Comp 322/422 - Software Development for Wireless and Mobile Devices

Fall Semester 2019 - Week 3

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Cordova app - test with local tools

- default testing options with Cordova CLI include
  - *`emulate` and `run`*
- many options available as well...
- e.g. Cordova testing tools
- Genymotion - target at Android development, testing, and provision
  - *professional development and testing options available*
  - *further details at https://www.genymotion.com*

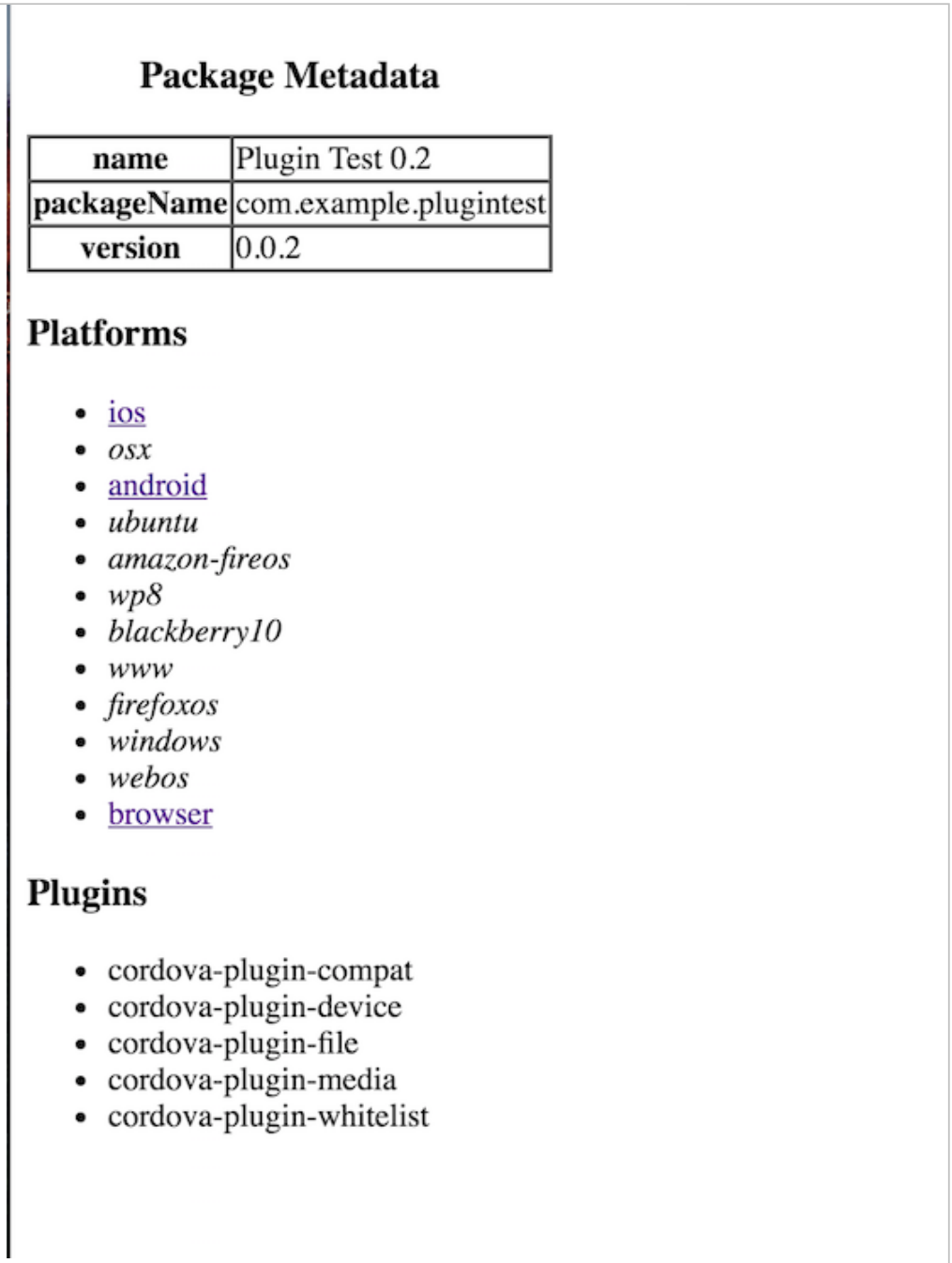
Cordova app - test with local tools - `serve`

- Cordova also provides the option to **serve** a current app
- `serve` as self-hosted site for testing

```
cordova serve
```

- start a local static file server at `http://localhost:8000`
  - *then navigate to a given platform's directory*
  - *and the associated project UI and build*
  - *useful for UI testing and quick development*

Image - Cordova app - test with local server - `serve`



Package Metadata

name	Plugin Test 0.2
packageName	com.example.plugintest
version	0.0.2

Platforms

- ios
- *osx*
- android
- *ubuntu*
- *amazon-fireos*
- *wp8*
- *blackberry10*
- *www*
- *firefoxos*
- *windows*
- *webos*
- browser

Plugins

- cordova-plugin-compat
- cordova-plugin-device
- cordova-plugin-file
- cordova-plugin-media
- cordova-plugin-whitelist

Cordova app - test with local server - serve

Cordova app - test with local tools - Chrome browser and device

- test and develop Android applications with **devices** on Chrome browser
- after running our app on a connected device, e.g.

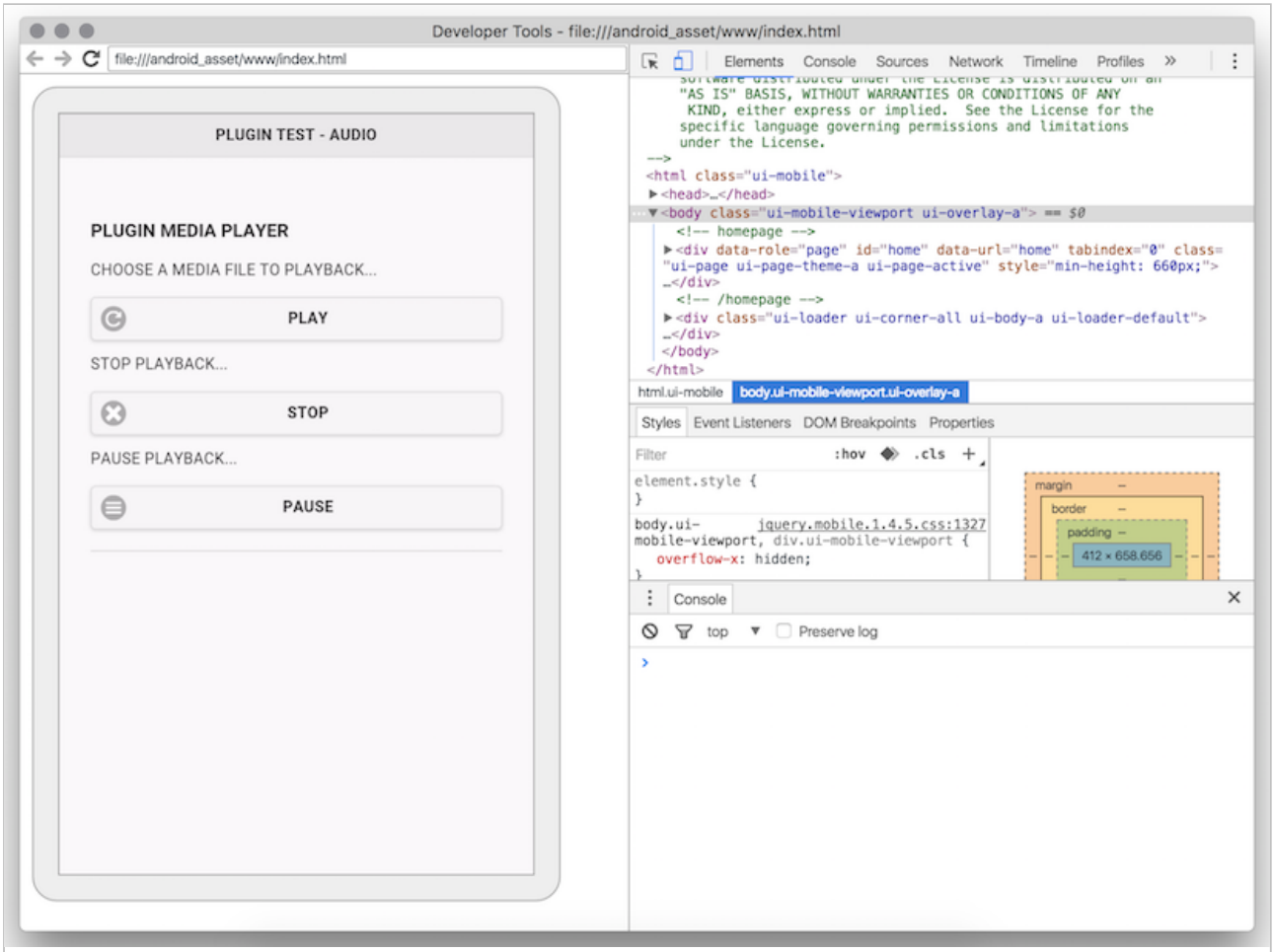
```
cordova run android
```

- inspect the app using Chrome's developer tools at the following URL,

```
chrome://inspect/#devices
```

- then select the option to `inspect` a connected device
- shows window with the standard Chrome developer tools and options
  - *inspect the DOM, JS console, styles, and so on...*
  - *use inspect option to control, navigate, and interact with our running app*

Image - Cordova app - test with local server - Chrome & Device

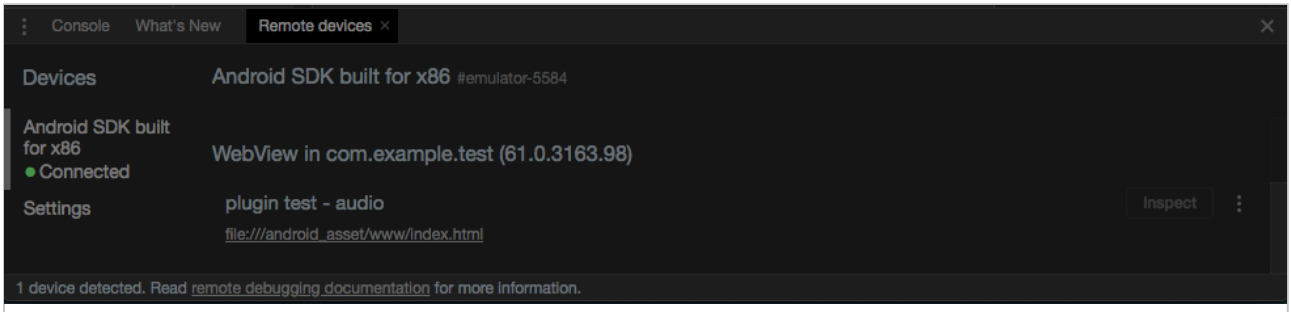


Cordova app - test with local server - Chrome dev tools with device

Cordova app - test with local tools - Chrome browser and emulator

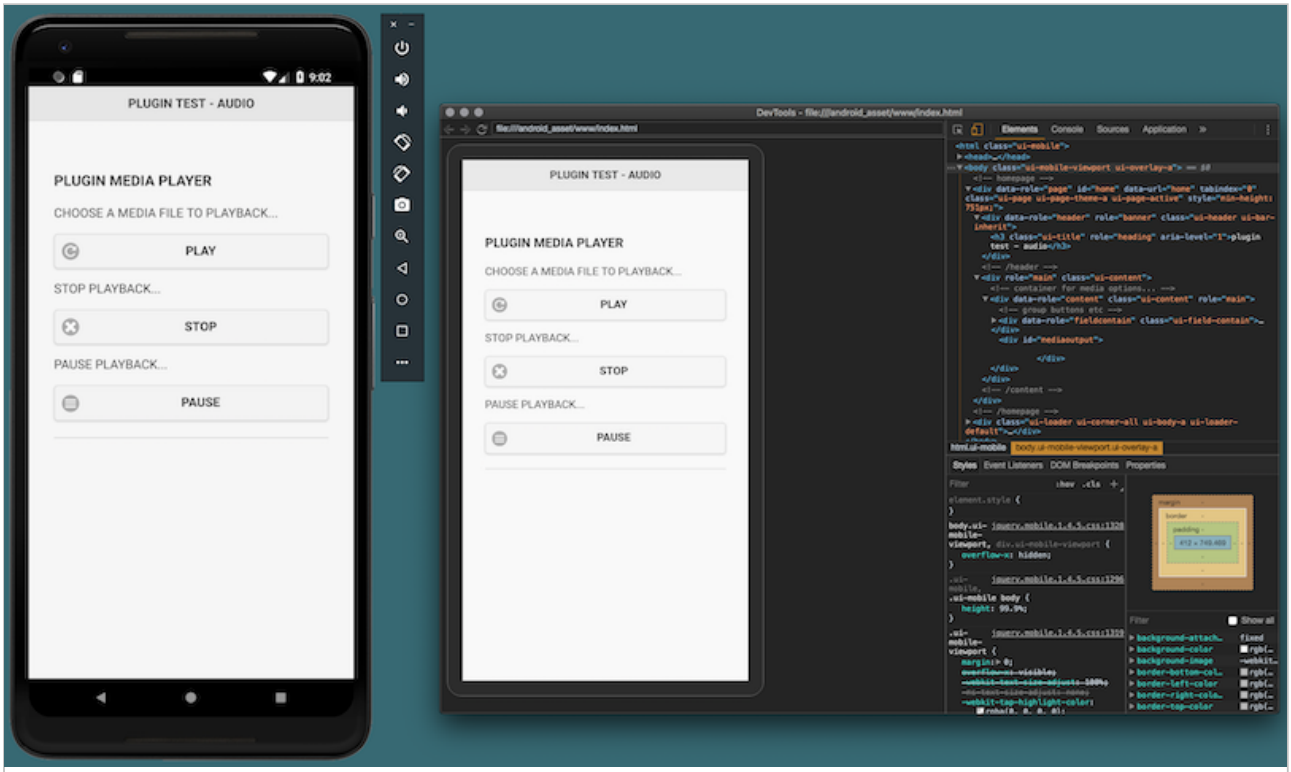
- in Chrome, select 'developer tools - more tools - remote devices'
- select name of device
- select **inspect** option next to name of app
  - *name corresponds to app on emulator*
- inspect opens standard Dev Tools window
  - *elements, console, memory, application, network &c.*

Image - Cordova app - test with local server - Chrome remote devices



Cordova app - test with local server - Chrome remote devices

Image - Cordova app - test with local server - Chrome remote devices



Cordova app - test with local server - Chrome dev tools with emulator

Cordova app - test with Browser platform

- Cordova recently added a **Browser** platform option
- use to create a quasi-test environment for our apps
- install browser support as a standard platform

```
cordova platform add browser
```

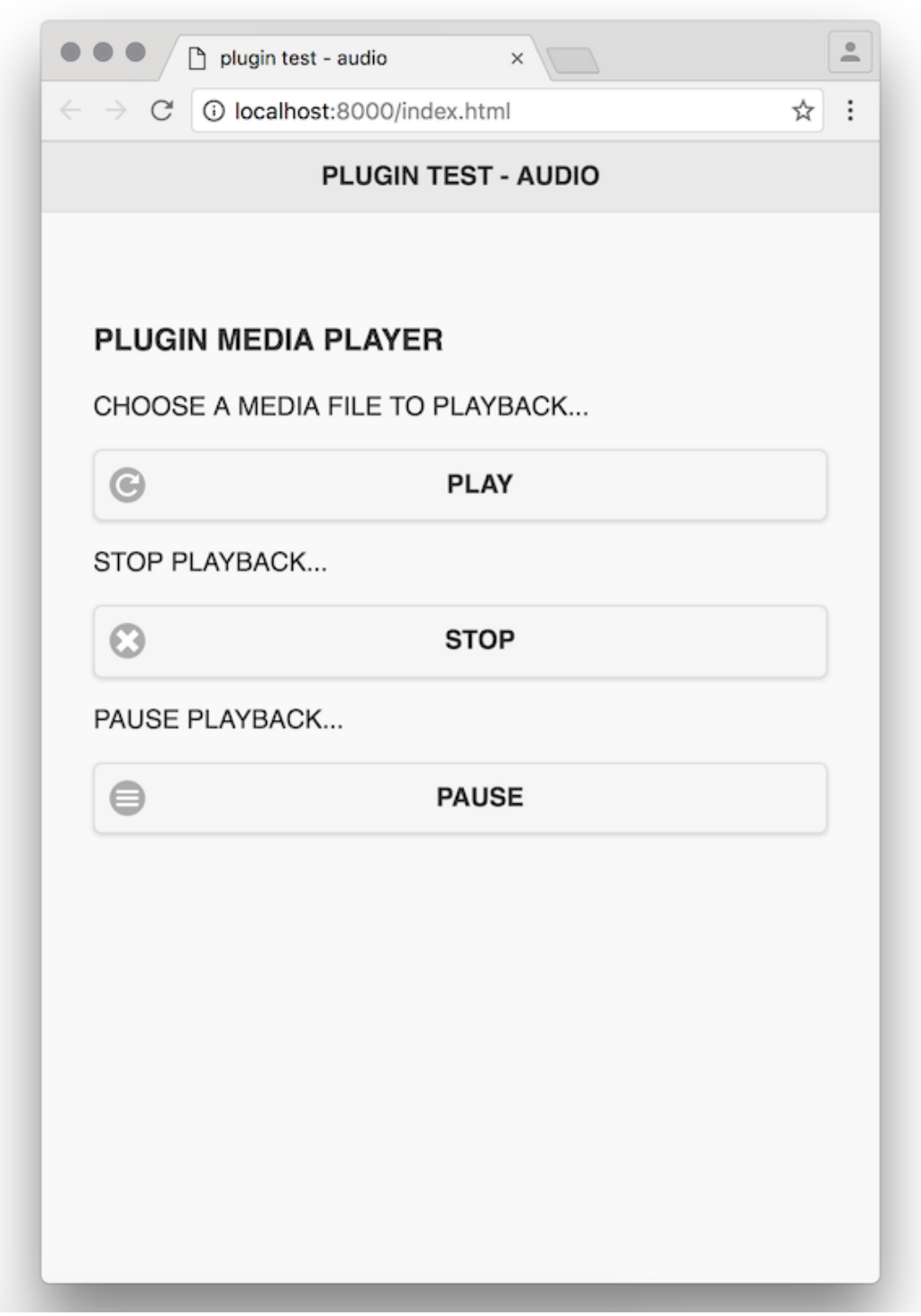
- load our app into the browser using the following command,

```
cordova run browser
```

- platform will be useful for testing UI design and development
- many of the plugins are supported as well
  - *e.g. camera*

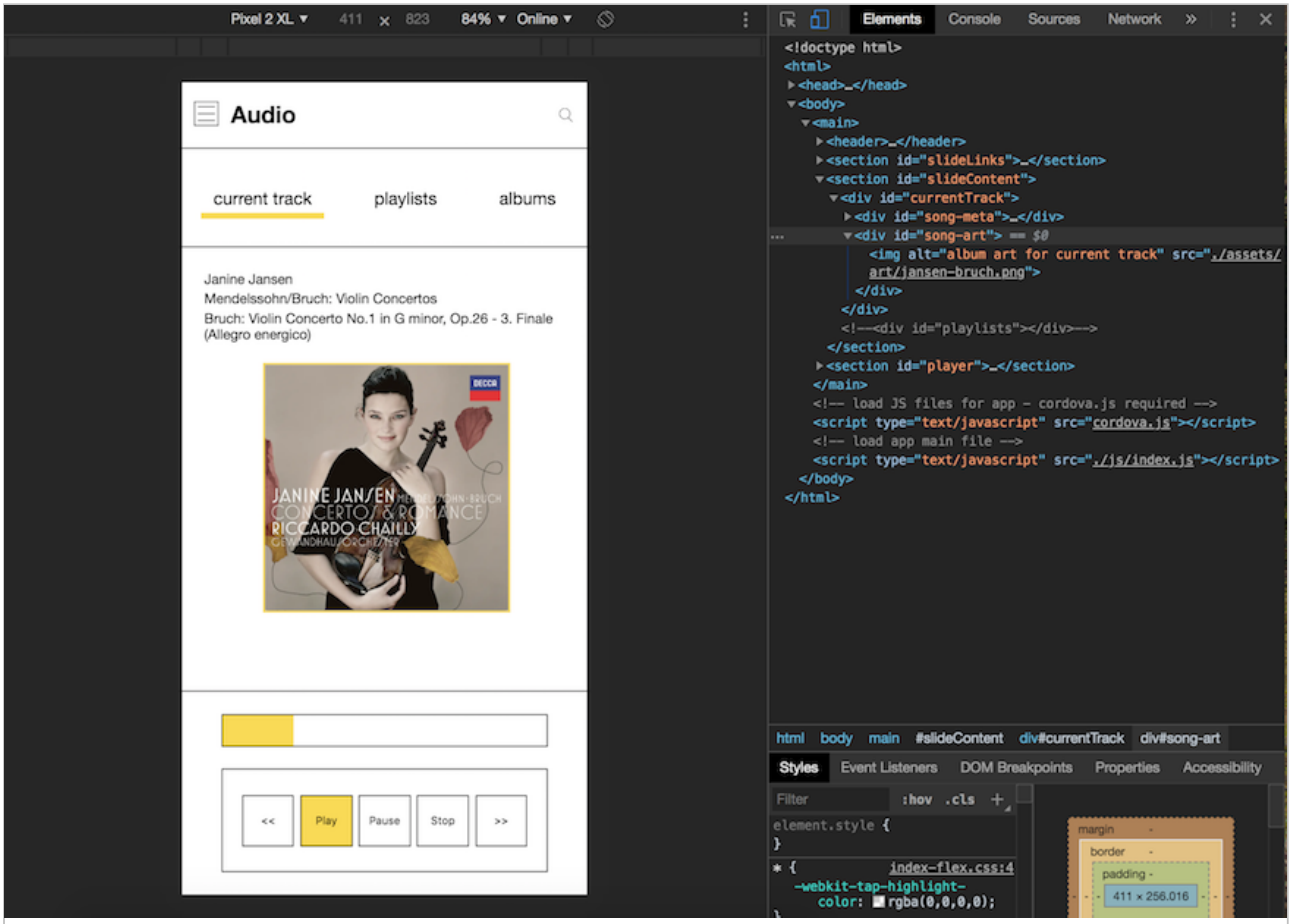
n.b. *other options better for testing development of custom or OS level Android or iOS features...*

Image - Cordova app - test with browser platform



Cordova app - browser platform

Image - Cordova app - test with browser platform - Chrome Dev Tools



Cordova app - browser platform - Chrome DEV tools

Cordova app - testing and automation with Microsoft's App Center

- App Center
- AppCenter Testing

Cordova app - automation with FastLane

- Fastlane - Overview

Mobile Design - Touch Events & Interaction

Fun exercise

Choose one of the following app types,

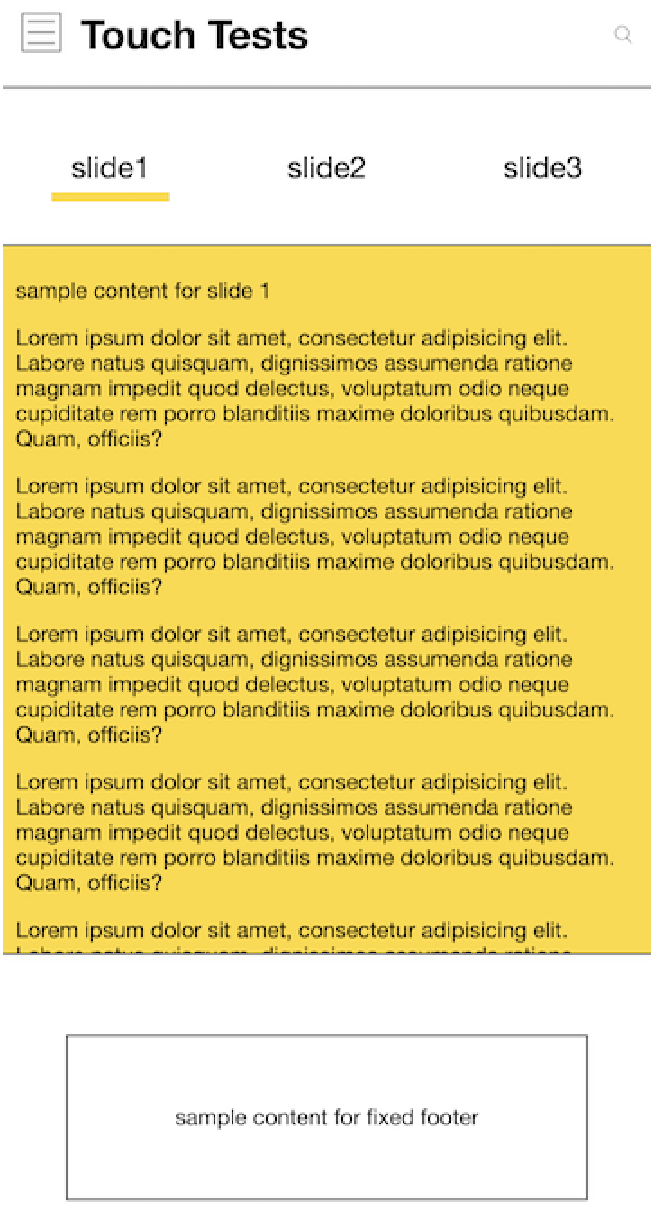
- mobile game - genre &c. is your choice...
- media app - audio or video (or both) playback options...
- fitness and geolocation app - track exercise, find locations &c.

Then, consider the following

- required **touch** events within this app
- role of these events relative to executed action
  - *i.e. what is the expected result of a touch event in the UI*
  - *consider logic and code execution...*
- UX options associated to a given touch event
  - *i.e. what is updated or added in the UI design*
  - *e.g. highlights, animations &c.*

~ 10 minutes

Image - Mobile Design - Touch Events & Interaction

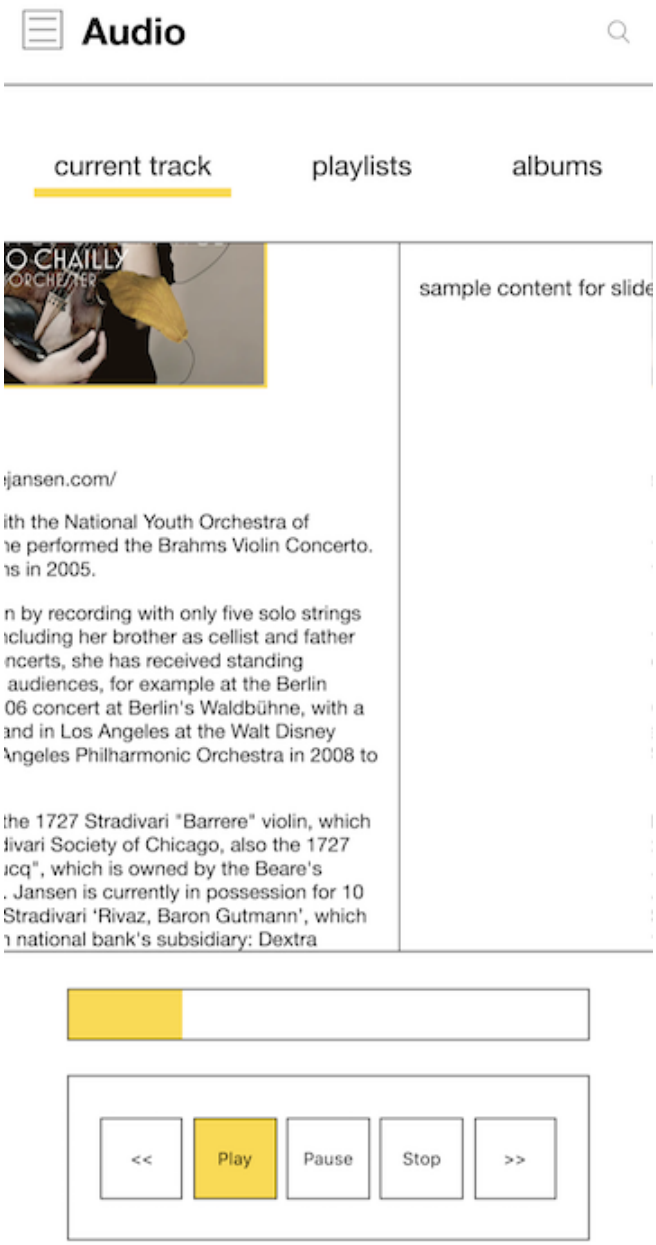


Mobile Design - Touch Events & Interaction

Image - Mobile Design - Touch Events & Interaction - Basic Audio

Mobile Design - Touch Events & Interaction - Basic Audio

Image - Mobile Design - Touch Events & Interaction - Basic Audio - Scroll



Mobile Design - Touch Events & Interaction - Basic Audio - Scroll

Cordova app - templates - basic

- Cordova default template for project structure
  - `create` *command used for basic structure...*
- create custom, reusable template for a new project
  - *e.g. create starting template for tabs, menu &c. based app...*
- to create a custom template
  - *start with new project structure for Cordova*
  - *then modify to create and configure app structure*
  - *set required icons, splashscreens, designs &c. for template*
- then we can start to package a reusable template

Cordova app - templates - structure

- each template uses the following directory structure

```
|-- template_package
    |__ package.json
    |__ index.js
    |__ template_src
        |__ ... (app template contents...)
```

- template specific code is added to `template_src` directory
- `package.json` includes reference to template's `index.js` file
- `index.js` used to export reference to `template_src` directory

Cordova app - templates - `template_src`

- `template_src` usually includes the following structure

```
|-- hooks (add custom hooks for template, app &c...)
|-- www
    |__ css
        |__ index.css
    |__ img
        |__ logo.png
    |__ js
        |__ index.js
    |__ index.html
|-- config.xml
```

- add any custom scripts to the `hooks` directory
- design and build our template in the `www` directory
- `template_src/config.xml` will usually follow pattern of default Cordova config
- then add template customisations, e.g.
  - *name, description, icons, splashscreens...if necessary*

Cordova app - templates - `package.json`

- `package.json` includes template specific metadata
  - *add keyword `cordova:template` & `ecosystem:cordova`*
  - *used for package distribution, e.g. NPM*
- add reference to `index.js`

```
"main": "index.js"
```

- output will be similar to a standard NPM `package.json` file
  - *created for NPM package management*
  - *then initialised using the command,*

```
npm init
```

Cordova app - templates - template `index.js`

- then add necessary export reference for `template_src` to our template `index.js` file
  - *follows a standard pattern*

```
var path = require('path');

module.exports = {
    dirname : path.join(__dirname, 'template_src')
};
```

Cordova app - templates - finish & create

- template is now ready to be published and shared online
  - *use NPM, GitHub, &c.*
- use as the template for a new local project

```
cordova create basic com.example.basic BasicTemplate --template <path-to-template
```

- add the local directory path for the custom template
  - *replace `<path-to-template` with local directory for template...*
- creates new Cordova project with custom template
  - *uses `template_src` for the project*

Cordova app - API plugin examples

- a few API plugins to consider
  - *accelerometer*
  - *camera*
  - *connection*
  - *device*
  - *file*
  - *geolocation*
  - *InAppBrowser*
  - *media and capture*
  - *notification*
  - *StatusBar*
  - ...

Data considerations in mobile apps

- no one size fits all model for mobile
- can't just default to the server-side for reading and writing data
- our app may become useless if we rely heavily on remote data
  - *lose our network connection*
  - *run out of monthly data allowance*
  - *or end up with throttled or restricted data on a poor network, e.g. 2G*
- Facebook's introduction of **2G Tuesdays**
  - *remind employees, developers of 2G limitations and issues around the world*
- also need to consider
  - *data security, read and write privileges for certain data stores, authentication for remote sources...*
- careful consideration of the options for reading and writing data
  - *a crucial aspect of our app's planning and subsequent development*

Cordova app - API plugin examples - plugin test 3

setup

- create our initial plugin test shell application

```
cordova create plugintest3 com.example.plugintest plugintest3
```

- add any required plaforms, e.g. Android, iOS, Windows Phone...
  - *we'll add iOS as well*

```
cordova platform add android --save
```

- then update the default `www` directory
- modify the initial settings in our app's `config.xml` file
- then run an initial test to ensure the shell application loads correctly
  - *run in the Android emulator or*
  - *run on a connected Android device*

```
cordova emulate android
```

- or

```
cordova run android
```

Cordova app - API plugin examples - plugin test 3

setup

- also add support for iOS development

```
cordova platform add ios --save
```

- running a test application on iOS is not as simple as Android
- need to add support to Cordova for a local iOS simulator
  - *add package for iOS simulator using* ***npm***
  - ***NB****: may require admin or sudo permissions to install correctly*

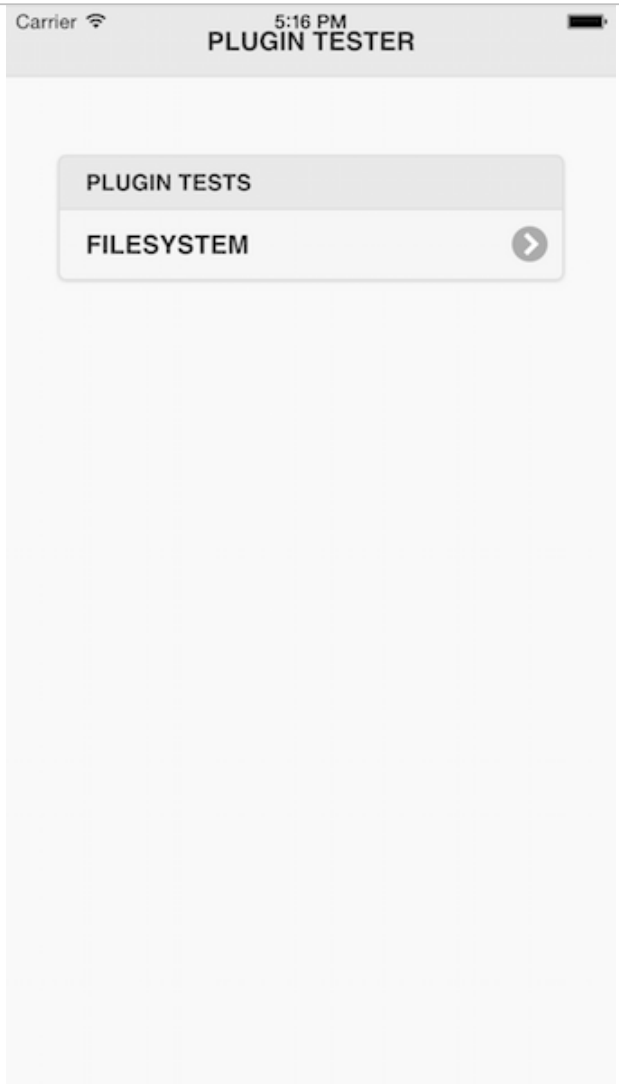
```
npm install -g ios-sim
```

- then run our Cordova app from the working directory

```
cordova run ios
```

- Cordova will try to load the application using this local simulator
  - *without defaulting to Xcode*
- quickly test our iOS application with this simulator

Image - iOS Local Simulator



iOS Simulator - running locally on OS X

Cordova app - API plugin examples - plugin test 3

iOS simulator - options

- iOS simulator gives us many useful options
  - *helpful ways to test our local Cordova based iOS applications*
- emulate many different devices
  - *from the iPhone SE to the iPhone X and various iPads...*
- mimic many of these device's hardware features
  - *such as rotate, shake, different keyboards...*
  - *also output to a simulated Apple Watch device*
- various debugging options available within this simulator
  - *including ability to mimic locations for GPS enabled applications*
- quickly take a screenshot of the current application screen within the simulator

Cordova app - API plugin examples - plugin test 3

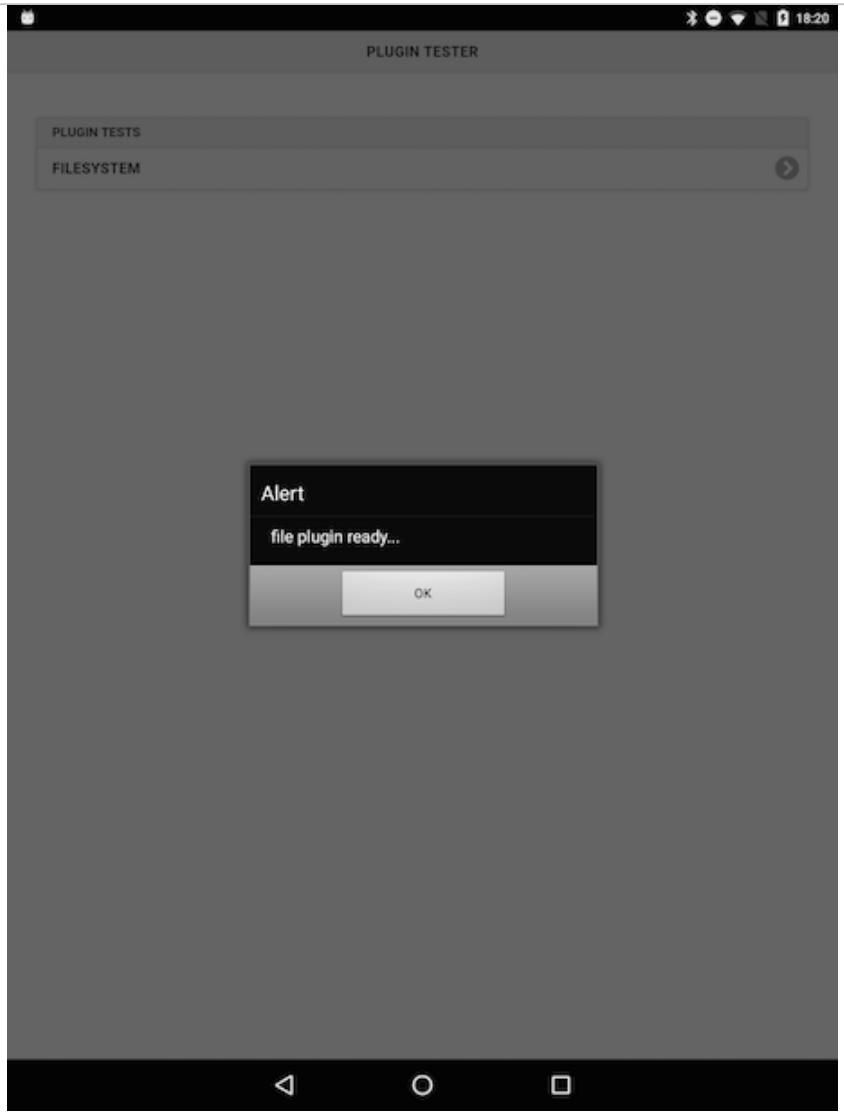
plugins - add filesystem

- add and use the **file** plugin
- plugin has been designed to permit read and write access to files
  - *files are stored on the local device for Cordova applications*
- **file** plugin is initially based on open specifications
  - *includes the **HTML5 File API**, W3C's **FileWriter** specification...*
- add the file plugin to our test application using the standard CLI command

```
cordova plugin add cordova-plugin-file
```

- command will install plugin for all currently installed platforms
  - *includes Android and iOS for our test application*

Image - API Plugin Tester - file



API Plugin Tester - file plugin ready

Cordova app - API plugin examples - plugin test 3

plugins - test filesystem

- using this plugin we can read local files from within the filesystem
- we could read a file from within our Cordova application
  - *e.g. located in the following directory*

```
...
|- www
   |- docs
      |- txt
         |- madeira.txt
```

- we can use the available global `cordova.file` object
- to be able to use the URL for our text document in the file-system directory
  - *convert it to a `DirectoryEntry` using*

```
window.resolveLocalFileSystemURL()
```

- in our standard `onDeviceReady()` function
  - *use this global object to resolve the URL of our file*
  - *then pass to specified callbacks for success and fail*

```
window.resolveLocalFileSystemURL(cordova.file.applicationDirectory +
"www/docs/txt/madeira.txt", onSuccess, onFail);
```

Image - API Plugin Tester - file

API Plugin Tester - read an app txt file

Cordova app - API plugin examples - plugin test 3

plugins - test filesystem `onSuccess`

- render this text after retrieving from the requested file
  - *update our `onSuccess()` function to output the file's content*

```
function onSuccess(data) {
  data.file(function(file) {
    var readFile = new FileReader();
    readFile.onloadend = function(e) {
      //output result as required by app...
      // e.g this.result
    }
    readFile.readAsText(file);
  });
}
```

- call the `file()` method on our returned file data
  - *effectively gives us a hook/handle into the file*
  - *we can now work with the returned file data*
- then call the `FileReader()` method from the **FileAPI**
  - *and process the returned text*
- output to our specified HTML element
  - *using a standard selector with the `html()` method*

Cordova app - API plugin examples - plugin test 3

plugins - test filesystem `onFail()`

- complement to the `onSuccess()` function
- now add our function `onFail()` for the fail callback
- test it with the returned error code

```
function onFail(error) {
  console.log("FileSystem Error"+error.code);
  // output error and code as required in app...
  // e.g error.code
}
```

- uses the passed error object
  - *returns a code for rendering in the specified selector*
- obviously does not make a lot of sense to our user

Cordova app - API plugin examples - plugin test 3

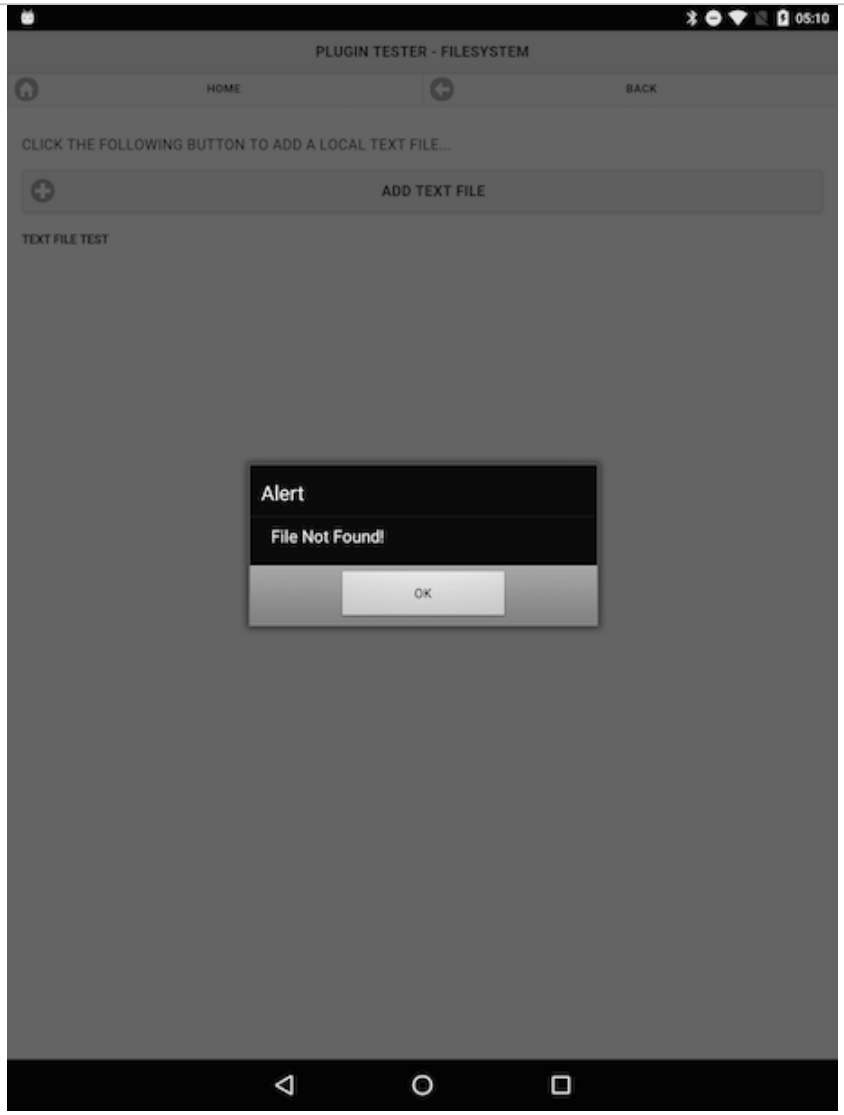
plugins - test filesystem `onFail()`

- we can use a conditional statement to check for certain returned error codes
  - *then output a meaningful error message to the user in the application*

```
function onFail(error) {
  switch(error.code) {
    case 1:
    alert('File Not Found!');
    break;
    //add other options to cover additional error codes...
    default:
    alert('An error occurred reading this file.');
  };
}
```

- now output more graceful error messages and feedback to the user

Image - API Plugin Tester - file



API Plugin Tester - output error message

Cordova app - API plugin examples - plugin test 3

plugins - test filesystem with event

- easily link file loading to a given event, such as a user tap event
- instead of loading the file by default with the `onDeviceReady()` function
  - *get the contents of our file when needed by the user*
- link this to a button event, a separate page init event...
  - *touch event on button, link &c.*
- then call our local file as before within its own function, `getTxtFile()`

Image - API Plugin Tester - file

API Plugin Tester - event file loader

Cordova app - API plugin examples - plugin test 3

plugins - test filesystem with file write

- now read files from the local device's native storage thanks to Cordova's File plugin
- file plugin also offers an option to write to files in the same local filesystem
- quickly create a test app for writing to files
- create your project
- `cd` to app's working directory
- add required platforms
- add our required Cordova API plugin for working with the file system
- run usual initial tests for app loading, `deviceready` event...

Cordova app - API plugin examples - plugin test 3

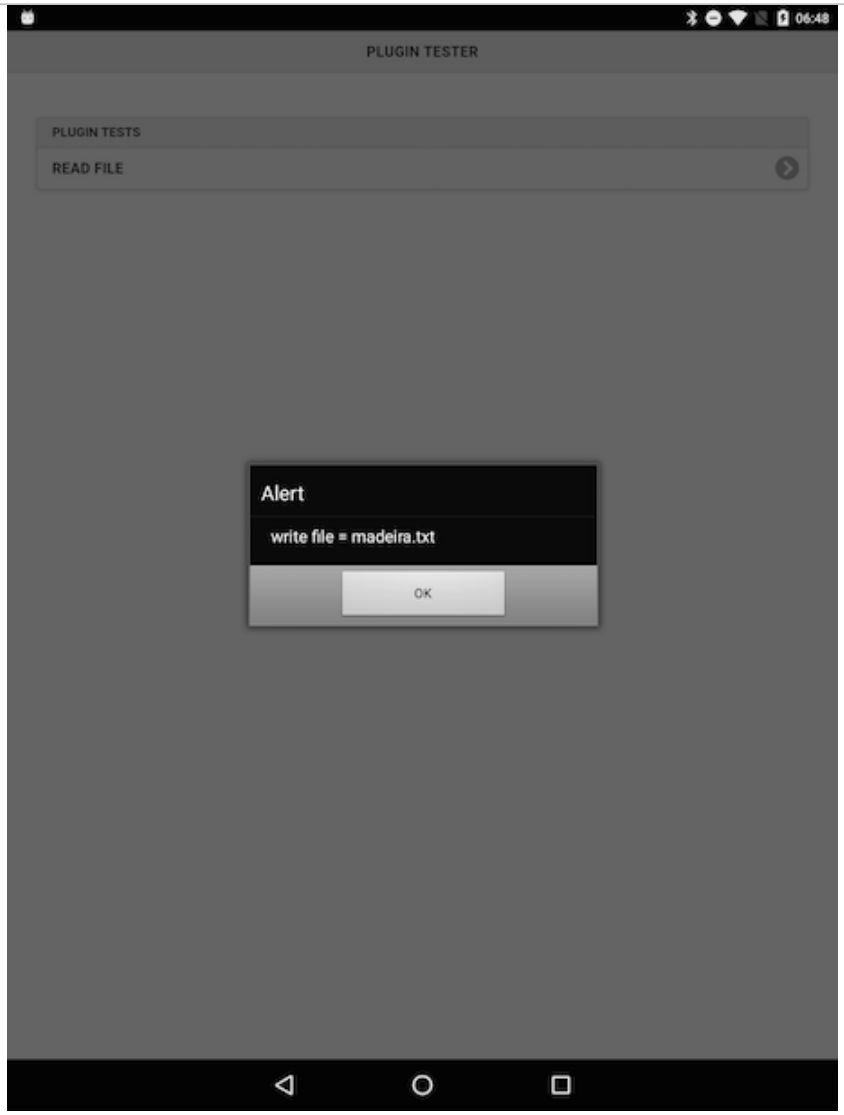
plugins - test filesystem with file write

- now start to add writing to a file to our test app
- start, as we did with file reading, by getting a hook/handle to a file
- we can then write to a file within the assigned app's data directory
  - *specific app directory has read and write access*
  - *allows us to create files as needed for our app*
  - *then read and write within the confines of the native app*
- use `window.resolveLocalFileSystemURL` to allow us to work with this data directory

```
var fileDir = cordova.file.dataDirectory;
window.resolveLocalFileSystemURL(fileDir, function(dir) {
// do something useful...
});
```

- in application specific directory get our required file for writing

Image - API Plugin Tester - file



API Plugin Tester - get file for writing

Cordova app - API plugin examples - plugin test 3

plugins - test filesystem with file write

- create a new file if it doesn't exist on app loading
- use directory object with `getFile()` method etc...
  - *set flag to create a new file*

```
window.resolveLocalFileSystemURL(fileDir, function(dir) {
dir.getFile("madeira.txt", {create:true}, function(file) {
//do something useful
});
});
```

- pass file object to other functions for processing...
- create our write function to check and write to specified file within app's data directory

Cordova app - API plugin examples - plugin test 3

plugins - test filesystem with file write

- now write some simple text to our file

```
function writeTxtFile(data) {
  //check passed data for writing
  if (data !== "") {
    //new text to write to file
    var text = data;
    //use write file object
    writeObj.createWriter(function(writeFile) {
      //call seek() to ensure we append to end of file
      writeFile.seek(writeFile.length);
      //create raw Blob for writing
      var textBlob = new Blob([text], {type:'text/plain'});
      //write to the end of the file
      writeFile.write(textBlob);
    });
  }
}
```

Cordova app - API plugin examples - plugin test 3

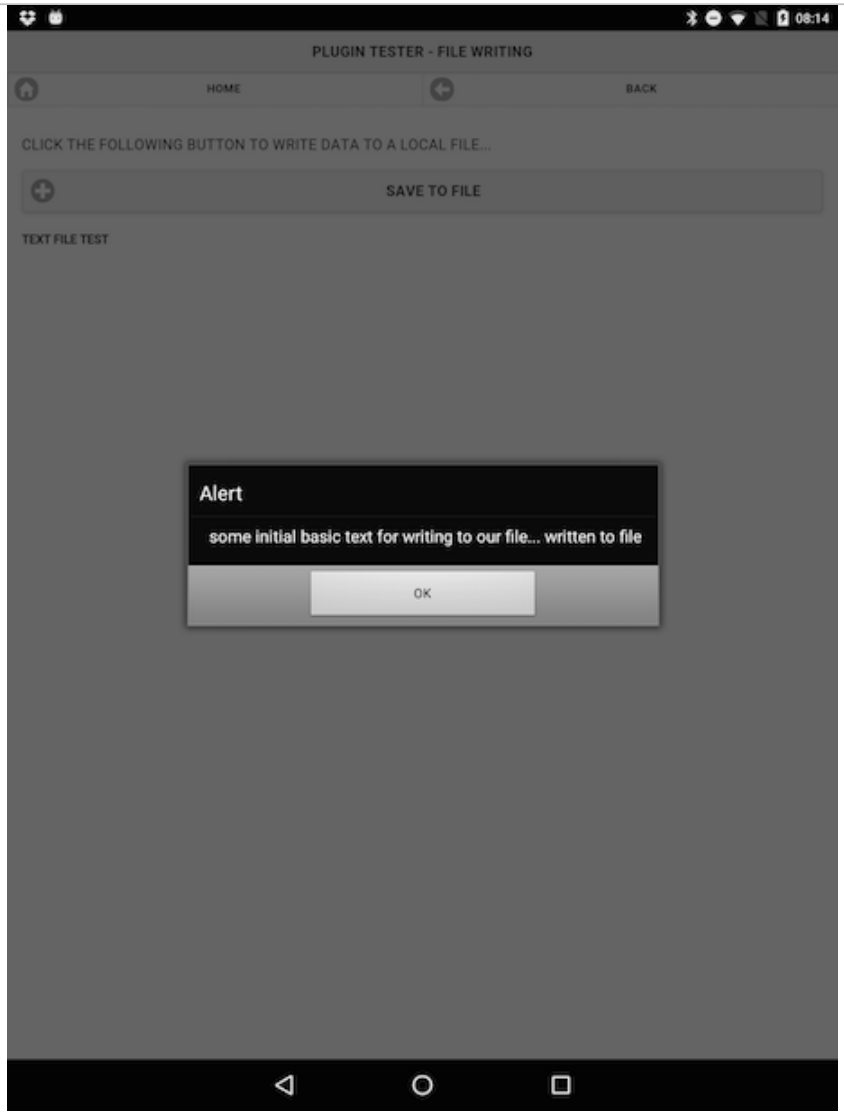
plugins - test filesystem with file write

- then call this `writeTxt()` as needed within our application
  - *e.g. calling it from event handler for a button tap*
- could easily get text to write from an input field, from metadata...
- then pass it to our `writeTxtFile()` function for writing

e.g.

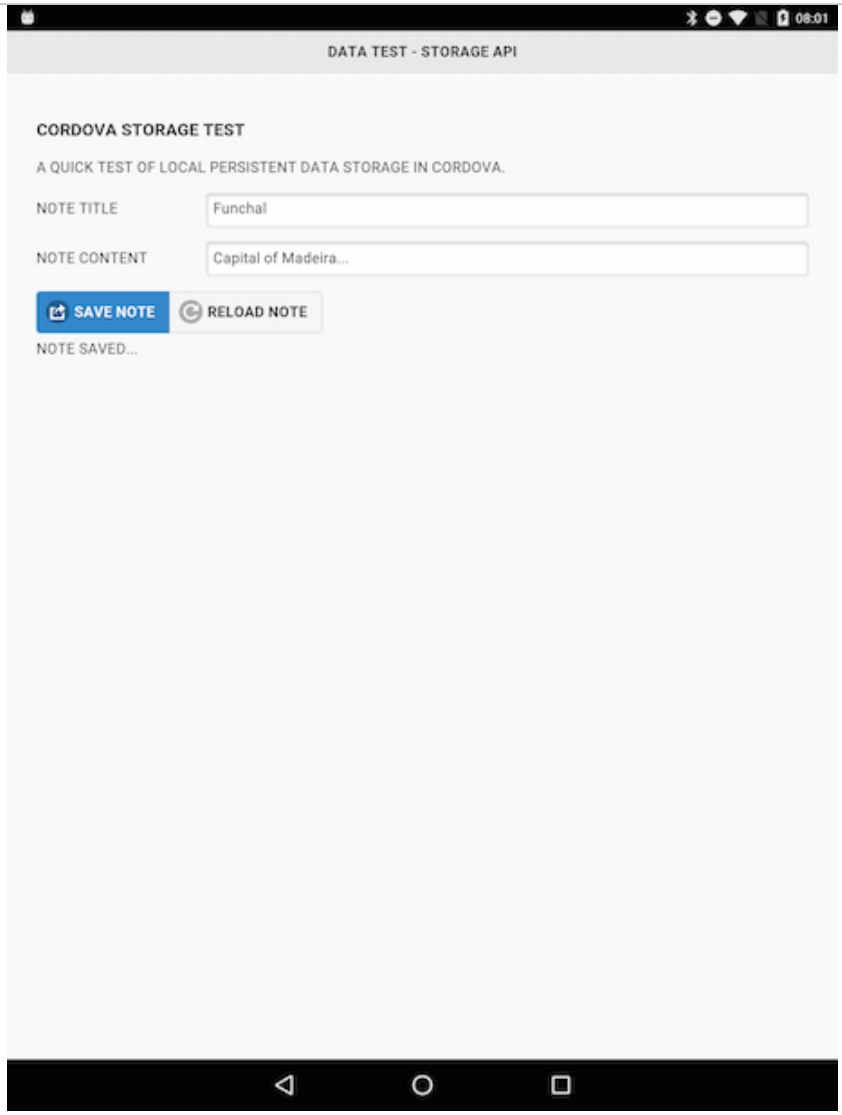
```
writeTxtFile("some initial basic text for writing to our file...");
```

Image - API Plugin Tester - file



API Plugin Tester - text written to file

Image - Data Tester



DataTest1 - save a note

Cordova app - LocalStorage - data test 1

app logic - save.js

- need to handle events for our `reloadNote` button
- retrieve our notes data
  - *loaded by calling the `reloadNoteData()` function*
- uses the main app object, `storageNotes`
  - *gets the defined key for our notes*
- use this key to retrieve stored *stringified* JSON object
- then use `JSON.parse()` to convert the *stringified* object to a plain JSON object
  - *contains our note information*
- use this note information
  - *populate form fields*
  - *output our notes for rendering to the DOM*

Cordova app - LocalStorage - data test I

app logic - save.js - reload button handler

- event handler for reload button
  - *call `reloadNoteData()`*
  - *output and update result...*
- reload note data

```
function reloadNoteData() {
  var noteInfo = JSON.parse(storageNotes.get(NOTE_KEY));
  loadFormFields(noteInfo);
  noteOutput(noteInfo);
}
```

- load form fields data

```
function loadFormFields(data) {
  if (data) {
    document.getElementById('noteName').value = data.noteName;
    document.getElementById('noteContent').value = data.noteContent;
  }
}
```

Cordova app - LocalStorage - data test 1

app logic - save.js

- pageinit event
  - *eg: check and validate the rendered form for our notes*
- to validate our form we specify
  - *a set of options as a parameter to* `validate()`
  - *many different options available*
  - *eg: add a* `rules` *object,* `messages` *object...*
- in the `rules` object
  - *set both input fields as required*
- then reload our note data
  - *update the application accordingly*

Cordova app - LocalStorage - data test 1

app logic - save.js - pageshow event

```
    $("#noteForm").validate({
      rules: {
        noteName: "required",
        noteContent: "required"
      },
      messages: {
        noteName: "Add title for note",
        noteContent: "Add your note"
      }
    });
```

Cordova app - LocalStorage - data test I

app logic - storagenotes.js

- add another new JS file, `storagenotes.js`
  - *store the logic for getting and setting of data with `localStorage`*
- start by creating a singleton object for this instance
- creating this object to ensure that we only have one instance
- create this object by calling the `getInstance()` function
  - *in effect, the guardian to the instance object for the application*
- function also highlights a pattern known as `Lazy Load`
  - *checks to see if an instance has already been created*
- if not, create one and then store for future reference
- all subsequent calls will now received this stored reference
- this pattern is particularly useful for mobile development
- helps us save CPU and memory usage within an application
  - *an object is only created when it is actually needed*
- gives us a single object with getters and setters for the local storage

Cordova app - LocalStorage - data test I

app logic - storagenotes.js

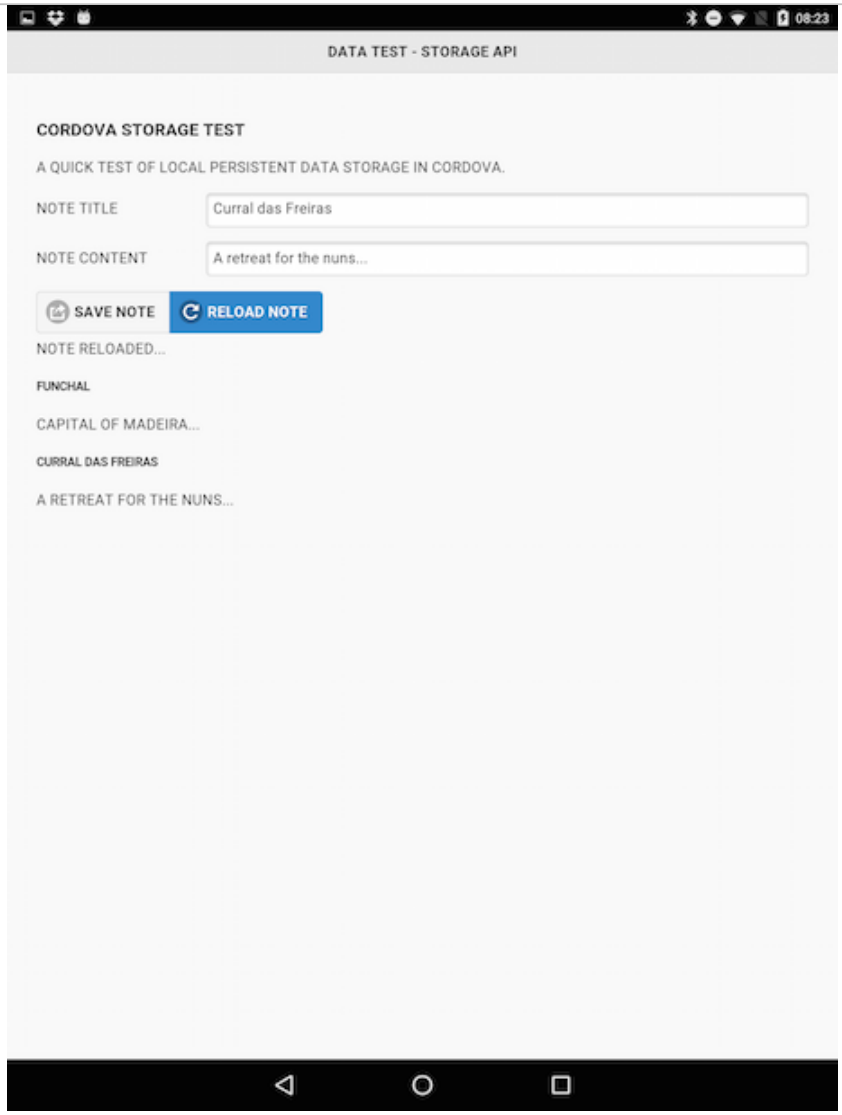
```
var NotesManager = (function () {
  var instance;

  function createNoteObject() {
      return {
        set: function (key, value) {
          window.localStorage.setItem(key, value);
        },
        get: function (key) {
          return window.localStorage.getItem(key);
        }
      };
  };

  return {
    getInstance: function () {
      if (!instance) {
        instance = createNoteObject();
      }
      return instance;
    }
  };

})();
```

Image - Data Tester



DataTest1 - update the notes

Cordova app - API plugin examples - plugin test 4

plugins - geolocation

- add and use Cordova's **Geolocation** plugin
- helps us provide information about current location of user's device
- plugin returns data on device's location
  - *including latitude and longitude*
- plugin can use the following to help determine location
  - *GPS, network signals, phone network IDs...*
- API has been developed around the W3C's **Geolocation API Specification**
- **n.b.** may not always be able to return a reliable location due to
  - *location restrictions*
  - *lack of access to a network*
  - *a user may reject location tracking and awareness...*
- need to be aware of potential privacy and security concerns
  - *application's privacy policy important*
  - *how we collect and whether we store data or not*
  - *how and when we share such data with 3rd-party services*
- consider offering user a simple opt-in/out option for location services
  - *app needs fallback options to cover lack of location services*

Cordova app - API plugin examples - plugin test 4

plugins - geolocation

- now create our test application for the **geolocation** plugin

```
cordova create plugintestgeo com.example.plugintest PluginTestGeo
```

- add our required platforms for support and development,

```
cordova platform add android --save
```

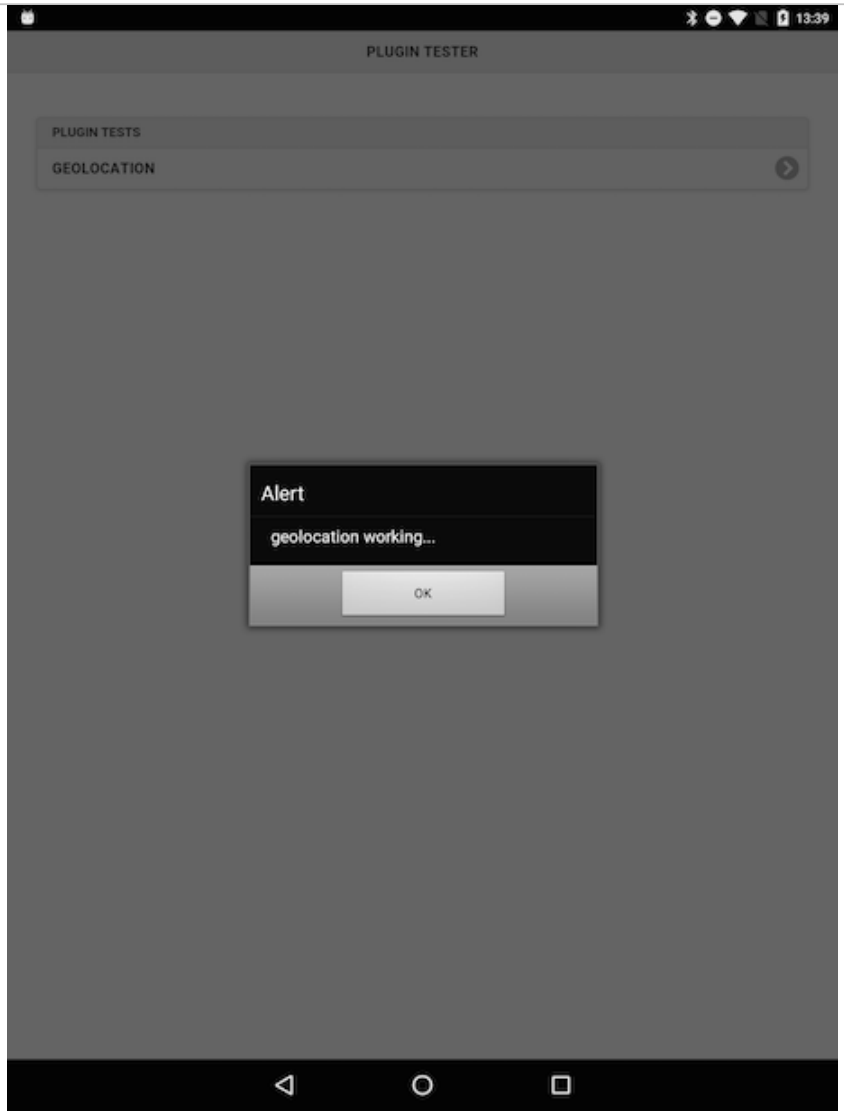
- update the `www` directory, modify initial settings in `config.xml`, and run initial test

```
//test in the Android emulator
cordova emulate android
//test on a connected Android device
cordova run android
```

- add **geolocation** plugin to our new project using the Cordova CLI

```
//cordova version 5.0+
cordova plugin add cordova-plugin-geolocation
//install directly via repo url
cordova plugin add https://github.com/apache/cordova-plugin-geolocation.git
```

Image - API Plugin Tester - Geolocation



API Plugin Tester - geolocation up and running

Cordova app - API plugin examples - plugin test 4

plugins - geolocation - test plugin

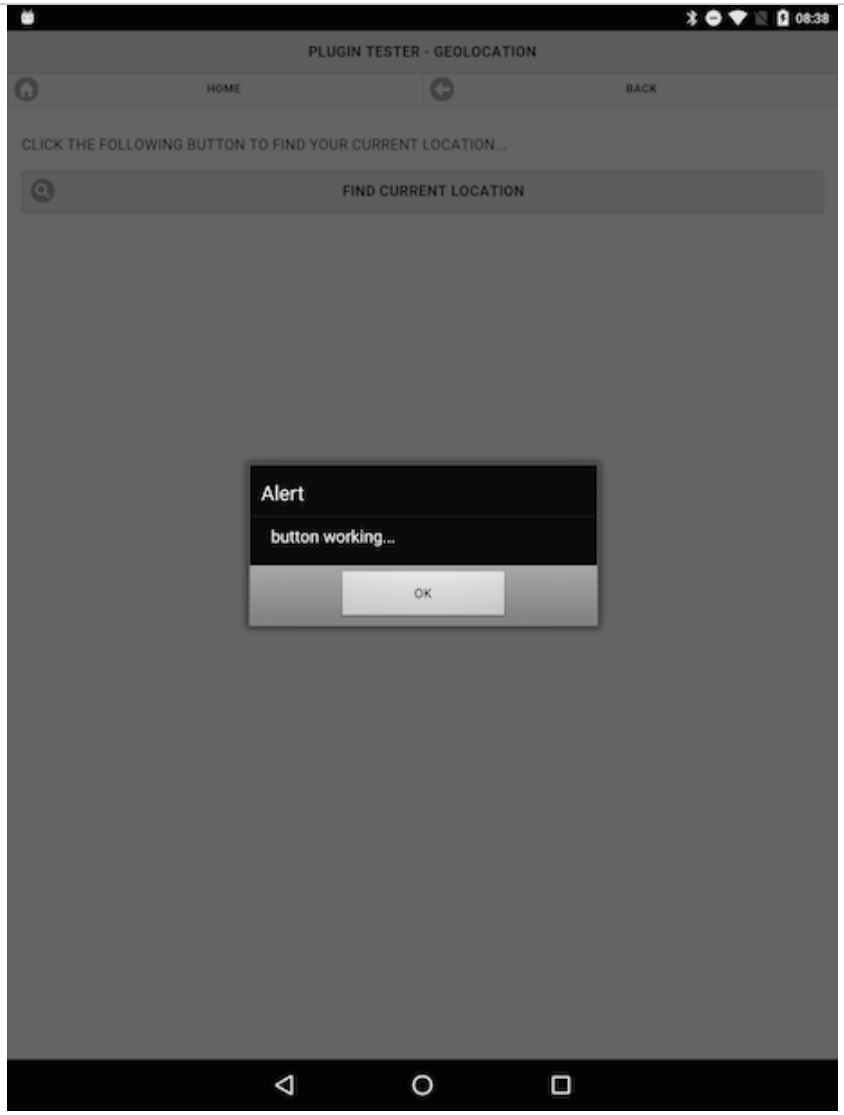
- add option to check and return current location of the user's device
- add a button to allow the user to request their current location
  - *then get the location's latitude and longitude*
  - *then output the location results to the user*

e.g.

```
<div id="content">
  <p>Click the following button to find your current location...</p>
  <button type="button" id="getLocation">Find Current Location</button>
</div>
```

- then update the `plugin.js` file to handle the touch event for this button
  - *get element from DOM*
  - *add event listener & test execution...*
- output test alert &c. for handler

Image - API Plugin Tester - Geolocation



API Plugin Tester - test geolocation button

Cordova app - API plugin examples - plugin test 4

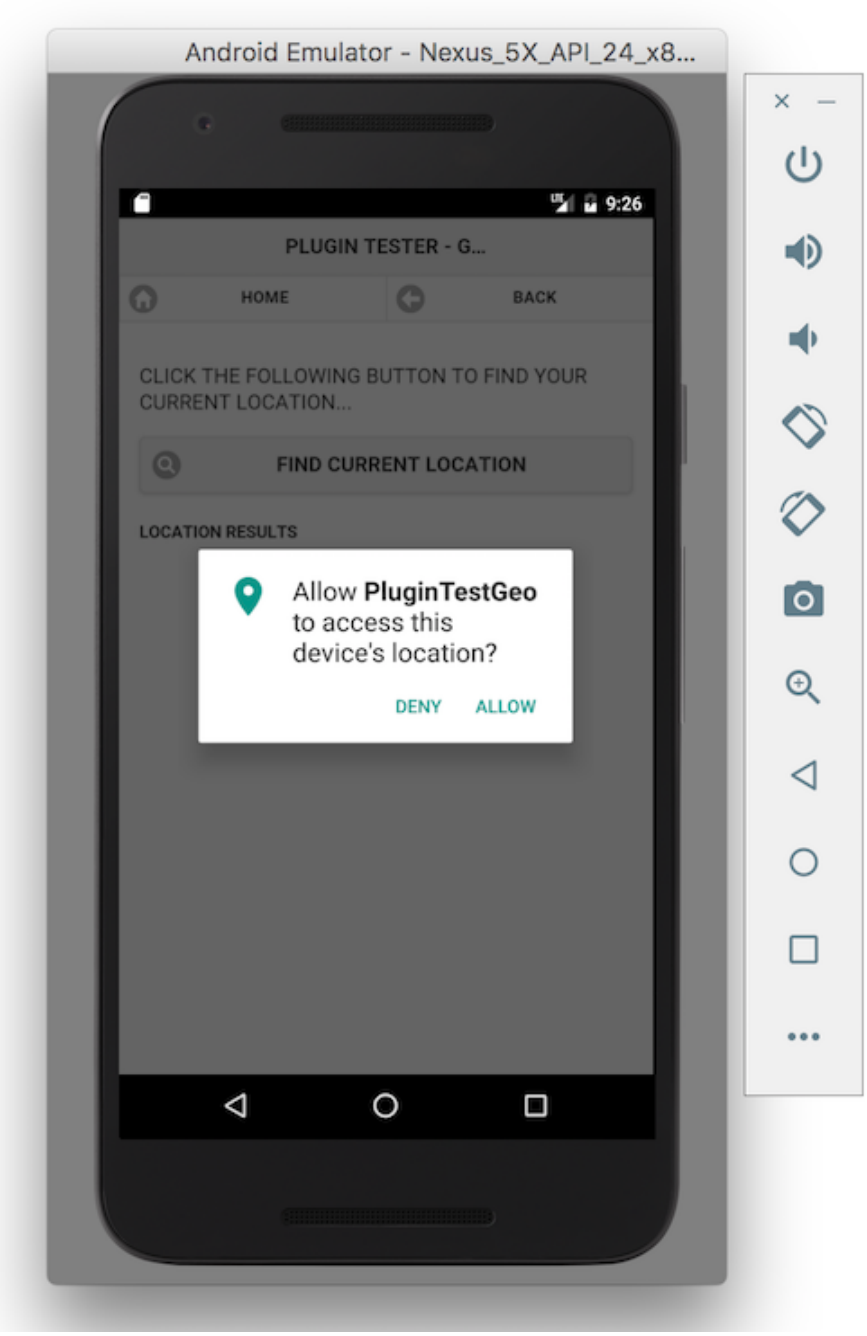
plugins - geolocation - test plugin

- add our logic for working with the navigator object and the geolocation plugin
- first function we need to add is `getLocation()`
  - *use navigator object to get current position of user's device*
- add our standard success and fail callbacks
  - *initially add a timeout for poor signal or reception*
  - *enable high accuracy for this check*
  - *asking plugin to use most accurate source available, e.g. GPS*
- `getLocation()` function is as follows,

```
function getLocation() {
  navigator.geolocation.getCurrentPosition(onSuccess,
    onFail, {
      timeout: 15000,
      enableHighAccuracy: true
  });
}
```

- standard callbacks for `onSuccess` and `onFail`

Image - API Plugin Tester - Geolocation permissions



API Plugin Tester - check geolocation permissions

Cordova app - API plugin examples - plugin test 4

plugins - geolocation - test plugin

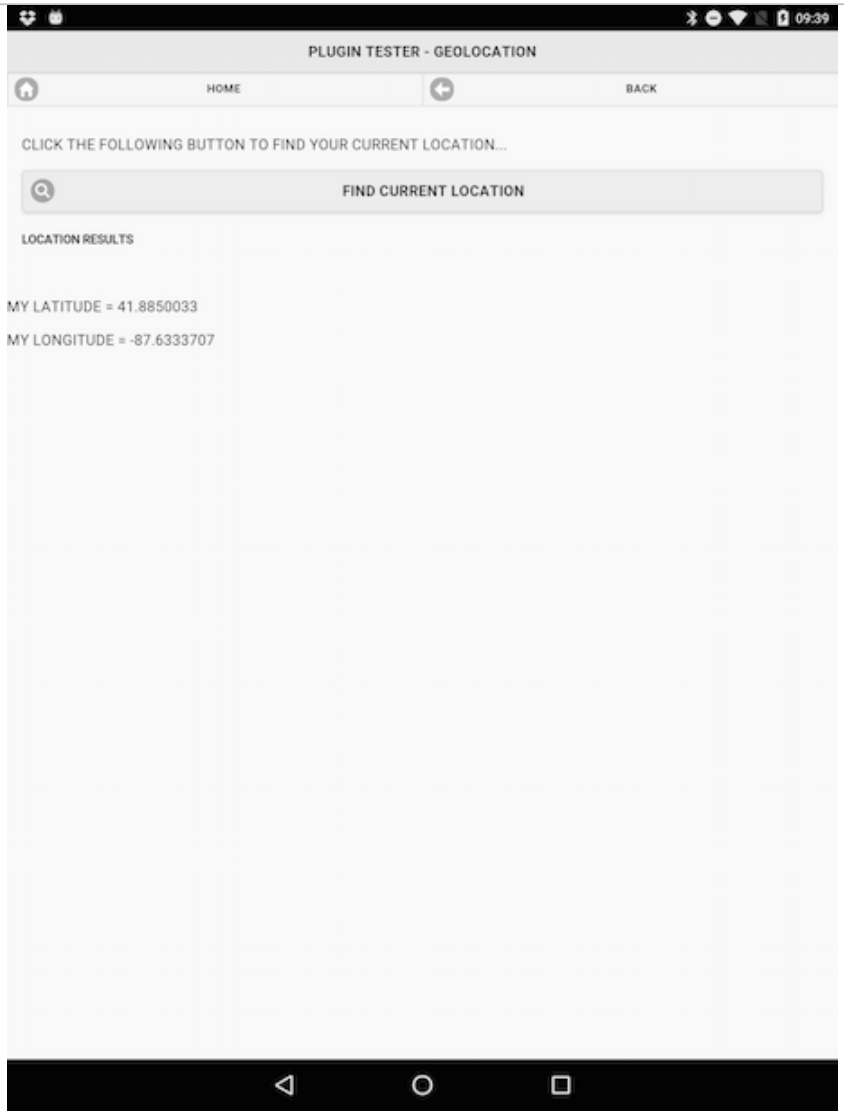
- successful return of location data
  - *use the latitude and longitude coordinates within our application*

```
function onSuccess(location) {
  var myLatitude = location.coords.latitude;
  var myLongitude = location.coords.longitude;
  //output result to #location div...
  // e.g. "<p>my latitude = "+myLatitude+"</p><p>my longitude = "+myLongitude+"</
}
```

- now store coordinates of user's location as latitude and longitude values
- various options for usage per application
  - *render to page, use with maps, add metadata to photos, track navigation...*
- also need to allow for the possibility of errors
  - *set our `onFail` callback as follows*

```
function onFail(error) {
  // or output error to #location div...
  // e.g. "location error code = "+error.code+" message = "+error.message
}
```

Image - API Plugin Tester - Geolocation



API Plugin Tester - geolocation output

Cordova app - API plugin examples - plugin test 4

plugins - geolocation - plugin options

- additional options and properties available to us in the callbacks
  - *navigator object and properties for returned `location` object*
- add options to navigator object for geolocation
  - *`maximumAge` - cached position as long as it is not older than the specified age*
  - *age is specified as a number in milliseconds, e.g. `maximumAge: 3000`*
- returned `location` object properties
  - ***altitude*** *- location.coords.altitude*
  - ***heading*** *- location.coords.heading*
  - ***speed*** *- location.coords.speed*
  - ***timestamp*** *- location.timestamp*
- fine-tune results for our users

Cordova app - API plugin examples - plugin test 4

plugins - geolocation - monitor location

- set plugin to monitor a device's location for changes

```
navigator.geolocation.watchPosition
```

- checking user's device for changes in their current location
  - *then returns device's location if a change is detected*

```
var watchID = navigator.geolocation.watchPosition(onSuccess, onFail,
{option...}
);
```

- error callback and options are both optional
- also use returned ID with a `clearWatch()` function to stop ongoing location check and monitoring

Cordova app - API plugin examples - plugin test 4

plugins - geolocation - manual toggle

- add a toggle option to allow a user to choose
  - *auto or manual refresh of their location*
- toggle set to **on** - app will **watch** a user's position
- toggle set to **off** - explicit location request required
- option to disable `watchPosition()` helps save battery life, reduces privacy issues...
- toggle switch initially set to default **off** position
  - *location position requires explicit request*
- toggle switch set to **on**
  - *app calls `watchPosition()` method against global `navigator.geolocation` object*

Cordova app - API plugin examples - plugin test 4

plugins - geolocation - manual toggle

- add a toggle switch to our UI

```
<form>
  <label for="flip-select">watch location:</label>
  <select id="setWatch" name="flipWatch">
  <option>off</option>
  <option>on</option>
  </select>
</form>
```

- then update our JS logic to handle a UI event on this UI grouping
- add a check for the current value of the toggle switch
  - *add to a property, e.g.* `watchState`
  - *simply checking set value of* `option` *for the switch*

Cordova app - API plugin examples - plugin test 4

plugins - geolocation - manual toggle

- as a user **changes** the state of the toggle switch to on
  - *need to call `watchPosition()` method against geoLocation*
  - *start constant polling of geolocation object*
- add a new function `getWatchID()`
  - *allows us to set a value for a `watchID` property*
  - *property set against `onDeviceReady()` function*

```
function getWatchID() {
    watchID = navigator.geolocation.watchPosition(onSuccess,
    onFail, {
        enableHighAccuracy: true
  });
}
```

Cordova app - API plugin examples - plugin test 4

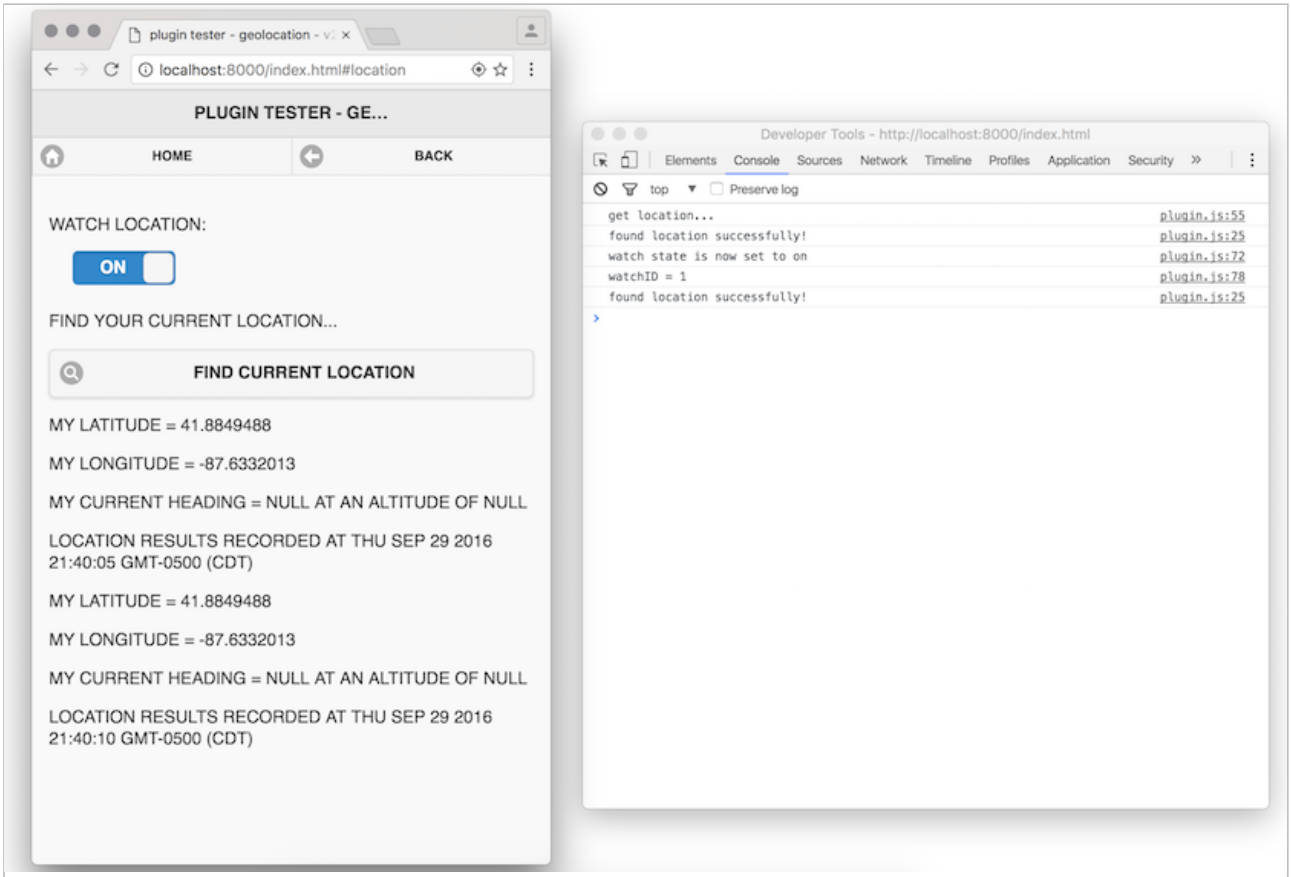
plugins - geolocation - manual toggle

- call `getWatchID()` - using standard callback, `onSuccess`
  - *get required location details*
  - *then set value for `watchID` property*

```
...
    //check state of toggle
    if (watchState === "on") {
        //call function to start watching...
        getWatchID();
        //output check of watchID
        console.log("watchID = "+watchID);
    } else {
        //clear the location watching - stops location tracking...
        navigator.geolocation.clearWatch(watchID);
        //output check of watchID - check match against on watchID...
        console.log("clear watch..."+watchID);
  }
...
```

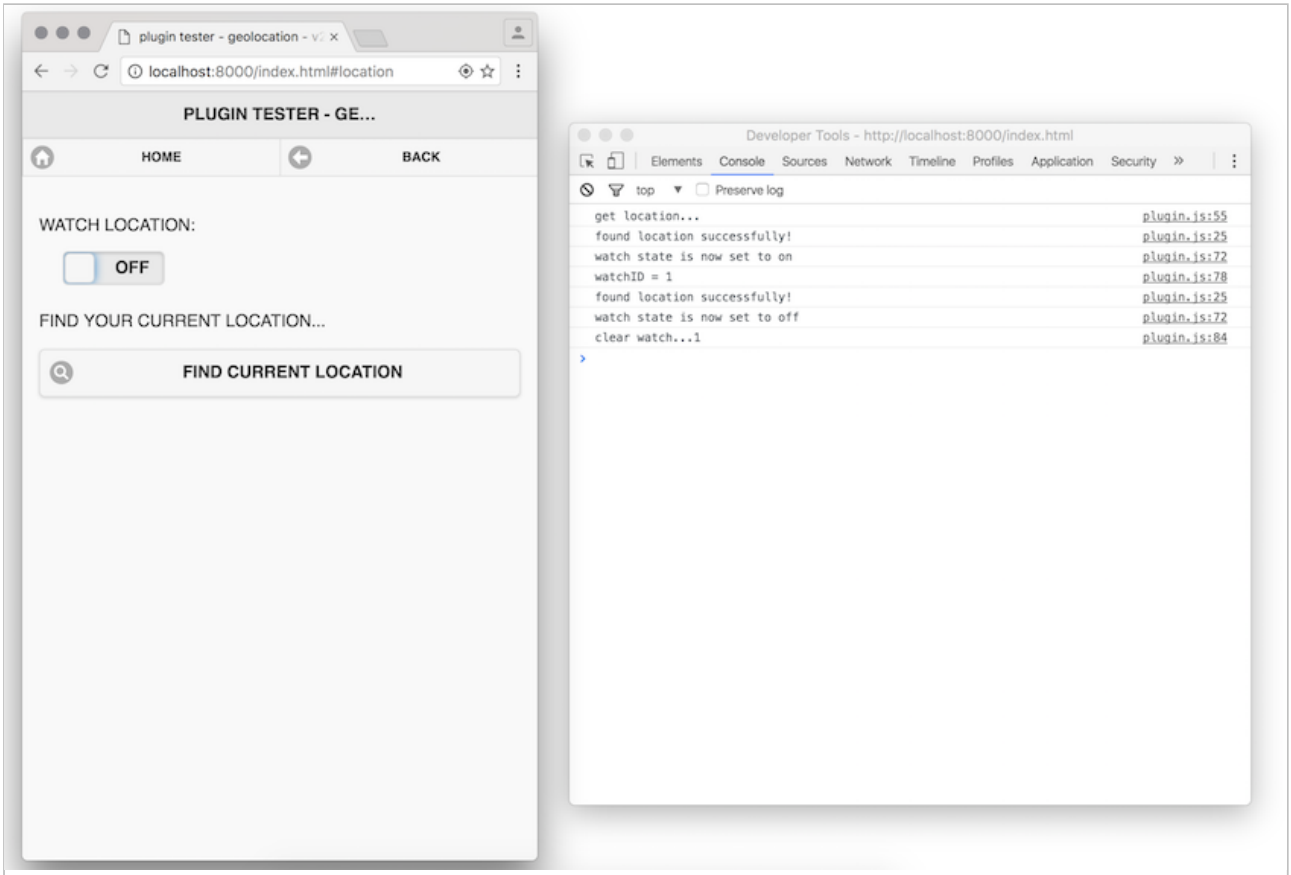
- update conditional statement
  - *clear output of coordinates, then clear watching of user's current location*

Image - API Plugin Tester - Geolocation toggle



API Plugin Tester - geolocation toggle

Image - API Plugin Tester - Geolocation toggle



API Plugin Tester - geolocation toggle

References

- Cordova Docs - Events
- Cordova API
  - *config.xml*
  - *plugins*
  - *plugin - device*
  - *plugin - file*
  - *plugin - media*
  - *plugin - Splashscreen*
- HTML5
  - *HTML5 File API*