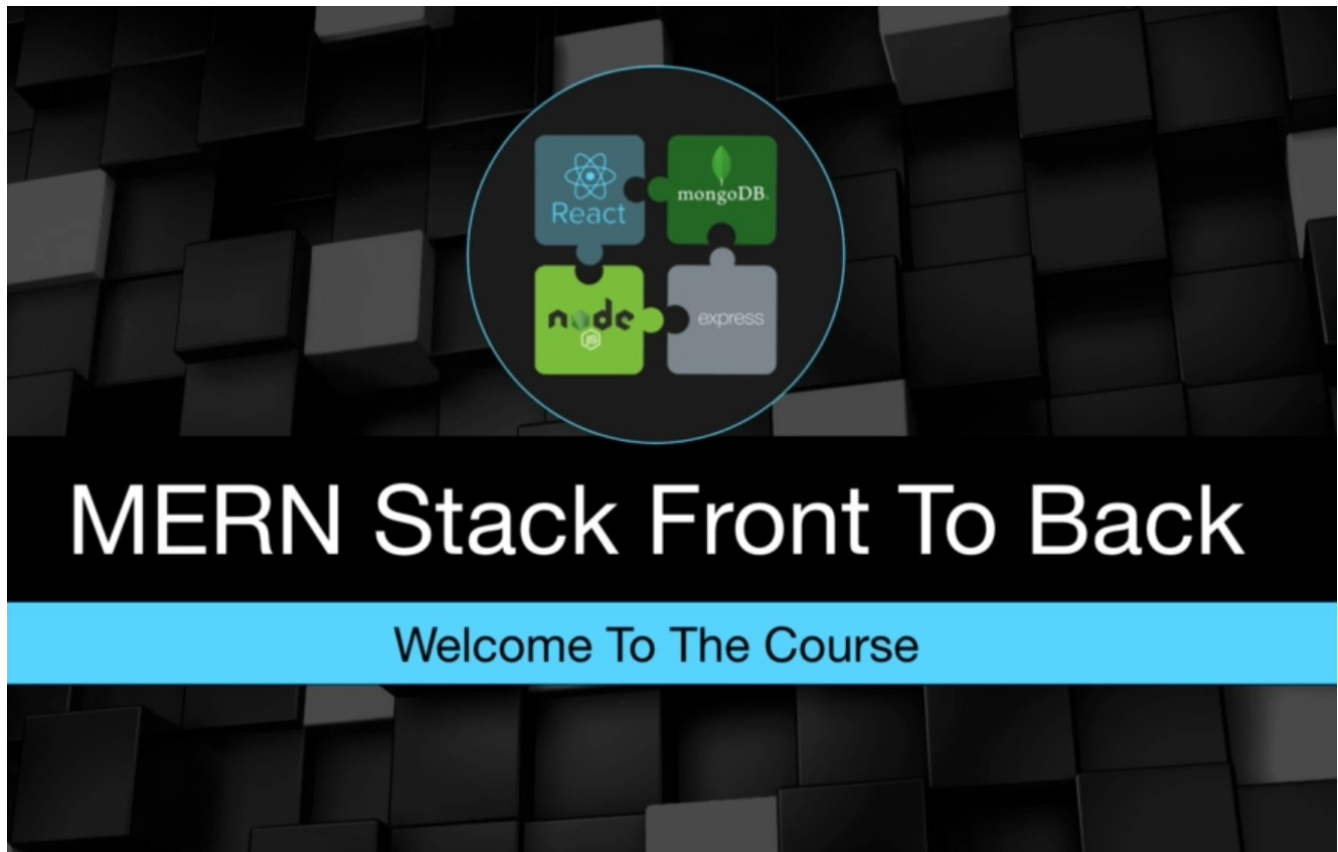


# MERN Stack Front To Back: Full Stack React, Redux & Node.js (2020)



<https://www.udemy.com/course/mern-stack-front-to-back/>

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## 0. Introduction



# Modern Technologies Used

- VSCode Editor
- ES6+ Syntax
- Async / Await
- React Hooks
- Redux With DevTools
- JWT (JSON Web Tokens)
- Postman HTTP Client
- Mongoose / MongoDB / Atlas
- Bcrypt Password Hashing
- Heroku & Git Deployment

## 0.1 Environment & Setup

### 0.1.1 Node.js

Windows: <https://nodejs.org/en/> - just download and install with GUI.

Linux:

```
CLI=> sudo apt-get update
```

```
CLI=> sudo apt install curl build-essential
```

```
CLI=> curl -sL https://deb.nodesource.com/setup_14.x | sudo -E bash -
```

```
CLI=> sudo apt install -y nodejs
```

```
CLI=> node -v [=> v14.16.1]
```

### 0.1.2 Visual Studio Code (VSC)

Windows: <https://code.visualstudio.com/> - just download and install with GUI.

Linux:

```
CLI=> sudo apt-get update
```

```
CLI=> sudo apt install code
```

### 0.1.3 GIT

Windows: <https://git-scm.com/> just download and install with GUI.

Linux: **GIT is a basic component**

### 0.1.4 Postman

Windows: <https://www.postman.com/> - just download and install with GUI.

Linux: <https://www.postman.com/downloads/> - download archive *tar.gz*  
<https://dl.pstmn.io/download/latest/linux64>

go to download folder and unpack that file with command `tar xvf [PACKAGENAME].tar.gz`

CLI=> `tar xvf Postman-linux-x64-8.6.1.tar.gz`

go to folder and use shortcut

### 0.1.5 React Developer Tools chrome extension

### 0.1.6 Redux DevTools chrome extension

### 0.1.7 VSC extensions

- Bracket Pair Colorizer - <https://marketplace.visualstudio.com/items?itemName=CoenraadS.bracket-pair-colorizer>
- ES7 React/Redux/GraphQL/React-Native snippets - <https://marketplace.visualstudio.com/items?itemName=dsznajder.es7-react-js-snippets>
- Prettier - Code formatter - <https://marketplace.visualstudio.com/items?itemName=esbenp.prettier-vscode>

VSC=>Manage=>Settings=> “format on save” should be enable

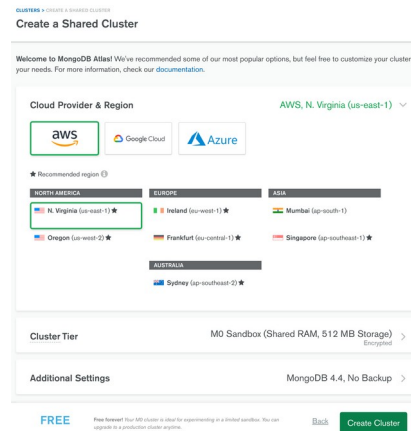
# 1. Express & MongoDB Setup

## 1.1 MongoDB (create a new cluster for project)

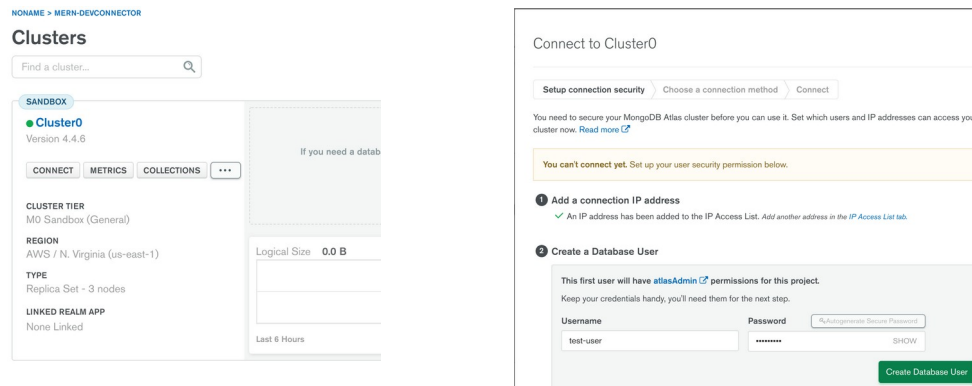
Create an account at <https://www.mongodb.com/>. Sign in to an account.

Create a new project – **MERN-devconnector**

Create a new cluster - **Cluster0**

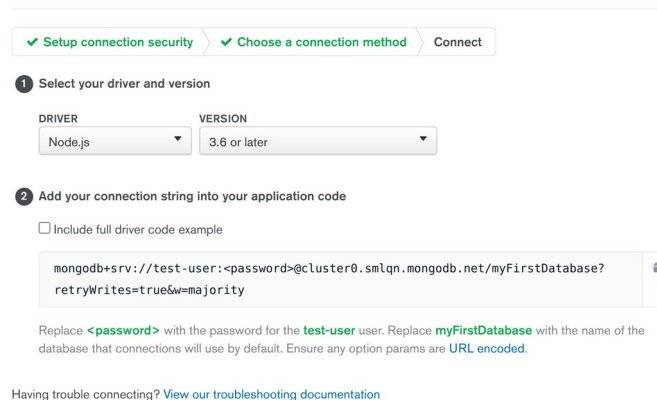


Push button “CONNECT” and add your IP adress and create a new database user to connect to a DB.



Push button “Choose a connection method” and “connect your application” and save that link

Connect to Cluster0



## 1.1 Express (install a package and setup a server)

### 1.1.1 Create a .gitignore file

It is a file with list of files/folders which will be ignored by GIT. Add **node\_modules** folder

### 1.1.2 Initialize an NPM project and setup entry point

CLI=> *npm init -y*

```
stslon@stslon-System-Product-Name:/media/stslon/860_2/june2021/git-projects/mern2$ npm init -y
Wrote to /media/stslon/860_2/june2021/git-projects/mern2/package.json:

{
  "name": "mern2",
  "version": "1.0.0",
  "description": "",
  "main": "index.js",
  "scripts": {
    "test": "echo \"Error: no test specified\" && exit 1"
  },
  "repository": {
    "type": "git",
    "url": "git+https://github.com/ILopatenko/mern2.git"
  },
  "keywords": [],
  "author": "",
  "license": "ISC",
  "bugs": {
    "url": "https://github.com/ILopatenko/mern2/issues"
  },
  "homepage": "https://github.com/ILopatenko/mern2#readme"
}
```

This command creates a new file package.json with basic information about project and all the dependencies. I'm going to change entry point ("main": "server.js") for this project to **server.js**

### 1.1.3 Install all the packages as regular dependencies

I'm going to use in this project next packages:

- **express** – backend server;
- **express-validator** – for validation data;
- **bcryptjs** – for making hash for passwords;
- **config** – for making global variables;
- **gravatar** – for working with user's avatars;
- **jsonwebtoken** – for working with JWT;
- **mongoose** – for working with MongoDB database;
- **request** – for working with another API based services;

CLI=> *npm install express express-validator bcryptjs config gravatar jsonwebtoken mongoose request*

## 1.1.4 Install all the packages as DEV dependencies

DEV dependencies will be installed without direct reference to a project (npm will add them to package.json file as a devDependencies)

- **nodemon** – will track all the changes and make a restart server automatically;
- **concurrently** – allows me to run few scripts at the same time with a single command;

CLI=> `npm install -D nodemon concurrently`

```
{ } package.json U X
{ } package.json > ...
1  {
2    "name": "mern2",
3    "version": "1.0.0",
4    "description": "",
5    "main": "server.js",
6    "scripts": {
7      "test": "echo \\\"Error: no test specified\\\" && exit 1"
8    },
9    "repository": {
10     "type": "git",
11     "url": "git+https://github.com/ILopatenko/mern2.git"
12   },
13   "keywords": [],
14   "author": "",
15   "license": "ISC",
16   "bugs": {
17     "url": "https://github.com/ILopatenko/mern2/issues"
18   },
19   "homepage": "https://github.com/ILopatenko/mern2#readme",
20   "dependencies": {
21     "bcryptjs": "^2.4.3",
22     "config": "^3.3.6",
23     "express": "^4.17.1",
24     "gravatar": "^1.8.1",
25     "jsonwebtoken": "^8.5.1",
26     "mongoose": "^5.12.13",
27     "request": "^2.88.2"
28   },
29   "devDependencies": {
30     "concurrently": "^6.2.0",
31     "nodemon": "^2.0.7"
32   }
33 }
```

## 1.1.5 Create an express server

```
JS server.js U X
_docs > JS server.js > ...
1  const express = require('express');
2
3  const app = express();
4
5  app.get('/', (req, res) => res.send('API is running'));
6
7  const PORT = process.env.PORT || 5000;
8
9  app.listen(PORT, () => console.log(`Server is started on port ${PORT}`));
10
```

## 1.1.6 Change run script at package.json

```
"scripts": {  
  "start": "node server.js",  
  "server": "nodemon server.js"  
},
```

Now command “npm run start” will run server.js with node.js and command “npm run server” will run server.js with nodemon

## 1.1.7 The first run

The image displays three screenshots illustrating the initial setup and execution of a web server.

**Terminal Screenshot:** Shows the command prompt where the user runs `npm run server`. The output indicates that nodemon is watching for changes and has started the server on port 5000.

```
stslon@stslon-System-Product-Name:/media/stslon/860_2/june2021/git-projects/mern2$ npm run server  
> mern2@1.0.0 server /media/stslon/860_2/june2021/git-projects/mern2  
> nodemon server.js  
  
[nodemon] 2.0.7  
[nodemon] to restart at any time, enter `rs`  
[nodemon] watching path(s): *.*  
[nodemon] watching extensions: js,mjs,json  
[nodemon] starting `node server.js`  
Server is started on port 5000
```

**Browser Screenshot:** A web browser window at `localhost:5000` displays the message "API is running".

**Postman Screenshot:** A screenshot of the Postman application showing a GET request to `localhost:5000`. The response status is 200 OK, and the body contains the text "API is running".



## 1.2 Create a connection with mongoDB.

Create a new folder **config**. Inside this folder create a new file – **default.json** – with information to connect with a database

```
{ default.json U X
config > {} default.json > ...
1  {}
2  "mongoURI": "mongodbsrv://test-user:test-user@cluster0.smlqn.mongodb.net/myFirstDatabase?retryWrites=true&w=majority"
3  }
```

Create a new file – **db.js** – with connection logic

```
JS db.js U
config > JS db.js > ...
1  const mongoose = require('mongoose');
2
3  const config = require('config');
4
5  const db = config.get('mongoURI');
6
7  const connectDB = async () => {
8    try {
9      await mongoose.connect(db);
10     console.log('MongoDB is connected!');
11   } catch (error) {
12     console.error(err.message);
13     process.exit(1);
14   }
15 };
16
17 module.exports = connectDB;
```

Add **db.js** to a **server.js**

```
JS server.js M X
JS server.js > ...
1  const express = require('express');
2  const connectToDB = require('./config/db');
3
4  const app = express();
5  connectToDB();
6
7  app.get('/', (req, res) => res.send('API is running'));
8
9  const PORT = process.env.PORT || 5000;
10
11 app.listen(PORT, () => console.log(`Server is started on port ${PORT}`));
12
```

```
stslon@stslon-System-Product-Name:/media/stslon/860_2/june2021/git-projects/mern2$ npm run server
> mern2@1.0.0 server /media/stslon/860_2/june2021/git-projects/mern2
> nodemon server.js

[nodemon] 2.0.7
[nodemon] to restart at any time, enter `rs`
[nodemon] watching path(s): *.*
[nodemon] watching extensions: js,mjs,json
[nodemon] starting `node server.js`
(node:49585) DeprecationWarning: current URL string parser is deprecated, and will be removed in a future version.
(Use `node --trace-deprecation ...` to show where the warning was created)
Server is started on port 5000
(node:49585) [MONGODB DRIVER] Warning: Top-level use of w, wtimeout, j, and fsync is deprecated. Use writeConcern instead.
(node:49585) [MONGODB DRIVER] Warning: Current Server Discovery and Monitoring engine is deprecated, and will be removed in a future version. To use the new MongoClient, pass option { useUnifiedTopology: true } to the MongoClient constructor.
MongoDB is connected!
```

Fix all the warnings and run a server again:

```
JS db.js U X
config > JS db.js > ...
1  const mongoose = require('mongoose');
2
3  const config = require('config');
4
5  const db = config.get('mongoURI');
6
7  const connectDB = async () => {
8    try {
9      await mongoose.connect(db, {
10        useNewUrlParser: true,
11        useUnifiedTopology: true,
12      });
13      console.log('MongoDB is connected!');
14    } catch (error) {
15      console.error(err.message);
16      process.exit(1);
17    }
18  };
19
20  module.exports = connectDB;
21
```

```
PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
stslon@stslon-System-Product-Name:/media/stslon/860_2/june2021/git-projects/mern2$ npm run server
> mern2@1.0.0 server /media/stslon/860_2/june2021/git-projects/mern2
> nodemon server.js

[nodemon] 2.0.7
[nodemon] to restart at any time, enter `rs`
[nodemon] watching path(s): *.*
[nodemon] watching extensions: js,mjs,json
[nodemon] starting `node server.js`
Server is started on port 5000
MongoDB is connected!
```

## 1.3 Create routes.

Create a new folder – **routes/api** – to store and work with all the routes.

Inside this folder create new files – **user.js, profile.js, post.js and auth.js**

```
JS user.js U X
routes > api > JS user.js > ...
1  const express = require('express');
2  const router = express.Router();
3
4  //@route      GET api/user
5  //@desc      Test route
6  //@access     Public
7  router.get('/', (req, res) => res.send('User route'));
8
9  module.exports = router;
```

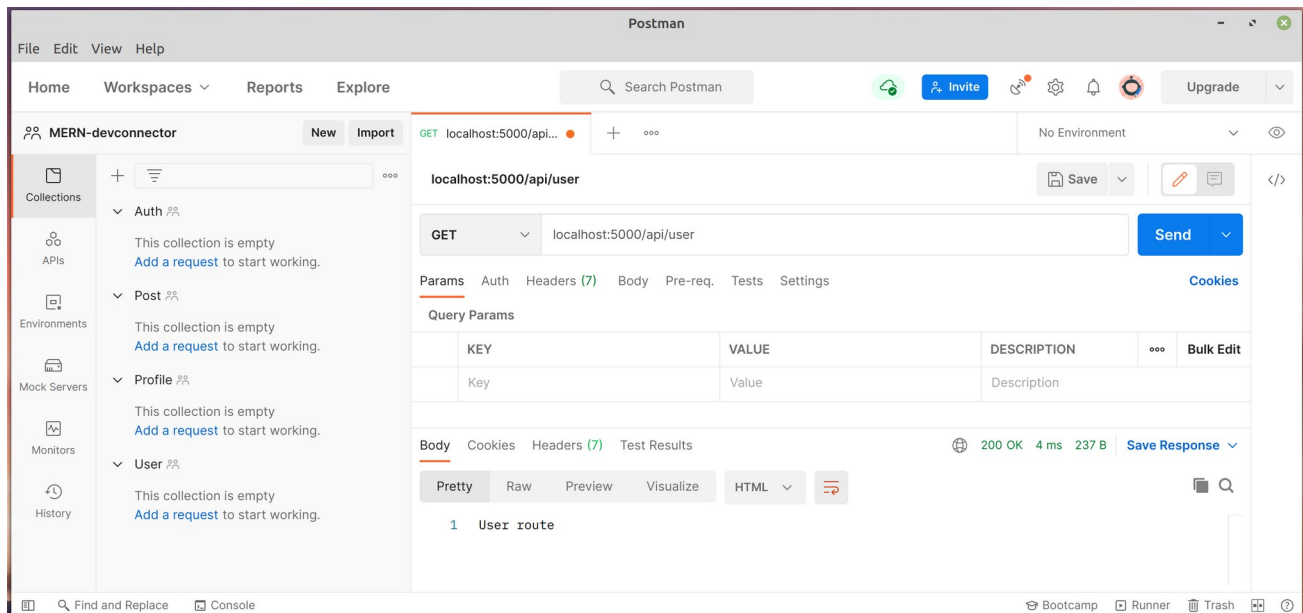
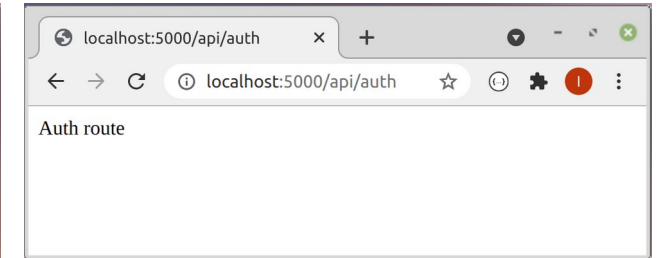
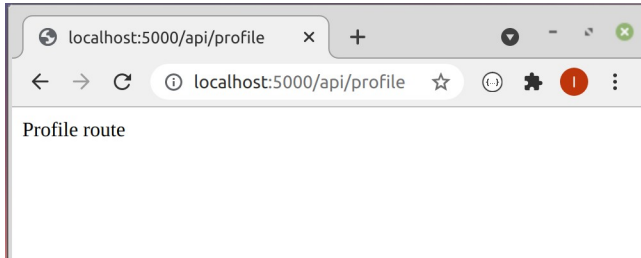
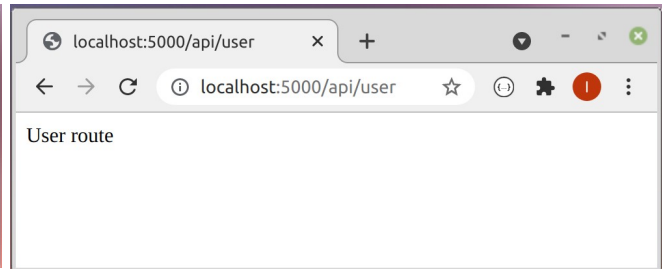
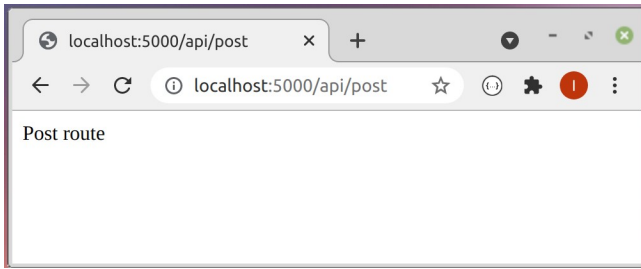
```
JS profile.js U X
routes > api > JS profile.js > router.get('/') callback
1  const express = require('express');
2  const router = express.Router();
3
4  //@route      GET api/profile
5  //@desc      Test route
6  //@access     Public
7  router.get('/', [req, res] => res.send('Profile route'));
8
9  module.exports = router;
```

```
JS post.js U X
routes > api > JS post.js > ...
1  const express = require('express');
2  const router = express.Router();
3
4  //@route      GET api/post
5  //@desc      Test route
6  //@access     Public
7  router.get('/', (req, res) => res.send('Post route'));
8
9  module.exports = router;
```

```
JS auth.js U X
routes > api > JS auth.js > ...
1  const express = require('express');
2  const router = express.Router();
3
4  //@route      GET api/auth
5  //@desc      Test route
6  //@access     Public
7  router.get('/', (req, res) => res.send('Auth route'));
8
9  module.exports = router;
```

Add all these routes to **server.js**

```
JS server.js M X
JS server.js > ...
1  const express = require('express');
2
3  const connectToDB = require('./config/db');
4
5  const userRoute = require('./routes/api/user');
6  const profileRoute = require('./routes/api/profile');
7  const postRoute = require('./routes/api/post');
8  const authRoute = require('./routes/api/auth');
9
10 const app = express();
11 connectToDB();
12
13 app.get('/', (req, res) => res.send('API is running'));
14
15 //define all the routes
16 app.use('/api/user', userRoute);
17 app.use('/api/profile', profileRoute);
18 app.use('/api/post', postRoute);
19 app.use('/api/auth', authRoute);
20
21 const PORT = process.env.PORT || 5000;
22
23 app.listen(PORT, () => console.log(`Server is started on port ${PORT}`));
24
```



## 1.4 User API Routes & JWT Authentication

### 1.4.1 Create an User schema for MongoDB

Create a new folder – **models** – to store all the schemas.

Create a new file – **User.js** – inside this folder.

```
JS User.js U X
models > JS User.js > UserSchema > password
1 const mongoose = require('mongoose');
2
3 const UserSchema = new mongoose.Schema({
4   name: {
5     type: String,
6     required: true,
7   },
8   email: {
9     type: String,
10    required: true,
11    unique: true,
12  },
13  password: {
14    type: String,
15    required: true,
16  },
17  avatar: {
18    type: String,
19  },
20  date: {
21    type: Date,
22    default: Date.now,
23  },
24 });
25
26 module.exports = User = mongoose.model('user', UserSchema);
27
```

### 1.4.2 Edit test route to *api/user* endpoint

Add Middleware (ex. bodyParser) to work with request object. Change user.js route. Change request in Postman

```
JS server.js M X
JS server.js > ...
1 const express = require('express');
2
3 const connectToDB = require('./config/db');
4
5 const userRoute = require('./routes/api/user');
6 const profileRoute = require('./routes/api/profile');
7 const postRoute = require('./routes/api/post');
8 const authRoute = require('./routes/api/auth');
9
10 const app = express();
11
12 //Init a built in Middleware (ex. bodyParser)
13 app.use(express.json({ extended: false }));
14
15 connectToDB();
16
17 app.get('/', (req, res) => res.send('API is running'));
18
19 //define all the routes
20 app.use('/api/user', userRoute);
21 app.use('/api/profile', profileRoute);
22 app.use('/api/post', postRoute);
23 app.use('/api/auth', authRoute);
24
25 const PORT = process.env.PORT || 5000;
26
27 app.listen(PORT, () => console.log('Server is started on port ${PORT}'));
28
```

```
JS user.js M X
routes > api > JS user.js > ...
1 const express = require('express');
2 const router = express.Router();
3
4 /* @route GET api/user
5 //@desc Test route
6 //@access Public
7 router.get('/', (req, res) => res.send('Test route'));
8
9 //@route POST api/user
10 //@desc Register a new user
11 //@access Public
12 router.post('/', (req, res) => {
13   console.log(req.body);
14   res.send('User route');
15 });
16
17 module.exports = router;
18
```

localhost:5000/api/user

POST localhost:5000/api/user

Params Authorization Headers (9) Body Pre-request Script Tests

Headers 8 hidden

KEY	VALUE
Content-Type	application/json
Key	Value

POST localhost:5000/api/user

Params Authorization Headers (10) Body Pre-request Script Tests Settings

none form-data x-www-form-urlencoded raw binary GraphQL JSON

```
1 {
2   "name": "Iurii Lopatenko"
3 }
```

```
nodemon] 2.0.7
nodemon] to restart at any time, enter `rs`
nodemon] watching path(s): *.*
nodemon] watching extensions: js,mjs,json
nodemon] starting `node server.js`
Server is started on port 5000
MongoDB is connected!
{ name: 'Iurii Lopatenko' }
```

Now Postman can send a request (with some data in body) and server can receive this request and work with data (in this example server just sent an object from req.body to console.log)



## 1.4.3 Add data validation with express-validate npm module

```
1 const express = require('express');
2 const router = express.Router();
3 const { body, validationResult } = require('express-validator');
4
5 /* @@route GET api/user
6 //@desc Test route
7 //@access Public
8 router.get('/', (req, res) => res.send('User route')); */
9
10 @@route POST api/user
11 //@desc Register a new user
12 //@access Public
13 router.post(
14   '/',
15   body('name')
16     .isString()
17     .withMessage('Name should be a text')
18     .not()
19     .isEmpty()
20     .withMessage('Name can not be an empty'),
21   body('email')
22     .isEmail()
23     .withMessage('Email should an email')
24     .not()
25     .isEmpty()
26     .withMessage('Email can not be an empty'),
27   body('password')
28     .isLength({ min: 6 })
29     .withMessage('Password should be at least 6 characters length'),
30   (req, res) => {
31     const errors = validationResult(req);
32     if (!errors.isEmpty()) {
33       return res.status(400).json({ errors: errors.array() });
34     }
35     console.log(req.body);
36     res.send('User route');
37   }
38 );
39
40 module.exports = router;
```

POST localhost:5000/api/user

Params Authorization Headers (10) Body Pre-request Script Tests Settings

none form-data x-www-form-urlencoded raw binary GraphQL JSON

```
1 {
2   "name": null,
3   "email": 34,
4   "password": "hello"
5 }
```

Body Cookies Headers (7) Test Results

Pretty Raw Preview Visualize JSON

```
1 {
2   "errors": [
3     {
4       "value": null,
5       "msg": "Name should be a text",
6       "param": "name",
7       "location": "body"
8     },
9     {
10      "value": null,
11      "msg": "Name can not be an empty",
12      "param": "name",
13      "location": "body"
14    },
15     {
16      "value": 34,
17      "msg": "Email should an email",
18      "param": "email",
19      "location": "body"
20    },
21     {
22      "value": "hello",
23      "msg": "Password should be at least 6 characters length",
24      "param": "password",
25      "location": "body"
26    }
27   ]
28 }
```

User / Register

POST localhost:5000/api/user

Params Auth Headers (10) Body Pre-req. Tests Settings

raw JSON

```
1 {
2   "name": "Iurii Lopatenko",
3   "email": "YALopatenko@gmail.com",
4   "password": "hello3"
5 }
```

Body

Pretty Raw Preview Visualize HTML

1 User route

```
Server is started on port 5000
MongoDB is connected!
{
  name: 'Iurii Lopatenko',
  email: 'YALopatenko@gmail.com',
  password: 'hello3'
}
```

## 1.4.4 Register a new user.

```
1 routes > api > JS userjs > router.post('/') callback
2 const bcrypt = require('bcryptjs');
3 //@@route POST api/user
4 //@desc Register a new user
5 //@access Public
6 router.post('/',
7   body('name').isString().withMessage('Name should be a text').not().isEmpty().withMessage('Name can not be empty'),
8   body('email').isEmail().withMessage('Email should be an email').not().isEmpty().withMessage('Email can not be empty'),
9   body('password').isLength({ min: 6 }).withMessage('Password should be at least 6 characters length'),
10   async (req, res) => {
11     const errors = validationResult(req);
12     if (!errors.isEmpty()) {
13       //action in case when validation has detected issue
14       return res.status(400).json({ errors: errors.array() });
15     }
16     //Destructuring all the data from req.body to local variables
17     const { name, email, password } = req.body;
18     try {
19       //action in case when validation has not detected any issues:
20       //1 - See if user with current email exists in database
21       let user = await User.findOne({ email });
22       if (user) {
23         //if user with this email was found in database - throw an error
24         return res.status(400).json({ errors: [{ msg: "User already exists! Try to use another email!" }] });
25       }
26       //2 - Get a gravatar for this email
27       const avatar = gravatar.url(email, {s: '200',r: 'pg',d: 'mm'});
28       //3 Create a new user
29       user = new User({name, email, avatar, password});
30       //4 - Encrypt user's password
31       //4.1 - Create a salt
32       const salt = await bcrypt.genSalt(10);
33       //4.2 - Hash the password
34       user.password = await bcrypt.hash(password, salt);
35       //5 - Save a new user model to a database
36       await user.save();
37       //TODO !!!!!
38       //6 - return a JWT
39       //TODO !!!!!
40       res.send('User registered!');
41     } catch (error) {
42       console.error(err.message);
43       res.status(500).send('Server error!');
44     }
45   }
46 );
47
48 module.exports = router;
```

POST localhost:5000/api/user

Params Authorization Headers (10) Body Pre-request Script Tests Settings

none form-data x-www-form-urlencoded raw binary GraphQL JSON

```
1 {
2   "name": "Iurii Lopatenko",
3   "email": "YALopatenko@gmail.com",
4   "password": "qwerty"
5 }
```

Body Cookies Headers (7) Test Results

Pretty Raw Preview Visualize HTML

1 User registered!

myFirstDatabase.users

COLLECTION SIZE: 266B TOTAL DOCUMENTS: 1 INDEXES TOTAL SIZE: 8KB

Find Indexes Schema Anti-Patterns Aggregation

FILTER {"filter": "example"}

QUERY RESULTS 1-1 OF 1

```
1 {
2   "_id": ObjectId("60c3a530609f6f665b1de2b"),
3   "name": "Iurii Lopatenko",
4   "email": "YALopatenko@gmail.com",
5   "avatar": "http://www.gravatar.com/avatar/29b33c4fbaf493f1e63469325fa5900?s=200&r=pg&d=mm",
6   "password": "$2a$10$KGLiC0HztK0NG.kW404e98f02f4IP01stB2CD20Tw4EKHjCbway",
7   "date": "2021-06-11T18:02:24.981+00:00",
8   "__v": 0
9 }
```

Body Cookies Headers (7) Test Results

Pretty Raw Preview Visualize JSON

```
1 {
2   "errors": [
3     {
4       "msg": "User already exists! Try to use another email!"
5     }
6   ]
7 }
```

# 1.4.5 JWT

Encoded

PASTE A TOKEN HERE

eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJzdWIiOiIxMjM0NTY3ODkwIiwibmFtZSI6IkpvaG4gRG9lIiwiaWF0IjoxNTE2MjM5MDIyfQ.SflKxwRJSMeKKF2QT4fwpMeJf36P0k6yJV\_adQssw5c

Decoded

EDIT THE PAYLOAD AND SECRET

HEADER: ALGORITHM & TOKEN TYPE

{

"alg": "HS256",

"typ": "JWT"

}

PAYLOAD: DATA

{

"sub": "1234567890",

"name": "John Doe",

"iat": 1516239822

}

VERIFY SIGNATURE

HMACHSHA256(

base64UrlEncode(header) + "." +

base64UrlEncode(payload),

your-256-bit-secret

)

☐ secret base64 encoded

```
//6 - return a JWT
//6.1 - create a payload
const payload = {
  user: {
    id: user.id,
  },
};
//6.2 - create a JWT with payload and secret and a callback function
jwt.sign(
  payload,
  config.get('jwtSecret'),
  { expiresIn: 360000 },
  (err, token) => {
    if (err) throw err;
    res.json({ token });
  });
```

() default.json M X

config > {} default.json > ...

1 {

2 "mongoURI": "mongodb+srv://test-user:test-user@cluster0.smlqn.mongodb.net/myFirstDatabase?retryWrites=true&w=majority",

3 "jwtSecret": "superSecret"

4 }

User / Register

Save

POST

localhost:5000/api/user

Params

Authorization

Headers (10)

Body

Pre-request Script

Tests

Settings

none

form-data

x-www-form-urlencoded

raw

binary

GraphQL

JSON

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Body

Cookies

Headers (7)

Test Results

Status: 200 OK

Time: 245 ms

Size: 431 B

Pretty

Raw

Preview

Visualize

JSON

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# What was used in project?

**Operating Systems:** Linux Mint 20.1 and Windows 10

**Node.js** – javascript runtime enviroment.

NPM

GIT -

express

express-validator

MongoDB

Mongoose

jwt

nodemon

postman

VSCode

Chrome