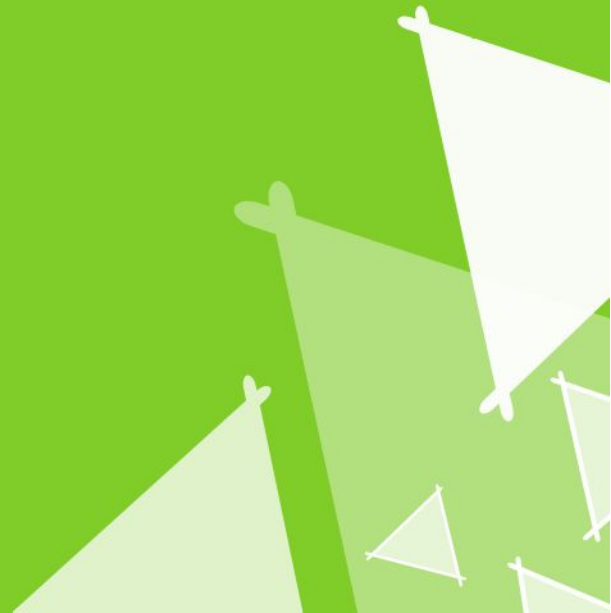


FROM SWING TO JET

THOMAS KRUSE



THOMAS

KRUSE

 @everflux

- CEO trion development GmbH – www.trion.de
- Founder Java User Group (JUG) Münster – www.jug-muenster.de
- Speaker: JavaOne, Netbeans Days, ...
- Oracle certified Enterprise Architect, Sun certified Java developer

trion

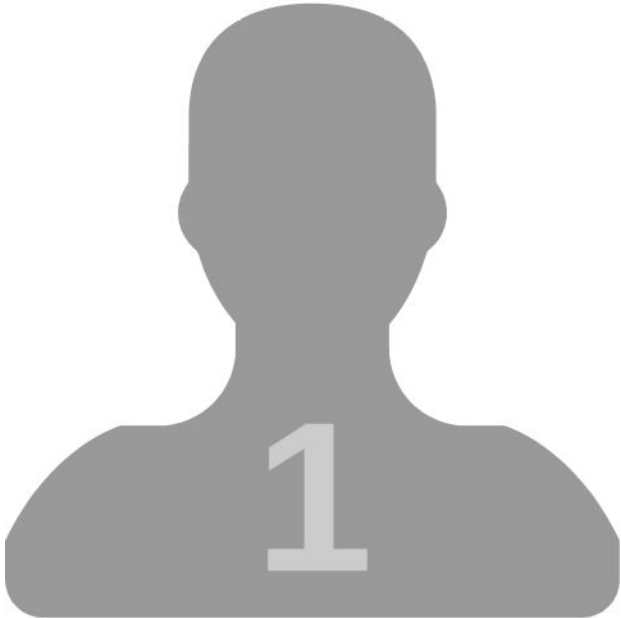
www.trion.de

- Professional services
- Architecture
- Consulting
- Development
- Training

FROM SWING TO JET

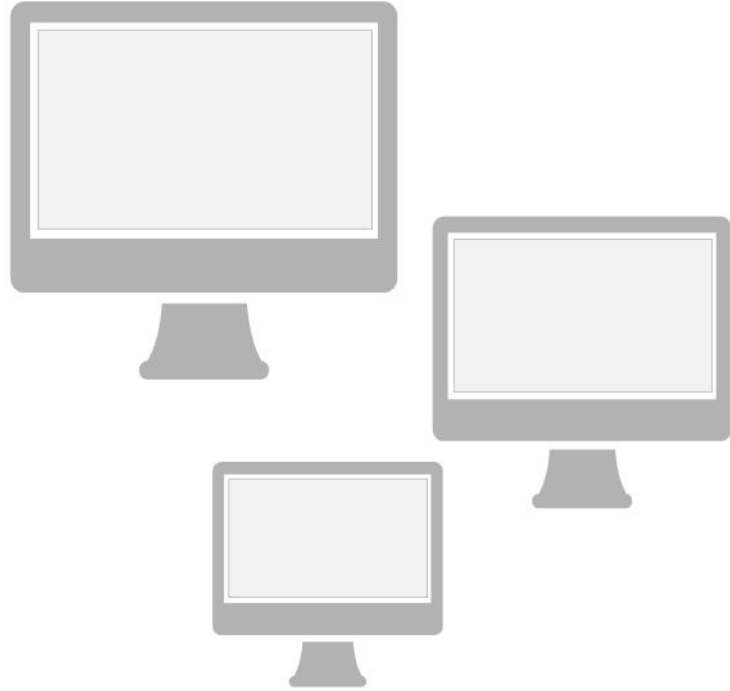
- Background
- Motivation
- Architecture
- Opportunity

DESKTOP APPLICATION

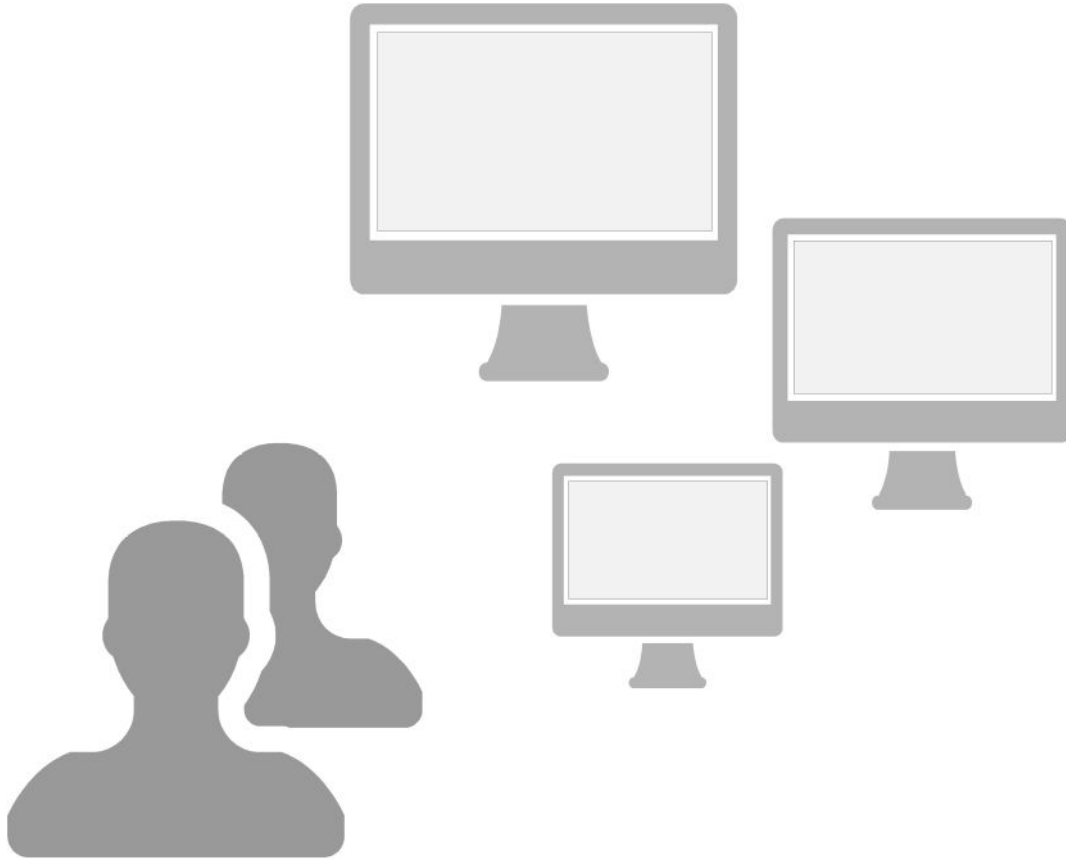


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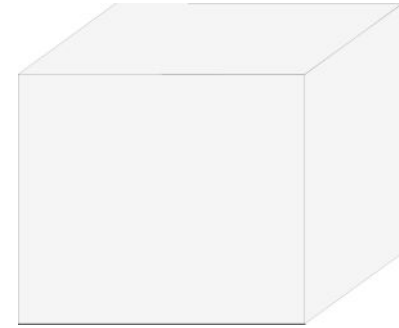
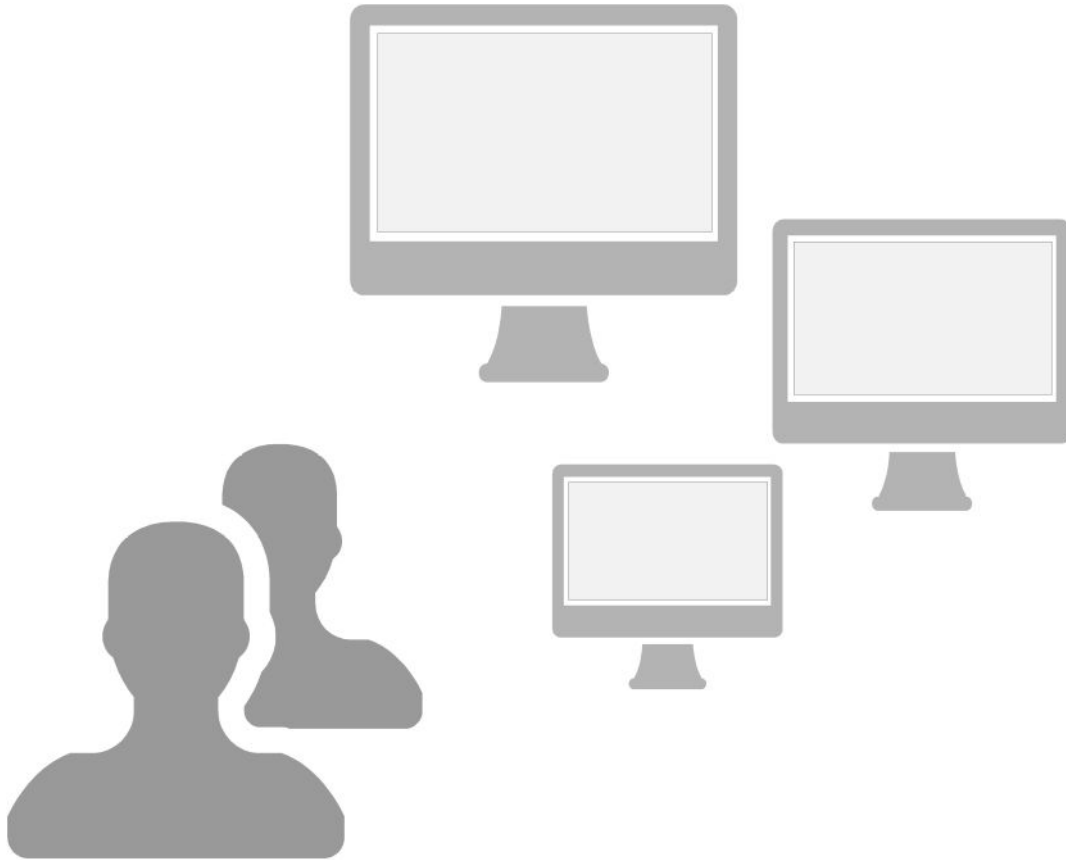
MULTI USER



REMOTE SERVER

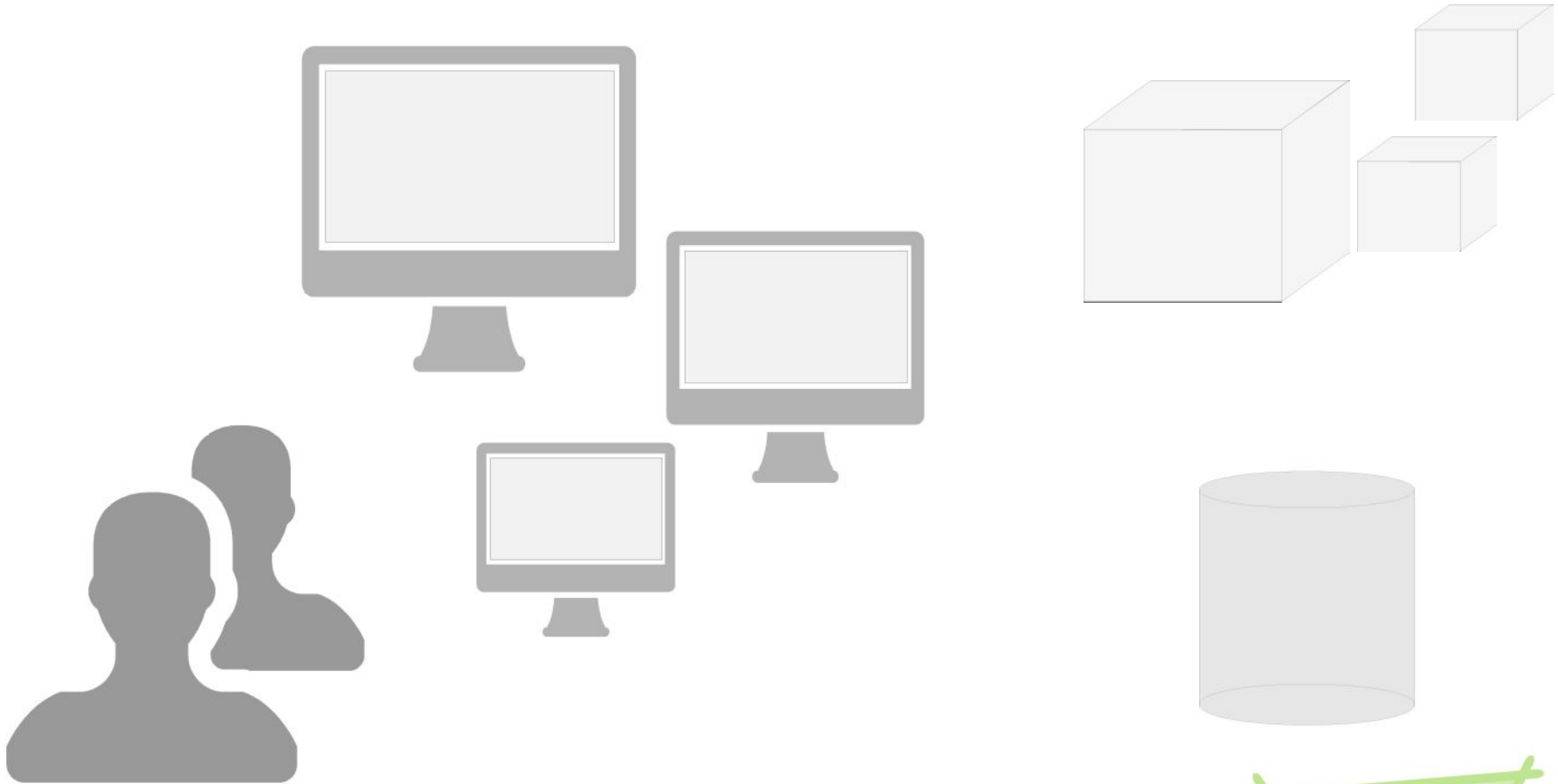


CENTRAL DATA STORE

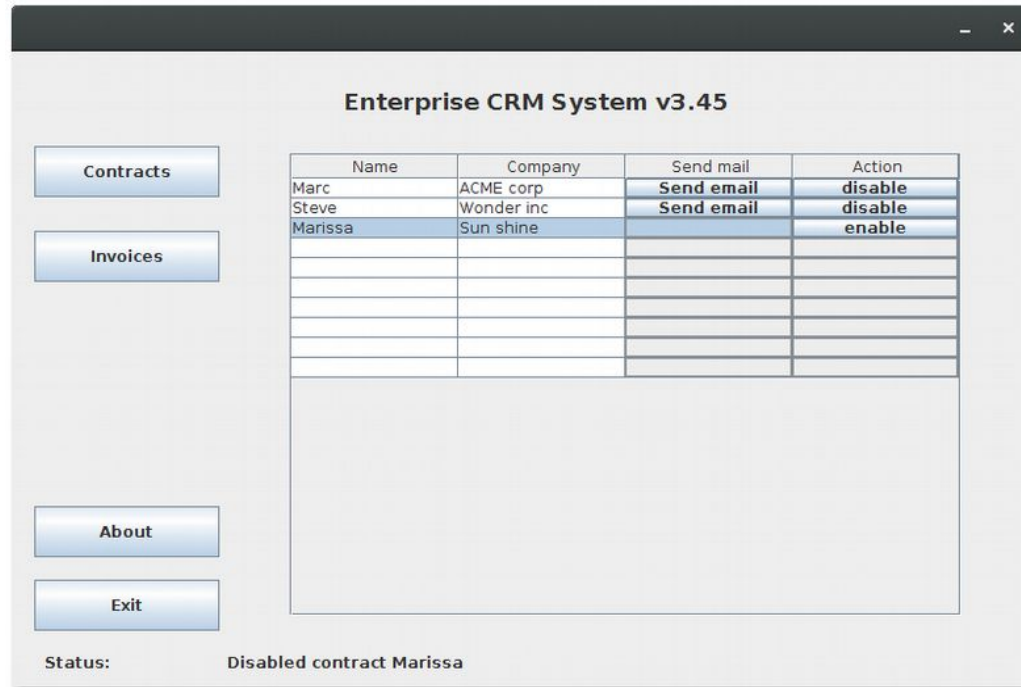


2016-03-31

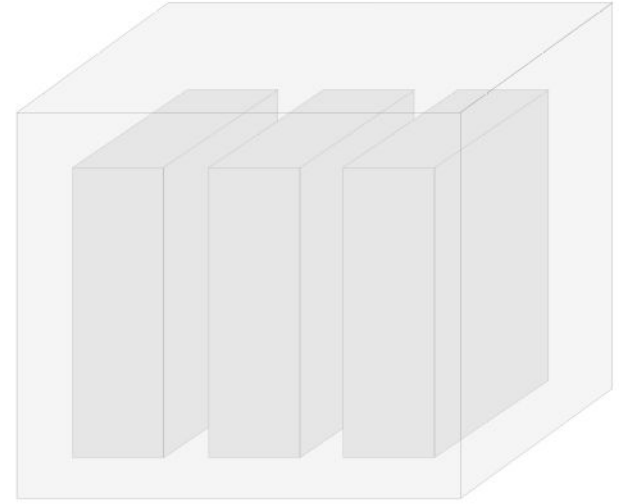
SCALING THE APPLICATION



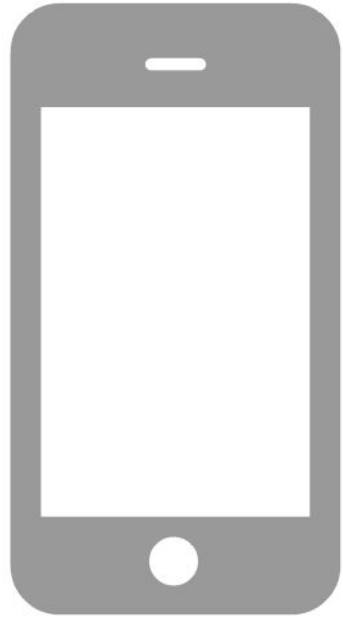
DEMO – SWING ENTERPRISE



ELEMENTS OF AN APPLICATION



MOBILE



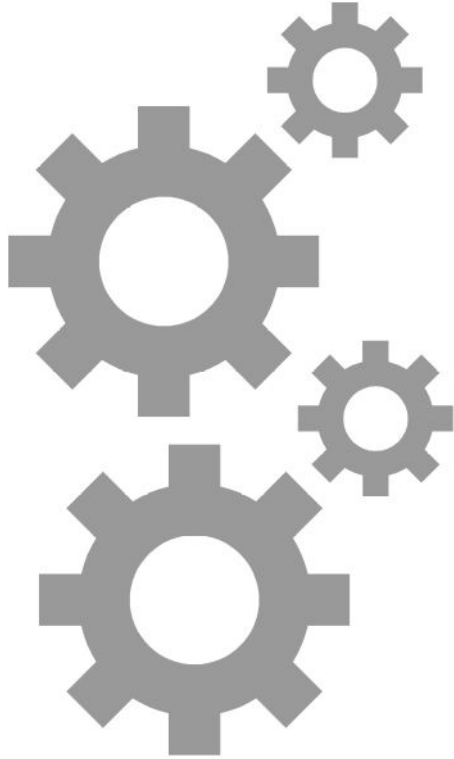
?

CLOUD



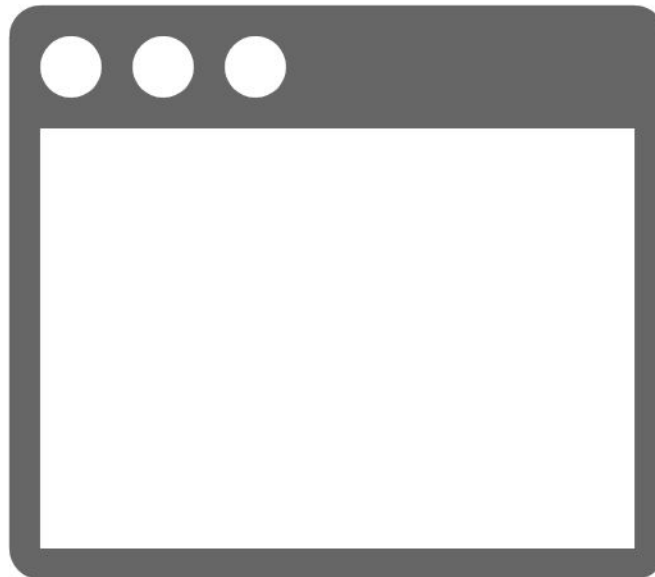
?

MICROSERVICES



WEB

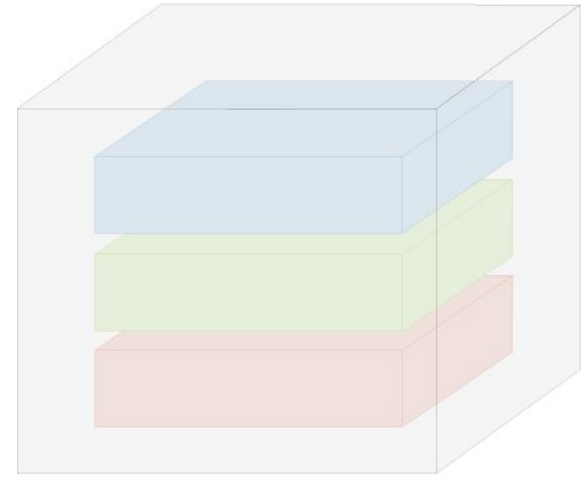
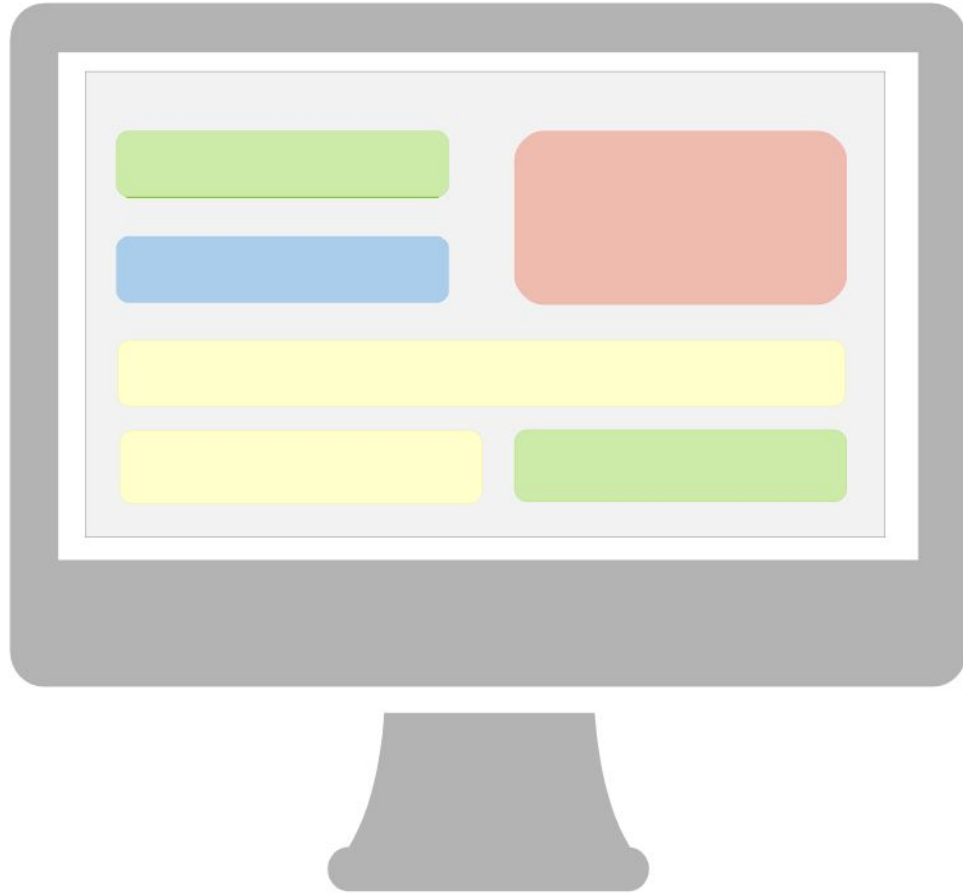
- HTML
- CSS
- JavaScript
- ... everywhere



MIGRATION OPTIONS

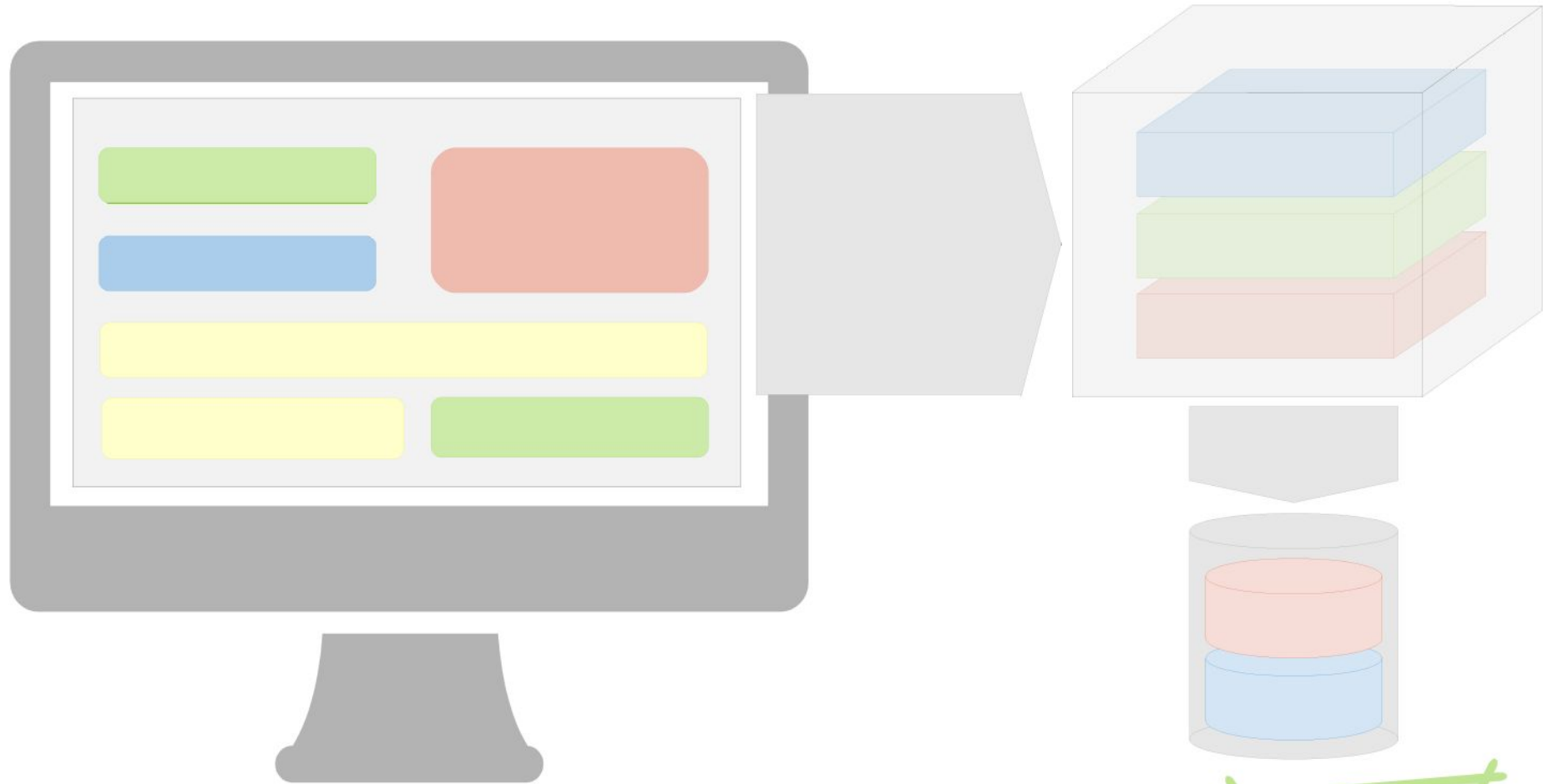
- Big Bang
 - Long development time
 - Late feedback
 - High risk
 - Over time
 - Over budget
 - Late benefit from investment
 - Only after completion
- Incremental migration
 - Early feedback
 - Reduced risk
 - Opportunity to benefit early from investment
 - Migrate some user groups when partial features are sufficient
 - Reduced pressure
 - Migration may even take longer

COMPONENTS



2016-03-31

COMMUNICATION



2016-03-31

JAVAFX WEB VIEW

- Part of JavaFX / Oracle JDK
- Based on WebKit
- Tight integration
 - User styles (CSS)
 - DOM manipulation
 - Java to JavaScript calls
 - JavaScript to Java calls
- Cross platform

SOME CODE FOR WEB VIEW

```
WebView webView = new WebView();

AnchorPane anchorPane = new AnchorPane();
anchorPane.getChildren().add(webView);

Scene scene = new Scene(anchorPane);
fxContainer.setScene(scene);

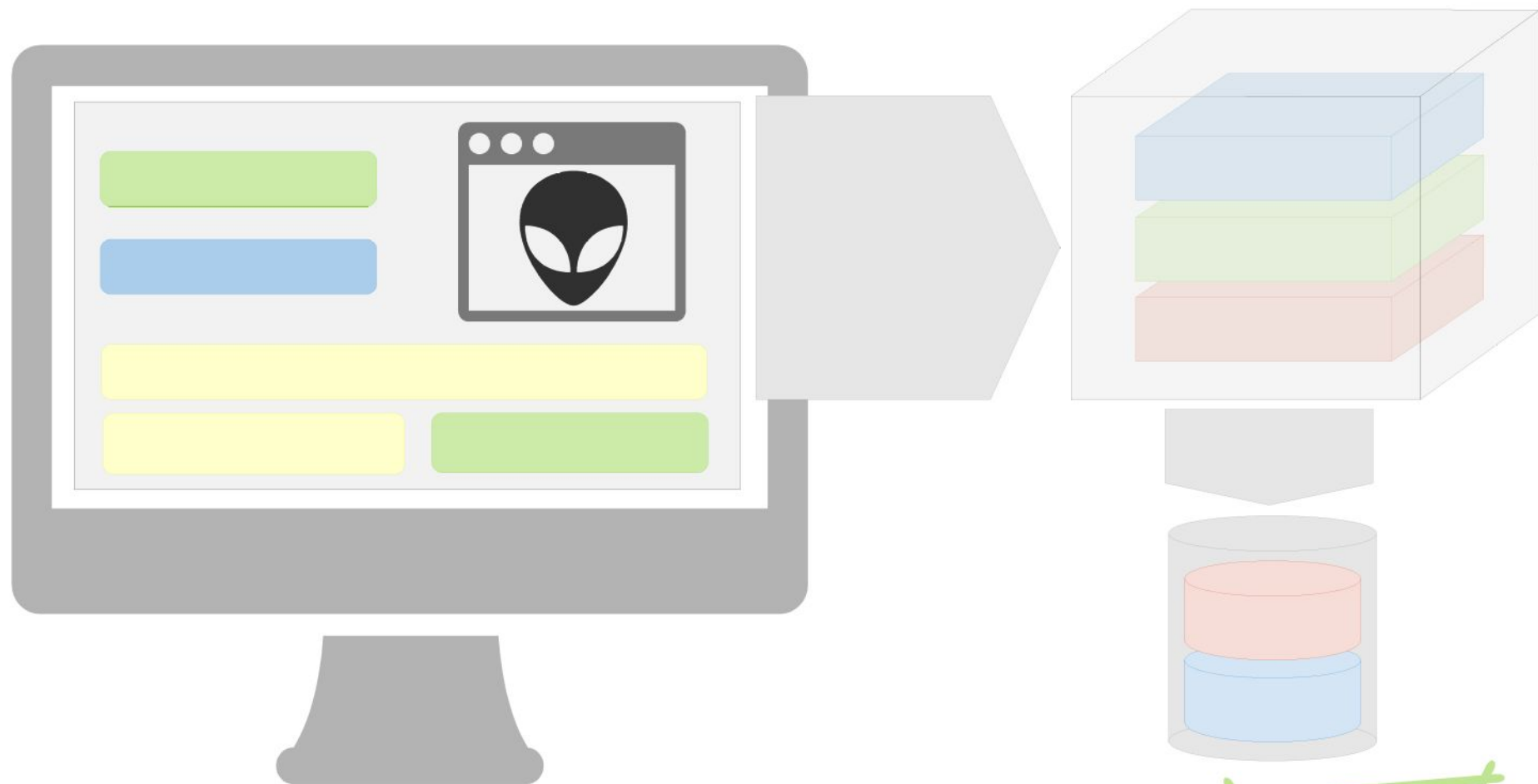
final WebEngine webEngine = webView.getEngine();
webEngine.setJavaScriptEnabled(true);

webEngine.load("http://127.0.0.1/");
```

DEMO – WEBVIEW SHOWCASE

Demo WebView Showcase

EMBEDDING THE WEB



TRION



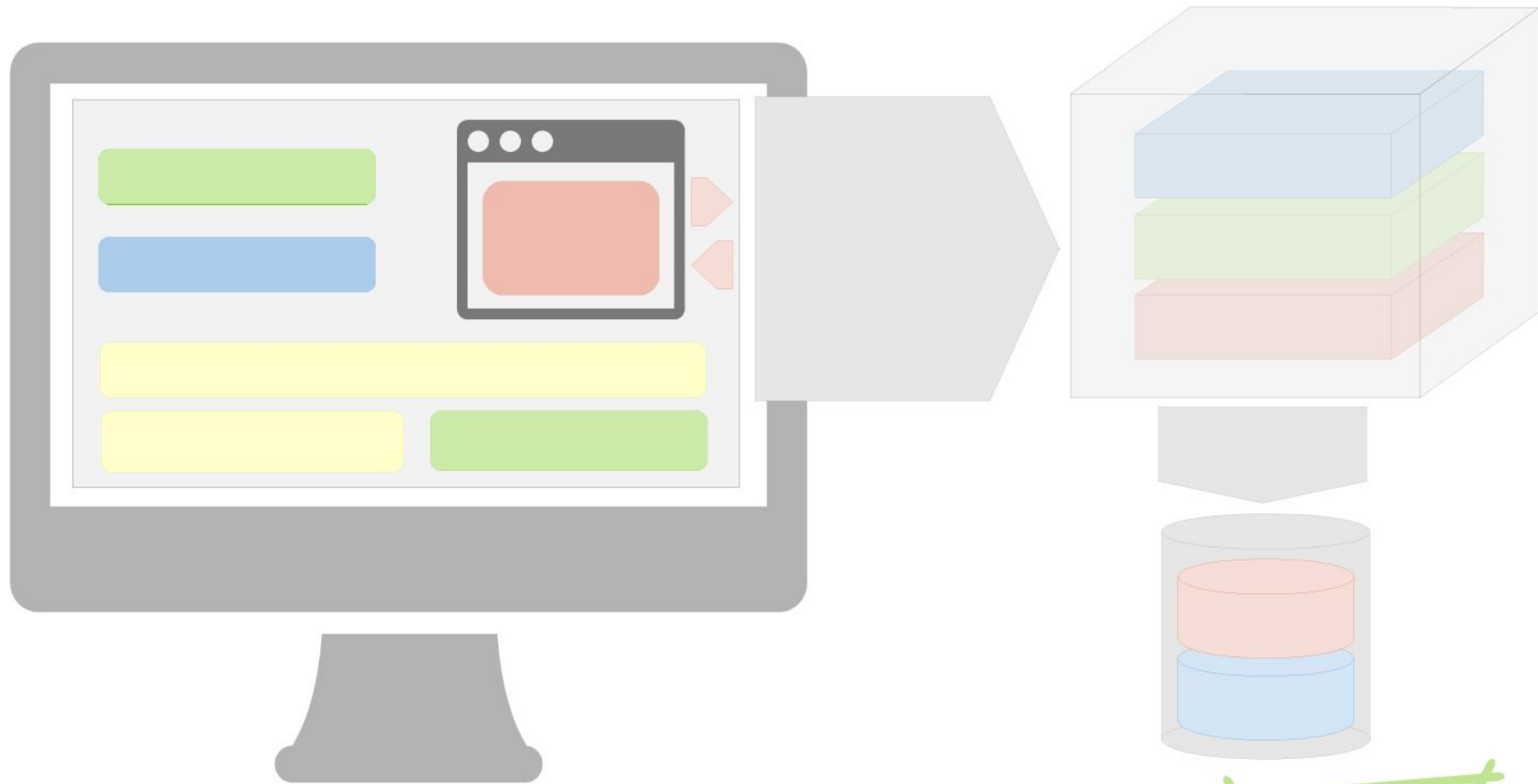
ARCHITECTURE

- Migrate the application step wise
 - Provide an application host API that can be implemented in JavaScript or Java
 - Provide server side API that can be consumed by Java and browser application
 - Server endpoints for remote communication: HTTP (+ SSE, Websockets)
- MVC
 - Model adapter
 - Controller delegate
 - View strategy
- Choose a client framework like Angular, Oracle JET

ORACLE JET

- Based on Knockout
 - For data binding using observables
 - Component model
- Provides components for rich web applications
 - Based on Alta UX
- Responsive grid
- I18n, Accessibility
- Routing

BRIDGING THE WEB



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JAVA API BRIDGE

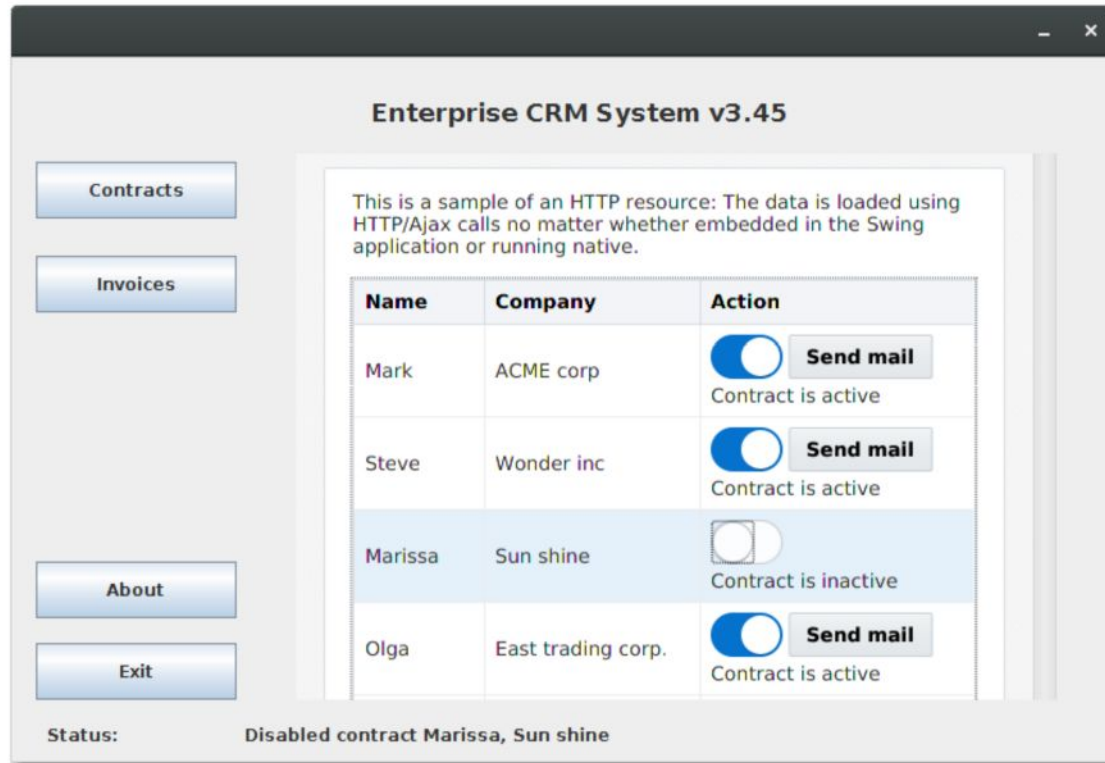
```
public class ApiBridge {  
  
    public void sendMail(JSObject contract) {  
        Contract contractJava = ModelConverter.contractFrom(contract);  
        navigationController.sendMail(contractJava);  
    }  
  
    public void updateStatus(String status) {  
        navigationController.statusUpdate(status);  
    }  
}
```

```
JSObject win = (JSObject)  
webEngine.executeScript("window");  
win.setMember("appFrame", new ApiBridge());
```

ORACLE JET IS CALLING

```
define(['ojs/ojcore', 'knockout', 'jquery', 'ojs/ojdialog'],
function (oj, ko, $) {
    var StatusService = {
        updateStatus: function (msg) {
            if (window.appFrame) {
                window.appFrame.updateStatus (msg);
            }
        }
    };
    return StatusService;
});
```

DEMO - HYBRID



GOOD TO KNOW

- Interact with the WebView only from JavaFX Thread
 - Use `Platform.runLater()`
 - ...so keep your JavaFX Thread alive

```
Platform.setImplicitExit(false);
```

- Java classes to be used by JavaScript must be public
 - The methods as well
- API should be a thin layer
 - Event delegation
 - Model transformation

DATA BINDING

- Knockout uses Observables for UI data binding
 - Requires handling when bridging
 - Used by other frameworks like Ember as well

```
fetch: function() {  
  $.getJSON(self.contractUrl, function (data) {  
    data.forEach(function (entry) {  
      entry.active = ko.observable(entry.active);  
      entry.active.subscribe(changePropagation, entry);  
      self.contractCollection.push(entry);  
    });  
  });  
  return self.contractCollection;  
}
```

HANDLING CHANGE

- Change event propagation using `subscribe()`

```
entry.active = ko.observable(entry.active);  
entry.active.subscribe(changePropagation, entry);
```

- Delegation to a service to handle the change
 - For example notification of the back end

```
function changePropagation(activeValue) {  
  // "this" is bound to the "entry" parameter  
  if (activeValue) {  
    ContractService.enable(this);  
  } else {  
    ContractService.disable(this);  
  }  
}
```

VISUAL ADJUSTMENTS

- Use CSS to adjust the presentation

```
URL resource = getClass().getResource("/styles.css");  
String css = resource.toExternalForm();  
  
webView.getEngine().setUserStyleSheetLocation(css);
```

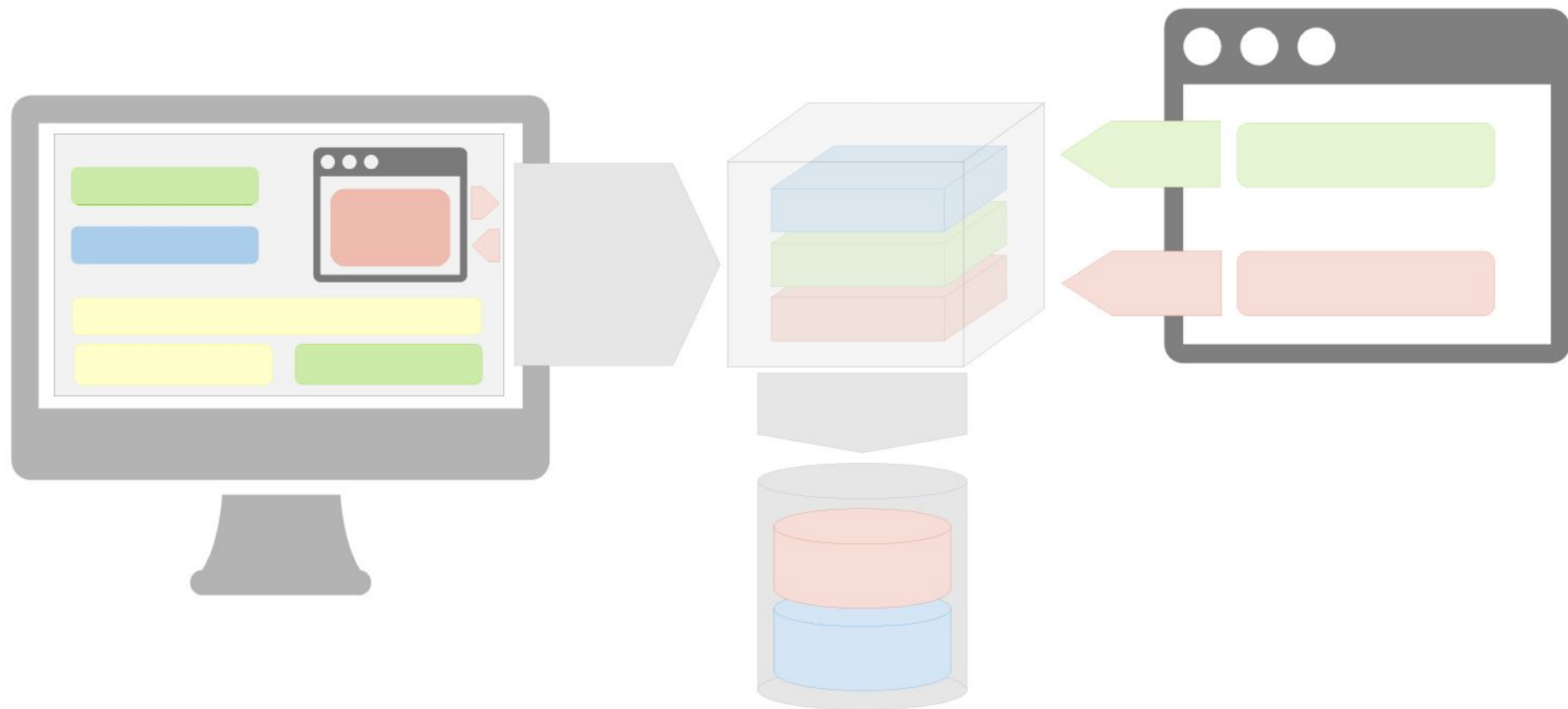
- Avoid external DOM manipulation

OPPORTUNITY

STAND ALONE

- Some user groups need only small vertical of system
 - A web application with reduced scope can be developed in parallel
 - Based on already migrated features
- Provide application frame as client side web application
 - Contains navigation elements
 - Holds application state
- Can be used on all devices that support web
- Needs remote endpoints for all required use cases
- Opportunity for early feedback on user experience design

PARALLEL CONSTRUCTION



DEMO – WEB NATIVE

Oracle JET Sample for Swing Web Bridge

user@example.com ▾

Home About Contracts Invoices

This is a sample of an HTTP resource: The data is loaded using HTTP/Ajax calls no matter whether embedded in the Swing application or running native.

Name	Company	Action
Mark	ACME corp	<input checked="" type="checkbox"/> Send mail Contract is active
Steve	Wonder inc	<input checked="" type="checkbox"/> Send mail Contract is active
Marissa	Sun shine	<input type="checkbox"/> Contract is inactive
Olga	East trading corp.	<input checked="" type="checkbox"/> Send mail Contract is active
Svetlana	East trading corp.	<input type="checkbox"/> Contract is inactive
Olivier	French toast	<input checked="" type="checkbox"/> Send mail Contract is active

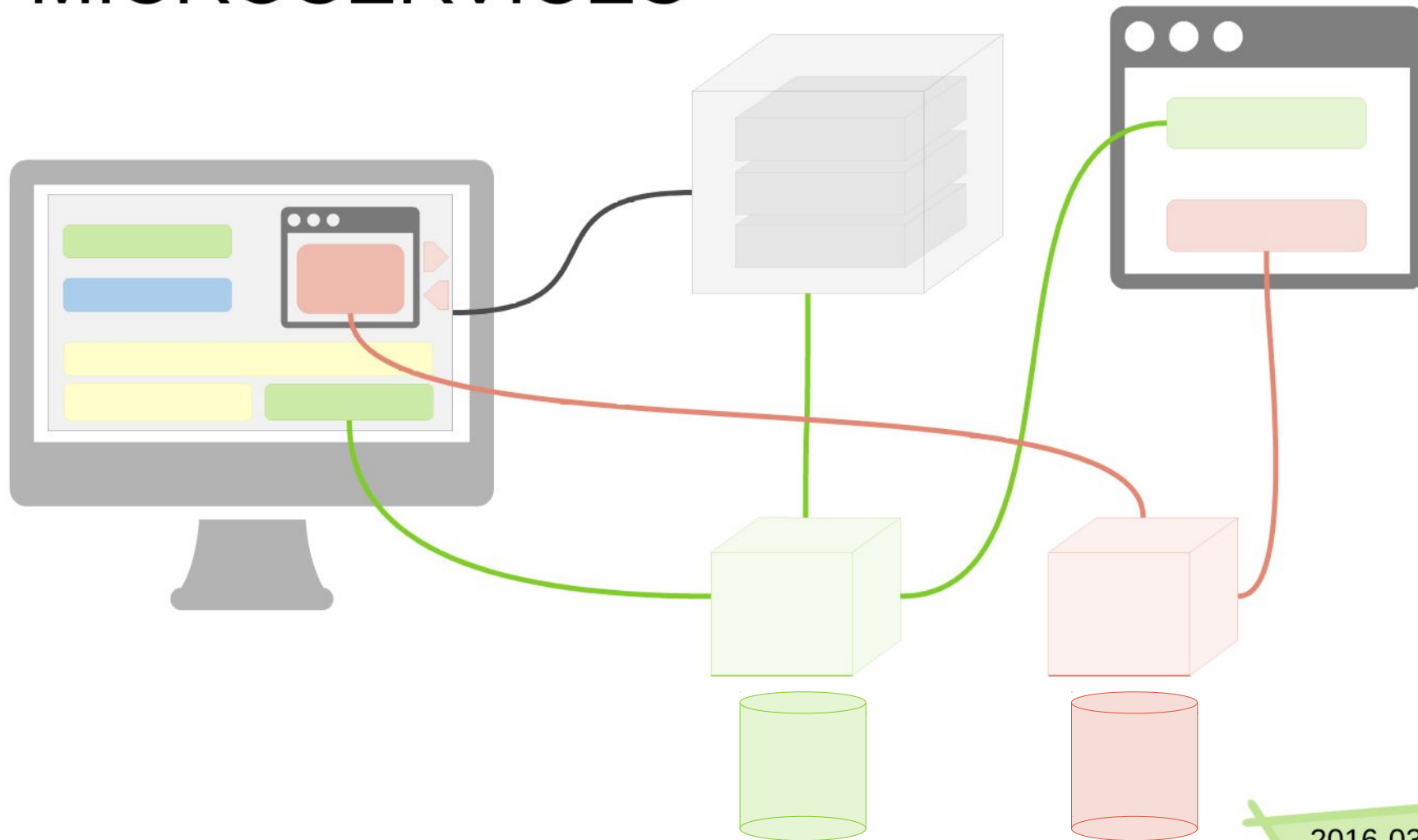
MIGRATION CHALLENGES

- Authentication and authorization
- Architecture and design
 - Parallel API development for web and native
 - Accidental dependency on native application
 - Data mapping between Java/JavaScript
- Testing effort increases
 - Additional testing of web standalone and embedded
- JavaFX WebKit is very old (2014)
 - Oracle seems to plan regular updates when JDK 9 is released

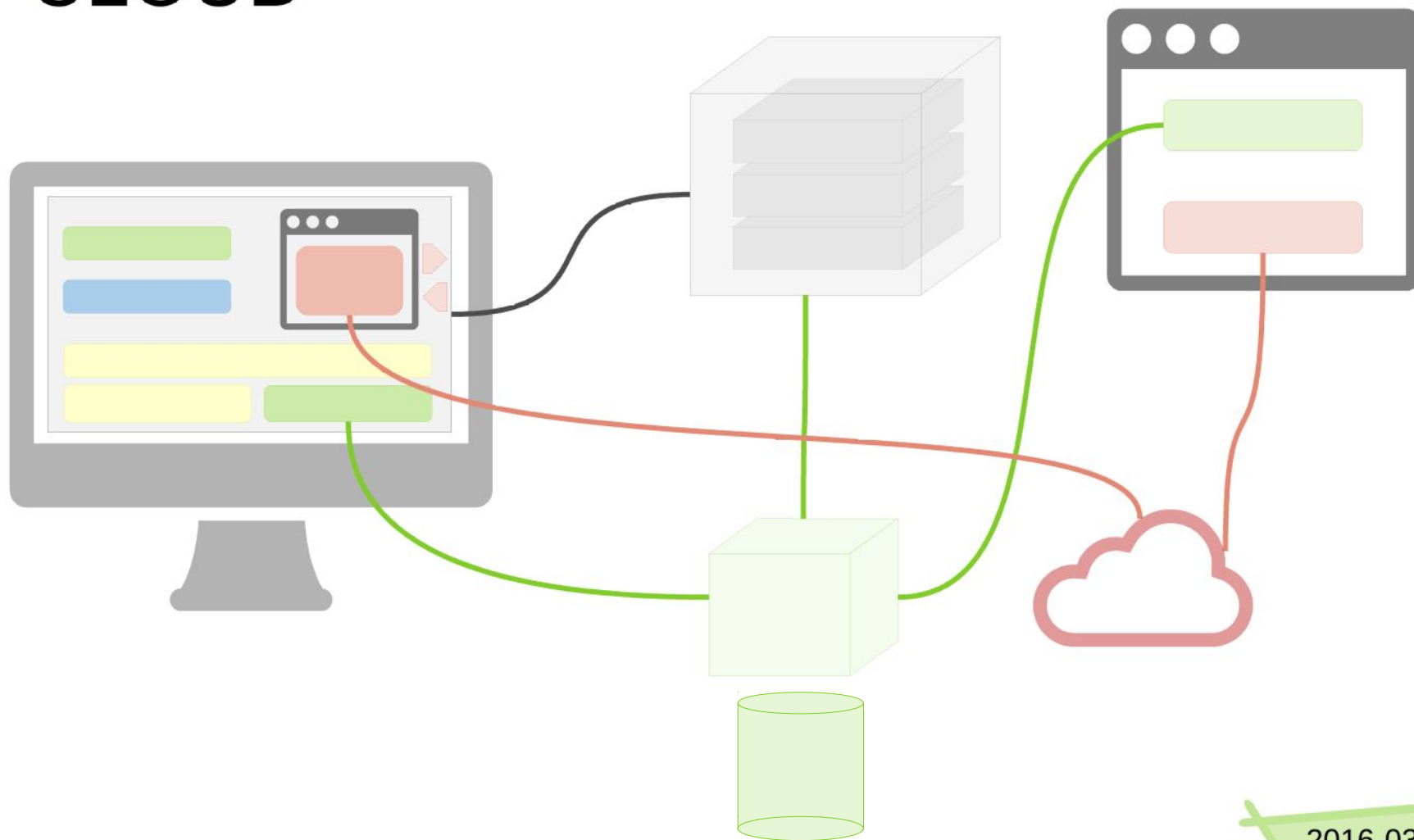
CLOUD AND MICROSERVICES

- When updating the client, consider the back-end as well
- Keys to the cloud
 - Stateless and standardized remote communication
 - Small, individually scalable services
- Back-end can be written in Java, PHP, go, JavaScript, ...
 - As long as HTTP communication is possible

MICROSERVICES



CLOUD



OPPORTUNITY OF A HYBRID

- Not only for migration
- Hybrid applications unite the best of both worlds
 - Bridge legacy APIs (as code or HTTP endpoint)
 - Provide access to connected devices (f.e. signature pad)
 - Integrate web based services (Maps, Navigation, ...)
- Web developers are easier to find than Java Swing/FX

NETBEANS PLATFORM

- Provides runtime environment
 - Plugin system
 - Application lifecycle
 - Service registry
- Potential for use as host of hybrid applications
- NetBeans Platform itself can be customized using JavaScript
 - Ctrl-Space by ProjektMotor
 - Code completion and hints currently working



WHO ELSE?

- Spotify, Steam client, Adobe creative cloud, Battle.net, Amazon Music, ...
- Architectural decision to develop an web based desktop app
- CEF
 - Chromium embedded framework
 - Native, available for all major platforms
- JCEF
 - Java port of CEF
 - Heavy use of JNI




TOOLING

ORACLE – JAVA 8

 <http://www.oracle.com/technetwork/java/javase/downloads/index.html>

NETBEANS IDE – JAVA, SWING, HTML/CSS/JAVASCRIPT

 <https://netbeans.org/downloads/>

JAVASCRIPT TOOLKIT

<http://oraclejet.org/>

Thank you for your attention

Questions? Comments? Reach out!

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