

Building Native Apps with ArcGIS API for JavaScript Using PhoneGap and jQuery

Andy Gup, Lloyd Heberlie

Agenda



- **Getting to know PhoneGap**
- jQuery and jQuery mobile overview
- jQuery and ArcGIS API for JavaScript
- Putting it all together
- Additional information

Technical workshops at Dev Summit

- **Web**
 - Building Mobile Web Apps with the ArcGIS API for JavaScript
- **Hybrid**
 - You are here!
- **Native**
 - Search the agenda for “Runtime SDK”

Application comparison: Native vs. Web

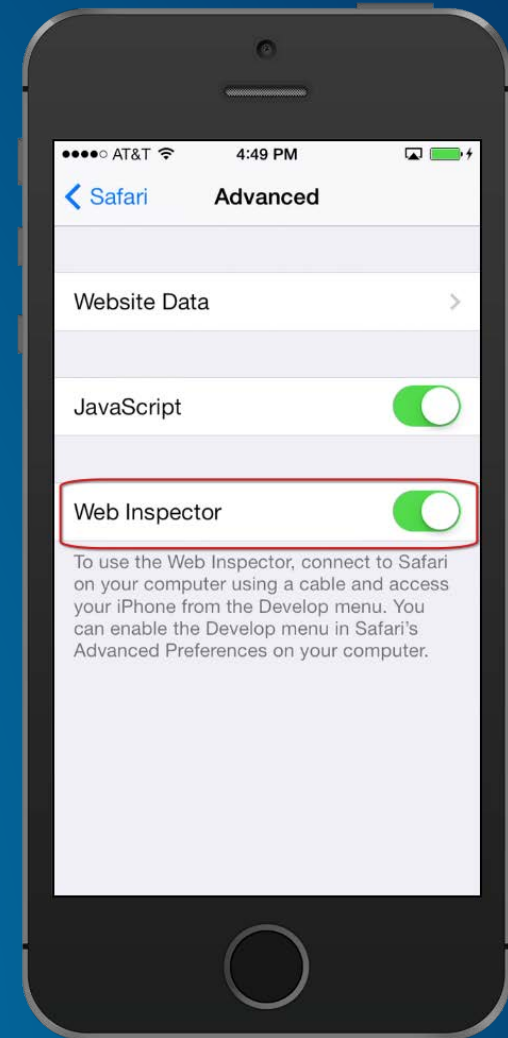
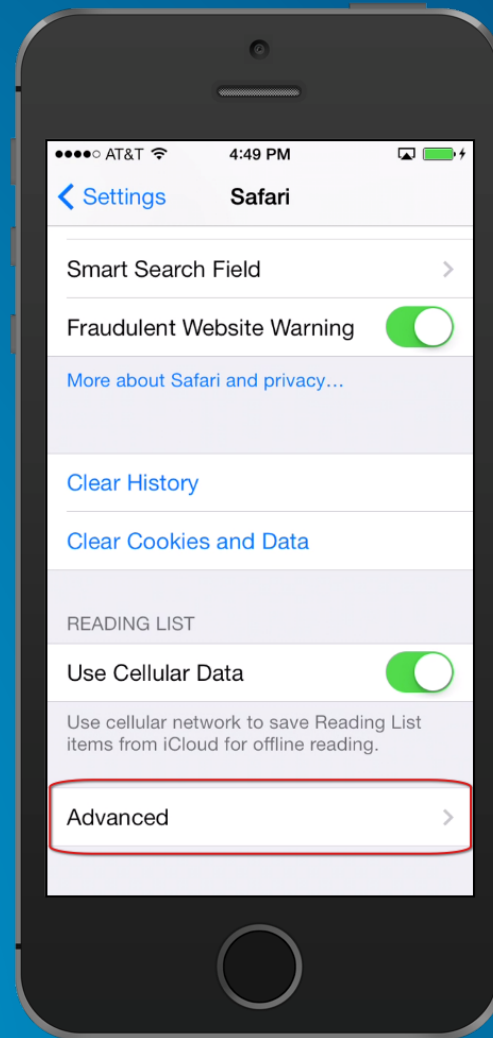
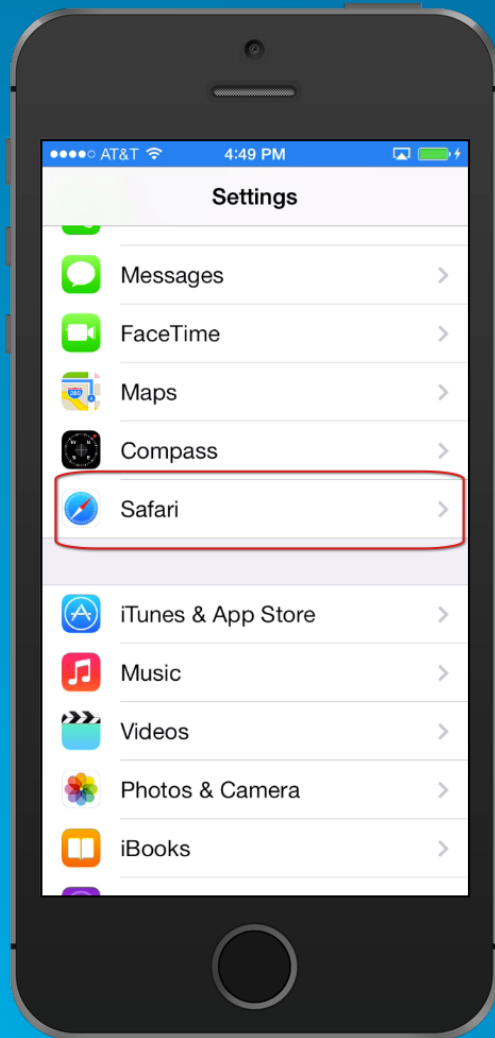
- ArcGIS Runtime SDK for Android
- <https://developers.arcgis.com/android/guide/native-vs-web.htm>
- ArcGIS Runtime SDK for iOS
- <https://developers.arcgis.com/ios/objective-c/guide/native-vs-web.htm>

Demonstration

Hello Cordova and Resources

Lloyd Heberlie

Enable Safari remote web inspection



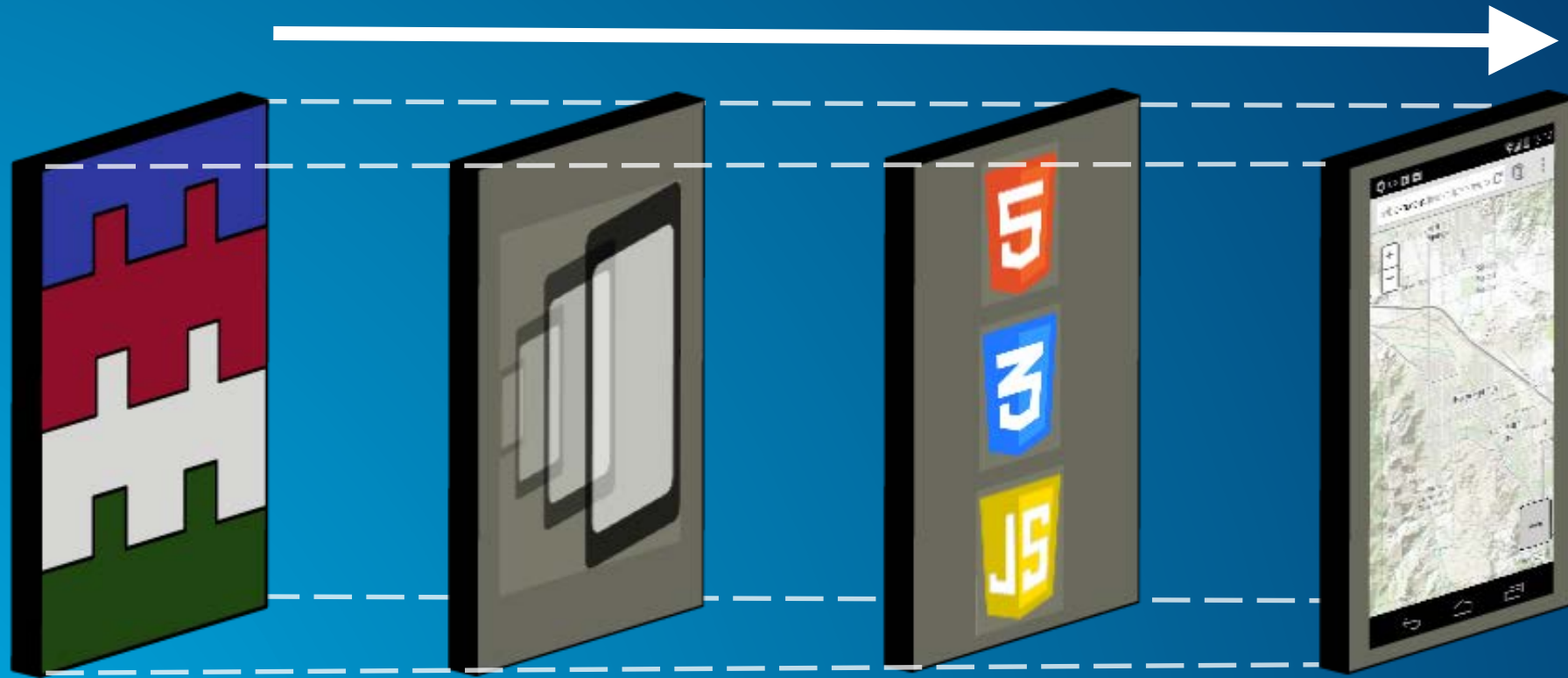
What is PhoneGap?

- Application container technology
- Core engine is 100% open source
- Web view container, plus JS API
- HTML5, CSS3, JS = Native App



PhoneGap

PhoneGap architecture



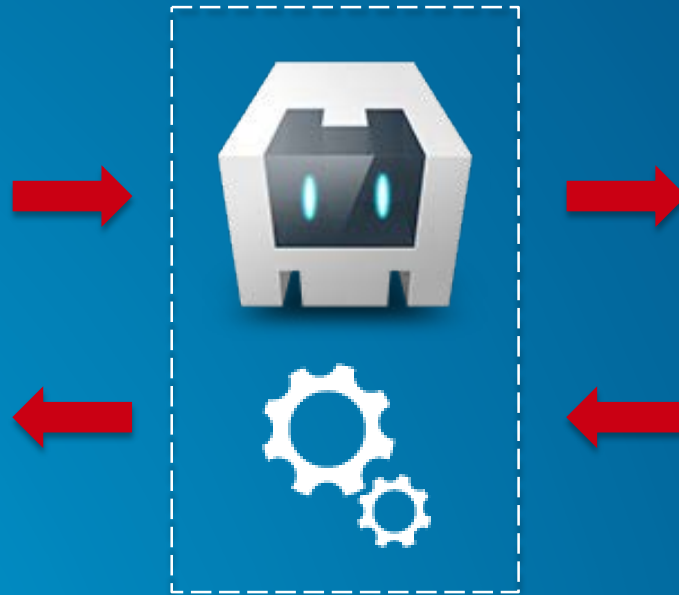
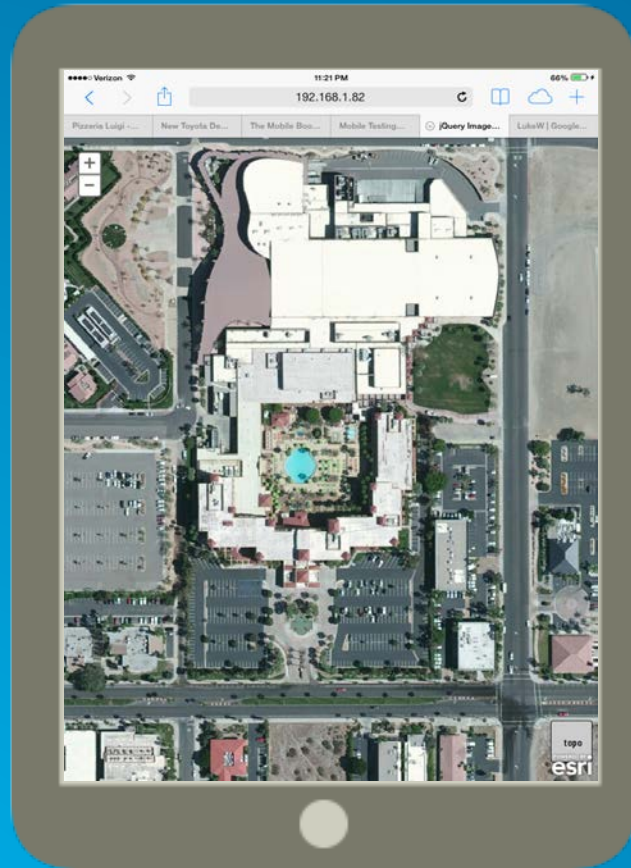
**PhoneGap
Plugins**

PhoneGap

**Application
Code**

**Native
App**

PhoneGap Plugins



PhoneGap Plugin options

The screenshot shows the Adobe PhoneGap Build website with the 'PhoneGap Plugins' tab selected in the navigation menu. The main content area displays a list of plugins, including Battery, Camera, Capture, and Console. The 'Battery' plugin's ID, 'org.apache.cordova.battery-status', is highlighted with a red box.

Plugin Name	Plugin ID
Battery	org.apache.cordova.battery-status
Camera	org.apache.cordova.camera
Capture	org.apache.cordova.media-capture
Console	org.apache.cordova.console

The screenshot shows the Adobe PhoneGap Build website with the 'BarcodeScanner' plugin selected. The 'PhoneGap Plugins' tab is selected in the navigation menu. The plugin details for 'BarcodeScanner' are displayed, including its ID, version, platform(s), phonegap version(s), license, submitter, repository, and tag/branch. The 'BarcodeScanner' plugin's ID, 'com.phonegap.plugins.barcodescanner', is highlighted with a red box. A tooltip is shown over the 'BarcodeScanner' plugin details, listing the following metadata:

Plugin ID	com.phonegap.plugins.barcodescanner
Version	1.1.0
Platform(s)	Android, iOS
PhoneGap Version(s)	3.0.0, 3.1.0, 3.2.0, 3.3.0
License	MIT
Submitter	ryan.willoughby@adobe.com
Repository	http://github.com/phonegap-build/BarcodeScanner.git
Tag / Branch	1.1.0

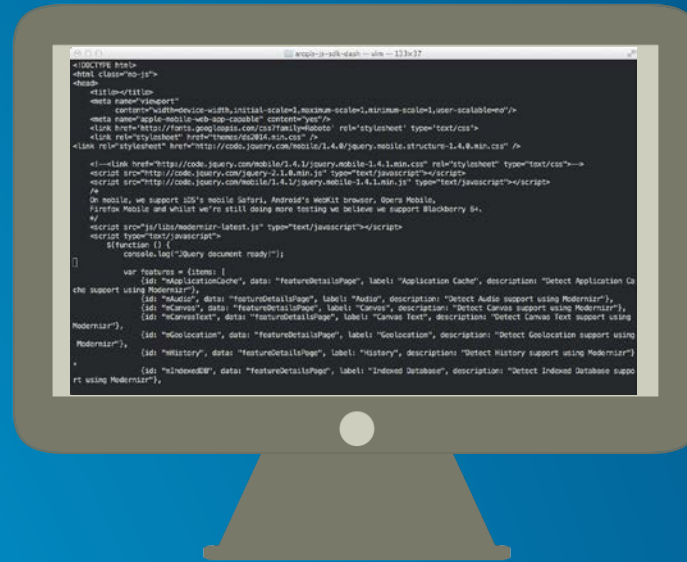
Setup a developer machine



web server



Source Control



Code quality and verification



Preparing for PhoneGap



 **Developer Program**

Installing PhoneGap and Apache Cordova

```
lheberlie — bash — 55x5  
Last login: Thu Feb 27 17:18:10 on ttys000  
heb:~ lheberlie$ npm install -g cordova
```

```
lheberlie — bash — 55x5  
Last login: Thu Feb 27 17:18:10 on ttys000  
heb:~ lheberlie$ npm install -g phonegap
```



Check versions of PhoneGap and Apache Cordova

```
lheberlie — bash — 55x6
Last login: Thu Feb 27 17:18:10 on ttys000
heb:~ lheberlie$ cordova -v
3.4.0-0.1.0
heb:~ lheberlie$ phonegap -v
3.3.0-0.19.4
heb:~ lheberlie$
```

```
lheberlie — bash — 55x5
heb:~ lheberlie$ npm info phonegap version
3.3.0-0.19.6

heb:~ lheberlie$ npm info cordova version
3.4.0-0.1.0
```



Updating PhoneGap and Apache Cordova

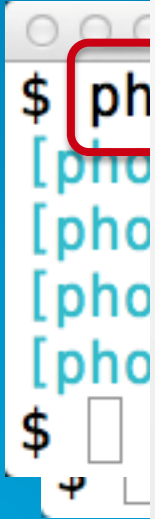
```
heb:~ lheberlie$ sudo npm update -g cordova
```

```
heb:~ lheberlie$ sudo npm update -g phonegap
```



Creating your first PhoneGap CLI project

phone



Running HelloDS on Heb's iPhone 5c

Build Settings

Setting	Value
Compiler for C/C++/Objective-C	Default compiler (Apple LLVM 5.0)
Debug Information Format	DWARF with dSYM File
Generate Profiling Code	No
Precompiled Header Uses Files From Build Directory	Yes
Scan All Source Files for Includes	No
Validate Built Product	No

Code Signing

Setting: HelloDS

Code Signing Entitlements: <Multiple values>

Code Signing Identity

Setting	Value
Debug	Automatic
Any iOS SDK	Automatic
Release	Automatic
Any iOS SDK	iPhone Developer

Other Code Signing Flags

Provisioning Profile: iOS Team Provisioning Profile: *

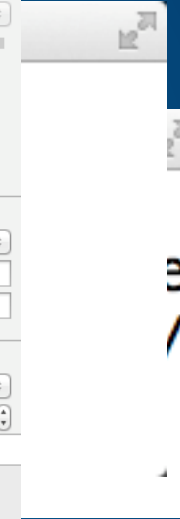
Deployment

Setting: HelloDS

Additional Strip Flags

```
2014-02-27 22:37:10.206 HelloDS[4028:60b]
Resetting plugins due to page load.
2014-02-27 22:37:10.336 HelloDS[4028:60b]
Finished load of: file:///var/mobile/
Applications/B38C3866-5666-4D0B-B82E-
BCBD8719CA39/HelloDS.app/www/index.html
```

App"

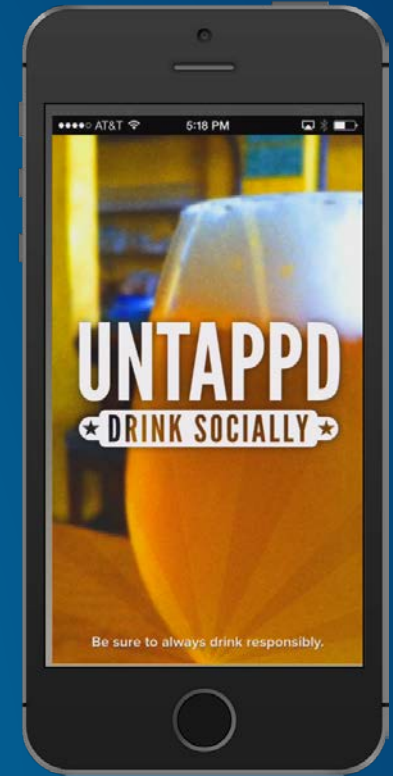
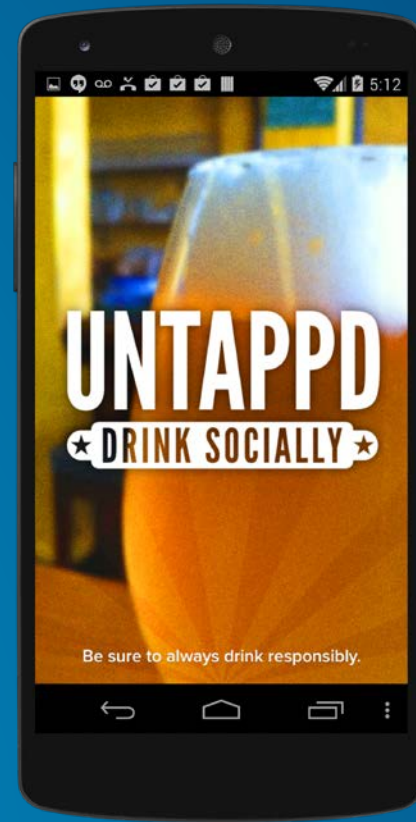
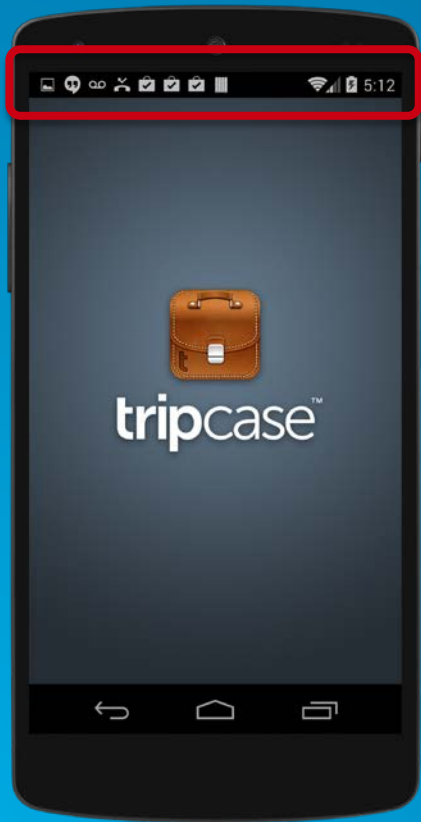


Demonstration

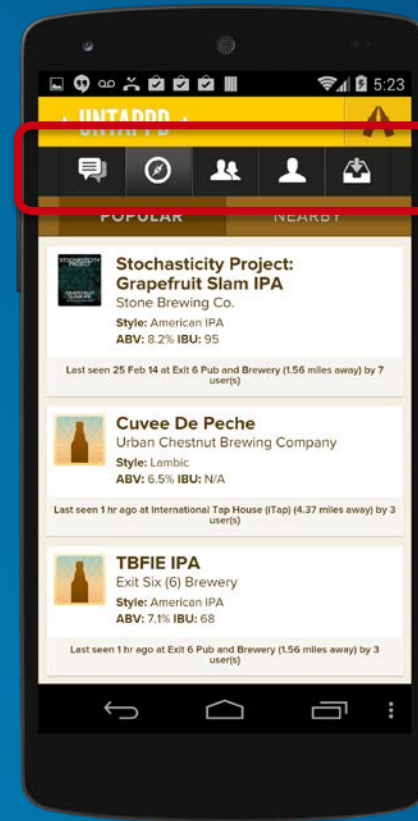
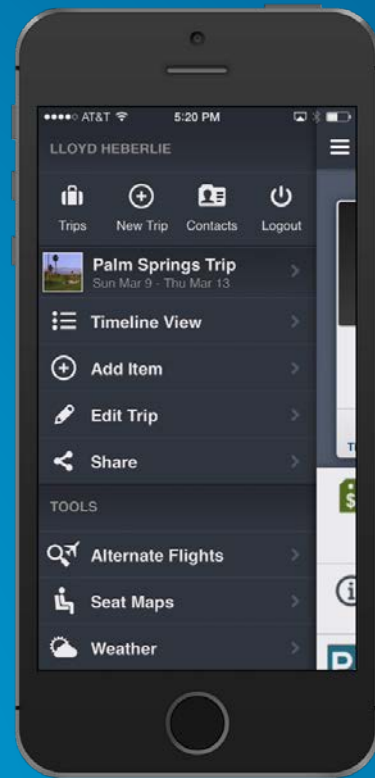
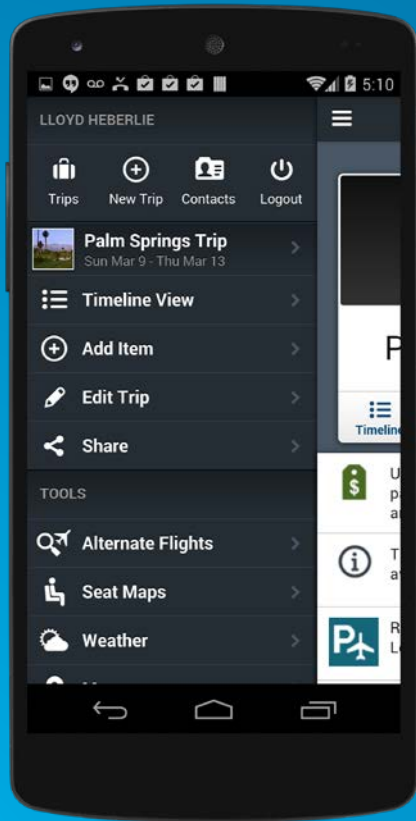
Hello Cordova (cont.)

Lloyd Heberlie

PhoneGap: Featured Apps



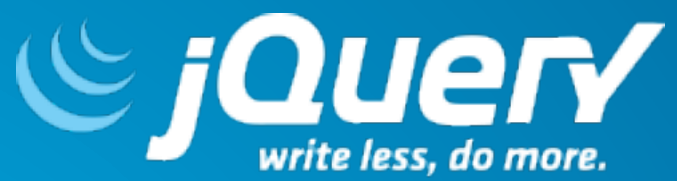
Featured Apps: Tripcase, Untappd



Agenda



- Getting to know PhoneGap
- **jQuery and jQuery mobile overview**
- jQuery and ArcGIS API for JavaScript
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Theme roller

The screenshot displays the ThemeRoller interface for jQuery Mobile Version 1.4.2. The top navigation bar includes the jQuery Mobile logo, version information, and utility buttons for undo, redo, and inspector. The main interface is divided into three sections:

- Left Panel:** A tree view showing the theme structure. The current theme is 'A', and the selected swatch is 'Swatch A'. The tree includes: Page, Header/Footer Bar, Body, Link, Button: Normal, Button: Hover, Button: Pressed, and Active State.
- Top Right Panel:** A color selection tool with a color palette and sliders for LIGHTNESS and SATURATION. It includes a 'Download theme zip file' button.
- Right Panel:** A preview of the mobile theme 'A'. The preview shows a mobile interface with a header bar, a body containing sample text and links, a list with a header and items, and form elements including a radio button, a checked checkbox, and an 'On/Off' toggle.

data-attributes

Listview

OL or UL with `data-role="listview"`

data-autodividers	true false
data-count-theme	swatch letter (a-z)
data-divider-theme	swatch letter (a-z)
data-filter	true false
data-filter-placeholder	string
data-filter-theme	swatch letter (a-z)
data-header-theme	swatch letter (a-z)
data-icon	home delete plus forward back ale
data-inset	true false

```
206 <div id="page-main" data-role="page">
207   <div data-role="header" data-position="fixed">
208     <h1>Feature Detection</h1>
209   </div>
210   <div data-role="content">
211     <ul id="featureDetectionListView" data-role="listview">
212       <!-- This content is auto generated -->
213     </ul>
214   </div>
215 </div>
```


Selections and filtering

```
7 <script type="text/javascript">
8   $("document").ready(function() {
9     $("p:last").css("border", "3px solid red");
10
11    $(".a").css("border", "3px solid green");
12
13    $("#list1").css("border", "3px solid yellow");
14
15    $("p.b").css("border", "3px solid orange");
16  });
17 </script>
```

```
24 <body>
25   <ul id="list1">
26     <li class="a">item 1</li>
27     <li class="a">item 2</li>
28     <li class="b">item 3</li>
29     <li class="b">item 4</li>
30
31   </ul>
32
33   <p class="a">This is paragraph 1</p>
34
35   <p>This is paragraph 2</p>
36
37   <p class="b">This is paragraph 3</p>
38
39   <p>This is paragraph 4</p>
40
41 </body>
```

Events

```
77 $("#featureDetectionListView li").on("click", function (evt) {  
78     var featureTest = evt.currentTarget.id;  
79     console.log("clicked it", featureTest);
```

```
▼ <ul id="featureDetectionListView" data-role="listview"  
listview">  
    <!-- This content is auto generated -->  
    ▶ <li id="mApplicationCache" class="ui-first-child">...</li>  
    ▶ <li id="mAudio">...</li>  
    ▶ <li id="mCanvas">...</li>  
    ▶ <li id="mCanvasText">...</li>  
    ▼ <li id="mGeolocation">  
        ▼ <a href="#page-feature-details" class="ui-btn ui-bt  
right ui-icon-carat-r">  
            <h3>Geolocation</h3>  
            <p>Detect Geolocation support using Modernizr</p>  
            ::after  
        </a>  
    </li>
```

Dynamic content

```
53     $.each(featuresArr, function (key, val) {
54         featureDetectionDict[val.id] = val;
55         var pageData = val;
56         var end = featuresArr.length - 1;
57         var htmlString = "";
58         switch (key) {
59             case 0:
60                 htmlString = "<li id='" + pageData.id + "' c";
61                 break;
62             case end:
63                 htmlString = "<li id='" + pageData.id + "'";
64                 break;
65             default:
66                 htmlString = "<li id='" + pageData.id + "' >";
67         }
68         featureItemsArr.push($(htmlString));
69     });
70     $("#featureDetectionListView").append(featureItemsArr);
```

jQuery mobile page lifecycle

Category: Events

jQuery Mobile offers several custom events that build upon native events to create useful hooks for development.

pagebeforechange

Triggered twice during the page change cycle: First prior to any page loading or transition and next after page load completes successfully, but before the browser history has been modified by the navigation process.

pagebeforecreate

Triggered on the page being initialized, before most plugin auto-initialization occurs.

pagebeforehide

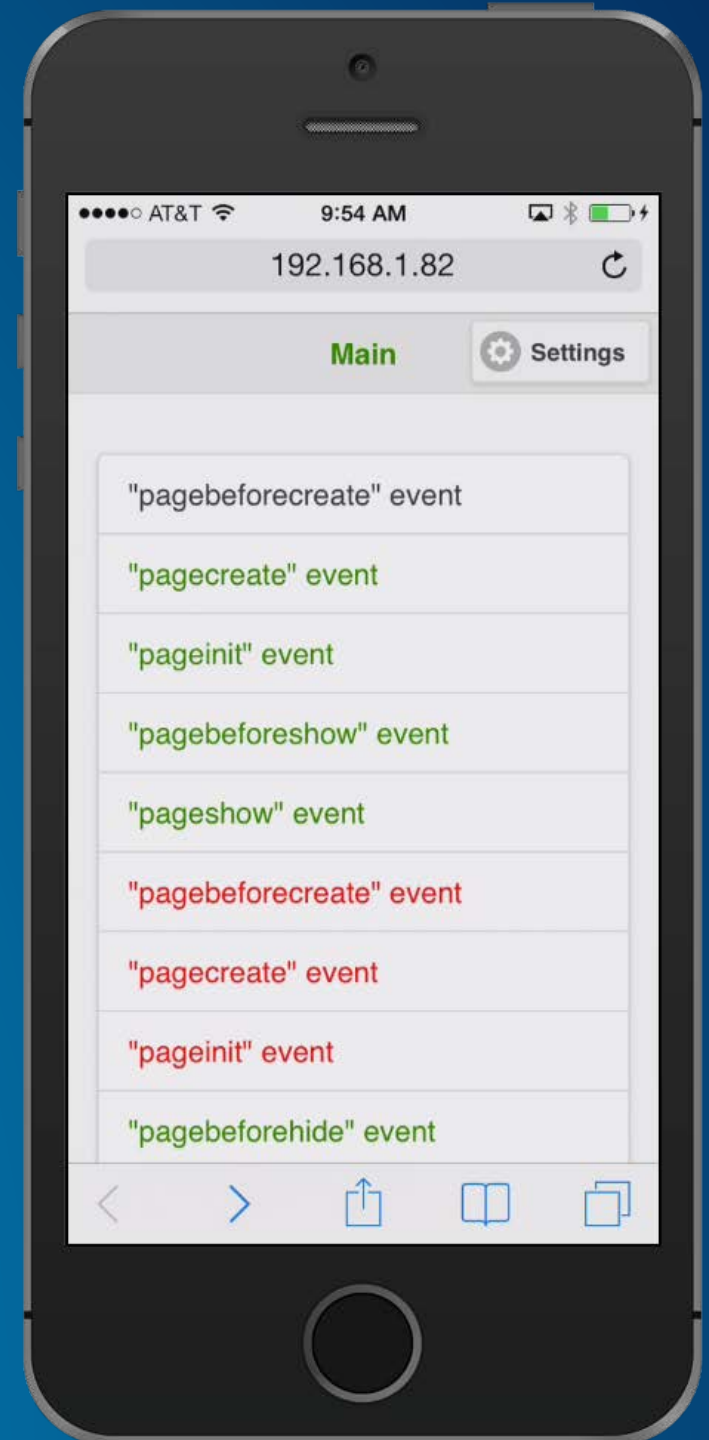
Triggered on the "fromPage" we are transitioning away from, before the actual transition animation is kicked off.

pagebeforeload

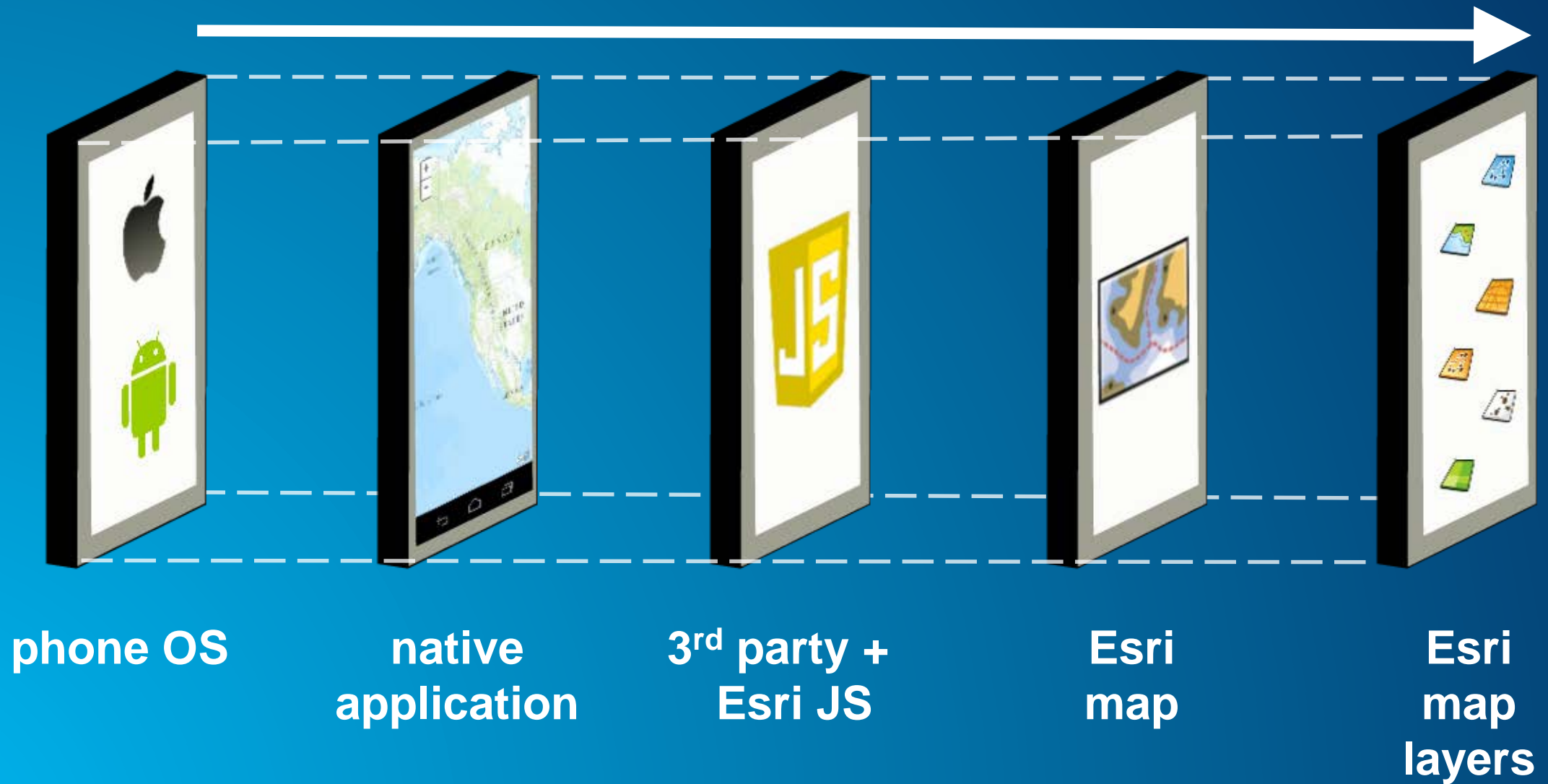
Triggered before any load request is made.

pagebeforeshow

Triggered on the "toPage" we are transitioning to, before the actual transition animation is kicked off.



Application lifecycle

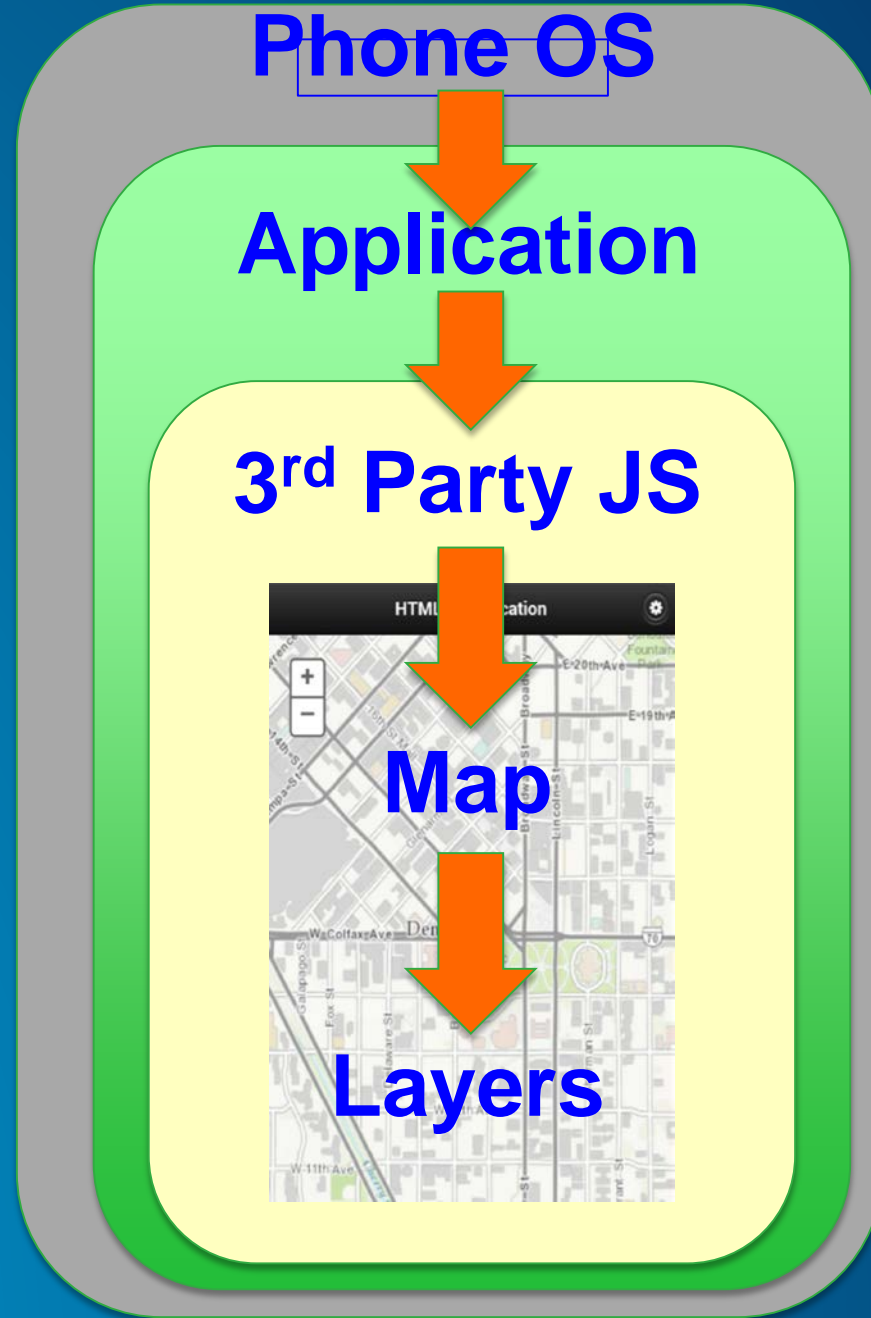


Demonstration

jQuery mobile lifecycle

Lloyd Heberlie

LifeCycle





jQuery and ArcGIS API for JavaScript

Andy Gup

Jquery Mobile + ArcGIS

Page-based approach versus responsive

Single page map app

Multiple page map app

<https://github.com/Esri/quickstart-map-phonegap>

<https://github.com/Esri/jquery-mobile-map-js>

Single Page view

Page Structure

Apply CSS, roles and themes

Viewport meta tag

```
<meta name="viewport" content="width=device-width, user-scalable=no"/>
```


Single Page Map - HTML

```
<div data-role="page" id="home">
//Header
  <div data-theme="a" data-role="header"
    data-position="fixed">
    <h3>HTML5 Geolocation</h3>
  </div>
//Map
  <div data-role="content">
    <div id="mapDiv"></div>
  </div>
</div>
```

Single Page Map - HTML

```
<div data-role="page" id="home">  
  //Header  
  <div data-theme="a" data-role="header"  
    data-position="fixed">  
    <h3>HTML5 Geolocation</h3>  
  </div>  
  
  //Map  
  <div data-role="content">  
    <div id="mapDiv"></div>  
  </div>  
</div>
```

Single Page Map - HTML

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<div data-role="page" id="home">
  //Header
  <div data-theme="a" data-role="header"
    data-position="fixed">
    <h3>HTML5 Geolocation</h3>
  </div>
  //Map
  <div data-role="content">
    <div id="mapDiv"></div>
  </div>
</div>
```

Single Page Map - CSS

```
<style type="text/css">
  html,body, div[data-role ="page"] {
    height: 100%;
    width: 100%;
    margin: 0px;
    padding: 0px;
    overflow: hidden !important;
    font-size: 20px;
  }
  .ui-header{
    margin: 0px !important;
    padding: 0px !important;
    float: left;
  }
  .ui-title{
    margin: 1% !important;
  }
  .ui-content{
    height: 100%;
    width: 100%;
    margin: 0px;
    padding: 0px;
  }
  #mapDiv {
    position: absolute;
    background-color: #EEEEDD;
    height: 90%;
    width: 100%;
    padding: 0px;
    z-index: 0;
    left: 0px;
  }
}
</style>
```

Demonstration

Single page app

Andy Gup

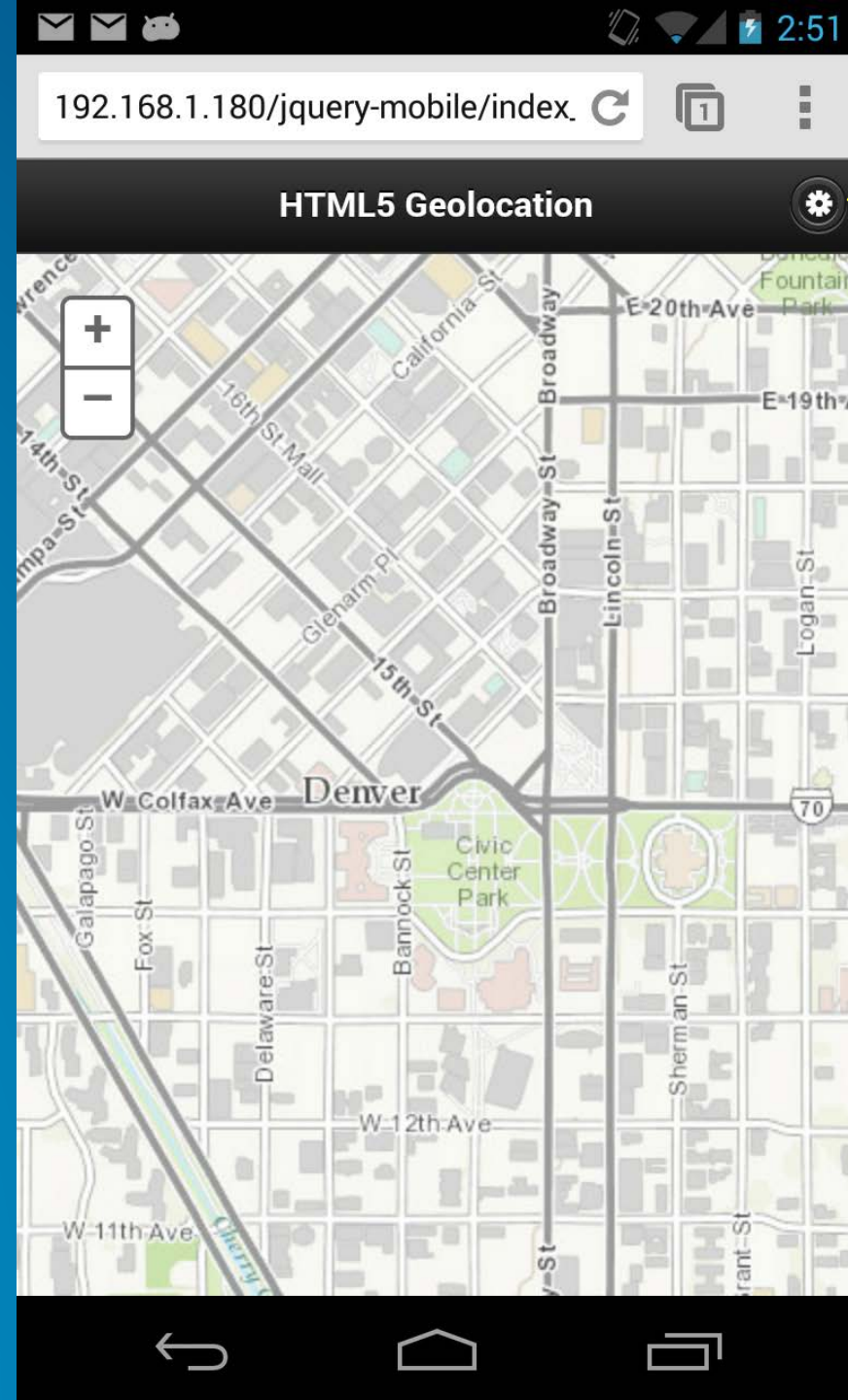
Multi Page View

Set up additional pages

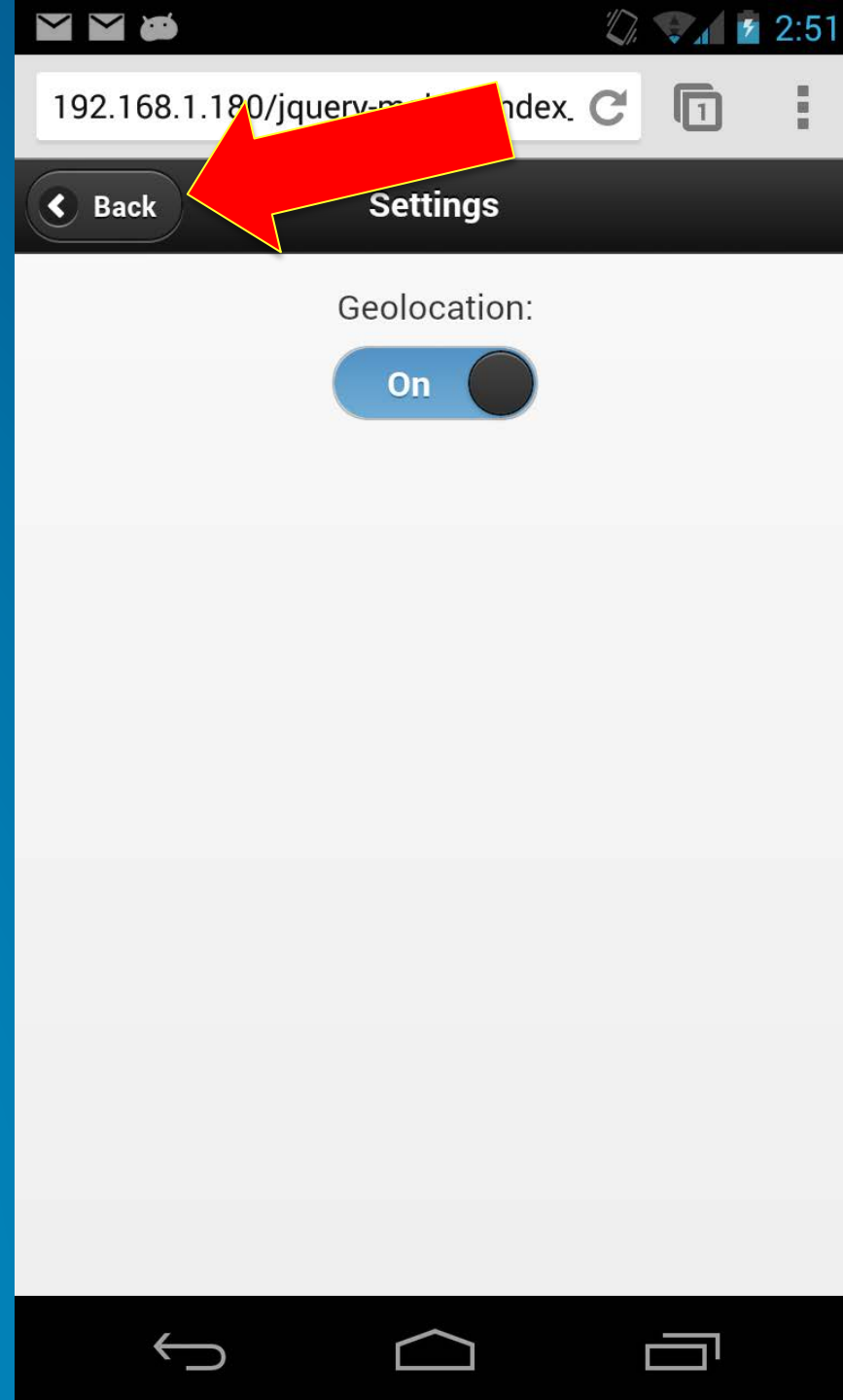
Set up page navigation

Additional CSS

Multi Page View



Multi Page View



Multi Page app – Page 2 HTML

```
<div data-role="page" id="settings" data-icon="home">
//Our Header
<div data-theme="a" data-role="header"
  data-position="fixed">
  <h1>Settings</h1>
</div>

//Page Content
<div data-role="content">
  <div class="settings" style="margin-top: 15px;">
    <div>Geolocation:</div>
    <select name="slider" id="slider-geo-on-off"
      data-role="slider" data-theme="a">
      <option value="off">Off</option>
      <option value="on" selected>On</option>
    </select>
  </div>
</div>
</div>
```

Multi Page app – Page 2 HTML

```
<div data-role="page" id="settings" data-icon="home">
//Our Header
<div data-theme="a" data-role="header"
  data-position="fixed">
  <h1>Settings</h1>
</div>

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<div data-role="content">
  <div class="settings" style="margin-top: 15px;">
    <div>Geolocation:</div>
    <select name="slider" id="slider-geo-on-off"
      data-role="slider" data-theme="a">
      <option value="off">Off</option>
      <option value="on" selected>On</option>
    </select>
  </div>
</div>
</div>
```


Multi Page app – Page 2 HTML

```
<div data-role="page" id="settings" data-icon="home">
//Our Header
<div data-theme="a" data-role="header"
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  <h1>Settings</h1>
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  <div class="settings" style="margin-top: 15px;">
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      <option value="off">Off</option>
      <option value="on" selected>On</option>
    </select>
  </div>
</div>
</div>
```

Multi Page app – Page 2 HTML

```
<div data-role="page" id="settings" data-icon="home">
//Our Header
<div data-theme="a" data-role="header"
  data-position="fixed">
  <h1>Settings</h1>
</div>

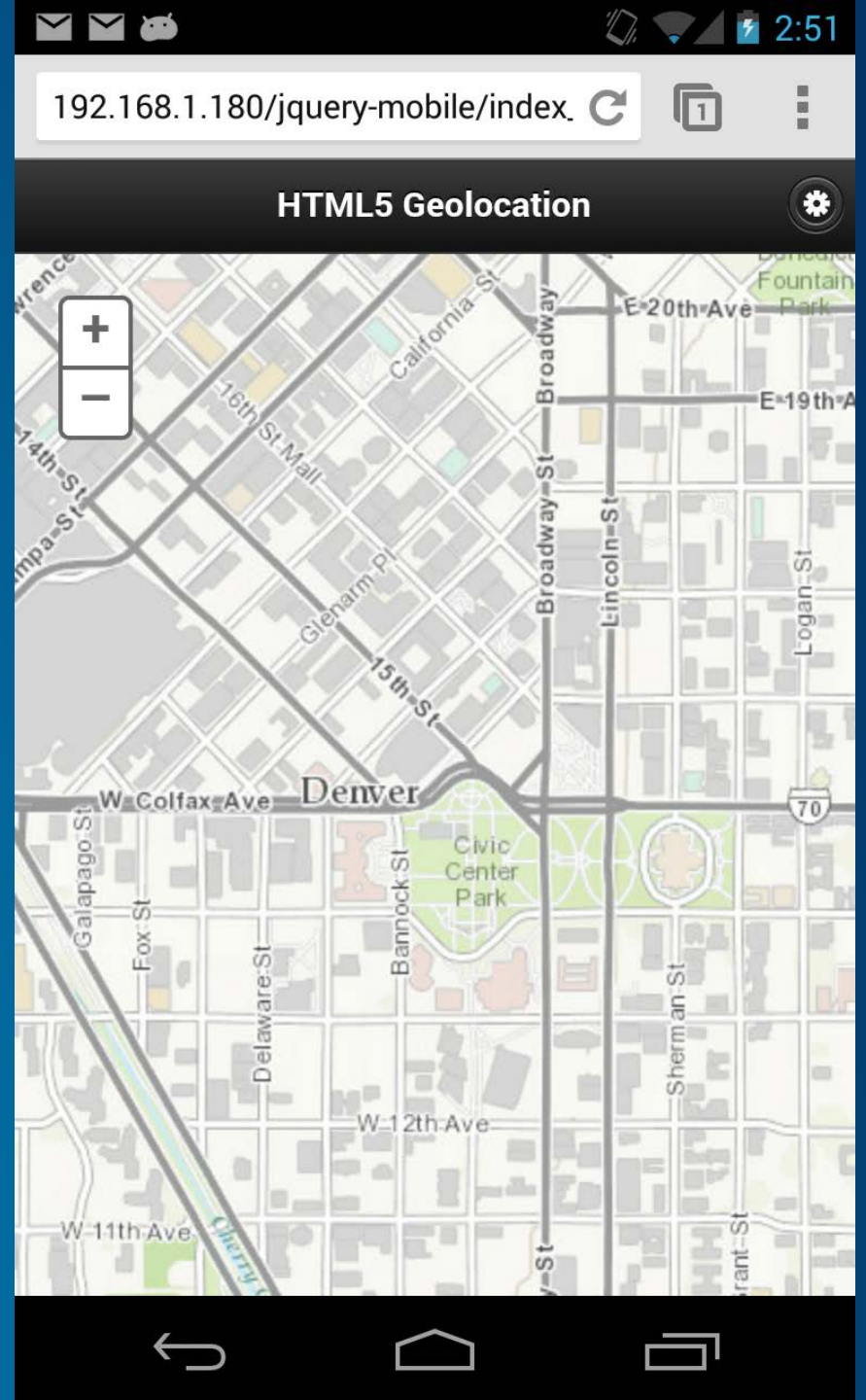
//Page Content
<div data-role="content">
  <div class="settings" style="margin-top: 15px;">
    <div>Geolocation:</div>
    <select name="slider" id="slider-geo-on-off"
      data-role="slider" data-theme="a">
      <option value="off">Off</option>
      <option value="on" selected>On</option>
    </select>
  </div>
</div>
</div>
```

Multi Page app – Page 2 CSS

```
<style type="text/css">
  /* Class for aligning buttons */
  .settings{
    margin-left: auto;
    margin-right: auto;
    text-align: center;
    width: 100%;
  }
</style>
```

Multi-page map app

Andy Gup



Page Transitions & Orientation Change

- Page and Orientation life cycle
- Map destruction and resizing

Use jQueryHelper.js!

<https://github.com/Esri/quickstart-map-phonegap>

<https://github.com/Esri/jquery-mobile-map-js>

Page Transitions

Page 1



~250 ms

Page 2



Events: leaving page

pagebeforechange

pagechange

pagechangefailed

<http://api.jquerymobile.com/category/events/>

Events: entering page

pagebeforeshow

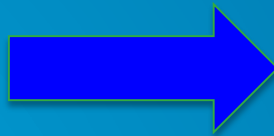
pageshow

pagechangefailed

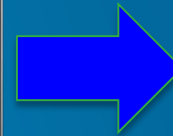
<http://api.jquerymobile.com/category/events/>

Page Transitions & Orientation Change

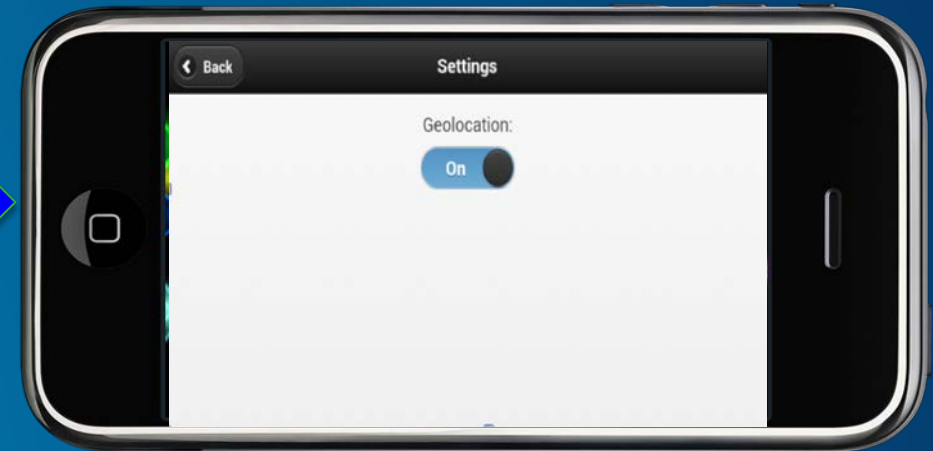
Page 1



Page 2



Page 2

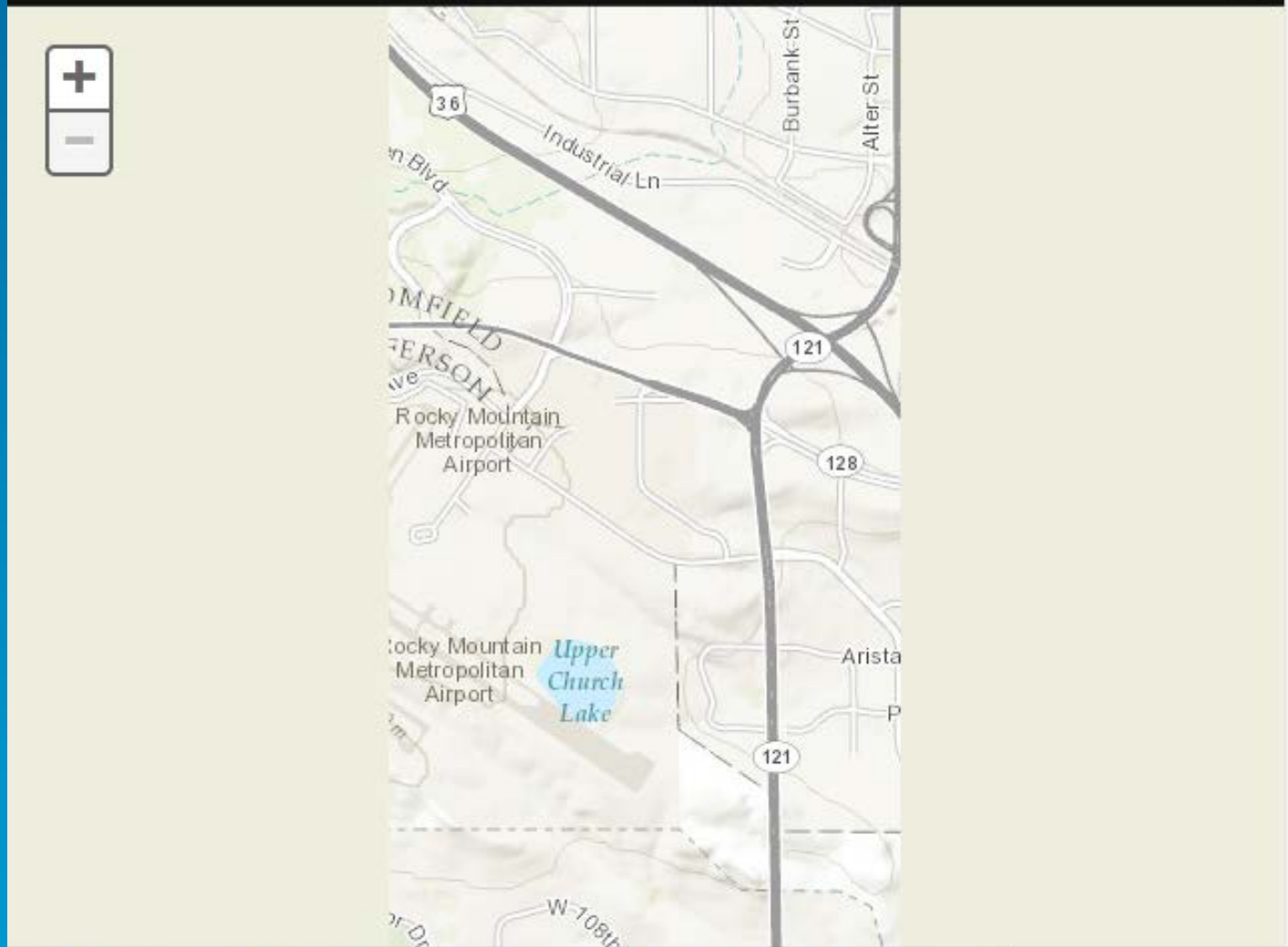


The following won't work in all use cases:

```
map.reposition();
```

```
map.resize();
```


HTML5 Geolocation



× Elements Resources Network Sources Timeline Profiles Audits Console

✖ XMLHttpRequest cannot load http://services.arcgisonline.com/ArcGIS/rest/info?f=json. Origin
▶ Resource interpreted as Script but transferred with MIME type text/plain: "http://service
f=json&callback=dojo.io.script1.jsonp dojoIoScript1. jsonpCallback".

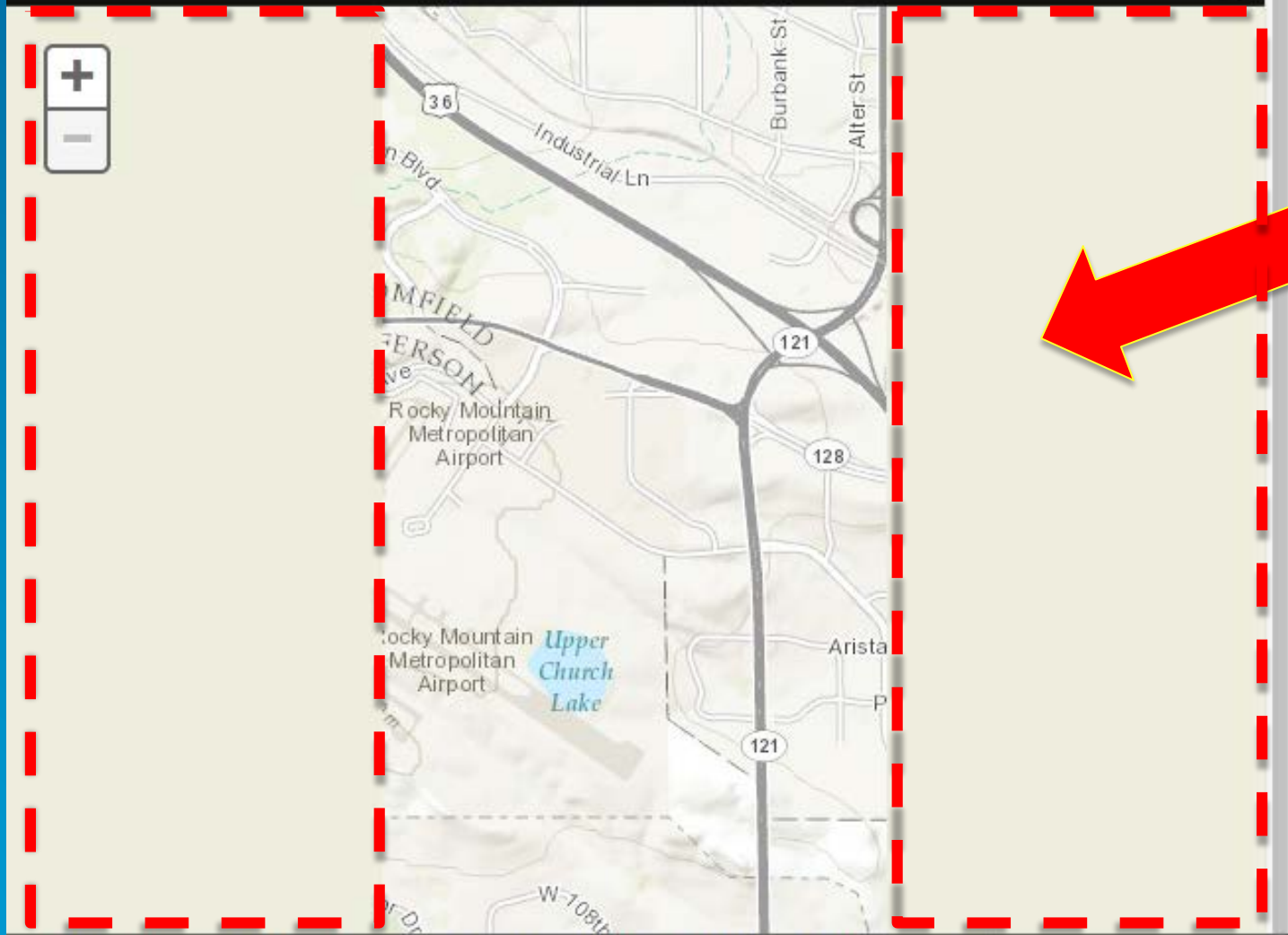
2 home showing

✖ ▶ Error: Invalid value for <image> attribute x="NaN"

✖ ▶ Error: Invalid value for <image> attribute y="NaN"

>

HTML5 Geolocation

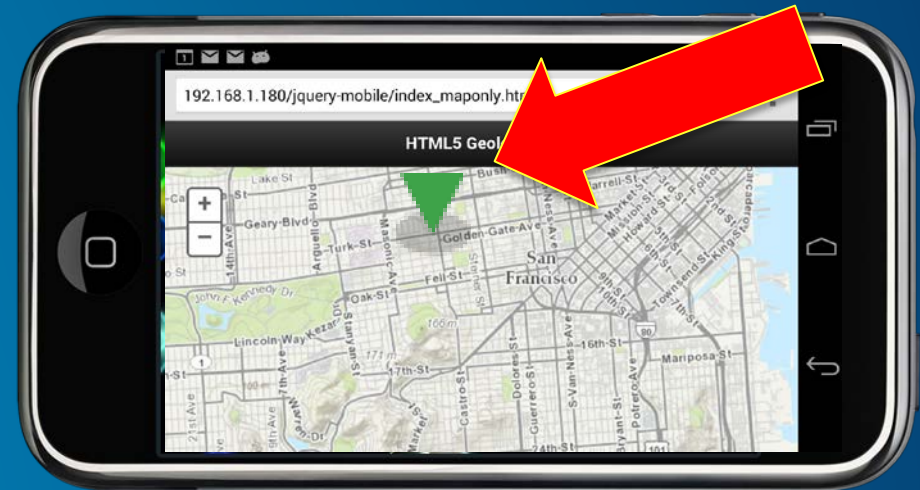
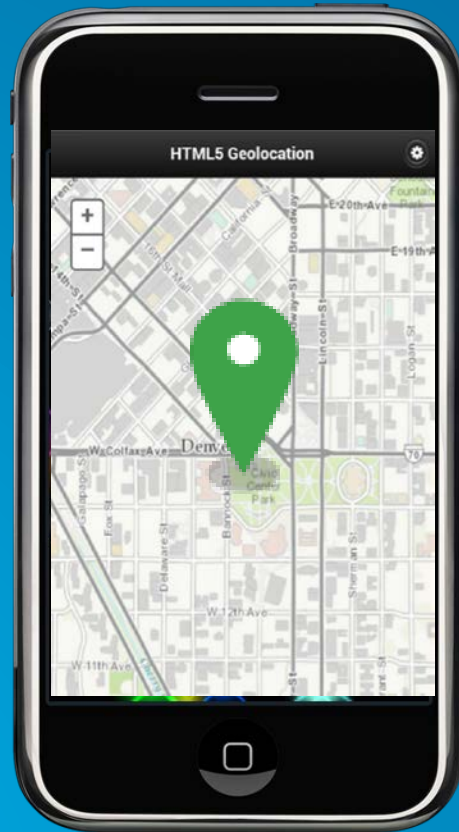


× Elements Resources Network Sources Timeline Profiles Audits Console

```
× XMLHttpRequest cannot load http://services.arcgisonline.com/ArcGIS/rest/info?f=json. Origin
  ▶ Resource interpreted as Script but transferred with MIME type text/plain: "http://service
  f=json&callback=dojo.io.script.jsonp dojoIoScript1. jsonpCallback".

2 home showing
× ▶ Error: Invalid value for <image> attribute x="NaN"
× ▶ Error: Invalid value for <image> attribute y="NaN"
>
```

Use Case - Recenter the map



jQuery Helper library

Page rotation – landscape/portrait

Auto-recentering

Multiple views

```
var helper = new jQueryHelper(map);
```

<https://github.com/Esri/jquery-mobile-map-js>

<https://github.com/Esri/quickstart-map-phonegap>

Auto-recenter after orientation change

```
helper = new jQueryHelper(map);
```

```
helper.setCenterPt(latitude, longitude, 4326);  
helper.setZoom(9);
```


Multiple page app – **Map** Life Cycle

Listen for “helper-map-loaded” event

```
//Custom event from jQueryHelper
$(document).on("helper-map-loaded",function(evt){
    map = helper.map;

    if(geoEnabled == true) {
        startGeolocation();
    }
});
```




Putting it all together

PhoneGap + jQuery + ArcGIS

Andy Gup

Demonstration

Quickstart-map-phonegap

Andy Gup

JavaScript API Web Optimizer

<http://jso.arcgis.com>

Creates a single file

CDN hosted or download

Custom modules

Optimizer session – Thurs 10am, Primrose B!

- Optimizing your JavaScript app performance

ArcGIS Web Optimizer

Andy Gup

jso.arcgis.com

ArcGIS API for JavaScript Web Optimizer

MY BUILDS

HELP

My Builds

arcgis_js

Created: 3/4/15

arcgis_optimized

Created: 3/4/15

Going Offline with JavaScript

Mobile web map used in areas of intermittent or no internet

Ability to reload or restart web map in areas of intermittent or no internet

Lightweight cross-browser functionality

[Github.com/esri/Offline-editor-js](https://github.com/esri/Offline-editor-js) (Experimental)

Want a full feature, robust offline solution?

ArcGIS Runtimes for iOS, Android, Qt and .NET!

Includes integrated support for offline editing and synchronization.

Offline routing!

Fully supports related tables, sub-types, domains and much more.

What does offline JavaScript mean?

Take map tiles offline

Storing/syncing feature edits

Limited storing/syncing attachments

View TPKs

These work in browser and with PhoneGap!

What does offline JavaScript mean?

How much storage?

- **Limited by the browser!**
- **Depends on device**
- **How many browser tabs open**
- **~100MB to 500MB**

Runtimes can store much more data!

Offline Demos


JS Offline Mapping esri

Min Zoom Level (farthest from ground)
18

Current Zoom Level
15

Max Zoom Level (closer to ground)
19

Level	Tile Count	Size Mb (aprox.)
18	360	16.17 Mb
19	1363	61.21 Mb
Total	1723	77.37 Mb



POWERED BY esri

Prepare for Offline Delete All Tiles Go Offline Usage: 0 Mb (0 tiles) Show Stored Tiles Save to File Load from File

1. Navigate to your area of interest
2. Click 'Prepare for Offline' button
3. Go Offline and enjoy!

Working with GPS

Exact same Geolocation API

Same coding pattern!

May require geolocation plugin

\$ plugman search geolocation

```
bash-3.2$ plugman search geolocation
com.cowbell.cordova.geofence - Geofence plugin
com.google.google-play-services -
    Google play service Plugin of Admob ,base on admob ios sdk 6.10 and android google pla
y service sdk 4.5 ,support ios and android,support all admob banner and Interstitial
    project home:https://github.com/googleadmob/admob-phonegap

com.infobip.push.cordova - Infobip Push Notification Plugin for Android and iOS
com.romainstroock.cordova.background-geolocation - Cordova Background GeoLocation Plugin
com.vitorventurin.gps - Cordova GPS plugin - iOS CoreLocation LocationService / Android Loc
ationService GPS
fr.louisbl.cordova.gpslocation - Android geolocation plugin using GPS provider
fr.louisbl.cordova.locationservices - Android geolocation plugin using Google Play Services
    Location API.
org.apache.cordova.geolocation - Cordova Geolocation Plugin
org.transistorsoft.cordova.background-geolocation - Cordova Background GeoLocation Plugin
```

Does it use device GPS

Yes!! ...but it depends.

If GPS is enabled

May also use WiFi and cell triangulation

Working with GPS

```
var mapLoaded = false;
navigator.geolocation.watchPosition(
    locationSuccess,
    locationError,
    {setHighAccuracy:true}
);

map.on("load",function(evt){
    mapLoaded = true;
});

function locationSuccess(evt){
    if(mapLoaded){ . . . }
}
```

Recap!

Install Cordova command line

Use jQuery Mobile for AppStore/Google Play

On [github.com/esri](https://github.com/esri/PhoneGap) > PhoneGap & jQuery

Works with Geolocation

Limited offline tiles and feature support

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Questions?

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Understanding our world.