



Name: Interlaken
NUTS-1: Switzerland
NUTS-2: Espace
Mittelland
NUTS-3: Bern
Postal: 3800
Area: 4280000
Population: 5659
Elevation: 568

Community Experience Distilled

Mastering OpenLayers 3

Create powerful applications with the most robust open source web mapping library using this advanced guide

Gábor Farkas

[PACKT] open source*
PUBLISHING community experience distilled

Mastering OpenLayers 3

Create powerful applications with the most robust open source web mapping library using this advanced guide

Gábor Farkas



BIRMINGHAM - MUMBAI

Mastering OpenLayers 3

Copyright © 2016 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: January 2016

Production reference: 1220116

Published by Packt Publishing Ltd.
Livery Place
35 Livery Street
Birmingham B3 2PB, UK.

ISBN 978-1-78528-100-6

www.packtpub.com

Credits

Author

Gábor Farkas

Project Coordinator

Bijal Patel

Reviewer

Jose Troche

Proofreader

Safis Editing

Commissioning Editor

Veena Pagare

Indexer

Monica Ajmera Mehta

Acquisition Editor

Sonali Vernekar

Graphics

Disha Haria

Content Development Editor

Anish Dhurat

Production Coordinator

Conidon Miranda

Technical Editor

Jayesh Sonawane

Cover Work

Conidon Miranda

Copy Editors

Sonia Cheema

Trishya Hajare

About the Author

Gábor Farkas is a PhD student at University of Pécs's Institute of Geography. He holds a master's degree in geography, although he moved from traditional geography to pure Geoinformatics early in his academic journey. He often studies Geoinformatical solutions in his free time, keeps up with the latest trends, and is an open source enthusiast. He loves to work with GRASS GIS, PostGIS, and QGIS, but his all-time favorites are open source web mapping technologies, which mostly cover his main areas of research interest.

There have been many kind-hearted and nice people in my life who have helped me in my career or private life by giving me great advice. However, there is one significant person who has made this book possible. I would like to dedicate this book to my advisor, Titusz Bugya, who gave me the tip of starting a blog about WebGIS in English. This blog eventually led to the writing of this book. So, thanks Titusz; this book is partially the result of your trust and effort.

About the Reviewer

Jose Troche is a seasoned software development engineer with over a decade of hands-on experience in architecting and building enterprise web applications in multitiered environments. He has developed web-based applications that are capable of creating, storing, searching, retrieving, real-time sharing, and tracking geospatial data. He has also created REST APIs for advanced geospatial web services that are deployed to large-scale enterprise cloud architectures. He has integrated OpenLayers into several of his projects.

Jose has also worked as a contractor in aerospace and defense companies and agencies such as NASA, Lockheed Martin and General Dynamics; he is currently employed by Amazon Inc.

www.PacktPub.com

Support files, eBooks, discount offers, and more

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://www2.packtpub.com/books/subscription/packtlib>

Do you need instant solutions to your IT questions? PacktLib is Packt's online digital book library. Here, you can search, access, and read Packt's entire library of books.

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

Free access for Packt account holders

If you have an account with Packt at www.PacktPub.com, you can use this to access PacktLib today and view 9 entirely free books. Simply use your login credentials for immediate access.

Table of Contents

Preface	vii
Chapter 1: Creating Simple Maps with OpenLayers 3	1
Before getting started	2
Creating a working environment	2
Structure of OpenLayers 3	3
Building the layout	4
Creating the appeal	5
Writing the code	6
Using the API documentation	9
Understanding type definitions	10
Debugging the code	11
Summary	12
Chapter 2: Applying Custom Styles	13
Before getting started	13
Basic considerations	14
Customizing the default appearance	14
Identifying the classes	15
Styling the controls	15
Customizing the attribution control	18
Creating a custom zoom control with CSS	19
Styling vector layers	22
Customizing the appearance with JavaScript	24
Changing the overview map and the scale bar	24
Truncating the coordinate control	25
Changing the attribution	26

Creating a WebGIS client layout	28
Building the HTML	28
Styling the layout	29
Writing the code	32
Summary	34
Chapter 3: Working with Layers	35
Before getting started	35
Using a proxy	36
Resources to use	36
Basic considerations	37
Building a layer tree	37
Styling the layer tree	38
Creating a layer tree constructor	39
Adding layers dynamically	43
Creating the interface	43
Extending the constructor	45
Fetching the WMS metadata	49
Adding WMS layers	53
Adding WFS layers	54
WFS considerations	55
Adding vector layers with the File API	56
Creating the interface	56
Building the method	57
Adding vector layers with a library	59
Removing layers dynamically	61
Extending a constructor	61
Changing layer attributes	64
Styling active layers	64
Extending the method	65
Changing the layer order with the Drag and Drop API	68
Clearing the message bar	72
Summary	73
Chapter 4: Using Vector Data	75
Before getting started	76
Accessing attributes	76
Writing the code	77
Setting attributes	80
Styling the form	80
Writing the code	81

Validating attributes	84
Adjusting the styles	85
Building headers	85
Writing the code	86
Creating thematic layers	89
Extending the layer tree	89
Creating choropleth maps	91
Creating categorized maps	94
Saving vector data	96
Saving in arbitrary formats	96
Saving with WFS-T	97
Modifying the geometry	98
Summary	99
Chapter 5: Creating Responsive Applications with Interactions and Controls	101
Before getting started	101
Basic considerations	102
Building the toolbar	102
Mapping interactions to controls	104
Creating the control	105
Adding and removing the control	107
Adding a selection control	108
Building a set of feature selection controls	109
Styling the controls	109
Creating the selection tools	110
Adding new vector layers	112
Creating the HTML and the CSS	113
Extending the layer tree	114
Building a set of drawing tools	116
Writing the method	116
Modifying and snapping to features	121
Extending the method	122
Creating new interactions	124
Understanding ol.interaction.Pointer	125
Removing features	125
Dragging features	127
Extending the method	128
Building a measuring control	130
Creating the interaction	130

Doing geodesic measurements	136
Calculating lengths even more precisely	138
Summary	139
Chapter 6: Controlling the Map – View and Projection	141
Before getting started	141
Basic considerations	142
Customizing a view	143
Constraining a view	145
Creating a navigation history	146
Working with extents	151
Creating a zoom control	151
Extending the toolbar	152
Rotating a view	154
Changing the map's projection	157
Creating custom animations	162
Building the control	163
Creating animations	164
Summary	169
Chapter 7: Mastering Renderers	171
Before getting started	171
Using different renderers	172
Creating a WebGL map	172
Drawing lines and polygons with WebGL	174
Blending layers	176
Clipping layers	178
Exporting a map	179
Creating a raster calculator	182
Raster 101	183
Operating with pixels	184
Creating a convolution matrix	186
How convolution works	187
Converting an image to 8-bit	187
Implementing the Sobel filter	189
Normalizing an image	190
Finalizing a control	191
Clipping a layer with WebGL	194
Writing programs	195
Creating a clipping mask	197
Summary	201

Chapter 8: OpenLayers 3 for Mobile	203
Before getting started	204
Basic considerations	204
Responsive styling with CSS	204
Writing the style sheet	205
Constructing the map	207
Generating geocaches	209
Adding device-dependent controls	211
Adding controls for touch devices	213
Adding controls for desktop computers	214
Vectorizing the mobile version	216
Making the mobile application interactive	220
Summary	223
Chapter 9: Tools of the Trade – Integrating Third-Party Applications	225
Before getting started	225
Exporting a QGIS project	226
Installing the qgis2web plugin	227
Inspecting the project	228
Exporting a map	229
Salvaging the results	230
Importing shapefiles	232
Editing the HTML file	232
Replacing a function	234
Spatial analysis with Turf	236
Preparing an example	236
Implementing a buffer operation	238
Implementing a merge operation	240
Implementing the self-intersect operation	242
Spatial analysis with JSTS	244
Implementing operations	245
3D rendering with Cesium	248
Preparing a map	248
Creating a control	250
Observing a terrain	253
Extending the Cesium scene	255
Summary	257

Chapter 10: Compiling Custom Builds with Closure	259
Before getting started	259
Configuring Node JS	260
Installing Node JS on Windows	260
Installing Node JS on Linux	261
Resolving dependencies	261
Compiling OpenLayers 3	262
Building default versions	263
Understanding a configuration file	263
Building OpenLayers 3 with a subset of features	264
Bundling an application with OpenLayers 3	266
Editing the application	266
Creating a configuration file	267
Fixing the application	270
Extending OpenLayers 3	272
Creating rich documentation with JSDoc	274
Customizing the documentation	275
Summary	279
Index	281
