

## REST Web Services

### Objectives

- Start a local web server
- Create a web page and display on a web server
- Use jQuery's Ajax to get data from a REST API web server
- Parse JSON data and display on a web page

*Note: if there is anything wrong with your computer, pair program today with someone else!*

### Pre-lab work

1. Be sure you have a web server installed. You might be all ready to go, check to see what happens if you type in a terminal window:
  - a. This should work with python, and the default port should be 8000. But you can specify a different port, like 8080 if you'd like.

```
python -m SimpleHTTPServer 8000
```

- b. There may be an elegant way to terminate the web server, but closing the terminal works.
2. Install the [jq](#) command line tool for formatting JSON data.
    - a. Linux
      - i. `sudo apt-get install jq`
    - b. OS X
      - i. Install [Homebrew](#) ← Super cool, you should probably just have this if you use OSX.

```
ii. brew install jq
```

3. Sign up for a free API key for the [Dark Sky Forecast API](#).
4. Learn the basics of HTML and JavaScript if you don't know it already. It will help to understand what you are doing. We will walk through what you need for this lab—it just helps to know more. You may also want to read up on [Ajax](#).

### Exercise

The goal of this project is to set up a client-side web program using JavaScript, the [jQuery](#) library, and Ajax to access data on a web server via REST API. More specifically, you will create a web application that displays dynamic information on the current weather conditions of different cities.

## Part 1 - Web server

Setup a local web server to serve a simple HTML file.

1. Open a terminal window.
2. Go to a directory (or create a new directory) to work from.
3. Using vim, create a new web page titled hello.html.
4. Add the following HTML code to the file

```
<html>
<head>
  <title>Hello</title>
</head>
<body>
  <p>Hello, world.</p>
</body>
</html>
```
5. Save the file.
6. Open a second terminal window, and go to the same directory.
7. Run the command below (same from the pre-lab) to start the simple web server using the current directory as the base.

```
python -m SimpleHTTPServer 8000
```

8. Open a web browser and open the file hello.html via the local web server <http://127.0.0.1:8000/hello.html>.
  - a. Also, you can go to 127.0.0.1:8000/ and click hello.html which should be an option, as well as anything else in the directory where you started your server.

## Part 2 - Query REST API

We will start by getting the weather of Boulder from [forecast.io](https://api.forecast.io/).

```
curl 'https://api.forecast.io/forecast/APIKEY/40.014984,-105.270546' >
results.json
```

```
cat results.json
```

Replace APIKEY with your actual key. You should see a JSON document printed. We can use jq to format the JSON code so we can more easily read it.

```
cat results.json | jq . > forecast.json
cat forecast.json
```

Feel free to read the manual page for jq. The '.' is a filter, but a very simple filter. jq is a filtering program for JSON files.

## Part 3 - Web console

Every web browser contains a collection of debugging tools known as the Web Inspector. The web console is similar to a terminal window: you can execute JavaScript code and view its output.

The menu item to open the console can be found here in each of these major browsers:

- Chrome: View > Developer > Developer Tools
- Firefox: Tools > Web Developer > Web Console
- Safari: Preferences > Advanced > Show Develop menu

*We'll need this console open for the rest of the lab to view output from calls to `console.log`.*

## Part 4 - jQuery

The [jQuery](#) library is a fast, small, and feature-rich JavaScript library. It makes things like HTML document traversal and manipulation, event handling, animation, and Ajax much simpler with an easy-to-use API that works across a multitude of browsers.

The code below is the ajax code that will query [forecast.io](#), just like the curl command we used earlier. It specifies the URL and the default HTTP method is GET.

```
var url = 'https://api.forecast.io/forecast/APIKEY/40.014984,-105.270546'
$.ajax({url:url, dataType:"jsonp"}).then(function(data) {
  console.log(data)
})
```

If the ajax call is successful, it calls the then function with the response body returned from the server in the variable named data.

We need to put this code inside jQuery's [document.ready](#) function.

```
<html>
<head>
  <title>Hello</title>
  <script>
    $(document).ready(function() {
      var url =
        'https://api.forecast.io/forecast/APIKEY/40.014984,-105.270546'
      $.ajax({url:url, dataType:"jsonp"}).then(function(data) {
        console.log(data)
      })
    })
  </script>
</head>
<body>
  <p>Hello, world.</p>
</body>
</html>
```

## Include jQuery

If you try to run it, you won't see the results yet. We need to include the jQuery library in our code. Type the following inside the <head> tags:

```
<script src="http://code.jquery.com/jquery-2.2.0.js"></script>
```

The browser will download and initialize the jQuery library before our code uses it later in the page.

Feel free to look at the code you're using, go to: <http://code.jquery.com/jquery-2.2.0.js> to check it out. It's a whole lot of code, so realistically you might click that link and immediately close it, scared. That's okay. But check out jquery, [http://www.w3schools.com/jquery/jquery\\_get\\_started.asp](http://www.w3schools.com/jquery/jquery_get_started.asp) and ajax - [http://www.w3schools.com/xml/ajax\\_intro.asp](http://www.w3schools.com/xml/ajax_intro.asp)

**Note:** While you can have your web page access the library on the Internet, most sites download and serve it themselves from a directory named js/, 'javascripts/', etc. This prevents the site from breaking should the file hosted on the jQuery servers move or disappear.

## Part 5 - JSON

When we receive JSON data from \$.ajax, jQuery has already parsed the JSON text into a JavaScript Object. To understand what jQuery did for us, let's parse our own JSON formatted text document.

Paste the following into your browser's web console:

```
var text = '{"players": [ \
  {"name": "DeMarcus Ware", "jersey": 94}, \
  {"name": "Peyton Manning", "jersey": 18}, \
  {"name": "Von Miller", "jersey": 58} \
]}'

var team = JSON.parse(text)

console.log(team.players[0].name)
console.log(team.players[1].name)
console.log(team.players[2].name)
```

Notice the dot notation used to navigate the object properties. We can use this same syntax while navigating the weather JSON data.

## Part 6 - Display results

The last step is to take this information that we can now access from the JSON response and add it to the web page.

We will again make use of jQuery to help us. Add the following line (intelligently):

```
$('#results').text(data.currently.temperature)
```

```
<p id="results">original</p>
```

This is jQuery's way of updating the content within an HTML tag. The `#results` selector references any element that has the `id` attribute equal to `results`. The `.text()` call replaces the text inside the tags with the new String.

Add the `currently.summary` and `currently.humidity` field values from the JSON object to the page. Be sure to label each thing that is displayed.

Hint, you can use `.append` instead of `.text` to keep adding to the same HTML tag, or add multiple `p` tags with different IDs and reference those to add additional fields.

**Credit:** To get credit for this lab exercise, show the TA your work and get signed for the lab.