Teach your Parents how to build an API server in Node.js

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About me

<img width="100%" src="https://i.imgur.com/zU2zIHU.jpg">
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What we'll cover

   Another Node.js explanation   A look into APIs   Building an API with Express.js   Securing your API

What's Node.js?

- **Lesson 0** of *Get Programming with Node.js*
- A place to run JavaScript outside of your browser (*via Chome V8*)

<img src="https://drek4537l1klr.cloudfront.net/wexler/Figures/00fig01_alt.jpg" style="padding:20px; background: white;"> https://livebook.manning.com/book/get-programming-with-node-js/chapter-0/38

Install Node.js

- Go to nodejs.org
- Download `v14.15.5` (LTS version)
- Follow standard GUI steps
- Run these commands in a terminal window

```
node -v #Verify your version of node
node #Enter the Node.js REPL environment
```

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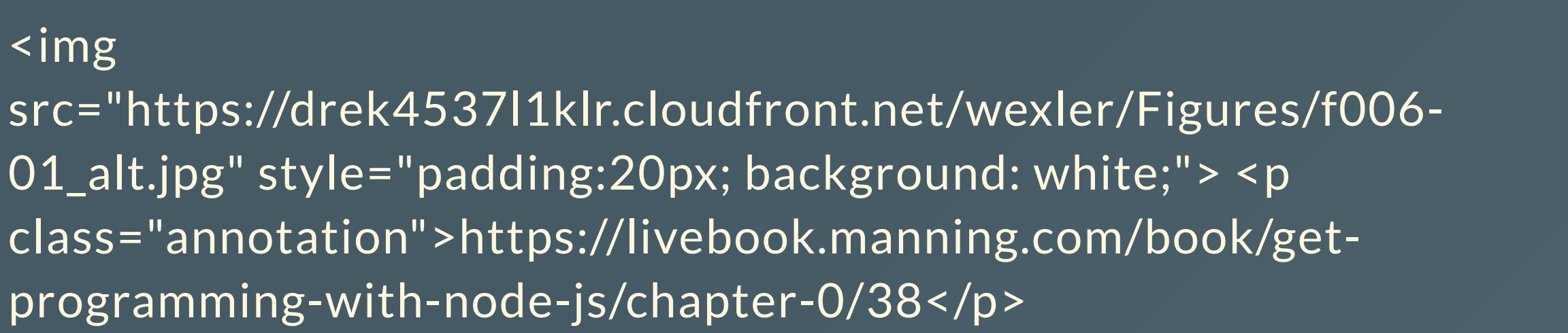
What's an API?

- Application Programming Interface
- A way of communicating with an application server to get data
- Structure to handle requests in specific formats



What's in a request?

- **Request method**:
  - `GET` = Read
  - `POST` = Create
  - `PATCH` / `PUT` = Update
  - `DELETE` = Destroy

- **Headers**
  - Metadata about the request

What's in a response?

- **Status Code**
  - 200 for success
- **Response headers**
  - metadata about the server
- **Response body**
  - data payload

Movie data API example

- Hit the api from the client omdbapi
- Create an API key (*Your key will be emailed to you*)
- Create a new directory called `movie_api`
- add a file called `index.js`, and add the following:

Request with Node's HTTP module

```
const http = require('http');
const API_KEY = 'XXXXXXX';
const query = 'hacker';
const URI = `http://www.omdbapi.com/?apikey=${API_KEY}&s=${query}`;

http.get(URI, res => {
  let data = '';
  res.on('data', chunk => data += chunk);
  res.on('end', () => console.log(JSON.parse(data)));

}).on("error", err => console.log("Error: " + err.message));
```

The Response


```
{
  Search: [
    {
      Title: 'Hacker',
      Year: '2016',
      imdbID: 'tt3173594',
      Type: 'movie',
      Poster: 'https://m.media-amazon.com/images/M/MV5BYjk3ZWQ4ZmMtNzM1OS00NDQxLWJmZjctNzFlODAyODRkMjcyXkEyXkFqcGdeQXVyMjEwODIzODA@._V1_SX300.jpg'
    },
    {
      Title: 'The Hacker Wars',
      Year: '2014',
      imdbID: 'tt4047350',
      Type: 'movie',
      Poster: 'https://m.media-amazon.com/images/M/MV5BNzgwOTI0MjQwN15BMl5BanBnXkFtZTgwMjAwNzQ3MzE@._V1_SX300.jpg'
    },
    {
      Title: 'The Hacker Wars',
      Year: '2014',
      imdbID: 'tt4056570',
      Type: 'movie',
      Poster: 'https://m.media-amazon.com/images/M/MV5BNzgwOTI0MjQwN15BMl5BanBnXkFtZTgwMjAwNzQ3MzE@._V1_SX300.jpg'
    },
  ]
```

Make it cleaner with Axios

- We'll need to generate a `package.json` by running `npm init`
- 📦 Then, `npm i axios`

```
const axios = require('axios');

axios.get(URI)
  .then(res => console.log(res.data))
  .catch(error => console.log(error));
```

- There are other ways to query an API

REST

- Representational State Transfer
- Unique URI's (Uniform Resource Identifiers)

  HOST   +   VERSION   +   RESOURCE   https://api.data.com   +   /v2   +   /item/:id/sub-item/:subId

- Differentiate data based on route and version

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What if that API was your own server?

Control over:

- API response
- Who gets access
- Shape of the data

Why Express.js

- Great for RESTful routes
- Set up for middleware
- 📦 Run `npm i express`
- Run `npm init` to initialize a new project called `express_api`
- create an `index.js` file to hold our main application code

Start the Express server

- Add the following code to `index.js`

```
const express = require('express');
const app = express();
const PORT = 8000;

app.listen(PORT, () => console.log('Server is up!'));
```

- Run `node index` and notice what happens when we visit `localhost:8000`
- We have no routes set up

What we can notice

- No routes to handle the request yet
- Add a `GET` request
- Let's look at the network tab to see the response
- Let's use postman to test a request

```
app.get('/products', <handler>)
```

Data worth accessing

```
const data = {
  products: [{
      name: 'jeans',
      inventory: 2
    },
    {
      name: 'jackets',
      inventory: 0
    },
    {
      name: 'hats',
      inventory: 12
  }]
}
```

A simple route

- Next, let's handle incoming API requests for products

```
const router = express.Router();

app.use('/v1', router);
router.route('/products')
  .get((req, res) => {
    res.status(200).send(data.products);
  })
```

We control the data

We can examine the request body and params once the request is received by our server!

- such as:

```
const { name } = req.params;
```

Dynamic params

```
function productRouter () {
  const productRouter = express.Router();
  productRouter.get('/', (req, res) => {
    res.status(200).send(data.products)
  })
  productRouter.get('/:name', (req, res) => {
    let result = data.products.filter(item => {
      return item.name.includes(req.params.name)
    });
    res.status(200).send(result);
  })
  return productRouter;
}

router.use('/products', productRouter())
```

Process JSON with Express middleware

- Express doesn't parse JSON by default so we'll need to add `app.use(express.json())` middleware that runs between the request being recieved and response going out.
- Then add a `POST` request to our `productRouter` like so:

```
productRouter.post('/', (req, res) => {
  const { name, inventory } = req.body;
  console.log(`Saving ${inventory} of ${name}.`);
  res.status(200).send({ message: "Data Saved." });
})
```

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Securing your API

- Authentication with **Username** and **Password**
- Recieve token to send in an Authorization header
- Token is verified on the server before sending back data
- JSON web tokens

Simple security

- Similar to OMDB, we could provide an API key with specific access if an email is provided.
- As long as the user provides an email, we can send them a token and associate the two in our database to monitor or rate limit their requests.
- 📦 For this we can use JSON web tokens by running `npm i jsonwebtoken`
- Then, in `index.js` add:

```
const jwt = require('jsonwebtoken');
```

JWTs

- JWTs can be used to sign the token with the user's information *This is particularly useful after first verifying the user in your database.*
- It takes **user info**, a **server secret key**, and an **expiration date**

```
const token = jwt.sign({ email }, SECRET_KEY, { expiresIn: '24h' });
```

- This ensures the token is assocaited with an email and cannot be misused past a certain date.

Use JWTs to verify a request

- First, define `const SECRET_KEY = 'get_programming';`

```
function authRouter () {
  const authRouter = express.Router();
  authRouter.post('/key', (req, res) => {
    const { email } = req.body;
    const token = jwt.sign({ email }, SECRET_KEY, { expiresIn: '24h' });
    console.log(`Saving ${email} with token: ${token}.`);
    res.status(200).send({ token });
  })
  return authRouter;
}
```

Verify JWTs through middleware

- Within your `productRouter` we'll add `productRouter.use(authMiddleware);`
- Then we can define the middleware function as:

```
function authMiddleware (req, res, next) {
  const auth = req.headers.authorization;
  const decoded = jwt.verify(auth, SECRET_KEY);
  if (decoded && decoded.email) {
    next();
  } else {
    res.send({ message: 'Unauthorized request.' });
  }
}
```

Make an authenticated API request

- Submit the same `GET` request, but this time with an Authorization header

```
Authorization: eyJhbGciOiJIUzI1N
```

- In this way, we can secure the type of data users can access for demo purposes, versus for paid accounts.

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Thank You