



Building Native Mapping Apps with PhoneGap: Advanced Techniques

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Agenda

Application life-cycle

Working with UI frameworks

Security

Geolocation

Offline

Expectations

Experience with PhoneGap and/or Cordova

Intermediate/Advanced JS, CSS

Mobile JS debugging skills

Native app debugging skills

Requirements

ArcGIS JS API v3.10 – v3.14

PhoneGap/Cordova 5.x

Latest gen iPhone and/or Android

Caveats

PhoneGap/Cordova not officially supported

There may be hidden gotchas

Best practices will minimize gotchas

quickstart-map-phonegap

github.com/Esri/quickstart-map-phonegap

Samples

Best practices

PhoneGap Application Lifecycle



Lifecycle

Part 1

**Native
PhoneGap
Application**

Lifecycle

Part 2

Native
PhoneGap
Application



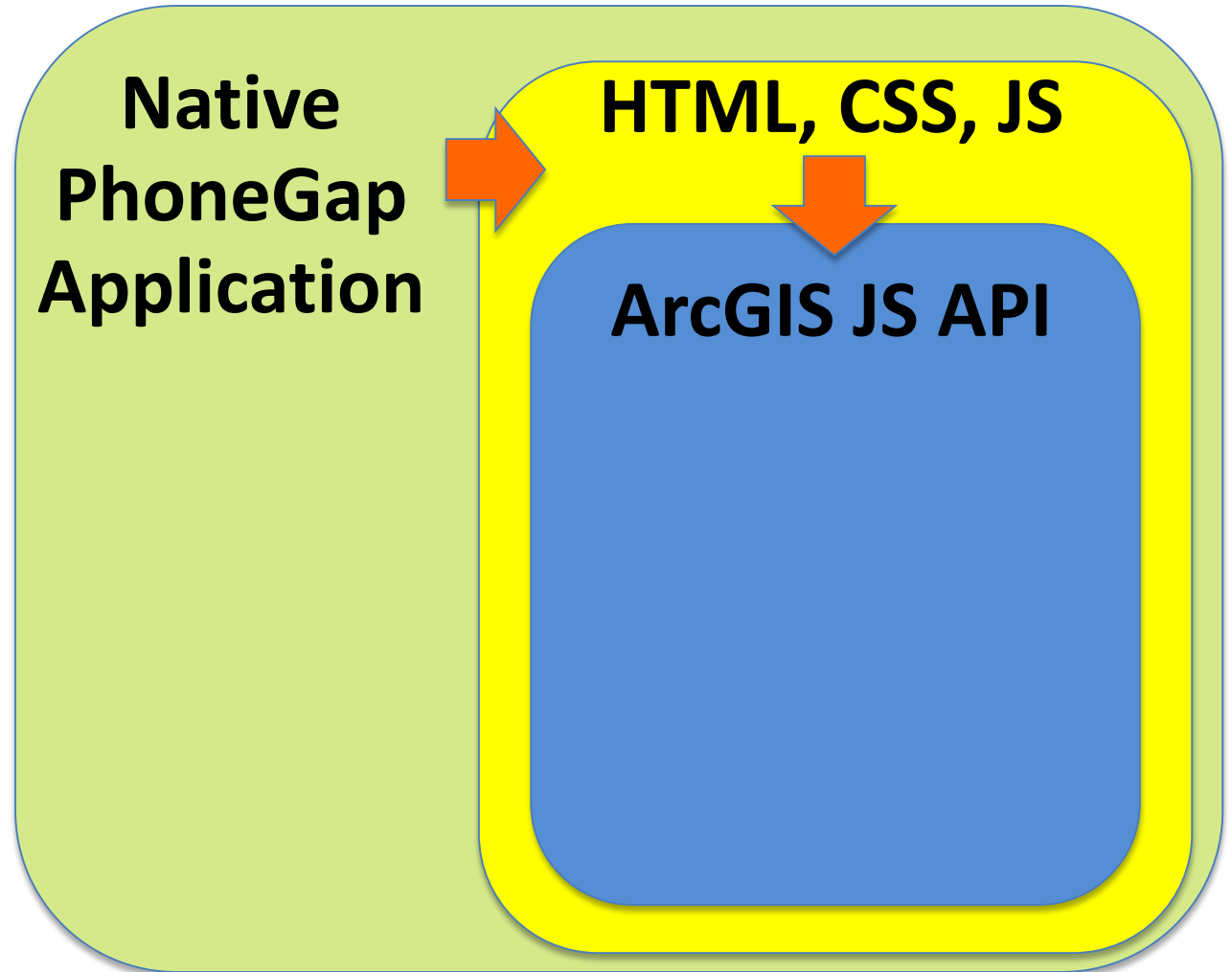
HTML, CSS, JS

Native WebView

```
<!DOCTYPE html>
<html>
<head>
  <meta charset="utf-8">
  <title>Map</title>
</head>
<body>
  . . .
</body>
</html>
```

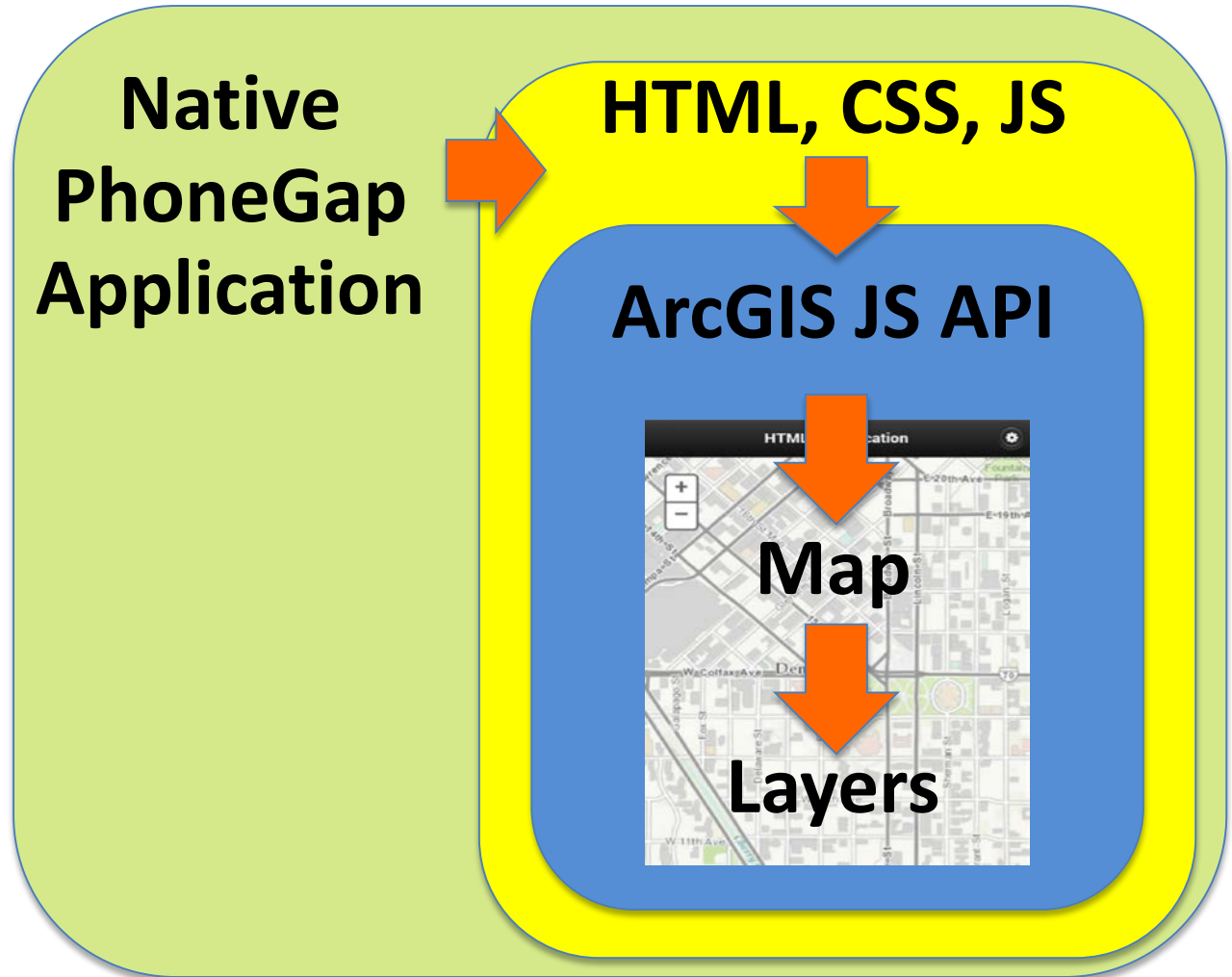
Lifecycle

Part 3



Lifecycle

Part 5



UX Frameworks



UX Frameworks + Maps

Some considerations:

Do view transitions cache pages?

Does map get re-created after transition?

Map widgets work portrait & landscape?

Gracefully handle loss of internet?

Bootstrap-map-js

github.com/Esri/bootstrap-map-js

Auto-resize map

Auto-center map

Not PhoneGap tested

Jquery-mobile-map-js

github.com/Esri/jquery-mobile-map-js

Auto-resize map

Auto-center map

View-based Approach






Single page, single view

Single page, multi-view

Multi-page

gis.dhss.mo.gov/Website/mobileWIC/WIC.html


Find WIC Services

-  **WIC offices and satellite** >
-  **Stores that accept WIC** >
-  **Enter a starting address**
-  **Use my current location** >
-  **Change Search Distance** >

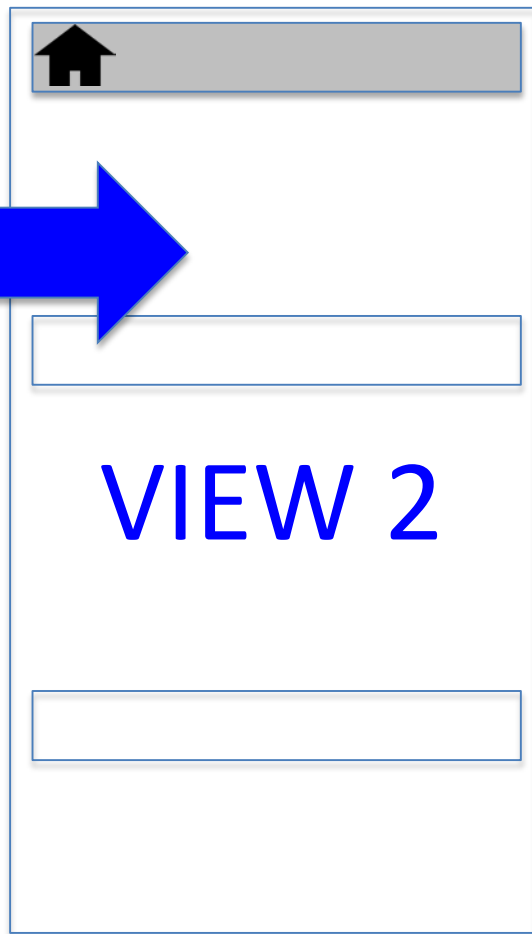
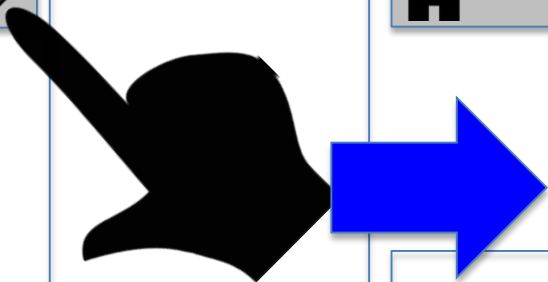
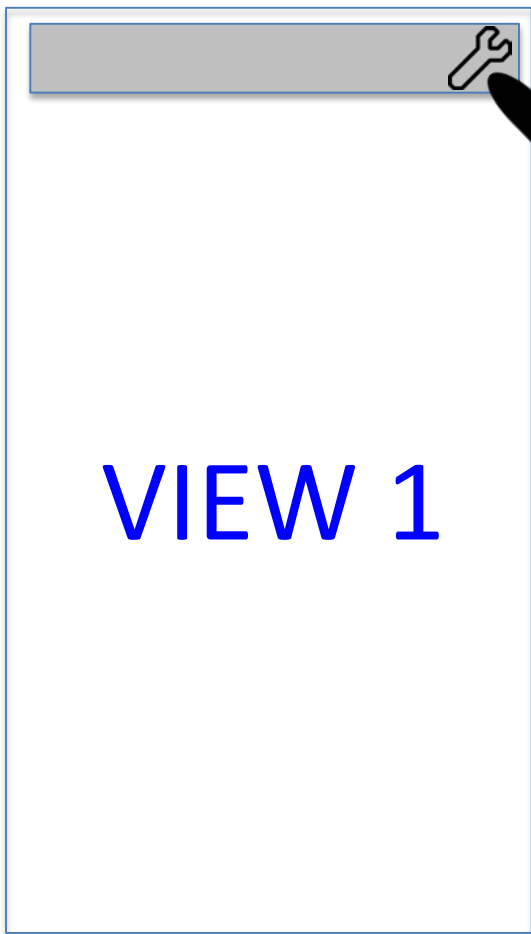
Current Location

1561 W 3rd Ave
Broomfield, CO 80020

Location accurate within 24000 meters
of the address listed. Last Updated: 11/1/2013
10:05:06 AM

 Missouri WIC
Program





JS library loading

Synchronous

VS

Asynchronous

Synchronous vs async

Trade-offs in map load performance

Dependencies between libs?

Synchronous forces life cycle management

Consider concatenating JS libs

Synchronous

```
<!DOCTYPE html>
<html>
<head>
  <link href="map.css"/>
  <script src="jquery.js"/>
  <script src="gp.js" /> //depends on jquery.js
</head>
<body>
  Hello World!
</body>
</html>
```

| | Time (milliseconds) → | | |
|------------|-----------------------|---|---|
| map.css | █ | | |
| jquery.css | | █ | |
| gp.js | | | █ |

Async

```
<!DOCTYPE html>
<html>
<head>
  <link href="map.css"/>
</head>
<body>
  Hello World!
  <script async src="jquery.js"/>
  <script async src="gp.js" />
</body>
</html>
```

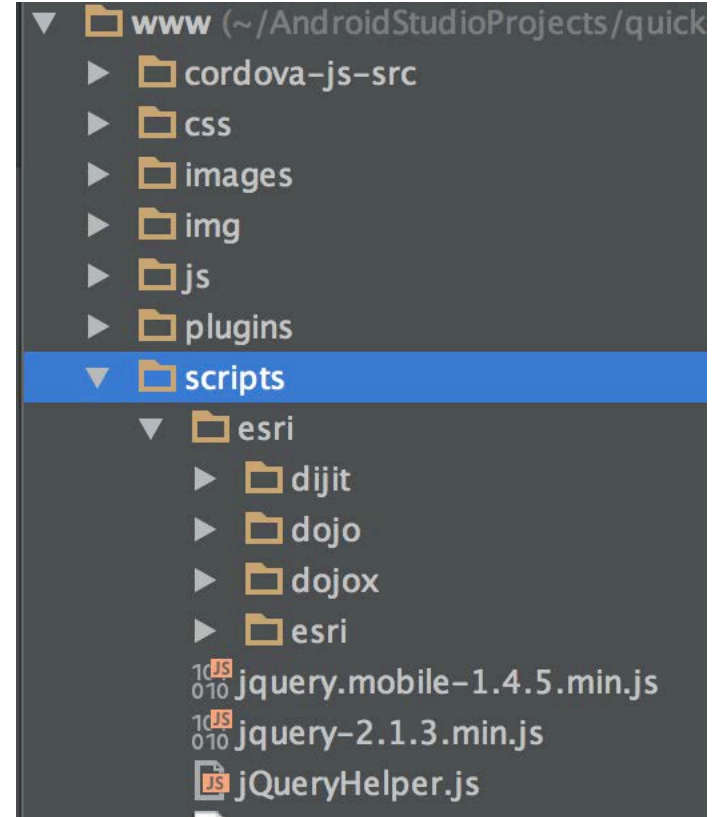
| | Time (milliseconds) → | | |
|------------|-----------------------|------------|--|
| map.css | ██████████ | | |
| jquery.css | | ██████████ | |
| gp.js | | ██████████ | |

Host files locally

HTML, CSS, JS, images

Significantly faster load times!

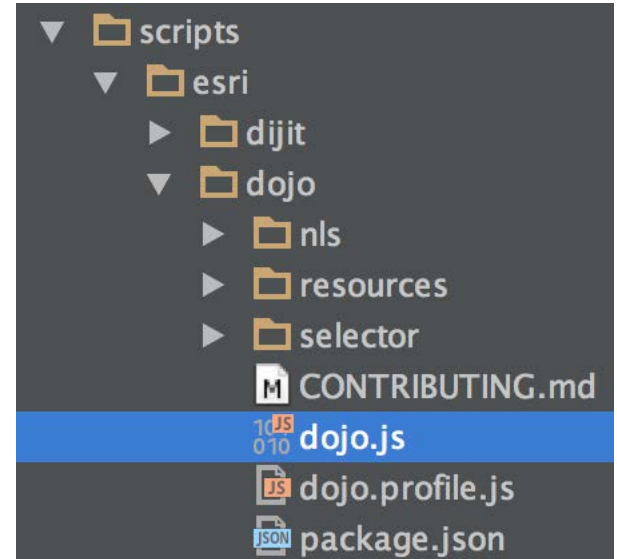
Security (no interceptions)



ArcGIS Web Optimizer

One JS library file!

<http://jso.arcgis.com/>



```
<script src="scripts/esri/dojo/dojo.js" data-dojo-config="async: true"></script>
```

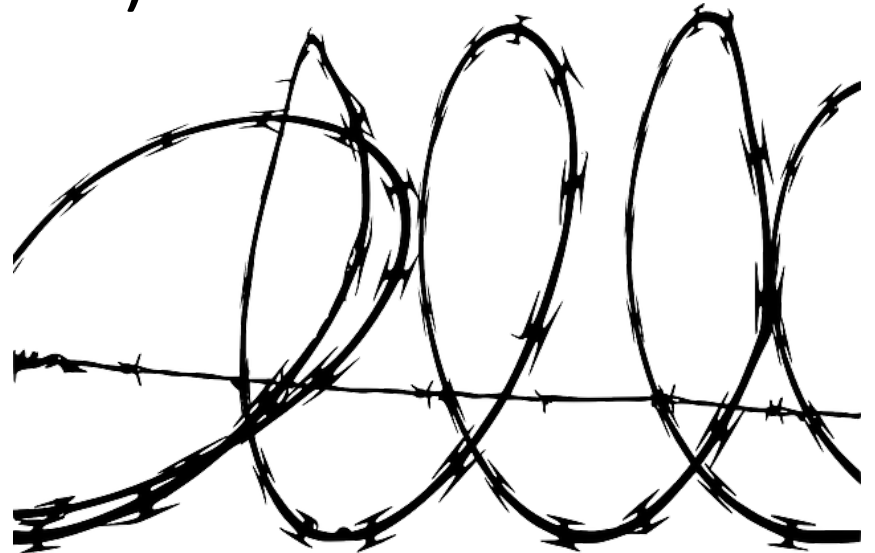
Security

Whitelisting (as of Cordova 4.0)

Content Security Policy (CSP)

iOS 4.0.0 +

Android 4.0.0 +

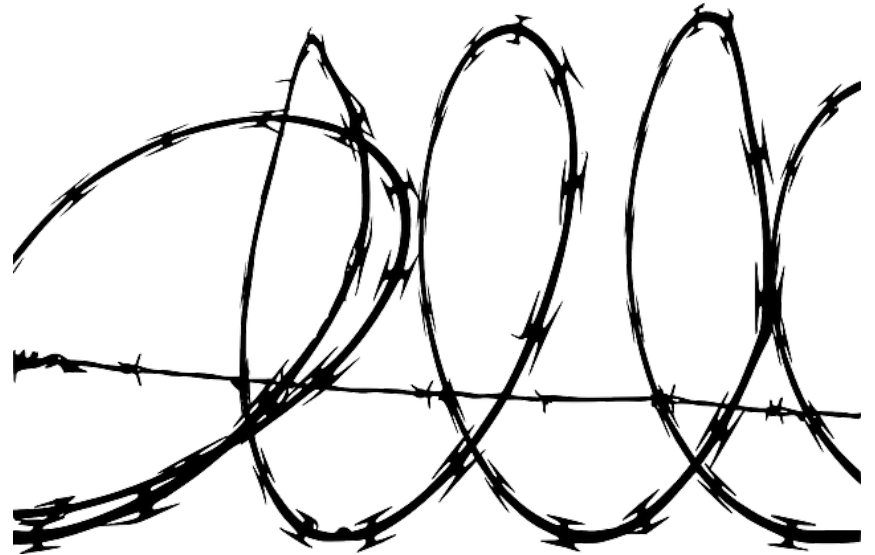


Security

Mitigate XSS attacks

Data injection attacks

Unauthorized images



config.xml - Navigation Whitelist

```
<!-- Allow links to example.com -->
<allow-navigation href="http://example.com/*" />

<!-- Wildcards are allowed for the protocol, as a prefix
      to the host, or as a suffix to the path -->
<allow-navigation href="*://*.example.com/*" />

<!-- A wildcard can be used to whitelist the entire network,
      over HTTP and HTTPS.
      *NOT RECOMMENDED* -->
<allow-navigation href="*" />
```

config.xml - Intent Whitelist

```
<!-- Allow links to web pages to open in a browser -->  
<allow-intent href="http://*/*" />  
<allow-intent href="https://*/*" />
```

```
<!-- Allow links to example.com to open in a browser -->  
<allow-intent href="http://example.com/*" />
```

```
<!-- Wildcards are allowed for the protocol, as a prefix  
to the host, or as a suffix to the path -->  
<allow-intent href="*://*.example.com/*" />
```

Content Security Policy (CSP)

```
<head>
```

```
<meta http-equiv="Content-Security-Policy"  
      content="  
        default-src 'self'  
          http://js.arcgis.com  
          http://server.arcgisonline.com;  
          http://services.arcgisonline.com  
        img-src 'self'  
          http://js.arcgis.com  
          http://services.arcgisonline.com  
          http://server.arcgisonline.com data:;  
        style-src 'self' http://js.arcgis.com 'unsafe-inline';  
        script-src 'self' http://js.arcgis.com 'unsafe-eval'">
```

Content Security Policy (CSP)

<head>

```
<meta http-equiv="Content-Security-Policy"
      content="
        default-src 'self'
          http://js.arcgis.com
          http://server.arcgisonline.com;
          http://services.arcgisonline.com
        img-src 'self'
          http://js.arcgis.com
          http://services.arcgisonline.com
          http://server.arcgisonline.com data:;
        style-src 'self' http://js.arcgis.com 'unsafe-inline';
        script-src 'self' http://js.arcgis.com 'unsafe-eval'">
```

**Policy
Directives**

Geolocation with PhoneGap



Geolocation with PhoneGap

Same coding pattern.

Works online and offline

Approximate location

Still always requires user opt-in.

Geolocation with PhoneGap

Can allow for passive location

Does not increase accuracy

Does not speed up acquisitions times

Outdoors – turn off WiFi!

github.com/Esri/html5-geolocation-tool-js

Geolocation (online)

Online location

- Location Service (Google, Microsoft, Apple)
- WiFi info
- GPS
- Cell network info

Geolocation (offline)

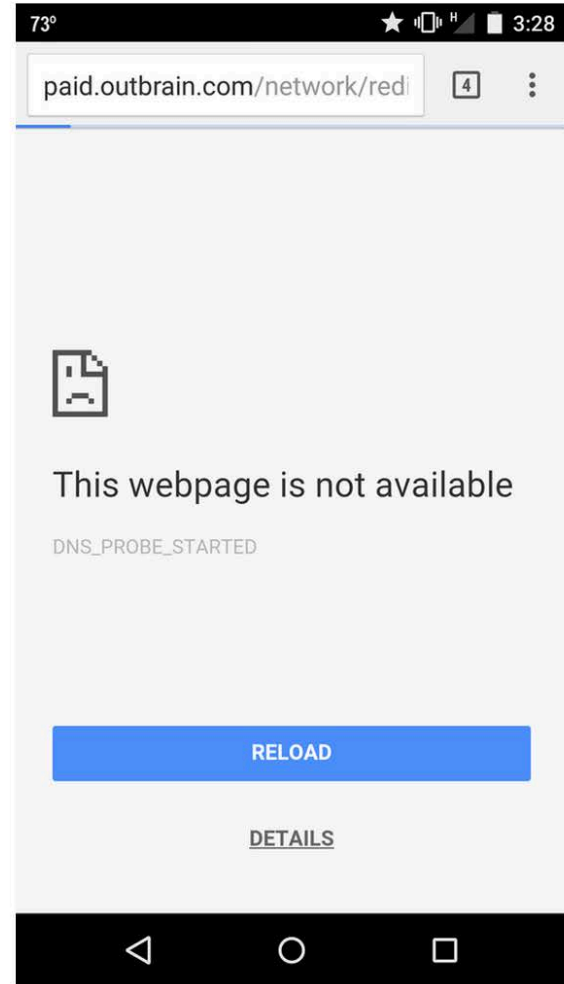
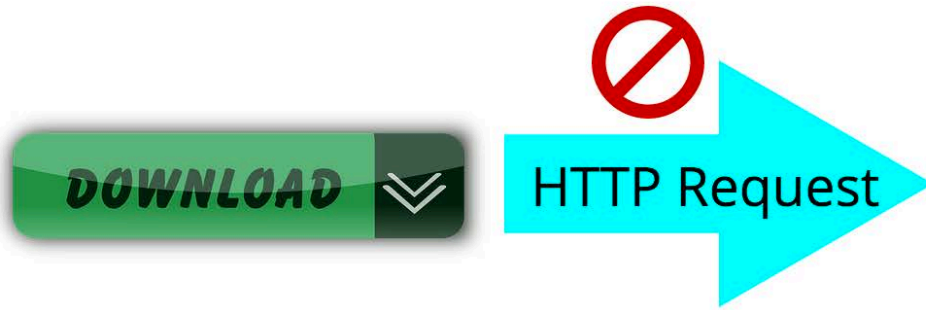
Offline location determination

- GPS only!!

Offline JS



Bad pattern!



Good pattern!



Offline JS

Intermittent or no internet

Ability to reload or restart app offline

Lightweight cross-browser functionality

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

Offline JS

Offline tiled maps for small areas

Offline editing and basic attachments

Offline TPKs (Tile Packages)

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

Offline JS – detect network status

[github.hubspot.com/offline](https://github.com/hubspot/offline)

[cordova-plugin-network-information](#)

cordova-plugin-network-information

```
function checkConnection() {  
    var networkState = navigator.connection.type;  
  
    var states = {};  
    states[Connection.UNKNOWN] = 'Unknown connection';  
    states[Connection.ETHERNET] = 'Ethernet connection';  
    states[Connection.WIFI] = 'WiFi connection';  
    states[Connection.CELL_2G] = 'Cell 2G connection';  
    states[Connection.CELL_3G] = 'Cell 3G connection';  
    states[Connection.CELL_4G] = 'Cell 4G connection';  
    states[Connection.CELL] = 'Cell generic connection';  
    states[Connection.NONE] = 'No network connection';  
  
    alert('Connection type: ' + states[networkState]);  
}  
  
checkConnection();
```

`cordova-plugin-network-information`

Caveats:

Use in addition to `Offline.js`

Mainly benefits Android users

iOS can't detect connection type

Emulators may return `Connection.UNKNOWN`

Offline JS

More good info:

slides.com/andyg/offline-js

andygup.net/web-mobile/

Offline JS

Need a full features, robust offline solution?

- ArcGIS Runtime SDKs
- Integrated offline support for editing and sync
- Support for related tables, domains, subtypes and more.

Best practices

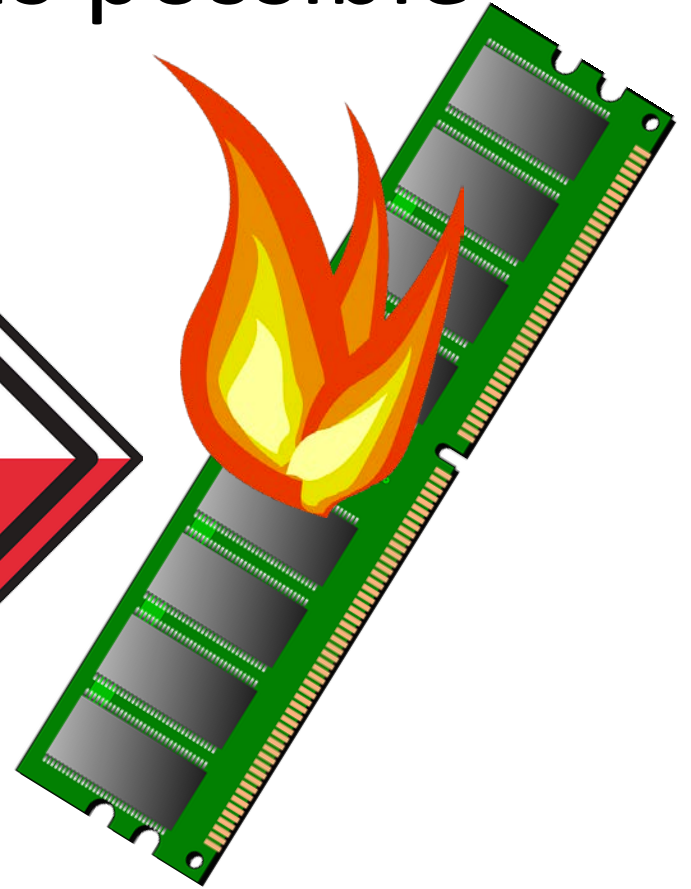
Monitor & handle offline conditions

Protect all HTTP requests

Host HTML, CSS, JS and images locally

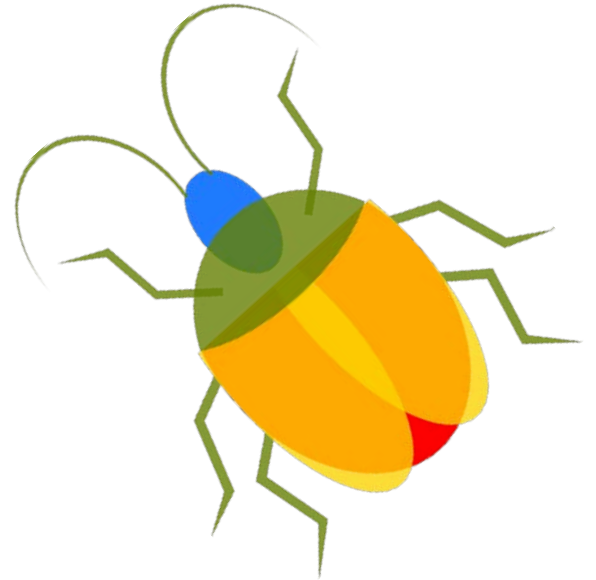
Cache resources when feasible

Use as little memory as possible



Bonus slide – Debugging!

Chrome and Safari remote debugging



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Understanding our world.