Watch this chapter's introduction video by scanning this QR code with your phone or going to http://reactquickly.co/videos/ch20.

20 Project: Implementing autocomplete with Jest, Express, and MongoDB

This chapter covers

- Project structure and Webpack configuration
- Implementing the web server
- Adding the browser script
- Creating the server template
- Implementing the autocomplete component

The goal of this project is first of all to combine many of the techniques you've learned throughout this book, such as component composition, states, form elements, and testing, as well as how to fetch data from an API server and store and how to implement a simple Express server and Universal React rendering. You've already done most of these things in the book, but repetition is the mother of learning—especially intermittent repetition!

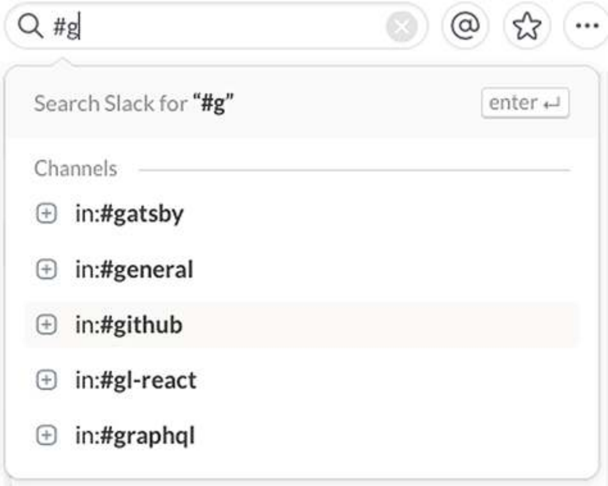


Figure 20.1 In Slack, when you start typing, the widget offers matches.

In this chapter, you'll build a well-rounded component and supply it with a back end. This little project is close to the sort of real-life projects you'll most likely perform on the job.

In a nutshell, this project will guide you through building an autocomplete component that's visually and functionally similar to the one in Slack (a popular messaging app) and Google (a popular search engine), as shown in figure 20.1. For simplicity's sake, the widget will work with the names of rooms in a chat application.

The autocomplete widget, shown in figure 20.2, has the following:

1. *Input field*—Always appears but is empty initially
2. *List of options, filtered according to the entered characters*—Appears when there's at least one match
3. *Add button*—Appears when there are no matches

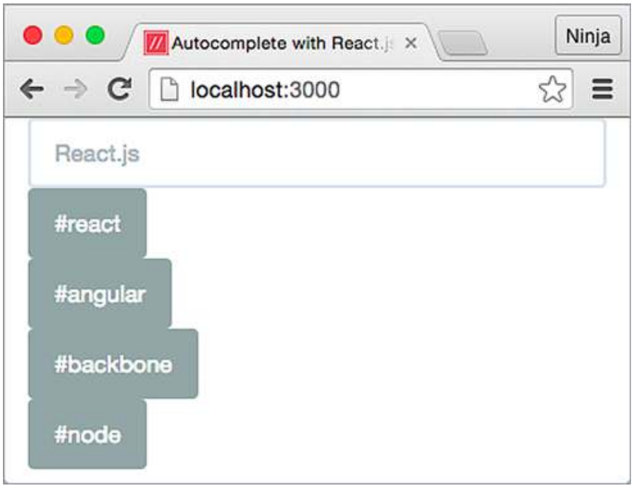


Figure 20.2 Autocomplete form with an empty field

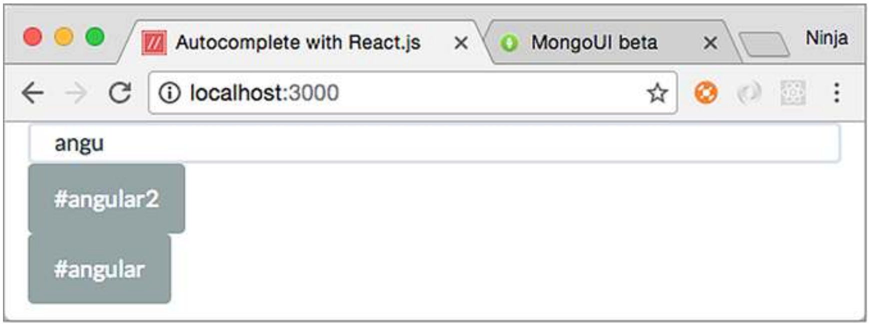


Figure 20.3 Typing `angu` filters the matches and shows only *angular* and *angular2*.

Room names are filtered using the entered characters as the first characters of each option. A simple comparison autocompletes the name of a room (see figure 20.3). For example, if you have rooms named *angular*, *angular2*, and *react*, and you type `angu`, then only *angular* and *angular2* will be shown as a match, not the *react* option.

What if there are no matches? There's a way to add a new option using the Add button. For convenience, the Add button is shown only when there are no matches (see figure 20.4). This button lets you *persist* (save permanently in the database) the new input.

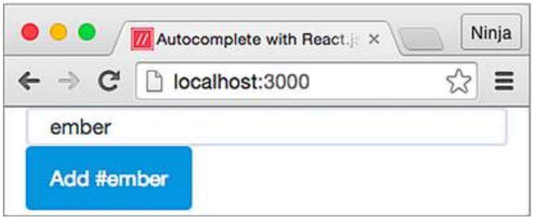


Figure 20.4 The Add button is shown only when there are no matches.

The new option is saved to the database via an XHR call to the REST API. You can use this new room name in future matches (see figure 20.5), just like the initial list of room names.

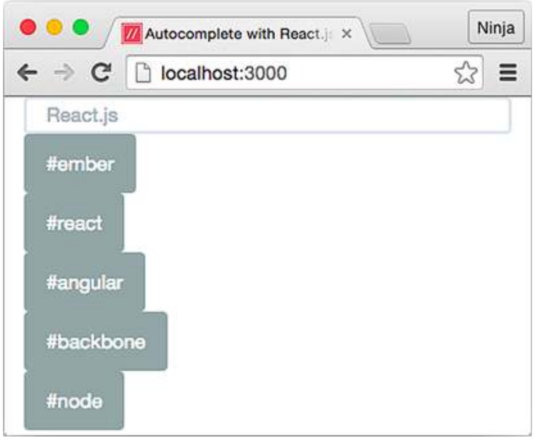


Figure 20.5 The room name has been saved and now appears in the list.

To implement this autocomplete widget, you need to do the following:

- Install dependencies.
- Set up the build process with Webpack.
- Write tests using Jest.
- Implement an Express REST API server that connects to MongoDB and also acts as a static server for the widget example.
- Implement an `Autocomplete` React component.
- Implement the example using `Autocomplete` and Handlebars.

You'll render the React components on the server, test them with Jest, and make AJAX/XHR requests with `axios`.

> **NOTE** The source code for the examples in this chapter is at www.manning.com/books/react-quickly and https://github.com/azat-co/react-quickly/tree/master/ch20. You can also find some demos at http://reactquickly.co/demos.

Let's start by setting up the project.

20.1 Project structure and Webpack configuration

To give you an overview of the tech stack, in this project you'll use the following technologies and libraries:

- Node.js and npm for compiling JSX and downloading dependencies such as React
- Webpack as a build tool
- Jest as the test engine
- Express to act as a web server, and MongoDB accessed using the native MongoDB Node.js driver to hold the autocomplete options
- Handlebars for the layout

Why Handlebars and not React for everything?

I prefer to use Handlebars for the layout for several reasons. First, React makes it painstakingly difficult to output unescaped HTML; it uses a weird syntax that involves the word `dangerously`. But this is what you need to do for Universal React and server-side rendering. Yes, the unescaped HTML can expose an app to cross-site scripting attacks,[1] but you're rendering on the server, so you control the HTML string.

The second reason is that Handlebars more naturally renders things like `<!DOCTYPE html>`. React can't do it as naturally because React is meant more for individual elements than entire pages.

Third, React is for managing state and automatically maintaining the view in accordance with the state. If all you're doing is rendering a static HTML string from a React component, why bother with React? It's overkill. Handlebars is similar to HTML, so it's easy to copy and paste existing HTML code without having to think twice about JSX and React gotchas that may bite you in the tail when you're converting HTML to React.

Finally, my personal experience explaining code functionality to other developers and to students in my courses and workshops has shown that some people have a harder time understanding the structure when React components are used for layout on the server and other React components are used for views on both the client and server.

[1] A cross-site scripting (XSS) attack is characterized by attackers injecting malicious code into legitimate websites that users trust but that contain XSS vulnerabilities. For example, an attacker can post a message with some bad code that includes `<script>` elements on a vulnerable forum that isn't sanitizing and/or escaping the post text. All visitors to the forum will end up executing the malicious code. For more on XSS, see Jakob Kallin and Irene Lobo Valbuena, "Excess XSS: A Comprehensive Tutorial on Cross-Site Scripting," https://excess-xss.com.

Appendix A covers the installation of these tools, so I won't bore you by duplicating that information. Go ahead and create a new project folder named autocomplete. This is what the folder structure will look like:

```
/autocomplete
  /__tests__
    autocomplete.test.js
  /node_modules
  /public
    /css
      bootstrap.css
    /js
      app.js
      app.js.map
  /src
    app.jsx
    autocomplete.jsx
  /views
    index.handlebars
  index.js
  package.json
  rooms.json
  webpack.config.js
```

Folder for front-end/client static files (alternative names: static, dist, client, build, and so on)

Compiled bundle file (alternative names: bundle.js and script.js)

An entry point: that is, the main front-end script file, which uses the Autocomplete component

Source code in JSX (alternative names: jsx, components, and source)

Autocomplete component

Handlebars template to render HTML layout on the server side

Seed data for MongoDB

The __tests__ folder is for Jest tests. As should now be familiar to you, the node_modules folder is for Node.js dependencies (from npm's package.json). The public, public/css, and public/js folders contain the static files for the application.

> **On naming**
>
> Naming is paramount to good software engineering because a good name provides a crucial piece of information. It can tell you a lot about the script, file, module, or component without you having to read the source code, tests, or documentation (which may not exist!).
>
> Just as you've gotten familiar with putting JSX files into the jsx folder and using build as a destination folder for compiled files, I've started to use other names. That's because you'll encounter many different conventions. Each project will probably have a different structure; the structure may vary a lot or a little. As a developer, it's your job to be comfortable with configuring tools such as Webpack and libraries such as Express to work with any names. For that reason, and to add variety, in this chapter I use public instead of build (plus public is a convention for static files served by Express), src instead of jsx (you may have other source files, not just JSX, right?), and so on.

The public/js/app.js file will be bundled by Webpack from the dependencies and the JSX source code src/app.jsx. The source code for the `Autocomplete` component is in the src/autocomplete.jsx file.

The views folder is for Handlebars templates. If you feel confident about your React skills, you don't have to use a template engine; you can use React as the Node.js template engine!

In the root of the project, you'll find these files:

- *webpack.config.js*—Enables build tasks
- *package.json*—Contains project metadata
- *rooms.json*—Contains MongoDB seed data
- *index.js*—With the Express.js server and its routes for the API server (`GET` and `POST` /rooms)

Don't forget that to avoid installing each dependency with the exact version manually, you can copy the package.json file from the following listing (ch20/autocomplete/package.json) to the root folder, and run `npm install`.

Listing 20.1 Dependencies and setup for the project

```
{
  "name": "autocomplete",
  "version": "1.0.0",
  "description": "React.js autocomplete component with Express.js, and
  ➥ MongoDB example.",
  "main": "index.js",
  "scripts": {
    "test": "jest",
    "start": "npm run build && ./node_modules/.bin/node-dev index.js",
    "build": "./node_modules/.bin/webpack",
    "seed": "mongoimport rooms.json --jsonArray --collection=rooms
    ➥ --db=autocomplete"
  },
  "keywords": [
    "react.js",
    "express.js",
    "mongodb"
  ],
  "author": "Azat Mardan",
  "license": "MIT",
  "babel": {
    "presets": [
      "react"
    ]
  },
  "dependencies": {
    "babel-register": "6.11.6",
    "body-parser": "1.13.2",
    "compression": "1.5.1",
    "errorhandler": "1.4.1",
    "express": "4.13.1",
    "express-handlebars": "2.0.1",
    "express-validator": "2.13.0",
    "mongodb": "2.0.36",
```

Lets you import and transpile JSX on the server side

Express server-side web framework

Express plug-in (middleware) for logging HTTP requests

Library to connect to the MongoDB database

```
    "morgan": "1.6.1"
  },
  "devDependencies": {
    "axios": "0.13.1",
    "babel-core": "6.10.4",
    "babel-loader": "6.2.4",
    "babel-preset-react": "6.5.0",
    "jest-cli": "13.2.3",
    "node-dev": "3.1.3",
    "react": "15.5.4",
    "react-dom": "15.5.4",
    "webpack": "1.13.1"
  }
}
```

Of course, using the same versions as in this book is important if you want to have a working app in the end. Also, don't forget to install the dependencies from package.json using `npm i`.

The `scripts` section is interesting:

```
"scripts": {
    "test": "jest",
    "start": "./node_modules/.bin/node-dev index.js",
    "build": "./node_modules/.bin/webpack",
    "seed": "mongoimport rooms.json --jsonArray --collection=rooms
    ➥ --db=autocomplete"
  },
```

`test` is for running Jest tests, and `start` is for building and launching your server. You also add seed data for the room names, which you can run with `$ npm run seed`. The database name is `autocomplete`, and the collection name is `rooms`. This is the content of the rooms.json file:

```
[ {"name": "react"},
  {"name": "node"},
  {"name": "angular"},
  {"name": "backbone"}]
```

When you run the `seed` command, it prints something like this (MongoDB must be running as a separate process):

```
> autocomplete@1.0.0 seed /Users/azat/Documents/Code/
➥ react-quickly/ch20/autocomplete
> mongoimport rooms.json --jsonArray --collection=rooms --db=autocomplete

2027-07-10T07:06:28.441-0700    connected to: localhost
2027-07-10T07:06:28.443-0700    imported 4 documents
```

You've defined the project dependencies, and now you need to set up your Webpack build process so you can use ES6 and transform JSX. To do this, create the webpack.config.js file in the root directory with the following code (ch20/autocomplete/webpack.config.js).

Listing 20.2 Webpack configuration

```
module.exports = {
  entry: './src/app.jsx',
  output: {
    path: __dirname + '/public/js/',
    filename: 'app.js'
  },
  devtool: '#sourcemap',
  stats: {
   colors: true,
   reasons: true
  },
  module: {
    loaders: [
      {
        test: /\.jsx?$/,
        exclude: /(node_modules)/,
        loader: 'babel-loader'
      }
    ]
  }
}
```

Sets an entry point for the project (there can be multiple entry points)

Sets up the source maps to show the correct source line numbers in DevTools

Applies Babel, which uses Babel configs from package.json

There's no difference between this Webpack config file and those in the other projects you've built so far. It sets up Babel for transpiling JSX files and identifying where the bundled JavaScript will be saved.

20.2 Implementing the web server

In this project, rather than a host HTML file, you need to write a simple web server to receive requests based on what the reader has typed so far and respond with a list of suggestions. It will also render the control on the server side and send the respective HTML to the client. As noted earlier, the example uses Express as the web server. The index.js file defines the web server and has three sections:

- Importing libraries and components
- Defining the REST API for receiving requests
- Rendering the control on the server side

We'll look at each section in turn. First is the most straightforward bit: the imports. The following listing shows the components and libraries the server needs (ch20/autocomplete/index.js).

Listing 20.3 Components and libraries for the web server

```
const express = require('express'),
  mongodb = require('mongodb'),
  app = express(),
```

Instantiates the Express app

Defines and imports using a comma-style (multiline) declaration (analogous to having const on each line)

```
  bodyParser = require('body-parser'),
  validator = require('express-validator'),
  logger = require('morgan'),
  errorHandler = require('errorhandler'),
  compression = require('compression'),
  exphbs  = require('express-handlebars'),
  url = 'mongodb://localhost:27017/autocomplete',
  ReactDOM = require('react-dom'),
  ReactDOMServer = require('react-dom/server'),
  React = require('react')
```

Sets the MongoDB connection string to the local database

```
require('babel-register')({
  presets: ['react']
})
```

Defines a babel-register preset to import JSX files

```
const Autocomplete  = ,
React.createFactory(require('./src/autocomplete.jsx')),
  port = 3000
...
```

Creates a React component function factory from a JSX file (will return new instances; no need to use createElement())

The next section continues with index.js and discusses connecting to the database and middleware.

20.2.1 Defining the RESTful APIs

The index.js file has `GET` and `POST` routes for /rooms. They provide RESTful API endpoints for your front-end app to supply the data. The data in turn will come from a MongoDB database, which you can see with an npm script (`npm run seed`), assuming that you have it in package.json and that you have the rooms.json file. But before fetching data from the database, you need to connect to it and define the Express routes (ch20/autocomplete/index.js).

Listing 20.4 RESTful API routes

```
mongodb.MongoClient.connect(url, function(err, db) {
  if (err) {
    console.error(err)
    process.exit(1)
  }
  app.use(compression())
  app.use(logger('dev'))
  app.use(errorHandler())
  app.use(bodyParser.urlencoded({extended: true}))
  app.use(bodyParser.json())
  app.use(validator())
  app.use(express.static('public'))
  app.engine('handlebars', exphbs())
  app.set('view engine', 'handlebars')

  app.use(function(req, res, next){
    req.rooms = db.collection('rooms')
    return next()
```

Connects to MongoDB

Terminates the current process with an error code

```
})

app.get('/rooms', function(req, res, next) {
  req.rooms
    .find({}, {sort: {_id: -1}})
    .toArray(function(err, docs) {
      if (err) return next(err)
      return res.json(docs)
    }
  )
})
app.post('/rooms', function(req, res, next) {
  req.checkBody('name', 'Invalid name in body')
    .notEmpty()
  var errors = req.validationErrors()
  if (errors) return next(errors)
  req.rooms.insert(req.body, function (err, result) {
    if (err) return next(err)
    return res.json(result.ops[0])
  })
})
```

Returns a list of existing chat rooms

Creates a new chat room

Validates that the payload contains a name and isn't empty

Calls the database to save the new message

If you need to brush up on the Express.js API, there's a convenient cheatsheet in appendix C.

20.2.2 Rendering React on the server

Finally, index.js contains the / route, where you render React on the server by hydrating components with the room objects (ch20/autocomplete/index.js).

Listing 20.5 Server-side React

```
app.get('/', function(req, res, next){
    var url = 'http://localhost:3000/rooms'
    req.rooms.find({}, {sort: {_id: -1}}).toArray(function(err, rooms){
      if (err) return next(err)
      res.render('index', {
        autocomplete: ReactDOMServer.renderToString(Autocomplete({
          options: rooms,
          url: url
        })),
        data: `<script type="text/javascript">
                window.__autocomplete_data = {
                  rooms: ${JSON.stringify(rooms, null, 2)},
                  url: "${url}"
                }
              </script>`
      })
    })
  })
```

Creates the Autocomplete React element

Passes the names of rooms as the options property

Passes the URL of the API to fetch and create names

Passes data from the server to the browser code to ensure that Universal React works properly

Uses stringify parameters to prettify the output

There are two properties for the `Autocomplete` component: `options` and `url`. `options` contains the names of the chat rooms, and `url` is the URL of the API server (http://localhost:3000/rooms in this case). The Autocomplete component will be rendered on the browser as well.

20.3 Adding the browser script

The browser script is an example of how someone might use the autocomplete widget; it will be run only on the browser. The file is very short. You just create an element with options and url properties (ch20/autocomplete/src/app.jsx).

Listing 20.6 Main client-side script

```
const React = require('react')
const ReactDOM = require('react-dom')

const Autocomplete = require('./autocomplete.jsx')
const {rooms, url} = window.__autocomplete_data

ReactDOM.render(<Autocomplete
    options={rooms}
    url={url}/>,
  document.getElementById('autocomplete')
)
```

Accepts data from a global variable

Creates and renders the component using existing data and without XHR requests

The global __autocomplete_data is provided via the data local (*local* is the term for template data in Express lingo) using the <script> tag in the / route.

Listing 20.7 Express app rendering data for browser React

```
res.render('index', {
  // ...
  data: `<script type="text/javascript">
          window.__autocomplete_data = {
            rooms: ${JSON.stringify(rooms, null, 2)},
            url: "${url}"
          }
        </script>`
```

Uses a script element to “print” JavaScript in the Handlebars template index.hbs

Converts data from an object into a string to print it

The <script> HTML tag is injected into the index.hbs template (the .hbs file extension is assumed by Express, so it’s optional). Next, you’ll implement this template.

20.4 Creating the server template

In the index.handlebars file, you can see the props and autocomplete locals being output.

Listing 20.8 Host markup page

```
<!DOCTYPE html>
<html lang="en">
  <head>
```

```
    <meta charset="utf-8" />
    <title>Autocomplete with React.js</title>
    <meta name="description" content="React Quickly: Autocomplete" />
    <meta name="author" content="Azat Mardan" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <link type="text/css" rel="stylesheet" href="/css/bootstrap.css" />
  </head>

  <body>
  <div class="container-fluid">
      <div>{{{data}}}</div>
      <div class="row-fluid">
        <div class="span12">
          <div id="content">
            <div class="row-fluid"
              id="autocomplete" />{{{autocomplete}}}</div>
        </div>
      </div>
    </div>
    <script type="text/javascript" src="/js/app.js"></script>
  </body>
</html>
```

Renders the <script> tag containing the list of names and the URL for the API

Renders static HTML with Universal React's checksum

Applies the client script that will activate browser React and use __autocomplete_data (see the previous section)

The work for running the autocomplete example is done. Obviously, it will be powered by the Autocomplete component. Next, you'll finally start implementing it.

20.5 Implementing the Autocomplete component

The Autocomplete component is self-sufficient, meaning it isn't just a view component but can also fetch from and save to the REST API. It has two properties: options and url. In accordance with TDD, let's start coding the Autocomplete component with tests.

20.5.1 The tests for Autocomplete

According to the principles of TDD/BDD, you should begin with tests. The __tests__/autocomplete.test.js file lists room names and then renders the component into autocomplete:

```
const rooms = [
    { "_id" : "5622eb1f105807ceb6ad868b", "name" : "node" },
    { "_id" : "5622eb1f105807ceb6ad868c", "name" : "react" },
    { "_id" : "5622eb1f105807ceb6ad868d", "name" : "backbone" },
    { "_id" : "5622eb1f105807ceb6ad868e", "name" : "angular" }
  ]
const TestUtils = require('react-addons-test-utils'),
  React = require('react'),
  ReactDOM = require('react-dom'),
  Autocomplete = require('../src/autocomplete.jsx'),
  fD = ReactDOM.findDOMNode
```

Hardcodes rooms data for the room names

Saves the fD object for convenience (less typing means fewer errors)

```
const autocomplete = TestUtils.renderIntoDocument(
  React.createElement(Autocomplete, {
    options: rooms,
    url: 'test'
  })
)
const optionName = TestUtils.findRenderedDOMComponentWithClass(autocomplete,
➥ 'option-name')
  ...
```

Uses TestUtils from react-addons-test-utils to render the Autocomplete component

Gets the input field by the class option-name

You get the input field, which has an `option-name` class. These room options will match the input-field value.

Now you can write the actual tests. You can get all the `option-name` elements from the widget and compare them against the number 4, which is the number of rooms in the `rooms` array:

```
describe('Autocomplete', () => {
  it('have four initial options', () => {
    var options = TestUtils.scryRenderedDOMComponentsWithClass(
      autocomplete,
      'option-list-item'
    )
    expect(options.length).toBe(4)
  })
```

The next test changes the input-field value and then checks for that value and the number of the offered autocomplete option. There should be only one match, which is `react`:

```
it('change options based on the input', () => {
    expect(fD(optionName).value).toBe('')
    fD(optionName).value = 'r'
    TestUtils.Simulate.change(fD(optionName))
    expect(fD(optionName).value).toBe('r')
    options = TestUtils.scryRenderedDOMComponentsWithClass(autocomplete,
      'option-list-item')
    expect(options.length).toBe(1)
    expect(fD(options[0]).textContent).toBe('#react')
  })
```

The last test changes the room name field to `ember`. There should be no matches, only the Add button:

```
it('offer to save option when there are no matches', () => {
    fD(optionName).value = 'ember'
    TestUtils.Simulate.change(fD(optionName))
    options = TestUtils.scryRenderedDOMComponentsWithClass(
      autocomplete,
      'option-list-item'
    )
    expect(options.length).toBe(0)
    var optionAdd = TestUtils.findRenderedDOMComponentWithClass(
      autocomplete,
      'option-add'
    )
    expect(fD(optionAdd).textContent).toBe('Add #ember')
  })
})
```

20.5.2 The code for the Autocomplete component

Finally, it's time to write the `Autocomplete` component (ch20/autocomplete/src/autocomplete.jsx). It includes the input field, the list of matching options, and the Add button to add a new option when there are no matches. The component performs two AJAX/XHR calls: to retrieve a list of options and to create a new option. There are two methods:

- `filter()`—Happens on every new input in the `<input>` field. Takes the current input and the list of options, and sets the state to a new list that contains only options that match the current input.
- `addOption()`—Happens on a button click or Enter press for the Add button. Takes the value, and sends it to the server.

This is how the Autocomplete component looks at a high level:

```
const React = require('react'),
  ReactDOM = require('react-dom'),
  request = require('axios')

class Autocomplete extends React.Component {
  constructor(props) {
    ...
  }
  componentDidMount() {
    ...
  }
  filter(event) {
    ...
  }
  addOption(event) {
    ...
  }
  render() {
    return (
      <div ...>
        <input ... onChange={this.filter}>
        </input>
        {this.state.filteredOptions.map(function(option,
➥ index, list) {
        ...
        })}
        ...
            <a ...onClick={this.addOption}>
```

Fetches the list of options from the server

Filters the list to leave only the options matching the input

Adds a new option persistently by making an XHR call to the server

Captures the option value by tracking the browser event

Prints the list of matching (filtered) options

Calls the add method when the button (a link) is clicked

```
       Add #{this.state.currentOption}
      </a>
    ...
   </div>
  )
 }
}

module.exports = Autocomplete
```

Now let's start from the beginning of the file. Begin by importing the libraries in the CommonJS/Node.js style; thanks to Webpack, this is bundled for the browser's consumption. The fD alias is for convenience:

```
const React = require('react'),
  ReactDOM = require('react-dom'),
  request = require('axios')

const fD = ReactDOM.findDOMNode
```

constructor sets the state and bindings. You set options from properties. filteredOptions will initially be the same as all the options, and the current option (input-field value) is empty. As the user types characters, filteredOptions will become narrower and narrower, to match the entered letters.

In componentDidMount(), you perform the GET request using the axios (request variable) library. It's similar to jQuery's $.get(), but with promises:

```
class Autocomplete extends React.Component {
  constructor(props) {
    super(props)
    this.state = {options: this.props.options,
      filteredOptions: this.props.options,
      currentOption: ''
    }
    this.filter = this.filter.bind(this)
    this.addOption = this.addOption.bind(this)
  }
  componentDidMount() {
    if (this.props.url == 'test') return true
    request({url: this.props.url})
      .then(response=>response.data)
      .then(body => {
        if(!body){
          return console.error('Failed to load')
        }
      this.setState({options: body})
      })
      .catch(console.error)
  }
  ...
```

Blocks fetching for the test

Sets the result to options

The filter() method is called on every change of the <input> field. The goal is to leave only the options that match user input:

```
  ...
  filter(event) {
    this.setState({
      currentOption: event.target.value,
      filteredOptions:
        (this.state.options.filter((option, index, list) => {
        return (event.target.value === option.name.substr(0,
          event.target.value.length))
      }))
    })
  }
```

Uses filter() on an array

Strips out the #

The addOption() method handles the addition of a new option, in the event that there are no matches, by invoking the store's action:

```
addOption(event) {
    let currentOption = this.state.currentOption
    request
      .post(this.props.url, {name: currentOption})
      .then(response => response.data)
      .then((body) => {
        if(!body){
          return console.error('Failed to save')
        }
        this.setState({
            options: [body].concat(this.state.options)
          },
          () => {
            this.filter({target: {value: currentOption}})
          }
        )
      })
      .catch(error=>{return console.error('Failed to save')})
  }
```

Uses axios to make a POST request

Uses Array.concat() to create a new array instead of Array.push(), because mutating state directly is a bad practice

Calls the filter() method in the callback of setState() to ensure that the new value is saved to the state when filter() runs

Finally, the render() method has a controlled component, <input>, with an onChange event listener, this.filter:

```
  ...
  render() {
    return (
      <div className="form-group">
        <input type="text"
          onKeyUp={(event) => (event.keyCode==13) ? this.addOption() : ''}
          className="form-control option-name"
          onChange={this.filter}
          value={this.currentOption}
          placeholder="React.js">
        </input>
```

onKeyUp can be written as a method, not necessarily as an anonymous inline function, right in {}.

The list of filtered options is powered by the filteredOptions state, which is updated in the filter() method. You iterate over it and print _id as keys and links with option.name:

Uses the map() method to display the list of filtered options

```
    {this.state.filteredOptions.map(function(option, index, list){
      return <div key={option._id}>
        <a className="btn btn-default option-list-item"
          href={'/#/'+option.name} target="_blank">
          #{option.name}
        </a>
      </div>
    })}
  ...
```

Uses a URL as a value for the anchor tag for each option

Displays the name of an option with #, as in Slack

The last element is the Add button, which is shown only when there's no filteredOptions (no matches):

Hides the button when there are matches

```
    ...
    {(()=>{
      if (this.state.filteredOptions.length == 0 &&
        this.state.currentOption!='')
        return <a className="btn btn-info option-add"
          onClick={this.addOption}>
          Add #{this.state.currentOption}
        </a>
    })()}
  </div>
  )
 }
}
```

Uses addOption as an onClick event handler

Prompts to add the currently typed value as an option

You're using CommonJS syntax, so you can declare the Autocomplete component and export it like this:

```
module.exports = Autocomplete
```

You're finished. Good job, mate!

20.6 Putting it all together

If you've followed along through the steps, you should be able to install the dependencies with this command (if you haven't done so already):

```
$ npm install
```

Then, launch the app as follows (you must have started MongoDB first with $ mongod):

```
$ npm start
```

The tests will pass after you run this command:

```
$ npm test
```

There's also `npm run build`, without the watch (you'll need to rerun it on changes). `npm start` runs `npm run build` for you.

Optionally, you can seed the database with `$ npm run seed`. Doing so populates MongoDB with names from ch20/autocomplete/rooms.json:

```
[ {"name": "react"},
  {"name": "node"},
  {"name": "angular"},
  {"name": "backbone"}]
```

That's all for the `Autocomplete` component. Now, run the project by building it with `npm run build` and navigating to http://localhost:3000, assuming you have MongoDB running in a separate terminal. Although 127.0.0.1 is an alias, you must use the same domain localhost as the browser location to avoid CORS/Access-Control-Allow-Origin issues, because JavaScript will call the localhost server.

You should see the component with names (if you seeded the database) on the page. When you type characters in the input field, the selection will be filtered according to matches in the input. When there are no matches, click the Add button to add the room to the database; it will immediately appear in the list.

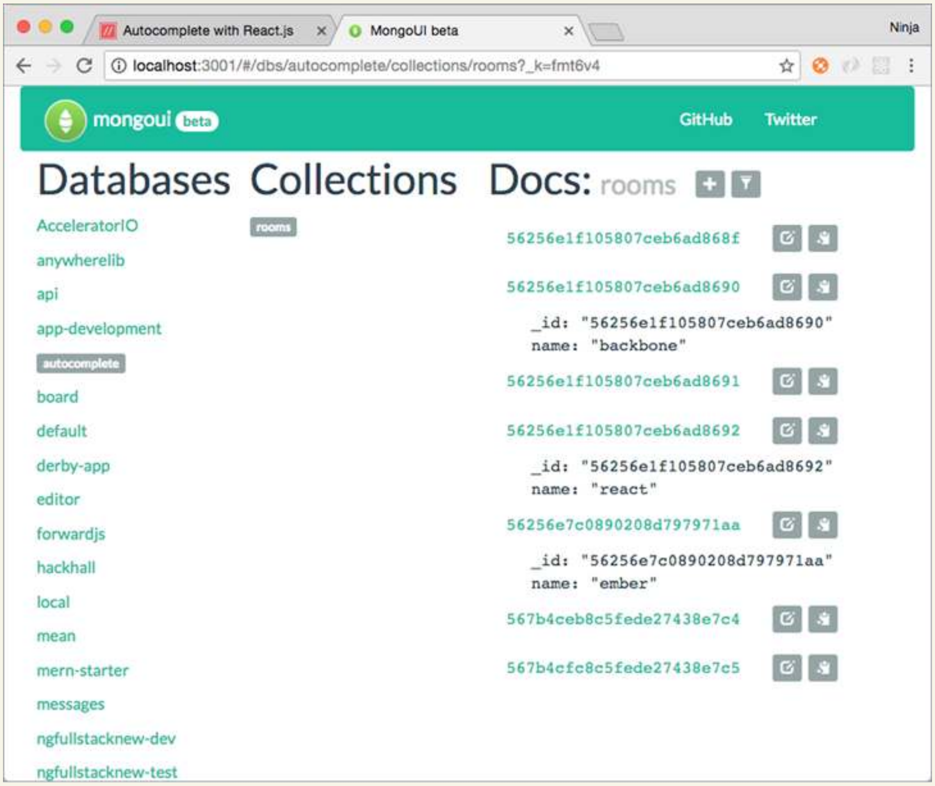
Mongo and MongoUI

If you ever need to manipulate the data in MongoDB directly, the mongo shell (a.k.a. REPL) is available via the `mongo` command in the terminal. It automatically connects to the locally running instance on port 27017 (you must have one running; to do so, use `mongod`). Once in the mongo shell, you can perform all kinds of operations like creating a new document, querying a collection, dropping a database, and so on. The advantage is that you can use the mongo shell anywhere, even on a remote server without a GUI.

But there's a lot of typing involved when working with the mongo shell, and typing is slow and error-prone. Therefore, I built a better tool called MongoUI (https://github.com/azat-co/mongoui), which you can use to query, edit, add documents, remove documents, and do other things in a browser by clicking with your trackpad instead of typing copious amounts of JSON (MongoDB is JavaScript and JSON-based).

MongoUI allows you to work with MongoDB via a user-friendly web interface. This figure shows the names of the rooms in my `rooms` collection in the `autocomplete` database.

(continued)



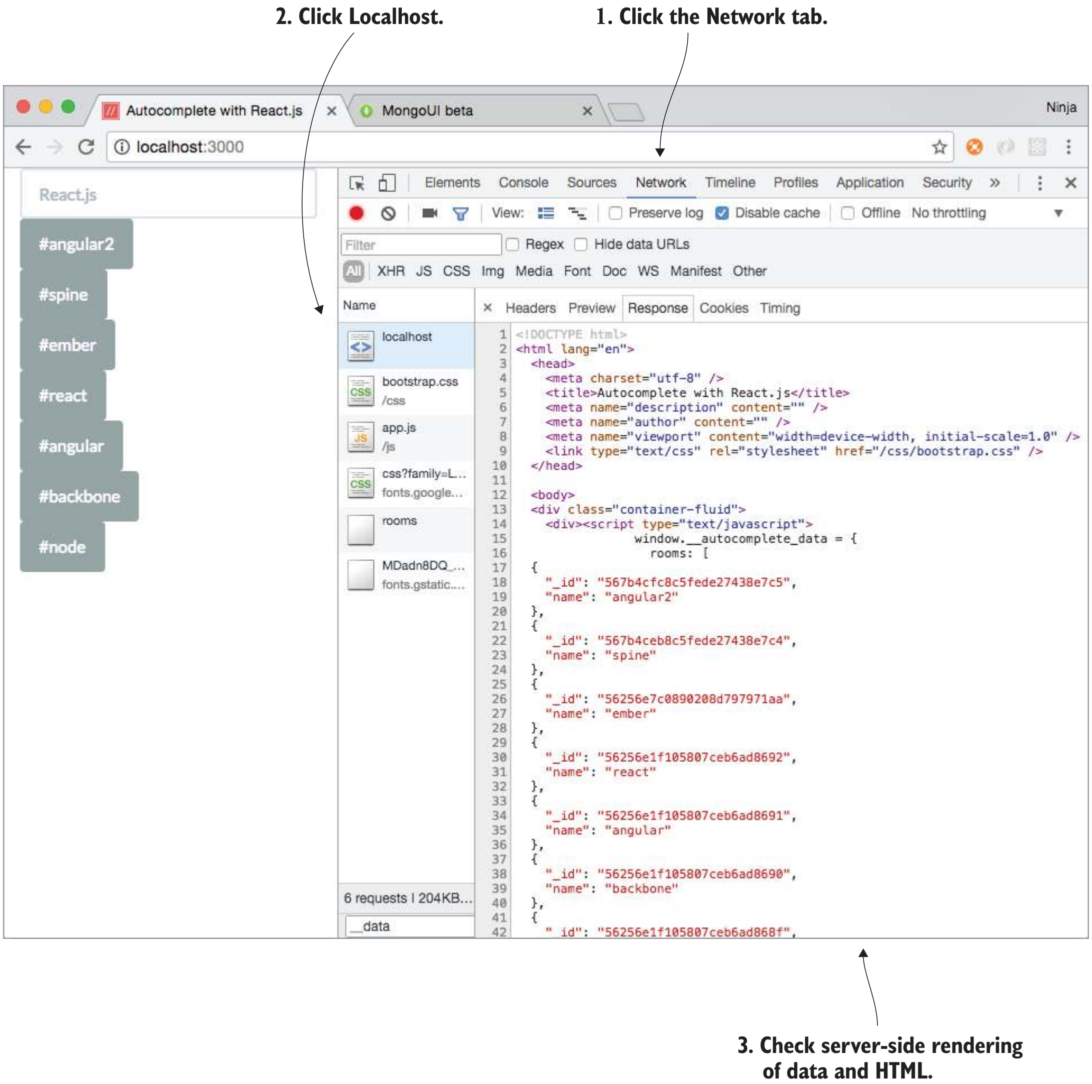
```
56256e1f105807ceb6ad868f
56256e1f105807ceb6ad8690
  _id: "56256e1f105807ceb6ad8690"
  name: "backbone"
56256e1f105807ceb6ad8691
56256e1f105807ceb6ad8692
  _id: "56256e1f105807ceb6ad8692"
  name: "react"
56256e7c0890208d797971aa
  _id: "56256e7c0890208d797971aa"
  name: "ember"
567b4ceb8c5fede27438e7c4
567b4cfc8c5fede27438e7c5
```

The MongoDB web interface

Install MongoUI with `npm i -g mongoui`, launch it with `mongoui`, and then open in the browser at http://localhost:3001. Oh, and MongoUI is built with React, Express, and Webpack. Enjoy!

The end result of this autocomplete example is shown in figure 20.6. You can open the Network tab and click Localhost to make sure the server-side rendering is working (that is, that the data and HTML for names are there).

If for some reason your project isn't working, there may be a new version or a typo in your code. Refer to the working code at www.manning.com/books/react-quickly or https://github.com/azat-co/react-quickly/tree/master/ch20.



```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="utf-8" />
    <title>Autocomplete with React.js</title>
    <meta name="description" content="" />
    <meta name="author" content="" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
    <link type="text/css" rel="stylesheet" href="/css/bootstrap.css" />
  </head>

  <body>
  <div class="container-fluid">
    <div><script type="text/javascript">
                window.__autocomplete_data = {
                  rooms: [
  {
    "_id": "567b4cfc8c5fede27438e7c5",
    "name": "angular2"
  },
  {
    "_id": "567b4ceb8c5fede27438e7c4",
    "name": "spine"
  },
  {
    "_id": "56256e7c0890208d797971aa",
    "name": "ember"
  },
  {
    "_id": "56256e1f105807ceb6ad8692",
    "name": "react"
  },
  {
    "_id": "56256e1f105807ceb6ad8691",
    "name": "angular"
  },
  {
    "_id": "56256e1f105807ceb6ad8690",
    "name": "backbone"
  },
  {
    "_id": "56256e1f105807ceb6ad868f",
```

2. Click Localhost.

1. Click the Network tab.

3. Check server-side rendering of data and HTML.

Figure 20.6 Inspect the localhost response by clicking Network (1) and Localhost (2) to ensure that server-side rendering (3) is working properly.

20.7 Homework

For bonus points, do the following:

- Add a test for a Remove button, which is as an X icon next to each option name.
- Add the Remove button as an X icon next to each option name. Implement an AJAX/XHR call, and add a REST endpoint to handle deletion.

- Enhance the matching algorithm so that it will find matches in the middle of names. For example, typing `ac` should show *react* and *backbone*, because both of them contain the letters *ac*.
- Add a Redux store.
- Implement GraphQL instead of a REST API back end.

Submit your code in *a new folder under ch20* as a pull request to this book's GitHub repository: https://github.com/azat-co/react-quickly.

20.8 Summary

- Curly braces output unescaped HTML in Handlebars, whereas in React you need to use `__html` to dangerously set inner HTML.
- `findRenderedDOMComponentWithClass()` tries to find a *single* component by its CSS class name, and `scryRenderedDOMComponentsWithClass()` finds *multiple* components by their CSS class name (see chapter 16).
- `babel-register` lets you import and use JSX files: `require('babel-register')({presets:[ 'react' ]})`.
- MongoUI is an open source, web-based interface built on React for developing and administering MongoDB databases. You can install it with `npm i -g mongoui` and run it with `mongoui`.