# Table of Contents

**The World of JavaScript** ................................................................. ix

**Part I. Classic JavaScript** ........................................................... 3

1. **The JavaScript Not-So-Simple Building Blocks** .......................... 3
   1.1. Differentiating Between a JavaScript Object, Primitive, and Literal  3
   1.2. Extracting a List from a String ........................................... 7
   1.3. Checking for an Existing, Nonempty String ............................ 10
   1.4. Inserting Special Characters ............................................. 14
   1.5. Replacing Patterns with New Strings ................................... 16
   1.6. Finding and Highlighting All Instances of a Pattern ............... 18
   1.7. Swapping Words in a String Using Capturing Parentheses ........ 22
   1.8. Replacing HTML Tags with Named Entities ............................ 25
   1.9. Converting an ISO 8601 Formatted Date to a Date Object Acceptable Format ......................................................... 25
   1.10. Using Function Closures with Timers .................................. 29
   1.11. Tracking Elapsed Time ..................................................... 31
   1.12. Converting a Decimal to a Hexadecimal Value ....................... 32
   1.13. Summing All Numbers in a Table Column .............................. 33
   1.14. Converting Between Degrees and Radians ............................. 36
   1.15. Find the Radius and Center of a Circle to Fit Within a Page Element ................................................................. 37
   1.16. Calculating the Length of a Circular Arc ............................ 39
   1.17. Using ES6 String Extras Without Leaving Users in the Dirt .... 40

2. **JavaScript Arrays** ................................................................. 43
   2.1. Searching Through an Array ............................................. 43
   2.2. Flattening a Two-Dimensional Array with concat() and apply()  45
   2.3. Removing or Replacing Array Elements .................................. 46
   2.4. Extracting a Portion of an Array ....................................... 48
2.5. Applying a Function Against Each Array Element
2.6. Traversing the Results from querySelectorAll() with forEach() and call() 
2.7. Applying a Function to Every Element in an Array and Returning a New Array
2.8. Creating a Filtered Array
2.9. Validating Array Contents
2.10. Using an Associative Array to Store Form Element Names and Values
2.11. Using a Destructuring Assignment to Simplify Code

3. Functions: The JavaScript Building Blocks........................................... 61
  3.1. Placing Your Function and Hoisting
  3.2. Passing a Function As an Argument to Another Function
  3.3. Implementing a Recursive Algorithm
  3.4. Preventing Code Blocking with a Timer and a Callback
  3.5. Creating a Function That Remembers Its State
  3.6. Converting Function Arguments into an Array
  3.7. Reducing Redundancy by Using a Partial Application
  3.8. Improving Application Performance with Memoization (Caching Calculations)
  3.9. Using an Anonymous Function to Wrap Global Variables
  3.10. Providing a Default Parameter

4. The Malleable JavaScript Object....................................................... 85
  4.1. Keeping Object Members Private
  4.2. Using Prototype to Create Objects
  4.3. Inheriting an Object's Functionality
  4.4. Extending an Object by Defining a New Property
  4.5. Preventing Object Extensibility
  4.6. Preventing Any Changes to an Object
  4.7. Namespacing Your JavaScript Objects
  4.8. Rediscovering this with Prototype.bind
  4.9. Chaining Your Object's Methods

5. JavaScript and Directly Accessing the User Interface........................... 107
  5.1. Accessing a Given Element and Finding Its Parent and Child Elements
  5.2. Accessing All Images in the Web Page
  5.3. Discovering All Images in Articles Using the Selectors API
  5.4. Setting an Element's Style Attribute
  5.5. Applying a Striped Theme to an Unordered List
  5.6. Finding All Elements That Share an Attribute
  5.7. Inserting a New Paragraph
  5.8. Adding Text to a New Paragraph
5.9. Deleting Rows from an HTML Table .............................................. 127
5.10. Adding a Page Overlay .............................................................. 129
5.11. Creating Collapsible Form Sections ............................................. 133
5.12. Hiding Page Sections ................................................................. 136
5.13. Creating Hover-Based Pop-Up Info Windows ............................... 137
5.14. Displaying a Flash of Color to Signal an Action ........................... 140

6. Preliminary Testing and Accessibility .............................................. 143
6.1. Cleaning Up Your Code with JSHint ........................................... 143
6.2. Unit Testing Your Code with QUnit ............................................ 145
6.3. Testing Your Application in Various Environments ....................... 148
6.4. Performance Testing Different Coding Techniques ......................... 152
6.5. Highlighting Errors Accessibly ................................................... 156
6.6. Creating an Accessible Automatically Updated Region ................. 163

7. Creating and Using JavaScript Libraries .......................................... 165
7.1. Finding the Perfect Library ......................................................... 165
7.2. Testing for Features with Modernizr.load .................................... 166
7.3. Going Beyond the Math Object's Capability .................................. 168
7.4. Finding the Number of Days Between Two Dates ......................... 170
7.5. Using an External Library: Building on the jQuery Framework ....... 171
7.6. Using a jQuery Plugin ............................................................... 174
7.7. Handling Keyboard Shortcuts with Mousetrap .............................. 177
7.8. Utilizing the Utility Library Underscore ...................................... 180
7.9. Packaging Your Code ............................................................... 182
7.10. Adding Support for Private Data Members ................................... 185
7.11. Minify Your Library .............................................................. 187
7.12. Hosting Your Library .............................................................. 189
7.13. Serving Code from a CDN ....................................................... 192
7.15. Safely Combining Several Libraries in Your Applications ........... 195

8. Simplified Client-Server Communication and Data ........................ 199
8.1. Handling an XML Document Returned via an Ajax Call ............... 199
8.2. Extracting Pertinent Information from an XML Tree ..................... 201
8.3. Parsing and Automatically Modifying JSON .................................. 206
8.4. Converting an Object to a Filtered/Transformed String with JSON ... 208
8.5. Making an Ajax Request to Another Domain (Using JSONP) ............ 209
8.6. Processing JSON from an Ajax Request ...................................... 212
8.7. Populating a Selection List from the Server ................................ 214
8.8. Using a Timer to Automatically Update the Page with Fresh Data .... 218
9. Creating Media Rich, Interactive Web Effects
   9.1. Creating a Dynamic Line Chart in Canvas
   9.2. Adding JavaScript to SVG
   9.3. Accessing SVG from Web Page Script
   9.4. Integrating SVG and the Canvas Element in HTML
   9.5. Running a Routine When an Audio File Begins Playing
   9.6. Controlling Video from JavaScript with the video Element
   9.7. Adding Filter Effects to Video via Canvas

Part II. JavaScript, All Blown Up

10. The New ECMAScript Standard Objects
    10.1. Using let in Your Browser Application
    10.2. Creating a Collection of Non-Duplicated Values
    10.3. Creating Unique Key/Value Pairs with Uniquely Different Keys
    10.4. Creating Absolutely Unique Object Property Keys
    10.5. Iterating Through Tasks Made Easy
    10.6. Creating Functions that Gracefully Yield
    10.7. Implementing Just-in-Time Object Behavioral Modifications with
          Proxies
    10.8. Creating a True Class and Extending It (with a Little Help from Traceur)
    10.9. Using Promises for Efficient Asynchronous Processing

11. Node: JavaScript on the Server
    11.1. Responding to a Simple Browser Request
    11.2. Serving Up Formatted Data
    11.3. Reading and Writing File Data
    11.4. Using let and Other ES 6 Additions in Node
    11.5. Interactively Trying Out Node Code Snippets with REPL
    11.6. Getting Input from the Terminal
    11.7. Working with Node Timers and Understanding the Node Event Loop
    11.8. Managing Callback Hell
    11.9. Accessing Command-Line Functionality Within a Node Application
    11.10. Running Node and Apache on the Same Port
    11.11. Keeping a Node Instance Up and Running
    11.12. Monitoring Application Changes and Restarting
    11.13. Screen Scraping with Request

12. Modularizing and Managing JavaScript
    12.1. Loading Scripts with a Script Loader
12.2. Loading Scripts Asynchronously the HTML5 Way 315
12.3. Converting Your JavaScript to AMD and RequireJS 316
12.4. Using RequireJS with jQuery or Another Library 319
12.5. Loading and Using Dojo Modules 323
12.6. Installing and Maintaining Node Modules with npm 325
12.7. Searching for a Specific Node Module via npm 326
12.8. Converting Your Library into a Node Module 328
12.9. Taking Your Code Across All Module Environments 329
12.10. Creating an Installable Node Module 334
12.11. Packaging and Managing Your Client-Side Dependencies with Bower 339
12.13. Unit Testing Your Node Modules 342
12.14. Running Tasks with Grunt 345

13. Fun with APIs ................................................................. 351
   13.1. Accessing JSON-Formatted Data via a RESTful API 352
   13.2. Creating a RESTful API with Restify 355
   13.3. Enabling a Mobile-Like Notification in the Desktop Browser 360
   13.4. Loading a File Locally in the Browser 363
   13.5. Creating a Mini E-Pub Reader Using Web Workers and the File API 366
   13.6. Exploring Google Maps and Other APIs 371
   13.7. Accessing Twitter's API from a Node Application 379

14. JavaScript Frameworks .................................................. 387
   14.1. Using the Express-Generator to Generate an Express Site 388
   14.2. Converting a Generated Express Site into a Basic MVC App 396
   14.3. Choosing a SPA Framework: Deconstructing the TodoMVC 410
   14.4. Working with the OAuth Framework 422
   14.5. Extending the Possible with Web Components 436

15. Advanced Client-Server Communications and Streams .......... 447
   15.1. Allowing Cross-Domain Requests 447
   15.2. Implementing a PUT Request in Ajax 450
   15.3. Sending Binary Data Through Ajax and Loading into an Image 453
   15.4. Sharing HTTP Cookies Across Domains 455
   15.5. Establishing Two-Way Communication Between Client and Server 458
   15.6. Unloading and Zipping Files Using Transform Streams 464
   15.7. Testing the Performance and Capability of Your WebSockets Application 466

   16.1. Creating an SVG Bar Chart with D3 470
   16.2. Mapping Data Point Variations with a Radar Chart 476
16.3. Feeding a Scrolling Timeline via WebSocket 478
16.4. Generating Screenshots of Generated Web Page Content (PhantomJS) 483
16.5. Converting Graphics to Text (Ocrad.js) 489
16.6. Cropping (or Otherwise Modifying) Uploaded Images 491

17. Data and Persistence ................................................................. 495
17.1. Validating Form Data 495
17.2. Persisting Information Using HTML5 502
17.3. Using sessionStorage for Client-Side Storage 505
17.4. Creating a localStorage Client-Side Data Storage Item 513
17.5. Using Squel.js to Query a MySQL Database 517
17.6. Persisting Larger Chunks of Data on the Client Using IndexedDB 520
17.7. Accessing Data in the Cloud Using Dropbox Datastores 523

18. JavaScript Hits the (Mobile) Road .............................................. 535
18.1. Creating an Installable, Hosted Web App 535
18.2. Packaging Web Apps for the Amazon Appstore 541
18.3. Building a Basic Android App Using Cordova (PhoneGap) 543
18.4. Porting Where Am I? to Android 551
18.5. Creating a Geolocation Firefox OS App 559
18.6. Porting the Geolocation App to a Google Chrome App 569
18.7. Publishing Your Geolocation App in the Kindle Fire OS Environment 577
18.8. Debugging Your Android or Amazon Fire OS App 580
18.9. Getting Information About the Device 583

A. Up and Running in jsBin and jsFiddle ......................................... 589

Index .......................................................... 595