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## Building Responsive Mobile Applications with Oracle Application Express 5.1

Dracle Internal/Restricted/Highly Restricted

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

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- Working for Oracle since 1998
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- APEX on Twitter: #ORCLAPEX
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- Mobile Development Overview
- <sup>2</sup> Developing Mobile Apps with the jQuery Mobile Theme
- Developing Responsive Apps with the Universal Theme
- 4 Testing, Debugging and Deploying your Mobile Apps

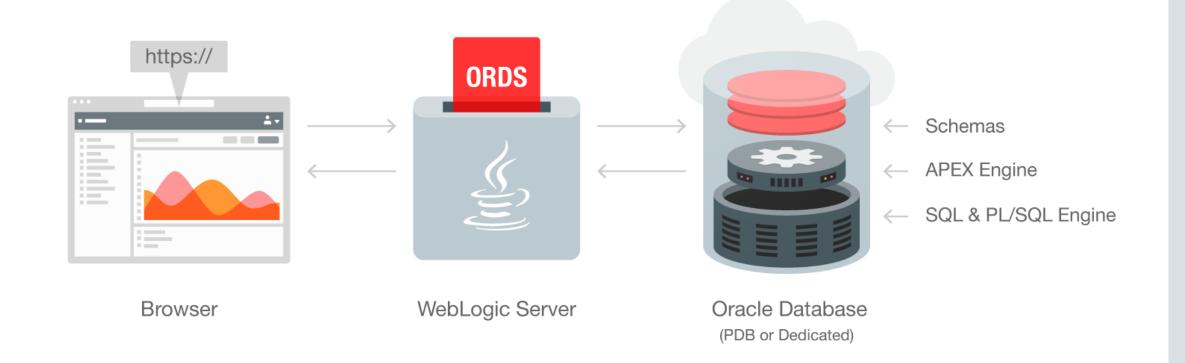


### Mobile Development – Overview

- Developing Mobile Apps with the jQuery Mobile Theme
- **Developing Responsive Apps with the Universal Theme**
- Testing, Debugging and Deploying your Mobile Apps 4



### 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



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## 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

- <sup>3</sup> 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







- 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:	
Flip toggle:	
Vertical controlgroup, checkbox:	
One	
🗹 Two	
Three	

Vertical controlgroup, radio:

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	Тwo
	Three



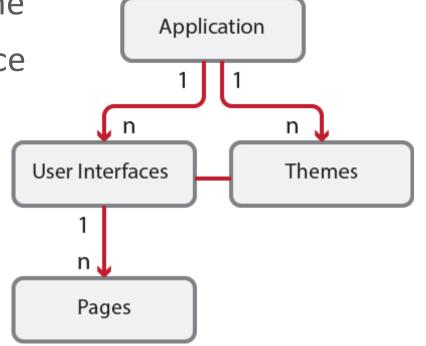
### **Mobile Theme**

### **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

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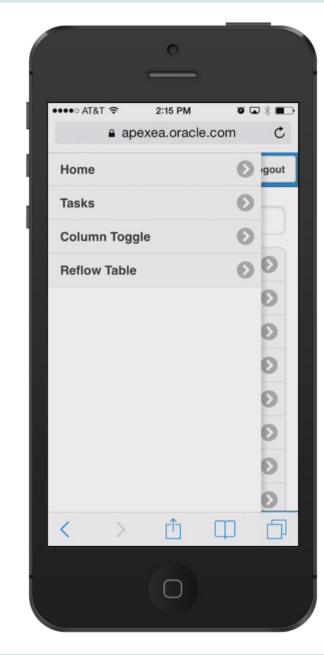
Auto Detection



### **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

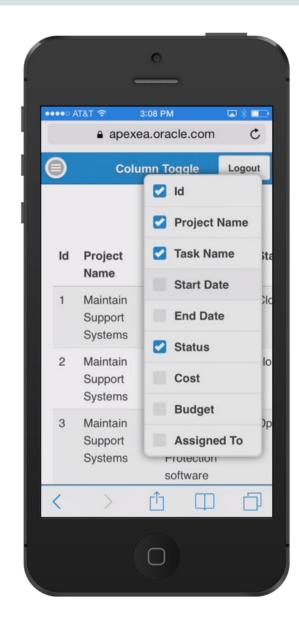
- Default View for data display, navigation, drill-down view
- Based on unordered list
- Automatic Dividers
- Custom formatting options
- Declarative Search Options, supporting server- and client side search
- data-role="listview"

Tasks	u la la la la	.ogout
Maintain Support Systems		
HR software upgrades	Pam King	Ø
Apply Billing System updates	Russ Sanders	Θ
Investigate new Virus Protection software	Pam King	Ø
Arrange for holiday coverage	Al Bines	Θ
Email Integration		
Complete plan	Mark Nile	Ø



### 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

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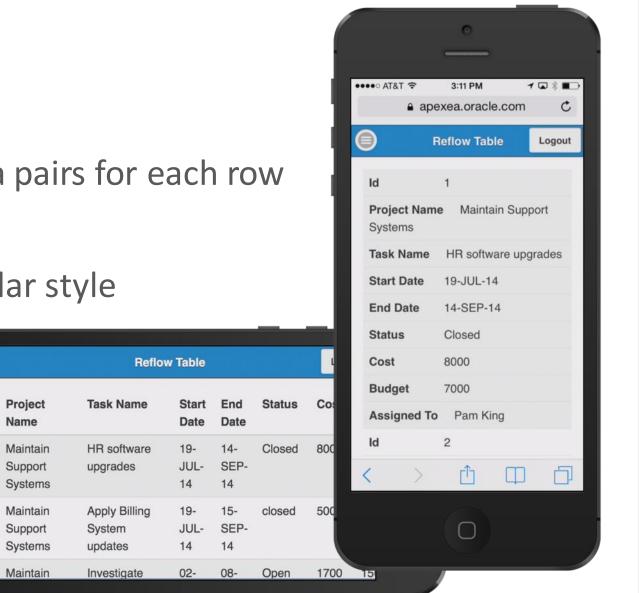
Collapsing table data into label/data pairs for each row

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- Stacked presentation style default
- Media query used to switch to tabular style presentation above a specific screen width



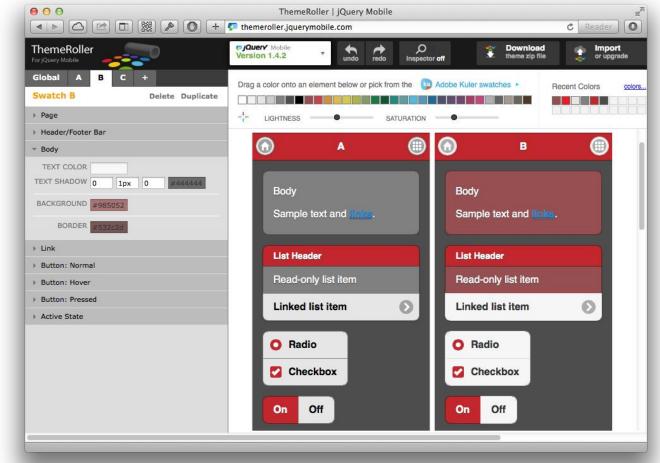
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## Mobile Theme

### **ThemeRoller**

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- 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





- 2 Developing Mobile Apps with the jQuery Mobile Theme
- Developing Responsive Apps with the Universal Theme
- 4 Testing, Debugging and Deploying your Mobile Apps



## Universal Theme Responsive Grid

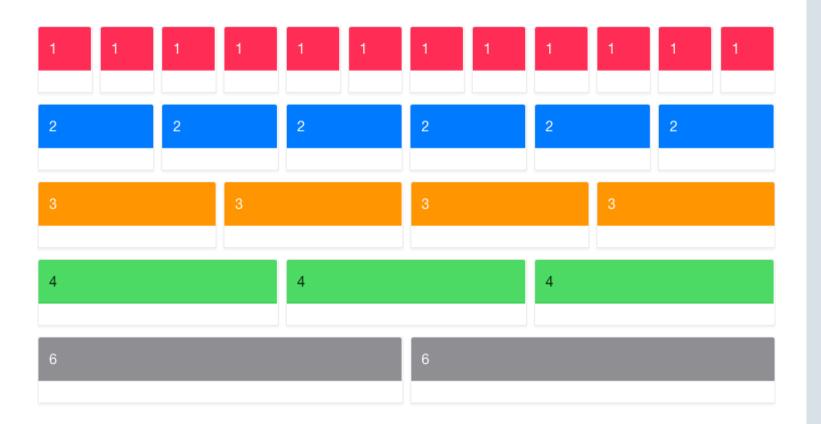
- Smart Page Layouts
- Improved Grid System
- Complex Form Layout
- Responsive Components
- Tap Event Handling

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## 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

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## 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

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### 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

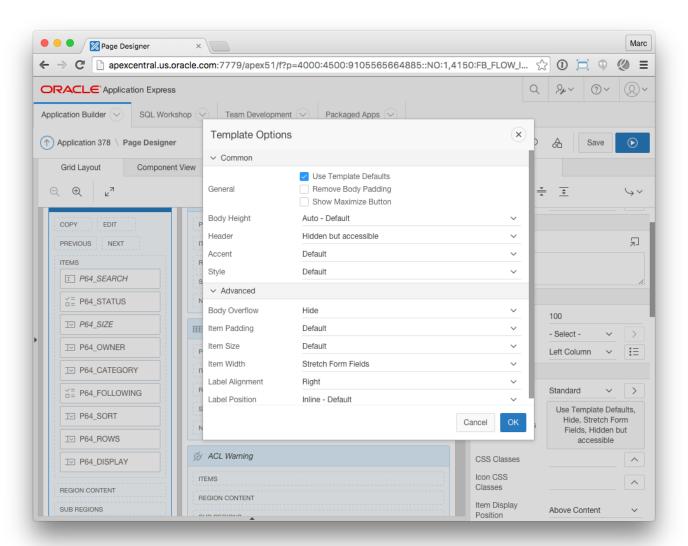
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## Universal Theme

### **Template Options**

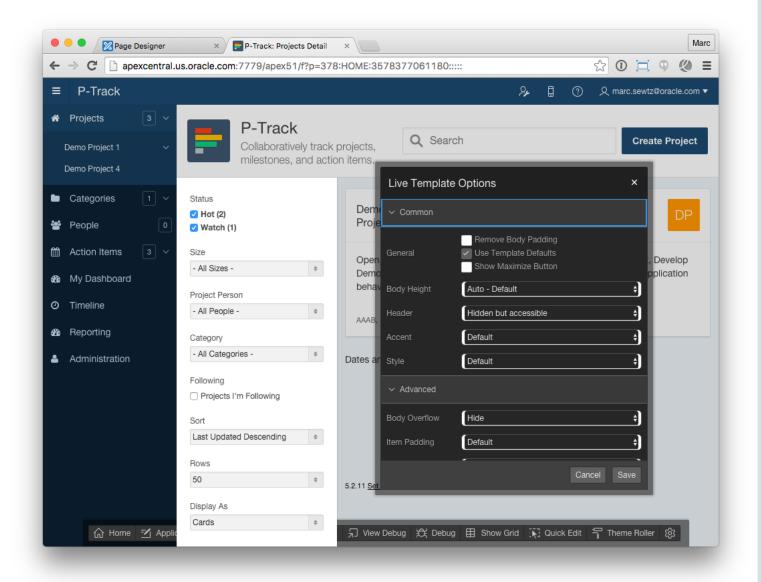
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- Declarative CSS modifiers for HTML5 templates
  - Apply styles like borders, padding, icons, colors, size, etc.
  - Uses easy-to-understand, descriptive names
  - Available for most template types:
    - Page, Region, Report, Breadcrumb, List, Item, 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

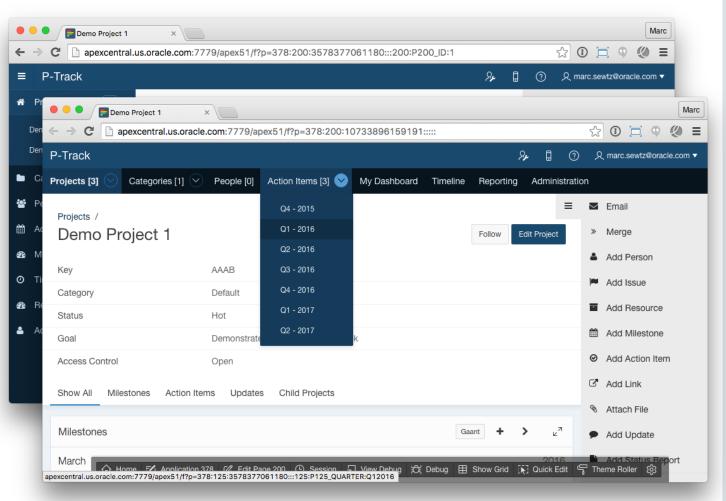


## Universal Theme Navigation Lists

- Choice of sidebar menu or tab-style navigation on top
- Accessible multi-level pulldown menus
- Implemented as lists

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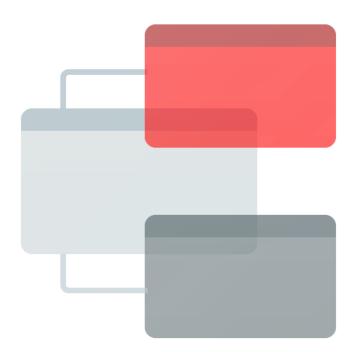
Migration of tabs from legacy themes



## **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



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# Demo



### 1 Mobile Development – Overview

- <sup>2</sup> Developing Mobile Apps with the jQuery Mobile Theme
- <sup>3</sup> Developing Responsive Apps with the Universal Theme
- Testing, Debugging and Deploying your Mobile Apps



### 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



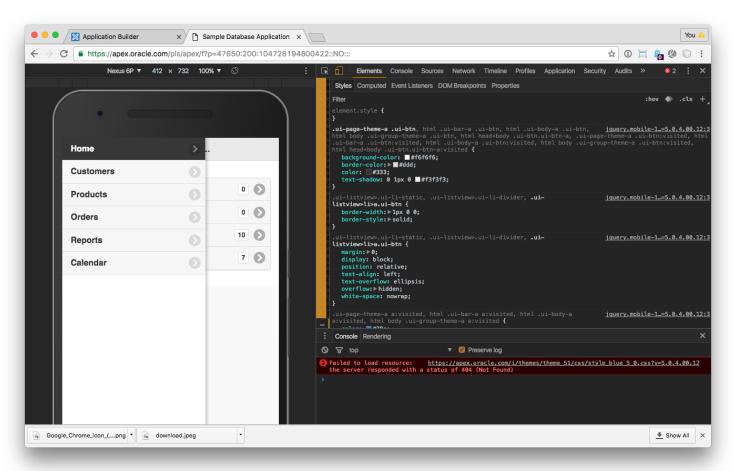


## Testing, Debugging and Deploying Desktop Browser testing

• Resize browser to approximate device

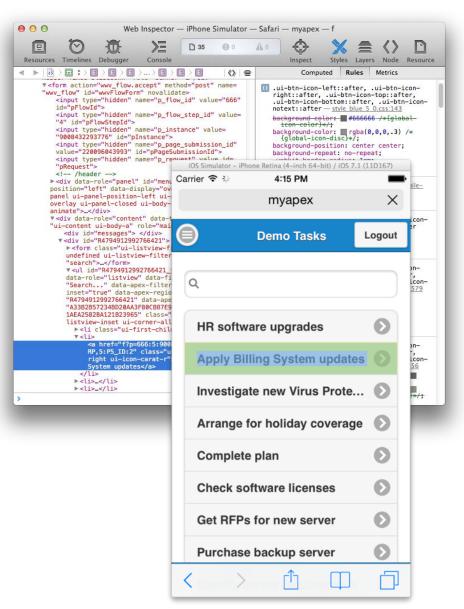
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- Use tools such as Google Chrome device toolbar
  - Exact control over height and width
  - Built-in dimensions simulating popular devices
  - Optionally shows device frame



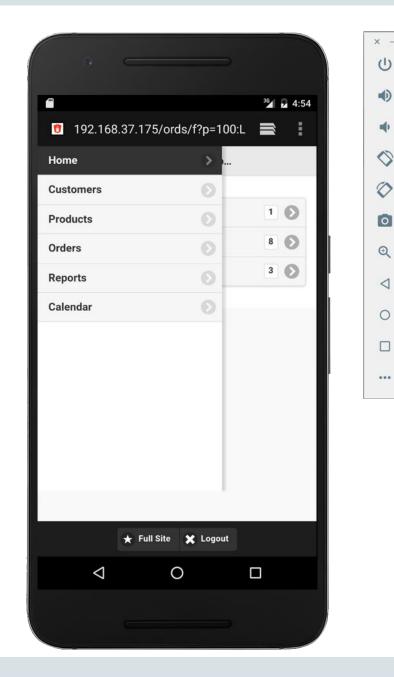
### Testing, Debugging and Deploying Testing and Debugging with Safari and XCode

- 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



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## Testing, Debugging and Deploying Deploying Mobile Apps

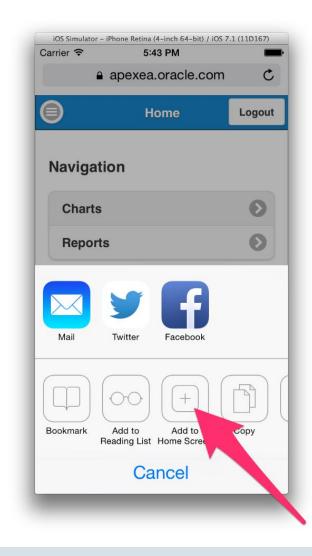
- Mobile Apps are accessed through web browser on device
- In-house applications
  - Deploy to APEX instance in the company internal network
  - Access from outside the network via VPN
- Public-facing applications
  - Deploy on APEX instance that is accessible from the Internet
  - Deploy to public-facing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



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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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