ArcGIS API for JavaScript: Building Mobile Apps

Andy Gup, Lloyd Heberlie, Yannik Messerli
Agenda

- Capabilities
- Managing app life-cycle
- Working with locally hosted builds
- Working from JS frameworks
- Debugging
- Working with 3D on Mobile
Expectations
Touch
Demo
BasemapGallery
BasemapToggle
Home
Bookmarks
Coordinate Conversion
Driving Directions
LayerList
LayerList action
Legend

- Graduate Degree
- College Degree
- Associates Degree
- Some College
- High School Degree
- Some High School
- No High School
- Tie

Percent Predominant of Total

> 39
Compass
Responsive apps
Locate
Demo
Popups

Popup dock positions
Use the control in the center of the map to change the location where the popup will dock.

Popup Dock Position
- Auto
- Top Left
- Top Center
- Top Right
- Bottom Left
- Bottom Center
- Bottom Right

Boston Demographics
The unemployment rate here is 19.10%. In comparison, the growth rate of per capita income is 2.76%.
Calcite Maps - Settings
Calcite Maps
HTML5 input types

- type="email"
- type="tel"
- type="date"
Mobile media queries

```html
html[data-browser*="Mobile"]
  .detail-name
  .icon-anchor
  .icon-ui-link {
    /* -- -- -- Positioning -- -- -- */
    display: inline-block;
    /* -- -- -- Box-model -- -- -- */
    margin-left: -30px;
  }

html[data-browser*="Mobile"]
  .detail-name
  .icon-anchor
  .icon-ui-link:before {
    /* -- -- -- Box-model -- -- -- */
    padding-right: 0.5625rem;
  }

html[data-browser*="Mobile"]
  .detail-name
  .icon-anchor
  .icon-ui-link {
    /* -- -- -- Positioning -- -- -- */
    display: none;
    /* -- -- -- Appearance -- -- -- */
    vertical-align: middle;
  }
```
Mobile media queries
Mobile Media queries

```html
<!DOCTYPE html>
<html data-browser="Mozilla/5.0 (Linux; Android 6.0; Nexus 5 Build/MRA58N) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/59.0.3071.115 Mobile Safari/537.36">
<head>
  <meta charset="utf-8">
  <meta name="viewport" content="initial-scale=1,maximum-scale=1,user-scalable=no">
  <title></title>
</head>
<body>
  <script>
    // --------------------------------------------------------------------------
    // Tablet and phone viewports need a different CSS selector than desktop viewports.
    // --------------------------------------------------------------------------
    var mqDesktop = window.matchMedia("(min-width: 1024px) and (max-width: 2560px)");
    var mqTablet = window.matchMedia("(min-width: 768px) and (max-width: 1023px)");
    var mqPhone = window.matchMedia("(max-width: 767px)");
    if (mqDesktop.matches){
      console.log("Desktop");
    }
    if (mqTablet.matches){
      console.log("Tablet");
    }
    if (mqPhone.matches){
      console.log("Phone");
    }
  </script>
</body>
</html>
```
Managing initial load times

Andy Gup
Initial loading in a mobile browser

Often misunderstood

Many things happening

Vulnerable to timing issues

Consider user’s experience
Initial loading in a mobile browser

CSS
3rd party libraries
Frameworks
Framework plugins
ArcGIS JS API
GIS queries
GET map tiles
Initial loading in a mobile browser

Wait for framework initialization

- In Angular: implements OnInit
- In React: implements onAfterCreate
- In Cordova: ‘deviceready’ event
- In ArcGIS: dojo/domReady!
Consider SYNCHRONOUS patterns

Framework init → dojo/ready! → Map ready → Feature service loaded
Lazy load modules and libraries

Map ready → Wait for user input → Load widget
Lazy load modules and libraries

function lazyLoadPointCloudLayer()
{
  require(['
    "esri/layers/PointCloudLayer"
  ], function(PointCloudLayer) {
    var plc = new PointCloudLayer();
  });
}
View ready?

The View has a Map
View container size is greater than zero
View has a spatial reference

API Reference MapView.ready

Demo
Loadable Patterns

Any resource that handles async data access
Examples: feature layers, tasks, web maps

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>not-loaded</td>
<td>The object’s resources have not loaded.</td>
</tr>
<tr>
<td>loading</td>
<td>The object’s resources are currently loading.</td>
</tr>
<tr>
<td>loaded</td>
<td>The object’s resources have loaded without errors.</td>
</tr>
<tr>
<td>failed</td>
<td>The object’s resources failed to load. See loadError for more details.</td>
</tr>
</tbody>
</table>
API reference
WebMap.loadStatus
load() example

```javascript
var webmap = new WebMap({
  portalItem: { // autocasts as new PortalItem()
    id: "f2e9b762544945f390ca4ac3671cfa72"
  }
});

var view = new MapView({
  //map: webmap,
  container: "viewDiv"
});

webmap.load().then(function(r){
  view.map = webmap;
  console.log(r);
  console.log("Load Status: " + webmap.loadStatus)
}).otherwise(function(err){
  console.log("Problem loading webmap: " + error);
});
```
Using local builds
Lloyd Heberlie
Why?

• More modules – more requests
• Optimized build for app
• Web application vs. Hybrid
• Reduce http service calls for Hybrid apps
Using local builds

Demo
## More Information

<table>
<thead>
<tr>
<th>WORKSHOP</th>
<th>LOCATION</th>
<th>TIME FRAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Optimizing Your JavaScript App for Performance</td>
<td>• Thursday, July 12 – Demo Theater 08</td>
<td>• 11:15 – 12:00 pm</td>
</tr>
</tbody>
</table>
Cordova/Phonegap

Wait for "deviceready" event

https://github.com/Esri/quickstart-map-phonegap
Ionic and loading ArcGIS JavaScript modules

[arcgis-js-api.d.ts](#) (ArcGIS Typescript Type Definitions)
[esri-loader](#)
[ionic2-esri-map](#) (Sample app)
Working with Frameworks
Mobile browser-only

Andy Gup
Working with other JS frameworks

angular-cli-esri-map
esri-loader
arcgis-js-cli + React sample
arcgis-webpack-plugin
Debugging and testing

Lloyd Heberlie
Physical devices

http://blog.adtile.me/2014/01/08/adtile-device-lab/
Remote debugging

- Safari Web Inspector Remote
- Google Chrome remote debugging
- http://livereload.com/
- Browser-sync
- Firefox Web IDE
Enable iOS remote web inspection
Enable Android remote web inspection
Content Security Policy (CSP)
Debugging Mobile
Demo
Working with 3D on Mobile

Yannik Messerli
Topics

- Performance
  - Supported devices
  - Tips for better performance
- Build the best mobile experience (PWAs)
  - Service workers
  - App manifest
Performance

- Performance can vary across
  - Hardware
  - Operating System
  - Browser Vendor
- And depends heavily on
  - Number of layers in your scene
  - Number of features and their symbology
  - Environment settings
  - Rendering quality
Performance

Best on our officially supported devices:

- Apple iPhone 8
- Apple iPad Pro 2
- Samsung Galaxy S8
- Samsung Galaxy S9
- Samsung Galaxy Tab S3
Performance tips

Number of features and symbols

Complex visualisation will decrease performance.

```javascript
var newSymbol = {
  type: "point-3d",
  symbolLayers: [{
    type: "object",
    width: 500,
    height: 500,
    depth: 500,
    resource: { primitive: "cube" },
    material: { color: "red" }
  }]
};

var renderer = featureLayer.renderer.clone();
renderer.symbol = newSymbol;
```
Performance tips

Rendering: shadows

Shadow is costly to render.

```javascript
view.environment
  .lighting.directShadowsEnabled = false;
```
Performance tips

Rendering quality

High rendering settings decrease performance.

```javascript
view.environment.atmosphere.quality = "low";
view.qualityProfile = "low";
```
A progressive web app uses standard web technology to handle a vast variety of client's browsers, interruption of connection, fast user interaction to give the best mobile experience.

Google documentation
Service Workers

Definition

Service workers are Javascript scripts run by modern browsers to handle slow or intermittent network connectivity. They sit between your applications, the browser, and the network and take appropriate actions based on whether the network is available or the resource is cached.

Mozilla documentation
// service-worker.js

self.addEventListener('install', event => {
  event.waitUntil(
    caches.open("your_cache")
      .then((cache) => {
        // Cache the files you need offline
      }));
});

self.addEventListener('fetch', function(event) {
  event.respondWith(
    // Magic goes here
  );
});

// index.html

if (['serviceWorker' in navigator]) {
  navigator.serviceWorker.register('./service-worker.js', { scope: '/' });
    .then(function() {
      if (navigator.serviceWorker.controller) {
        // Service Worker is active
      }
      else {
        // Service Worker is installed but inactive
      }
    })
    .catch(function(error) {
      // An error occurred during Service Worker creation
    });
} else {
  // The current browser doesn't support service workers
}
Progresive Web Apps

Web App Manifest

```javascript
// index.html

<link rel="manifest" href="/manifest.json">

// manifest.json

{
  "short_name": "Hiking trails",
  "name": "Hiking trails Swiss National Park",

  "icons": [{
    "src": "src/img/android-icon-36x36.png",
    "sizes": "36x36",
    "type": "image/png"
  }],

  "start_url": "index.html",
  "display": "standalone",

  "background_color": 
"#2d2b07",
  "theme_color": 
"#b5a2c1"
}
```
Demo

Hiking app
Please Take Our Survey on the App

Download the Esri Events app and find your event

Select the session you attended

Scroll down to find the feedback section

Complete answers and select “Submit”