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
- ArcGIS Runtime SDK for iOS
Hello Cordova and Resources

Lloyd Heberlie
Enable Safari remote web inspection

1. Go to Settings.
2. Tap on Safari.
3. Tap Advanced.
4. Tap Website Data.
5. Tap JavaScript.

To use the Web Inspector, connect to Safari on your computer using a cable and access your iPhone from the Develop menu. You can enable the Develop menu in Safari's Advanced Preferences on your computer.
What is PhoneGap?

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

PhoneGap Plugins

PhoneGap

Application Code

Native App
PhoneGap Plugins
PhoneGap Plugin options
Setup a developer machine

- Source Control
- Code quality and verification
Preparing for PhoneGap
Installing PhoneGap and Apache Cordova

```bash
$ npm install -g cordova
$ npm install -g phonegap
```
Check versions of PhoneGap and Apache Cordova

```bash
heb:~ lheberlie$ cordova -v
3.4.0-0.1.0
heb:~ lheberlie$ phonegap -v
3.3.0-0.19.4
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

```
phonegap create path/to/my-app "com.example.app" "My App"
```
Hello Cordova (cont.)

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Featured Apps: Tripcase, Untappd
Agenda

• Getting to know PhoneGap
• jQuery and jQuery mobile overview
• jQuery and ArcGIS API for JavaScript
• Putting it all together
• Additional information
Theme roller
### Listview
OL or UL with `data-role=listview`

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>data-autodividers</td>
<td>true</td>
</tr>
<tr>
<td>data-count-theme</td>
<td>swatch letter (a-z)</td>
</tr>
<tr>
<td>data-divider-theme</td>
<td>swatch letter (a-z)</td>
</tr>
<tr>
<td>data-filter</td>
<td>true</td>
</tr>
<tr>
<td>data-filter-placeholder</td>
<td>string</td>
</tr>
<tr>
<td>data-filter-theme</td>
<td>swatch letter (a-z)</td>
</tr>
<tr>
<td>data-header-theme</td>
<td>swatch letter (a-z)</td>
</tr>
<tr>
<td>data-icon</td>
<td>home</td>
</tr>
<tr>
<td>data-inset</td>
<td>true</td>
</tr>
</tbody>
</table>

```html
<div id="page-main" data-role="page">
    <div data-role="header" data-position="fixed">
        <h1>Feature Detection</h1>
    </div>
    <div data-role="content">
        <ul id="featureDetectionListView" data-role="listview">
            <!-- This content is auto generated -->
        </ul>
    </div>
</div>
```
Selections and filtering

```javascript
$("document").ready(function() {
    $('p:last').css('border', '3px solid red');
    $('.a').css('border', '3px solid green');
    $('#list1').css('border', '3px solid yellow');
    $('p.b').css('border', '3px solid orange');
});
```

`<ul id="list1">
    <li class="a">item 1</li>
    <li class="a">item 2</li>
    <li class="b">item 3</li>
    <li class="b">item 4</li>
</ul>`

`<p class="a">This is paragraph 1</p>`

`<p class="b">This is paragraph 3</p>`

`<p>This is paragraph 4</p>`
Events

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

<ul id="featureDetectionListView" data-role="listview"

```html
  <!-- This content is auto generated --&gt;
  &lt;li id="mApplicationCache" class="ui-first-child"&gt;...&lt;/li&gt;
  &lt;li id="mAudio"&gt;...&lt;/li&gt;
  &lt;li id="mCanvas"&gt;...&lt;/li&gt;
  &lt;li id="mCanvasText"&gt;...&lt;/li&gt;
  &lt;li id="mGeolocation"&gt;
      &lt;a href="#page-feature-details" class="ui-btn ui-btn-right ui-icon-carat-r"&gt;
          &lt;h3&gt;Geolocation&lt;/h3&gt;
          &lt;p&gt;Detect Geolocation support using Modernizr&lt;/p&gt;
      &lt;/a&gt;
  &lt;/li&gt;
</ul>```
```javascript
$.each(featuresArr, function (key, val) {
    featureDetectionDict[val.id] = val;
    var pageData = val;
    var end = featuresArr.length - 1;
    var htmlString = "";
    switch (key) {
        case 0:
            htmlString = "<li id="" + pageData.id + ">"
            break;
        case end:
            htmlString = "<li id="" + pageData.id + ">
            break;
        default:
            htmlString = "<li id="" + pageData.id + ">
            break;
    }
    htmlString = "<li id="" + pageData.id + ">
    featureItemsArr.push($htmlString);
});
$("#featureDetectionListView").append(featureItemsArr);
```
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

phone OS

native application

3rd party + Esri JS

Esri map

Esri map layers
jQuery mobile lifecycle
Lloyd Heberlie
LifeCycle

Phone OS

Application

3rd Party JS

Map

Layers
jQuery and ArcGIS API for JavaScript

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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"/>
```
<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
Single page app

Andy Gup
Multi Page View

Set up additional pages

Set up page navigation

Additional CSS
Multi Page View
<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>
<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

```html
<br>Our Header<br>
```

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

```html
//Page Content
<esi data-role="content">
  <esi class="settings" style="margin-top: 15px;">
    Geolocation:
  </esi>
  <esi name="slider" id="slider-geo-on-off"
    data-role="slider" data-theme="a">
    <esi>Off</esi>
    <esi value="on" selected>On</esi>
  </esi>
</esi>
```
Multi Page app – Page 2 HTML

```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>
```
<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

Page 2

~250 ms
**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:

```java
map.reposition();
map.resize();
```
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

```javascript
helper = new jQueryHelper(map);
helper.setCenterPt(latitude, longitude, 4326);
helper.setZoom(9);
```
Multiple page app – **Map** Life Cycle

Listen for “helper-map-loaded” event

```javascript
//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
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

ArcGIS API for JavaScript Web Optimizer

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

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 play service sdk 4.5, support ios and android, support all admob banner and Interstitial project home:https://github.com/google/admob/admob-phonegap
com.infobip.push.cordova - Infobip Push Notification Plugin for Android and iOS
com.romainstrock.cordova.background-geolocation - Cordova Background GeoLocation Plugin
com.vitorventurin.gps - Cordova GPS plugin - iOS CoreLocation LocationService / Android LocationService 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

```javascript
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 > PhoneGap & jQuery
Works with Geolocation
Limited offline tiles and feature support
Questions?

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Understanding our world.