

Esri Developer Summit

March 8–11, 2016 | Palm Springs, CA



ArcGIS API for JavaScript Building Mobile Web Apps

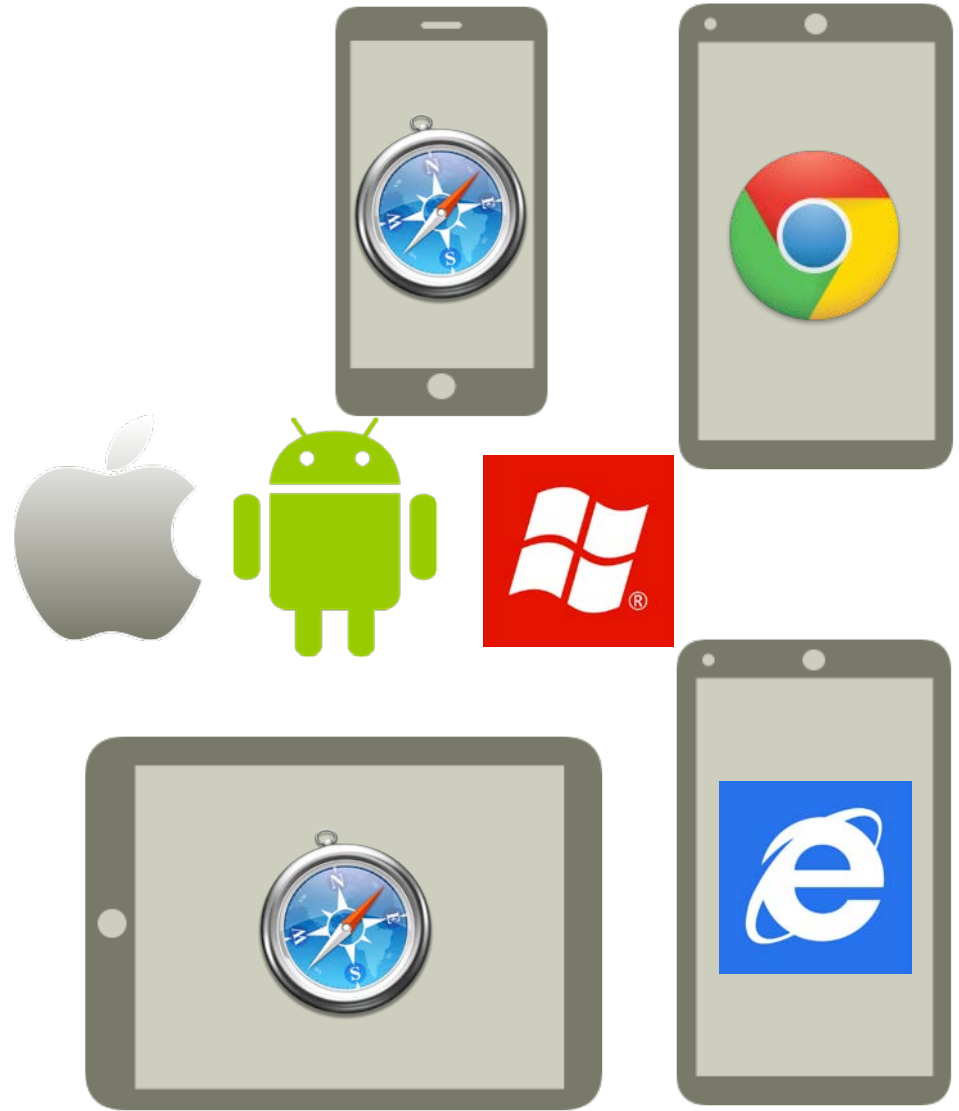
Andy Gup, @agup

Lloyd Heberlie, @lheberlie

Welcome

- Introductions
- Expectations
- Agenda
- [Resources](#)

Why are we here?



Resources

- <https://github.com/lheberlie/mobile-webapps-js>
- <https://github.com/lheberlie/mobile-webapps-js/blob/develop/Resources.md>

Demonstration

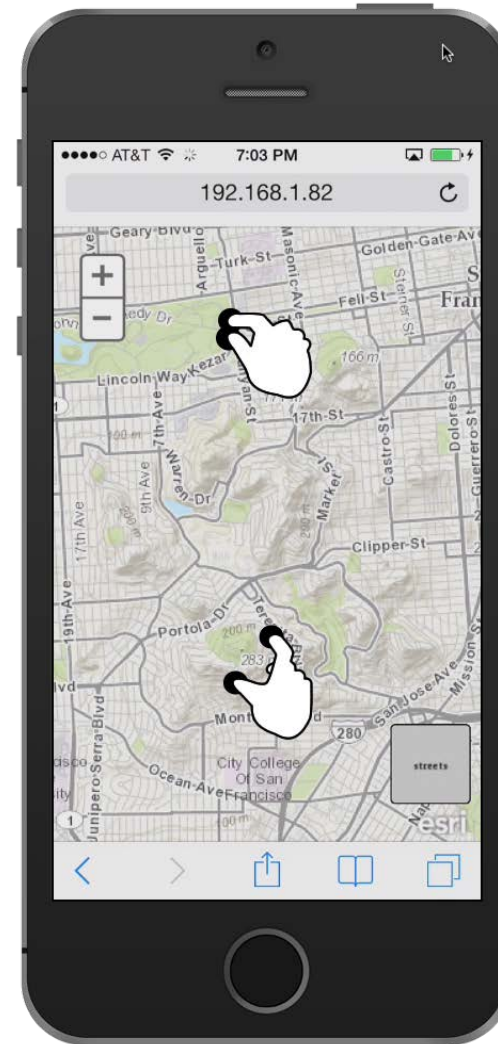
Mobile resources in the API

Lloyd Heberlie

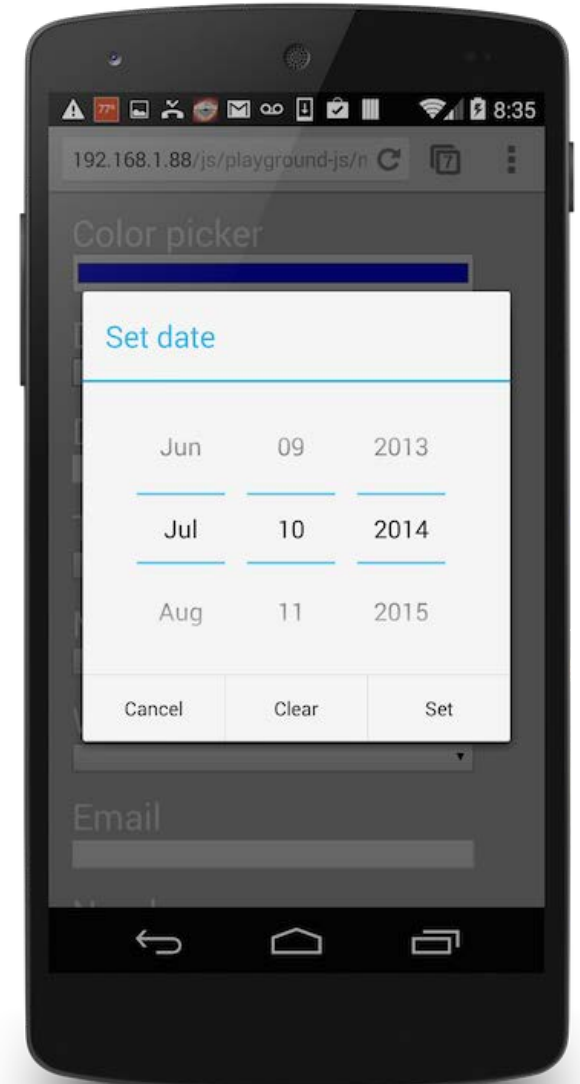
Designing for mobile

Lloyd Heberlie

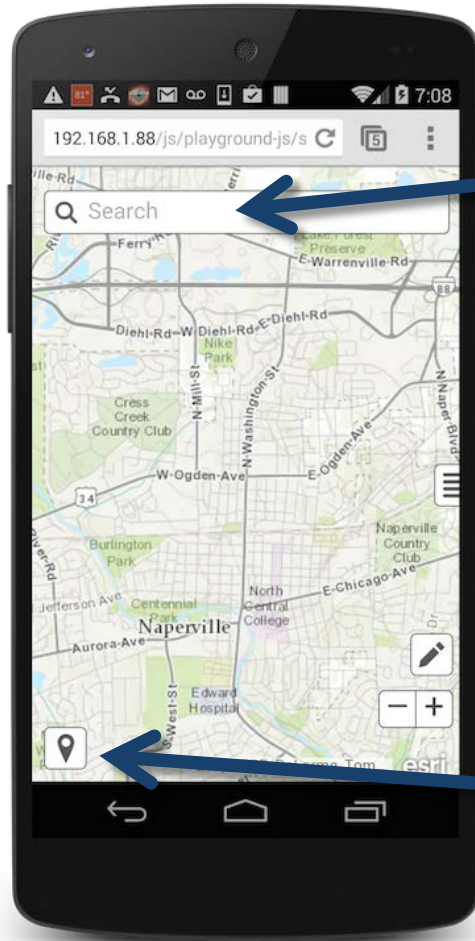
Touch aware map



HTML 5 input types



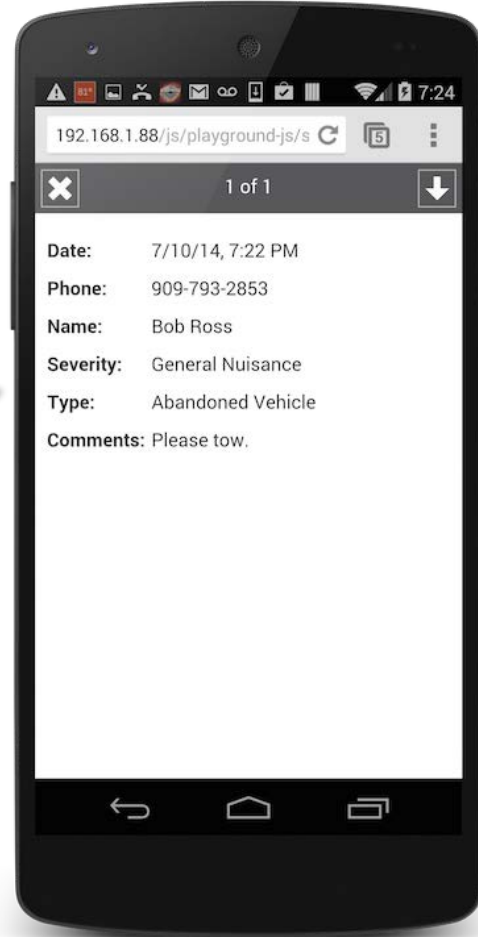
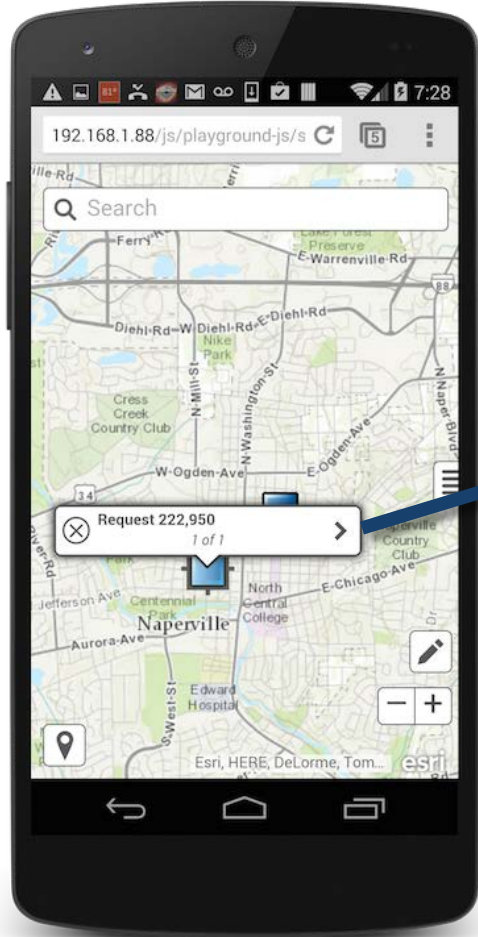
Geocoder, LocateButton



[esri/dijit/Geocoder](#)

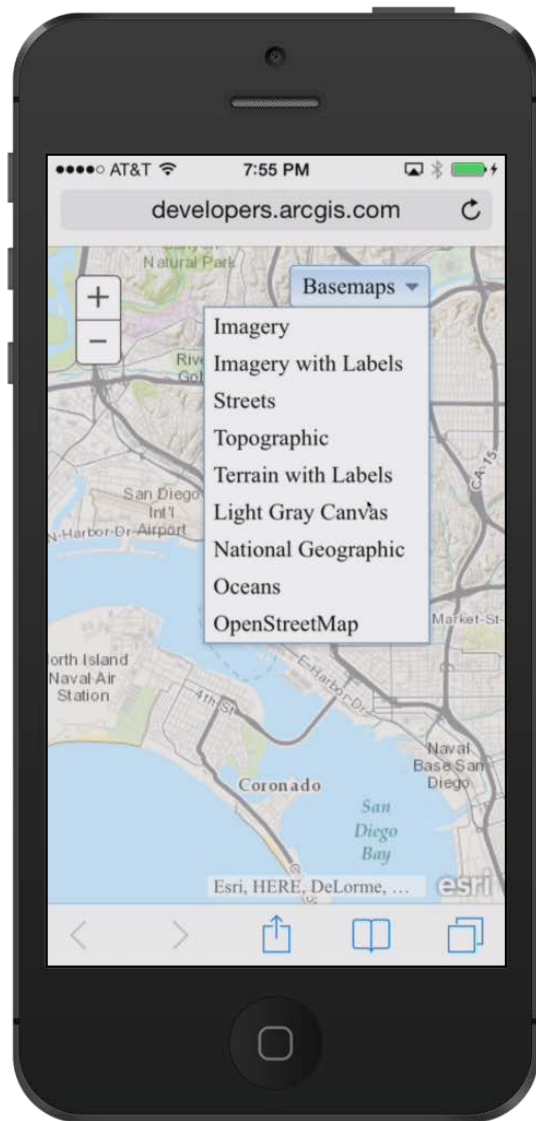
[esri/dijit/LocateButton](#)

Popup Mobile



esri/dijit/PopupMobile

Basemap Gallery



esri/dijit/BasemapGallery

ArcGIS API for JavaScript

Tutorials Concepts API Reference **Samples** Forum

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- Samples Overview
- > Latest Samples
- > Analytics
- > Directions and Routing
- > Dynamic Layers
- > Editing
- > Geocoding
- > Graphics
- > HTML5
- > Image Layers
- > Map
- > Maps from ArcGIS.com
- > Mobile

Toggle multiple ArcGIS Online services

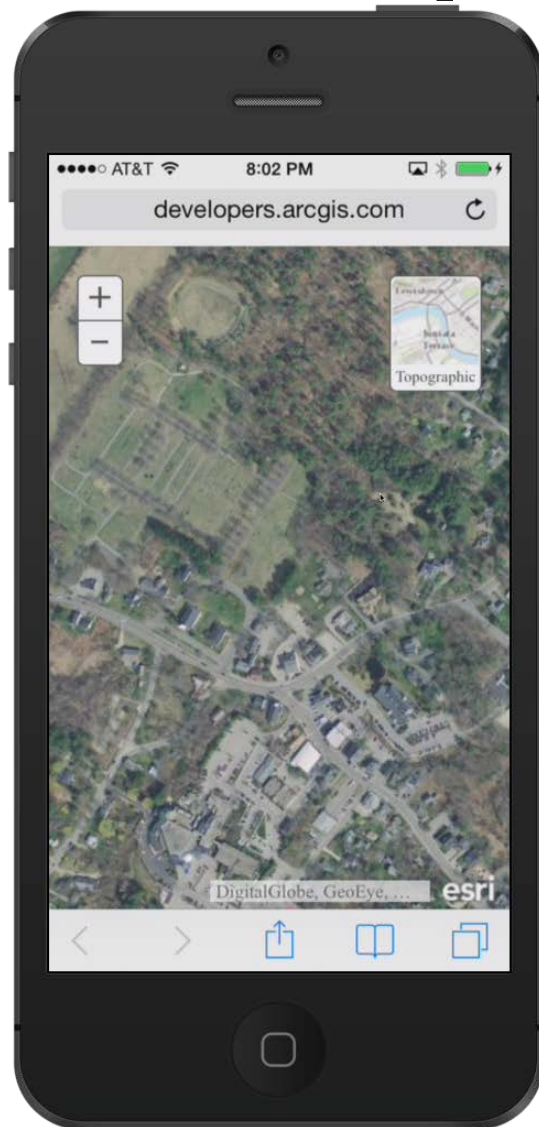
[View live sample](#)
[Download as a zip file](#)
[Explore in the sandbox](#)

Description

This sample shows how you can use buttons to switch between different layers in a map. All the layers in this map happen to be [ArcGISTiledMapServiceLayers](#) from ArcGIS Online. The BasemapGallery widget, introduced at version 2.1 of the ArcGIS JavaScript API simplifies the process of toggling the display of ArcGIS Online basemaps. In this sample a menu item is created for each basemap in the gallery. Since `showArcGISBasemaps` is set to true, the gallery contains basemaps from ArcGIS Online.

```
basemapGallery = new esri.dijit.BasemapGallery({
  showArcGISBasemaps: true,
  map: map
});
```

Basemap Toggle



esri/dijit/BasemapToggle

ArcGIS API for JavaScript

Tutorials

Concepts

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Samples

Forum

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- > Graphics
- > HTML5
- > Image Layers

Basemap Toggle

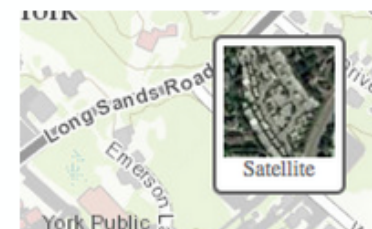
[View live sample](#)

[Download as a zip file](#)

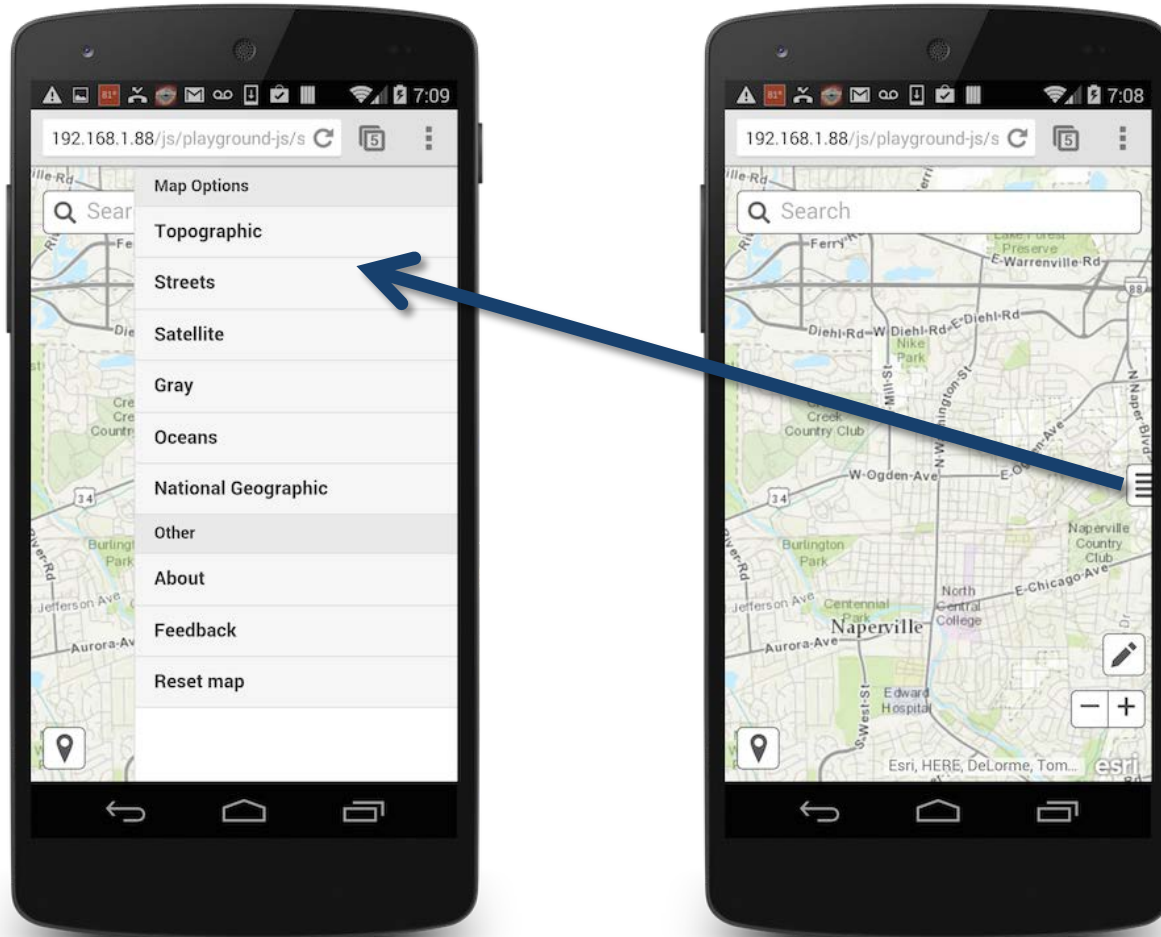
[Explore in the sandbox](#)

Description

Toggle between basemaps using the BasemapToggle widget. When creating the widget define a basemap that users will be able to switch to from the current basemap. Note: At version 3.7 the widget does not work with maps created from web maps using createMap.



Custom components



Custom basemap switcher

Demonstration

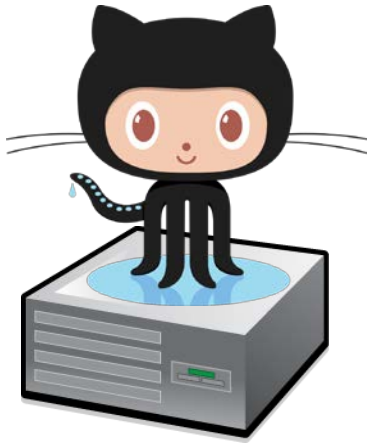
Designing for mobile

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Productivity and code management

Lloyd Heberlie

Setup a developer machine

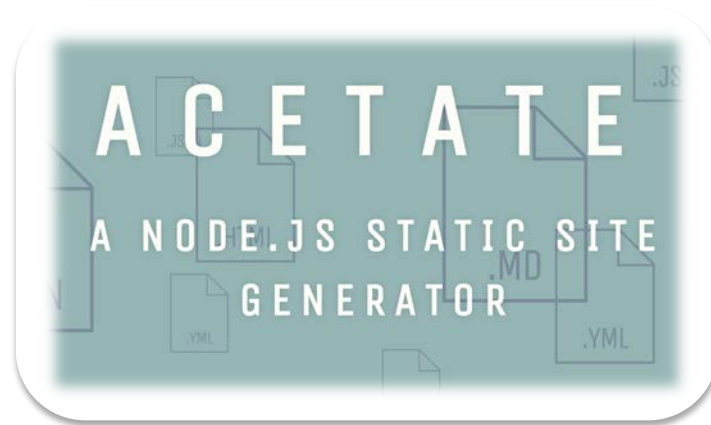


Code formatting and management

```
21 <style>
22   html, body {width: 100%;height: 100%;}
23
24   label {font-size: 1.5em;color: #ffffff;li
25
26   input {width: 80%;
27   }
28
29   input:invalid {color: #ff0000;
30   }
31
32   form {white-space: pre-wrap;
33   }
34
35 </style>
```

```
21 <style>
22   html, body {
23     width: 100%;
24     height: 100%;
25   }
26
27   label {
28     font-size: 1.5em;
29     color: #ffffff;
30     line-height: 1.0em;
31     vertical-align: middle;
32   }
33
34   input {
35     width: 80%;
36   }
37
38   input:invalid {
39     color: #ff0000;
40   }
41
42   form {
43     white-space: pre-wrap;
44   }
45
46 </style>
```

Automation and continuous integration



Code validation

- JSLint
- JSHint

```
101     cwd: "src/js",
102     src: ["app.js"],
103   },
104   { expand: true,
105     cwd: "bower_components",
106     src: ["images/**/*"],
107   },
108   { expand: true,
109     cwd: "src/styles",
110     src: ["images/**/*"],
111   }
112 }
113 }
114 }
115 }
116 , expected
117 //
118 concat: {
119   options: {
120     separator: "\n"
121   }
122   source_to_build: {
123     files: [
124       { src: [
125         "!src/**/app.js",
126         /*
```

CSS preprocessors



Demonstration

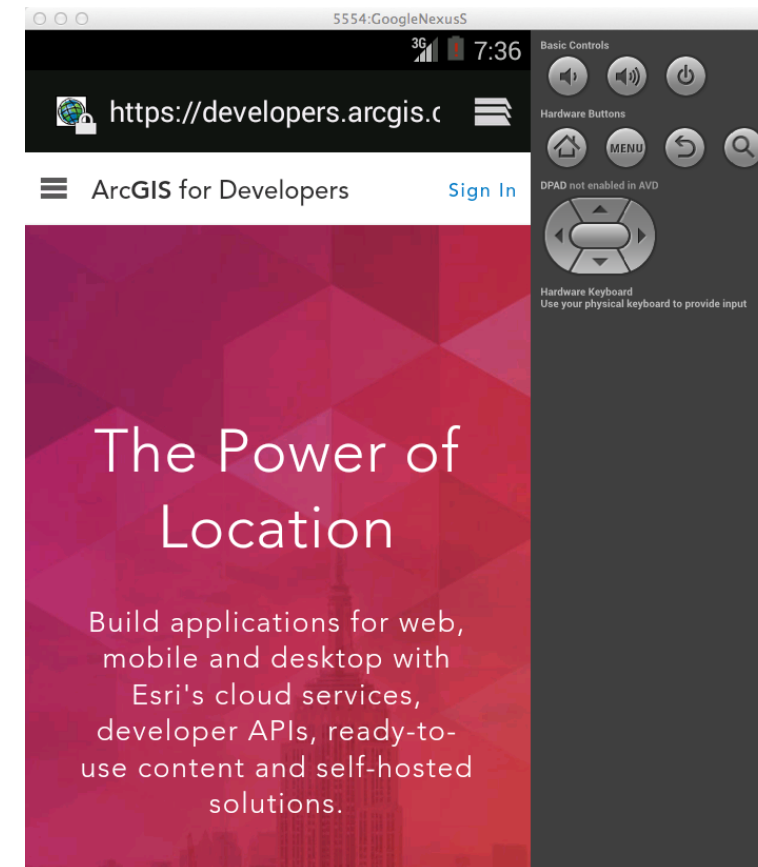
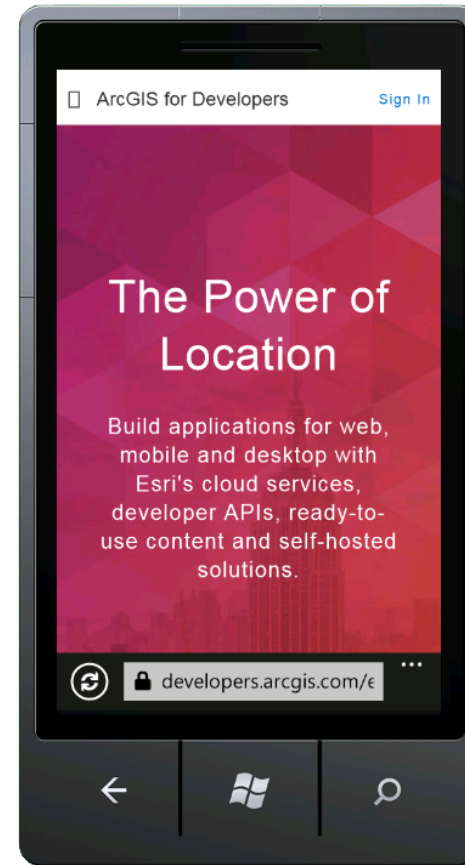
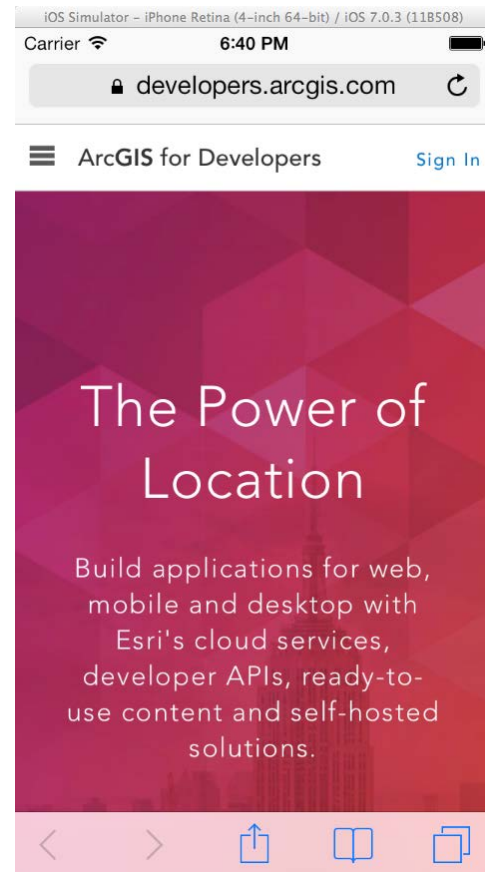
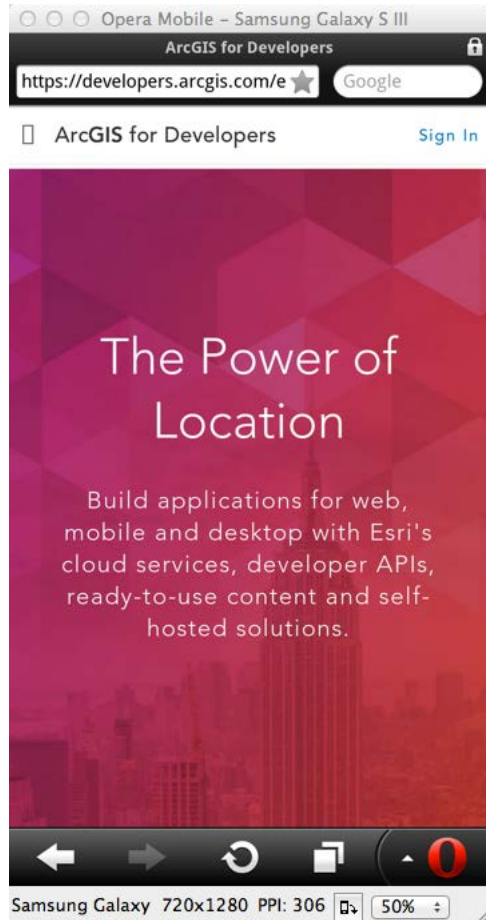
Productivity and code management

Lloyd Heberlie

Debugging and testing for mobile

Lloyd Heberlie

Emulators / Simulators



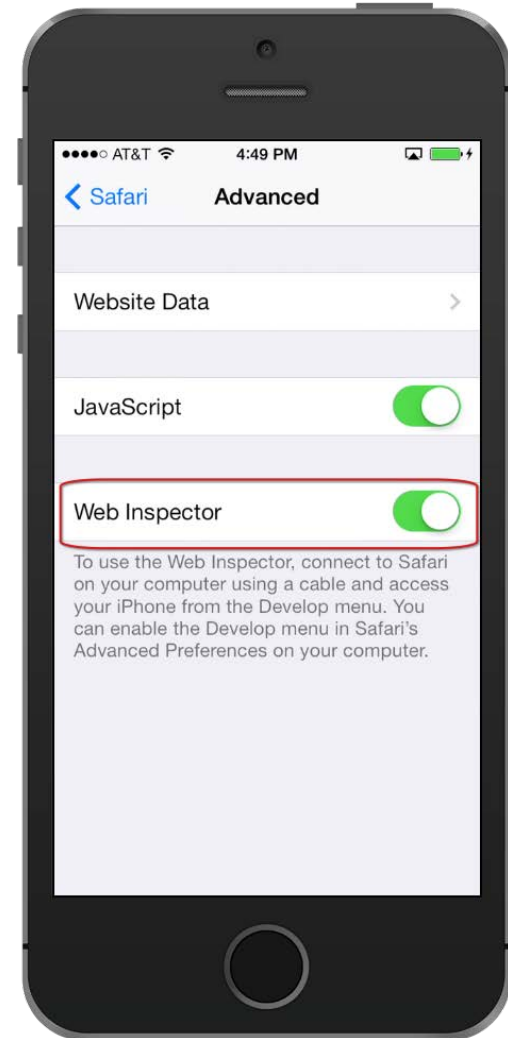
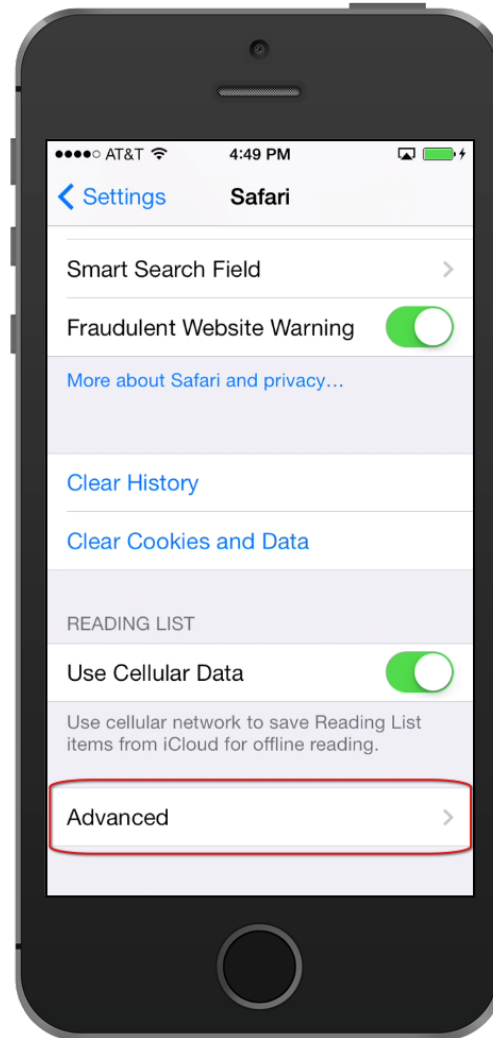
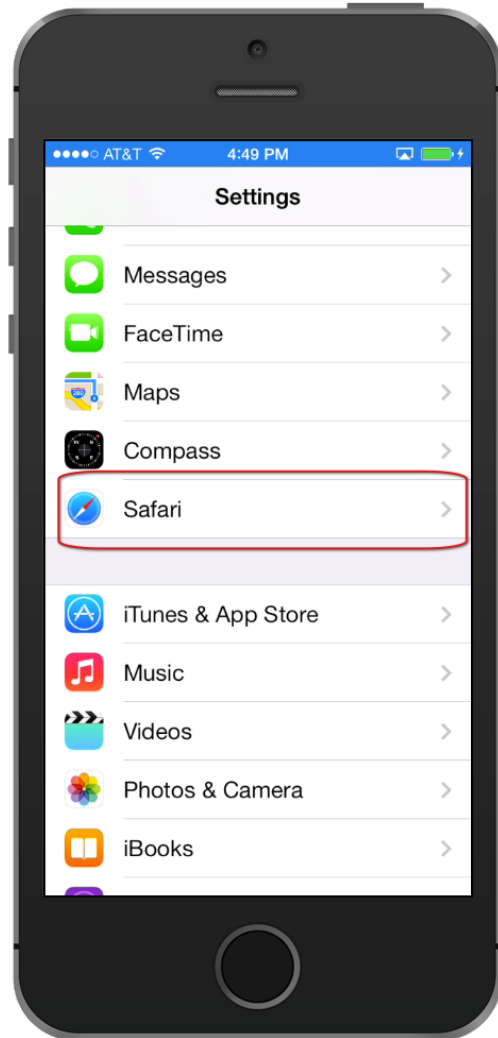
Physical devices



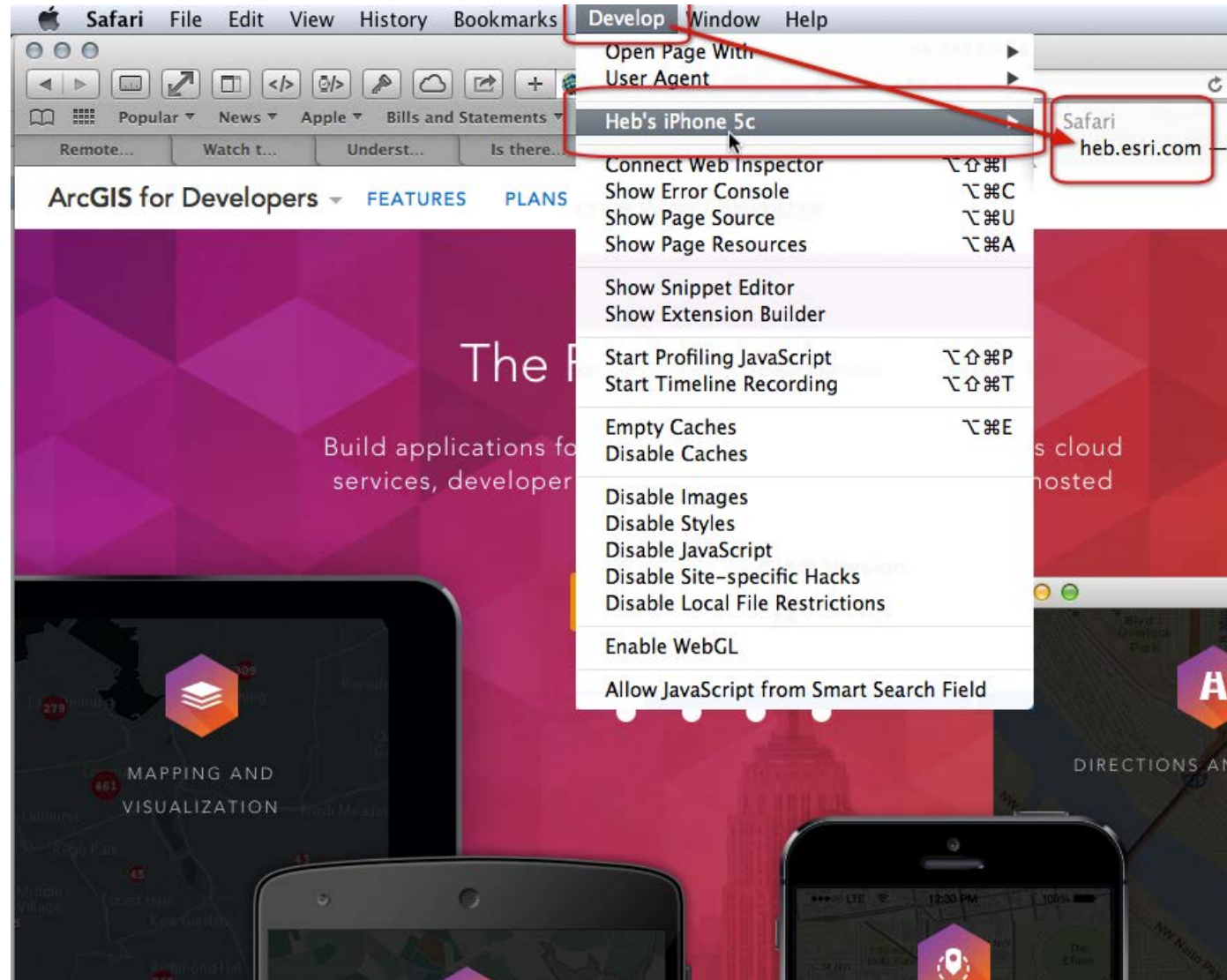
Remote debugging

- [Safari Web Inspector Remote](#)
- [Google Chrome remote debugging](#)
- [Adobe Edge Inspect](#)
 - Synchronized screen capture, device details
 - Node.js (weindre local)
- Web Inspector Remote (weindre)

Enable Safari remote web inspection



Safari remote debugging



Safari remote debugging

Web Inspector — Heb's iPhone 5c — Safari — 192.168.1.82 — imagerotator_start.htm

Resources Timelines Debugger

Call Stack

- rotatelImages — imagerotator_start...
- dispatch — jquery-2.1.0.min.js:3:5...
- handle — jquery-2.1.0.min.js:3:2766

Breakpoints

Source Code

```
1 <!DOCTYPE html PUBLIC
2 "https://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
3 <html xmlns="http://www.w3.org/1999/xhtml">
4 <head>
5   <meta name="viewport" content="initial-scale=1, maximum-scale=1, user-scalable=no">
6   <title>jQuery Image Rotator</title>
7   <link rel="stylesheet" type="text/css" href="http://js.arcgis.com/3.8/js/esri/css/esri.css"/>
8   <link rel="stylesheet" href="http://js.arcgis.com/3.8/dojo/dijit/themes/claro/claro.css">
9   <script src="//code.jquery.com/jquery-2.1.0.min.js"></script>
10  <script type="text/javascript" src="http://js.arcgis.com/3.8compact/"></script>
11  <script type="text/javascript">
12    $(function () {
13      /*
14       *
15       *
16       *
17       *
18       */
19      var map;
20      require(["esri/map", "dojo/domReady!"], function (Map) {
21        map = new Map("map", {
22          /* streets | satellite | hybrid | topo | gray | oceans | national-geographic | osm.
23           */
24          basemap: "topo",
25          center: [-122.45, 37.75], // long, lat
26          zoom: 13,
27          sliderStyle: "small"
28        });
29        // create the image rotator
30        $("#photoShow").click(rotateImages);
31        function rotateImages() {
32          var oCurPhoto = $("#photoShow div.current");
33          var _basemapName = $("#photoShow div.current img").data("basemapname");
34          map.setBasemap(_basemapName);
35          console.log("basemap: ", _basemapName);
36          var oNextPhoto = oCurPhoto.next();
37          console.log($("#div1").data("key1"));
38          if (oNextPhoto.length == 0)
39            oNextPhoto = $("#photoShow div:first");
40          oCurPhoto.removeClass('current').addClass('previous');
41          oNextPhoto.css({ opacity: 0.0 }).addClass('current').animate({ opacity: 1.0 }, 1000,
42            function () {
43              oCurPhoto.removeClass('previous');
44            });
45        }
46      };
47    }
48  </script>
49  <style type="text/css">
50    html, body, #map {
51      height: 100%;
52      width: 100%;
53    }
54  </style>
55  </html>
56  </script>
```

Local Variables

- _basemapName: "streets"
- arguments: Arguments[1]
- oCurPhoto: Object [1]
- oNextPhoto: undefined
- this: div#photoShow

Closure Variables

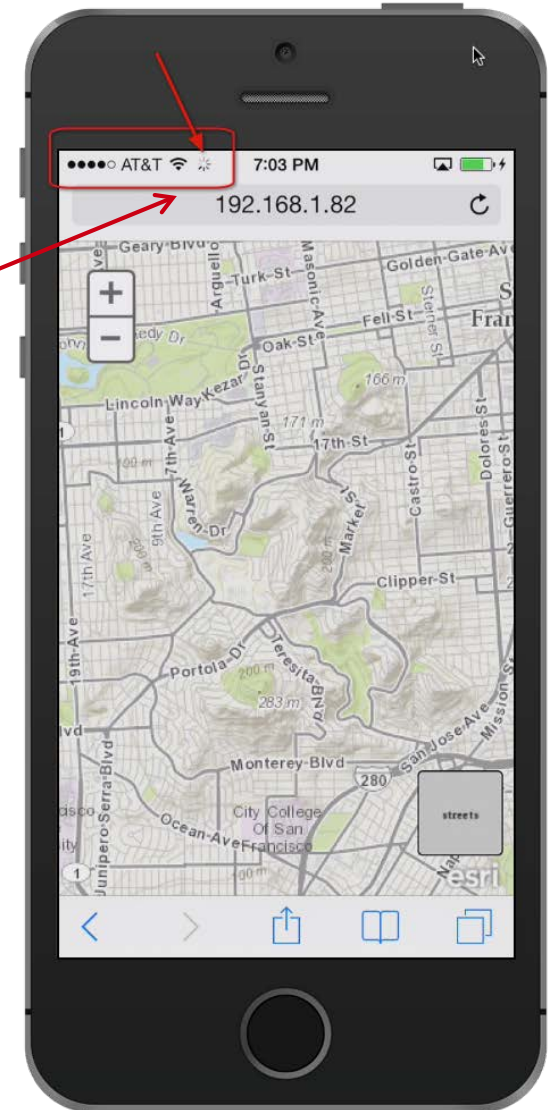
- arguments: Arguments[1]
- map: Object
- rotateImages: function rotateImages...

Global Variables

Console

```
basemap: streets
```

imagerotator_start.htm:33



Chrome remote debugging

The screenshot displays the Chrome DevTools interface with the 'Devices' panel active. The browser's address bar shows 'chrome://inspect/#devices'. A red box highlights the 'View Inspection Targets' button in the top right corner, which has a tooltip that reads: 'Chrome can now connect to devices without ADB Plugin. Please click View Inspection Targets above and enable Discover USB devices. Help & Documentation File a ticket'. Another red box highlights the 'Nexus 5' device entry, which is associated with 'Chrome Beta (33.0.1750.93)'. A third red box highlights the 'Chrome (32.0.1700.99)' entry at the bottom. The 'Discover USB devices' checkbox is checked, and a 'Port forwarding...' button is visible. The main panel lists several remote debugging targets, each with a URL and 'inspect', 'focus tab', 'reload', and 'close' actions.

DevTools

Devices

Discover USB devices [Port forwarding...](#)

Nexus 5 #04B76C5D3089FE44

Chrome Beta (33.0.1750.93) [Open tab with url](#) [Open](#)

jQuery Image Rotator http://192.168.1.82/lynda/jquery/05_effects/imagerotator_start.htm
[inspect](#) [focus tab](#) [reload](#) [close](#)

Maps Toolbar <http://heb.esri.com/javascript/playground-js/mobile/drawtoolbar/index.html>
[inspect](#) [focus tab](#) [reload](#) [close](#)

Maps Toolbar http://developers.arcgis.com/javascript/samples/toolbar_draw/
[inspect](#) [focus tab](#) [reload](#) [close](#)

Editing <http://heb.esri.com/javascript/playground-js/mobile/citizen-request/www/index.html>
[inspect](#) [focus tab](#) [reload](#) [close](#)

Maps Toolbar <http://heb.esri.com/javascript/playground-js/mobile/drawtoolbar/index.html>
[inspect](#) [focus tab](#) [reload](#) [close](#)

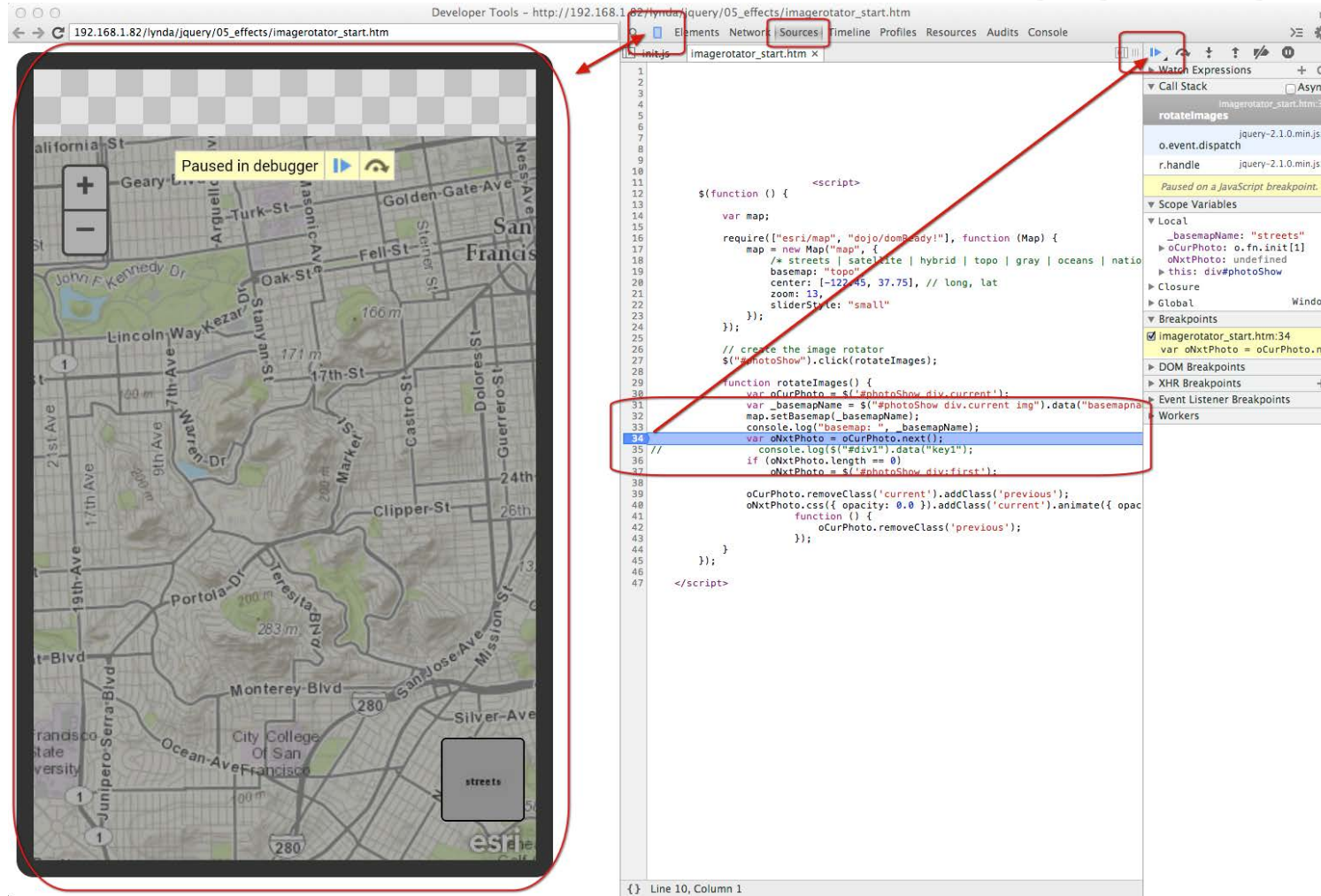
Measure Tool http://jianh.esri.com/test/measurement/measurement_toggle.html
[inspect](#) [focus tab](#) [reload](#) [close](#)

Chrome (32.0.1700.99) [Open tab with url](#) [Open](#)

jQuery Image Rotator http://192.168.1.82/lynda/jquery/05_effects/imagerotator_start.htm
[inspect](#) [focus tab](#) [reload](#) [close](#)

Maps Toolbar http://developers.arcgis.com/javascript/samples/toolbar_draw/
[inspect](#) [focus tab](#) [reload](#) [close](#)

Chrome remote debugging



Developer Tools - http://192.168.1.82/lynda/jquery/05_effects/imagerotator_start.htm

Paused in debugger

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{} Line 10, Column 1

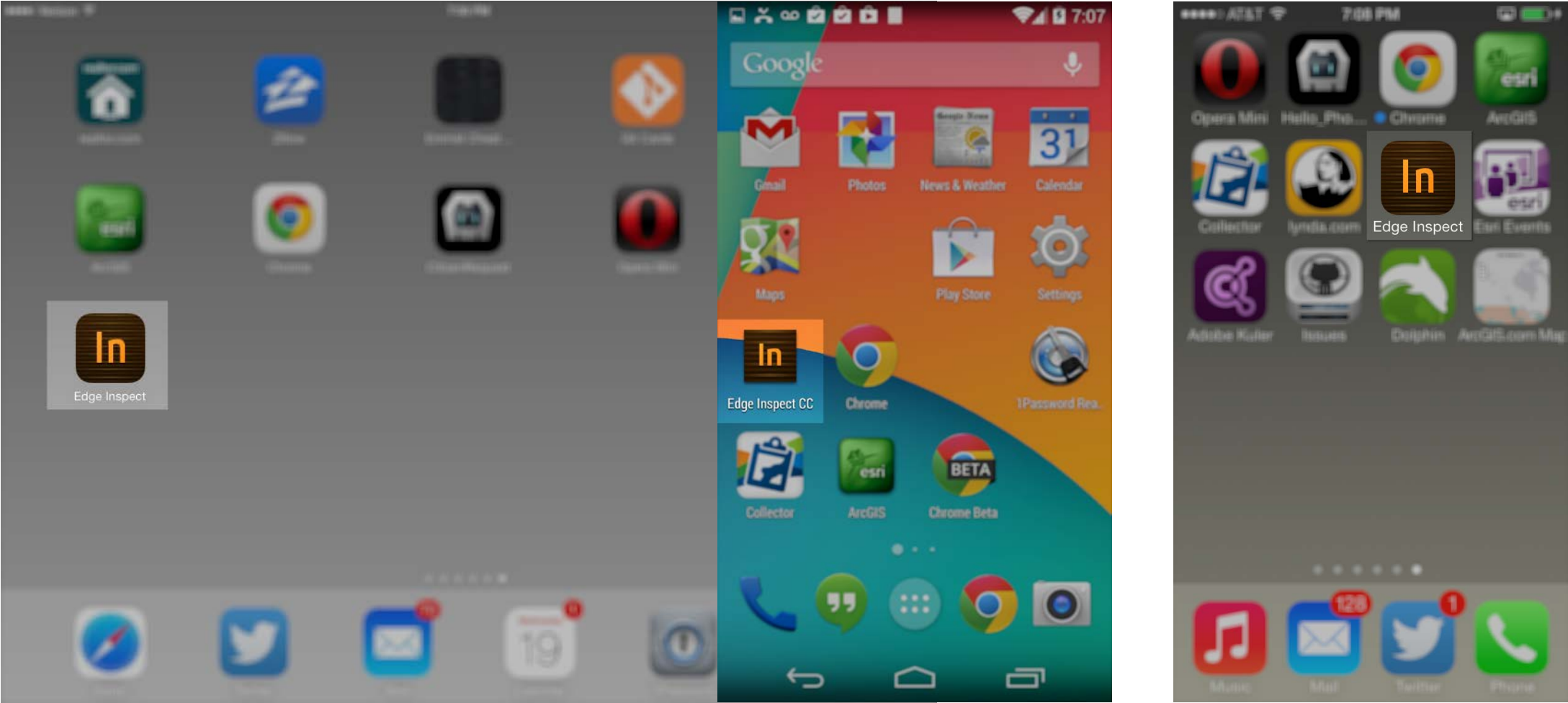


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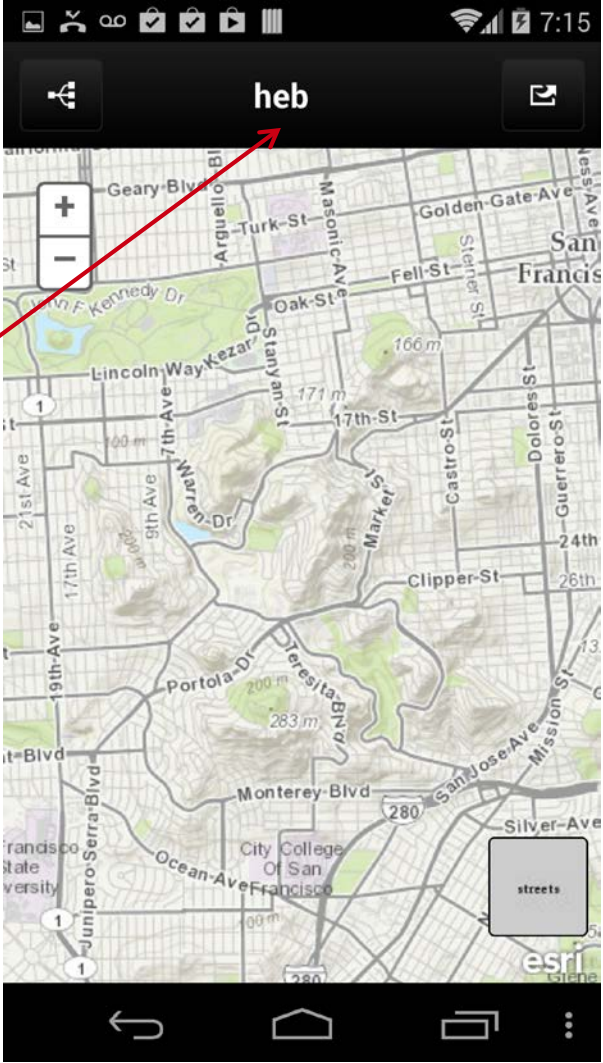
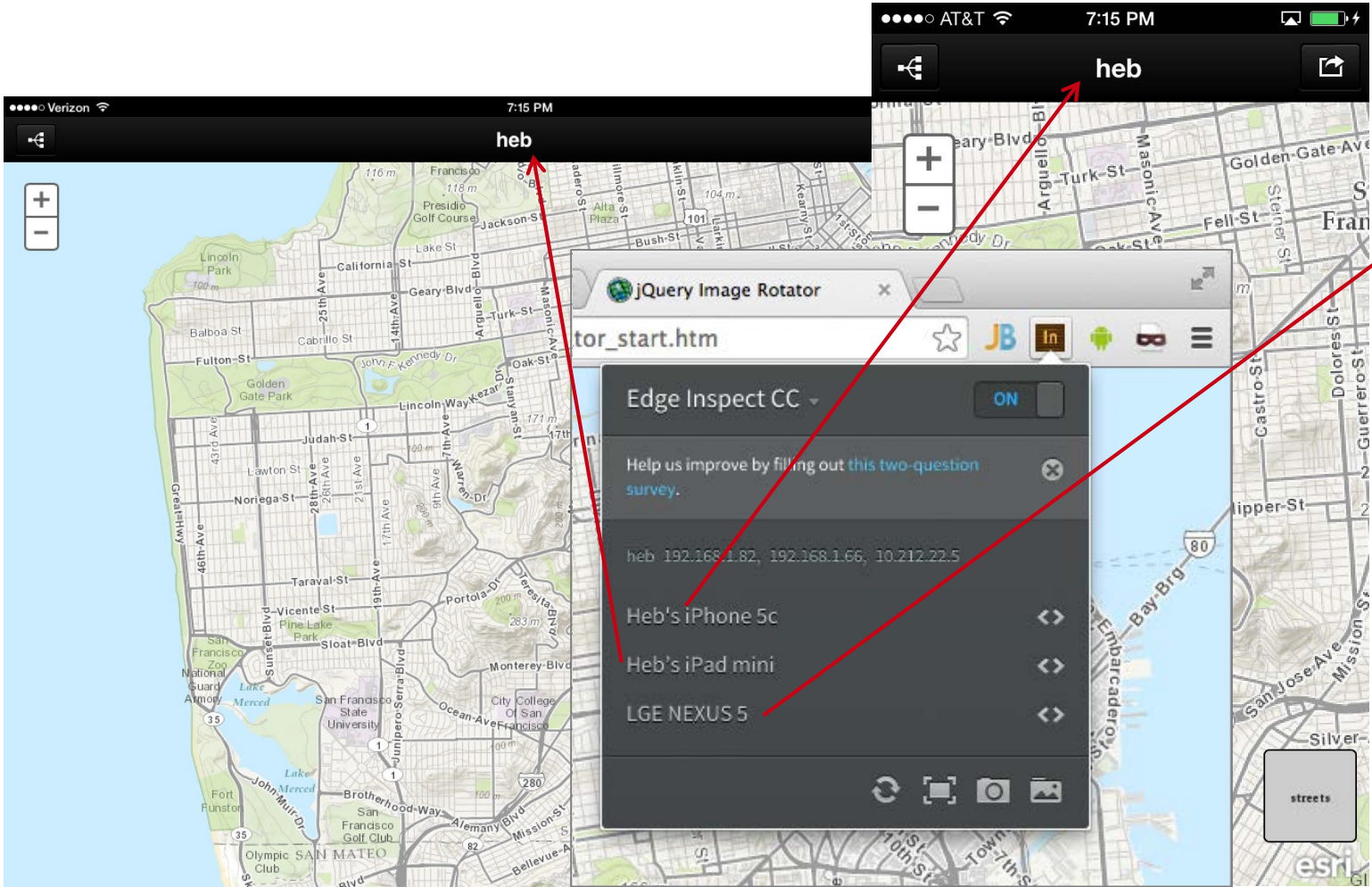
Paused in debugger

streets

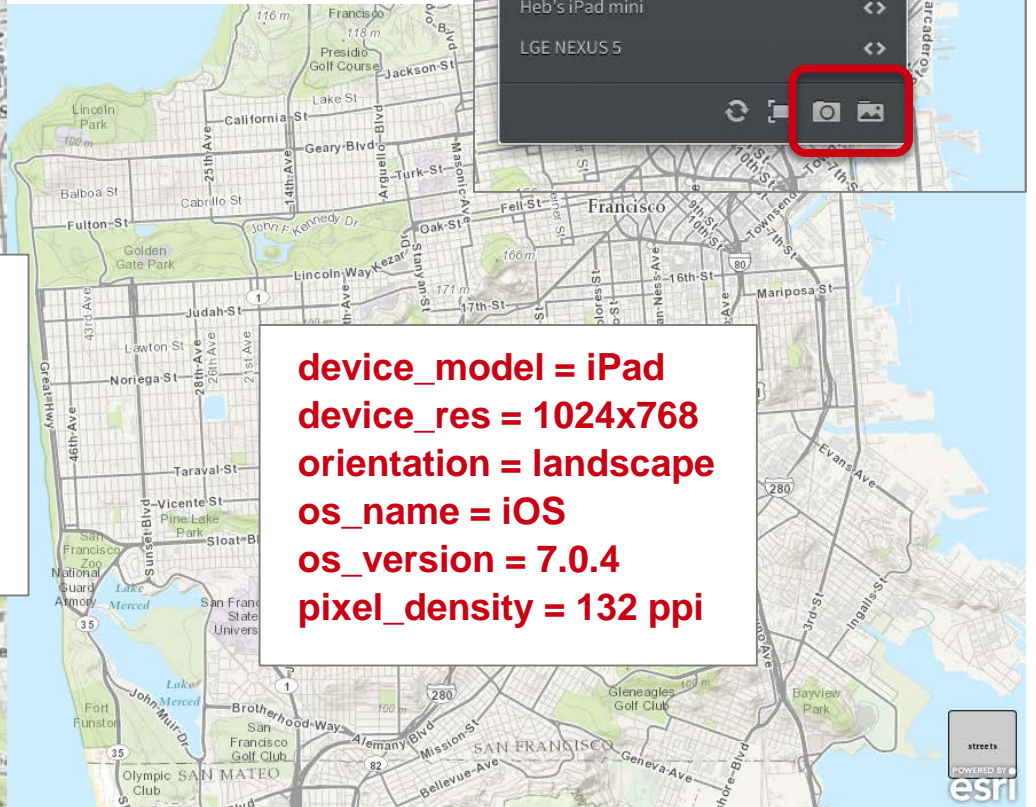
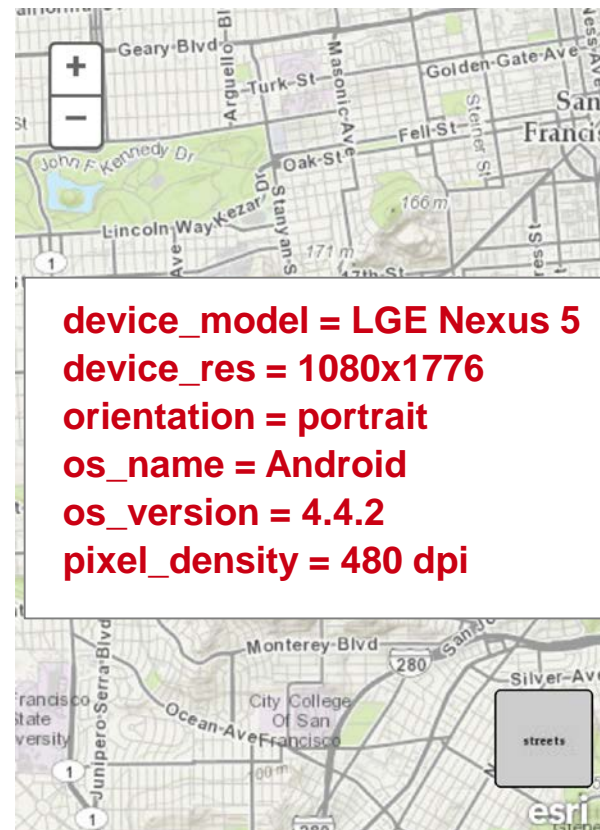
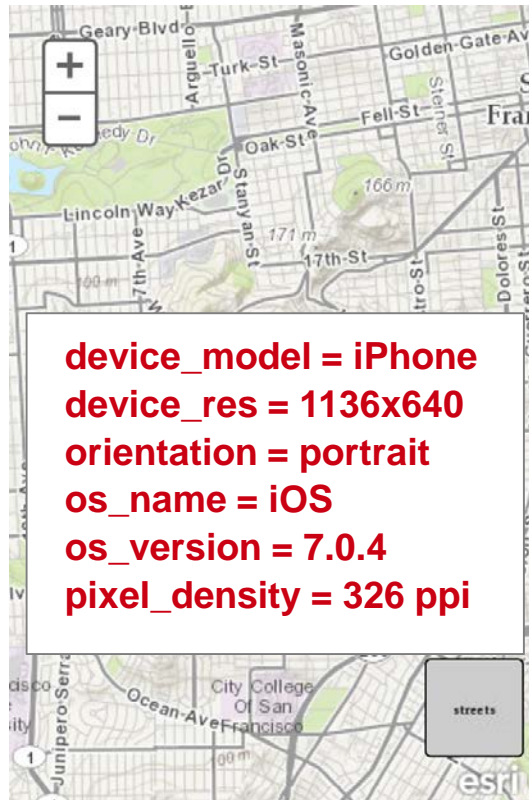
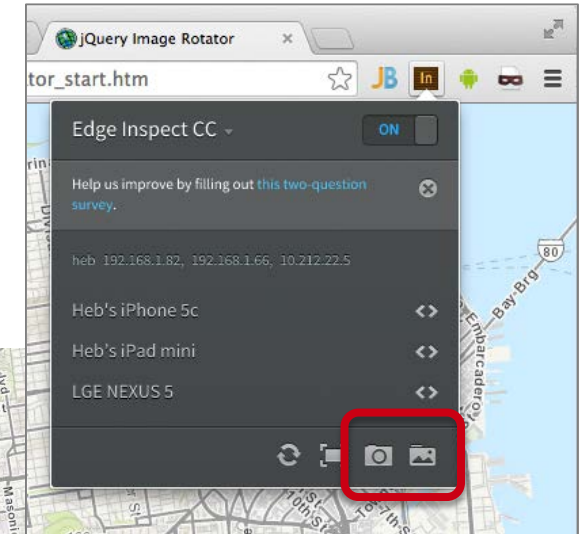
Adobe Edge Inspect



Adobe Edge Inspect



Adobe Edge Inspect



Demonstration

Debugging mobile

Lloyd Heberlie

Many UI frameworks

Bootstrap

Angular.js

jQuery

Ionic

...

...?

Frameworks on github.com/esri

github.com/Esri/bootstrap-map-js

github.com/Esri/angular-esri-map



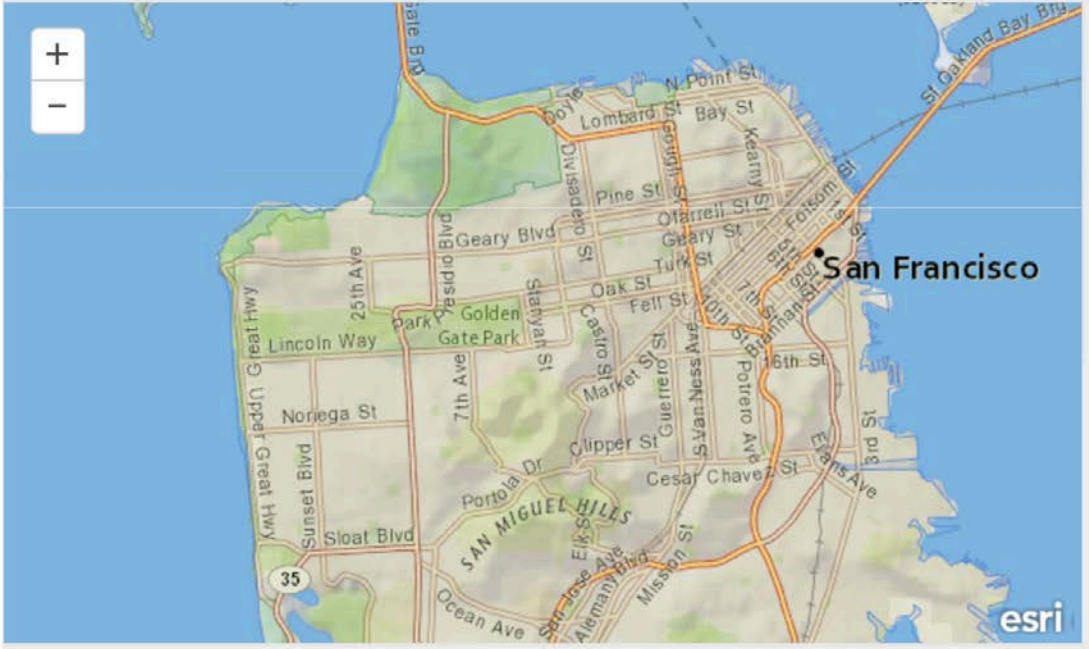
Bootstrap



DEMO

Left Center Right Fixed

Top 12



Right 4 (fixed)
content
content
content
content
content
content

Bottom 4 Bottom 4 Bottom 4

Add CSS

```
</script>  
<!-- Step 1. Add CSS for the mapping components -->  
<link rel="stylesheet" type="text/css" href="//js.arcgis.com/3.15/esri/css/esri.css">  
<link rel="stylesheet" type="text/css" href="http://esri.github.io/bootstrap-map-js/src/css/bootstrapmap.css">  
<style type="text/css">  
  #mapDiv {  
    min-height: 100px;  
    max-height: 1000px;  
  }  
</style>
```

Set up the div

```
<!-- Step 2. Add HTML to define the layout of the page and the map -->
<div class="container">
  <div id="mapDiv"></div>
</div>
```

Load BootstrapMap

```
<!-- Step 3. Add JS to load the responsive map -->
<script type="text/javascript">
    var package_path = "//esri.github.com/bootstrap-map-js/src/js";
    var dojoConfig = {
        packages: [{
            name: "application",
            location: package_path
        }]
    };
</script>
<script src="//js.arcgis.com/3.15compact"></script>
<script>
    require(["esri/map", "application/bootstrapmap", "dojo/domReady!"],
        function(Map, BootstrapMap) {
            // Get a reference to the ArcGIS Map class
            var map = BootstrapMap.create("mapDiv", {
                basemap: "national-geographic",
                center: [-122.45, 37.77],
                zoom: 12
            });
        });
</script>
```


Load Bootstrap + jQuery

```
<!-- jQuery (for Bootstrap's JavaScript plugins) -->  
<script src="http://code.jquery.com/jquery-1.11.1.min.js"></script>  
<!-- Include all plugins or individual files as needed -->  
<script src="//maxcdn.bootstrapcdn.com/bootstrap/3.3.2/js/bootstrap.min.js"></script>
```

Mobile Popups

Popups

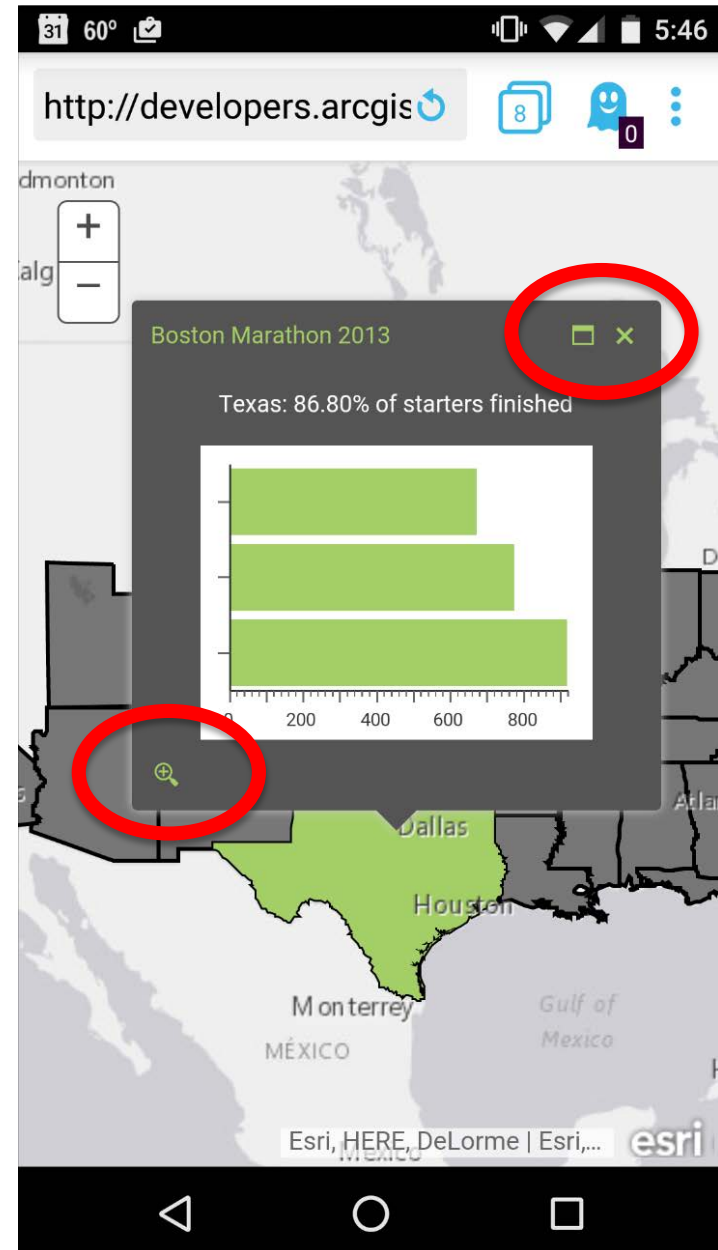
	Tablets	Smartphones
InfoWindow	Yes	No
MobilePopup	Yes	Yes

InfoWindow

Text may be hard to read

Not touch friendly

Not centered on rotate

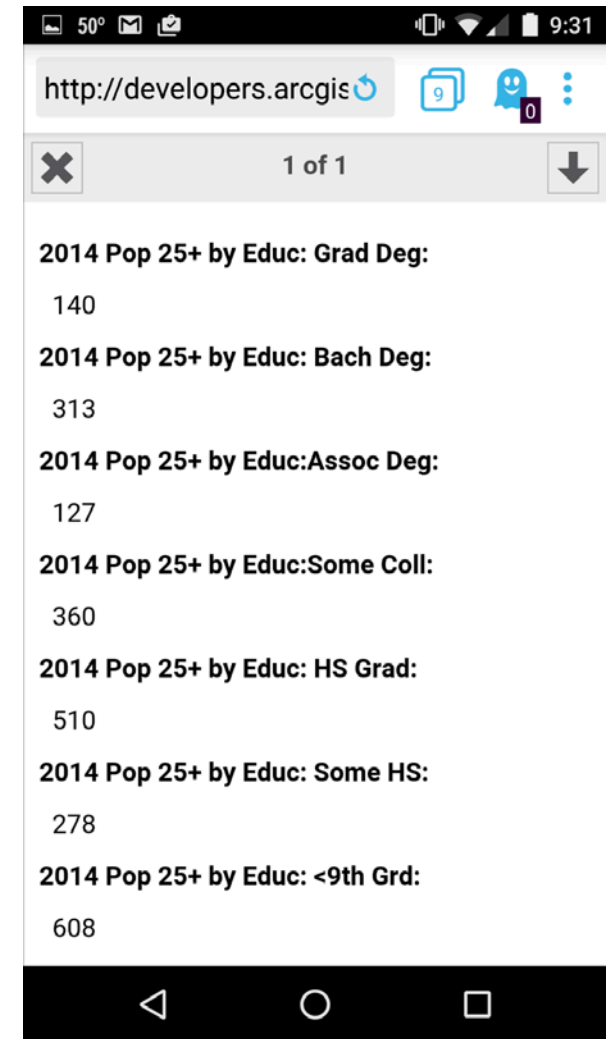
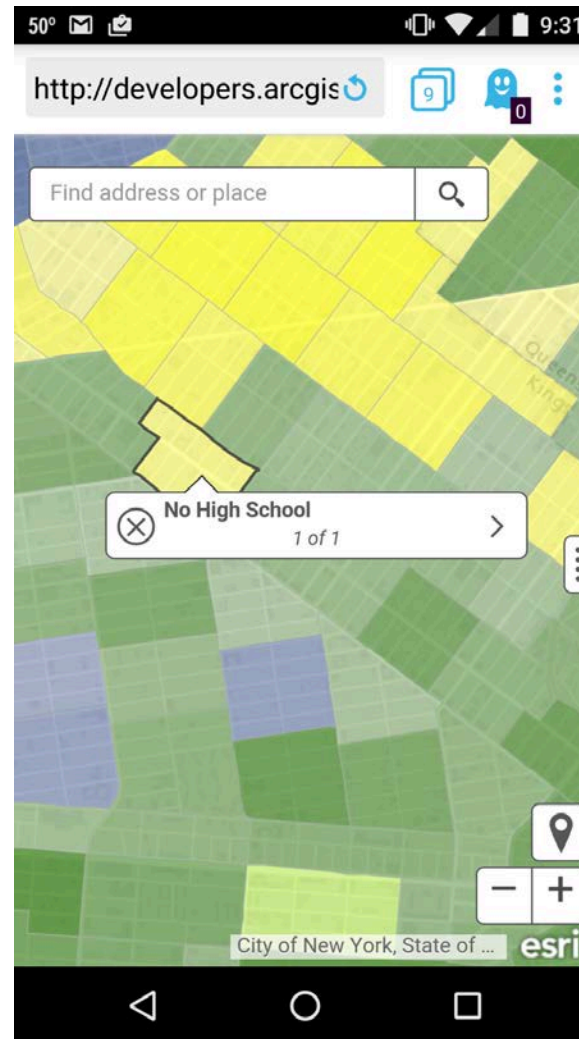


MobilePopup

Readable

Touch friendly

Rotate friendly

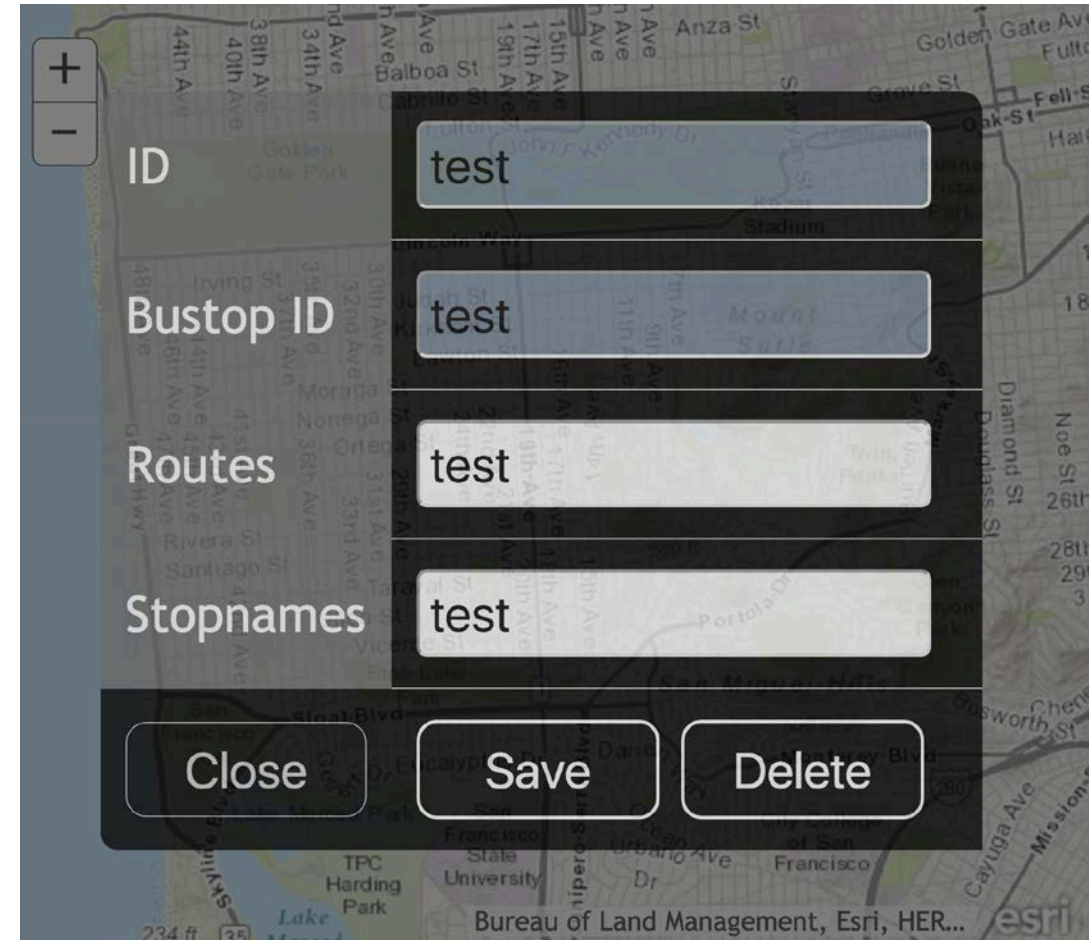


http://developers.arcgis.com/javascript/samples/mobile_arcgis/

Custom Popups

Modal popup example

<http://andygup.github.io/modal-popup-js/>



Mobile Performance

Smartphone vs Your Laptop

App performance not the same

Internet speeds fluctuate/limited

Power limitations



Reducing UI Jank (Jerkiness)

Interruptions in frame production (fps) and latency

Checkerboarding

Long pauses

Scrolling latency

Delayed animation start



Common causes of Jank

Slow internet response

Data processing overload

Excessive garbage collection



HTTP response times

Minimize, concatenate, optimize

Make sure server uses *gzip compression!*

Use Query MODE_ONDEMAND

Limit the Extent and use layer dependencies

Generalize features

[DEMO](#)

Using Web Workers

Move expensive tasks off main thread!

Parsing large number of features

`json.parse()` blocks

Serialization/deserialization costs

[Timers](#)

Main UI thread

```
var worker = new Worker("libs/MyWorker.js");

worker.postMessage(
  {
    // TODO
  }
);

worker.onmessage = function(result){
  // TODO
};

worker.onerror = function(err){
  console.log("Worker error: " + err.message);
};
```

Background thread

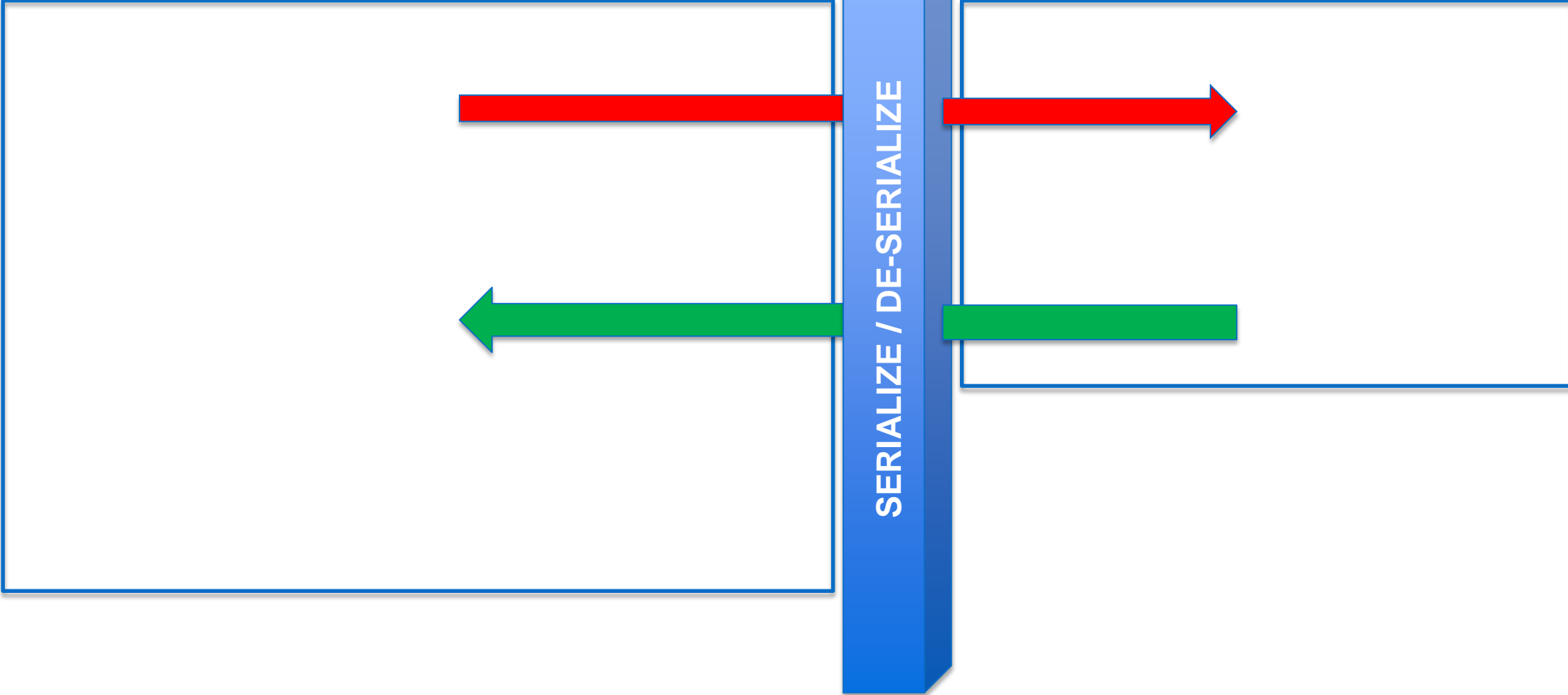
```
// Receive data from main thread
onmessage = function(msg) {
  // TODO
}

// Send data back to main thread
postMessage( data );
```

CPU

Main UI thread

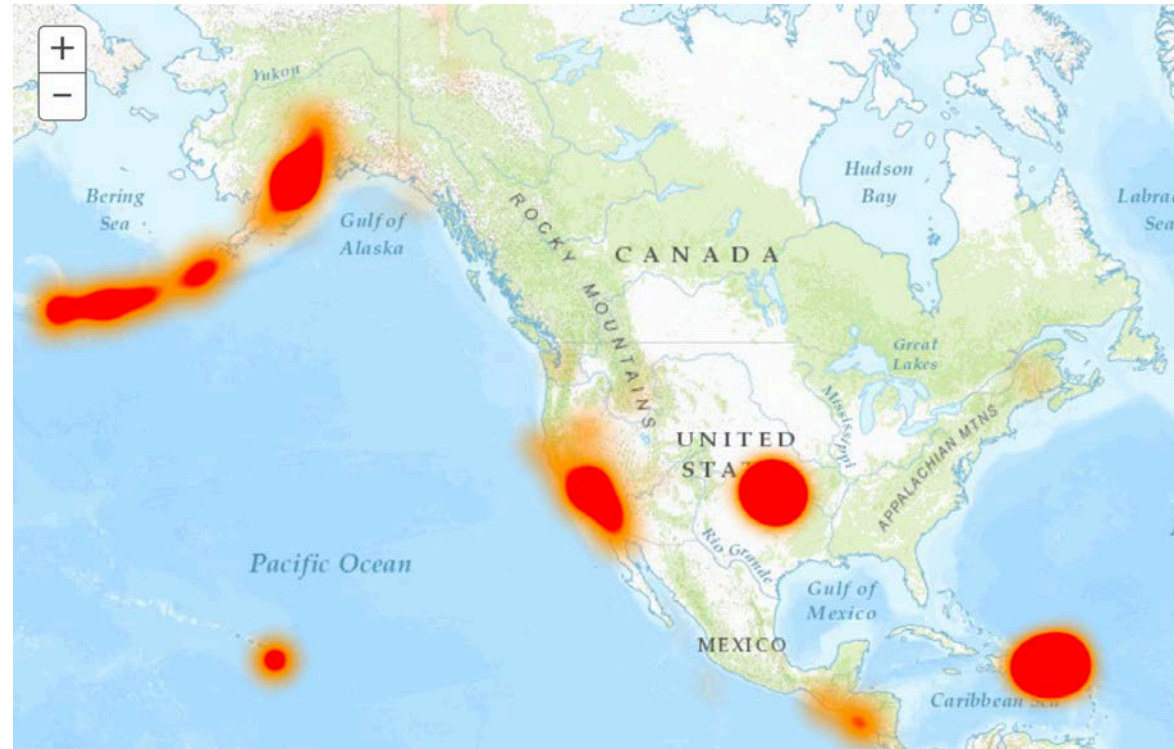
Background thread



Using Web Workers

Example:

Parsing GeoJSON



<https://github.com/andygup/earthquake-heatmap-layer>

Example: 7x Performance boost!

1MB of data with web workers

parseFeaturesInWorkerThread: 2.478ms

parseTestTimer: 139.338ms

Without web workers

parseTestTimer: 1028.427ms

Garbage collection

De-reference any variables no longer in use

```
var feature = { feature: { ... } };  
feature = null;
```

Managing memory in loops

Re-use objects where possible

Versus `new Object();`

Reset arrays: `myArray.length = 0;`

Versus this: `myArray = [];`

Geolocation

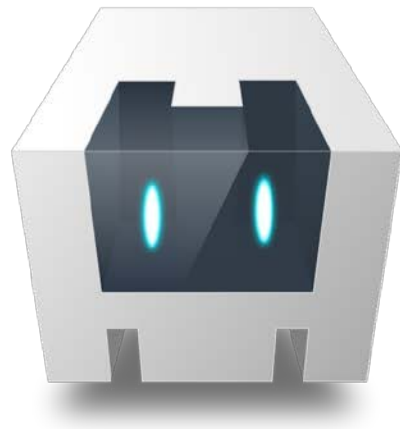
Advanced Geolocation Session – 10a – 11a Friday

Outdoor geolocation – turn off WiFi

Not very accurate – 3 – 10 meters

Hybrid – PhoneGap/Cordova

Wednesday 10:30am, Mesquite B



APACHE
CORDOVA™

github.com/Esri/quickstart-map-phonegap

Resources

- <https://github.com/lheberlie/mobile-webapps-js>
- <https://github.com/lheberlie/mobile-webapps-js/blob/develop/Resources.md>

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