Migrate Power of Desktop Applications to the Browser

by Iaroslav Kobyliukh

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Who we are?

ANIMATRON funded by JET BRAINS

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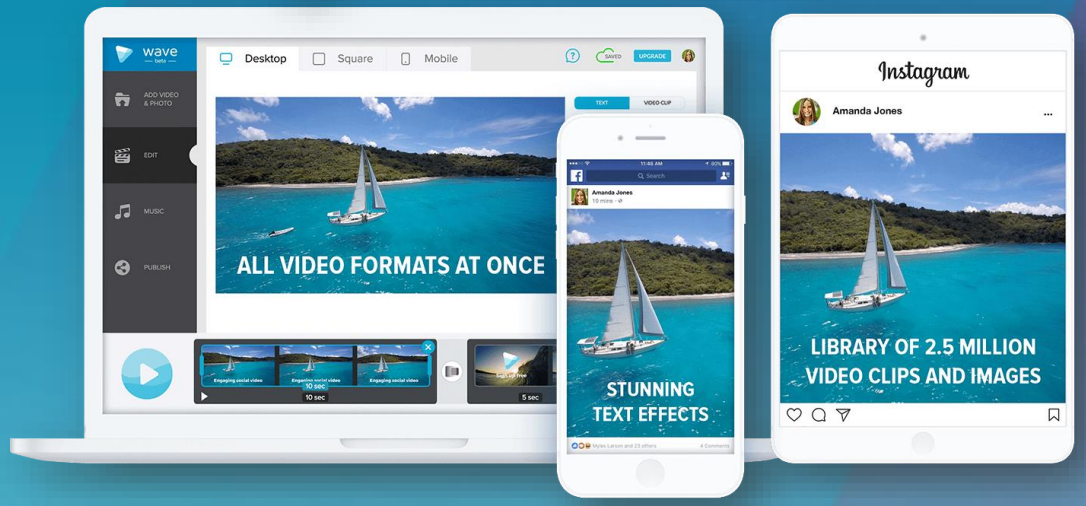

Incredibly easy to use online video maker for creating marketing and social videos in minutes

STUDIO

Universal animation maker for small businesses and agencies

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What we do?

- Tween based vector animation editor
- Rich vector tools
- Import (images, audio, video, SVG)
- Export (HTML5, GIF, Video, SVG+SMIL)
- Share (Facebook, Twitter, YouTube, Dropbox, etc.)
- Collaborative editing

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What is Rich Web Application?

Rich Web application *(or rich Internet application (RIA))* is a Web application designed to deliver the same features and functions normally associated with desktop applications.

Google Docs

SketchUp

TINKERCAD

AUTODESK® TINKERCAD®

AUTODESK® PIXLR®

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Rich Web Applications: Editors

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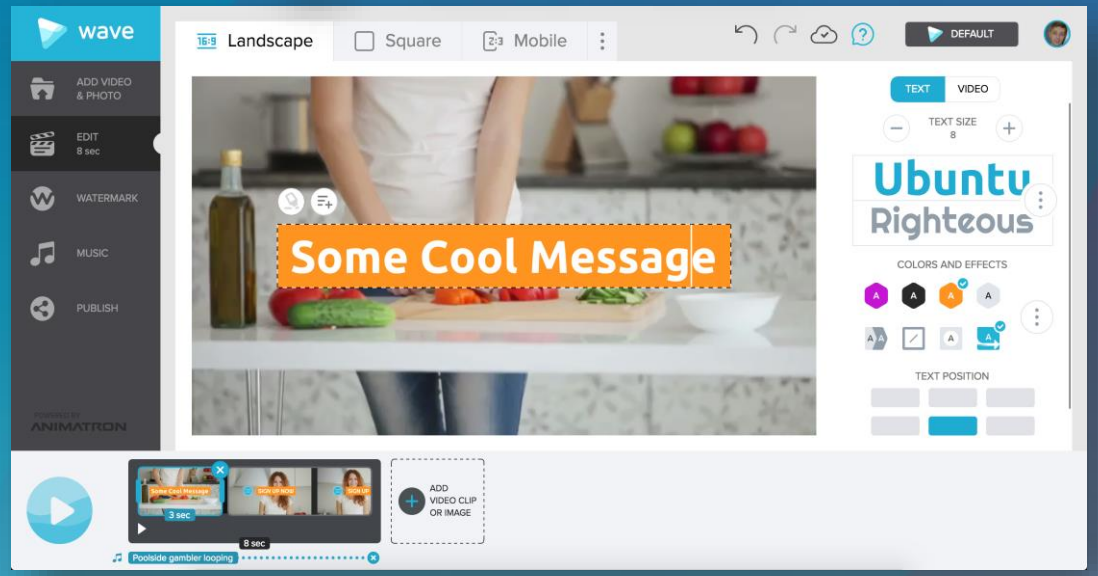

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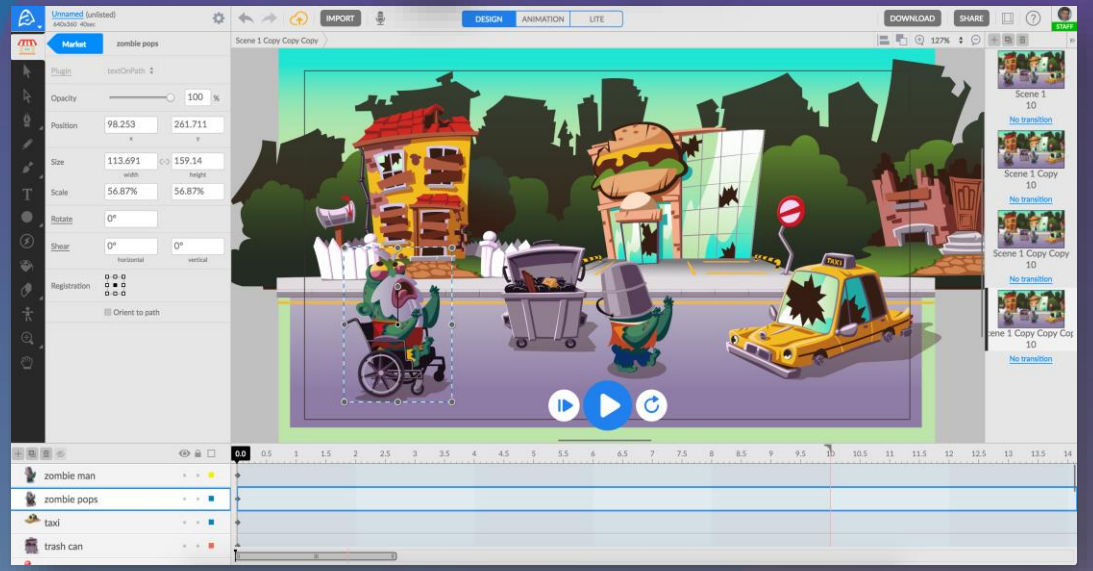

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Rich Web Applications: Principles

- Pages should render fast
- Act immediately on user input
- React to data changes
- Control the data exchange with the server
- Listen internet connection
- Predict behavior

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Rich Web Application: Technologies

GWT

ANGULAR

vaadin

Microsoft

ASP.NET

React

PhoneGap

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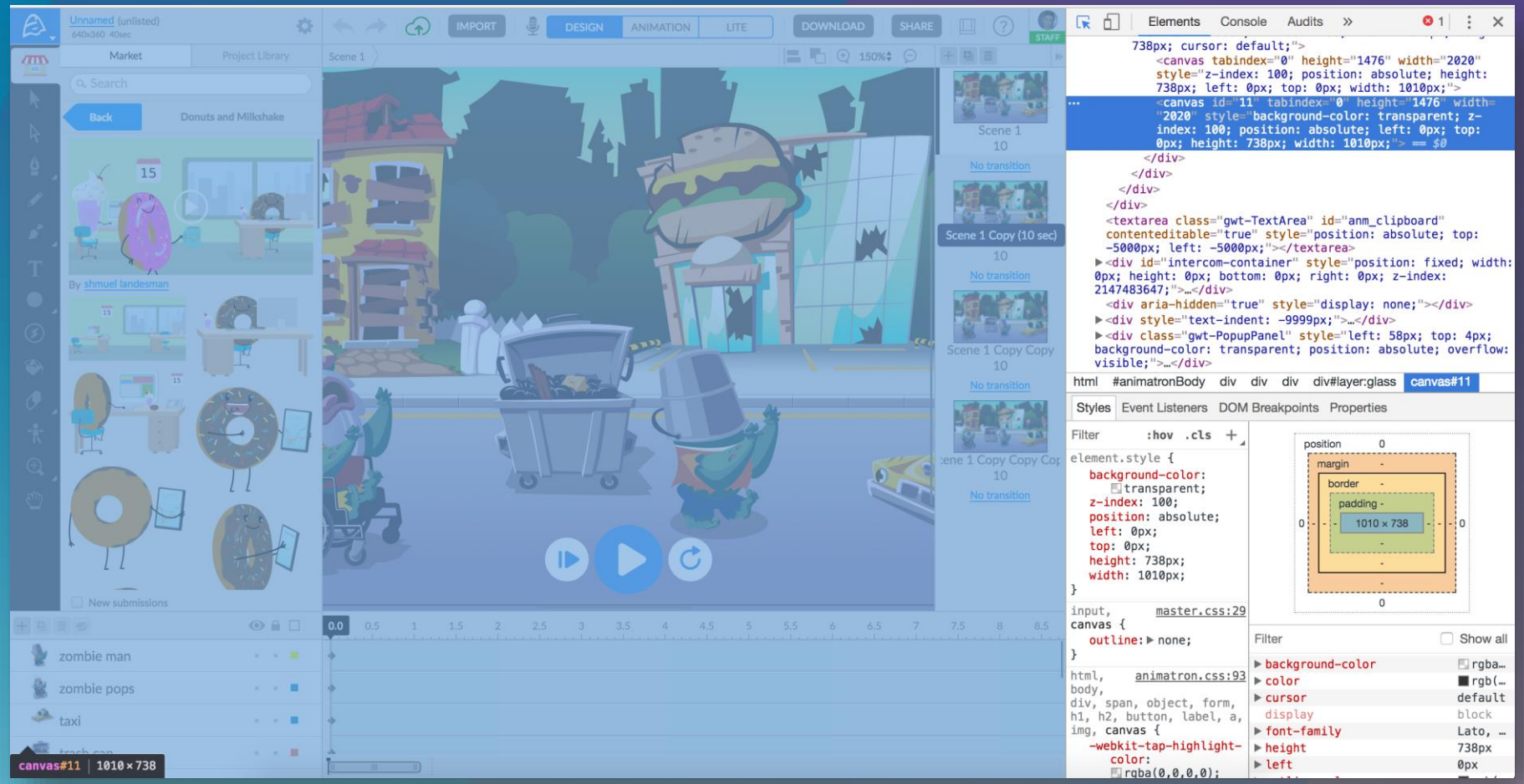
Creating GWT UI

- Create UI Binding Template
- Write UI Java code
- Hand it over to CSS + HTML guy
- The guy styles it
- Next day you get it (at best)
- Roundtrips to fix browser's problems

Everything is Canvas



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Canvas Based Widgets

Are You F**ing Crazy???

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Canvas Based Widgets

- Write only Java code
- No CSS + HTML guy
- No roundtrips
- No browser inconsistences

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Canvas Based Widgets

- This is NOT Swing
- Much simpler than Swing
- Much easier than Swing
- Exactly one look and feel
- Everything is pure Java code
- Many components on the one canvas

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Examples

```
public class DemoPanel extends TPanel.BorderLayout {
     public DemoPanel() {
          super(20);

          TLabel.Ui title = new TLabel.Ui("Demo Panel");
          title.setHAlignment(Alignment.H.center);

          TTextField.Ui.ForString field = new TTextField.Ui.ForString("");

          TTextArea textArea = new TTextArea("");
          textArea.setPlaceholder(“Type something”);

          TLink.Ui.BroserUrl link = new TLink.Ui.BrowserUrl("GWTCon17", "http://www.gwtcon.org");

          TPanel.FlowLayout flowLayout = new TPanel.FlowLayout(Direction.vertical, 10);
          flowLayout.add(field);
          flowLayout.add(textArea);
          flowLayout.add(link);

          north(title);
          center(flowLayout);
     }
}
```

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Examples

Demo Panel

Type something

Type something

Welcome to GWTCon 2017

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Painting Components

```
protected void paintComponent(ACanvas canvas);
public final void invalidate();
public final TComponent revalidate();
public final void repaint();
```

```
public class CustomComponent extends Tcomponent.Ui {
     @Override
     protected void paintComponent(ACanvas canvas) {
          Rectangle rectangle = new Rectangle(0, 0, 100, 50);
          Fill red = new Fill("red");
          canvas.fillRect(rectangle, red);
     }
}
```

```
TButton.Ui button = new TButton.Ui("Please click on me");
button.onMouseDown(new AMouseDownEvent.Handler() {
     @Override
     public void process(AMouseDownEvent event) {
          button.setText("Awesome!");
          button.revalidate();
          button.repaint();
     }
});
```

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Sizes & Dimensions

```
public final Rectangle getBounds();
public final Rectangle getAbsoluteBounds();
public final Rectangle getContentBounds();
public final Dimension getPrefferedSize();
public <C extends TComponent> C setPrefferedSize(Dimension size);
public <C extends TComponent> C setMaximumSize(Dimension size);
public <C extends TComponent> C setMinimumSize(Dimension size);
```

```
public class CustomComponent extends Tcomponent.Ui {
     @Override
     protected void paintComponent(ACanvas canvas) {
          Rectangle rectangle = getContentBounds();
          Fill green = new Fill("green");
          canvas.fillRect(rectangle, green);
     }
}
```

```
TPanel.BorderLayout layout = new TPanel.BorderLayout();
layout.setMaximumSize(new Dimension(640, 480));
layout.setMinimumSize(new Dimension(32, 32));
```

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Lists & Grids

```
List<String> someList = Arrays.asList("one", "two", "three");
TList.Model.Simple<String> simpleModel = new TList.Model.Simple<>(someList);
TList.Ui<String> uiList = new TList.Ui<>(simpleModel);

uiList.getSelectionModel().setSelection("two");
String selectedItem = uiList.getSelectionModel().getSelected();

someList.add("four");
uiList.getModel().fireModelChanged();
```

```
List<CustomObject> someList = getCustomObjects();
TList.Model.Simple<CustomObject> simpleModel = new TList.Model.Simple<>(someList);

TGrid.Ui<String> uiGrid = new TGrid.Ui<>(simpleModel);
uiGrid.setColumns(2);
uiGrid.setRenderer(new CustomRenderer());
```

```
class CustomRenderer extends TLabel.Ui implements TFlyweight.Renderer.Active<CustomObject> {
     @Override
     public void prepareToRender(CustomObject object, boolean selected) {
          setText(object.getName());
     }
}
```

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Viewports

```
List<String> someList = Arrays.asList("one", "two", "three");
TList.Model.Simple<String> simpleModel = new TList.Model.Simple<>(someList);
TList.Ui<String> uiList = new TList.Ui<>(simpleModel);

TViewport.Ui viewport = new TViewport.Ui(uiList);
viewport.setViewWidthTracksViewport(true);
viewport.setViewHeightTracksViewport(true);

TPanel.BorderLayout layout = new TPanel.BorderLayout();
layout.center(viewport);
layout.setPreferredSize(new Dimension(640, 320));
```

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Styling

```
interface Button extends TLook {
     TLookKey<Boolean> OPAQUE = new TLookKey<>("button.opaque", false);
     TLookKey<Fill> BG = new TLookKey<>("button.background", new Fill("#FFFFFF");
     TLookKey<Fill> FG = new TLookKey<>("button.foreground", new Fill("#000000");
     TLookKey<Fill> BG_PRESSED = new TLookKey<>("button.background.pressed", BG);
     TLookKey<Fill> FG_PRESSED = new TLookKey<>("button.foreground.pressed", FG);
     TLookKey<Fill> BG_HOVERED = new TLookKey<>("button.background.hovered", BG);
     TLookKey<Fill> FG_HOVERED = new TLookKey<>("button.foreground.hovered", FG);
     TLookKey<TFont> FONT = new TLookKey<>("button.font", new TFont("Lato", 10);
}
```

```
public interface THasLook {
     TLookSet getLook();
     <C extends TComponent> C setLook(TLookSet lookSet);
}
```

```
TButton.Ui button = new TButton.Ui("Click");
button.getLook().set(Button.FG, new Fill("red"));

TPanel.FlowLayout flowLayout = new TPanel.FlowLayout(Direction.vertical, 10);
flowLayout.add(field);

flowLayout.getLook().set(Button.FONT, new TFont("Consolas", 12));
```

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Mouse Events

```java
/**
 * Handler interface for {@link MouseDownEvent} events.
 */
public interface MouseDownHandler extends EventHandler {
  /**
   * Called when MouseDown is fired.
   * @param event the {@link MouseDownEvent} that was fired
   */
  void onMouseDown(MouseDownEvent event);
}
```

```java
public final <C extends TComponent> C onMouseDown(new AMouseDownEvent.Handler());
public final <C extends TComponent> C onMouseUp(new AMouseUpEvent.Handler());
public final <C extends TComponent> C onMouseMove(new AMouseMoveEvent.Handler());
public final <C extends TComponent> C onMouseWheel(new AMouseWheelEvent.Handler());
public final <C extends TComponent> C onMouseDoubleClick(new AMouseDoubleClickEvent.Handler());
```

```java
TButton.Ui button = new TButton.Ui("Click");
button.onMouseDown(new AMouseDownEvent.Handler() {
    @Override
    public void process(AMouseDownEvent event) {
        //TODO: actions
    }
});
```

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Mouse Events

```
public class GlobalMouseHandler implements MouseDownHandler, … , MouseUpHandler {
     @Override
     public void onMouseDown(MouseDownEvent event) {
          dispatch(new AMouseDownEvent(event));
     }

     @Override
     public void onMouseMove(MouseMoveEvent event) {
          dispatch(new AMouseMoveEvent(event));
     }

     …

     @Override
     public void onMouseUp(MouseUpEvent event) {
          dispatch(new AMouseUpEvent(event));
     }

     private void dispatch(AMouseEvent event) {
          …
     }
}
```

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Canvas Based Widgets

- Core framework development takes time
- Hard to create automated tests
- Everything is done manually
- Big Canvas can be slow
- Text rendering can cause problems
- Sometimes require special hacks

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Future of Java in Rich Web Apps

GWT

vaadin

Java + Clojure

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Relocation to Lviv:

- Front-End Developer (Java)
- Backend Developer (Java/Scala)
- Front-End Developer (Typescript/AngularJS/React)
- DevOps Engineer (with Amazon AWS Experience)

For more information: ykobyliuk@animatron.com

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