Bruno Joseph D'mello, Mithun Satheesh, Jason Krol

# Web Development with MongoDB and Node

**Third Edition** 

Build fast web applications for handling any kind of data



Packt>

## Web Development with MongoDB and Node - Third Edition

Node.js builds fast, scalable network applications while MongoDB is the perfect fit as a high-performance, open source NoSQL database solution. The combination of these two technologies offers high performance and scalability. Together, they provide the power to manage any form of data, as well as speed of delivery.

This book will help you to get these two technologies working together to build web applications quickly and easily, with effortless deployment to the cloud. You will also learn about Angular 4, which consumes pure JSON APIs from a hapi server.

The book begins by setting up your development environment and running you through the steps necessary to get the main application server up and running. Then you will see how to use Node.js to connect to a MongoDB database.

From here, the book will take you through integration with third-party tools to interact with web apps. You will see how to use controllers and view models to generate reusable code that will reduce development time.

By the end of the book, you will have a running web application developed with MongoDB, Node.js, and some of the most powerful and popular frameworks.

### Things you will learn:

- Work with Node.js building blocks
- Write and configure a web server using Node.js and powered by the Express.js framework
- Build dynamic HTML pages using the Handlebars template engine
- Persist application data using MongoDB and Mongoose ODM
- Test your code using automated testing tools such as the Mocha framework
- Automate test cases using Gulp
- Reduce your web development time by integrating third-party tools for web interaction
- Deploy a development environment to the cloud using services such as Heroku, Amazon Web Services, and Microsoft Azure
- Explore single page application frameworks to take your web applications to the next level



\$ **39.99** US £ **32.99** UK 

# SET SETS Ř



# Web Development with MongoDB and Node

Third Edition

Build fast web applications for handling any kind of data

Bruno Joseph D'mello

Mithun Satheesh

Jason Krol



### Web Development with MongoDB and Node

### Third Edition

Copyright © 2017 Packt Publishing

All rights reserved. No part of this book may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, without the prior written permission of the publisher, except in the case of brief quotations embedded in critical articles or reviews.

Every effort has been made in the preparation of this book to ensure the accuracy of the information presented. However, the information contained in this book is sold without warranty, either express or implied. Neither the author, nor Packt Publishing, and its dealers and distributors will be held liable for any damages caused or alleged to be caused directly or indirectly by this book.

Packt Publishing has endeavored to provide trademark information about all of the companies and products mentioned in this book by the appropriate use of capitals. However, Packt Publishing cannot guarantee the accuracy of this information.

First published: September 2014

Second edition: October 2015

Third edition: September 2017

Production reference: 1260917

Published by Packt Publishing Ltd. Livery Place 35 Livery Street Birmingham B3 2PB, UK. ISBN 978-1-78839-508-3

www.packtpub.com

### Credits

**Authors** 

Bruno Joseph D'mello Mithun Satheesh Jason Krol **Copy Editor** 

Charlotte Carneiro

Reviewer

Alex Bachuk

**Project Coordinator** 

Sheejal Shah

**Commissioning Editor** 

Smith Thakkar

Proofreader

Safis Editing

**Acquisition Editor** 

Reshma Raman

Indexer

Rekha Nair

**Content Development Editor** 

Jason Pereira

Graphics

Jason Monteiro

**Technical Editor** 

Surabhi Kulkarni

**Production Coordinator** 

Melwyn D'sa

### About the Authors

Bruno Joseph D'mello works at Yapsody as a software engineer. He has possesses almost 5 years of experience in web application development, serving industries such as entertainment, social media, enterprise, and IT services. He is a JavaScript enthusiast and dedicatedly worked on it for the past 4 years. Apart from rare commits, he believes in contributing to open source by actually mentoring new technologies to beginners and involving them in open source communities. Bruno follows Kaizen and enjoys the freedom of architecting new things on the web. He also contributed his knowledge by authoring books such as Web Development in Node.js and Mongodb second edition, What You Need to Know About Node.js (Free ebook), and by being a reviewer.

You can connect with Bruno at: bron1010@gmail.com

"Thanks to my family for patience and encouragement, especially Erina..."

Mithun Satheesh is an open source enthusiast and a web developer who resides in India. He has more than 5 years of experience in web development and specializes in JavaScript, Ruby, PHP, and other frontend engineering technologies. He is the author of a couple of libraries on Node.js, which are available open source via npm. One of these, called noderules, is a forward-chaining rule engine implementation written initially to handle transaction risks on bookmyshow, one of his former employers. Node-rules have a considerable user following both on npm and GitHub.

Apart from this, he has also served as an individual contributor in many open source projects on GitHub.

He is a regular on programming sites, such as Stack Overflow, and loves contributing to the open source world. Apart from programming, he is also interested in experimenting with various cloud platform solutions. He has a number of applications listed in the developer spotlight of Platform-as-a-Service providers, such as RedHat's OpenShift.

**Jason Krol** is a passionate web developer with over 15 years of professional experience creating highly interactive web applications using the latest in both client and server technologies.

Over the past few years, Jason has been focusing on developing Single-Page Applications using JavaScript in the full stack with Node.js, MongoDB, and Backbone.js. After co-owning and running a successful web development agency for a number of years, Jason recently joined AWeber Communications, an e-mail marketing service provider in the suburbs of Philadelphia.

### About the Reviewer

**Alex Bachuk** is a web developer with over 9 years of experience and specializes in custom JavaScript web applications. Currently, Alex leads the Rental Cars Web UX team at priceline.com and runs JavaScript and React workshops in NYC area along with the EcmaStack.com team.

Alex organizes and talks at JavaScript, Meteor.js, and GraphQL meetups in the New York City area. In his free time, he likes to spend time with his family and also travel the world.

### www.PacktPub.com

For support files and downloads related to your book, please visit www.PacktPub.com.

Did you know that Packt offers eBook versions of every book published, with PDF and ePub files available? You can upgrade to the eBook version at www.PacktPub.com and as a print book customer, you are entitled to a discount on the eBook copy. Get in touch with us at service@packtpub.com for more details.

At www.PacktPub.com, you can also read a collection of free technical articles, sign up for a range of free newsletters and receive exclusive discounts and offers on Packt books and eBooks.



https://www.packtpub.com/mapt

Get the most in-demand software skills with Mapt. Mapt gives you full access to all Packt books and video courses, as well as industry-leading tools to help you plan your personal development and advance your career.

### Why subscribe?

- Fully searchable across every book published by Packt
- Copy and paste, print, and bookmark content
- On demand and accessible via a web browser

### **Customer Feedback**

Thanks for purchasing this Packt book. At Packt, quality is at the heart of our editorial process. To help us improve, please leave us an honest review on this book's Amazon page at https://www.amazon.com/dp/1788395085.

If you'd like to join our team of regular reviewers, you can e-mail us at customerreviews@packtpub.com. We award our regular reviewers with free eBooks and videos in exchange for their valuable feedback. Help us be relentless in improving our products!

### **Table of Contents**

Preface	1
Chapter 1: Welcome to JavaScript in the Full Stack	7
A short introduction to Node.js	8
The advantage that the V8 engine brings in	8
Node.js is single-threaded!	9
Non-blocking asynchronous execution	10
npm - the Node Package Manager	12
Sharing and reusing JavaScript	12
Not just for building web servers!	13
Real-time web application with Socket.io	13
Networking and file IO	14
Microservices	14
Internet of things (IoT)	14
A simple server with Node.js	15
When to use Node.js	15
The NoSQL movement	16
A short introduction to MongoDB	17
JSON-friendly database	17
Schema-less design	18
Various performance facets	18
Node.js and MongoDB in the wild	18
What to expect from this book	20
Summary	20
Chapter 2: Getting Up and Running	21
Installing Node.js	22
Mac OS X	22
Windows	23
Linux	24
Testing that Node.js is installed properly	24
Online documentation	25
Installing MongoDB	25
Mac OS X installation instructions	26
Windows 7/Windows 8 installation instructions	27
Linux installation instructions	28

Confirming successful MongoDB Installation	29
Bookmarking the online documentation	29
Writing your first app	30
Creating the sample application	30
Getting the dependent modules in place	31
Adding the application code	31
Understanding the code	31
Launching the sample app	34
Checking the actual database	34
Summary	35
Chapter 3: Node and MongoDB Basics	37
A JavaScript primer	37
Introducing es6	38
Syntax basics	38
Understanding the scope of variables	39
Data types	41
Operators and flows	41
Understanding objects	43
Understanding arrays	46
Understanding functions	46
Anonymous functions and callbacks	48
JSON	49
The basics of Node.js	50
Node.js architecture	50
Event-driven	52
Asynchronous execution	52
The module system	53
The Node.js core	54
HTTP	55
Net Streams	55 55
Installing modules using npm	56
The basics of MongoDB	58
The Mongo shell	58
Inserting data	59
Querying	60
Updating data	61
Deleting data	62
Additional resources	62

Summary	62
Chapter 4: Introducing Express	65
Web application frameworks	65
What is Express.js?	66
Building a complete web application	67
Designing the web application	67
Organizing the files	69
Creating the application's entry point	70
Booting up the application	72
Middlewares	73
Creating custom middleware	74
Order of middlewares	75
The configure module	75
Activating the configure module	77
Routers and controllers	78
Handlebars as View engines	83
Summary	85
Chapter 5: Templating with Handlebars	87
Templating engines	87
Server-side and client-side templating	88
Client-side templating	88
Server-side templating	88
The basics of Handlebars	88
Binding an object to the template	89
Embedding presentation logic	90
Views	90
Layouts	97
Partial views	99
Handlebars helpers	101
Global helpers	102
View-specific helpers	103
Rendering the views	103
Summary	107
Chapter 6: Controllers and View Models	109
Controllers	109
View models	110
Updating the home controller	111
Updating the image controller	114

Displaying an image	114
Uploading an image	116
Helpers for reusable code	120
The sidebar module	121
The stats module	122
The images module	123
The comments module	124
Testing the sidebar implementation	125
Iterating on the UI	125
Summary	128
Chapter 7: Persisting Data with MongoDB	131
Using MongoDB with Node.js	132
Connecting to MongoDB	133
Inserting a document	134
Retrieving a document	135
Introducing Mongoose	136
Schemas	137
Models	138
Built-in validation	140
Static methods	142
Virtual properties	142
Context of method (this)	143
Connecting with Mongoose	144
Defining the schemas and models	145
The models index file	147
Adding CRUD to the controllers	148
The home controller	148
The image controller	. 151
Index - retrieving an image model	151
Create - inserting an image model	155
Testing everything out so far	158
The like button and updating an image model	161
Comment - inserting a comment model Wrapping it up	163 165
Helpers	
Introducing the async module	166 166
The comments helper	167
The sidebar helper	171
Troubleshooting	173
The stats helper	174
The popular images helper	177

Iterating by adding an image removal capability	178
Adding a route	178
Adding a controller handler	179
Updating the Handlebars image page template	180
Updating jQuery	180
Refactoring and improvements	181
Summary	182
Chapter 8: Creating a RESTful API	183
What is an API?	184
What is a RESTful API?	184
Introducing Postman REST Client	185
Installation instructions	185
A quick tour of Postman REST Client	187
Using the JSONView Chrome extension	190
Creating a basic API server	191
Creating sample JSON data	192
Responding to GET requests	193
Receiving data - POST and PUT requests	196
Removing data - DELETE	202
Consuming external APIs from Node.js	204
Consuming an API endpoint using request	204
Summary	207
Chapter 9: Testing Your Code	209
The tools of the trade	209
Running tests with the Mocha framework	210
Asserting tests with Chai.js	212
Getting started with Chai	213
Spies and stubs with Sinon.js	214
Stubbing node modules with Proxyquire	216
Writing and running your first test	218
Writing a test helper	219
Testing the application	221
Testing the routes	221
Testing the server	224
Testing a model	226
Testing a controller	229
Spy and stub everything!	233
Automating everything	233

Summary	236
Chapter 10: Deploying with Cloud-Based Services	237
Cloud versus traditional hosting	237
Infrastructure as a Service versus Platform as a Service	238
An introduction to Git	239
Deploying your application	240
Nodejitsu	240
Heroku	246
Amazon Web Services	251
Creating a MongoLab account and database	252
Create and configure the AWS environment	254
Microsoft Azure	257
Digital Ocean	263
Summary	265
Chapter 11: Popular Node.js Web Frameworks	267
Koa	268
Meteor	268
Sails	269
Flatiron	269
total.js	269
LoopBack	270
Нарі	270
Kick starting Hapi.js	27
Scaffolding the Hapi app	27
Setting up a server	27
Creating APIs	272
Creating a configuration-based architecture  Summary	273
	276
Chapter 12: Single Page Applications with Popular Frontend	
Frameworks	277
Why use a frontend framework?	278
What is a single page application?	278
The TodoMVC project	279
Backbone.js	281
Ember.js	283
React.js	284
Angular	285
Scaffolding the Angular app	286
Understanding TypeScript and es6	287