Mapping in the Cloud

Michael P. Peterson

MAPPING in the CLOUD

Michael P. Peterson

THE GUILFORD PRESS
New York London

A Division of Guilford Publications, Inc.
72 Spring Street, New York, NY 10012
www.guilford.com

Printed in the United States of America

This book is printed on acid-free paper.

Last digit is print number: 9 8 7 6 5 4 3 2 1

Library of Congress Cataloging-in-Publication Data

Peterson, Michael P.
Mapping in the cloud / Michael P. Peterson.
pages cm
Includes bibliographical references and index.
ISBN 978-1-4625-1041-2 (pbk.)
ISBN 978-1-4625-1403-8 (hardcover)
1. Cartography—Computer network resources. 2. Cloud computing. I. Title.
GA102.4.E4P49 2014
526.0285'46782—dc23

2014003174

MAPPING IN THE CLOUD

Preface

It is difficult to overstate the importance of maps as a form of communication about the world. They help us understand both our surroundings and the space beyond our direct perception. Maps influence how we think about the world and how we act within it. They connect us to our environment.

Each of us is a mapmaker, or cartographer, in the sense that we all make mental maps. Sometimes, we even draw these maps for others to help explain how to find a particular location. The making of maps and the analysis of the underlying spatial information have evolved into a science and are valuable skills for many different types of work. Cloud-based mapping tools allow for the creation of very sophisticated maps that can be easily made available to others.

This book seeks to balance the conceptual and practical aspects of maps and mapping. It is as important to know the meaning of maps, their background, and their development as it is to know how to make maps with the tools currently available. This book alternates between chapters that deal with the concepts of cartography and cloud-based methods of mapmaking. There's a package of resources including examples, exercises, and links to other sources of information for each even-numbered chapter available at www.guilford.com/peterson-materials. This site will be updated regularly with new resources.

Making maps in the cloud requires using a server. Although almost any computer can be transformed into a server, it is easier and more secure to use a web-hosting service. These services generally charge under $10 a month. Many web-hosting services offer a free plan with up to 1500 mb of disk space, which is more than sufficient for the exercises in this book. Two such web-hosting services are `000webhost.com` and `podserver.info`. All that is required to request a free account is an email address.

Most web-hosting services are accessed through a browser and use a standard graphical user interface called the cPanel, which uses an icon interface to the many utility programs on the server. All exercises in this book make use of just three of these: FileManager, MySQL, and phpMyAdmin. Most work involves uploading and editing files with FileManager.

The exercises for the individual chapters are provided as zip files. Each zip file consists of a single folder that contains all the files necessary to complete the exercises for a particular chapter. FileManager can be used to upload the zip file into a `public_html` directory and will automatically unzip the file to create a folder. The folders are called code02, code04, code06, code08, code10, and so forth. Each folder contains an `index.htm` file that has links to all of the exercises for that chapter. Creating an `index.htm` file in the base `public_html` directory with links to each code folder provides access to the exercises for all the chapters. A central file can access the `index.htm` file for all students in a class. Being able to see what other students have done is a major advantage of using a server-based approach in the classroom.

Cloud-hosting systems such as Amazon Web Services (AWS) can also be used to host web pages. These services provide scalable and reliable hosting based on clustered load-balanced servers. At this point, cloud hosting is generally more cumbersome to access and manage than a web-hosting service. It is usually necessary to configure the server and install all of the software needed to serve web pages. The charging mechanism is also more complicated, and while free "instances" such as AWS T1.micro are available, it is likely that the user will eventually be charged for using a cloud-hosting service, and the charges can easily range in the hundreds of dollars.

It is important to work through these exercises in order to understand how the code works and how it can be modified. In working through the exercises, remember to make incremental changes to the working code. If your altered code does not work, return to a working version.

A book of this kind would not have been possible without the help of many individuals. During the course of its writing, I taught and presented multiple workshops. While the exercises were mostly developed for classes at the University of Nebraska at Omaha, I also taught courses at the Vienna University of Technology in Austria and the University of Applied Sciences in Karlsruhe, Germany, the National Institute of Design in Ahmadabad, India, and the University of Canterbury in Christchurch, New Zealand. Workshops were given at the Universiti Pendidikan Sultan Idris in Tanjung Malim, Malaysia, the Getty Conservation Institute in Los Angeles, the Brazilian Cartographic Congress in Rio de Janeiro, Brazil, and the District University of Bogotá, Colombia. A number of students in these courses and workshops suggested improvements to both the text and the exercises.

Prof. Georg Gartner at the Vienna University of Technology in Austria and Prof. Bill Cartwright from the Melbourne Institute of Technology in Australia were instrumental in early discussions of cartography and the Internet. Both suggested topics that should be included. The many interactions with colleagues through the Maps and the Internet Commission of the International Cartographic Association were also important in developing an outline for the book. A number of valuable discussions with Prof. Rex Cammack helped with the outline of the book. His help in focusing the organization of the book is much appreciated.

Students in Omaha who suggested a number of improvements to the text include Ed Zuelke and Nicholas Petersen. Prof. Leslie Rawlings provided a multipoint

map example of Wayne, Nebraska. A number of students in advanced seminars helped with specific exercises, including Patrick Butler, Andrew Clouston, Michael DeBoer, Konal Dobson, Kevin Fandry, Charles Fortier, Paul Hunt, Gregory Jameson, Kelly Koepsell, Bruce Muller, Gabriel Pereda, Rob Shepard, Bill Shrader, and Spencer Trowbridge. Manuela Schmidt designed some of the illustrations. Interns that came to Omaha from universities in Karlsruhe, Mainz, and Munich, Germany, assisted in various aspects of the book. Manuela Schmidt designed some of the illustrations. Matthias Uhler worked on the PHP and MySQL exercises and developed a server-based solution for their implementation. Matthias Krisam and Alexander Stobbe developed a method to input points into a database. Other interns and students from Germany that helped with various aspects include Andreas Hiebsch, Stefan Stark, Christoph Weiss, and Paul Weiser. Finally, Dr. Ben Appleton at Google in Australia needs to be thanked for reviewing a draft of the book.

Prof. Shunfu Hu from Southern Illinois University provided valuable comments on an earlier draft of the book, as did Prof. Scott Freundschuh from the University of New Mexico and Prof. Henry Bulley at Central Connecticut State University.

Finally, I could not have completed this book without the help of my wife, Kathy. Not only did she suggest improvements to the book but she mostly understood when my mind was somewhere else. I would also like to thank my children, Sarah and Amelia, for their support.

The companion website *www.guilford.com/peterson-materials* links to the exercises and other instructional materials.

Contents

CHAPTER 15

CHAPTER 16

CHAPTER 17

CHAPTER 18

CHAPTER 22

CHAPTER 23

The companion website *www.guilford.com/peterson-materials* links to the exercises and other instructional materials.