



Professional

XMPP

Programming with JavaScript® and jQuery

Jack Moffitt



Programmer to Programmer™

Get more out of wrox.com

Interact

Take an active role online by participating in our P2P forums @ p2p.wrox.com

Wrox Online Library

Hundreds of our books are available online through Books24x7.com

Wrox Blox

Download short informational pieces and code to keep you up to date and out of trouble!

Join the Community

Sign up for our free monthly newsletter at newsletter.wrox.com

Browse

Ready for more Wrox? We have books and e-books available on .NET, SQL Server, Java, XML, Visual Basic, C#/ C++, and much more!

Contact Us.

We always like to get feedback from our readers. Have a book idea?

Need community support? Let us know by e-mailing wrox-partnerwithus@wrox.com

PROFESSIONAL XMPP PROGRAMMING WITH JAVASCRIPT AND JQUERY

INTRODUCTION.....	xix
► PART I XMPP PROTOCOL AND ARCHITECTURE	
CHAPTER 1 Getting to Know XMPP	3
CHAPTER 2 Designing XMPP Applications.....	23
► PART II THE APPLICATIONS	
CHAPTER 3 Saying Hello: The First Application.....	39
CHAPTER 4 Exploring the XMPP Protocol: A Debugging Console.....	63
CHAPTER 5 Microblogging in Real Time: An Identica Client.....	87
CHAPTER 6 Talking with Friends: One-on-One Chat	103
CHAPTER 7 Exploring Services: Service Discovery and Browsing.....	145
CHAPTER 8 Group Chatting: A Multi-User Chat Client	165
CHAPTER 9 Publishing and Subscribing: A Shared Sketch Pad Introduction.....	203
CHAPTER 10 Writing with Friends: A Collaborative Text Editor.....	251
CHAPTER 11 Playing Games: Head to Head Tic-Tac-Toe	299
► PART III ADVANCED TOPICS	
CHAPTER 12 Getting Attached: Bootstrapping BOSH	377
CHAPTER 13 Deploying XMPP Applications.....	387
CHAPTER 14 Writing Strophe Plug-ins.....	401
APPENDIX A Getting Started with jQuery.....	419
APPENDIX B Setting Up a BOSH Connection Manager.....	429
INDEX.....	441

PROFESSIONAL

**XMPP Programming with
JavaScript[®] and jQuery**

PROFESSIONAL

XMPP Programming with JavaScript® and jQuery

Jack Moffitt



Wiley Publishing, Inc.

Professional XMPP Programming with JavaScript® and jQuery

Published by
Wiley Publishing, Inc.
10475 Crosspoint Boulevard
Indianapolis, IN 46256
www.wiley.com

Copyright © 2010 by Wiley Publishing, Inc., Indianapolis, Indiana

Published simultaneously in Canada

ISBN: 978-0-470-54071-8

Manufactured in the United States of America

10 9 8 7 6 5 4 3 2 1

No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, scanning or otherwise, except as permitted under Sections 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 646-8600. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, or online at <http://www.wiley.com/go/permissions>.

Limit of Liability/Disclaimer of Warranty: The publisher and the author make no representations or warranties with respect to the accuracy or completeness of the contents of this work and specifically disclaim all warranties, including without limitation warranties of fitness for a particular purpose. No warranty may be created or extended by sales or promotional materials. The advice and strategies contained herein may not be suitable for every situation. This work is sold with the understanding that the publisher is not engaged in rendering legal, accounting, or other professional services. If professional assistance is required, the services of a competent professional person should be sought. Neither the publisher nor the author shall be liable for damages arising herefrom. The fact that an organization or Web site is referred to in this work as a citation and/or a potential source of further information does not mean that the author or the publisher endorses the information the organization or Web site may provide or recommendations it may make. Further, readers should be aware that Internet Web sites listed in this work may have changed or disappeared between when this work was written and when it is read.

For general information on our other products and services please contact our Customer Care Department within the United States at (877) 762-2974, outside the United States at (317) 572-3993 or fax (317) 572-4002.

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic books.

Library of Congress Control Number: 2009900000

Trademarks: Wiley, the Wiley logo, Wrox, the Wrox logo, Wrox Programmer to Programmer, and related trade dress are trademarks or registered trademarks of John Wiley & Sons, Inc. and/or its affiliates, in the United States and other countries, and may not be used without written permission. JavaScript is a registered trademark of Sun Microsystems, Inc. All other trademarks are the property of their respective owners. Wiley Publishing, Inc. is not associated with any product or vendor mentioned in this book.

*Dedicated to my wife Kimberly and our son
Jasper, whose loves, hugs, and smiles make
every day the best day ever.*

CREDITS

EXECUTIVE EDITOR

Carol Long

PROJECT EDITOR

Ed Connor

TECHNICAL EDITOR

Dave Cridland

PRODUCTION EDITOR

Kathleen Wisor

COPY EDITOR

Kim Cofer

EDITORIAL DIRECTOR

Robyn B. Siesky

EDITORIAL MANAGER

Mary Beth Wakefield

MARKETING MANAGER

David Mayhew

PRODUCTION MANAGER

Tim Tate

**VICE PRESIDENT AND
EXECUTIVE GROUP PUBLISHER**

Richard Swadley

VICE PRESIDENT AND EXECUTIVE PUBLISHER

Barry Pruett

ASSOCIATE PUBLISHER

Jim Minatel

PROJECT COORDINATOR, COVER

Lynsey Stanford

COMPOSITOR

Craig Johnson, Happenstance Type-O-Rama

PROOFREADER

Carrie Hunter, Word One

INDEXER

Robert Swanson

COVER DESIGNER

Michael E. Trent

COVER IMAGE

© Punchstock/Glowimages

ABOUT THE AUTHOR



JACK MOFFITT is a hacker and entrepreneur based in Albuquerque, New Mexico. He has founded several startups built on XMPP technology including Chesspark, a real-time, multi-user gaming platform, and Collecta, a real-time search engine for the Web. He has started and contributed to numerous XMPP related open source and free software projects including the Strophe XMPP client libraries, the Punjab XMPP connection manager, the Palaver multi-user chat component, the Speeqe group chat application. He also has served several terms on both the XSF Board of Directors and the XSF Council. Previous to his XMPP work, he created the Icecast streaming media server, managed the Ogg, Vorbis, and Theora codec projects, and co-founded the Xiph.org Foundation, a standards organization for royalty-free multimedia technologies for the Internet. He is passionate about free software and open source, open standards, and Internet technology. His favorite programming languages include JavaScript, Erlang, and Python. You can find him at <http://metajack.im>, blogging about start-ups and code, as @metajack on Twitter and Identica, or often spreading the word of XMPP at technology conferences.

ACKNOWLEDGMENTS

WE ALL STAND ON THE SHOULDERS OF GIANTS, and I am fortunate to have stood on many friendly ones throughout my career and while writing this book. Thanks to Carol Long and Ed Connor for the encouragement, handholding, reminders, and patience that every author needs. Thanks also to Jason Salas who not only encouraged me on this project but made the appropriate introductions. Thanks also to Dave Cridland for his work ensuring the technical quality of this book and his tireless humor. I'm hugely indebted to Peter Saint-Andre, patron saint of XMPP, and the rest of the XMPP Standards Foundation members for their advice, criticism, and friendship over the years. Finally, the biggest thanks of all to my wife; not only did she encourage me in this project and put up with my long hours and absence, she also worked hard as my first reader and made many helpful suggestions to the text.

CONTENTS

INTRODUCTION

XIX

PART I: XMPP PROTOCOL AND ARCHITECTURE

CHAPTER 1: GETTING TO KNOW XMPP

3

What Is XMPP?

4

A Brief History of XMPP

5

The XMPP Network

6

Servers

6

Clients

7

Components

7

Plug-ins

8

XMPP Addressing

8

XMPP Stanzas

9

Common Attributes

10

Presence Stanzas

11

Message Stanzas

13

IQ Stanzas

15

Error Stanzas

17

The Connection Life Cycle

18

Connection

18

Stream Set Up

19

Authentication

20

Disconnection

20

Summary

20

CHAPTER 2: DESIGNING XMPP APPLICATIONS

23

Learning from Others

24

XMPP versus HTTP

27

Advantages of XMPP

28

Disadvantages of XMPP

29

Bridging XMPP and the Web

30

Long Polling

30

Managing the Connection

31

Making JavaScript Speak XMPP

32

Making XMPP Applications	33
The Browser Platform	33
Basic Infrastructure	33
Protocol Design	34
Summary	36

PART II: THE APPLICATIONS

CHAPTER 3: SAYING HELLO: THE FIRST APPLICATION **39**

Application Preview	40
Hello Design	40
Preparing the Way	41
jQuery and jQuery UI	42
Strophe	42
fXHR	43
XMPP Accounts	43
Starting Your First Application	43
User Interface	43
Application Code	45
Making Connections	47
The Connection Life Cycle	47
Creating a Connection	48
Connecting Hello	49
Running the Application	53
Creating Stanzas	53
Strophe Builders	54
Saying Hello	56
Handling Events	57
Adding and Removing Handlers	57
Stanza Matching	57
Stanza Handler Functions	58
Handling Responses in Hello	59
More Hellos	62
Summary	62

CHAPTER 4: EXPLORING THE XMPP PROTOCOL: A DEBUGGING CONSOLE **63**

Application Preview	64
Peek Design	64

Building the Console	65
User Interface	66
Displaying Traffic	68
Making XML Pretty	71
Dealing with XML Input	74
Making Input Easier	76
Exploring XMPP	81
Controlling Presence	81
Probing Versions	81
Dealing with Errors	82
Better Debugging	85
Summary	85
<hr/> CHAPTER 5: MICROBLOGGING IN REAL TIME: AN IDENTICA CLIENT	<hr/> 87
Application Preview	88
Arthur Design	88
Microblogging with Identica	89
Creating Your Account	90
Turning on XMPP	90
Building Arthur	90
Getting Started	91
Receiving Messages	93
XHTML-IM	94
Adding XHTML-IM to Arthur	95
Sending Messages	96
Offline Messages	97
Creating a Better Microblogger	101
Summary	102
<hr/> CHAPTER 6: TALKING WITH FRIENDS: ONE-ON-ONE CHAT	<hr/> 103
Application Preview	104
Gab Design	104
Presence	105
Messages	105
Chat Area	105
Roster Area	106
Making the Interface	106

Building the Roster	109
Requesting Rosters	111
Handling IQs	113
Updating Presence Status	114
Adding New Contacts	116
Responding to Roster Changes	117
Dealing with Subscription Requests	119
Building the Chats	122
Working with Tabs	122
Creating New Chats	123
Sending Messages	124
Best Practices for Instant Messaging	127
Understanding Message Routing	127
Addressing Messages Better	127
Adding Activity Notifications	130
Understanding Chat States	130
Sending Notifications	131
Receiving Notifications	132
Final Touches	133
Gabbing More	143
Summary	143
CHAPTER 7: EXPLORING SERVICES: SERVICE DISCOVERY AND BROWSING	145
<hr/>	
Application Preview	146
Dig Design	146
Finding Information	147
Disco#info Queries	147
Disco#items Queries	148
Disco Nodes	149
Creating Dig	149
Initial Disco Queries	153
Browsing the Disco Tree	155
Digging into Services	160
Finding a Proxy Server	161
Discovering Features	162
Looking for a Chat	162
Discovering More	163
Summary	163

CHAPTER 8: GROUP CHATTING: A MULTI-USER CHAT CLIENT	165
Application Preview	166
Groupie Design	167
Public Speaking	167
Group Chat Services	167
Entering and Leaving a Room	168
Sending and Receiving Messages	171
Anonymity	171
Creating Rooms	172
Understanding Roles and Affiliations	173
Building the Interface	175
Joining the Room	179
Dealing with Presence and Messages	183
Handling Room Messages	183
Tracking Presence Changes	185
Chat History	186
Keeping It Private	187
Describing Actions	190
Managing the Room	191
Changing Topics	191
Dealing with Troublemakers	192
Recruiting Help	194
Improving Groupie	201
Summary	201
CHAPTER 9: PUBLISHING AND SUBSCRIBING: A SHARED SKETCH PAD INTRODUCTION	203
SketchCast Preview	204
SketchCast Design	205
Everything Is Pubsub	205
Presenter's Flow	205
Audience's Flow	206
Filling Out Forms	206
What Is The Data Forms Extension?	206
Form Elements, Fields, and Types	207
Standardized Form Fields	210

Working with Pubsub Nodes	211
Creating Nodes	211
Configuring Nodes	213
Pubsub Events	215
Publishing to a Node	215
Subscribing and Unsubscribing	216
Retrieving Subscriptions	218
Retrieving Items	219
Subscription Management	221
Broadcasting Sketches Using Pubsub	222
Building the Interface	222
Sketching with Canvas	225
Logging In and Making Nodes	228
Publishing and Receiving Sketch Events	234
Summary	249
CHAPTER 10: WRITING WITH FRIENDS: A COLLABORATIVE TEXT EDITOR	251
<hr/>	
Application Preview	252
NetPad Design	252
Operational Transformation	253
Basic Principles	253
Details of the Algorithm	255
Implementation	256
Extending the XMPP Protocol	267
Ignoring the Unknown	267
XML Namespaces	268
Extended Elements	268
Extended Attributes	270
Contributing Extensions	271
Designing the Protocol	271
Testing for Support	272
Requesting and Controlling Sessions	272
Editing Operations	273
Building the Editor	274
The Initial Skeleton	274
Starting Editing Sessions	278
Chatting About Work	284
Making Edits	287
Expanding NetPad	298
Summary	298

CHAPTER 11: PLAYING GAMES: HEAD TO HEAD TIC-TAC-TOE	299
Application Preview	300
Toetem Design	301
Designing the Game Protocol	302
Keeping Track of Users	303
Managing Players	304
Managing Games	305
Playing and Watching the Game	308
Getting Started on Toetem	311
Implementing Sessions and the Waiting List	317
Referee Version One	317
Toetem Client Version One	322
Implementing Game Management	325
Referee Version Two	325
Toetem Client Version Two	334
Implementing the Game Logic	338
The Tic-Tac-Toe Library	338
Referee Version Three	343
Toetem Client Version Three	345
Making the Game More Fun	372
Summary	373

PART III: ADVANCED TOPICS

CHAPTER 12: GETTING ATTACHED: BOOTSTRAPPING BOSH	377
Session Attachment	378
The Mechanics of Sessions	378
Use Cases	379
Automatic Logins with Session Attachment	380
Creating the Django Project	381
Summary	385
CHAPTER 13: DEPLOYING XMPP APPLICATIONS	387
Growing Horizontally	387
Multiple Connection Managers	388
Clustering XMPP Servers	391
Spreading Out Components	392
Federating Internally	393
Becoming a Server	393

Growing Vertically	394
Reducing Latency	394
Minimizing XML Serialization	397
Optimizing DOM Operations	398
Summary	399
CHAPTER 14: WRITING STROPHE PLUG-INS	401
Using Plug-ins	402
Loading Plug-ins	402
Accessing Plug-in Functionality	402
Building Plug-ins	403
Creating a Roster Plug-in	404
Storing Contacts	405
Getting and Maintaining the Roster	407
Manipulating the Roster	411
Taking the Plug-in for a Spin	412
Improving the Roster Plug-in	417
Summary	417
Appendix A: Getting Started with jQuery	419
Appendix B: Setting Up a BOSH Connection Manager	429
INDEX	441

INTRODUCTION

XMPP POWERS A WIDE RANGE OF APPLICATIONS including instant messaging, multi-user chat, voice and video conferencing, collaborative spaces, real-time gaming, data synchronization, and even search. Although XMPP started its life as an open, standardized alternative to proprietary instant messaging systems like ICQ and AOL Instant Messenger, it has matured into an extremely robust protocol for all kinds of exciting creations.

Facebook uses XMPP technology as part of its chat system. Google uses XMPP to power Google Talk and its exciting new Google Wave protocol. Collecta has built a real-time search engine based extensively on XMPP's publish-subscribe system. Several web browsers are experimenting with XMPP as the basis of their synchronization and sharing systems. Dozens of other companies have XMPP-enabled their web applications to provide enhanced user experiences and real-time interaction.

The core of XMPP is the exchange of small, structured chunks of information. Like HTTP, XMPP is a client-server protocol, but it differs from HTTP by allowing either side to send data to the other asynchronously. XMPP connections are long lived, and data is pushed instead of pulled.

Because of XMPP's differences, it provides an excellent companion protocol to HTTP. XMPP-powered web applications are to AJAX what AJAX was to the static web site; they are the next level of interactivity and dynamism. Where JavaScript and dynamic HTML have brought desktop application features to the web browser, XMPP brings new communications possibilities to the Web.

XMPP has many common social web features built in, due to its instant messaging heritage. Contact lists and subscriptions create social graphs, presence updates help users keep track of who is doing what, and private messaging makes communication among users trivial. XMPP also has nearly 300 extensions, providing a broad and useful range of tools on which to build sophisticated applications. With only a handful of these, along with the core protocol, amazing things can be built

This book teaches you to harness the promise of XMPP in your own applications, enabling you to build applications that are social, collaborative, real time, or all of the above. You will develop a series of increasingly sophisticated XMPP applications, starting from "Hello, World!" and finishing with a collaborative text editor, a shared sketch pad, and a real-time, multi-player game. By the end, you will have all the tools you need to build the next generation of applications using XMPP or to add new real-time, push, or social features to your current applications.

WHO THIS BOOK IS FOR

This book is written for developers interested in making XMPP applications. You need not have any previous experience with XMPP, although it will certainly be helpful if you do. The book starts from the assumption that you've heard great things about XMPP and are looking to dive right in.

The JavaScript language is used to develop all the applications in the book because it is an easy language to understand, is familiar to a large number of programmers, and comes on every computer with a web browser. Even though this book uses JavaScript, all the concepts and applications could be developed in any language; most of the “hard parts” are not related to the programming language, the libraries used, or the web browser. You do not need to be a JavaScript expert to understand and work with the code in this book.

It is assumed that you understand the basic front-end web technologies, CSS and HTML. If you’ve ever written a little HTML from scratch and changed a few CSS styling properties, you should be fine.

This book also makes use of two libraries, jQuery and Strophe. It is helpful if you have used jQuery before, but if you haven’t, a short primer is included in Appendix A. The Strophe library is explained fully as the applications are developed.

WHAT THIS BOOK COVERS

The XMPP protocol and its extensions cover a lot of ground. This book focuses on the pieces of XMPP in wide use. The following topics receive much attention:

- XMPP’s instant messaging features like rosters, presence and subscriptions, and private chats
- XMPP stanzas, stanza errors, and client protocol syntax and semantics
- Extending XMPP stanzas
- Service discovery (XEP-0030)
- Data Forms (XEP-0004)
- Multi-User Chat (XEP-0045)
- Publish-Subscribe (XEP-0060)

Although these topics are all approached from the client side, almost all of it is equally applicable to XMPP bots or server components and plug-ins.

The book also covers XMPP programming related topics such as application design, event handling, and combining simple protocol elements into a greater whole. Along the way, a few web programming topics are also discussed such as the Canvas API.

XMPP is now more than 10 years old and quite mature. This book covers the 1.0 version of the core protocol. The XMPP protocol parts of this book should work unchanged in future versions of the protocol, just as HTTP 1.0 clients can easily communicate with HTTP 1.1 servers.

XMPP has many extensions and several of these are also covered. For the most part, the book concentrates on extensions that are in a stable, mature state. For each extension used, the document number is always given, and if in doubt, you can always check the latest version of the extension to see if it has been changed or superseded.

The book was written with the 1.3 series versions of jQuery and the 1.7 series versions of jQuery UI. These libraries generally remain backward compatible to a large degree. Version 1.0 of the Strophe library is used, but future 1.X versions should also work fine.

HOW THIS BOOK IS STRUCTURED

This book is primarily organized as a walkthrough tutorial of a series of example XMPP applications. Each application increases in difficulty and teaches you one or more useful parts of the XMPP protocol and its extensions. These applications are stripped down for clarity, but they are examples of the kinds of applications XMPP developers create every day.

This book is divided into three parts.

The first part is an introduction to the XMPP protocol, its uses, and XMPP application design. Chapter 1 covers the use cases for XMPP, the history of the protocol, and its component parts. Chapter 2 explains when XMPP is a good choice for the job and goes into detail about how XMPP applications work, particularly for the Web.

The second part is the meat of the book and contains nine XMPP applications that solve a variety of problems. Each application is more complex than the last and builds on the concepts of the previous ones. Chapter 3 starts with a simple “Hello, World!” type example, and by Chapter 11 you build a real-time, multi-player game.

The last part covers a few advanced but important topics. Chapter 12 discusses attached sessions, a useful trick for security, optimization, and persistence. Chapter 13 goes into detail about how best to deploy and scale XMPP-based applications. Chapter 14 explains how to use Strophe’s plug-in system and how to create your own plug-ins.

WHAT YOU NEED TO USE THIS BOOK

This book makes use of web technologies and therefore requires almost no special tools. You can use, build, and run the applications in this book on virtually any platform. The libraries needed for the applications are explained in Chapter 3, and most can be used without downloading any code.

You will need some way to serve web pages such as a local web server or a hosting account somewhere. If you don’t have these readily available, you can use the Tape program to serve the files; Tape is a simple web server and is explained in Appendix B. It is an unfortunate requirement of browser security policy that you can’t easily run these applications directly from your local file system.

You will need an XMPP account (or multiple accounts in some cases if you want to test the code by yourself) to run the applications. You can avail yourself of any of the public XMPP servers for this purpose, although you will need to ensure that the server has support for publish-subscribe and multi-user chat; most do. You can also download and run your own XMPP server instead, although this is not covered in the book.

Chapter 12 requires some server-side assistance. The example uses the Python programming language along with the Django framework to provide this. This chapter is an advanced topic and is not needed for the normal applications in the book.

CONVENTIONS

To help you get the most from the text and keep track of what's happening, we've used a number of conventions throughout the book.



Boxes like this one hold important, not-to-be forgotten information that is directly relevant to the surrounding text.



Notes, tips, hints, tricks, and asides to the current discussion are offset and placed in italics like this.

As for styles in the text:

- ▶ We *highlight* new terms and important words when we introduce them.
- ▶ We show keyboard strokes like this: Ctrl+A.
- ▶ We show file names, URLs, and code within the text like so: `persistence.properties`.
- ▶ We present code in two different ways:

We use a monospace type with no highlighting for most code examples.

We use **boldface highlighting** to **emphasize code that is of particularly importance in the present context.**

SOURCE CODE

As you work through the examples in this book, you may choose either to type in all the code manually or to use the source code files that accompany the book. All of the source code used in this book is available for download at <http://www.wrox.com>. Once at the site, simply locate the book's title (either by using the Search box or by using one of the title lists) and click the Download Code link on the book's detail page to obtain all the source code for the book.

- [click *Introduction to Japanese Culture*](#)
- [read *Filibustering: A Political History of Obstruction in the House and Senate* pdf, azw \(kindle\), epub](#)
- [The Prose Edda: Norse Mythology \(Penguin Classics\) online](#)
- [download online *Kids of Kabul: Living Bravely Through a Never-Ending War* pdf, azw \(kindle\), epub, doc, mobi](#)

- <http://transtrade.cz/?ebooks/Introduction-to-Japanese-Culture.pdf>
- <http://anvilpr.com/library/Blender-2-5-Lighting-and-Rendering.pdf>
- <http://chelseaprintandpublishing.com/?freebooks/Kim-Philby--The-Unknown-Story-of-the-KGB-s-Master-Spy.pdf>
- <http://transtrade.cz/?ebooks/Managing-Depression-with-Mindfulness-for-Dummies.pdf>