Control



Simple metro arc gauge

Control:

- Value
- Min / max value
- Segments

Skin:

- Nodes
- Layout

CSS:

- Colors
- Label format



Non trivial layouts

JavaFX wants to favor composition over inheritance

- Half the classes and methods are final

Composition quickly runs into problems

- CSS
- Resize

Rule of thumb

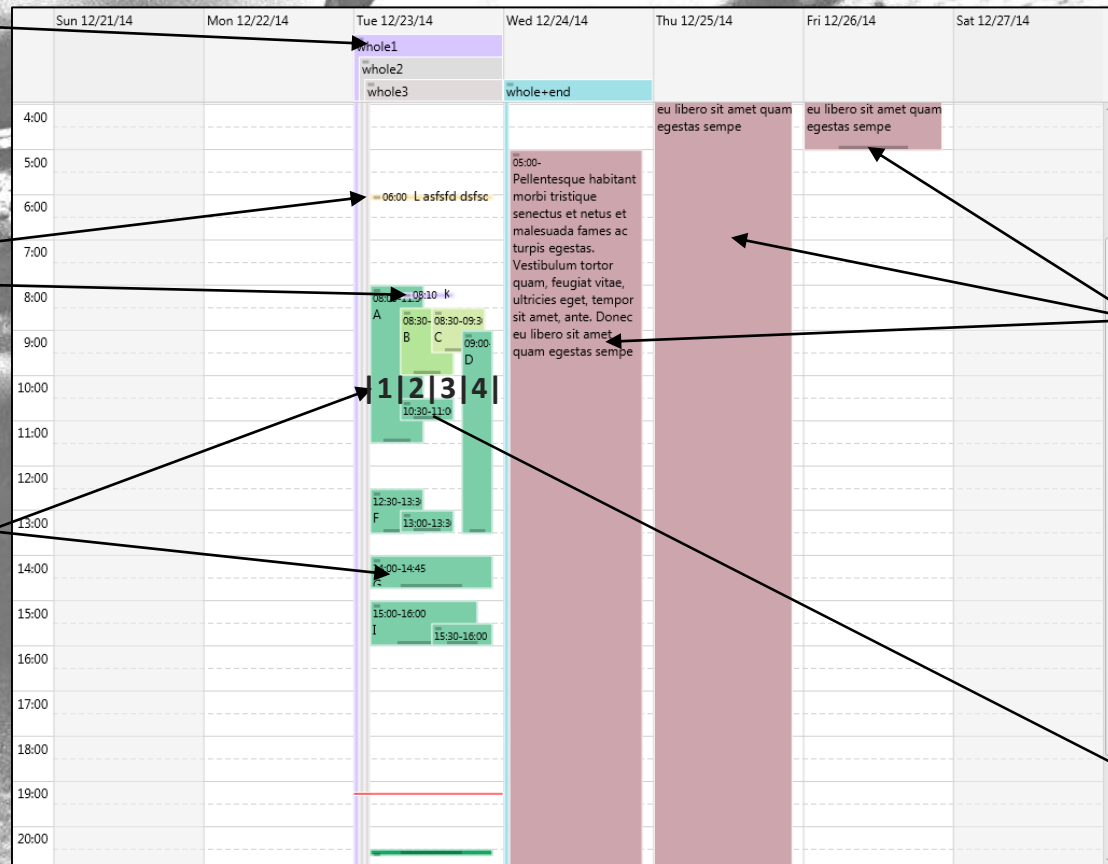
- Extend Pane
- Create nodes in constructor
- Layout nodes in `layoutChildren()`

Consider making it a control



Agenda

Whole day appointment



Task

Simple appointment, spanning

Simple appointment

"Tracked"

Agenda control

`appointments()`

`appointmentGroups()` // aka calendars in Google calendar

`displayedDateTimeProperty()`

`localeProperty()`

`dateTimeRangeCallbackProperty()`

`newAppointmentCallbackProperty()`

`editAppointmentCallbackProperty()`



Agenda control

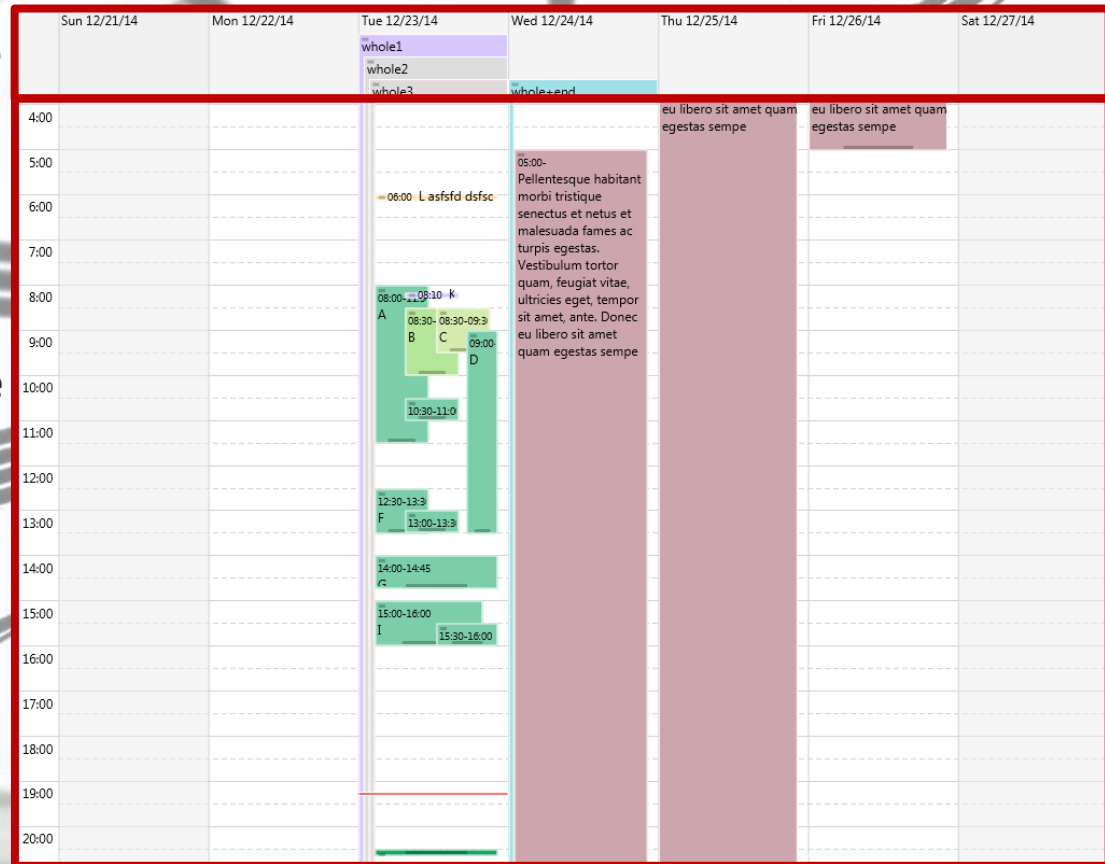
```
interface Appointment {  
    LocalDateTime getStartDateTime();  
    LocalDateTime getEndDateTime();  
    Boolean isWholeDay();  
    String getSummary();  
    AppointmentGroup getAppointmentGroup();  
    String getDescription();  
    String getLocation();  
}
```



Agenda week skin

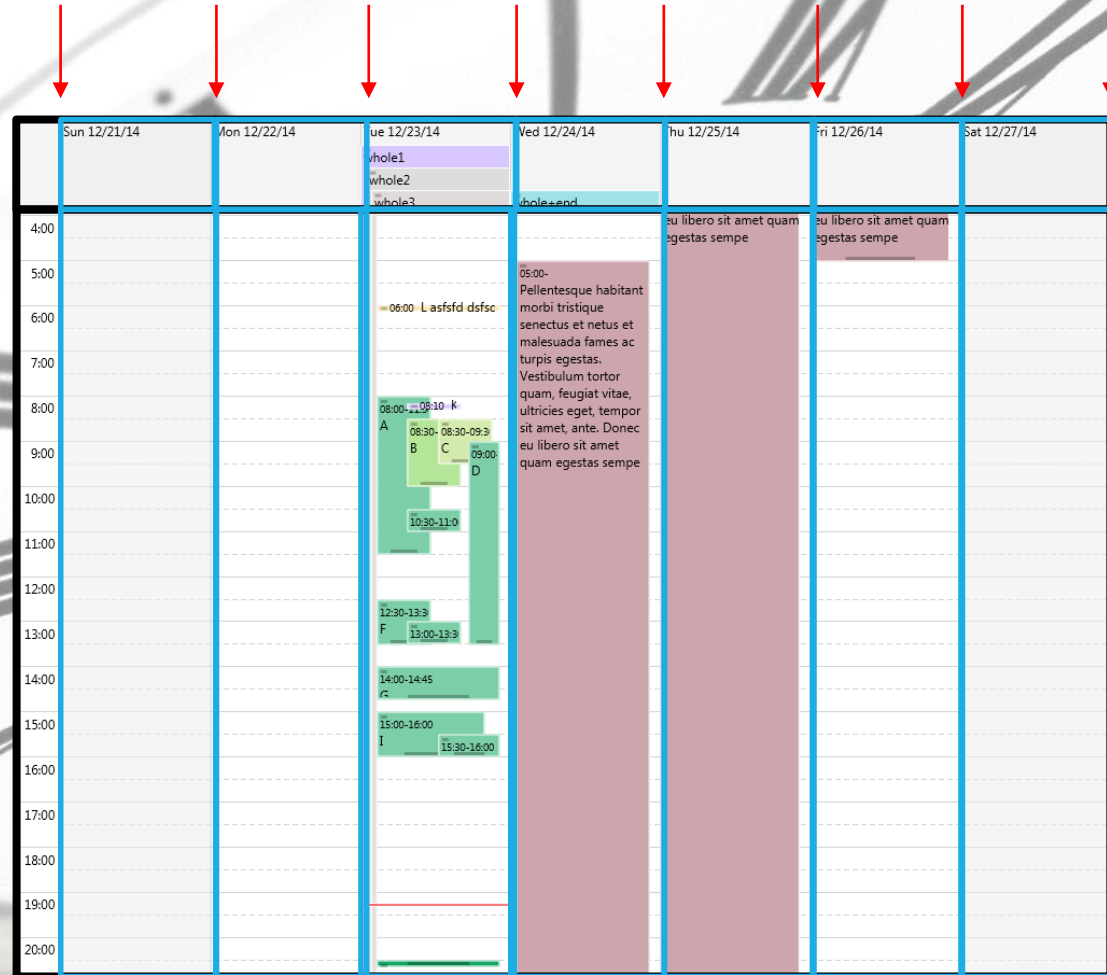
WeekHeaderPane

WeekBodyPane



ScrollPane

Agenda week skin



DayHeaderPanes

DayBodyPanes

Node orientation

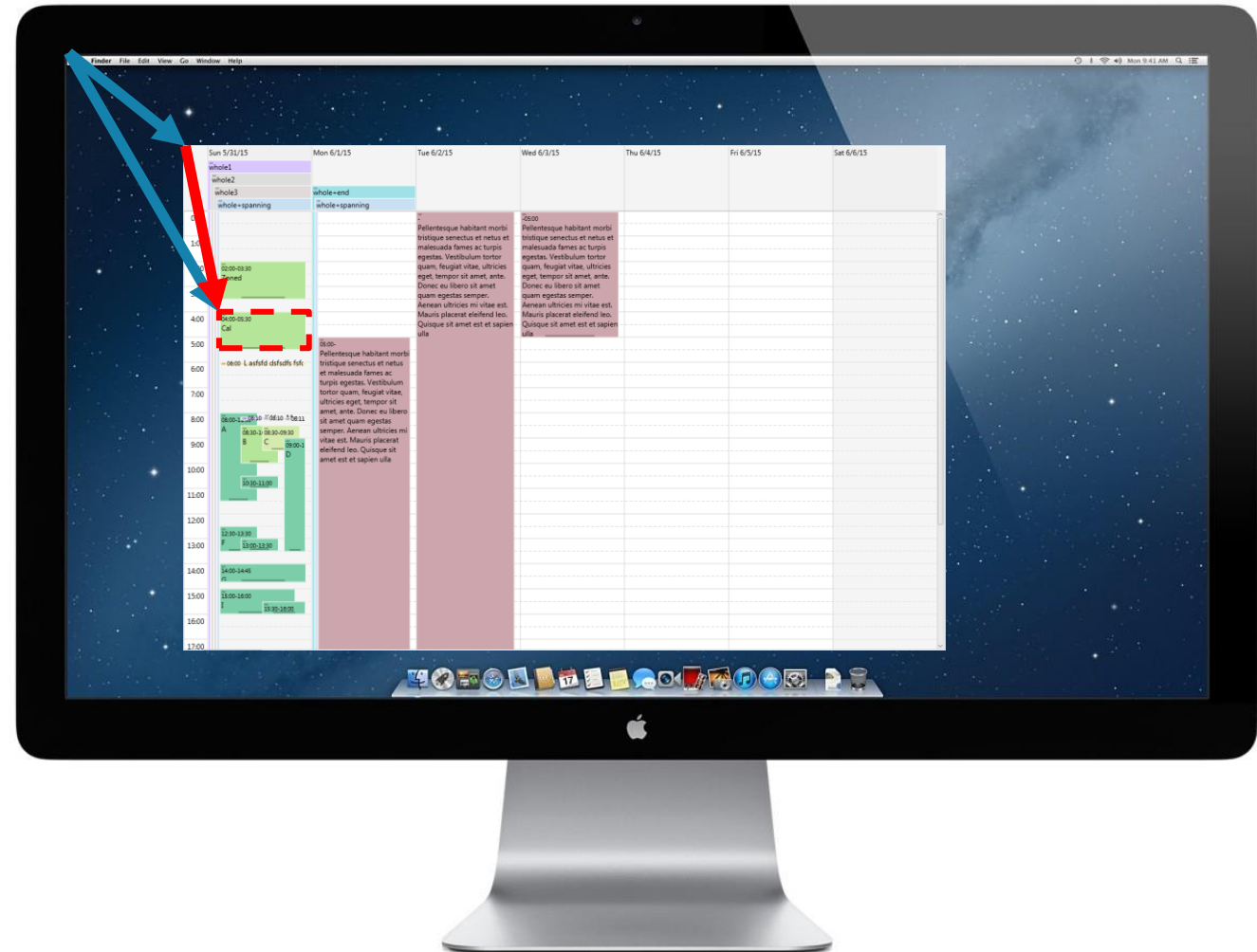
Left-to-right is default

MouseEvent.getScreenX is easy

Suppose:

- Appointment at 400x600
- Agenda at 200x100

Drag rectangle at 200x500



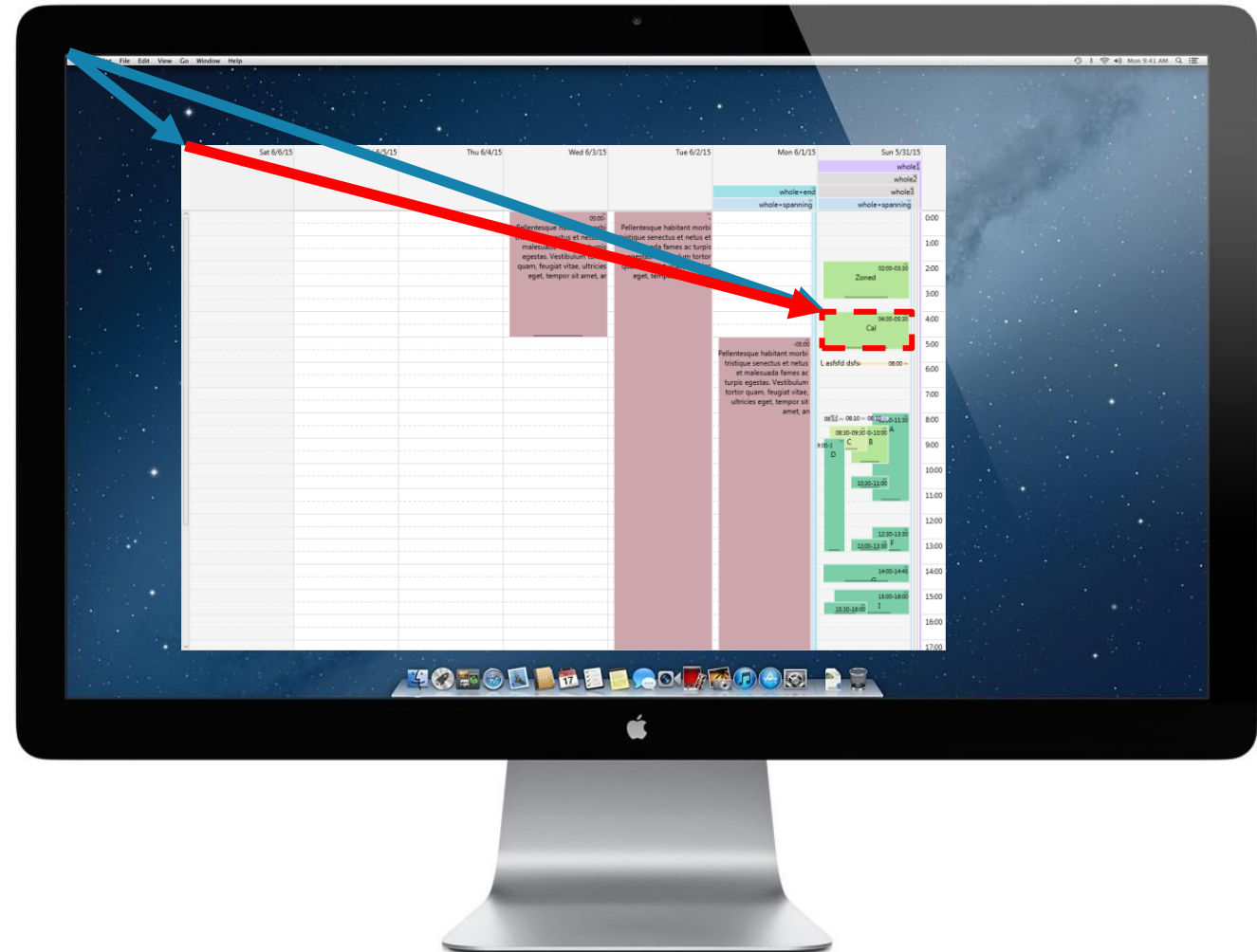
Node orientation: right-to-left

Nodes are mirrored automatically!

Now:

- Appointment at 1500x600
- Agenda still at 200x100

Drag rectangle at 1300x500



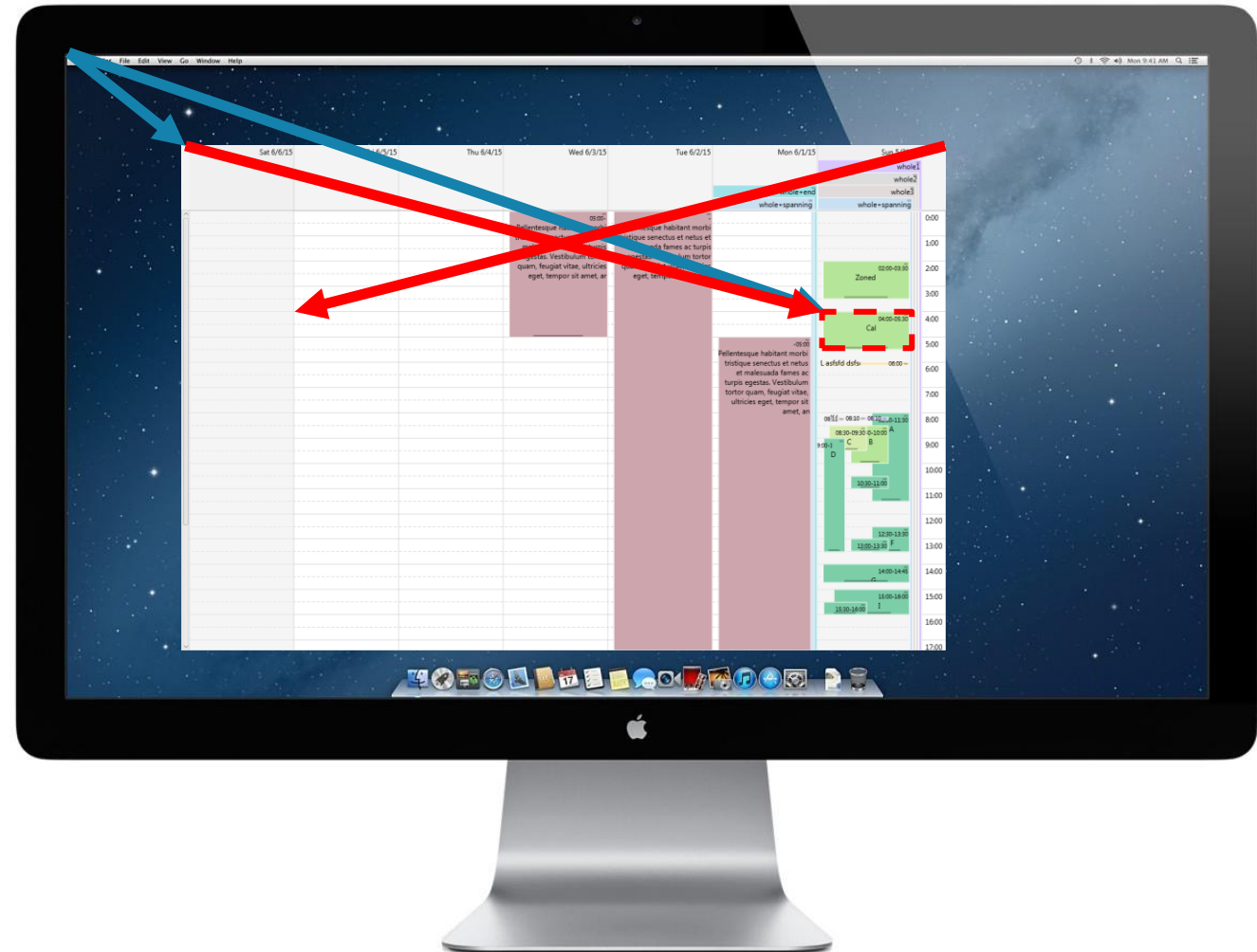
Node orientation: right-to-left

But XY is mirrored automatically!

Drag rectangle at 1300x500, mirrored!

Do not use screen & scene XY

Clipping is not mirrored



Testing

Not TDD

Regression

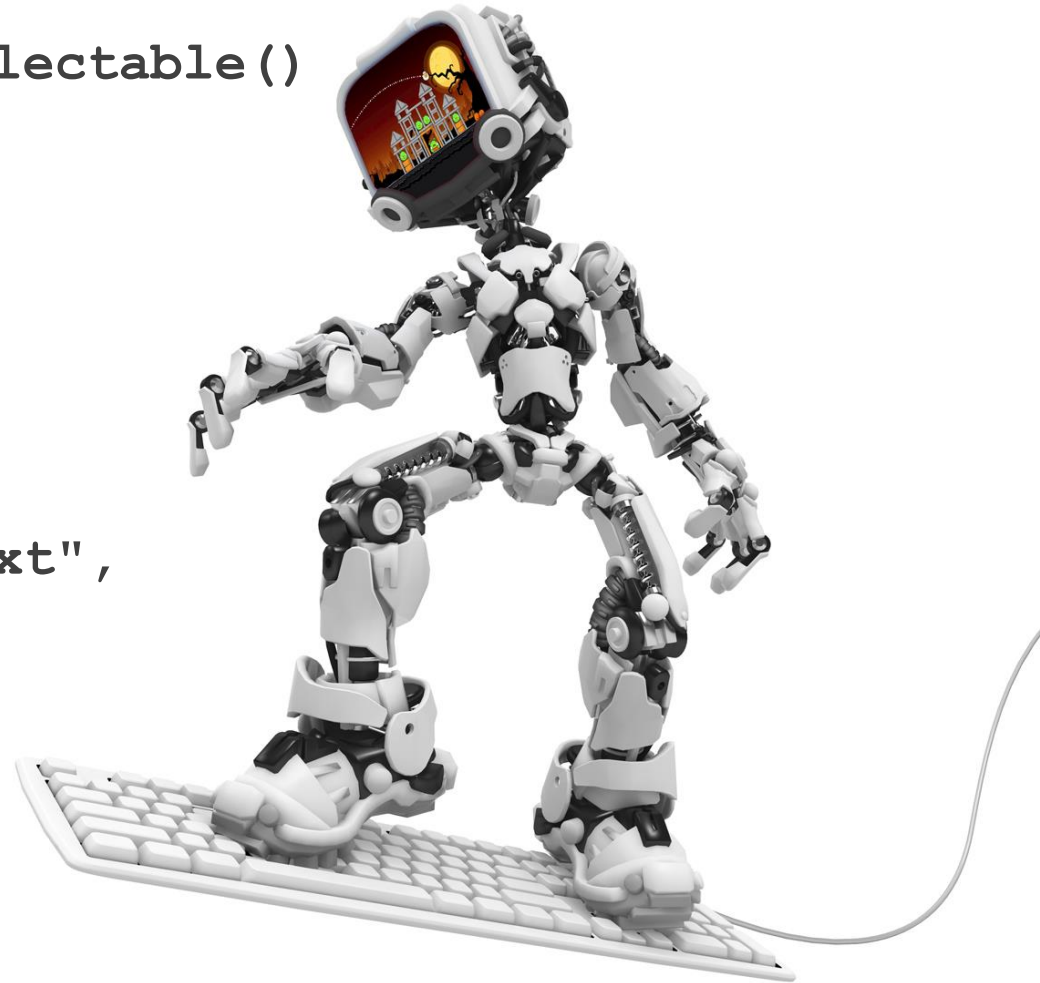


JemmyFX

```
new ComboBoxDock(scene.asParent()).asSelectable()  
.selector().select(new File(location));
```

```
new LabeledDock(scene.asParent(),  
"back_btn").mouse().click();
```

```
new ListItemDock(list.asList(), "file.txt",  
SUBSTRING).mouse().click(1);
```



TestFX

```
click("#wholeday-checkbox");  
click(".close-icon");  
click("#RegularBodyPanel1 .MenuIcon");  
move("#hourLine15");  
press(MouseButton.PRIMARY);  
moveBy(100, 0);  
release(MouseButton.PRIMARY);
```



JFXtras – what to examine closer?

Things I like



Things I do not like



Layout

Hbox, VBox, BorderPane, GridPane, StackPane, FlowPane, AnchorPane, ...

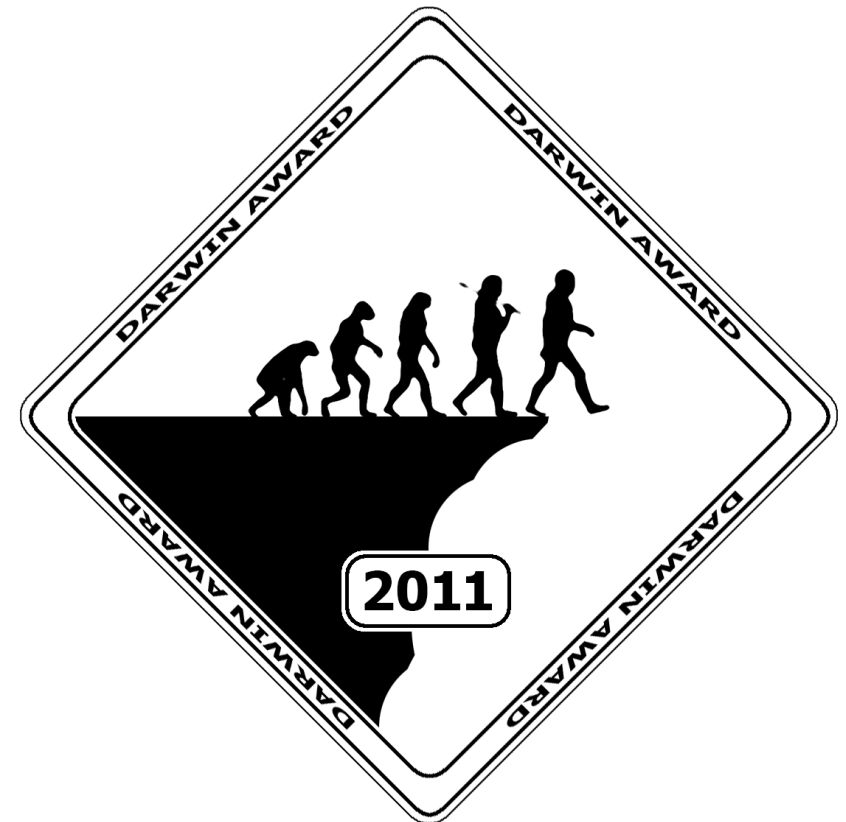
No constraint classes but static methods

```
Text t = new Text("text");  
gridPane.add(t, 0, 3);  
GridPane.setVAlignment(t, VPos.BOTTOM);
```

JFXtras constraint classes & fluent API:

```
gridPane.add(new Text("text"), new C()  
    .col(0).row(3)  
    .valignment(VPos.BOTTOM));
```

MaxWidth & MaxHeight denote intent, not capability?!



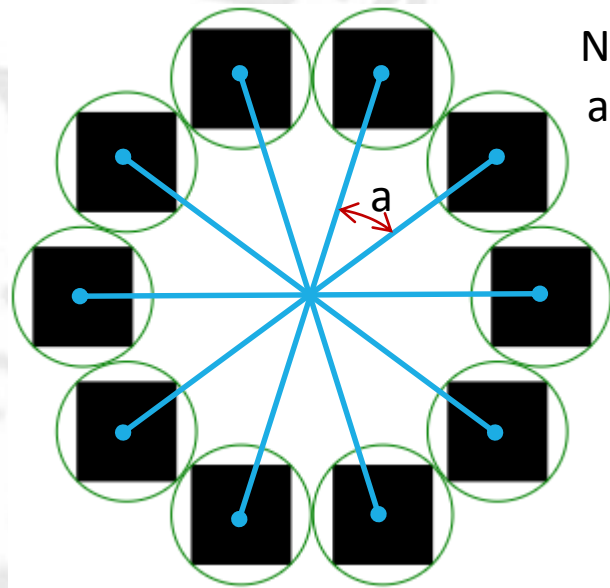
CircularPane

99% vertical or horizontal

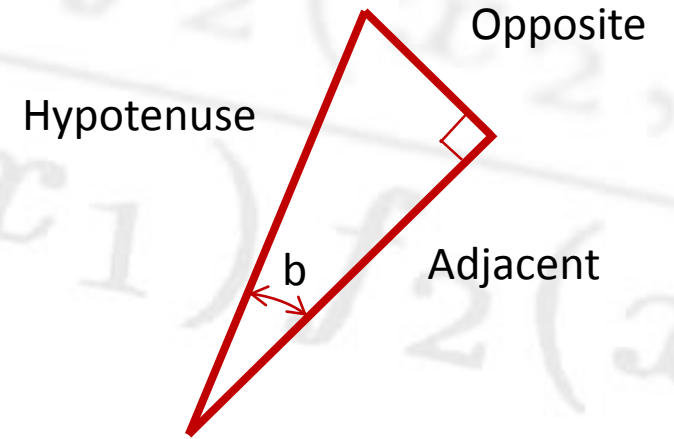
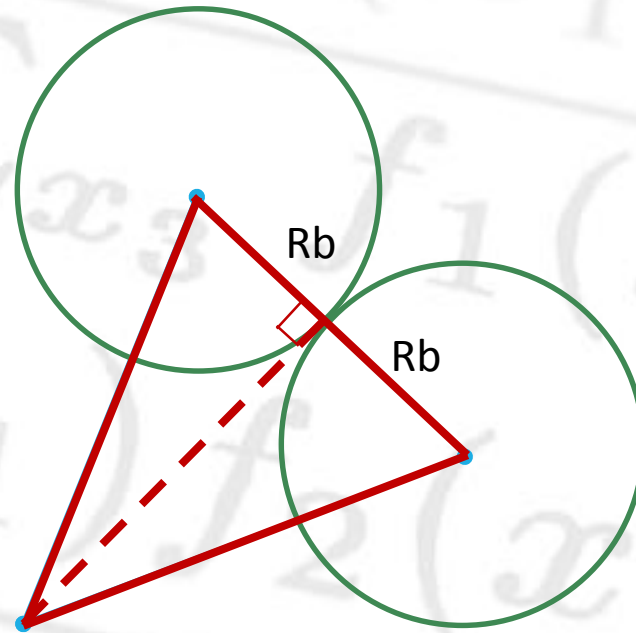
Sometimes circular is better



CircularPane's secret



$N = 10$
 $a = 360/N$



$$\sin(b) = O/H$$

$$b = \frac{1}{2}a = \frac{360}{2N} = \frac{180}{N}$$

O = bead radius

H = chain radius

CircularPane animation

CircularPane pluggable animation

```
@FunctionalInterface
public interface AnimationInterpolation {
    public void interpolate(double progress, AnimationLayoutInfo ali);
}
```

Anonymous inner class

```
cp.setAnimationInterpolation(new CircularPane.AnimationInterpolation() {
    @Override public void interpolate(double progress, AnimationLayoutInfo ali) {...
```

Lambda

```
cp.setAnimationInterpolation( (progress, animationLayoutInfo) -> { ...
```

Method reference

```
cp.setAnimationInterpolation( CircularPane::animateFromTheOrigin );
```



Future



In 2012 16 contributors, 2014 only 5.

Enzo (Gerrit Grunwald)

ControlsFX (Jonathan Giles – JavaFX's control lead)

JFXtras: 95% by me

Questions?

