

SECOND EDITION

---

# Learning React

*Modern Patterns for Developing React Apps*

*Alex Banks and Eve Porcello*

Beijing • Boston • Farnham • Sebastopol • Tokyo

**O'REILLY®**

## Learning React

by Alex Banks and Eve Porcello

Copyright © 2020 Alex Banks and Eve Porcello. All rights reserved.

Printed in the United States of America.

Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472.

O'Reilly books may be purchased for educational, business, or sales promotional use. Online editions are also available for most titles (<http://oreilly.com>). For more information, contact our corporate/institutional sales department: 800-998-9938 or [corporate@oreilly.com](mailto:corporate@oreilly.com).

**Acquisitions Editor:** Jennifer Pollock

**Development Editor:** Angela Rufino

**Production Editor:** Kristen Brown

**Copyeditor:** Holly Bauer Forsyth

**Proofreader:** Abby Wheeler

**Indexer:** Judith McConville

**Interior Designer:** David Futato

**Cover Designer:** Karen Montgomery

**Illustrator:** Rebecca Demarest

May 2017: First Edition  
June 2020: Second Edition

### Revision History for the Second Edition

2020-06-12: First Release

See <http://oreilly.com/catalog/errata.csp?isbn=9781492051725> for release details.

The O'Reilly logo is a registered trademark of O'Reilly Media, Inc. *Learning React*, the cover image, and related trade dress are trademarks of O'Reilly Media, Inc.

The views expressed in this work are those of the authors, and do not represent the publisher's views. While the publisher and the authors have used good faith efforts to ensure that the information and instructions contained in this work are accurate, the publisher and the authors disclaim all responsibility for errors or omissions, including without limitation responsibility for damages resulting from the use of or reliance on this work. Use of the information and instructions contained in this work is at your own risk. If any code samples or other technology this work contains or describes is subject to open source licenses or the intellectual property rights of others, it is your responsibility to ensure that your use thereof complies with such licenses and/or rights.

978-1-492-05172-5

[LSI]

---

# Table of Contents

<b>Preface.....</b>	<b>ix</b>
<b>1. Welcome to React.....</b>	<b>1</b>
A Strong Foundation	2
React's Past and Future	2
Learning React: Second Edition Changes	3
Working with the Files	4
File Repository	4
React Developer Tools	4
Installing Node.js	5
<b>2. JavaScript for React.....</b>	<b>7</b>
Declaring Variables	8
The const Keyword	8
The let Keyword	9
Template Strings	11
Creating Functions	12
Function Declarations	12
Function Expressions	12
Default Parameters	14
Arrow Functions	14
Compiling JavaScript	17
Objects and Arrays	18
Destructuring Objects	18
Destructuring Arrays	20
Object Literal Enhancement	20

The Spread Operator	21
Asynchronous JavaScript	23
Simple Promises with Fetch	24
Async/Await	25
Building Promises	26
Classes	27
ES6 Modules	28
CommonJS	30
<b>3. Functional Programming with JavaScript.....</b>	<b>31</b>
What It Means to Be Functional	32
Imperative Versus Declarative	33
Functional Concepts	36
Immutability	36
Pure Functions	38
Data Transformations	40
Higher-Order Functions	47
Recursion	48
Composition	51
Putting It All Together	52
<b>4. How React Works.....</b>	<b>57</b>
Page Setup	57
React Elements	58
ReactDOM	61
Children	61
React Components	65
React Components: A Historical Tour	69
<b>5. React with JSX.....</b>	<b>71</b>
React Elements as JSX	71
JSX Tips	72
Mapping Arrays with JSX	73
Babel	73
Recipes as JSX	75
React Fragments	82
Intro to webpack	84
Creating the Project	85
Loading the Bundle	94
Source Mapping	94
Create React App	95

<b>6. React State Management.....</b>	<b>97</b>
Building a Star Rating Component	98
The useState Hook	99
Refactoring for Advanced Reusability	104
State in Component Trees	106
Sending State Down a Component Tree	106
Sending Interactions Back up a Component Tree	109
Building Forms	113
Using Refs	114
Controlled Components	115
Creating Custom Hooks	117
Adding Colors to State	119
React Context	120
Placing Colors in Context	122
Retrieving Colors with useContext	123
Stateful Context Providers	125
Custom Hooks with Context	126
<b>7. Enhancing Components with Hooks.....</b>	<b>129</b>
Introducing useEffect	129
The Dependency Array	132
Deep Checking Dependencies	136
When to useEffect	141
Rules to Follow with Hooks	143
Improving Code with useReducer	146
useReducer to Handle Complex State	148
Improving Component Performance	150
shouldComponentUpdate and PureComponent	153
When to Refactor	154
<b>8. Incorporating Data.....</b>	<b>155</b>
Requesting Data	155
Sending Data with a Request	157
Uploading Files with fetch	157
Authorized Requests	158
Saving Data Locally	159
Handling Promise States	162
Render Props	165
Virtualized Lists	167
Creating a Fetch Hook	172

Creating a Fetch Component	174
Handling Multiple Requests	176
Memoizing Values	177
Waterfall Requests	181
Throttling the Network Speed	184
Parallel Requests	185
Waiting for Values	187
Canceling Requests	188
Introducing GraphQL	191
GitHub GraphQL API	191
Making a GraphQL Request	193
<b>9. Suspense.....</b>	<b>199</b>
Error Boundaries	201
Code Splitting	205
Introducing: The Suspense Component	207
Using Suspense with Data	208
Throwing Promises	212
Building Suspenseful Data Sources	216
Fiber	220
<b>10. React Testing.....</b>	<b>223</b>
ESLint	223
ESLint Plug-Ins	227
Prettier	229
Configuring Prettier by Project	229
Prettier in VSCode	230
Typechecking for React Applications	231
PropTypes	231
Flow	235
TypeScript	238
Test-Driven Development	241
TDD and Learning	241
Incorporating Jest	242
Create React App and Testing	242
Testing React Components	246
Queries	249
Testing Events	250
Using Code Coverage	252

<b>11. React Router.....</b>	<b>255</b>
Incorporating the Router	256
Router Properties	259
Nesting Routes	261
Using Redirects	264
Routing Parameters	265
<b>12. React and the Server.....</b>	<b>271</b>
Isomorphic Versus Universal	271
Client and Server Domains	272
Server Rendering React	274
Server Rendering with Next.js	280
Gatsby	285
React in the Future	287
<b>Index.....</b>	<b>289</b>