

Exercise 1

Create a simple JSON HTTP server

Prior Knowledge

Unix Command Line Shell

Some simple JavaScript (node.js)

Learning Objectives

Understand the basics of a Web Server

Software Requirements

Node.js

Npm

A Text Editor (e.g. Atom)

Creating a node.js program

1. Node.js is an effective framework for writing server-side programs using the JavaScript language. In this exercise we are going to create a simple program that returns a random number between 1 and 100.

Because we expect the result to be read by a machine not a human, we will return this as a JSON not as an HTML.

2. Make a directory called ex1. You can do this by starting a terminal window and typing:
`mkdir ~/ex1`
`cd ~/ex1`

Hint: if you prefer to use the Ubuntu window system to do this, you may.

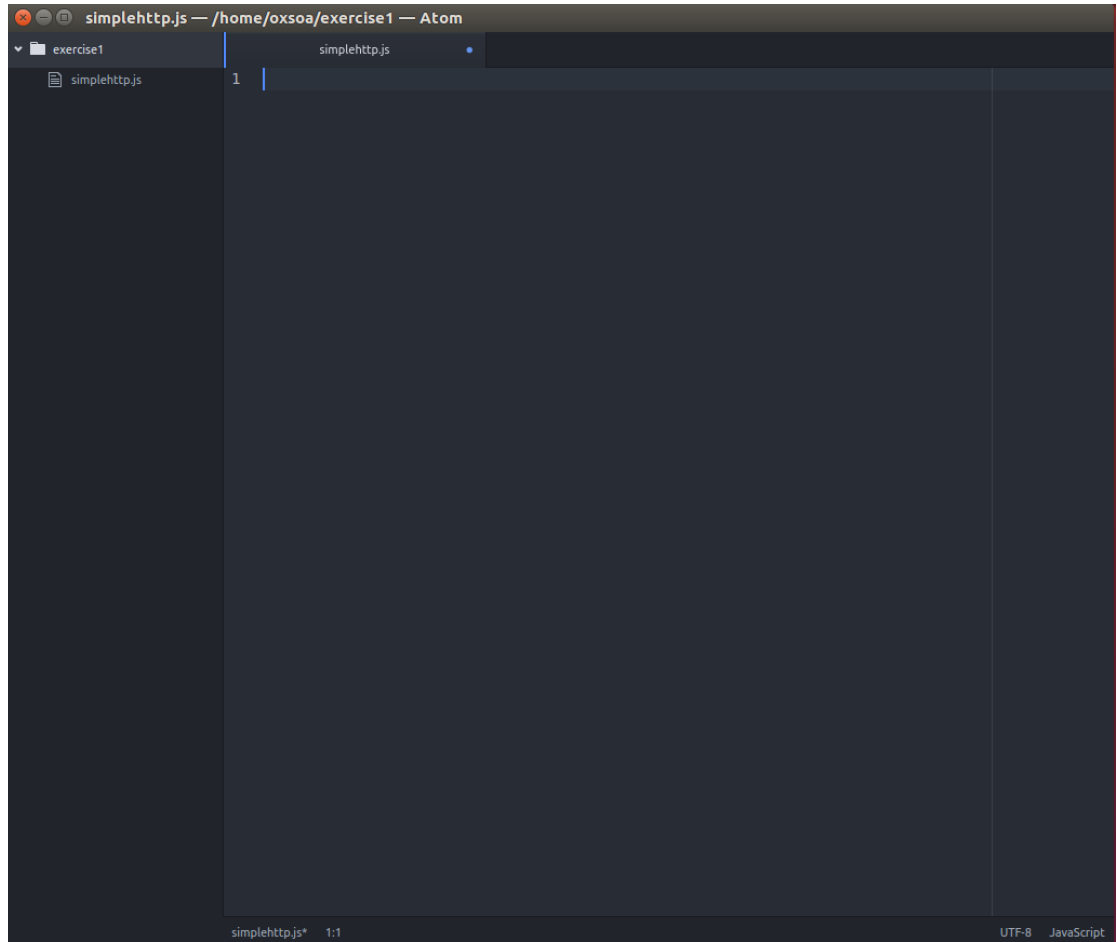
3. Now we need to create a file and code the server.
In the terminal window type:
`atom simplehttp.js`

Hint: There is a harmless bug with Atom on the 16.04 Ubuntu. You can simply close the bug notification window.

Hint: If you have another text editor on Ubuntu that you prefer, switch to that instead.



4. You should see an Atom editor window:



5. Type (or copy and paste) the following code:

```
var http = require('http'),
    express = require('express'),
    app = express();

app.get("/", function(req, res){
  obj = {random : Math.floor(Math.random() * 100) + 1};
  res.json(obj);
});

var server = app.listen(8080, function() {
  console.log("Random server listening on port 8080");
});
```

If you copy and past please make sure you understand the code.

The code is at <http://freo.me/ex1-js>

6. This uses a library called express.js which is a very popular framework for writing REST applications in JS. This code creates an HTTP server that responds to any HTTP GET request in the same way. It will instantiate a JavaScript object containing a random number and then return that as a JSON string.

7. To run this code, you need to type the following into a terminal window:

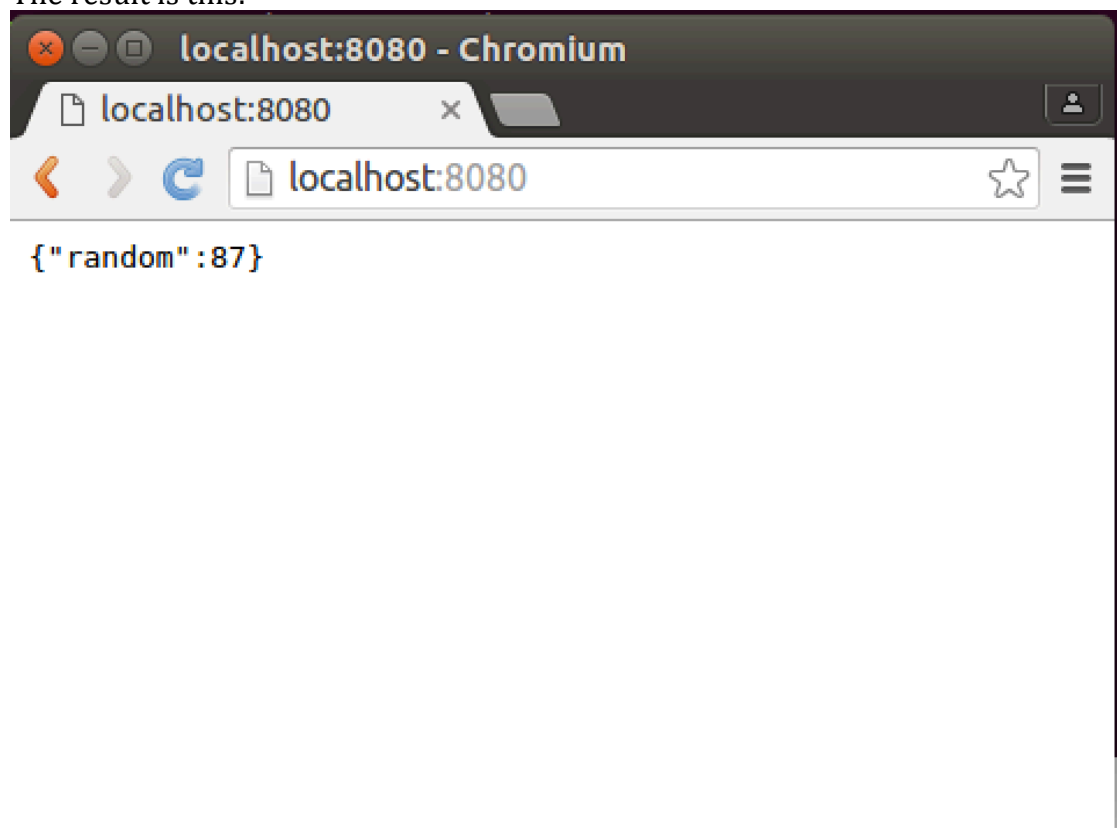
```
cd ~/ex1
npm install express
node simplehttp.js
```

This will install express.js (if it isn't already).

You should see the server respond:
oxsoa@oxsoa:~/ex1\$ nodejs simplehttp.js
Server listening on: http://localhost:8080

8. You can test this code by pulling up a browser window (e.g. Chromium or Firefox) and then browsing to <http://localhost:8080>

The result is this:



9. However, we do not want a human-/browser-enabled service. We want to call this service from machine-based clients. Let's first try curl (a command-line URL / HTTP tool).

Type:
`curl http://localhost:8080`

You should see:
`curl http://localhost:8080`
`{"random":71}oxsoa@oxsoa:~/ex1$`


Hint: Because the HTTP response has no '\n' line ending, the result is a bit hard to read as the next line merges with the output.

10. curl provides a useful debug facility. If you turn on verbose output, you can see the actual network messages as they are sent on the wire:

```
curl -v http://localhost:8080
You should see output similar to this:
* Rebuilt URL to: http://localhost:8080/
* Trying 127.0.0.1...
* Connected to localhost (127.0.0.1) port 8080 (#0)
> GET / HTTP/1.1
> Host: localhost:8080
> User-Agent: curl/7.47.0
> Accept: */*
>
< HTTP/1.1 200 OK
< Content-Type: application/json
< Date: Tue, 24 May 2016 09:04:03 GMT
< Connection: keep-alive
< Content-Length: 13
<
* Connection #0 to host localhost left intact
{"random":33}oxsoa@oxsoa:~/ex1$
```

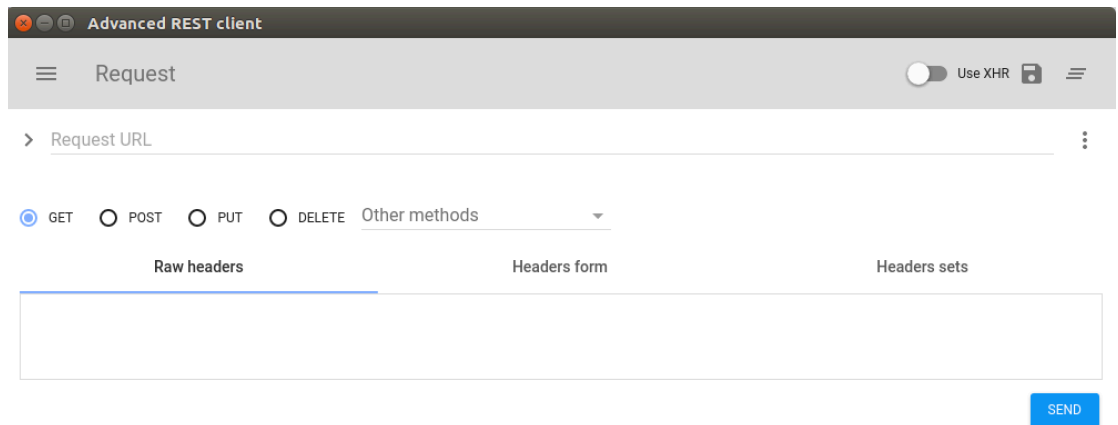
The lines beginning with > indicate that these are sent to the server and < are received from the service.



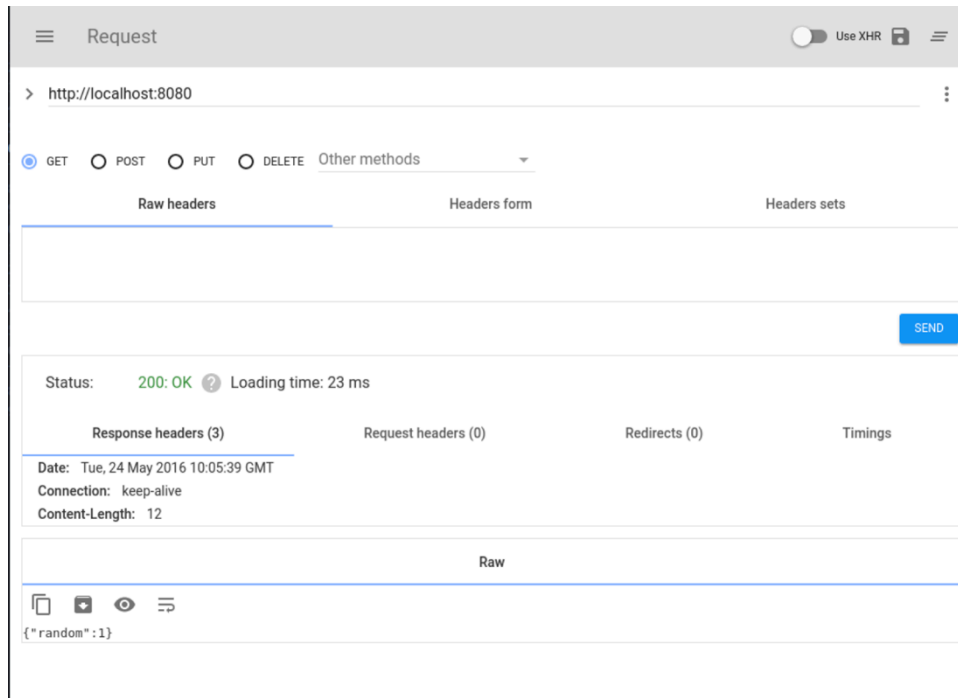
11. Another way of testing this is to use a tool called the Advanced Rest Client (ARC) in Chrome/Chromium. Start Chromium and open up a new window or tab. In the corner is a little button called Apps . Click on that and then choose the ARC button:



12. You should see a window like this:



13. Type <http://localhost:8080> into the Request URL field and then click Send. You should see:



14. Automated testing of the service

We want this service to meet a set of behavior requirements. To ensure this, we can use a set of tests. There are a number of testing frameworks for SOA services. For this example, we are going to use a JavaScript tool called Frisby (<http://frisbyjs.com/>), which builds on top of another node.js test framework called Jasmine.

I have written a test script for this service. It is available as a gist on Github. You can download it onto your VM using the following command:

```
cd ~/ex1
curl -L http://freo.me/ex1-test -o simplehttp_spec.js
```

15.

The test script looks like this:

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

frisby.create('Test Random Number service')
  .get('http://localhost:8080/')
  .expectStatus(200)
  .expectHeaderContains('Content-Type',
    'application/json')
  .expectJSONTypes( {
    random: Number
  }
)
  .expectJSON({
    random: function(v) {
      expect(v).toBeGreaterThan(0); expect(v).toBeLessThan(101);
    }
  })
  .toss();
```

The test does an HTTP GET on the URL and then validates the following aspects:

- The return code is 200
- The Content-Type header is “application/json”
- The JSON type of the result is a number
- The JSON contains a tag called random, with a value >0 and <101

16. You can run this test using:

```
jasmine-node .
```

17. Does the result match your expectations?

18. Let's fix the server so that it passes the test. I'll leave this up to you, with a hint.

The hint is that `response.setHeader('header_name', 'header_value')` is the way of setting headers on HTTP responses in nodejs.

Hint: you will need to stop and restart the node server once you have edited the code.

19. Once the tests are passing, this exercise is complete.

Recap:

We have created a simple http server that returns a JSON output. We have tested this service in a number of ways – including via browser, ARC, curl and through a proper automated test.

In our next exercise we will create a client for this service.

