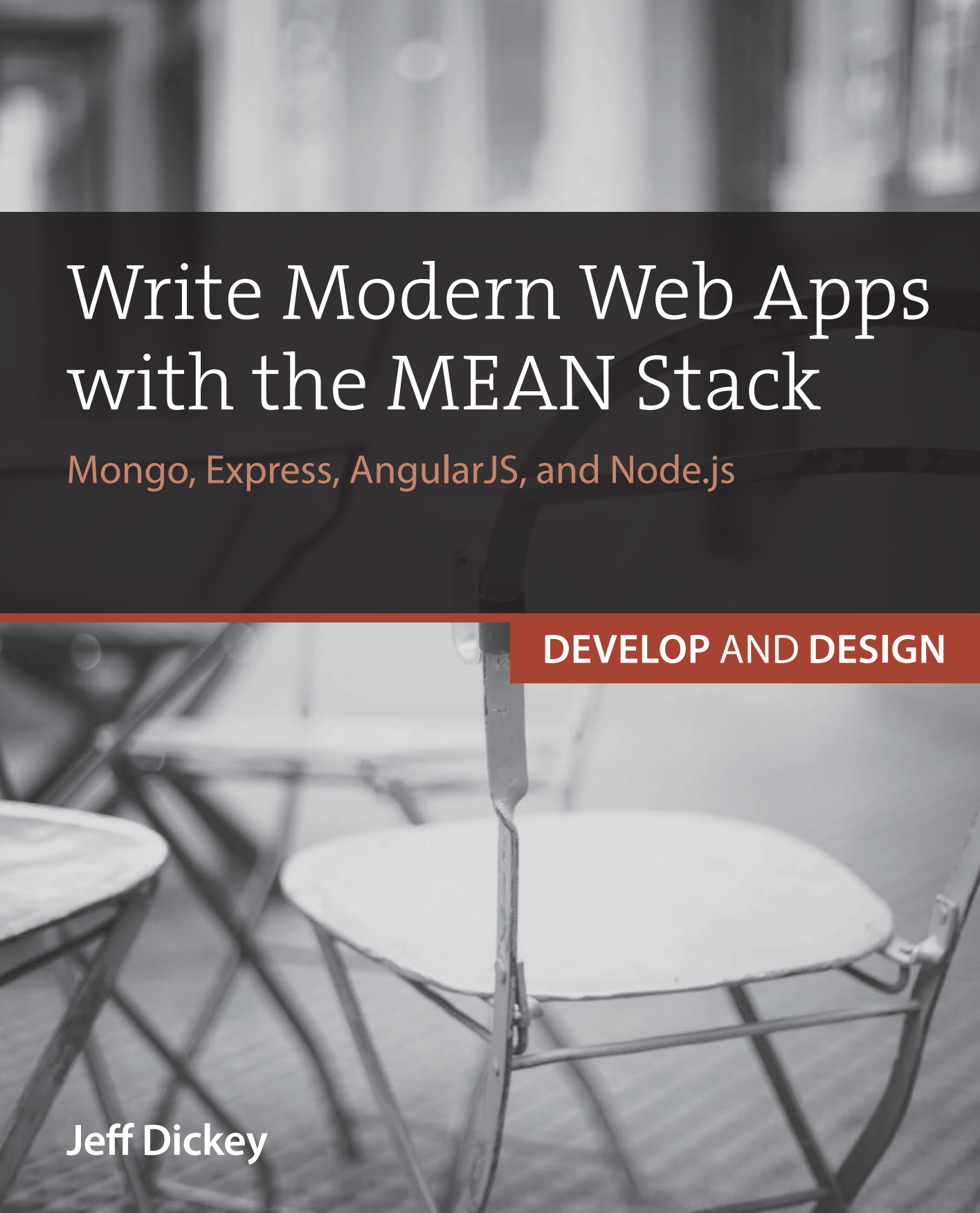

Write Modern Web Apps with the MEAN Stack

Mongo, Express, AngularJS, and Node.js

DEVELOP AND **DESIGN**

Jeff Dickey

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To Mom and Dad,
for sometimes allowing me to sit inside all day on that computer

ABOUT THE AUTHOR

Jeff Dickey is a full-stack web developer with years of startup experience in San Francisco and Los Angeles. Jeff has launched projects, maintained large systems, and led development teams. With more than 10 years of experience on all of the major web platforms, he is continually searching for the latest technology for building applications. Currently Jeff works for Heroku as its first CLI developer. Jeff is also an instructor for General Assembly, teaching a course on back-end web development.

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PREFACE

WHO IS THIS BOOK FOR?

This book is for web developers wanting to learn how building web applications has changed. The book assumes a basic knowledge of JavaScript. Knowledge of Node or Angular is helpful as well but not required.

WHY I WROTE THIS BOOK

I've been a web developer since 2004 and have professionally worked with most of the major web platforms. I love to seek out new technology that helps me write my applications better.

Applications built with an MVC framework such as Angular has been the largest paradigm shift that I've seen in the web community. Frameworks and tools have come and gone, but client-side MVC applications are fundamentally different.

I've been impressed with the quality of applications that I've shipped with Angular and Node. The tools are simple—sometimes a bit naïve—but this simplicity comes with the fantastic ability to iterate on features and maintain a codebase.

Applications such as those built with the MEAN stack are becoming more popular, but many development teams still feel comfortable with server-generated pages and relational databases.

I've had such good luck with MEAN applications that I want to share my knowledge of how to build them with you.

I hope you'll enjoy exploring this new method of building applications with me. I love discussing these topics, so feel free to reach out to me on Twitter to continue the conversation.

Jeff Dickey
@dickeyxxx
August 2014

INTRODUCTION

The JavaScript community has a strong belief in the power of composability when architecting software. This is in line with the Unix philosophy of simple components that can be used together to quickly build applications.

By no means is this methodology the only one that exists. Ruby on Rails, for example, uses an opinionated framework to make decisions for you about what your application should look like. Opinionated frameworks offer the advantage of being able to quickly learn an application because out of the box it works—you just need to fill in the gaps. Opinionated frameworks are also easier to learn because there is usually a "right" way to do something. The downside is that you're limited to building applications that the framework was made for, and moving outside of the use cases the framework was made for can be difficult.

By contrast, the composition methodology is more flexible. Composing simple pieces together has a clear advantage of allowing you to build anything you want. These frameworks provide you with building blocks, and it's up to you to decide how to put them together. The downside is mostly in the learning phase. It's difficult to know what is a good idea and what is a bad idea without having experience doing both.

For this reason, it's useful to read up on opinionated guides for how to build JavaScript applications. These opinions provide one person's viewpoint on good and bad decisions and give you a road map to what an application should look like.

This book shows you how to build your own MEAN application following my opinions of what a good application should look like. These opinions come from my experience developing applications. While I have a good amount of experience, it's unlikely it will fit perfectly with any other one person. For this reason, I find books such as this are useful to learn not just the "how" of using a tool set but the "why" as well.

In other words, it's useful to know how to use promises in Node but not very useful if you don't understand why they're useful.

The application you will build is called simply Social App (see **Figure I.1**). You can see an example of it running at *https://mean-sample.herokuapp.com* as well as the code at *https://github.com/dickeyxxx/mean-sample*.

The application is similar to Twitter. Users can create an account and add posts. The feature count is not large but does consist of some neat solutions such as WebSockets that immediately display new posts to all users viewing the application. I'll also go over compiling the CSS and JavaScript assets with Gulp, deploying the application to both Heroku and Digital Ocean, building a clean, maintainable API and more.

Having a "newsfeed" that displays live, updating content is a pattern that I see on just about every project I work on. I chose this as an example because it is complicated enough to incorporate many different tools but not so complex that you will become bogged down in the minutiae of this specific application.

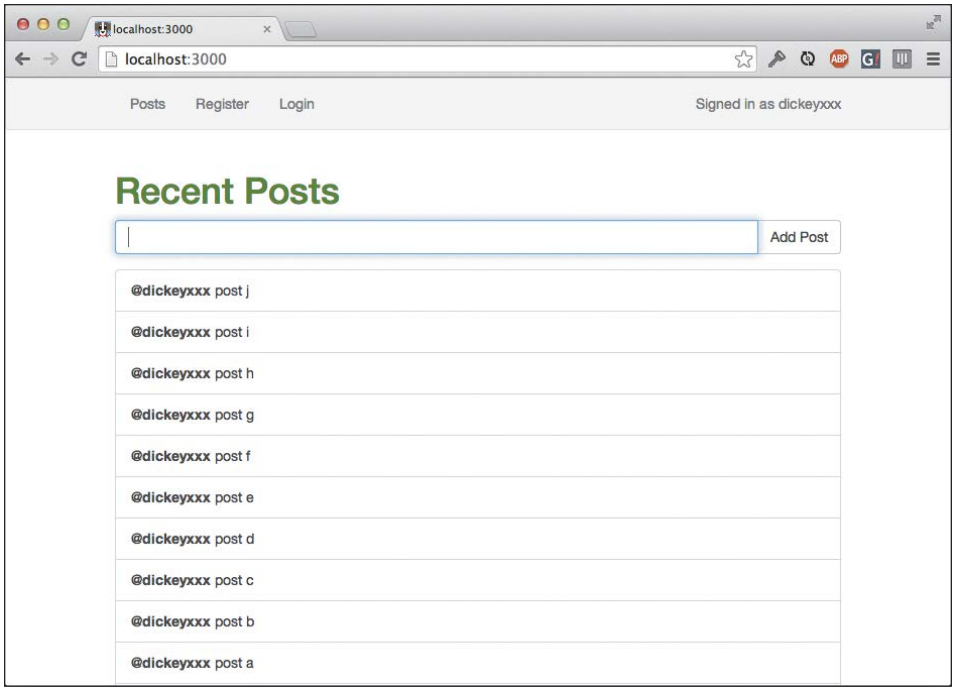

FIGURE I.1 Social app

This application is also easily extensible. I encourage you while reading this book to take the time to not only implement the application as I have done but to build features of your own. It's relatively easy to follow along and build the same application, but you know that's not how software is actually written.

Learning a new skill is tough. As a teacher, I've witnessed many people learning something for the first time and been able to witness their progress. One facet of that I've noticed is that learning doesn't feel like anything. You can't tell whether you're learning something when you're learning it—in fact, learning feels a lot more like frustration.

What I've learned is that during this period of frustration is actually when people improve the most, and their improvements are usually obvious to an outsider. If you feel frustrated while trying to understand these new concepts, try to remember that it might not feel like it, but you're probably rapidly expanding your knowledge.

With that, join me in Chapter 1 while you learn a bit about the history of the Web's surprising relationship with JavaScript, how it's changed the way we think of applications, and where the MEAN stack fits in.

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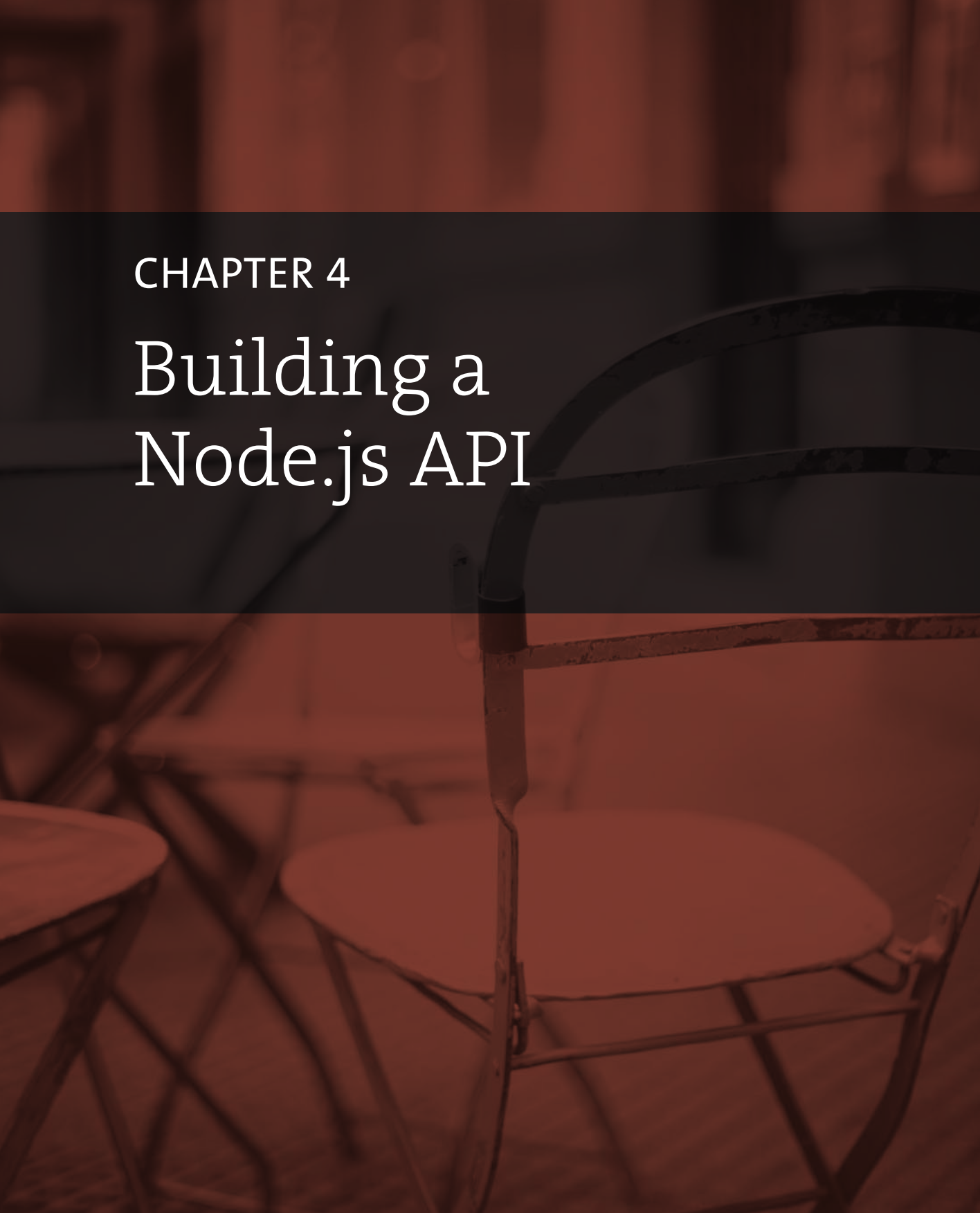

CHAPTER 4

Building a Node.js API

In the previous chapter, you built a fully functioning Angular app for posting status updates. In this chapter, you will build an API for it to get a list of all the posts and to make a new post. The endpoints will be as follows:

- `GET /api/posts` returns a JSON array of all the posts. This is similar to what you had in `$scope.posts`.
- `POST /api/posts` expects a JSON document containing a username and post body. It will save that post in MongoDB.

THE STOCK ENDPOINT

To start, you'll use Node.js and Express to build a stock `/api/posts` endpoint. First, inside a new folder, create a `package.json` file like the following:

```
{
  "name": "socialapp"
}
```

The name can be anything you want, but try to ensure it doesn't conflict with an existing package. The `package.json` file is the only thing you need to make a directory a node project.

Now that you have this, you can add `express` and `body-parser` as dependencies:

```
$ cd <path-to-project-folder>
$ npm install --save express
$ npm install --save body-parser
```

`body-parser` is used for `express` to read in JSON on POST requests automatically.

The `--save` flag saves the dependency to the `package.json` file so you know what versions of what packages the app was built with (and therefore depends on). In fact, if you open your `package.json`, you'll see something similar to this:

```
{
  "name": "socialapp",
  "dependencies": {
    "body-parser": "^1.4.3",
    "express": "^4.4.4"
  }
}
```

Now that you've done this, you can `require('express')` to include it in a node script.

Create a `server.js` file with the following contents:

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

var app = express()
app.use(bodyParser.json())

app.get('/api/posts', function (req, res) {
  res.json([
    {
      username: 'dickeyxxx',
      body: 'node rocks!'
    }
  ])
})

app.listen(3000, function () {
  console.log('Server listening on', 3000)
})
```

Try running this file:

```
$ node server.js
```

You can access it in your browser at *http://localhost:3000/api/posts*. You should see that your stubbed JSON comes back.

You now have the basic Node request in place, so you need to add the POST endpoint for adding posts and back it against MongoDB.

CREATING POSTS VIA THE API

Now let's build the POST endpoint for creating posts. Add this endpoint to `server.js`:

```
app.post('/api/posts', function (req, res) {
  console.log('post received!')
  console.log(req.body.username)
  console.log(req.body.body)
  res.send(201)
})
```

This is just a request that checks to see whether you're reading the data properly. The client would receive only the HTTP status code 201 (created). It's good to build a lot of these stubbed-out sorts of logic to check to see whether your plumbing is in order when building MEAN applications. Because you can't test a POST request using the browser, you should check to see whether it is working using `curl`:

```
curl -v -H "Content-Type: application/json" -XPOST --data
→ "{\"username\":\"dickeyxxx\", \"body\":\"node rules!\"}"
→ localhost:3000/api/posts
```

If you are unfamiliar with `curl`, this says "Make a POST request to *localhost:3000/api/posts*. Be verbose." Setting your `Content-Type` header to `json` includes the JSON document as the body.

The `Content-Type` header is necessary to be able to parse this content into the friendly `req.body.username` objects from the JSON.

If the command line isn't your thing, you can do this same thing using the great Postman app for Chrome to test APIs. Regardless of what method you use, it is crucial you test your APIs using stub clients like this rather than building your app in lockstep.

MongoDB MODELS WITH MONGOOSE

To interact with MongoDB, you will be using the Mongoose ODM. It's a light layer on top of the Mongo driver. To add the `npm` package, do this:

```
$ npm install --save mongoose
```

It'll be good to keep this code modularized so your `server.js` file doesn't get huge. Let's add a `db.js` file with some of the base database connection logic:

```
var mongoose = require('mongoose')
mongoose.connect('mongodb://localhost/social', function () {
  console.log('mongodb connected')
})
module.exports = mongoose
```

You can get access to this `mongoose` instance by using the `require` function. Now let's create a `mongoose` model to store the posts. Place this code in `models/post.js`:

```
var db = require('../db')
var Post = db.model('Post', {
  username: { type: String, required: true },
  body:     { type: String, required: true },
  date:     { type: Date, required: true, default: Date.now }
})
module.exports = Post
```

Now you have a model you can get with `require`. You can use it to interact with the database.

USING MONGOOSE MODELS WITH THE POST ENDPOINT

Now requiring this module will give you the `Post` model, which you can use inside of your endpoint to create posts.

In server.js, change your `app.post('/api/posts')` endpoint to the following:

```
var Post = require('./models/post')
app.post('/api/posts', function (req, res, next) {
  var post = new Post({
    username: req.body.username,
    body: req.body.body
  })
  post.save(function (err, post) {
    if (err) { return next(err) }
    res.json(201, post)
  })
})
```

First, you require the `Post` model. When a request comes in, you build up a new instance of the `Post` model with `new Post()`. Then, you save that `Post` model and return a JSON representation of the model to the user with status code 201.

While it isn't totally necessary to return the JSON here, I like for my create API actions to do so. The client can sometimes make use of it. It might be able to use the `_id` field or show data that the server generated (such as the date field, for example).

Note the `err` line. In Node, it's common for code to return callbacks like this that start with an error argument, and then the data is returned. It's your responsibility to check whether there is an error message and do something about it. In this case, you call the `next()` callback with an argument, which triggers a 500 in Express. An error in this case would typically mean the database was having issues. Other programming languages use exceptions to handle errors like this, but Node.js made the design decision to go with error objects because of its asynchronous nature. It's simply not possible to bubble up an exception with evented code like Node.js.

Go ahead and hit this endpoint again with `curl` or Postman. (Make sure you first restart your server. Later you'll see how to automatically restart it with `nodemon`.)

```
$ curl -v -H "Content-Type: application/json" -XPOST --data
→ "{\"username\":\"dickeyxxx\", \"body\":\"node rules!\"}"
→ localhost:3000/api/posts
```

You should see a response like the following (make sure you've started your Mongo server):

```
> POST /api/posts HTTP/1.1
> User-Agent: curl/7.30.0
> Host: localhost:3000
> Accept: */*
> Content-Type: application/json
> Content-Length: 46
>
* upload completely sent off: 46 out of 46 bytes
< HTTP/1.1 201 Created
< X-Powered-By: Express
< Content-Type: application/json; charset=utf-8
< Content-Length: 120
< Date: Sun, 22 Jun 2014 00:41:55 GMT
< Connection: keep-alive
<
* Connection #0 to host localhost left intact
{"__v":0,"username":"dickeyxxx","body":"node rules!","_id":
→ "53a62653fa305e5ddb318c1b","date":"2014-06-22T00:41:55.040Z"}
```

Since you see an `_id` field coming back, I'm pretty sure it's working. Just to be sure, though, let's check the database directly with the `mongo` command:

```
$ mongo social
MongoDB shell version: 2.6.1
connecting to social
> db.posts.find()
{ "_id" : ObjectId("53a62653fa305e5ddb318c1b"), "username" : "dickeyxxx",
→ "body" : "node rules!", "date" : ISODate("2014-06-22T00:41:55.040Z"),
→ "__v" : 0 }
```

Looks like it made it into the database!

Now, let's update the GET request to read from the database:

```
app.get('/api/posts', function (req, res, next) {
  Post.find(function(err, posts) {
    if (err) { return next(err) }
    res.json(posts)
  })
})
```

This one is similar to the last one. Call `find` on the `Post` model; then, when the request returns, render out the posts as JSON (so long as no error was returned). Go back to your web browser and reload *http://localhost:3000/api/posts* to see it in action.

You now have a full API you can read and write from in order to support your Angular app.

Here is the final `server.js`:

```
var express = require('express')
var bodyParser = require('body-parser')
var Post = require('./models/post')

var app = express()
app.use(bodyParser.json())

app.get('/api/posts', function (req, res, next) {
  Post.find(function(err, posts) {
    if (err) { return next(err) }
    res.json(posts)
  })
})

app.post('/api/posts', function (req, res, next) {
  var post = new Post({
    username: req.body.username,
    body: req.body.body
  })
  post.save(function (err, post) {
    if (err) { return next(err) }
    res.json(201, post)
  })
})

app.listen(3000, function () {
  console.log('Server listening on', 3000)
})
```

NEXT STEPS

You've now built the full API for you to use with the Angular app. In the next chapter, you'll integrate the API into Angular and serve the Angular app via Node. You'll also take some time to clean up your code a little by breaking it into modules.

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