Mobile Web

SEM2220 - Assignment 1

Alexander D Brown (adb9)

Contents

1 Introduction

This report shows the process undertaken to change the Conference Web Application (produced by Chris Loftus) from a statically generated list to one loaded dynamically using JavaScript from a Web SQL database[1].

The Conference Web Application is a website which was designed using progressive enhancement to provide content to mobile devices as well as desktop browsers. It uses the jQuery Mobile framework[2] to give a native feel for mobile users.

The process involved the implementation of some JavaScript code to query the Web SQL database created in HTML 5 storage when the Conference Web Application is initially loaded. The results of this query are then dynamically rendered in the sessions page as a part of a jQuery Mobile list view.

2 Implementation

This section describes the process taken to implement the dynamic loading of sessions into the session view from the pre-existing Web SQL database. There were two main steps to do this:

1. Query the database using standard SQL statements.
2. Render the results of the query.

Because a lot of the code was already written this was a simple case of implementing two methods. The method to query the database handled the building of SQL to perform the query and use a callback method to handle the results of this query. This callback method also needed implemented and read the each of the results and appended them to a jQuery Mobile list view object using jQuery methods.

2.1 Implementing the Database Query

The `DataContext.js` file handles the data handling for the application, on the first load of the whole site the database is built from hard-coded values in the file. It is also responsible for performing database queries and transactions and therefore is the location which the sessions query is required.

To start with a simple SQL statement was designed, based on the hints from the original author which would select everything from the sessions table where the session was on the first day of the conference.

```
SELECT * FROM sessions WHERE sessions.day_id = '1'
                       ORDER BY sessions.starttime ASC
```

From this it is a simple matter of calling a method from the transaction method as shown:

```
var querySessions = function(tx) {
  var sql = // SQL Statement
  tx.execute_sql(sql, [], callback, error_callback);
};
```

Where the callback is the rendering function.

To make this statement a little more secure, as recommended by the API, it was changed to be:

```
var querySessions = function(tx) {
  var sql = "SELECT * FROM sessions WHERE session.day_id = ?
             ORDER BY sessions.starttime ASC";
  tx.execute_sql(sql, [1], callback, error_callback);
};
```

Though the query is completely isolated from user input, it may not be in the future.

To enhance this further, joining the days table to include the name of the day that the session was on. This could have been hard coded in the rendering function, but again it may not remain limited to the first day so doing this dynamically will be a benefit in the future.

```
var querySessions = function(tx) {
  var sql = "SELECT sessions.* days.day FROM sessions, days
             WHERE sessions.day_id = ?
             AND days._id = sessions.day_id
             ORDER BY sessions.dayid
```

```
            AND sessions.starttime ASC";
  tx.execute_sql(sql, [1], callback, error_callback);
};
```

The improve the callback functionality, a helper method was used to provide only the rows from the results set to the callback as the other two attributes are based on non-select SQL statements.

2.2 Implementing the Rendering Function

The `Controller.js` file handles a lot of the application processing, particularly dynamic jQuery Mobile elements, but also with some geolocation processing. It is therefore the home of the function to render sessions onto the correct page.

The rendering function acts as a callback to the aforementioned database query, and receives a Web SQL `SQLResultSetRowList` from the query. The rendering function then enumerates over each row. From this information a series of HTML can be generated and rendered on the page.

First off, using the jQuery API, the element with the correct ID is found on the page and bound to a variable. From this raw HTML was appended to this element, with each individuals attributes inserted at the correct points. Finally, the bound element is initialised as a jQuery Mobile list view and refreshed using the API.

To improve this, several helper functions were written; one to convert the resulting rows from the `SQLResultSetRowList` to a standard JavaScript array to allow easier iteration. Such a function would be of use in extending the application, so it was well worth implementing.

A second function to render an individual session was also implemented, so that the processing could be abstracted away. This function returned a list item HTML element which could then easily be appended to the correct list in the main function.

2.3 Problems Encountered

The main issues found with this assignment related to the Web SQL database. The specification is very terse and, as such, doesn't contain a lot of information as to how the methods and objects actually work.

Because of the nature of JavaScript it can be quite difficult to debug, so working out the problems with the database connection could be quite difficult on occasion.

The main issue I ran into is there's no formal specification of the SQL statements Web SQL supports. When writing more advanced queries, particularly those involving joins between two or more tables, was a matter of constantly running the query to see if it would work then changing the statement until some form of correct result was gained.

3 Testing and Debugging

The Chrome developer tools were used to debug the conference web application, an in-browser implementation using Web Inspector.There are several similar tools which also use Web Inspector, including wienre, a locally run webserver which acts very similarly to the developer tools. The Apple Web Inspector is another similar product.

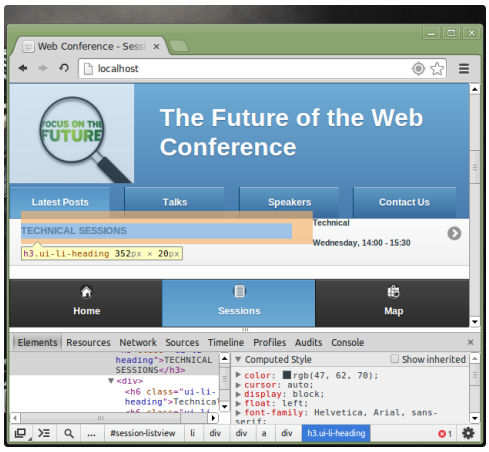
The Chrome developer tools were the easiest solution as they are native to the Google family of browsers and provide support without the need for setting up additional tools.

The Opera mobile browser was used to test the mobile version of the web application to ensure it viewed correctly on mobile devices. The Android emulator was used to test the hybrid application functioned correctly as a native Android application.

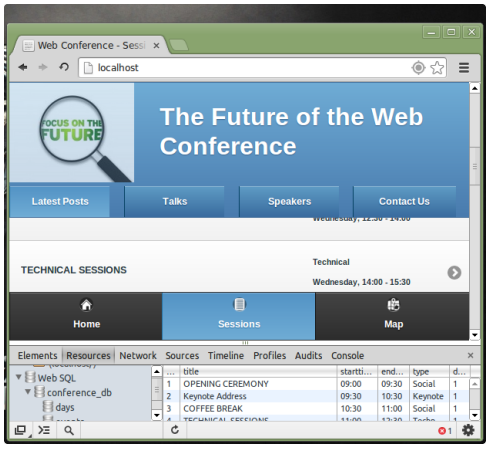
Figure 1 shows the use of the Chrome developer tools to debug the conference web application. These tools have the ability to inspect different elements to check their styling information, which is useful to check existing styles are being correctly applied as well as apply new styles on the fly.

The resources tool provides functionality to visually inspect a Web SQL database, this is a useful feature to test that all relevant items are correctly loaded into list views as well as being able to check to state of the database and the connections to other tables. This was especially useful when different databases were joined to provide additional information.

The developer tools also include a basic JavaScript console which picks up any `console.log` statements inside the code. This made building and debugging the application a lot easier when the Web SQL database API didn't provide the needed information to access objects from the database. Instead these objects could be logged and inspected using this view.



(a) Inspecting Element Styles using the Chrome Developer Tools.

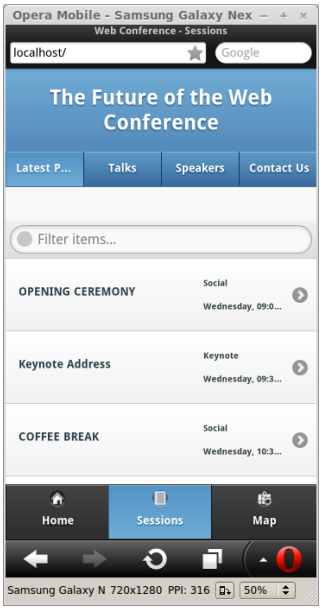


(b) Using the Chrome Developer Tools to inspect the database.

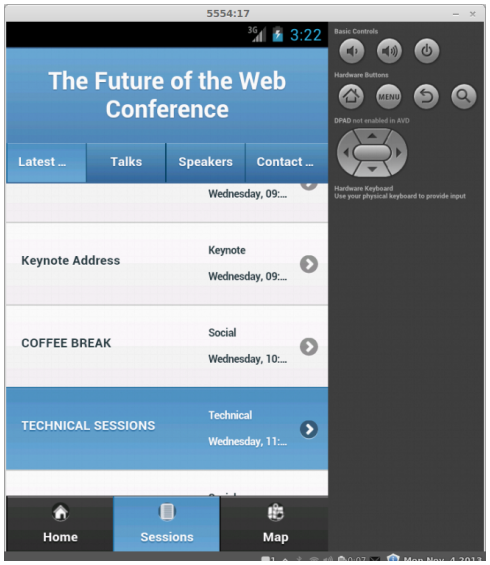
Figure 1: Using the Chrome Developer Tools for debugging.

Figure 2 shows the tools and process used to test the application in its different formats. The Opera Mobile Emulator provides a mobile-sized browsers which acts like the Opera Browser package on a mobile device. This allows the testing of styling and mobile experience as well as making sure the APIs used are compatible with mobile devices.

The hybrid application was created using PhoneGap and tested on the Android Emulator. The main bulk of the testing done through this was to ensure the API worked as part of a native application and not just a web application.



(a) Conference Web Application running as a Website App on the Opera Mobile Emulator



(b) Conference Web Application running as a Hybrid App on the Android Emulator.

Figure 2: Testing the Conference Web Application Sessions list on different mobile emulators.

4 Evaluation

References

[1] Ian Hickson. Web SQL database, November 2010.

[2] The jQuery Foundation. jQuery Mobile. http://jquerymobile.com, 2013.