

ORACLE®

Building Responsive Mobile Applications with Oracle Application Express 5.1

Marc Sewtz

*Senior Software Development Manager
Oracle America, Inc. – New York, NY*

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Marc Sewtz

Senior Software Development Manager
Oracle Application Express

- Working for Oracle since 1998
- Joined APEX Development Team in 2002
- Based in New York, NY

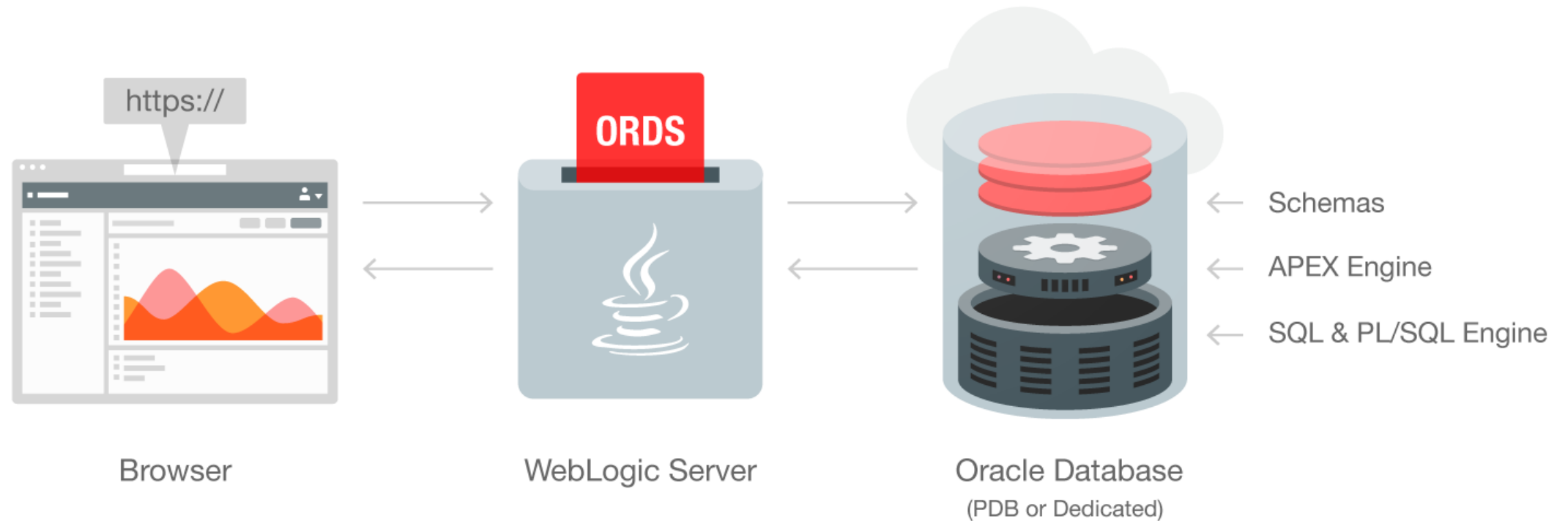
- Twitter: @msewtz
- APEX on Twitter: #ORCLAPEX
- Blog: <http://marcsewtz.blogspot.com>

- 1 ➤ Mobile Development – Overview
- 2 ➤ Developing Mobile Apps with the jQuery Mobile Theme
- 3 ➤ Developing Responsive Apps with the Universal Theme
- 4 ➤ Testing, Debugging and Deploying your Mobile Apps

- 1 Mobile Development – Overview
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Oracle Application Express (APEX)

Database Centric Application Development



Mobile Application Development

Native Apps vs Mobile Web Apps

- Native Apps:
 - Built for a specific platform
 - Using platform specific language and tools
 - Pros:
 - Full access to device's hardware and APIs
 - Potentially better performance
 - Offline use
 - Cons:
 - Separate codebase for different platforms
 - Expensive to build, maintain and distribute



Mobile Application Development

Native Apps vs Mobile Web Apps

- Mobile Web Apps:
 - Apps developed using HTML/CSS/JavaScript
 - Pros:
 - Can be accessed by any device with a web browser
 - Use standard Web technologies
 - Easy to deploy and update on the server
 - Cons:
 - Limited access to device specific hardware and APIs
 - Require permanent Internet connection



Mobile Application Development

Native Apps vs Mobile Web Apps



- Hybrid Apps:
 - Apps developed using Web technologies – deployed as native app
 - Wrapped in platform-specific container using e.g. PhoneGap / Cordova
 - Pros:
 - Single code base due to use of Web technologies
 - Access to device specific APIs
 - Cons:
 - Subject to store approval – best suited for apps installed locally on device
 - Security model requires whitelisting of outside domains

Mobile Application Development

Responsive Design vs Dedicated Mobile Pages

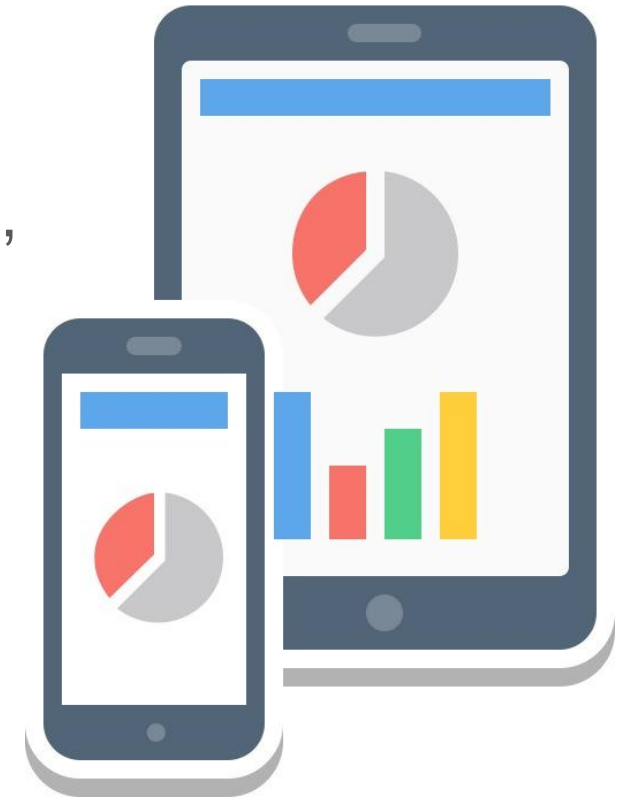
- Responsive Design
 - Providing an optimal viewing experience – easy reading and navigation with a minimum of resizing, panning, and scrolling – across a wide range of devices
 - Supporting a variety of devices and screen sizes with a single implementation
 - Offering content and feature parity:
same content and functionality is available
 - Potentially slower due to larger file size
(HTML, CSS, JS, images)
 - More expensive to develop



Mobile Application Development

Responsive Design vs Dedicated Mobile Pages

- Dedicated Mobile Pages
 - Building separate sites for mobile and for desktop
 - Optimized support for touch events, orientation change, native controls, etc.
 - Easier and faster to user due to light-weight HTML and small static file content (CSS, JS, images)
 - Less expensive to develop



Mobile Application Development

Mobile Development with Oracle Application Express

- Mobile Theme
 - Introduced with APEX 4.2 in 2012
 - jQuery Mobile framework used to render mobile UI
 - Comprehensive support for Mobile-specific capabilities and touch events
- Universal Theme
 - Introduced with APEX 5.0 in 2015
 - Build responsive pages that work on any screen and device



- 1 Mobile Development – Overview
- 2 Developing Mobile Apps with the jQuery Mobile Theme**
- 3 Developing Responsive Apps with the Universal Theme
- 4 Oracle JET Charts
- 5 Testing, Debugging and Deploying your Mobile Apps

Mobile Theme

jQuery Mobile - Philosophy

- One Code Base, All Platforms
- Works everywhere
- Built on standards
- Built on top of jQuery Core
- Mobile-first not Mobile-Only



Mobile Theme

jQuery Mobile - Features



- Unified user interface across all popular mobile platforms
- User Experience based on device capabilities
- Lightweight size and minimal image dependencies for speed
- Accessibility features like WAI-ARIA integrated in framework
- Support for screen readers and other assistive technologies
- AJAX based page load and HTML5 push state used for smooth / native-like page transitions

Mobile Theme

jQuery Mobile - Features

- Form inputs enhanced to be touch-friendly
- Touch-friendly UI widgets
- Auto-enhances forms to become touch-friendly
- Auto-grows text areas
- Designed to be touch-first



Slider:

50

A slider control with a blue track and a white knob. The value '50' is displayed in a small box to the left of the track.

Flip toggle:

Off

A flip toggle control with a white knob and the text 'Off' to its right.

Vertical controlgroup, checkbox:

One
 Two
 Three

A vertical list of three checkbox controls. The second option, 'Two', is selected with a blue checkmark.

Vertical controlgroup, radio:

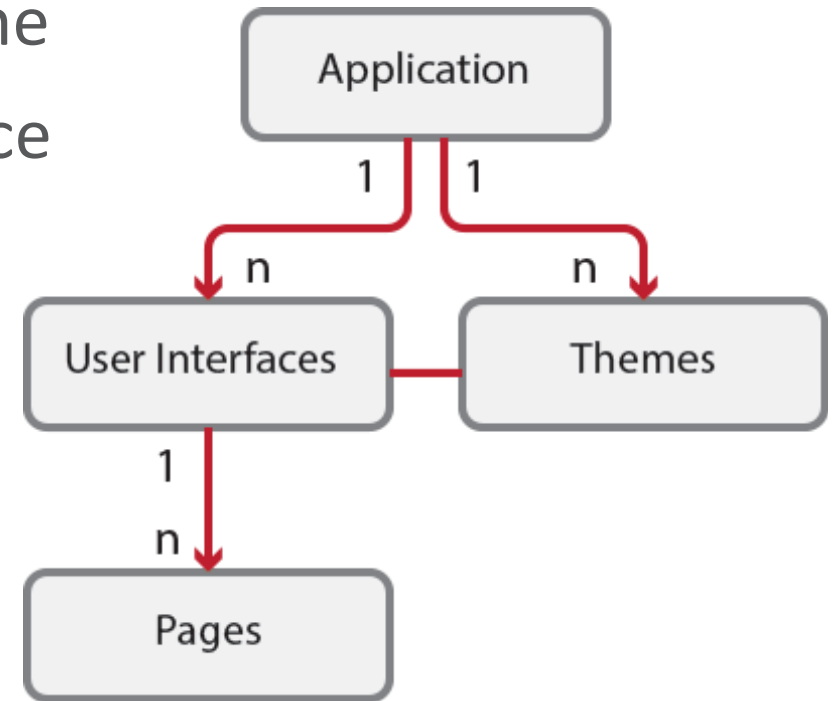
One
 Two
 Three

A vertical list of three radio button controls. The first option, 'One', is selected with a blue dot.

Mobile Theme

Application Express User Interfaces

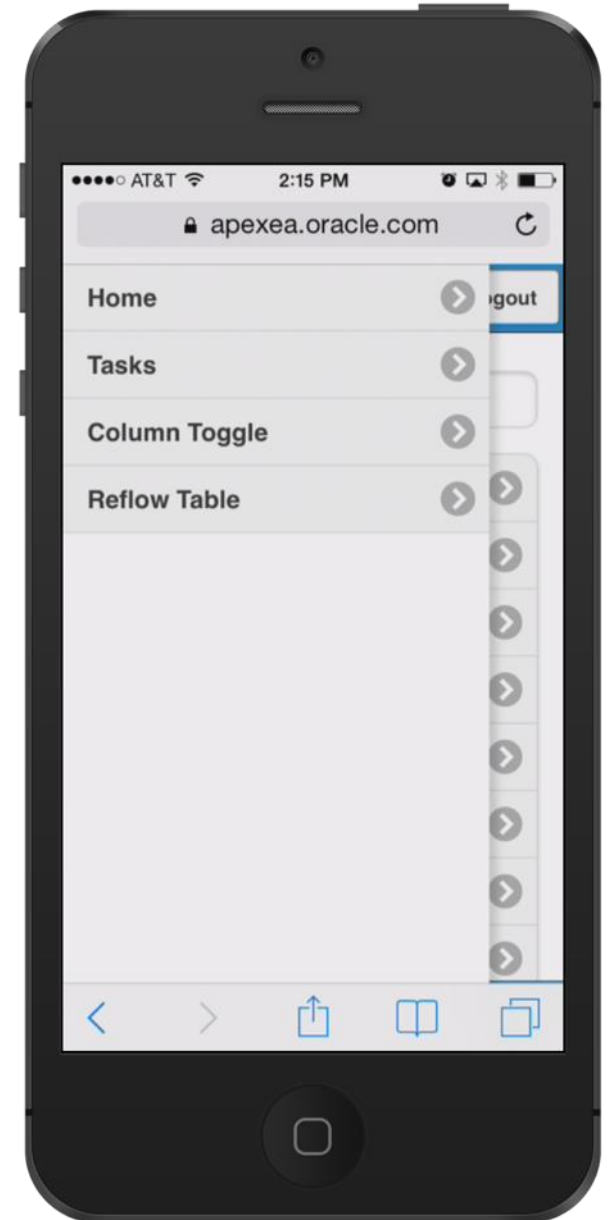
- Apps can have multiple User Interfaces
- Each User Interface is associated with one Theme
- Individual Pages can have only one User Interface
- User Interface defines:
 - Login URLs
 - UI specific home pages
 - Global Pages
 - Auto Detection



Mobile Theme

Navigation menus and side panels

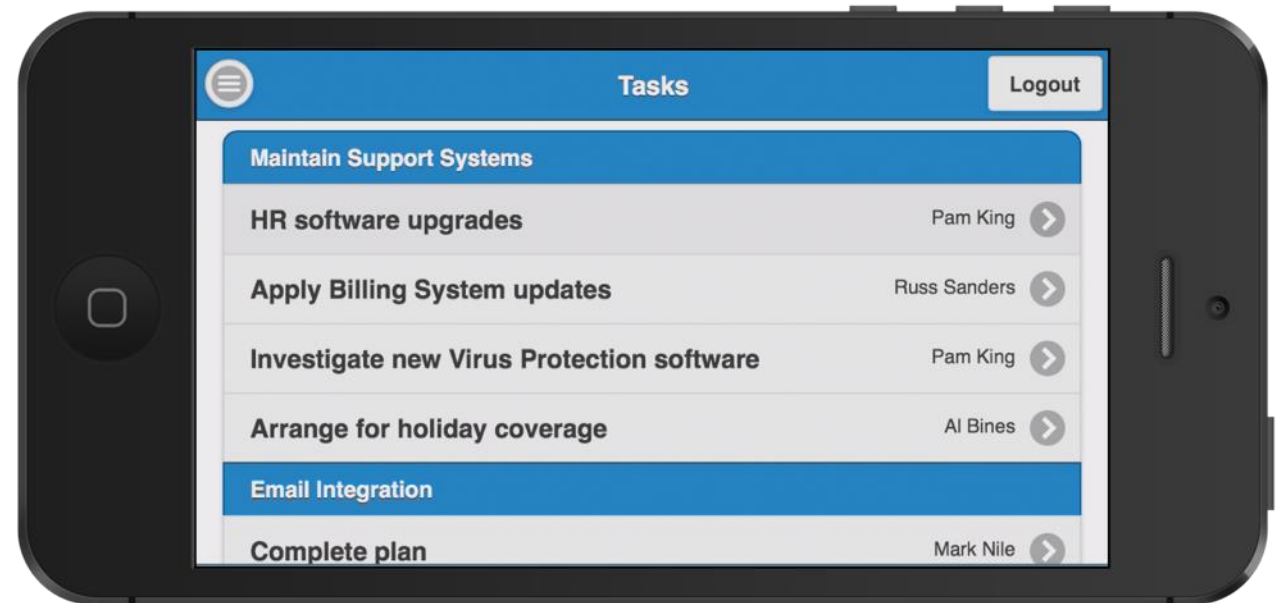
- All top level pages added to Navigation List
- Navigation lists in Mobile apps are implemented as menu panels
- Shown on the left with menu button shown in top bar
- Custom panels using “Panel” region template
- Choice of display modes: Overlay, Reveal, Push
- data-role="panel"



Mobile Theme

List View

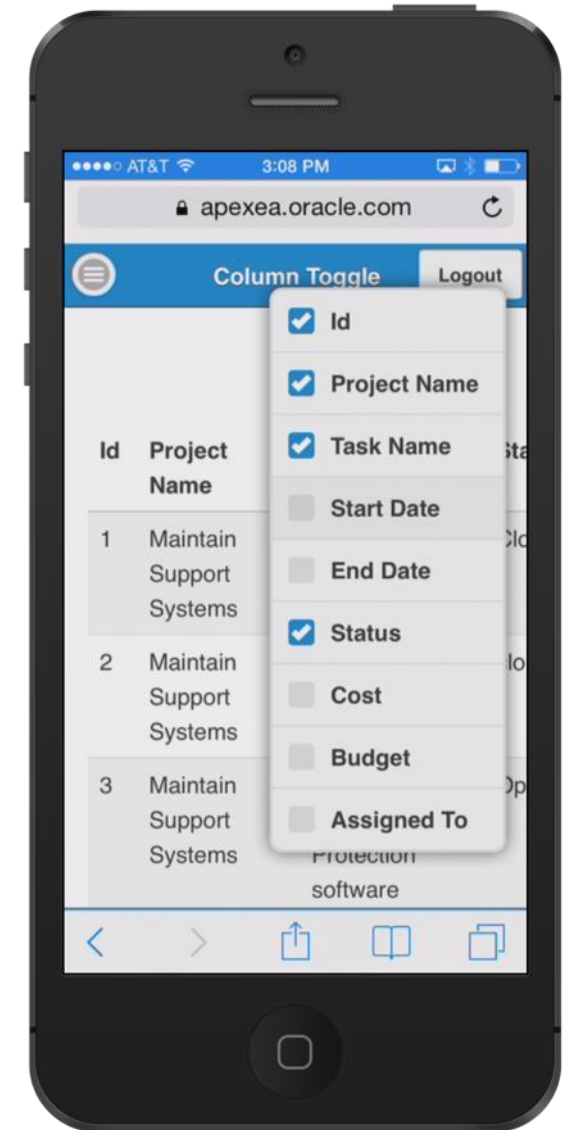
- Default View for data display, navigation, drill-down view
- Based on unordered list
- Automatic Dividers
- Custom formatting options
- Declarative Search Options, supporting server- and client side search
- **data-role="listview"**



Mobile Theme

Column Toggle Report

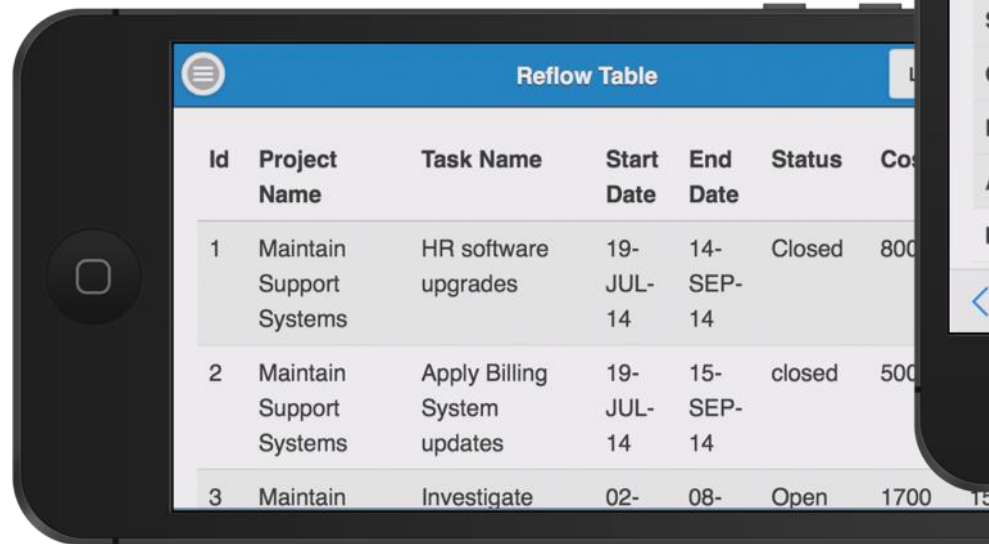
- Selectively hides columns at narrower widths as a sensible default
- Offers a menu to let users manually control which columns they want to see
- Column Toggle popup contains a dynamically generated list of columns based on the table markup



Mobile Theme

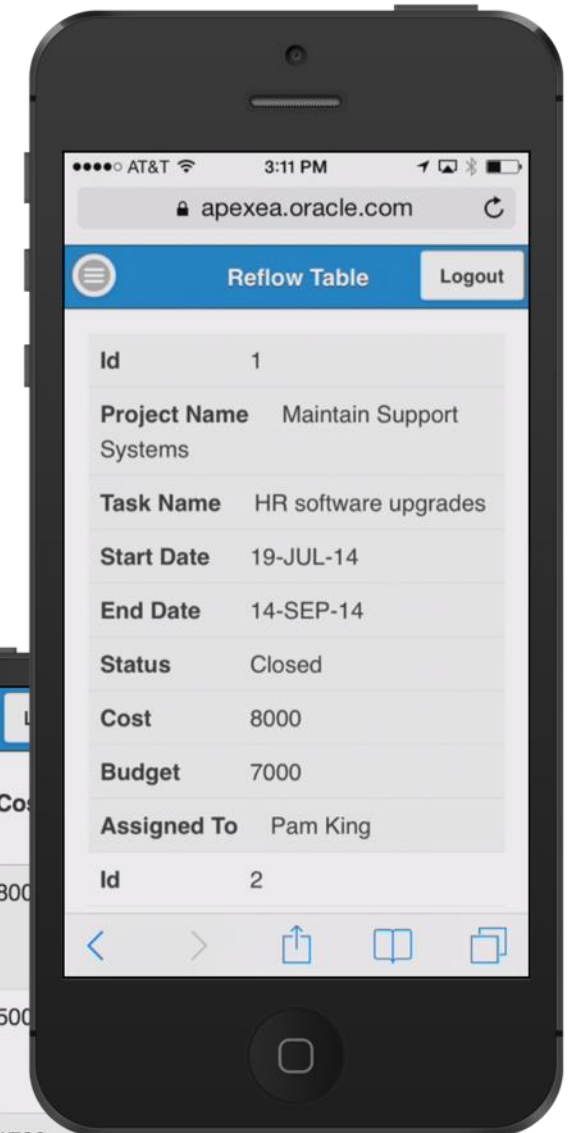
Reflow Table Report

- Collapsing table data into label/data pairs for each row
- Stacked presentation style default
- Media query used to switch to tabular style presentation above a specific screen width



A smartphone displaying a web application interface. The top navigation bar is blue with a hamburger menu icon on the left and the text "Reflow Table" in the center. Below the navigation bar is a table with the following data:

Id	Project Name	Task Name	Start Date	End Date	Status	Cost
1	Maintain Support Systems	HR software upgrades	19-JUL-14	14-SEP-14	Closed	8000
2	Maintain Support Systems	Apply Billing System updates	19-JUL-14	15-SEP-14	closed	5000
3	Maintain	Investigate	02-	08-	Open	1700



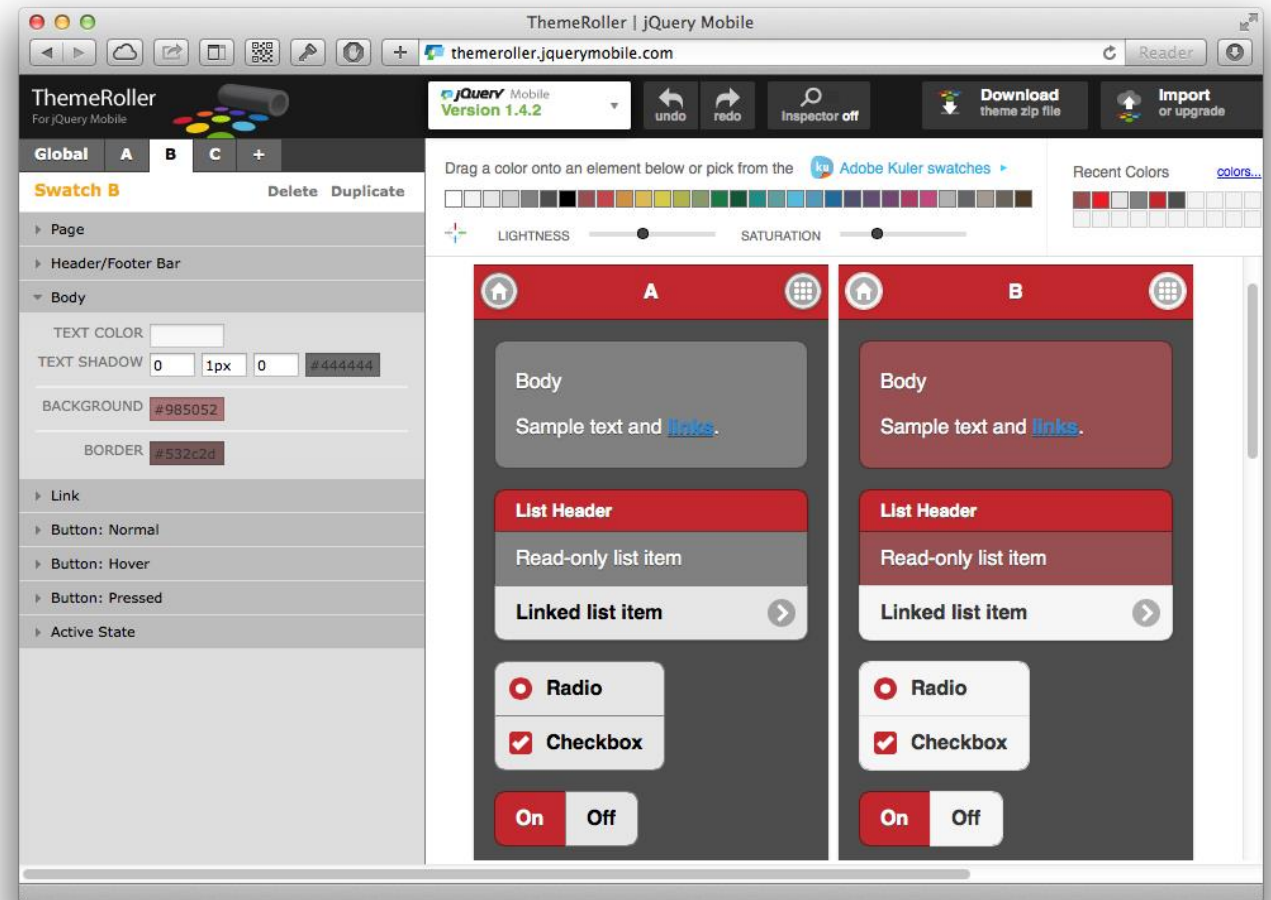
A smartphone displaying a web application interface. The top navigation bar is blue with a hamburger menu icon on the left and the text "Reflow Table" in the center, followed by a "Logout" button. Below the navigation bar is a collapsed table view showing label/data pairs for each row:

Id	1
Project Name	Maintain Support Systems
Task Name	HR software upgrades
Start Date	19-JUL-14
End Date	14-SEP-14
Status	Closed
Cost	8000
Budget	7000
Assigned To	Pam King
Id	2

Mobile Theme

ThemeRoller

- Mobile theme provides a variety of theme styles
- Create custom styles using Themeroller
- Upload Themeroller file as application or workspace files
- Define new theme style using your own Themeroller layout



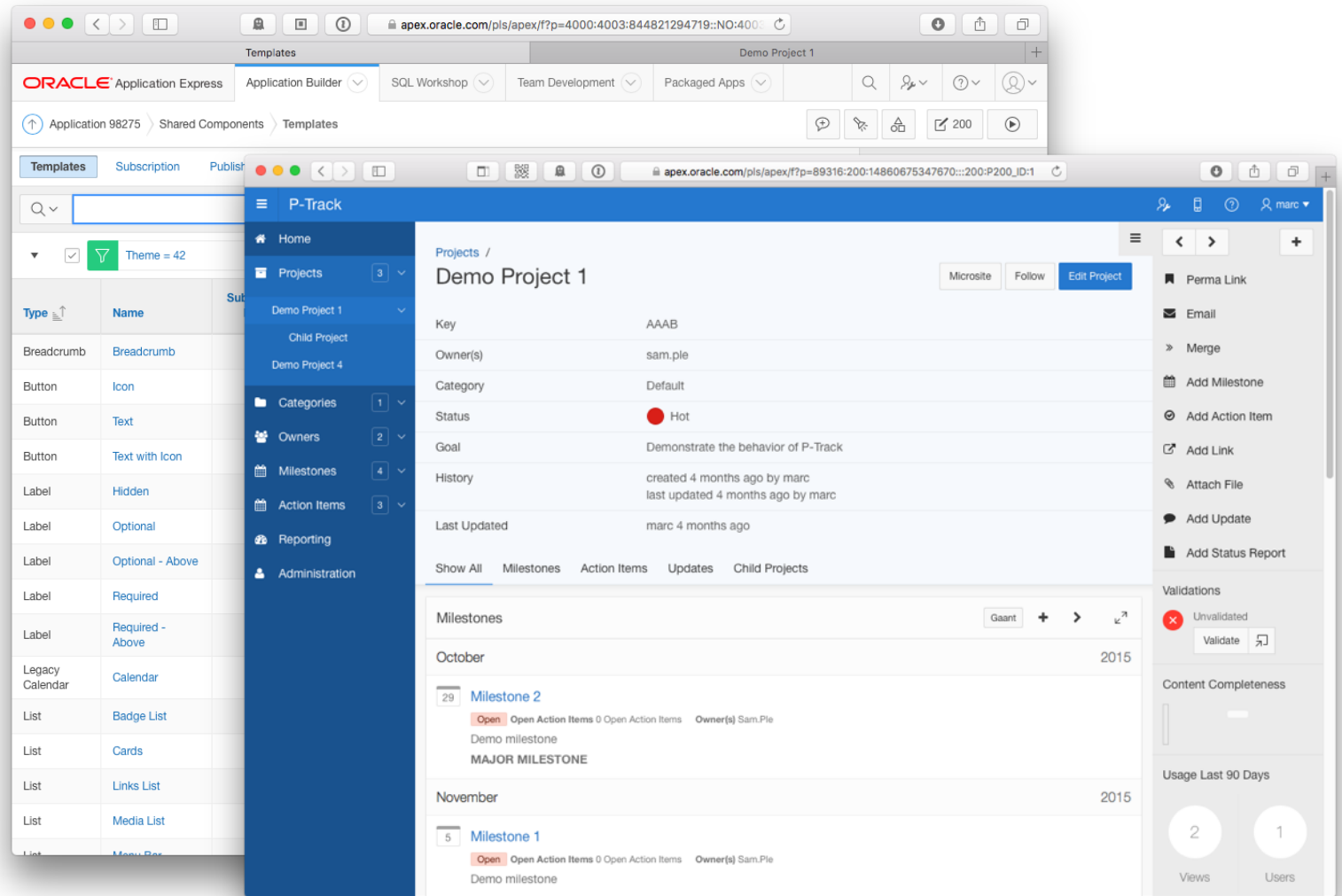
Demo

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Universal Theme

Responsive Grid

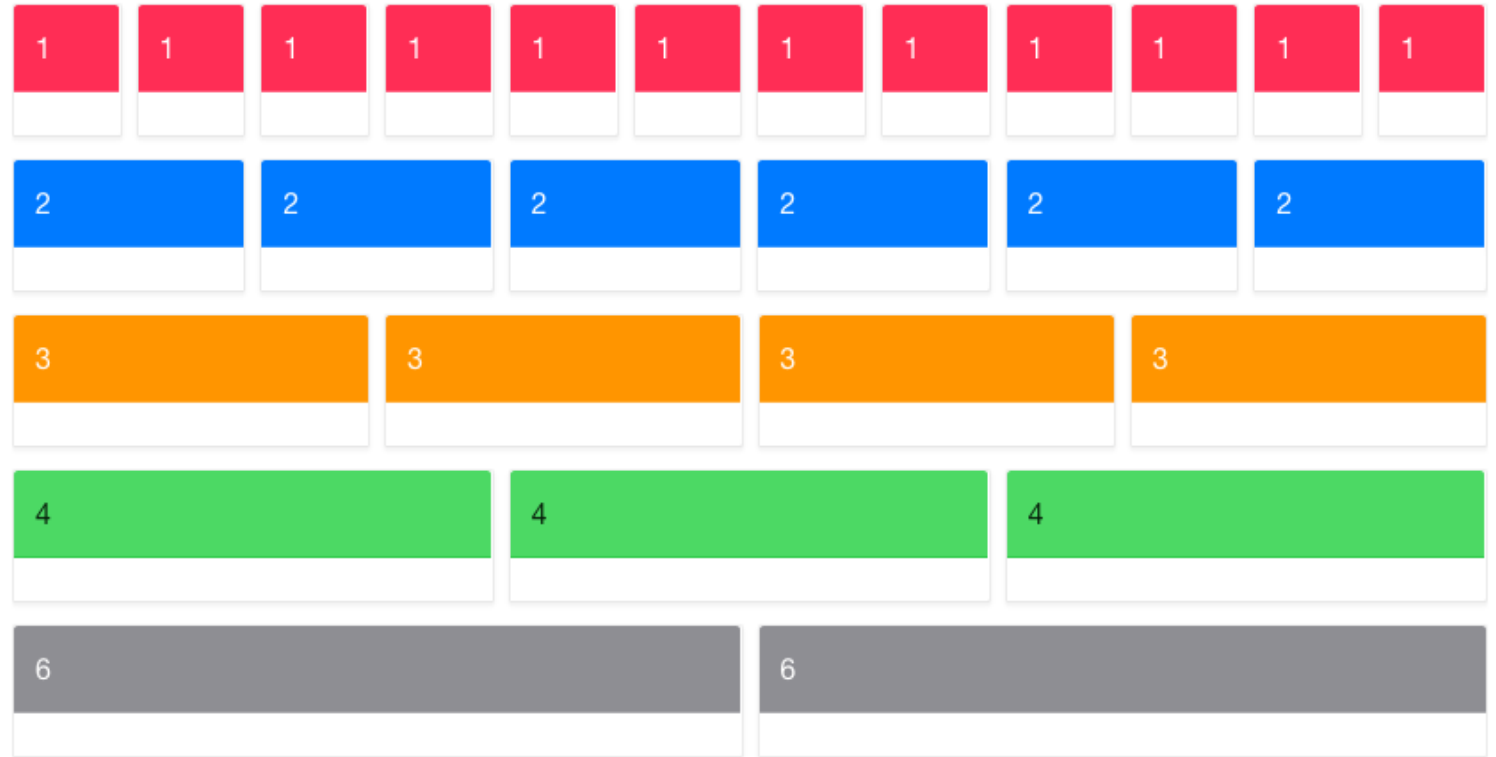
- Smart Page Layouts
- Improved Grid System
- Complex Form Layout
- Responsive Components
- Tap Event Handling



Universal Theme

Responsive Grid

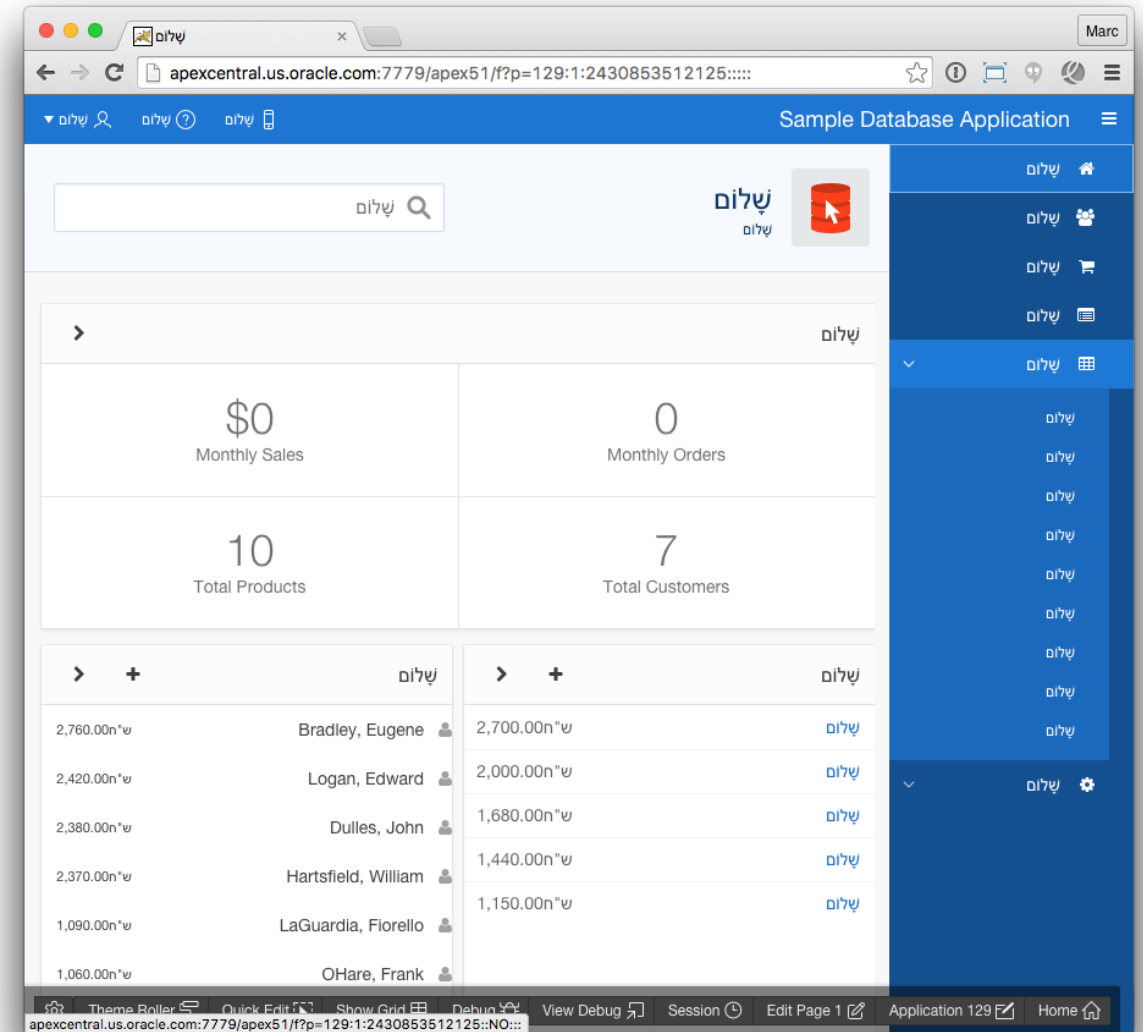
- Smart Page Layouts
- Improved Grid System
- Complex Form Layout
- Responsive Components
- Tap Event Handling



Universal Theme

Right to Left Support

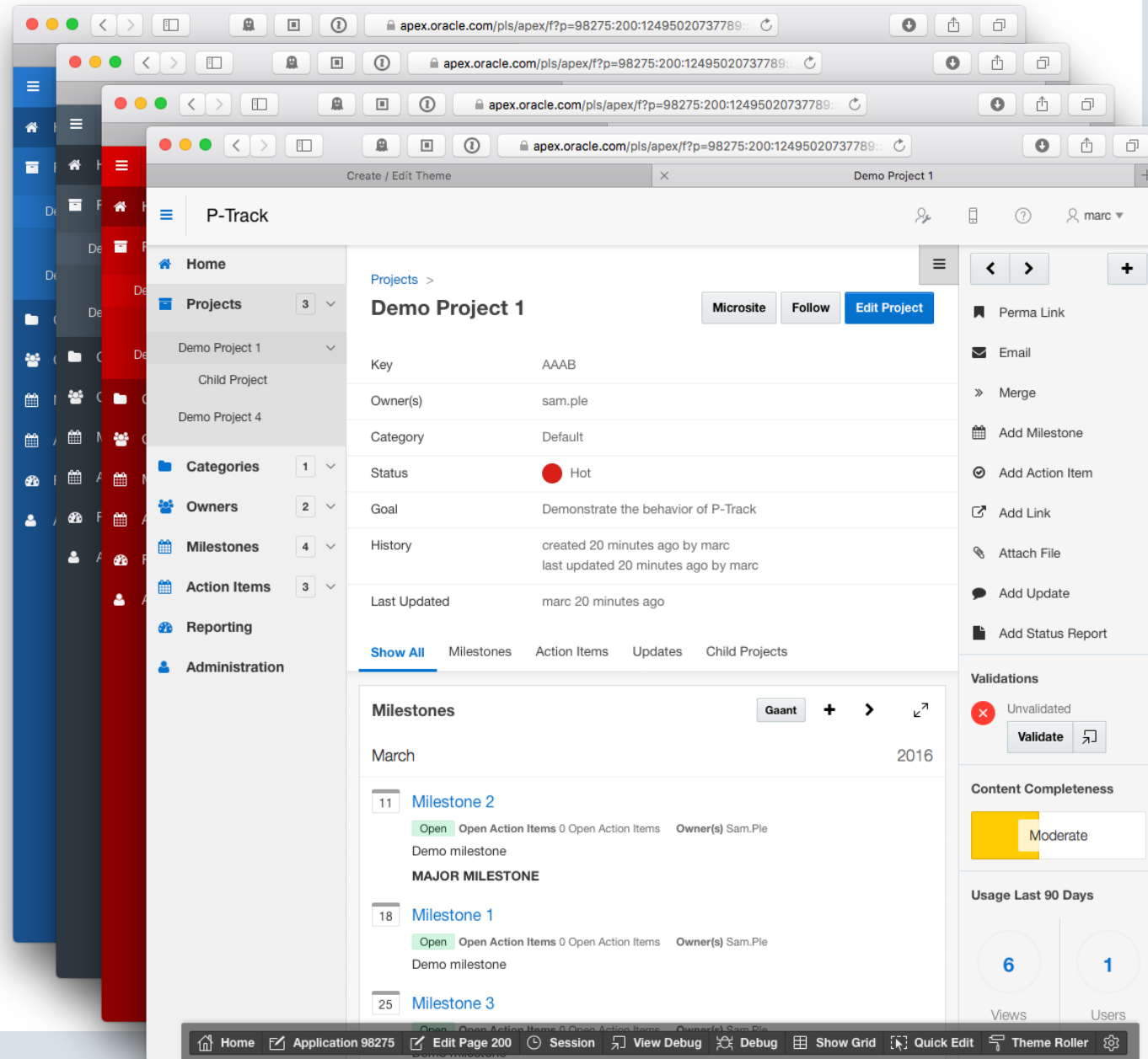
- APEX 5.1 adds support for right-to-left scripts, such as Arabic and Hebrew
- Available with Universal Theme
- Set “Document Direction” in globalization attributes und translation language mapping



Universal Theme

Theme Styles

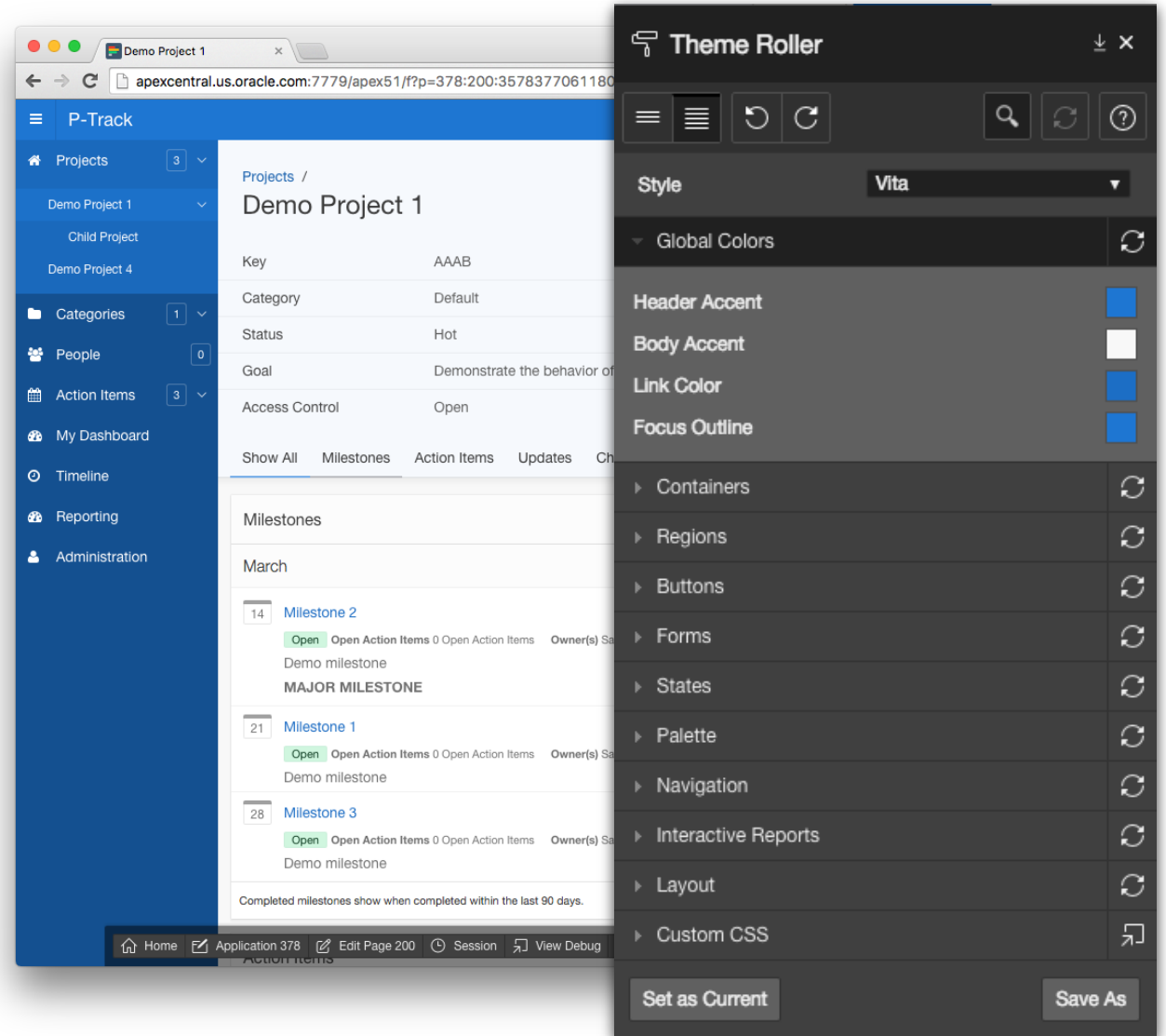
- Variety of different theme styles included with Universal Theme
- Set default Theme Style for app
- Administrators can change theme style for all users
- End users can select personal theme style
- Create custom Theme Styles using Theme Roller



Universal Theme

Theme Roller

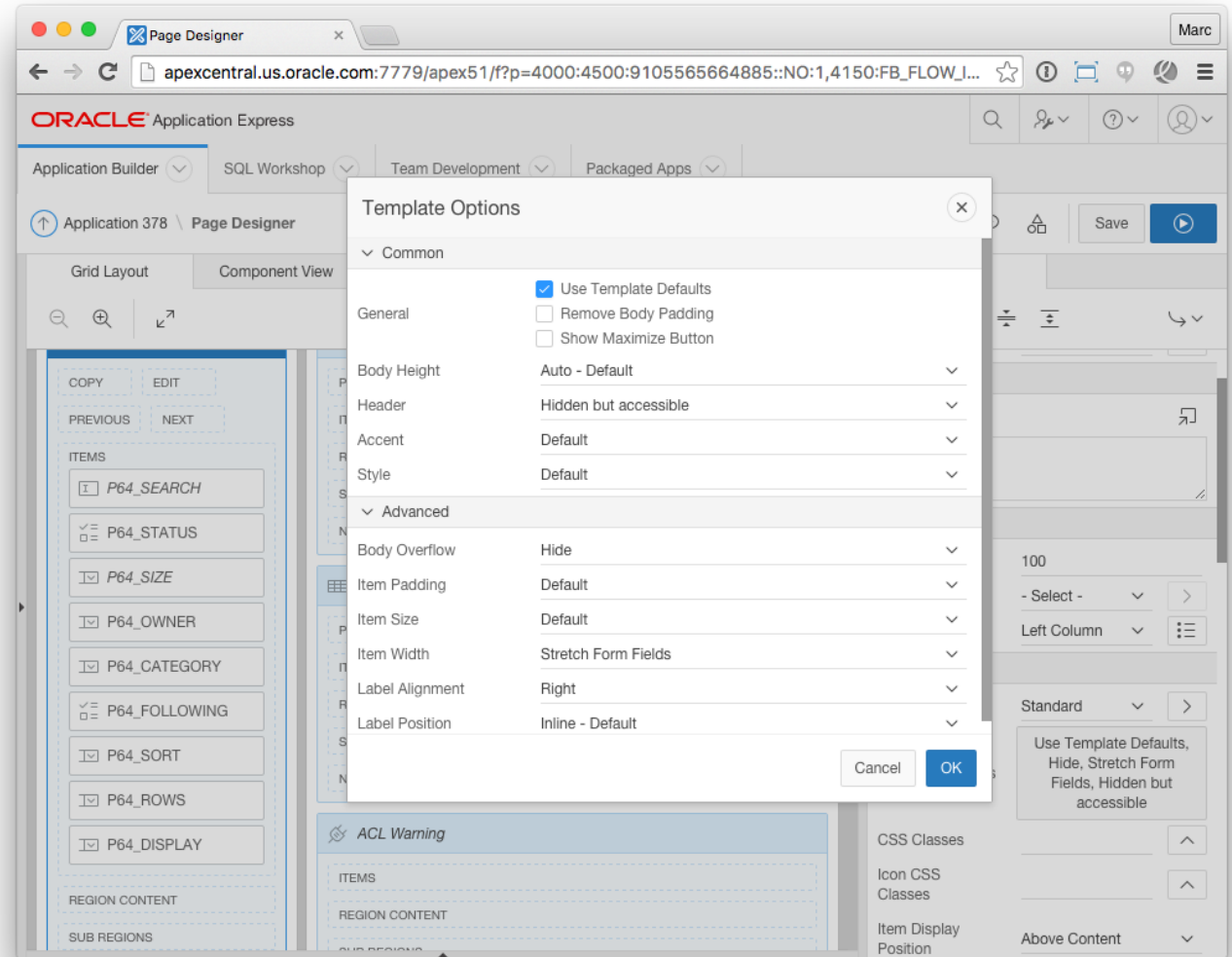
- Easily build custom Theme Styles
- Compiles CSS on the fly
- See changes live in your app
- Runs from developer toolbar
- Save changes directly to your theme



Universal Theme

Template Options

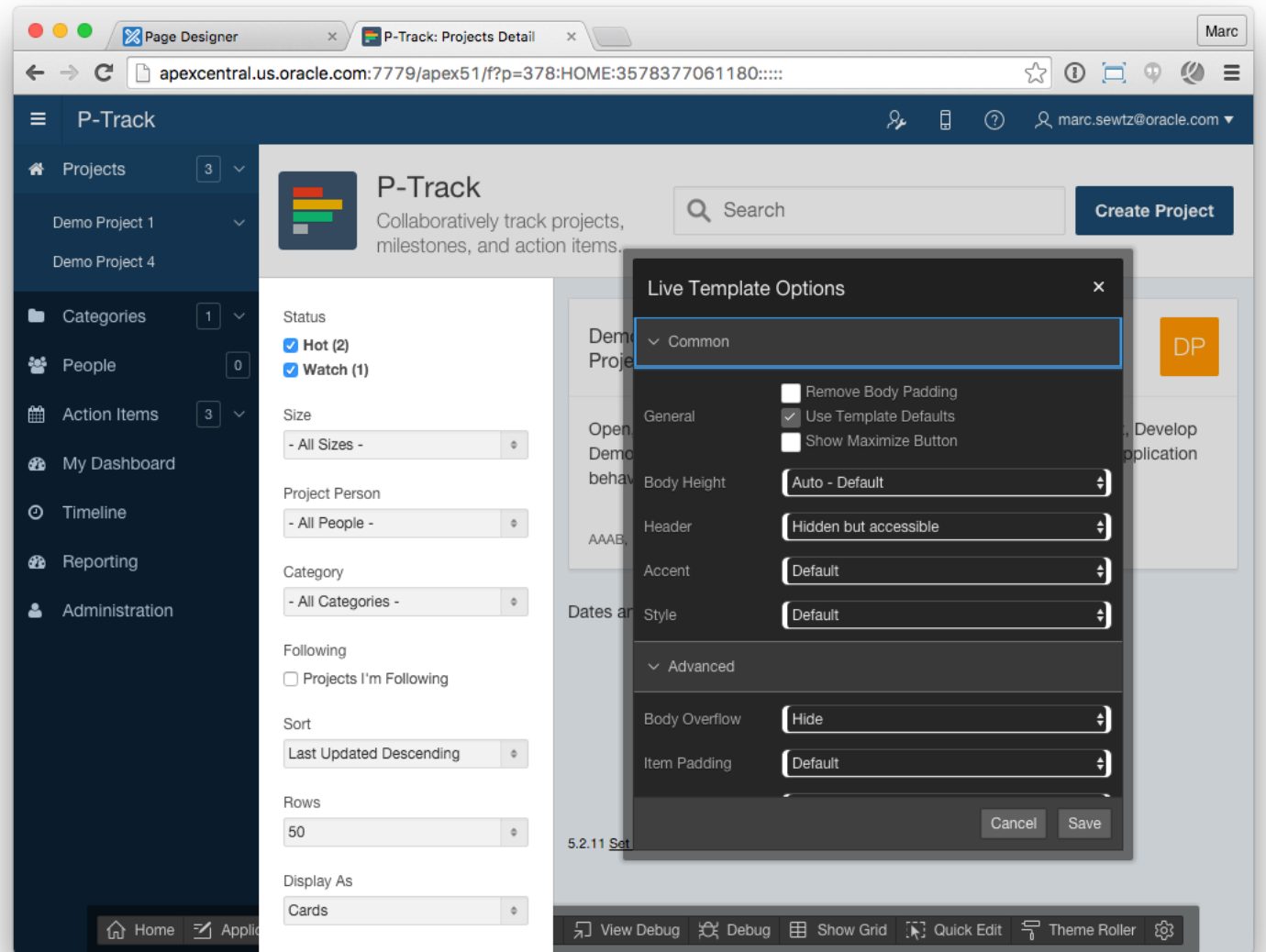
- Declarative CSS modifiers for HTML5 templates
 - Apply styles like borders, padding, icons, colors, size, etc.
 - Uses easy-to-understand, descriptive names
 - Available for most template types:
 - Page, Region, Report, Breadcrumb, List, Item, Button
 - Significantly reduces the number of required templates for a theme



Universal Theme

Live Template Options

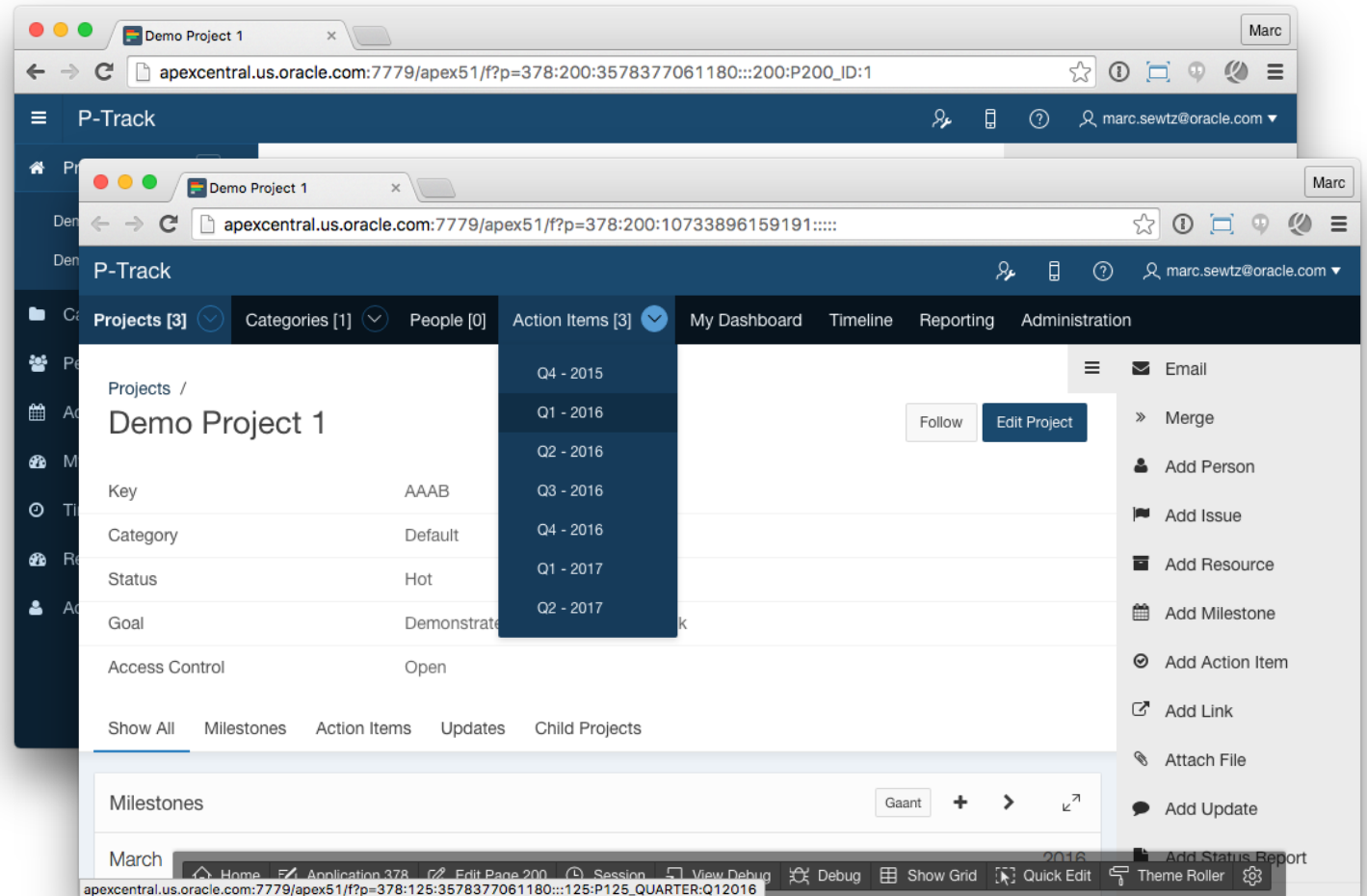
- Apply Template Options at Runtime
- Instantly see impact on selected component
- Enabled via Quick Edit



Universal Theme

Navigation Lists

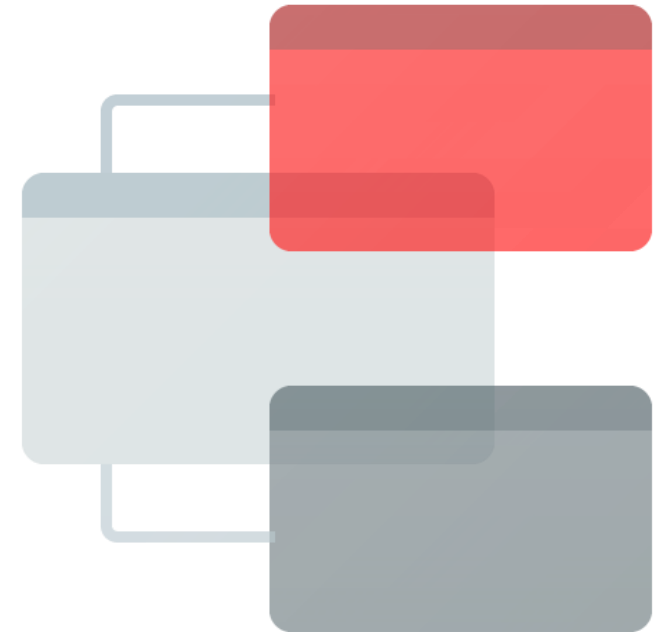
- Choice of sidebar menu or tab-style navigation on top
- Accessible multi-level pull-down menus
- Implemented as lists
- Migration of tabs from legacy themes



Universal Theme

Theme Subscriptions

- Keep up-to-date with latest version of theme
- Enables consistent UI across applications using master themes
- Identical templates, custom theme styles
- Push templates & template option changes to subscribing templates
- Subscribed templates are read only
- Edit local copies of templates



Demo

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Testing, Debugging and Deploying

Testing Strategies

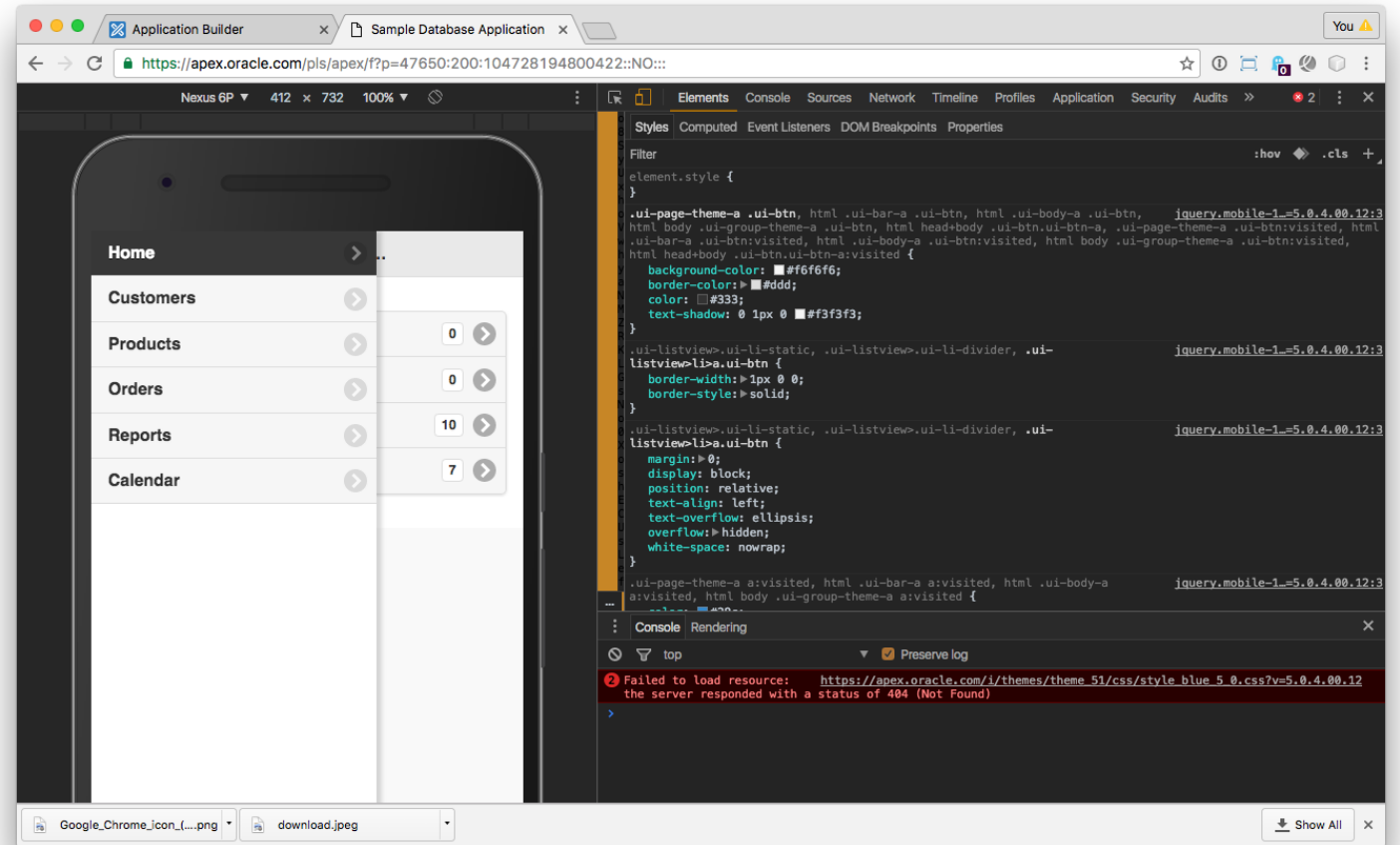
- Use resized standard Desktop browser for basic layout testing
- Use platform-specific development tools like Xcode or Android SDK to test mobile features:
 - native form controls, orientation change
 - simulate different devices, screen resolutions, High DPI, etc.
- Also include testing on real, physical devices for full access to hardware functions



Testing, Debugging and Deploying

Desktop Browser testing

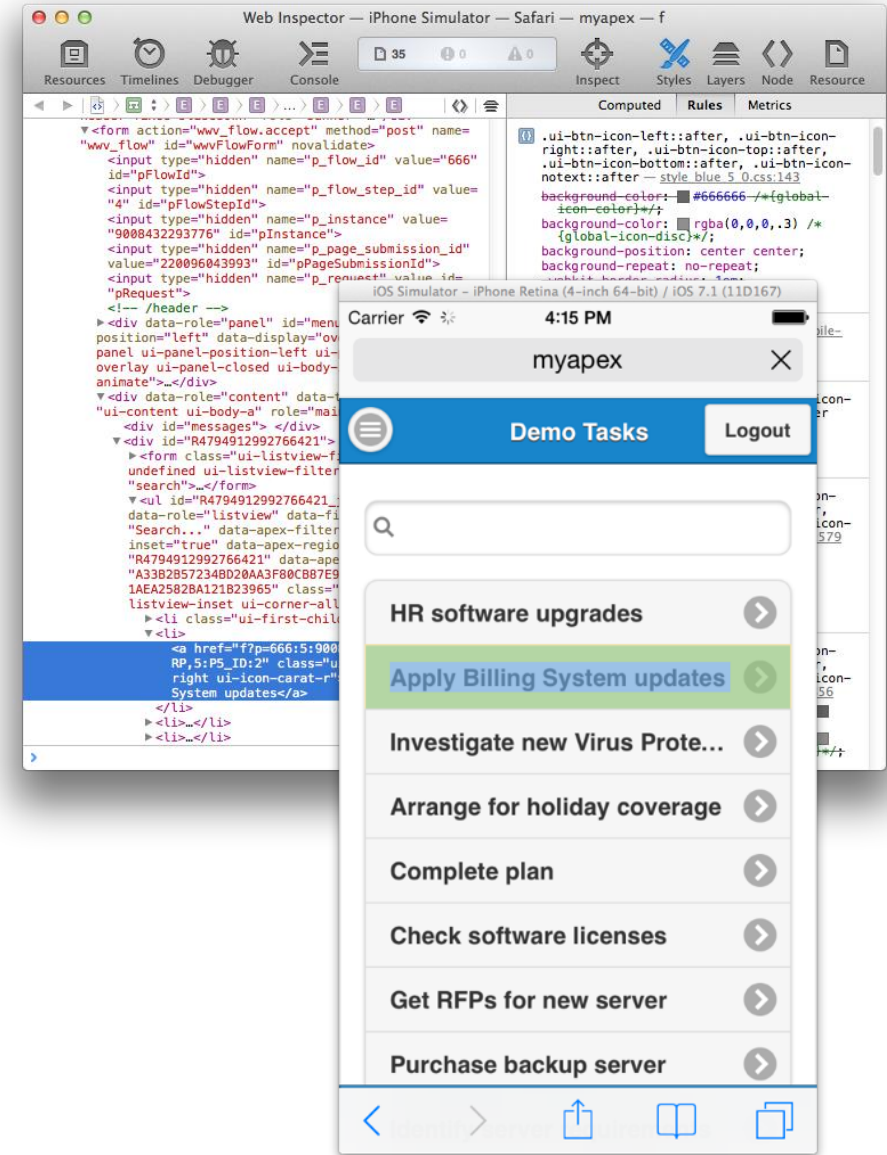
- Resize browser to approximate device
- Use tools such as Google Chrome device toolbar
 - Exact control over height and width
 - Built-in dimensions simulating popular devices
 - Optionally shows device frame



Testing, Debugging and Deploying

Testing and Debugging with Safari and XCode

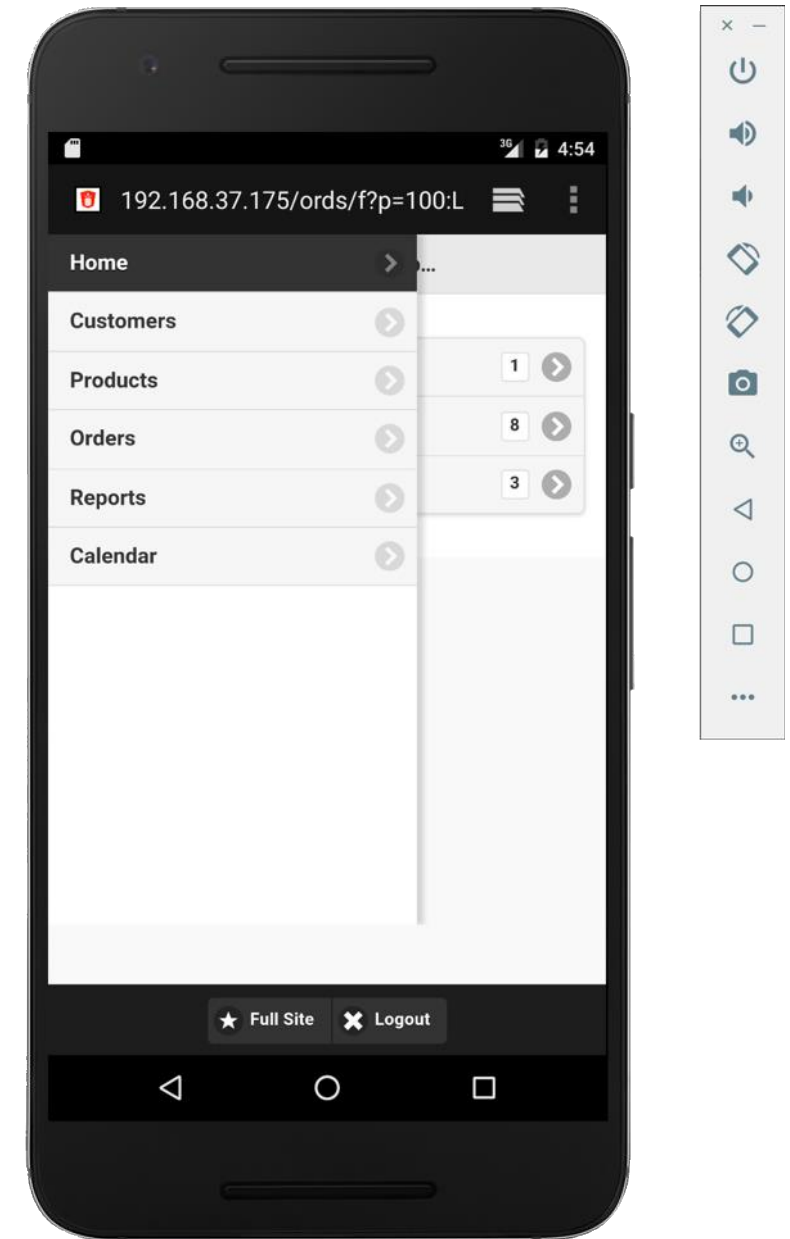
- Access iOS Simulator from Xcode
 - Simulate different iPhone and iPad models, Retina and non-Retina, different iOS versions
- Use Desktop Safari Web Inspector to debug app running in Safari on device
 - Also works with actual USB connected iOS device
 - Access to resources, debugger, console, etc.



Testing, Debugging and Deploying

Testing and Debugging with Android Studio

- Get the Android SDK or Android Studio
 - Includes Eclipse + ADT plug-in
 - Includes Android Emulator
- Use Android Virtual Device Manager
- Create virtual devices using different screen sizes, DPI and Android OS versions



Testing, Debugging and Deploying

Deploying Mobile Apps

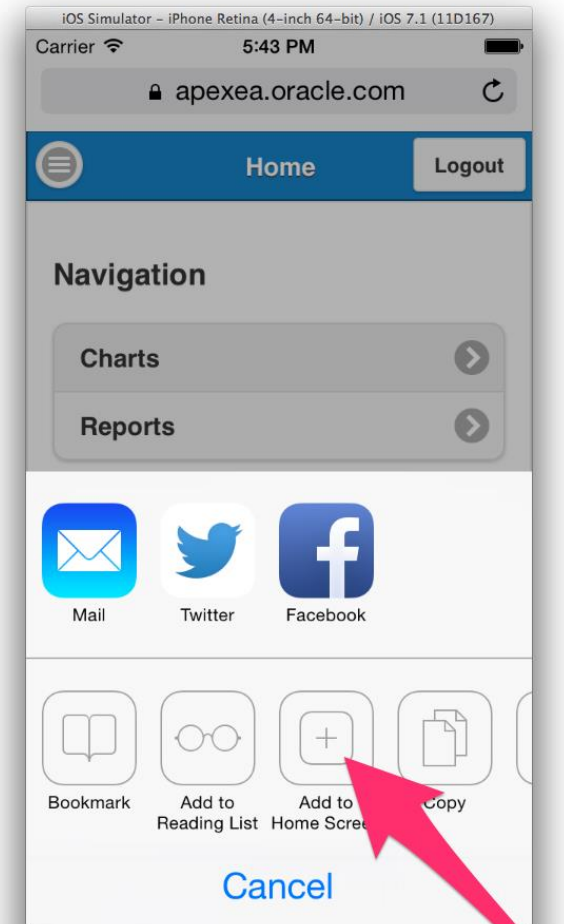
- Mobile Apps are accessed through web browser on device
- In-house applications
 - Deploy to APEX instance in the company internal network
 - Access from outside the network via VPN
- Public-facing applications
 - Deploy on APEX instance that is accessible from the Internet
 - Deploy to public-facing site or Cloud Services



Testing, Debugging and Deploying

Add to Home Screen

- Users open Mobile Web Apps by opening a URL in the Web browser of their device
- App specific URLs can be made available through mobile dashboards, portals, or communicated through email
- Apps that are frequently used can be bookmarked
- For easy and quick access to mobile Apps, use Add-To-Home-Screen function to place icon on the home screen of your device



Testing, Debugging and Deploying

Deploying Hybrid Apps using Cordova / PhoneGap



- Set of device APIs that allow access to native device functions from JavaScript
- Combined with a UI framework like jQuery Mobile this allows a smartphone app to be developed with just HTML, CSS, and JavaScript
- JavaScript APIs consistent across multiple device platforms thus apps are portable to other device platforms with minimal to no changes
- Apps made available for installation from platform specific app store

Demo

Integrated Cloud

Applications & Platform Services

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