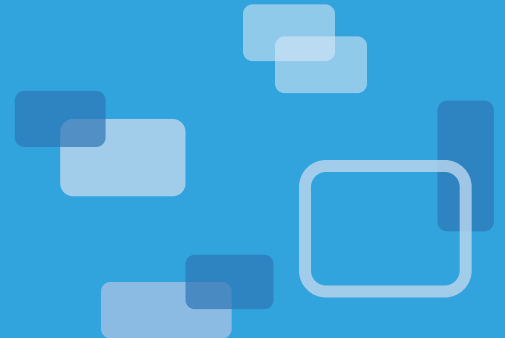


FOEX

Building Single Page Applications in APEX

Matt Nolan

CTO, FOEX GmbH



As a company...

FOEX

Our mission is to help companies easily create
complex UI's for data centric applications
faster and more cost effectively using



Oracle Application Express

+



SPA

What is a SPA?

Why use a SPA?

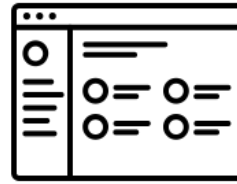
What are the benefits from a SPA?



Business Application Development i.e. Data Centric



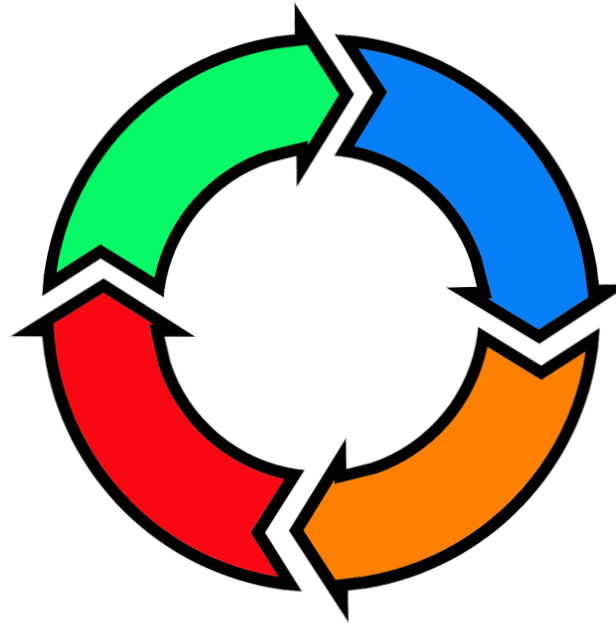
Web apps...



ever growing demand to be more sophisticated

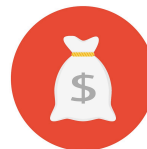


need to be built quicker



are getting more complex

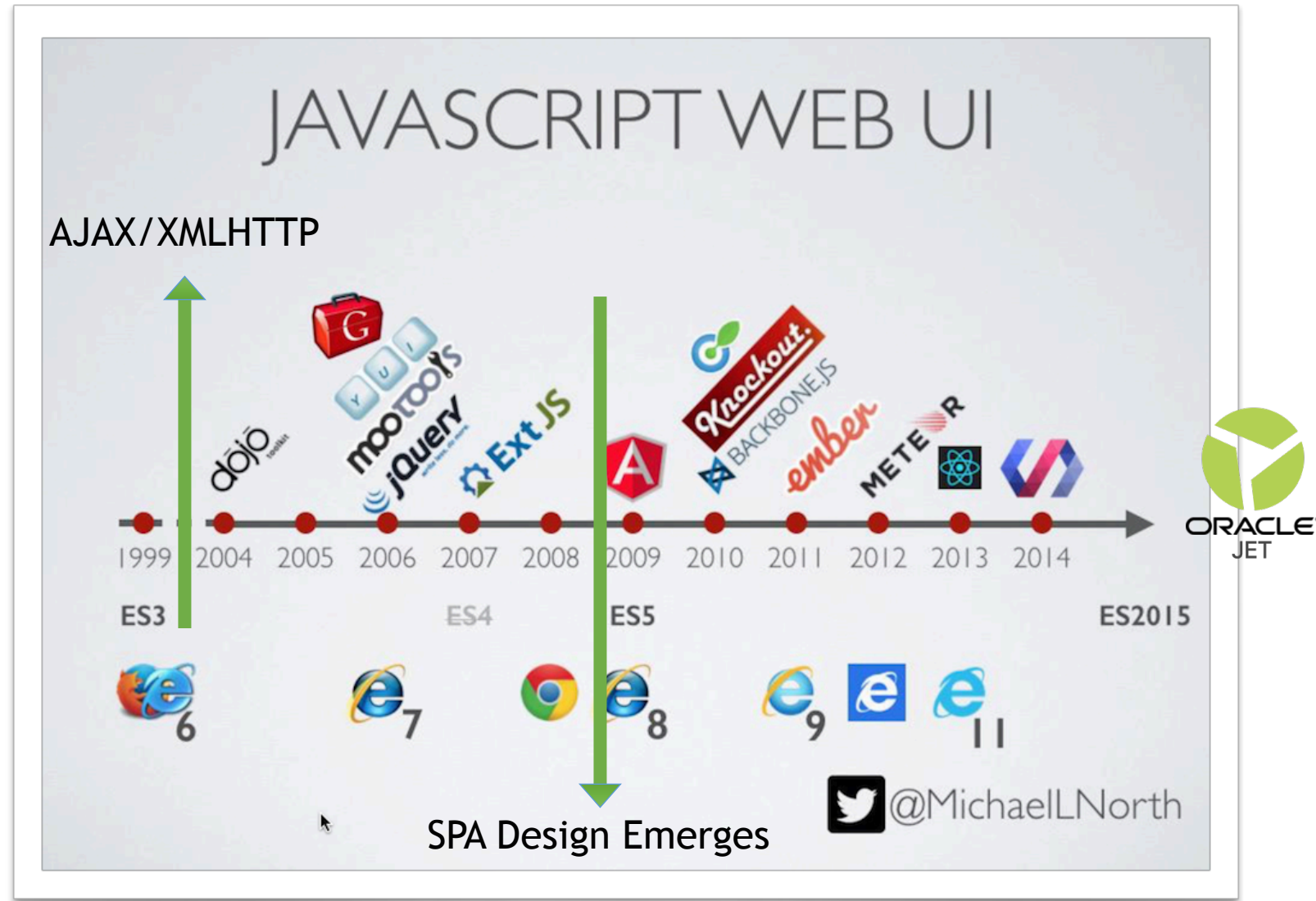
Overrunning Budgets



Better Tools!



Timeline



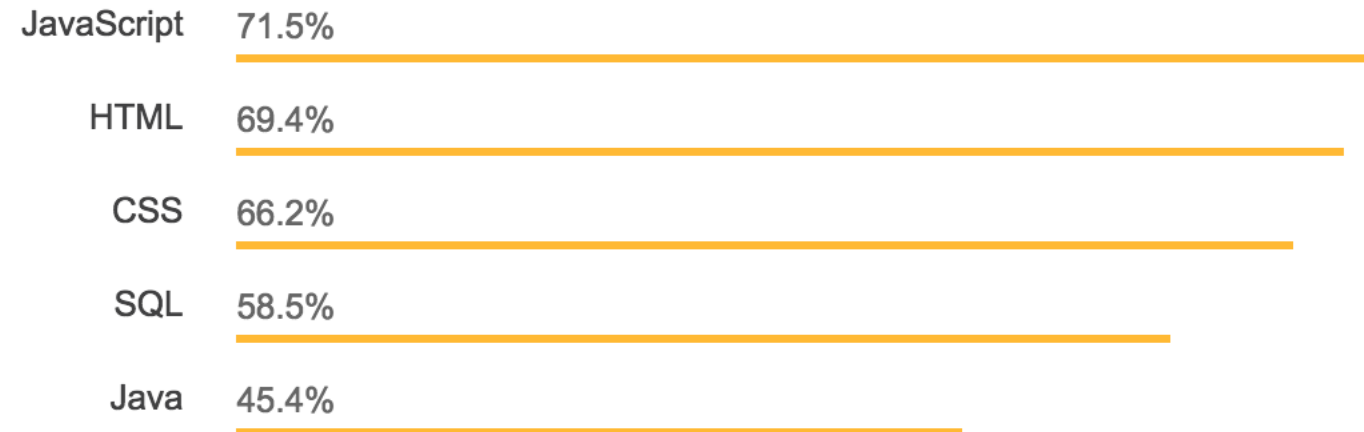
Javascript is KING!

Programming, Scripting, and Markup Languages

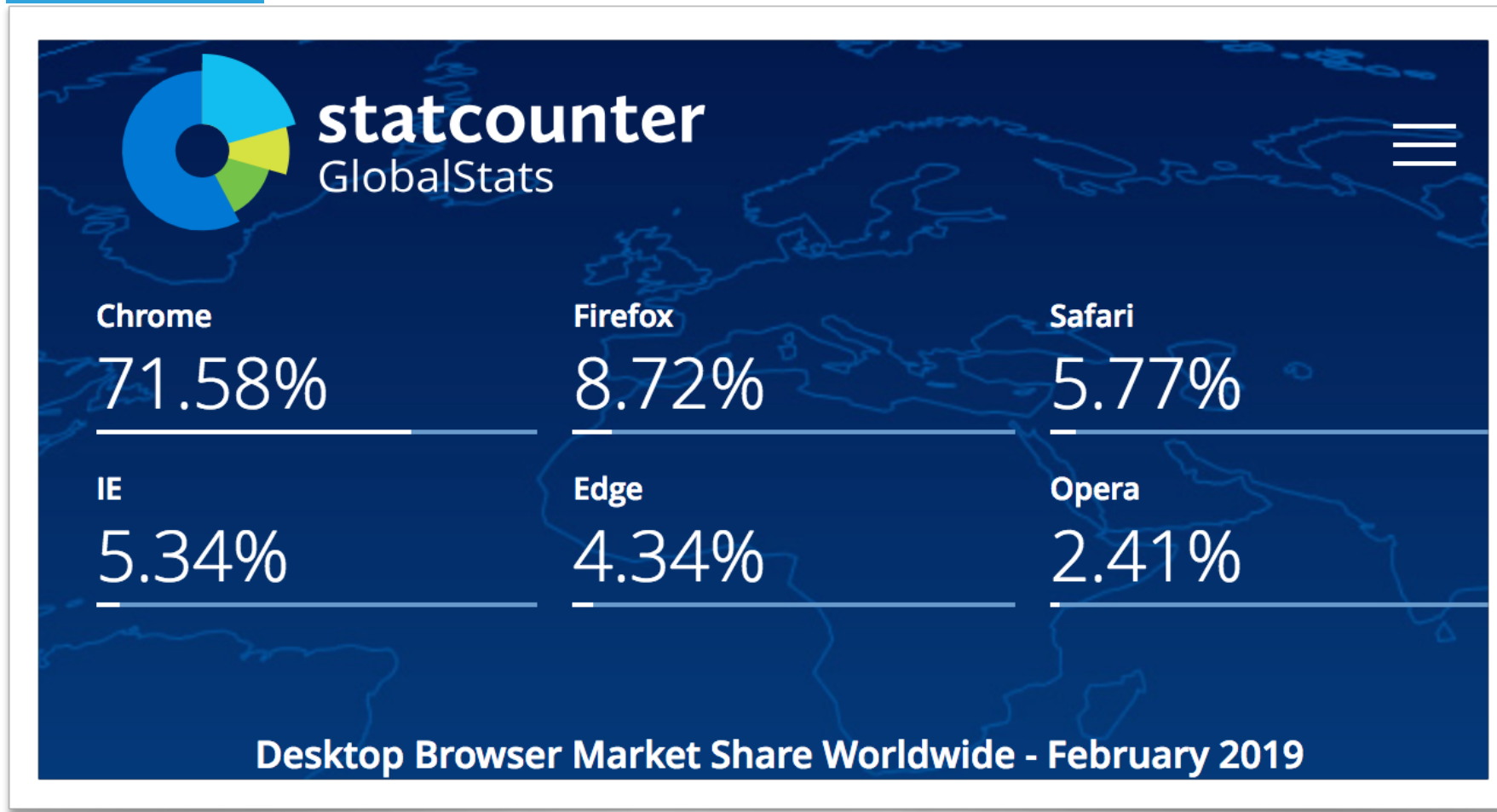


All Respondents

Professional Developers



The rise of Modern Browsers



* In 2009 **IE** had **70%** Market Share

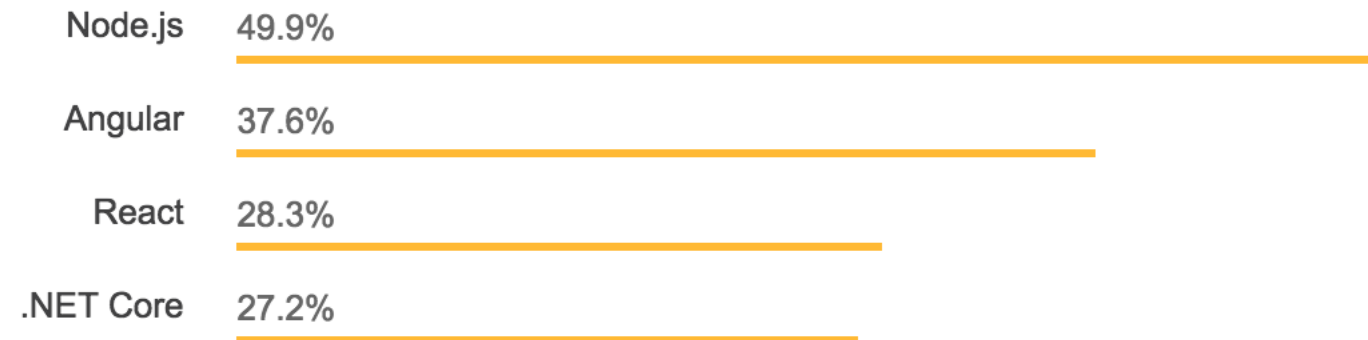


The rise of the JS Frameworks

Frameworks, Libraries, and Tools

All Respondents

Professional Developers

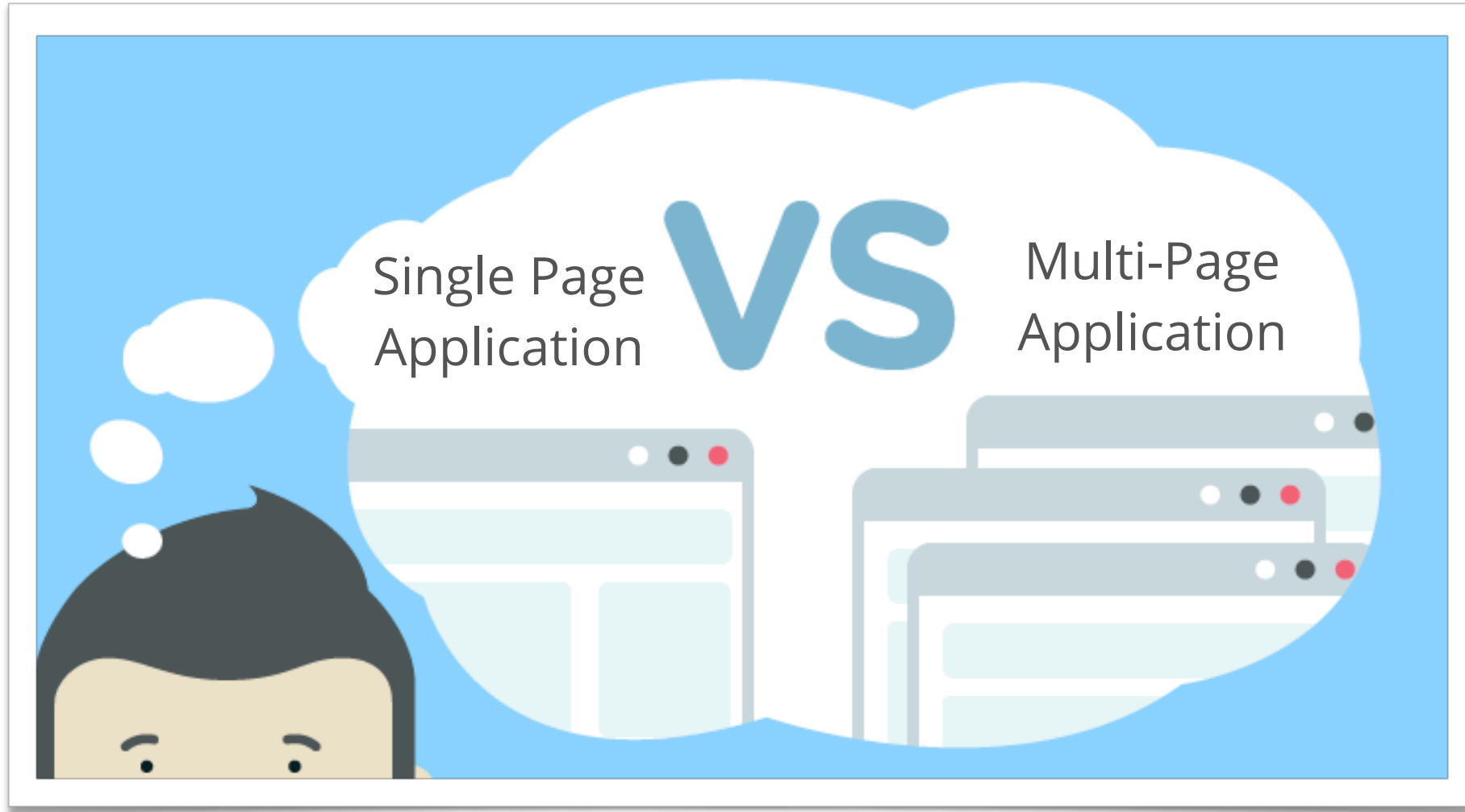


Electron



Build cross platform desktop apps with JavaScript, HTML, and CSS

Design Patterns

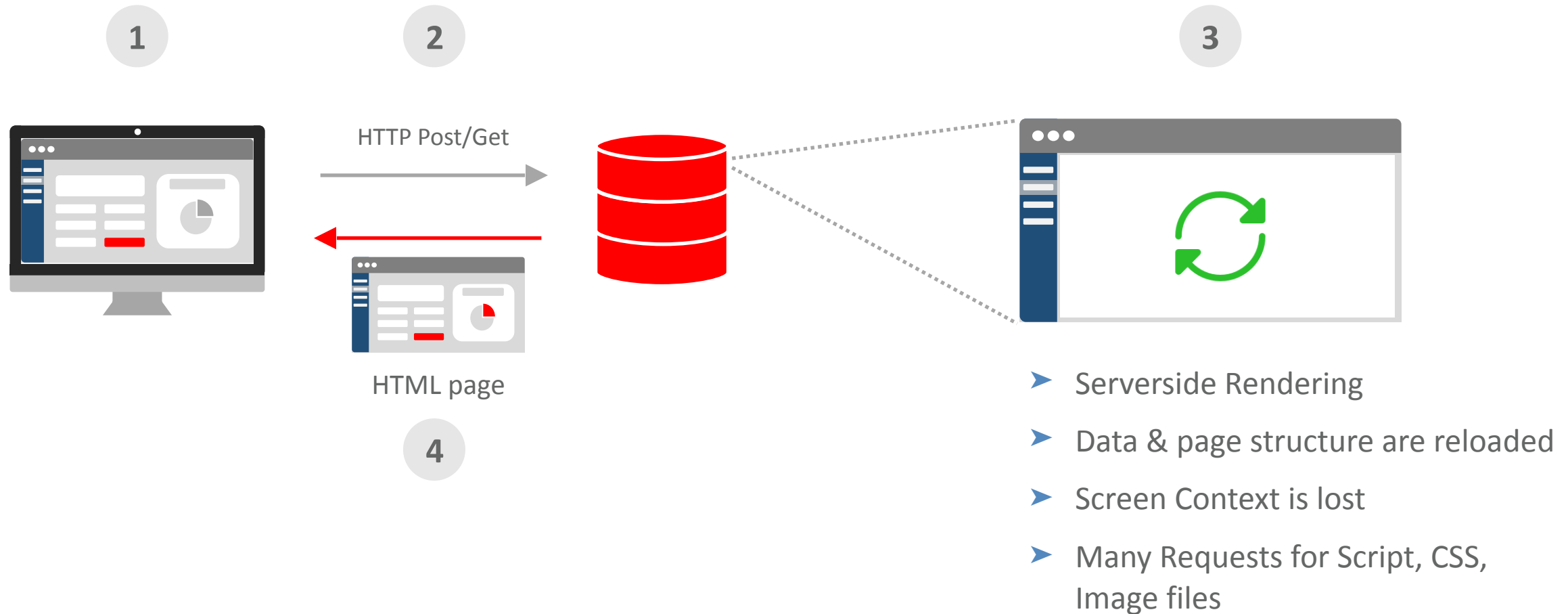


MPA or SPA?

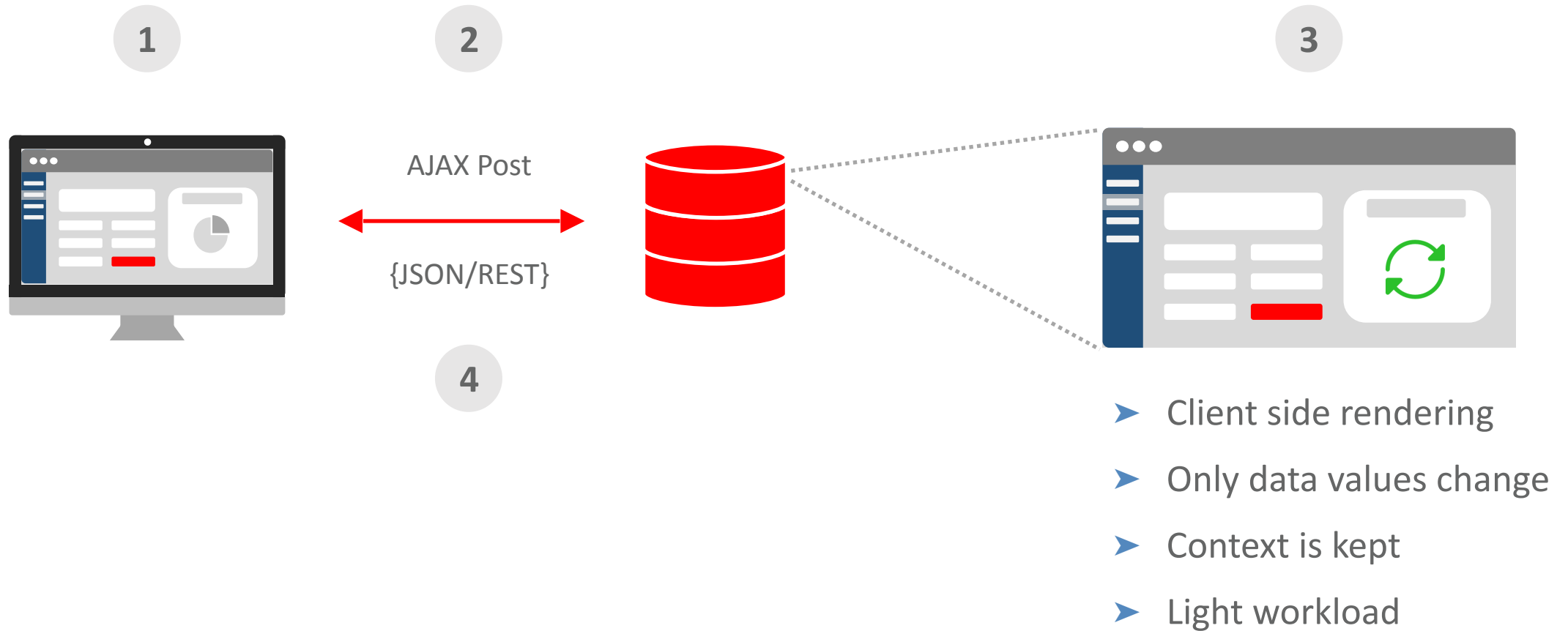
Factor	Traditional Web App (MPA)	Single Page Application (SPA)
Familiarity with Javascript	Minimal	Required
Minimal Client Side Application Behaviour	Well Suited	Overkill
Rich, Complex User Interface Requirements	Limited	Well Suited

<https://docs.microsoft.com>

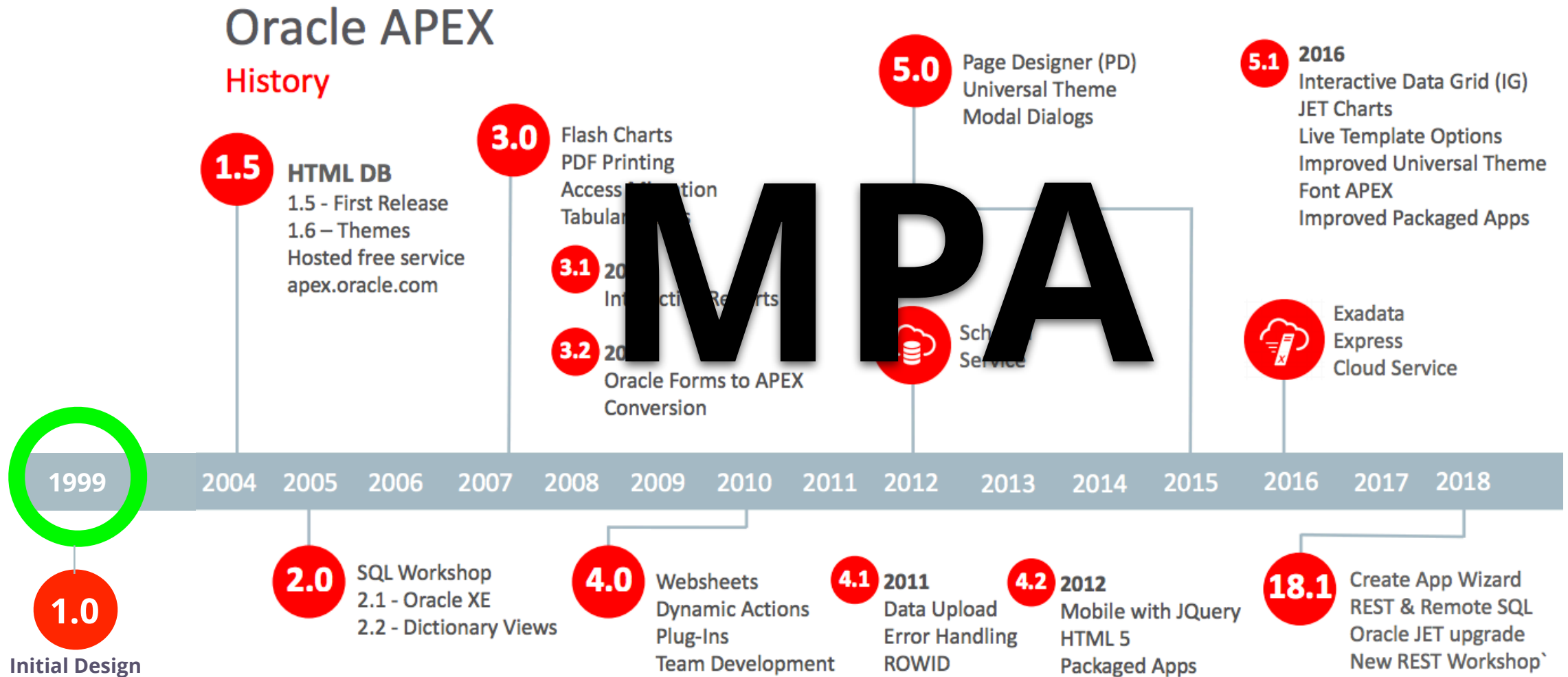
MPA Design



SPA Design



What type of framework is APEX?



Sample Database Application

Not Secure | vbox:8080/ords/f?p=102:1:6068024953723::NO::

Sample Database Application

Help foex.support

- Home
- Customers 7
- Products 10
- Orders 10
- Reports
- Administration

Sample Database Application

Track and Manage Customers, Orders and Products

Search customers, orders & products

Dashboard

\$2,565
Monthly Sales

10
Total Products

7
Total Customers

Top Customers

Bradley, Eugene Windsor Locks, CT · 1,000	2,760
Logan, Edward East Boston, MA · 1,000	2,420
Dulles, John Sterling, VA · 1,000	2,380

Top Products

Jacket - 18 x \$150	\$2,700
Bag - 16 x \$125	\$2,000
Trousers - 21 x \$80	\$1,680
Ladies Shoes - 12 x \$120	\$1,440
Business Shirt - 23 x \$50	\$1,150

Recording network activity...

Perform a request or hit % R to record the reload.

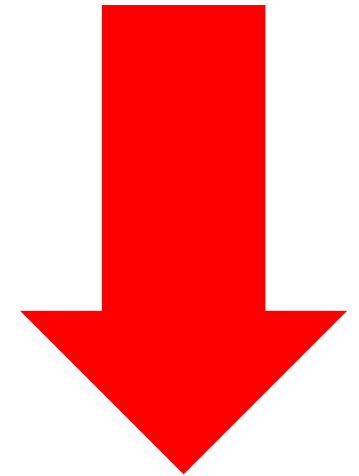
MPA Design Negatives

1. It's not a natural application design pattern
2. It does not handle UI complexity very well, everything rendered/fetched at once
3. User experience suffers from loss of context from page submitting/reloading
4. Less efficient
 - More requests/load due to Full page requests
 - Duplication of Navigation/Header/Footer across pages

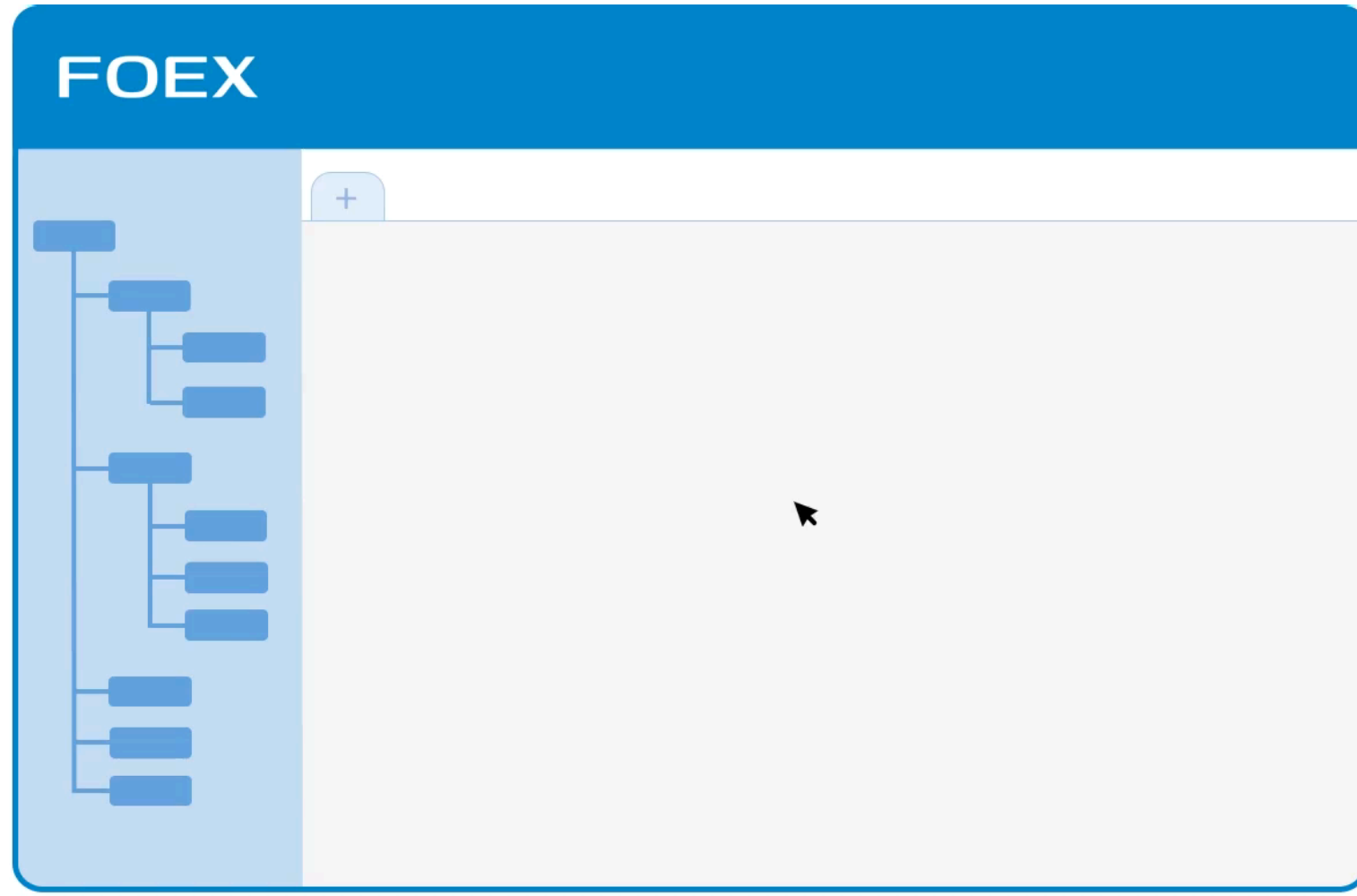
Browsers with No Tabs



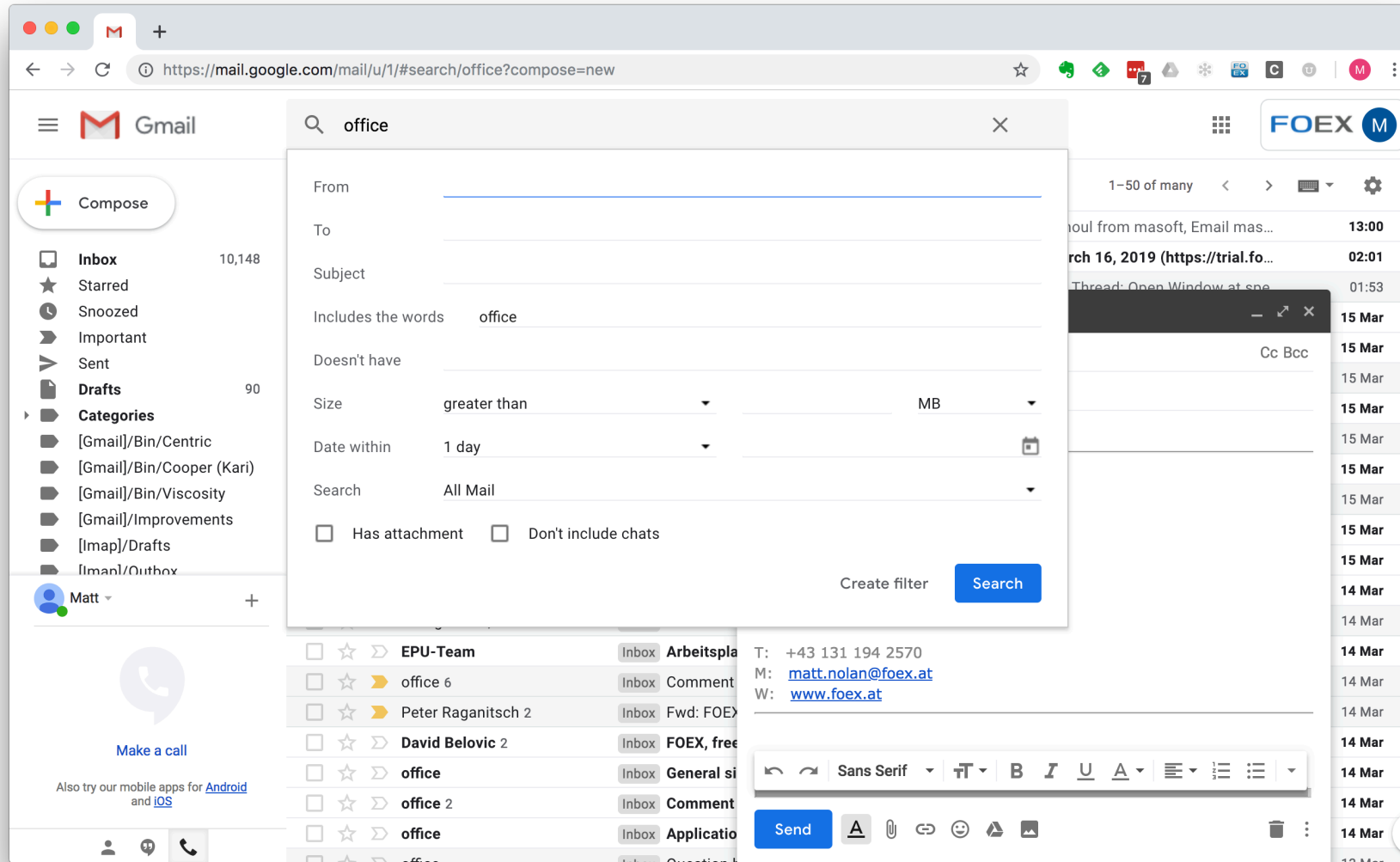
Productivity ?



SPA Concept



SPA Examples

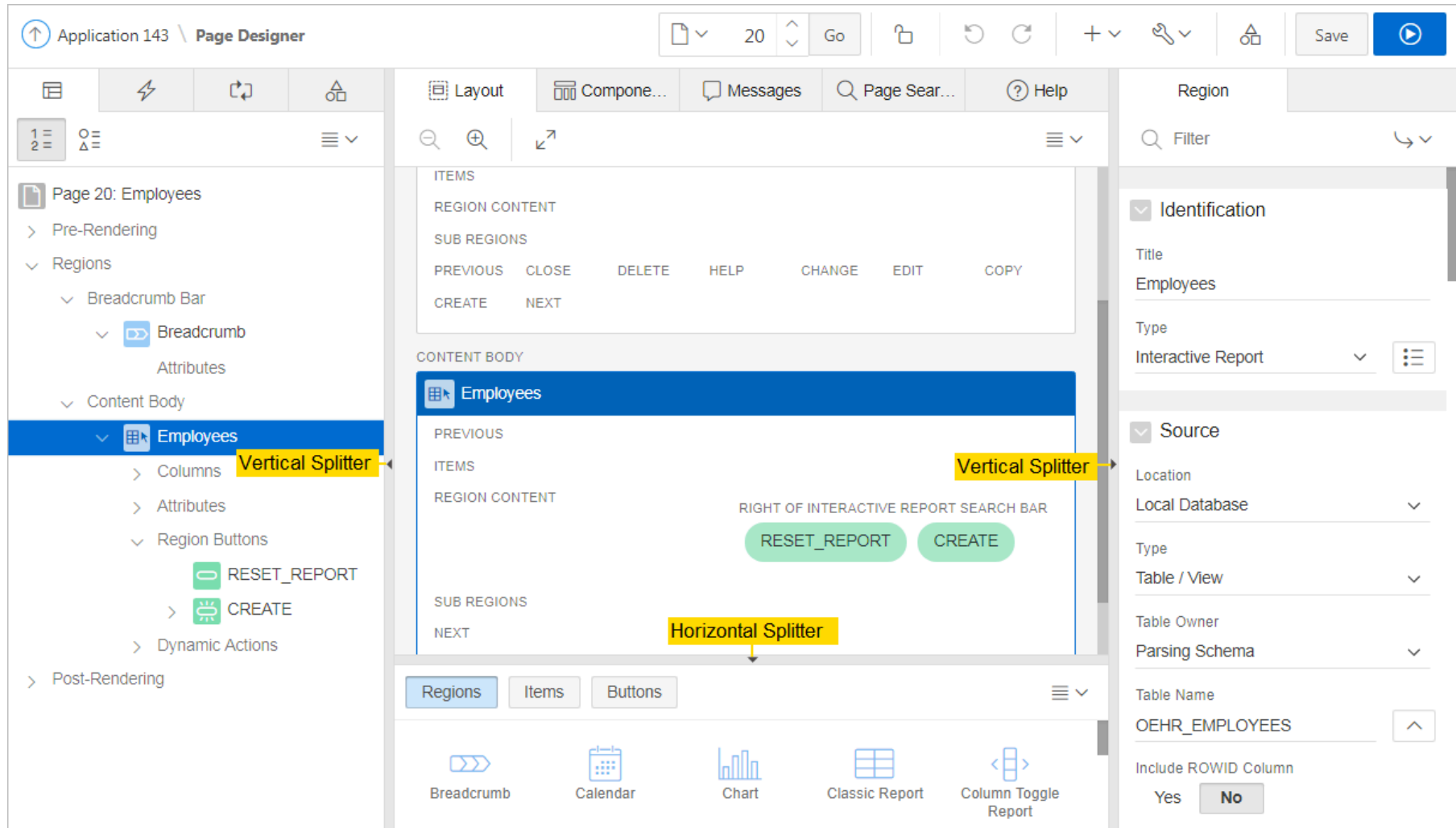


Why SPA is Preferred?



1. Faster Access to Data
2. Better User Experience
3. Increased End User Productivity
4. More resource efficient

What is an SPA user experience like?



SPA Frameworks



Build tools



Forms & Java



What technology do you see in your future?

pitss

ADF

30%

APEX

35%

Spring

30%

JSF / Primefaces

20%

AngularJS / Jet

45%

Vaadin

5%

Stay with Forms

15%

Not sure yet

25%



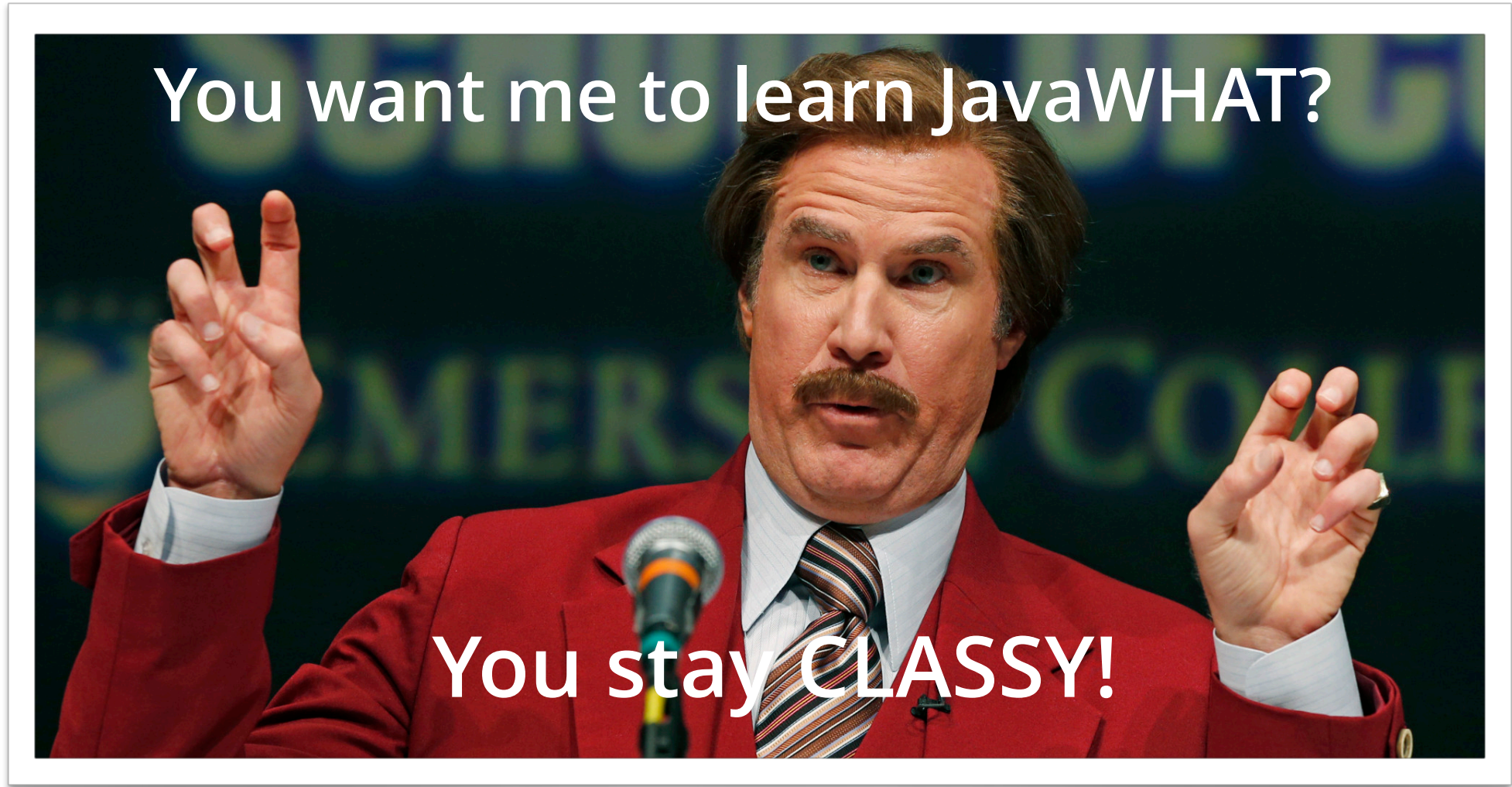
There's a lot to take in...

According to Steve McConnell's book, Code Complete “Industry Average: about *15 - 50 errors per 1000 lines* of delivered code.”

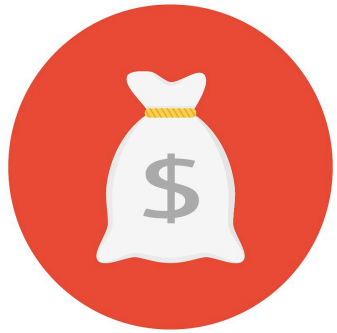
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Steep Learning Curve



It's not like APEX



Cost More



Take Longer

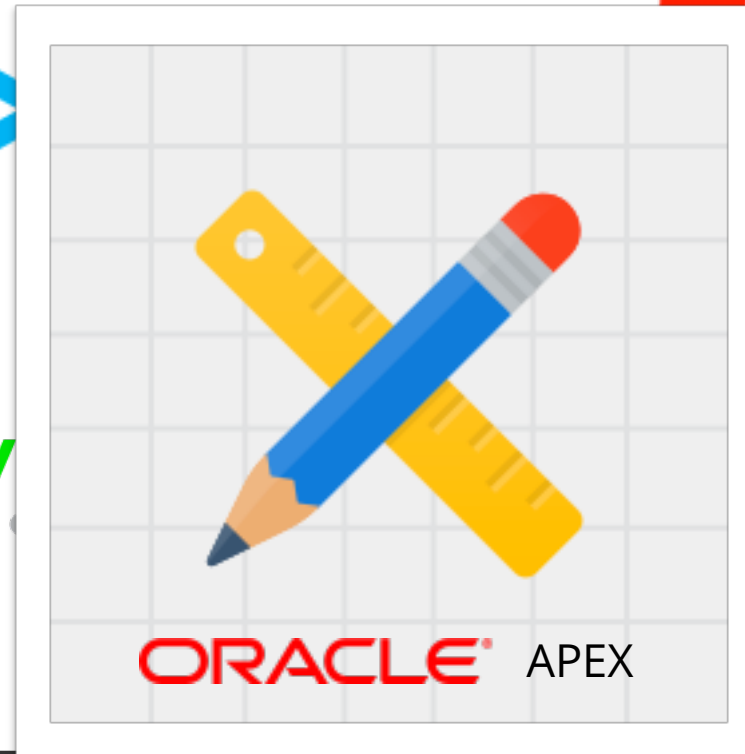
Productivity Tools/IDE



vaadin}>

appery

METEOR



systems

ORACLE
Visual Builder

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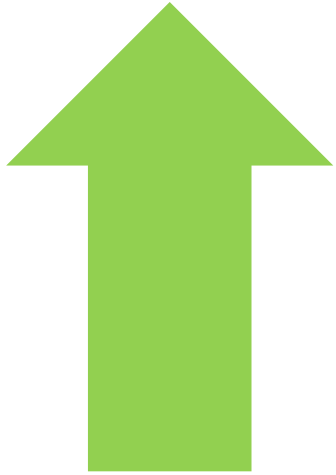


APEX is Unique!

- Simplifies Complexity
- Low Code / Full Control
- Meta Data Driven
- Full Access to all Database features
- API's to use or to create your apps/pages/regions/items
- Extendible using the plugin architecture



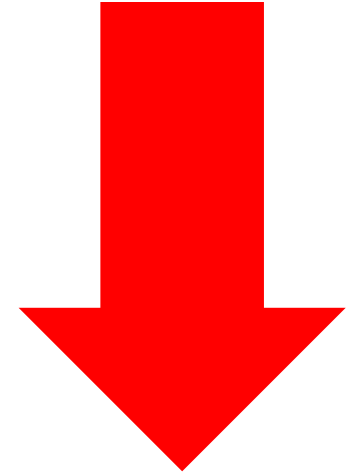
APEX Delivers!



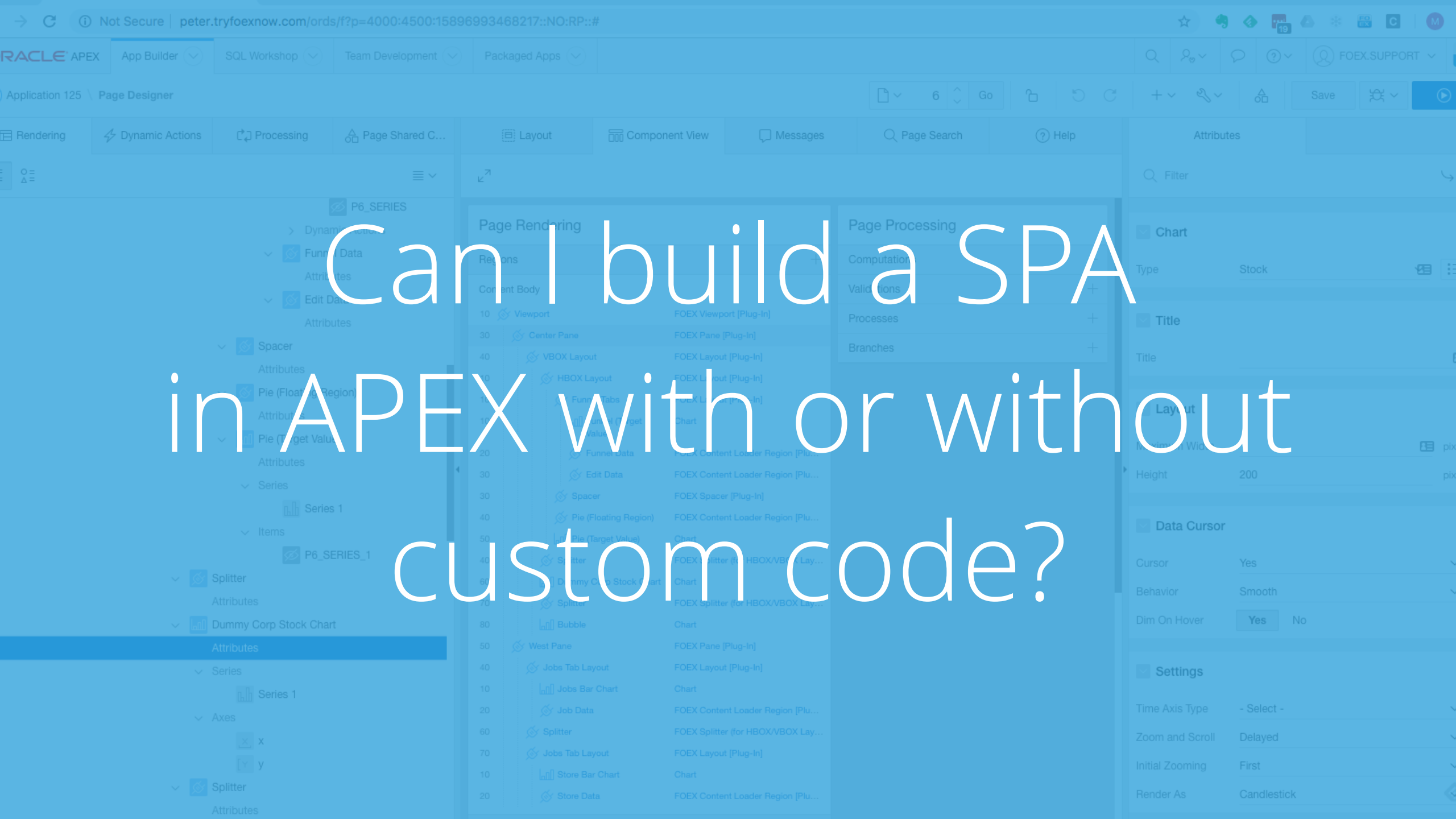
Productivity



Hours & days, **NOT** weeks & months.



Development Costs &
Maintenance



Can I build a SPA
in APEX with or without
custom code?

SPA - Using the APEX Dialog

The screenshot shows a web browser window with the URL `vbox:8080/ords/f?p=132:1:6568784651394::NO::`. The application is titled "Sample Database Application" and has a search bar for customers, orders, and products. A modal dialog titled "Sample Database Application - Customer Details" is open, displaying a form for customer information. The form includes fields for First Name (Eugene), Last Name (Bradley), Street Address (Schoephoester Road), City (Windsor Locks), State (Connecticut), Zip Code (06096), Credit Limit (1000), Phone Number (860-555-1835), Alternate Number (999-999-9999), Email, and URL. A "Tags" field contains the text "REPEAT CUSTOMER". At the bottom of the dialog are "Cancel", "Delete", and "Apply Changes" buttons. The background shows a sidebar with "Dashboard", "Statistics", and "Sales by" sections, and a table of "Top Customers" with entries for Bradley, Eugene and Hartsfield, William.

Customer Name	Address	Phone Number	Credit Limit
Bradley, Eugene	Windsor Locks, CT	1,000	3,900
Hartsfield, William	Atlanta, GA	1,000	3,370

Appearance

User Interface Desktop

Page Mode Modal Dialog

Dialog Template Theme Default

Template Options

General

- ☒ Use Template Defaults
- ☒ Stretch to Fit Window
- ☐ Remove Body Padding

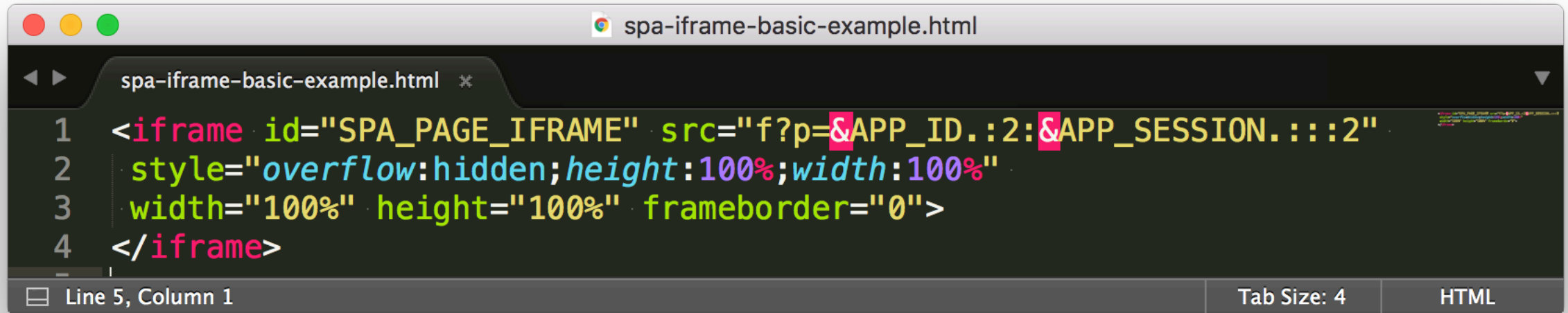
Refresh When

Event Dialog Closed

Selection Type Region

RegionTop Customers

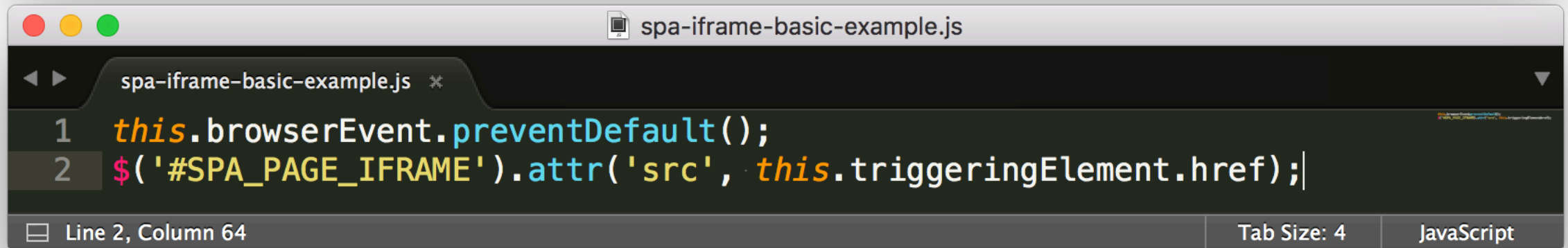
With Custom Code Using iFrames



The screenshot shows a code editor window titled "spa-iframe-basic-example.html". The code is as follows:

```
1 <iframe id="SPA_PAGE_IFRAME" src="f?p=&APP_ID.:2:&APP_SESSION.:::2"
2 style="overflow:hidden;height:100%;width:100%"
3 width="100%" height="100%" frameborder="0">
4 </iframe>
```

The editor status bar at the bottom indicates "Line 5, Column 1", "Tab Size: 4", and "HTML".



The screenshot shows a code editor window titled "spa-iframe-basic-example.js". The code is as follows:

```
1 this.browserEvent.preventDefault();
2 $('#SPA_PAGE_IFRAME').attr('src', this.triggeringElement.href);
```

The editor status bar at the bottom indicates "Line 2, Column 64", "Tab Size: 4", and "JavaScript".

SPA Using iFrames - Upside

- It works best for regular APEX pages
- It provides a clear boundary, CSS applies to that iFrame
- It's the easiest way to implement SPA in APEX
- It's transparent to the end user

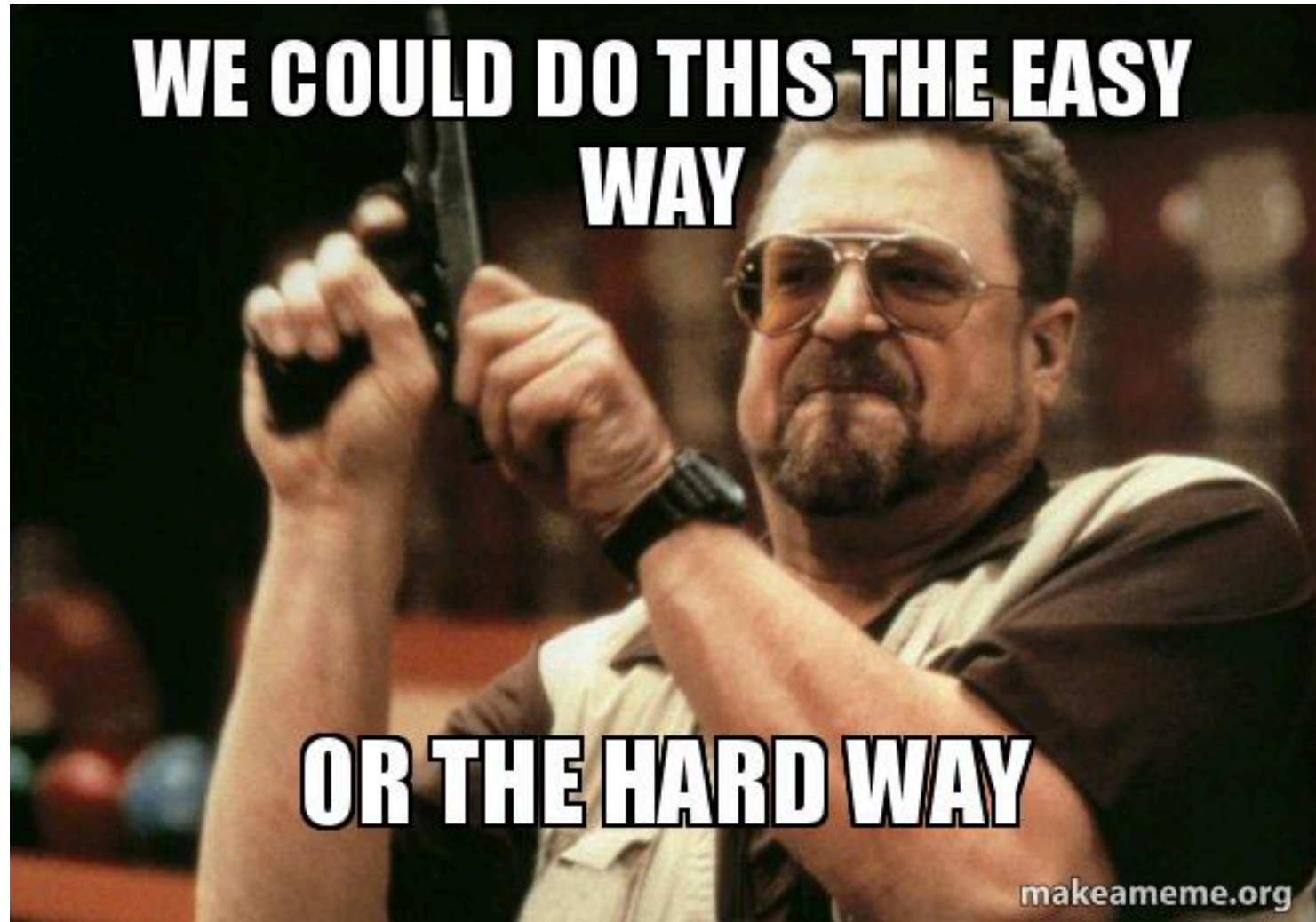


SPA Using iFrames - Downside

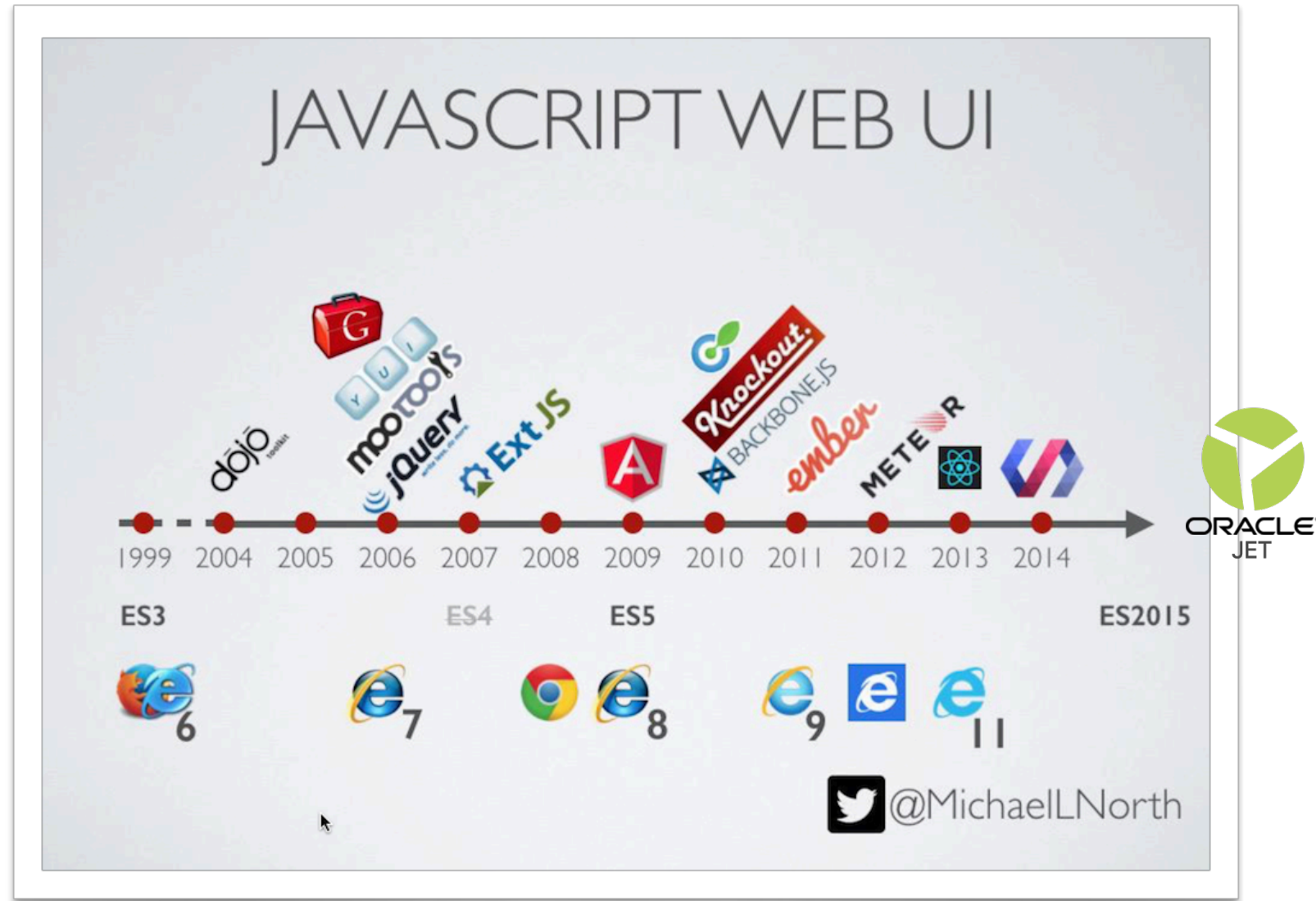
- It takes about 1 second to add to the DOM
- It performs all the HTTP requests for files etc.
- It is difficult to communicate across pages
- Potential session state issues with multiple pages open
- Potential navigation issues will need to be solved
- There's no support for dynamically adding new tabs with a new iframe
- It's a workaround



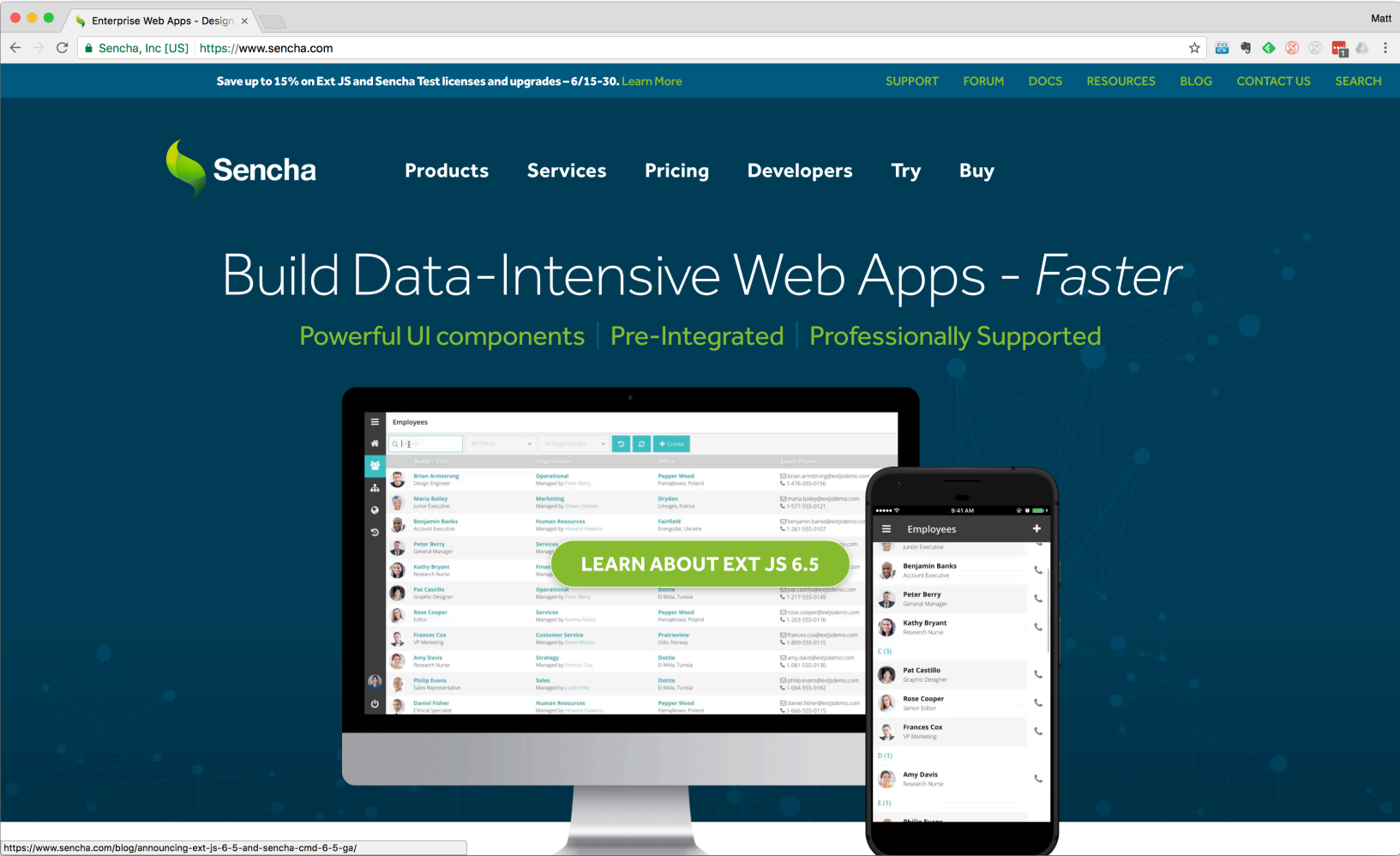
SPA in APEX



Timeline



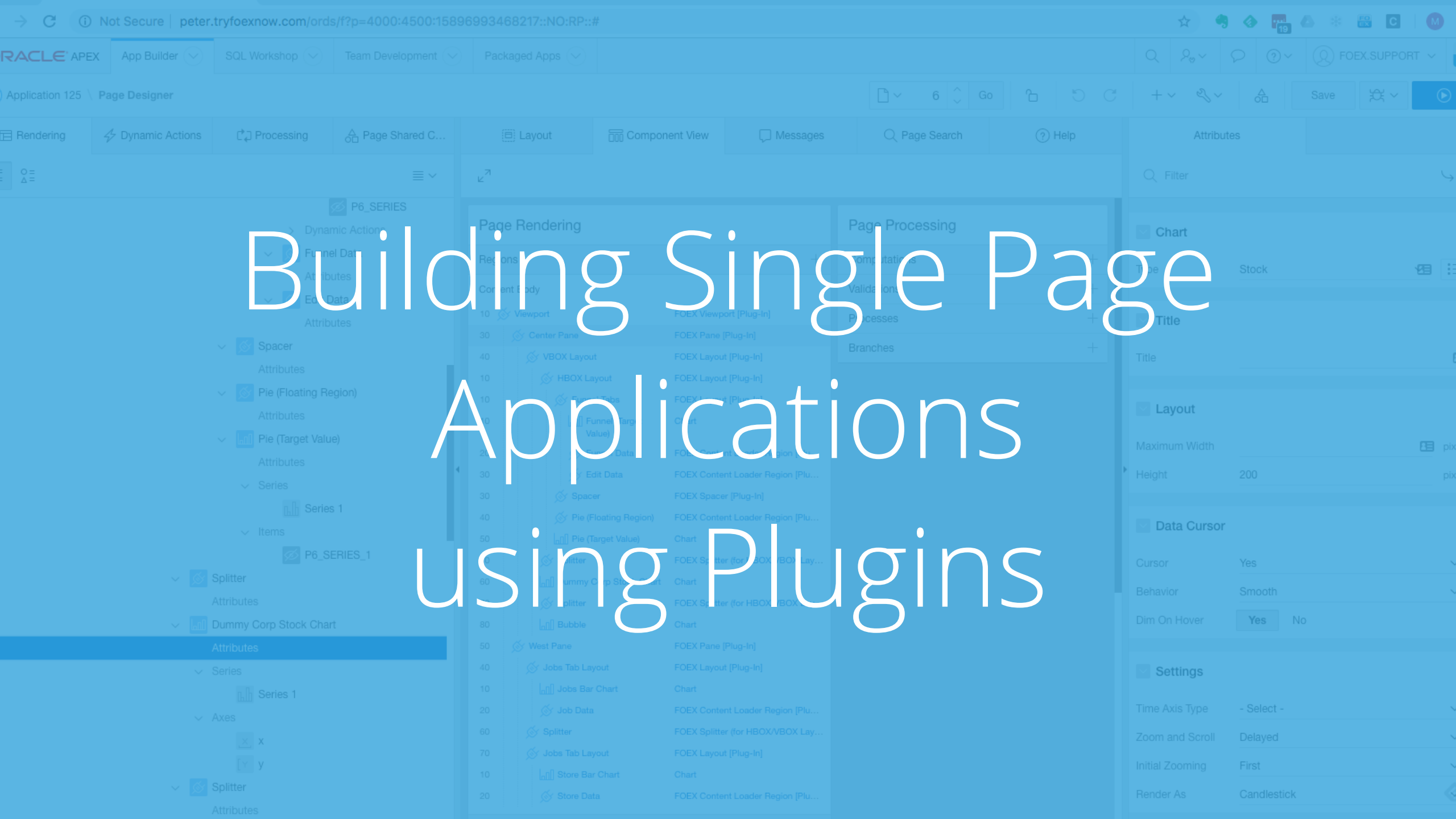
Integration



Great Documentation

The screenshot shows the Ext JS 6.5.3 - Classic Toolkit documentation page for `Ext.form.Panel`. The page is viewed in a browser at `https://docs.sencha.com/extjs/6.5.3/classic/Ext.form.Panel.html`. The left sidebar contains a navigation menu with sections like Quick Start, Guides, and API. The API section is expanded, showing a tree of classes including `Ext.form.Panel`. The main content area displays the `Ext.form.Panel` class documentation, including a summary of its xtype (`form`), a list of members (configs, properties, methods, events, theme variables, theme mixins) with counts, and a 'Form Submission' section explaining that Ext Forms are submitted through Ajax using `Ext.form.action.Action`. Below this is an 'Example usage' section with a code editor showing the following code:

```
1 Ext.create('Ext.form.Panel', {
2     title: 'Simple Form',
3     bodyPadding: 5,
4     width: 350,
5
6     // The form will submit an AJAX request to this URL when submitted
7     url: 'save-form.php',
8
9     // Fields will be arranged vertically, stretched to full width
10    layout: 'anchor',
11    defaults: {
12        anchor: '100%'
13    },
14
15    // The fields
16    defaultType: 'textfield',
17    items: [{
18        fieldLabel: 'First Name',
19        name: 'first',
20        allowBlank: false
21    }, {
```

Building Single Page Applications using Plugins

How did we do it?

- We integrated Sencha Ext JS, a single page application framework
- Followed a Component/Event/Action based approach and created 150+ plugins
- Moved processing to the plugins, more atomic thus avoiding page submits (AJAX Centric)
- Read the meta data to generate the page structure
- Used server side javascript rendering to create & initialise the components to add to the page
- Extended Page Designer using a Browser Extension
- Scripted the creation and installation of plugins

What did we need to consider?

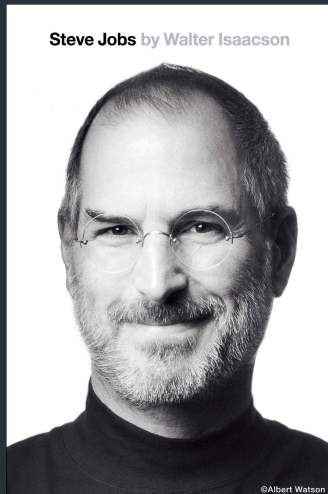
- ID conflicts
- Since we don't reload the page we need to destroy things, whilst avoiding memory leaks
- What to do when regular APEX components were used
- Upgrades of APEX, jQuery, Ext JS
- Developers including 3rd Party Plugins on pages
- Licensing, Sencha Ext JS requires a commercial license



Do it declaratively!

*The line of code that the developer can write the fastest,
the line of code that the developer can maintain the cheapest, and
the line of code that never breaks for the user, is
the line of code that the developer never had to write.*

Steve Jobs - 1997 demo of Interface Builder at NeXT



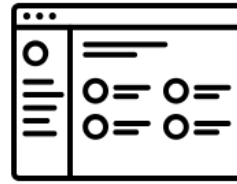
There's a lot to take in...

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Benefits



Create more sophisticated applications

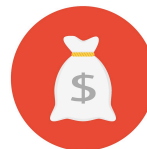


Build them much quicker



Simplify their Complexity

Deliver Cost Effectively



A blue-tinted background image featuring Leonardo DiCaprio and Joseph Gordon-Levitt from the movie Inception. They are both wearing suits and looking down, appearing to be in a meeting or discussion. The text is overlaid on this image.

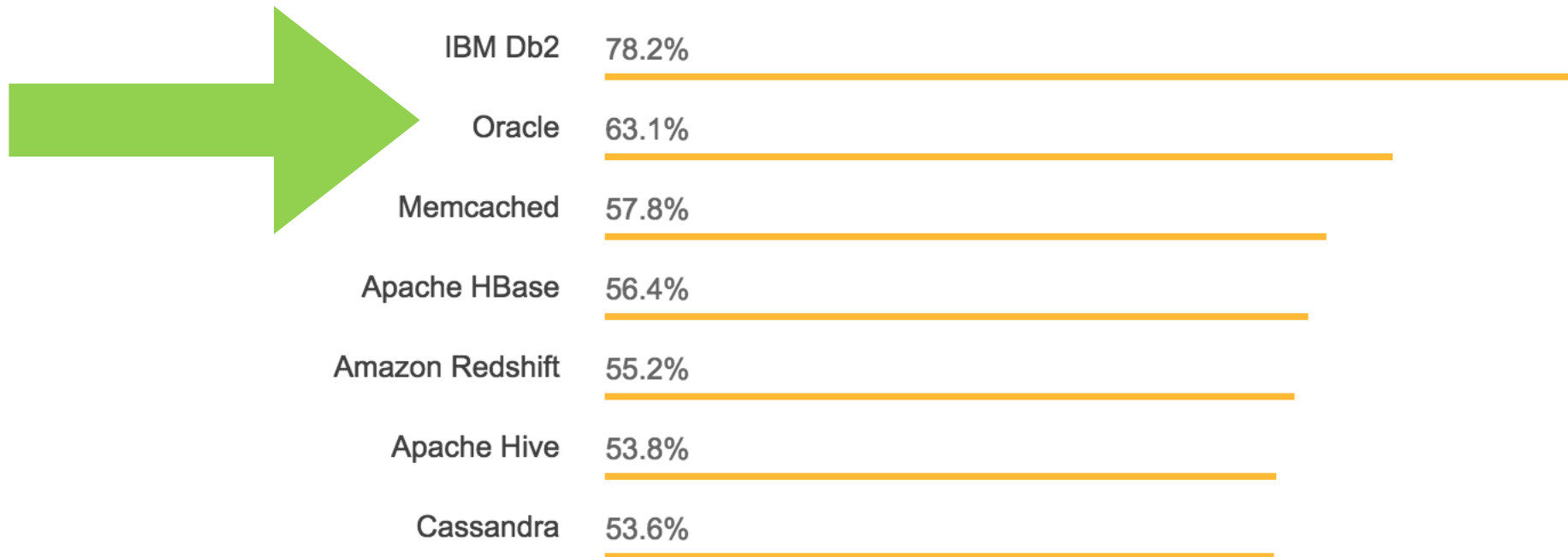
WE NEED TO GO

Inception Demo

DEEPER

APEX can change this #MOCA

Most Loved, Dreaded, and Wanted Databases



A blue-tinted photograph of a large audience in a lecture hall. Many audience members have their hands raised, indicating an interactive session or a Q&A period. A speaker is visible at the front of the room. The word "Questions?" is overlaid in the center in a large, white, sans-serif font.

Questions?

Thank you!

Follow Matt/FOEX:



@Matt_FOEX



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FOEXPlugins



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