THE EXPERT'S VOICE® IN OPEN SOURCE

Beginning PHP and PostgreSQL E-Commerce

From Novice to Professional

Learn how to use PHP, PostgreSQL, and sound development practices to build high quality, extensible e-commerce web sites in no time!

Cristian Darie, Emilian Balanescu, and Mihai Bucica

Apress®

Beginning PHP and PostgreSQL E-Commerce

From Novice to Professional

Cristian Darie, Emilian Balanescu,
Mihai Bucica

Apress®

Beginning PHP and PostgreSQL E-Commerce: From Novice to Professional

Copyright © 2006 by Cristian Darie, Emilian Balanescu, Mihai Bucica

All rights reserved. No part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage or retrieval system, without the prior written permission of the copyright owner and the publisher.

ISBN-13 (pbk): 978-1-59059-648-7

ISBN-10 (pbk): 1-59059-648-X

Printed and bound in the United States of America 9 8 7 6 5 4 3 2 1

Trademarked names may appear in this book. Rather than use a trademark symbol with every occurrence of a trademarked name, we use the names only in an editorial fashion and to the benefit of the trademark owner, with no intention of infringement of the trademark.

Lead Editor: Jason Gilmore
Technical Reviewer: Greg Sabino Mullane
Editorial Board: Steve Anglin, Ewan Buckingham, Gary Cornell, Jason Gilmore, Jonathan Gennick, Jonathan Hassell, James Huddleston, Chris Mills, Matthew Moodie, Dominic Shakeshaft, Jim Sumser, Keir Thomas, Matt Wade
Project Manager: Kylie Johnston
Copy Edit Manager: Nicole Flores
Copy Editor: Julie McNamee
Assistant Production Director: Kari Brooks-Copony
Production Editor: Lori Bring
Compositor: Gina Rexrode
Proofreader: April Eddy
Indexer: John Collin
Artist: April Milne
Cover Designer: Kurt Krames
Manufacturing Director: Tom Debolski

Distributed to the book trade worldwide by Springer-Verlag New York, Inc., 233 Spring Street, 6th Floor, New York, NY 10013. Phone 1-800-SPRINGER, fax 201-348-4505, e-mail `orders-ny@springer-sbm.com`, or visit `http://www.springeronline.com`.

For information on translations, please contact Apress directly at 2560 Ninth Street, Suite 219, Berkeley, CA 94710. Phone 510-549-5930, fax 510-549-5939, e-mail `info@apress.com`, or visit `http://www.apress.com`.

The information in this book is distributed on an “as is” basis, without warranty. Although every pre caution has been taken in the preparation of this work, neither the author(s) nor Apress shall have any liability to any person or entity with respect to any loss or damage caused or alleged to be caused directly or indirectly by the information contained in this work.

The source code for this book is available to readers at `http://www.apress.com` in the Source Code/ Download section.

Contents at a Glance

About the Authors xiii
About the Technical Reviewer xiv
Acknowledgments xv
Introduction xvii

PART 1 Phase 1 of Development

CHAPTER 1 Starting an E-Commerce Site 3
CHAPTER 2 Laying Out the Foundations 13
CHAPTER 3 Creating the Product Catalog: Part I 57
CHAPTER 4 Creating the Product Catalog: Part II 107
CHAPTER 5 Searching the Catalog 169
CHAPTER 6 Receiving Payments Using PayPal 189
CHAPTER 7 Catalog Administration 199

PART 2 Phase II of Development

CHAPTER 8 The Shopping Cart 267
CHAPTER 9 Dealing with Customer Orders 303
CHAPTER 10 Product Recommendations 335

PART 3 Phase III of Development

CHAPTER 11 Managing Customer Details 353
CHAPTER 12 Storing Customer Orders 425
CHAPTER 13 Implementing the Order Pipeline: Part I 453
CHAPTER 14 Implementing the Order Pipeline: Part II 477
CHAPTER 15 Credit Card Transactions 505
CHAPTER 16 Product Reviews 537
CHAPTER 17 Connecting to Web Services 547
APPENDIX A Installing Apache, PHP, and PostgreSQL 571
APPENDIX B Project Management Considerations 583

INDEX 593

Contents

About the Authors xiii
About the Technical Reviewer xiv
Acknowledgments xv
Introduction xvii

PART 1 Phase 1 of Development

CHAPTER 1 Starting an E-Commerce Site 3

Deciding Whether to Go Online 3
- Get More Customers 4
- Make Customers Spend More 4
- Reduce the Costs of Fulfilling Orders 5

Let's Make Money 5
Risks and Threats 6
Designing for Business 7
- Phase I: Getting a Site Up 7
- Phase II: Creating Your Own Shopping Cart 8
- Phase III: Processing Orders and Adding Features 8

HatShop 9
Summary 11

CHAPTER 2 Laying Out the Foundations 13

Designing for Growth 14
- Meeting Long-Term Requirements with Minimal Effort 14
- The Magic of the Three-Tier Architecture 15

Choosing Technologies and Tools 20
- Using PHP to Generate Dynamic Web Content 21
- Using Smarty to Separate Layout from Code 21
- Using PostgreSQL to Store Web Site Data 23
- PostgreSQL and the Three-Tier Architecture 26

Choosing Naming and Coding Standards 27

Starting the HatShop Project 28
Installing the Required Software 28
Getting a Code Editor 29
Preparing the hatshop Virtual Folder 29
Installing Smarty 32
Implementing the Site Skeleton 34
Handling and Reporting Errors 44
Preparing the Database 52
Downloading the Code 55
Summary 55

CHAPTER 3 Creating the Product Catalog: Part I 57

Showing Your Visitors What You've Got 57
What Does a Product Catalog Look Like? 58
Previewing the Product Catalog 58
Roadmap for This Chapter 60
Storing Catalog Information 62
Understanding Data Tables 63
Creating the department Table 70
Communicating with the Database 74
The Structured Query Language (SQL) 74
PostgreSQL Functions and Types 78
Adding Logic to the Site 81
Connecting to PostgreSQL 82
Writing the Business Tier Code 87
Displaying the List of Departments 95
Using Smarty Plugins 96
Planning Ahead for Secure Connections 103
Summary 106

CHAPTER 4 Creating the Product Catalog: Part II 107

Storing the New Data 107
What Makes a Relational Database 108
Enforcing Table Relationships with the FOREIGN KEY Constraint 112
Adding Categories 113
Adding Products 118
Relating Products to Categories 120
Using Database Diagrams 121

Querying the New Data 122
Getting Short Descriptions 122
Joining Data Tables 123
Showing Products Page by Page 125
Writing the New Database Functions 126
Completing the Business Tier Code 135
Implementing the Presentation Tier 142
Displaying Department and Category Details 143
Displaying the List of Categories 149
Displaying Product Lists 153
Displaying Front Page Contents 162
Showing Product Details 163
Summary 167

CHAPTER 5 Searching the Catalog 169

Choosing How to Search the Catalog 169
Teaching the Database to Search Itself 171
Searching Using WHERE and LIKE 171
Searching Using the PostgreSQL tsearch2 Module 172
Implementing the Business Tier 179
Implementing the Presentation Tier 181
Creating the Search Box 181
Displaying the Search Results 184
Summary 188

CHAPTER 6 Receiving Payments Using PayPal 189

Considering Internet Payment Service Providers 190
Getting Started with PayPal 190
Integrating the PayPal Shopping Cart and Checkout 192
Using the PayPal Single Item Purchases Feature 197
Summary 198

CHAPTER 7 Catalog Administration 199

Previewing the Catalog Administration Page 200
Setting Up the Catalog Administration Page 202
Using Secure Connections 203
Configuring HatShop for SSL 205
Obtaining an SSL Certificate 205
Enforcing SSL Connections 206
Authenticating Administrators 207

Administering Departments 215
Implementing the Presentation Tier 216
Implementing the Business Tier 222
Implementing the Data Tier 224
Administering Categories and Products 226
Administering Product Details 244
Implementing the Presentation Tier 245
Implementing the Business Tier 254
Implementing the Data Tier 257
Summary 263

PART 2 Phase II of Development

CHAPTER 8 The Shopping Cart 267

Designing the Shopping Cart 270
Storing Shopping Cart Information 270
Implementing the Data Tier 271
Implementing the Business Tier 277
Implementing the Presentation Tier 284
Administering the Shopping Cart 296
Deleting Products Residing in the Shopping Cart 296
Building the Shopping Cart Admin Page 296
Summary 301

CHAPTER 9 Dealing with Customer Orders 303

Implementing an Order Placement System 303
Storing Orders in the Database 305
Implementing the Data Tier 308
Implementing the Business Tier 312
Implementing the Presentation Tier 312
Administering Orders 314
Setting Up the Orders Administration Page 316
Displaying Pending Orders 316
Displaying Order Details 325
Summary 334

CHAPTER 10 Product Recommendations 335

Increasing Sales with Dynamic Recommendations 335
Implementing the Data Tier 337
Adding Product Recommendations 342
Adding Shopping Cart Recommendations 344
Implementing the Business Tier 346
Implementing the Presentation Tier 347
Summary 350

PART 3 Phase III of Development

CHAPTER 11 Managing Customer Details 353

Storing Customer Accounts 354
The HatShop Customer Account Scheme 354
Creating customer and shipping_region Tables 355
Implementing the Security Classes 356
Implementing Hashing Functionality in the Business Tier 357
Implementing the Encryption Functionality in the Business Tier . . . 360
Storing Credit Cart Information Using the SecureCard Class 366
Adding Customer Accounts Functionality to HatShop 376
Implementing the Data Tier 379
Implementing the Business Tier 383
Implementing the Presentation Tier 388
Creating the Checkout Page 412
Enforcing SSL Connections 421
Summary 423

CHAPTER 12 Storing Customer Orders 425

Adding Orders to Customer Accounts 425
Administering Customer Orders 429
Handling Tax and Shipping Charges 441
Tax Issues 441
Shipping Issues 442
Implementing Tax and Shipping Charges 443
Summary 452

CHAPTER 13 Implementing the Order Pipeline: Part I 453

What Is an Order Pipeline? 453
Designing the Order Pipeline 454
Laying the Groundwork 458
Adding More Functionality to OrderProcessor 469
Updating the Status of an Order 470
Setting Credit Card Authentication Details 471
Setting the Order Shipment Date 472
Sending Emails to Customers and Suppliers 473
Retrieving Order Details and the Customer Address 473
Summary 475

CHAPTER 14 Implementing the Order Pipeline: Part II 477

Implementing the Pipeline Sections 477
Testing the Pipeline 487
Updating the Checkout Page 495
Updating the Orders Admin Page 498
Implementing the Data Tier 498
Implementing the Business Tier 500
Implementing the Presentation Tier 500
Summary 504

CHAPTER 15 Credit Card Transactions 505

Credit Card Transaction Fundamentals 505
Working with Credit Card Payment Gateways 506
Understanding Credit Card Transactions 507
Working with DataCash 508
Working with Authorize.net 524
Integrating Authorize.net with HatShop 532
Summary 535

CHAPTER 16 Product Reviews 537

Implementing the Data Tier 538
Implementing the Business Tier 540
Implementing the User Interface 541
Summary 545

CHAPTER 17 Connecting to Web Services 547

Accessing the Amazon E-Commerce Service 549
Creating Your Amazon E-Commerce Service Account 549
Obtaining an Amazon Associate ID 550
Accessing Amazon E-Commerce Service Using REST 551
Accessing Amazon E-Commerce Service Using SOAP 556
Integrating Amazon E-Commerce Service with HatShop 558
Implementing the Business Tier 559
Implementing the Presentation Tier 564
Summary 569

APPENDIX A Installing Apache, PHP, and PostgreSQL 571

Preparing Your Windows Playground 571
Installing SSL-Enabled Apache 571
Installing Apache (No SSL) 573
Installing PHP 5 574
Installing PostgreSQL 576
Preparing Your Unix Playground 577
Installing Apache 2 577
Installing PostgreSQL 8 578
Installing PHP 5 580

APPENDIX B Project Management Considerations 583

Developing Software Solutions 583
Considering the Theory Behind Project Management 584
The Waterfall (or Traditional) Method 584
The Spiral Method 586
The Rapid Application Development (RAD) Method 588
Extreme Programming (XP) Methodology 588
Picking a Method 589
Understanding the E-Commerce Project Cycle 589
Maintaining Relationships with Your Customers 591
Summary 591

INDEX 593

About the Authors

CRISTIAN DARIE is a software engineer with experience in a wide range of modern technologies, and he is the author of numerous technical books. Cristian is studying distributed application architectures for his PhD and is getting involved with various commercial and research projects. When not planning to buy Google, he enjoys his bit of social life. If you want to say "hi," you can reach Cristian through his personal web site at `http://www.cristiandarie.ro`.

EMILIAN BALANESCU is a programmer experienced in many technologies, such as PHP, Java, .NET, AJAX, PostgreSQL, MySQL, and MS SQL Server. He currently works as a Fault Handling Engineer at AccessNET International. You can reach Emilian at `http://www.emilianbalanescu.ro`.

MIHAI BUCICA started programming and competing in programming contests (winning many of them) at age 12. With a bachelor's degree in computer science from the Automatic Control and Computers Faculty of the Politehnica University of Bucharest, Romania, Mihai works on building communication software with various electronic markets.

Even after working with a multitude of languages and technologies, Mihai's programming language of choice remains C++, and he loves the LGPL world. Mihai also co-authored *Beginning PHP 5 and MySQL E-Commerce.* He can be contacted through his personal web site, `http://www.valentinbucica.ro`.

About the Technical Reviewer

GREG SABINO MULLANE has used many databases but believes that none compare to PostgreSQL (and advocates calling it "Postgres"). He helps maintain the Postgres mailing lists and web sites, has spoken at OSCon and other events on Postgres topics, and has contributed code to the Postgres core. He is the primary developer of the DBD::Pg module, has ported MediaWiki to Postgres, and has been recognized as a Postgres Major Developer for all of his Postgres work. He has a strong interest in PGP and cryptography, and he attends keysignings as often as possible.

His PGP fingerprint is 2529 DF6A B8F7 9407 E944 45B4 BC9B 9067 1496 4AC8, and he has been known to sneak it into code he has written. He currently works as a software developer for End Point, primarily doing Postgres, Perl, and PHP work. He and his wife Joy enjoy traveling and try to make at least one overseas trip a year.

Acknowledgments

We would like to thank Kylie, our project manager, for guiding everyone through the process of building this book; Julie, for her constantly wonderful edits; Lori and April, for the final magic touch; and Greg and Jason, for giving us excellent technical feedback that contributed decisively to the quality of this book.

Introduction

Welcome to *Beginning PHP and PostgreSQL E-Commerce: From Novice to Professional*! The explosive growth of retail over the Internet is encouraging more small- to medium-sized businesses to consider the benefits of setting up e-commerce web sites. Although there are great and obvious advantages to online retail, there are also many hidden pitfalls that you might encounter when developing a retail web site. This book provides you with a practical, step-by-step guide to setting up an e-commerce web site. Guiding you through every step of the design and build process, this book will have you building high quality, extendable e-commerce web sites quickly and easily.

Over the course of the book, you will develop all the skills necessary to get your business up on the web and available to a worldwide audience. We present this information in a book-long case study, the complexity of which develops as your knowledge increases through the book.

The case study is presented in three phases. The first phase focuses on getting the site up and running as quickly as possible and at a low cost. Although not yet full-featured, at the conclusion of this phase, your site will be capable of accepting PayPal payments, enabling you to begin generating revenue immediately.

The second phase concentrates on increasing revenue by improving the shopping experience. In this phase, you'll learn how to proactively encourage customers to buy more by implementing product recommendations. We'll also begin laying the groundwork for handling credit card transactions by developing and integrating custom shopping cart functionality.

In the third phase, we'll show you how to increase your profit margins by reducing costs through automating and streamlining order processing and administration and by handling credit card transactions yourself. You also learn how to integrate external functionality through Web Services and how to improve your customer's shopping experience by adding product reviews functionality.

Who This Book Is For

Beginning PHP and PostgreSQL E-Commerce: From Novice to Professional is aimed at developers looking for a tutorial approach to building a full e-commerce web site from design to deployment. However, it's assumed that you have some knowledge of building web sites with PHP and PostgreSQL. *Beginning PHP and PostgreSQL 8: From Novice to Professional* (Apress, 2006), authored by W. Jason Gilmore and Robert Treat, can provide this foundation knowledge for you.

This book will also prove valuable for PHP 4 developers who learn best by example and want to experience PHP 5 development techniques first hand.

How This Book Is Structured

This book is divided into three parts consisting of 17 chapters and 2 appendixes. We cover a wide variety of topics, showing you how to

- Build an online product catalog that can be browsed and searched
- Implement the catalog administration pages that allow adding, modifying, and removing products, categories, and departments
- Create your own shopping basket and checkout in PHP
- Increase sales by implementing product recommendations and product reviews
- Handle payments using PayPal, DataCash, and Authorize.net
- Implement a customer accounts system
- Integrate external functionality through Web Services

The following brief roadmap highlights how we'll take you from novice to professional regarding each of the topics in the previous list.

Part 1: Phase I of Development

Chapter 1: Starting an E-Commerce Site

In this chapter, we'll introduce some of the principles of e-commerce in the real world. You see the importance of focusing on short-term revenue and keeping risks down. We look at the three basic ways in which an e-commerce site can make money. We then apply those principles to a three-phase plan that provides a deliverable, usable site at each phase of this book.

Chapter 2: Laying Out the Foundations

The first chapter offered an overview of e-commerce in the real world. Now that you've decided to develop a web site, we start to look in more detail at laying down the foundations for its future. We'll talk about what technologies and tools you'll use, and even more importantly, how you'll use them.

Chapter 3: Creating the Product Catalog: Part I

After learning about the three-tier architecture and implementing a bit of your web site's main page, it's time to continue your work by starting to create the HatShop product catalog. Because the product catalog is composed of many components, you'll create it over two chapters. In Chapter 3, you'll create the first database table and implement the data access code. By the end of this chapter, you'll have something dynamically generated on your web page.

Chapter 4: Creating the Product Catalog: Part II

The fun isn't over yet! In the previous chapter, you created a selectable list of departments for HatShop. However, a product catalog is much more than a list of departments. In Chapter 4, you'll add the rest of the product catalog features.

Chapter 5: Searching the Catalog

In the preceding two chapters, you will have implemented a functional product catalog for HatShop. However, the site still lacks the all-important search feature. The goal in this chapter is to allow the visitor to search the site for products by entering one or more keywords. You'll learn how to implement search results rankings and how to browse through the search results page by page. You'll see how easy it is to add new functionality to a working site by integrating the new components into the existing architecture.

Chapter 6: Receiving Payments Using PayPal

Let's make some money! Your e-commerce web site needs a way to receive payments from customers. The preferred solution for established companies is to open a merchant account, but many small businesses choose to start with a solution that's simpler to implement, where they don't have to process credit card or payment information themselves.

A number of companies and web sites exist to help individuals or small businesses that don't have the resources to process credit card and wire transactions. These companies can be used to process the payment between companies and their customers. In this chapter, we'll demonstrate some of the functionality provided by one such company, PayPal, as we use it on the HatShop web site in the first two stages of development.

Chapter 7: Catalog Administration

The final detail to take care of before launching a web site is to create its administrative interface. Although this is a part visitors will never see, it's still key to delivering a quality web site to your client.

Part 2: Phase II of Development

Chapter 8: The Shopping Cart

With this chapter, you enter the second phase of development, where you start improving and adding new features to the already existing, fully functional e-commerce site. In Chapter 8, you'll implement the custom shopping cart, which stores its data in the local database. This provides you with more flexibility than the PayPal shopping basket, over which you have no control and which you can't save into your database for further processing and analysis.

Chapter 9: Dealing with Customer Orders

The good news is that the brand new shopping cart implemented in Chapter 8 looks good and is fully functional. The bad news is that it doesn't allow the visitor to actually place an order, making it totally useless in the context of a production system. As you have probably already guessed, you'll deal with that problem in this chapter, in two separate stages. In the first part of the chapter, you'll implement the client-side part of the order-placing mechanism. In the second part of the chapter, you'll implement a simple orders administration page where the site administrator can view and handle pending orders.

Chapter 10: Product Recommendations

One of the best advantages of an Internet store compared to a brick-and-mortar store is the capability to customize the web site for each visitor based on his or her preferences, or based on data gathered from other visitors with similar preferences. If your web site knows how to suggest additional products to your visitor in a clever way, he or she might end up buying more than initially planned. In Chapter 10, you'll learn how to implement a dynamic product recommendation system.

Part 3: Phase III of Development

Chapter 11: Managing Customer Details

In the first two stages of development, you've built a basic (but functional) site and have hooked it into PayPal for taking payments and confirming orders. In the third section of the book, you'll take things a little further. By cutting out PayPal from the ordering process, you can gain better control as well as reduce overhead. This isn't as complicated as you might think, but you must be careful to do things right. Chapter 11 lays the groundwork by implementing a customer account system, as well as looking into the security aspects of exchanging and storing customer and credit card details.

Chapter 12: Storing Customer Orders

In this chapter, you'll make the modifications required for customers to place orders that are associated with their user profiles. The main modification here is that the customer associated with an order will be identified by a new piece of information in the `orders` table, and much of the rest of the modifications will be made to use this information.

Also in this chapter, you'll take a look at dealing with another common feature of e-commerce sites: tax and shipping charges. Many options are available for implementing this functionality, but we'll just examine a simple way of doing things and lay the groundwork for your own further development.

Chapter 13: Implementing the Order Pipeline: Part I

The HatShop e-commerce application is shaping up nicely. You've added customer account functionality, and you're keeping track of customer addresses and credit card information, which is stored in a secure way. However, you're not currently using this information—you're delegating responsibility for this to PayPal. In this and the next chapter, you'll build your own

order-processing pipeline that deals with authorizing credit cards, stock checking, shipping, providing email notifications, and so on. We'll leave the credit card processing specifics until Chapter 15, but we'll show you where this process fits in before then.

Chapter 14: Implementing the Order Pipeline: Part II

In this chapter, you'll add the required pipeline sections so that you can process orders from start to finish, although you won't be adding full credit card transaction functionality until the next chapter. We'll also look at the web administration of orders by modifying the order admin pages added earlier in the book to take into account the new order-processing system.

Chapter 15: Credit Card Transactions

The last thing you need to do before launching the e-commerce site is enable credit card processing. In this chapter, we'll look at how you can build this into the pipeline you created in Chapters 13 and 14. You'll see how to use two popular credit card gateways to do this: DataCash and Authorize.net. By the end of this chapter, HatShop will be a fully functioning, secure, and usable e-commerce application.

Chapter 16: Product Reviews

At this point, you have a complete and functional e-commerce web site. However, this doesn't stop you from adding even more features to it, making it more useful and pleasant for visitors. By adding a product reviews system to your web site, you increase the chances that visitors will get back to your site, either to write a review for a product they bought or to see what other people think about that product.

Chapter 17: Connecting to Web Services

In the dynamic world of the Internet, sometimes it isn't enough to just have an important web presence; you also need to interact with functionality provided by third parties to achieve your goals. So far in this book, you already saw how to integrate external functionality to process payments from your customers. In Chapter 17, you'll learn how to use Amazon.com functionality from and through Web Services. A *Web Service* is exposed through a web interface using standard Internet protocols such as HTTP. The messages exchanged by the client and the server are encoded using an XML-based protocol named SOAP (Simple Object Access Protocol), or by using REST (Representational State Transfer). These messages are sent over HTTP. You'll learn more about these technologies in this chapter.

Prerequisites

The code in this book has been built and tested with PHP 5 and PostgreSQL 8. It will not work with PHP 4 or older versions. You'll find detailed information about the required software in Appendix A.

Downloading the Code

The code for this book can be downloaded in zip file format from the Source Code/Downloads section of the Apress web site (`http://www.apress.com`). You also can find the code, errata, and other resources related to the book on Cristian's web site at `http://www.cristiandarie.ro/php-postgresql-ecommerce/`, or on Emilian's web site at `http://www.emilianbalanescu.ro/beginning-php-postgresql-ecommerce/`.

Contacting the Authors

You can contact the authors through their web sites, as follows:

- Cristian Darie, `http://www.cristiandarie.ro`
- Emilian Balanescu, `http://www.emilianbalanescu.ro`
- Mihai Valentin Bucica, `http://www.valentinbucica.ro`