NODE.JS - EXPRESS FRAMEWORK

Express Overview

Express is a minimal and flexible Node.js web application framework that provides a robust set of features to develop web and mobile applications. It facilitates a rapid development of Node based Web applications. Following are some of the core features of Express framework:

- Allows to set up middlewares to respond to HTTP Requests.
- Defines a routing table which is used to perform different action based on HTTP Method and URL.
- Allows to dynamically render HTML Pages based on passing arguments to templates.

Installing Express

Firstly, install the Express framework globally using npm so that it can be used to create web application using node terminal.

```
$ npm install express --save
```

Above command saves installation locally in **node_modules** directory and creates a directory express inside node_modules. There are following important modules which you should install along with express:

- **body-parser** - This is a node.js middleware for handling JSON, Raw, Text and URL encoded form data.
- **cookie-parser** - Parse Cookie header and populate req.cookies with an object keyed by the cookie names.
- **multer** - This is a node.js middleware for handling multipart/form-data.

```
$ npm install body-parser --save
$ npm install cookie-parser --save
$ npm install multer --save
```

Hello world Example

Following is a very basic Express app which starts a server and listens on port 3000 for connection. This app responds with **Hello World!** for requests to the homepage. For every other path, it will respond with a **404 Not Found.**

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

app.get('/', function (req, res) {
   res.send('Hello World');
})

var server = app.listen(8081, function () {

  var host = server.address().address
  var port = server.address().port

  console.log("Example app listening at http://%s:%s", host, port)

})
```

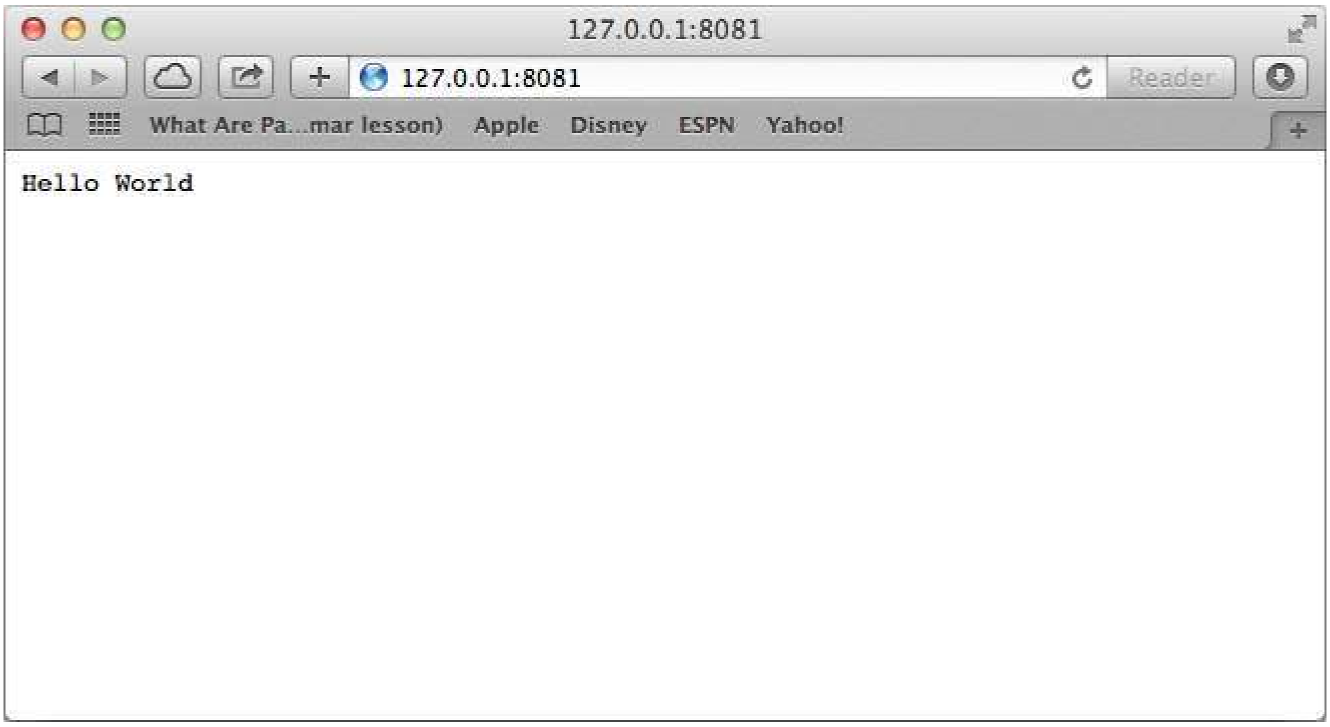
Save the above code in a file named server.js and run it with the following command.

```
$ node server.js
```

You will see the following output:

```
Example app listening at http://0.0.0.0:8081
```

Open http://127.0.0.1:8081/ in any browser and see the below result.



```
Hello World
```

Request & Response

Express application makes use of a callback function whose parameters are **request** and **response** objects.

```
app.get('/', function (req, res) {
   // --
})
```

You can check further detail on both the objects:

- Request Object - The request object represents the HTTP request and has properties for the request query string, parameters, body, HTTP headers, and so on.
- Response Object - The response object represents the HTTP response that an Express app sends when it gets an HTTP request.

You can print **req** and **res** objects which provide lot of information related to HTTP request and response including cookies, sessions, URL etc.

Basic Routing

We have seen a basic application which serves HTTP request for the homepage. Routing refers to determining how an application responds to a client request to a particular endpoint, which is a URI *orpath* and a specific HTTP request method *GET*, *POST*, *andsoon*.

We will extend our Hello World program to add functionality to handle more type HTTP requests.

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

// This responds with "Hello World" on the homepage
app.get('/', function (req, res) {
   console.log("Got a GET request for the homepage");
   res.send('Hello GET');
})


// This responds a POST request for the homepage
app.post('/', function (req, res) {
   console.log("Got a POST request for the homepage");
   res.send('Hello POST');
})

// This responds a DELETE request for the /del_user page.
app.delete('/del_user', function (req, res) {
   console.log("Got a DELETE request for /del_user");
   res.send('Hello DELETE');
})

// This responds a GET request for the /list_user page.
app.get('/list_user', function (req, res) {
   console.log("Got a GET request for /list_user");
   res.send('Page Listing');
})

// This responds a GET request for abcd, abxcd, ab123cd, and so on
app.get('/ab*cd', function(req, res) {
   console.log("Got a GET request for /ab*cd");
   res.send('Page Pattern Match');
})


var server = app.listen(8081, function () {

  var host = server.address().address
  var port = server.address().port

  console.log("Example app listening at http://%s:%s", host, port)

})
```

Save the above code in a file named server.js and run it with the following command.

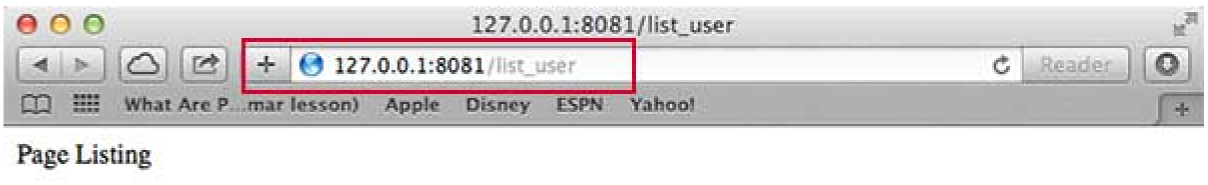
```
$ node server.js
```

You will see the following output:

```
Example app listening at http://0.0.0.0:8081
```

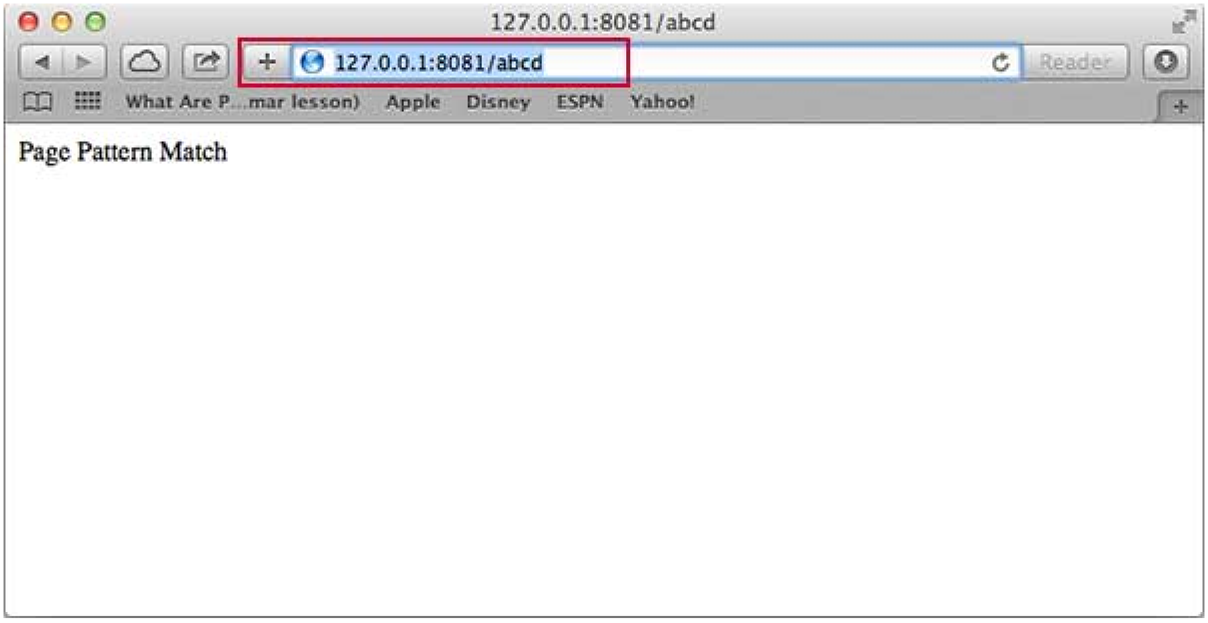
Now you can try different requests at http://127.0.0.1:8081 to see the output generated by server.js. Following are few screens showing different responses for different URLs.

Screen showing again http://127.0.0.1:8081/list_user



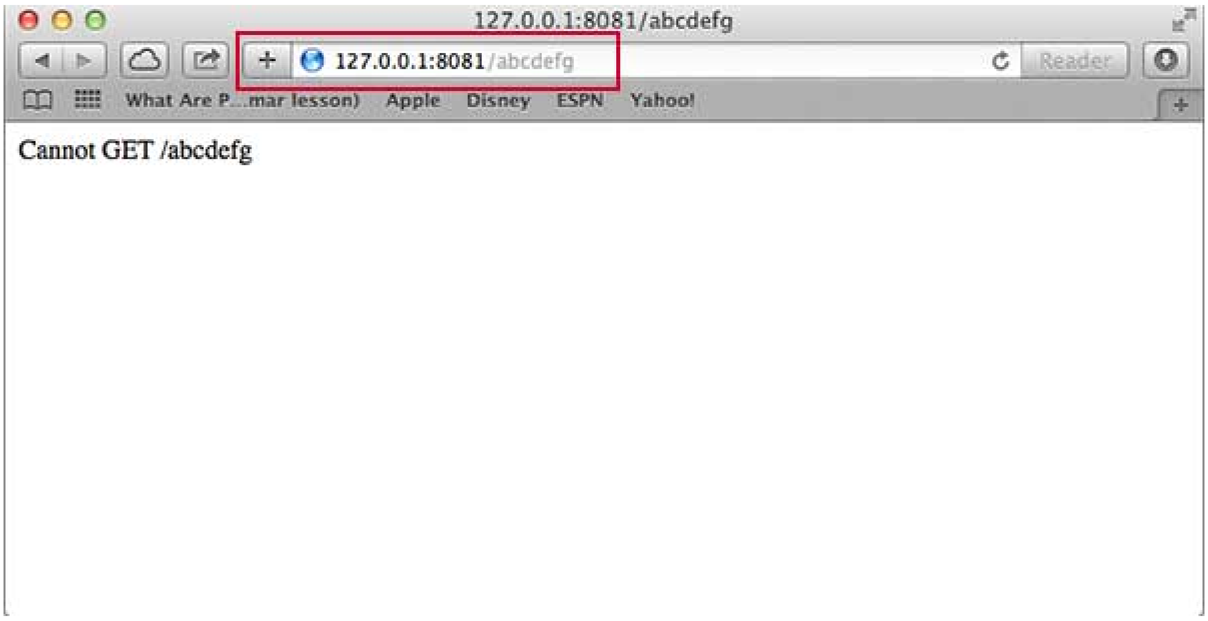
Page Listing

Screen showing again http://127.0.0.1:8081/abcd



```
Page Pattern Match
```

Screen showing again http://127.0.0.1:8081/abcdefg



```
Cannot GET /abcdefg
```

Serving Static Files

Express provides a built-in middleware **express.static** to serve static files, such as images, CSS, JavaScript etc.

You simply needs to pass the name of the directory where you keep your static assets, to the **express.static** middleware to start serving the files directly. For example, if you keep your images, CSS, and JavaScript files in a directory named public, you can do this:

```
app.use(express.static('public'));
```

We will keep few images in **public/images** sub-directory as follows:

```
node_modules
server.js
public/
public/images
```

```
public/images/logo.png
```

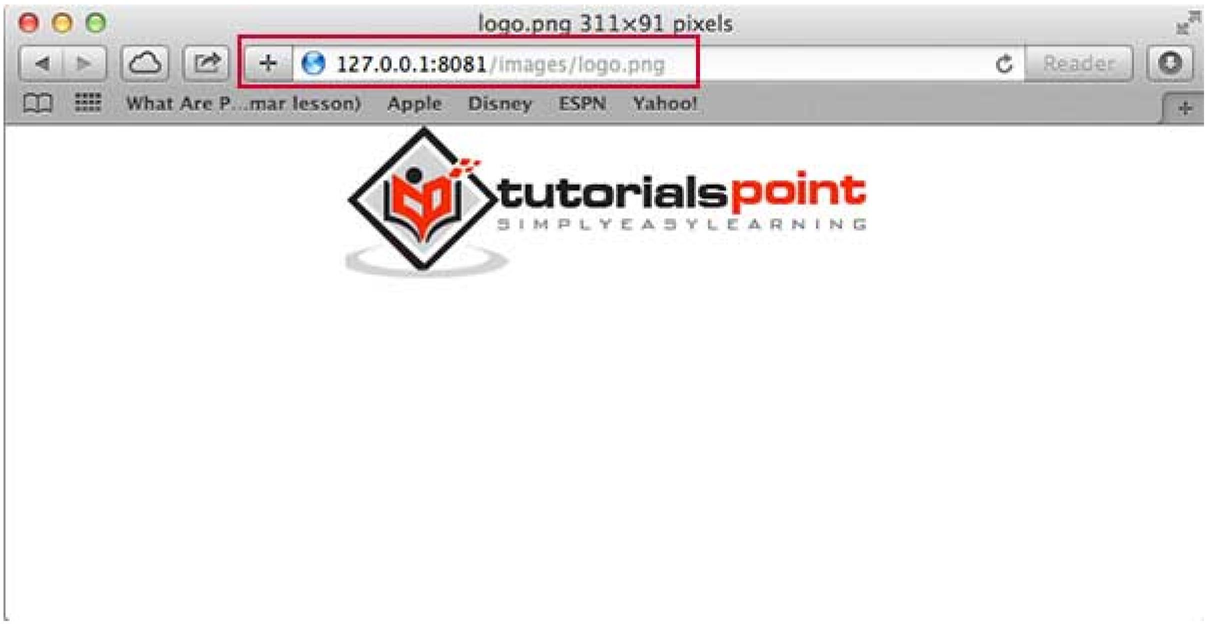
Let's modify "Hello Word" app to add the functionality to handle static files.

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

app.use(express.static('public'));

app.get('/', function (req, res) {
   res.send('Hello World');
})

var server = app.listen(8081, function () {

  var host = server.address().address
  var port = server.address().port

  console.log("Example app listening at http://%s:%s", host, port)

})
```

Save the above code in a file named server.js and run it with the following command.

```
$ node server.js
```

Now open http://127.0.0.1:8081/images/logo.png in any browser and see the below result.



GET Method

Here is a simple example which passes two values using HTML FORM GET method. We are going to use **process_get** router inside server.js to handle this input.

```
<html>
<body>
<form action="http://127.0.0.1:8081/process_get" method="GET">
First Name: <input type="text" name="first_name">  <br>

Last Name: <input type="text" name="last_name">
<input type="submit" value="Submit">
</form>
</body>
</html>
```

Let's save above code in index.htm and modify server.js to handle home page request as well as input sent by the HTML form.

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

app.use(express.static('public'));

app.get('/index.htm', function (req, res) {
   res.sendFile( __dirname + "/" + "index.htm" );
})

app.get('/process_get', function (req, res) {

   // Prepare output in JSON format
   response = {
       first_name:req.query.first_name,
       last_name:req.query.last_name
   };
   console.log(response);
   res.end(JSON.stringify(response));
})

var server = app.listen(8081, function () {

  var host = server.address().address
  var port = server.address().port

  console.log("Example app listening at http://%s:%s", host, port)

})
```

Now accessing HTML document using *http://127.0.0.1:8081/index.htm* will generate following form:

```
First Name:

Last Name:
```

Now you can enter First and Last Name and then click submit button to see the result and it should give result as follows:

```
{"first_name":"John","last_name":"Paul"}
```

POST Method

Here is a simple example which passes two values using HTML FORM POST method. We are going to use **process_get** router inside server.js to handle this input.

```
<html>
<body>
<form action="http://127.0.0.1:8081/process_post" method="POST">
First Name: <input type="text" name="first_name">  <br>

Last Name: <input type="text" name="last_name">
<input type="submit" value="Submit">
</form>
```

```
</body>
</html>
```

Let's save above code in index.htm and modify server.js to handle home page request as well as input sent by the HTML form.

```
var express = require('express');
var app = express();
var bodyParser = require('body-parser');

// Create application/x-www-form-urlencoded parser
var urlencodedParser = bodyParser.urlencoded({ extended: false })

app.use(express.static('public'));

app.get('/index.htm', function (req, res) {
   res.sendFile( __dirname + "/" + "index.htm" );
})

app.post('/process_post', urlencodedParser, function (req, res) {

   // Prepare output in JSON format
   response = {
       first_name:req.body.first_name,
       last_name:req.body.last_name
   };
   console.log(response);
   res.end(JSON.stringify(response));
})

var server = app.listen(8081, function () {

  var host = server.address().address
  var port = server.address().port

  console.log("Example app listening at http://%s:%s", host, port)

})
```

Now accessing HTML document using *http://127.0.0.1:8081/index.htm* will generate following form:

```
First Name:

Last Name:
```

Now you can enter First and Last Name and then click submit button to see the result and it should give result as follows:

```
{"first_name":"John","last_name":"Paul"}
```

File Upload

The following HTML code creates a file uploader form. This form is having method attribute set to **POST** and enctype attribute is set to **multipart/form-data**

```
<html>
<head>
<title>File Uploading Form</title>
</head>
<body>
<h3>File Upload:</h3>
Select a file to upload: <br />
<form action="http://127.0.0.1:8081/file_upload" method="POST"
      enctype="multipart/form-data">
<input type="file" name="file" size="50" />
<br />
<input type="submit" value="Upload File" />
</form>
</body>
</html>
```

Let's save above code in index.htm and modify server.js to handle home page request as well as file upload.

```
var express = require('express');
var app = express();
var fs = require("fs");

var bodyParser = require('body-parser');
var multer  = require('multer');

app.use(express.static('public'));
app.use(bodyParser.urlencoded({ extended: false }));
app.use(multer({ dest: '/tmp/'}));

app.get('/index.htm', function (req, res) {
   res.sendFile( __dirname + "/" + "index.htm" );
})

app.post('/file_upload', function (req, res) {

   console.log(req.files.file.name);
   console.log(req.files.file.path);
   console.log(req.files.file.type);

   var file = __dirname + "/" + req.files.file.name;
   fs.readFile( req.files.file.path, function (err, data) {
        fs.writeFile(file, data, function (err) {
         if( err ){
              console.log( err );
         }else{
               response = {
                   message:'File uploaded successfully',
                   filename:req.files.file.name
              };
          }
          console.log( response );
          res.end( JSON.stringify( response ) );
       });
   });
})

var server = app.listen(8081, function () {

  var host = server.address().address
  var port = server.address().port

  console.log("Example app listening at http://%s:%s", host, port)

})
```

Now accessing HTML document using *http://127.0.0.1:8081/index.htm* will generate following form:

```
File Upload:
Select a file to upload:








NOTE: This is just dummy form and would not work, but it must work at your server.
```

Cookies Management

You can send cookies to Node.js server which can handle the using the following middleware option. Following is a simple example to print all the cookies sent by the client.

```
var express      = require('express')
var cookieParser = require('cookie-parser')

var app = express()
app.use(cookieParser())

app.get('/', function(req, res) {
  console.log("Cookies: ", req.cookies)
})

app.listen(8081)
```

Loading [MathJax]/jax/output/HTML-CSS/jax.js