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About the Author

Janet Valade has 20 years of experience in the computing field. Her background includes work as a technical writer for several companies, as a Web designer/programmer for an engineering firm, and as a systems analyst in a university environment where, for over ten years, she supervised the installation and operation of computing resources, designed and developed a statewide data archive, provided technical support to faculty and staff, wrote numerous technical papers and documentation, and designed and presented seminars and workshops on a variety of technology topics.

Janet currently has two published books: PHP & MySQL For Dummies, 2nd Edition, and PHP 5 For Dummies. In addition, she has authored chapters for several Linux and Web development books.
Dedication

This book is dedicated to anyone who finds it useful.

Author’s Acknowledgments

I wish to express my appreciation to the entire Open Source community. Without those people who give their time and talent, there would be no cool PHP for me to write about. Furthermore, I never would have learned this software without the PHP lists where people generously spend their time answering foolish questions from beginners. Many ideas have come from reading questions and answers on the lists.

I want to thank my mother for passing on a writing gene and a good work ethic. Anything I accomplish has its roots in my beginnings. And, of course, thank you to my children who manage to remain close, though far away, and nourish my spirit.

And, of course, I want to thank the professionals who made it all possible. Without my agent, my editors, and all the other people at Wiley, this book would not exist. Because they all do their jobs so well, I can contribute my part to this joint project.
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Contents at a Glance

Introduction ................................................................. 1

Part I: Introducing Application Development ..................... 7
  Chapter 1: Building Your Application ................................................................. 9
  Chapter 2: Building in Application Security ....................................................... 23

Part II: Building a User Authentication Application .......... 43
  Chapter 3: User Authentication with HTTP ....................................................... 45
  Chapter 4: User Login Application ................................................................. 77

Part III: Building Online Sales Applications ..................... 129
  Chapter 5: Online Catalog Application .............................................................. 131
  Chapter 6: Shopping Cart Application ............................................................. 159

Part IV: Building Other Useful Applications ..................... 233
  Chapter 7: Building a Content Management System ....................................... 235
  Chapter 8: Hosting Discussions with a Web Forum .......................................... 309

Part V: The Part of Tens ..................................................... 373
  Chapter 9: Ten Hints for Application Development ........................................ 375
  Chapter 10: Ten Sources of PHP Code ........................................................... 379

Part VI: Appendixes ......................................................... 383
  Appendix A: Introducing Object-Oriented Programming ............................... 385
  Appendix B: Object-Oriented Programming with PHP .................................... 391
  Appendix C: The MySQL and MySQL Improved Extensions .......................... 407
  Appendix D: About the CD .............................................................................. 411

Index ................................................................................. 417
Table of Contents

Introduction .................................................................. 1
   About This Book ............................................................. 1
   Conventions Used in This Book ........................................... 1
   Foolish Assumptions ......................................................... 2
   How This Book Is Organized ............................................. 3
      Part I: Introducing Application Development ................. 3
      Part II: Building a User Authentication Application .......... 4
      Part III: Building Online Sales Applications ................... 4
      Part IV: Building Other Useful Applications .................... 4
      Part V: The Part of Tens .................................................. 4
      Part VI: Appendixes ......................................................... 5
   About the CD .................................................................... 5
   Icons Used in This Book ................................................. 5
   Where to Go from Here ................................................... 5

Part I: Introducing Application Development ............ 7

Chapter 1: Building Your Application ......................... 9
   Understanding PHP and MySQL Versions ....................... 10
      MySQL ........................................................................ 11
      PHP ........................................................................... 11
      PHP and MySQL together ........................................... 12
   Using the Application Source Code .................................. 13
      Choosing a location ..................................................... 13
      Understanding the PHP code ....................................... 14
      Procedural versus object-oriented programs .................. 15
   Modifying the Source Code ............................................. 16
      Programming editors .................................................. 17
      Integrated Development Environment (IDE) .................... 18
   Planning Your Application .............................................. 19
      Planning the software .................................................. 20
      Additional planning ..................................................... 20

Chapter 2: Building in Application Security ................ 23
   Understanding Security Risks .......................................... 24
   Building Security into Your PHP Scripts ....................... 24
      Don’t trust any information from an outside source .......... 25
      Storing information ..................................................... 30
Using system calls .................................................................31
Handling errors .........................................................................32
MySQL Security ...........................................................................33
Setting up accounts and passwords ...........................................33
Accessing MySQL from PHP scripts ...........................................37
Understanding SQL injection attacks ...........................................38
Backing up your databases ..........................................................40
Using a Secure Web Server ..........................................................41

Part II: Building a User Authentication Application ......43

Chapter 3: User Authentication with HTTP .........................45
  Understanding HTTP Authentication .......................................46
  Understanding how the WWW works .......................................46
  Requesting a password-protected file ....................................47
  Authorizing access ...............................................................48
  Using HTTP Authentication with Apache ............................49
  Configuring Apache .............................................................49
  Creating the .htaccess file .....................................................50
  Creating the password file ....................................................51
  Apache HTTP authentication in action .................................52
  Designing an HTTP Authentication Application in PHP .......52
  Creating a User Database ......................................................54
  Designing the user database ..................................................54
  Creating the user database ....................................................55
  Accessing the user database ..................................................55
  Building the Authentication Application in PHP:
    The Procedural Approach ..................................................56
  Building the Authentication Application in PHP:
    The Object-Oriented Approach .........................................60
    Developing the objects .......................................................60
    Writing the PasswordPrompter class .................................61
    Writing the Database class ................................................62
    Writing the Account class ..................................................66
    Writing the WebPage class ................................................71
    Writing the Auth-OO script ................................................73

Chapter 4: User Login Application .................................77
  Designing the Login Application ............................................78
  Creating the User Database ...................................................78
  Designing the database ........................................................79
  Building the database ...........................................................80
  Accessing the database ........................................................81
  Adding data to the database ....................................................81
Building the Login Web Page .................................................................82
  Designing the login Web page ..............................................................82
  Writing the code for the login page ....................................................83
  Displaying the login Web page ...........................................................91
Building the Login Application: The Procedural Approach ..................91
  Writing the application script ............................................................92
  Protecting your Web pages ..............................................................100
Building the Login Application: The Object-Oriented Approach ..........101
  Developing the objects .................................................................101
  Writing the WebForm class ............................................................102
  Writing the Database class .............................................................110
  Writing the Account class ...............................................................111
  Writing the Session class ...............................................................114
  Writing the Email class .................................................................117
  Writing the login application script ................................................119
  Protecting your Web pages ..............................................................126
Adding Features to the Application ........................................................126

Part III: Building Online Sales Applications .................................129

Chapter 5: Online Catalog Application ............................................131
  Designing the Online Catalog Application .........................................131
  Creating the Catalog Database .........................................................132
    Designing the Catalog database ......................................................132
    Building the Catalog database ........................................................134
    Accessing the food database ..........................................................134
    Adding data to the database ............................................................135
  Building the Catalog Web Pages .......................................................135
    Designing the catalog Web pages ....................................................136
    Writing the code for the index page .................................................138
    Writing the code for the products page .........................................140
    Displaying the catalog Web pages ................................................145
Building the Online Catalog Application: Procedural Approach ........145
Building the Online Catalog Application: The Object-Oriented Approach .................................................................149
  Developing the Objects .................................................................149
  Writing the Catalog class ...............................................................150
  Writing the catalog application script ..........................................155
  Growing the Catalog class .............................................................157

Chapter 6: Shopping Cart Application ............................................159
  Designing the Shopping Cart Application .........................................159
  Basic application design decisions .................................................159
  Application functionality design .....................................................161
Building the CMS Application: Object-Oriented Approach ........................................275
Writing the object model ..........................................................................................275
Writing a basic data class .......................................................................................277
Writing the Department class ...............................................................................279
Writing the ContentType class ..............................................................................281
Writing the ContentItem class ..............................................................................283
Writing the ContentDownload class ......................................................................289
Writing the Database class .....................................................................................291
Writing the WebForm class ....................................................................................292
Writing the code for the login page ........................................................................293
Writing fields_content.inc and content_form.inc ...............................................294
Writing the display code .........................................................................................294
Writing Admin-OO.php, the data manipulation code .............................................303
Enhancing the Content Management System .........................................................307

Chapter 8: Hosting Discussions with a Web Forum ........................................309

Designing the Forum Application ...........................................................................309
Creating the Forum Database ..................................................................................310
Designing the Forum database ..............................................................................311
Building the forum tables ......................................................................................314
Accessing the forum tables ....................................................................................315
Adding data to the database ...................................................................................316
Building the Forum Web Pages ..............................................................................317
Designing the Forum Web pages ............................................................................317
Writing the code for the Forums page ...................................................................321
Writing the code for the Threads page ..................................................................324
Writing the code for the Messages page ................................................................328
Writing the code for the New Message page .........................................................331
Writing the code for the Reply page ....................................................................334
Building the Forum Application: Procedural Approach ........................................337
Writing viewForums.php .........................................................................................337
Writing viewTopic.php ...........................................................................................338
Writing viewThread.php ........................................................................................338
Writing postMessage.php .......................................................................................339
Writing postReply.php ...........................................................................................342
Writing the supporting functions .........................................................................345
Building the Forum Application: The Object-Oriented Approach .........................347
Developing the objects ..........................................................................................348
Writing the TableAccessor class .........................................................................349
Writing the Thread class .........................................................................................353
Writing the Post class .............................................................................................355
Writing the Database class .....................................................................................357
Writing the WebForm class ....................................................................................358
Writing the Forum application scripts ..................................................................359
Writing the supporting functions .........................................................................368
Possible Enhancements ..........................................................................................371
Part V: The Part of Tens ............................................373

Chapter 9: Ten Hints for Application Development ..............375
Plan First ......................................................................................................375
Be Consistent ...............................................................................................376
Test Code Incrementally ............................................................................376
Remember Those Who Follow .................................................................376
Use Constants ..............................................................................................376
Write Reusable Code ...................................................................................377
Separate Page Layout from Function ........................................................377
Don’t Reinvent the Wheel ..........................................................................377
Use the Discussion Lists Frequently, but Wisely ..............................378
Document Everything .................................................................................378

Chapter 10: Ten Sources of PHP Code .................................................379
SourceForge.net ...........................................................................................379
WeberDev .....................................................................................................380
PHP Classes ..................................................................................................380
Codewalkers ................................................................................................380
PHP Builder ..................................................................................................381
HotScripts.com ............................................................................................381
Zend ..............................................................................................................381
PHP Freaks ...................................................................................................382
PX: The PHP Code Exchange ...................................................................382
Free PHP and MySQL Hosting Directory .............................................382

Part VI: Appendixes ...............................................................................383

Appendix A: Introducing Object-Oriented Programming ............385
Understanding Object-Oriented Programming Concepts .................385
Objects and classes ...........................................................................386
Properties ...........................................................................................386
Methods ..............................................................................................387
Abstraction .........................................................................................387
Inheritance ..........................................................................................388
Information hiding .............................................................................389
Creating and Using the Class .................................................................390

Appendix B: Object-Oriented Programming with PHP ...............391
Writing a Class Statement .........................................................................391
The class statement ...........................................................................391
Naming the class ..............................................................................392
Adding the class code ..........................................................................392
Introduction

Because you’re looking at a book called *PHP & MySQL Everyday Apps For Dummies*, I assume you want to build a Web application with the PHP scripting language and a MySQL backend database. If you need to build a dynamic Web application for a specific purpose, you’re in the right place. You will find six popular applications in this book and one additional application chapter on the CD. If the exact application you need isn’t here, you can probably adapt one of the applications to suit your needs.

About This Book

This book is a practical introduction to dynamic Web applications. It provides the code and information needed to build several of the most popular applications on the Web. The applications in this book allow you to

- Restrict your Web site or part of your Web site to authorized users
- Sell products on your Web site
- Provide a place where users can communicate with each other online
- Allow users to publish and edit their documents on a Web site
- Manage mailing lists

You can use these applications as is, modify them for use on your Web site, or build your own application by using techniques that I show you in these applications.

Conventions Used in This Book

This book includes many listings of PHP code. Line numbers appear at the end of some of the lines in the listings. I explain the code after the code listing. The line numbers in the explanation refer to the specific line in the code.
In MySQL queries in the code listings, the SQL commands and key words appear in uppercase letters. The parameters specific to your application, such as the database name and field names, use their specific names, usually lowercase letters or, sometimes, lowercase letters with a beginning uppercase letter. For example, look at the following SQL query:

```
SELECT name FROM Customer WHERE account_number="$acc_no"
```

The all-uppercase words are SQL commands and keywords, which must be spelled exactly as shown. The words with lowercase letters are the names of items in your database, such as the table name and field names.

A continuation symbol (Æ) appears at the end of some lines of code to indicate when a line is too long to fit in its allotted space on the printed page.

### Foolish Assumptions

I assume that:

- You're building your Web application in an environment that includes access to PHP and MySQL. This might be your own computer or a Web hosting company. This book doesn’t include instructions for installing PHP or MySQL. I assume that your environment is already installed and working.

- You have some experience with PHP. You don’t need to be an expert PHP coder. You don’t need advanced PHP skills. You only need a basic understanding of how PHP works and its basic features, such as if statements and `foreach` loops.

When I explain the code in the listings, I don’t explain each line in detail. I provide a general description of the tasks performed by the script and tasks performed by specific loops. I provide a detailed explanation only for parts of the script that are specialized or potentially confusing.

Even if you don’t have experience with PHP, if you have programming experience in another language, such as Perl or C, you might be able to understand and use the applications in this book. PHP is close to C syntax and is designed to be easy to use. Its features are quite familiar to anyone with programming experience.

- You have a basic understanding of MySQL. I don’t explain how to create MySQL databases. I don’t provide any description of SQL. I do provide SQL queries that you can use to create each database, but assume that you know how to use the SQL query.
You know HTML and a little CSS. If you have experience with PHP, you necessarily have experience with HTML. I also assume a slight acquaintance with CSS. The applications in this book display some Web pages, such as the catalog or the login screen, so HTML and CSS are included in the code listings. I keep the HTML as simple as possible so that it doesn’t interfere with your understanding of the PHP. However, some HTML is necessary. In general, I use in-line CSS code to format the HTML. I don’t explain the HTML or CSS.

How This Book Is Organized

This book is divided into six parts, with two chapters in each part. Chapters 3 through 8 present applications. An additional bonus application chapter is included on the CD. Each application chapter includes the following information:

- Discussion of issues
- Structure of the database
- Code listings
- Explanation of the code

Each application chapter presents both procedural code and object-oriented code for the application.

The additional chapters provide information that’s useful when building applications (for example, I demystify security considerations).

Part 1: Introducing Application Development

Chapter 1 in this part provides the information needed to use the applications in this book. It discusses PHP and MySQL versions, installing and modifying applications, and procedural versus object-oriented programming. In Chapter 2, you find out how to write secure code.
Part II: Building a User Authentication Application

This part provides information and code to build a user login application. I present two types of applications: user authentication using HTTP authentication (Chapter 3) and a user login application that allows users to register their own accounts, as well as log in to a secure Web site (Chapter 4).

Part III: Building Online Sales Applications

This part provides information and code for online sales applications. In Chapter 5, you find out how to write code for an application that provides an online catalog. Chapter 6 covers writing an application that allows customers to buy products from the catalog.

Part IV: Building Other Useful Applications

In Part IV, I present two other applications that you may find useful. In Chapter 7, I describe how to build a content management system (CMS). I describe how to build a Web forum in Chapter 8.

Part V: The Part of Tens

This part provides a useful list of important things to keep in mind when building an application (Chapter 9). I also provide a list of Web sites offering useful resources, such as code libraries, tutorials, articles, and so on (Chapter 10).

Part VI: Appendixes

This part provides instructions for object-oriented programming. Appendix A provides an introduction to the object-oriented programming features of PHP for people who know PHP, but are unfamiliar with the concepts and terminology of object-oriented programming. Appendix B describes the syntax of PHP object-oriented features for those who are familiar with object-oriented programming.
programming in another language. Appendix C provides information on PHP functions used to interact with MySQL. It provides tables for converting from mysql functions to mysqli functions and/or mysqli objects. Appendix D describes in detail what you can find on the CD accompanying this book.

**About the CD**

The CD at the back of this book contains all the source code you need to run the applications that I describe throughout. You also find a list of links to Web sites that offer PHP-related code libraries, tutorials, and articles. Lastly, I include a bonus chapter on the CD that simply wouldn’t fit in the book. The bonus chapter covers building and managing a mailing list.

**Icons Used in This Book**

**Tip**

Tips provide extra information for a specific purpose. Tips can save you time and effort, so they’re worth checking out.

**Warning!**

Always read the warnings. Warnings emphasize actions that you must take or must avoid to prevent dire consequences.

**Remember**

This icon is a sticky note of sorts, highlighting information that’s worth committing to memory.

**Where to Go from Here**

This book is organized around the applications. My suggested approach is to install an application from the CD and get it working. Then when it’s working as is, modify it by making one small change at a time. Get each change working before starting on another change. The first chapter provides the information that you need to install, run, and customize the applications in this book.

If you’re interested in object-oriented programming in PHP, using the new object-oriented features added in PHP 5, you might want to check out the appropriate appendixes first. Appendixes A and B describe the syntax and features of PHP available for object-oriented programming.
If you modify an application for use on your own Web site or build your own application by using the book applications as a pattern, you need to consider security issues. Security is a major issue for Web applications. Chapter 2 explains the security issues and describes how to write secure programs in PHP.
Part I
Introducing
Application Development
In this part . . .

This part contains the information that you need for implementing the applications in this book. Here you find details about the applications, how to find them, where to put them, how to understand them, and how to modify them.

When building Web applications, you also need to keep security in mind. These chapters explain security issues and show how to write secure code.
Chapter 1

Building Your Application

In This Chapter

- Understanding PHP and MySQL versions
- Installing applications files from the CD
- Setting up your programming environment
- Customizing the applications in the book
- Planning your application

You know PHP. Or at least you’ve been introduced and have spent some quality time together. You know PHP syntax, control structures, and some built-in functions. You can display a form and retrieve the information from it. You can interact with a database. You have the basics down.

Or, perhaps you’re an expert programmer in another language. You’ve been using C for years. You know the basics of programming. You don’t know exactly how the familiar programming features are implemented in PHP, but you believe you can understand quickly from seeing examples. After all, a for loop is a for loop and an if statement is an if statement. Other programmers have told you how easy PHP is and how similar it is to C.

Now, you want to write a practical application. You need an application quickly. Perhaps you need to provide a login application to protect a Web site or part of a Web site. Perhaps you need to provide an online catalog for a store. Perhaps you need to implement a forum on your Web site where your customers can interact.

This book provides complete applications. Chapters 3 through 8 provide all the code for six popular applications. An additional bonus chapter on the CD provides a seventh application. You can copy the code from the CD to your Web site and have a working application. Of course, nothing is ever quite that simple. You probably need to modify the application; you might need to make a small modification, such as adding your company logo, or a larger modification, such as removing or adding features to an application. Thus, I provide
explanations with the code so that you can more easily modify it. The applications are

- **User authentication**: The user authentication application uses HTTP (Hypertext Transfer Protocol) authentication. This feature is built in and useful for simple user/password authentication. It is quick and easy, but also limited and not very flexible. (See Chapter 3.)

- **User login**: In the user login application, the user/password authentication is written from scratch in PHP. This application allows users to register and set up their own user IDs and passwords, as well as log in to the Web site. (See Chapter 4.)

- **Online catalog**: Displays product information stored in a MySQL database on a Web site where customers can view it. (See Chapter 5.)

- **Shopping cart**: This application allows customers to purchase the products that they find in an online catalog. (See Chapter 6.)

- **Content management system**: This application allows users to post, delete, and edit information on a Web site. (See Chapter 7.)

- **Web forum**: This application functions as a public bulletin board. Users can read the posted messages and post messages of their own or responses to current messages. (See Chapter 8.)

- **Mailing list management**: This application allows users to subscribe to one or more mailing lists. An authorized administrator can use the application to create new mailing lists. (See the Bonus Chapter on the CD.)

You can copy an application from the CD to your Web site and have a working application instantly — well, assuming you have the correct versions of PHP and MySQL. In the first section (“Understanding PHP and MySQL Versions”), you find out more information about the versions that I use in this book. You also have to put the application files in the correct place, and I tell you how to do that in the “Using the Application Source Code” section.

### Understanding PHP and MySQL Versions

Because PHP and MySQL are open-source software, new versions are released often and sometimes without much warning. Sometimes new releases include changes in the way the software works or the installation procedure that require changes to your application — not often, but occasionally. The software developers try to maintain **backward compatibility** (meaning old programs can run on the new versions), but sometimes it’s just not possible. Consequently, you need to be aware of versions and keep informed about PHP and MySQL versions, changes, and problems.
MySQL

Currently, MySQL offers three versions: MySQL 4.0, MySQL 4.1, and MySQL 5.0. At this time, MySQL 5.0 is a developmental version, not recommended for production uses. It’s fine for testing or experimenting, but if you have a Web site that users are accessing, I recommend not using a developmental version.

MySQL 4.0 and 4.1 are stable versions, recommended for use on active Web sites. MySQL is maintaining and improving both versions. The current versions are MySQL 4.0.24 and 4.1.11.

Version 4.1 added many new features and is the currently recommended version. If you don’t have an existing MySQL server, install MySQL 4.1.

If you upgrade from version 4.0 to version 4.1, one change, starting with version 4.1.1, is longer passwords for MySQL accounts. That is, when you set a password for a new account using `SET PASSWORD`, `PASSWORD()`, or `GRANT`, the password is longer (and more secure) in 4.1 than in 4.0. Therefore, after you upgrade, you need to run the `mysql_fix_privilege_tables` script that is provided with the MySQL installation. This script changes the tables in MySQL that hold the account and password information, making the password column wider to hold the new, longer passwords. In addition, you need to access the database with a client that understands MySQL 4.1 passwords, such as the mysql client provided with MySQL version 4.1. (See http://dev.mysql.com/doc/mysql/en/password-hashing.html for more information on passwords in version 4.1.)

This book avoids the use of complex SQL queries, making the applications as easy to read and understand as possible. All SQL queries used in the applications in this book can run with either version 4.0 or 4.1. However, the functions used in PHP might or might not run correctly. See the following section for information on PHP versions.

PHP

Currently, PHP is maintaining two versions: PHP 4 and PHP 5. The current versions are PHP 4.3.11 and PHP 5.0.4.

PHP 5 is a major change from PHP 4. Enhancing object-oriented programming features was an important goal in the development of PHP 5. The creation and use of objects runs much faster, many object-oriented features have been added, and exceptions are introduced. Programmers who prefer object-oriented programming will be much happier with PHP 5. Most object-oriented programs that run with PHP 4 can run under PHP 5.
With PHP 5, the directory structure was changed. The executable programs have different names. The extension files are located in a different directory. Functions were added or enhanced. (For a complete list of new functions, see www.php.net/manual/en/migration5.functions.php.)

Each application provides procedural scripts and object-oriented programs. The procedural scripts in this book run with either PHP 4 or PHP 5, with the exception of the MySQL function calls. See the following section, “PHP and MySQL together,” for further information on the MySQL function calls. The object-oriented programs in this book run only with PHP 5.

**PHP and MySQL together**

PHP interacts with MySQL by using built-in functions. Currently, PHP provides two sets of functions for use when accessing MySQL databases: the MySQL extension and the MySQL Improved extension. The MySQL Improved extension was made available with PHP 5 for use with MySQL 4.1.

When you install PHP, you activate either the MySQL or the MySQL Improved extension. PHP 4 activates MySQL automatically during installation. You don’t need to activate it yourself. PHP 4 activates the MySQL extension. The MySQL Improved extension isn’t available with PHP 4. You can use the MySQL extension with MySQL 4.1; you just can’t use some of the new version 4.1 features.

PHP 5 doesn’t activate MySQL automatically. You need to enable MySQL support yourself either by using the installation option — with-mysql or with-mysqli — on Linux/Mac or by uncommenting one of the following lines in php.ini:

```
;extension=php_mysql.dll
;extension=php_mysqli.dll
```

In general, it’s best to use mysql with MySQL version 4.0 and mysqli with MySQL version 4.1.

To access MySQL from a PHP script, you use the appropriate functions, depending on which extension you enabled. The functions are similar to the following:

```php
$cxn = mysql_connect($host,$userid,$password);
$cxn = mysqli_connect($host,$userid,$password);
```
The applications in this book use the mysqli functions. Consequently, you must use PHP 5 to run these scripts in their current format. However, if you need to run the applications with PHP 4, you just need to use the mysql function calls instead of the mysqli calls. If you revise the script and change the mysqli functions to mysql, you need to change the format of some of the functions.

In the preceding `mysql_connect` functions, the syntax of the two function calls is the same. However, many of the function calls differ slightly, such as the following:

```php
$db = mysql_select_db("dbname");
$db = mysqli_select_db($cxn, "dbname");
```

The mysqli function requires a database connection parameter before the database name. Other functions require similar minor changes. Appendix C shows the differences between mysql and mysqli syntax for the functions used in this book.

### Using the Application Source Code

All the code for the applications in this book is provided on the CD. Each application is in its own directory. If you copy all the files from a specific directory to your Web space, you can run the application in your browser.

#### Choosing a location

Copy all the files from the CD directory to your Web space. You might want to put all the files into a subdirectory in your Web space, such as `c:\program files\apache group\apache\http\catalog`. The files include three types of files:

- **PHP scripts**: The files contain the scripts with the PHP code that provides the application functionality. PHP script files end with a `.php` extension.
- **Include files**: The files are called by using `include` statements in the PHP scripts. Include files end with a `.inc` extension.
- **Classes**: The files contain class definitions for object-oriented programs. The files are called at the beginning of the PHP scripts using include statements. Class files end with a `.class` extension.
If all the files are together in a single directory, the application runs. However, you might want to organize the files by putting them in subdirectories. If you put the files in subdirectories, you need to modify the script to use the correct path when including or calling the files.

One of the include files, named Vars.inc, contains the sensitive information needed to access the MySQL database. You should secure this file by putting it into your include directory — a directory where PHP looks for the files specified in an include statement. The include directory can be located outside your Web space, where visitors to your Web page cannot access it. You set up your include directory in the php.ini file. Look for the include_path setting. If the line starts with a semicolon (;), remove the semicolon. Add the path to the directory you want to use as your include directory. For example, you could use one of the following statements:

```php
include_path=".;c:\include"; #Windows
include_path=".:/include";  #Linux
```

Both of these statements specify two directories where PHP looks for include files. The first directory is dot (meaning the current directory), followed by the second directory path. You can specify as many include directories as you want, and PHP searches through them for the include file in the order in which they are listed. The directory paths are separated by a semicolon for Windows and a colon for Linux.

If you don’t have access to php.ini, you can set the path in each individual script by using the following statement:

```php
ini_set("include_path","c:\hidden");
```

This statement sets the include_path to the specified directory only while the program is running. It doesn’t set the directory for your entire Web site.

The catalog application in the book includes images, but the images aren’t included on the CD. Any catalog you implement will need specific product pictures. The application expects to find image files in a subdirectory named images.

**Understanding the PHP code**

The PHP code in the applications consists of only basic PHP statements. It doesn’t use advanced PHP concepts or statements. Anyone who has a basic understanding of PHP can understand the code in the applications. You don’t need to be an expert.
In the application, most of the code is included in the main PHP script(s). When building PHP scripts for an application, good programming practice dictates that you look for opportunities to use functions. Any time you find yourself using the same code more than once, you can place the code in a function and call the function at the appropriate locations in the script.

In the applications in this book, I don’t use functions nearly as often as I could (or should). I believe that you can understand the code and follow its flow more easily when the code is in a single file, rather than when you must jump from page to page and back again, looking for the listing of functions. So, I present the code in the listings in a less disjointed manner — in fewer files showing the code in a top-down listing. In the explanation of the code, I point out locations where functions would be better coding style.

After each listing, I explain the code. Numbers in the explanation refer to line numbers shown in the code listing. I assume you know how control structures work in PHP and can follow the program flow. I provide some general description and some detailed description for more difficult or complex coding blocks.

Procedural versus object-oriented programs

Each application in this book is built with both procedural code and object-oriented code. That means that the CD contains two sets of independent programs for each application in the book. The mailing list application, described in the bonus chapter on the CD, however, is provided only with procedural code.

I am providing both types of code with the intention of producing a useful book for the following readers:

- **Inexperienced PHP programmers who have written only procedural code and who need to build an application for a real-world Web site:** You can install and use the procedural version of the application.

- **Programmers experienced with procedural programs in PHP who want to find out how to write object-oriented code in PHP:** You can compare the two versions to understand how to build object-oriented code. Appendixes A and B provide the concepts and syntax of object-oriented programming.

- **Programmers experienced in writing object-oriented code in another language who want to build an object-oriented application in PHP:** You can install and use the object-oriented version of the application. Appendix B describes the syntax of object-oriented programming in PHP.
Procedural and object-oriented methods are more than simply different syntax. As I describe in Appendix A, object-oriented programming is a different way of approaching programming projects. In the object-oriented approach, the programming problem is modeled with objects that represent the components of the programming problem. The objects store information and can perform needed tasks. The code that defines the object is stored in a class, which can then be used anywhere in the application that it’s useful. The programmer using the class doesn’t need to know anything about what’s happening inside the class or how the class performs its tasks. The programmer can just use it. Thus, one programmer can develop a class that works in programs for many other programmers.

Developing really large, complex applications, involving several programmers or teams of programmers, is pretty difficult without using object-oriented programming. With object-oriented programming, programmers can develop their parts of the application independently. In addition, if something needs to be changed later, only the class with the change is affected. The other components of the application need not change. For the same reasons, maintenance of the application is much easier.

Modifying the Source Code

In most cases, you need to modify the application code. For one thing, the Web page design is very plain. Nothing in the page design will excite visitors or win you that Designer of the Year award. So, you undoubtedly want to customize the look and feel of the page. If you’re adding one of these applications to an existing Web site, you can modify these pages to look like the existing page. Or, you might want to design something creative to impress your customers. If nothing else, you surely want to add your logo.

Because the source code provided with this book is a simple text file, you can use your favorite text-editing tool to modify the PHP source code files. You wouldn’t be the first person to create scripts with vi, Notepad, or WordPad. However, you can find tools that make script editing much easier.

Check out programming editors and Integrated Development Environments before creating your PHP scripts. These tools offer features that can save you enormous amounts of time when building your application. So download some demos, try out the software, and select the one that suits you best. You can take a vacation on the time you save later.
Programming editors

Programming editors offer many features specifically for writing programs. The following features are offered by most programming editors:

- **Color highlighting**: Highlight parts of the script — such as HTML tags, text strings, keywords, and comments — in different colors so they’re easy to identify.

- **Indentation**: Automatically indent inside parentheses and curly braces to make scripts easier to read.

- **Line numbers**: Add temporary line numbers. This is important because PHP error messages specify the line where the error was encountered. It would be cumbersome to have to count 872 lines from the top of the file to the line that PHP says is a problem.

- **Multiple files**: You can have more than one file open at once.

- **Easy code inserting**: Buttons for inserting code, such as HTML tags or PHP statements or functions are available.

- **Code library**: Save snippets of your own code that can be inserted by clicking a button.

Many programming editors are available on the Internet for free or for a low price. Some of the more popular editors include the following:

- **Arachnophilia**: This multiplatform editor is written in Java. It’s CareWare, which means it doesn’t cost any money.
  
  [Link](http://www.arachnoid.com/arachnophilia)

- **BBEdit**: This editor is designed for use on a Mac. BBEdit sells for $199.00. Development and support have been discontinued for BBEdit Lite, which is free, but you can still find it and legally use it.
  
  [Link](http://www.barebones.com/products/bbedit/index.shtml)

- **EditPlus**: This editor is designed for use on a Windows machine. EditPlus is shareware, and the license is $30.
  
  [Link](http://www.editplus.com)

- **Emacs**: Emacs works with Windows, Linux, and UNIX, and it’s free.
  
  [Link](http://www.gnu.org/software/emacs/emacs.html)
**HomeSite:** HomeSite is designed for use with Windows and will run you $99.00.

www.macromedia.com/software/homesite

**HTML-Kit:** This is another Windows editor that you can pick up for free.

www.chami.com/html-kit

**TextWrangler:** This editor is designed for use on a Mac. It’s developed and published by the same company that sells BBEdit. TextWrangler has fewer features than BBEdit, but has most of the major features useful for programmers, such as syntax highlighting and automatic indenting. And it’s much cheaper than BBEdit — as in free.


**Vim:** These free, enhanced versions of vi can be used with Windows, Linux, UNIX, and Mac OS.

www.vim.org

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**Integrated Development Environment (IDE)**

An Integrated Development Environment (IDE) is an entire workspace for developing applications. It includes a programming editor as well as other features. Some features included by most IDEs are the following:

- **Debugging:** Has built-in debugging features.
- **Previewing:** Displays the Web page output by the script.
- **Testing:** Has built-in testing features for your scripts.
- **FTP:** Has built-in ability to connect, upload, and download via FTP. It also keeps track of which files belong in which Web site and keeps the Web site up to date.
- **Project management:** Organizes scripts into projects, manages the files in the project, and includes file checkout and check-in features.
- **Backups:** Makes automatic backups of your Web site at periodic intervals.

IDEs are more difficult to get familiar with than programming editors. Some are fairly expensive, but their wealth of features can be worth it. IDEs are particularly useful when several people will be writing scripts for the same application. An IDE can make project coordination much simpler and make the code more compatible.
The following are popular IDEs:

- **Dreamweaver MX**: This IDE is available for the Windows and Mac platforms. It provides visual layout tools so you can create a Web page by dragging elements around and clicking buttons to insert elements. Dreamweaver can write the HTML code for you. It includes the HomeSite editor so you can write code. It also supports PHP. Dreamweaver will set you back $399.00.
  
  [www.macromedia.com/dreamweaver](http://www.macromedia.com/dreamweaver)

- **Komodo**: Komodo is offered for the Linux and Windows platforms. It’s an IDE for open-source languages, including Perl and Python, as well as PHP. It’s offered for $29.95 for personal or educational use, and $295.00 for commercial use.
  
  [www.activestate.com/Products/Komodo](http://www.activestate.com/Products/Komodo)

- **Maguma**: Maguma is available for Windows only. It’s an IDE for Apache, PHP, and MySQL on Windows and comes in two versions at different costs: Maguma Studio Desktop and Maguma Studio Enterprise, which offers features for huge sites with multiple servers. Maguma Studio for PHP is a free version with support for PHP only.
  
  [www.maguma.com](http://www.maguma.com)

- **PHPEdit**: This free IDE is available only for Windows.
  
  [www.phpedit.net/products/PHPEdit](http://www.phpedit.net/products/PHPEdit)

- **Zend Studio**: Zend Studio is offered for the Linux and Windows platforms. This IDE was developed by the people who developed the Zend engine, which is the engine under the hood of PHP. These people know PHP extremely well. Zend Studio will cost you $195.00.
  

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**Planning Your Application**

Planning is an essential part of building your application. The application design is the blueprint for building your application. Your plan should be complete enough to keep your project on track toward its goal and to ensure that all the needed elements and features are included in the plan.

Even if you’re using one of the applications in this book, you need to develop your own plan first. With your plan as a guide, you can see whether the application meets all your needs as is or whether you need to modify the application, adding or removing features so the application fits your needs perfectly.
The larger and more complex your application is, the more planning is required. An application that displays Hello World on the screen, with five lines in the script, built by one person, requires little planning. The Amazon Web site requires mammoth planning.

**Planning the software**

Planning the application software includes the following steps:

1. **Identify the goal or goals of the application.**
   Is the application intended to collect information from users? Sell products to users? Entertain users? Create a community of users?

2. **Develop a list of tasks that the application needs to perform in order to meet the goal.**
   For instance, if the goal is to sell products, the application needs to, at the least, display the products information, provide a means for the customer to select a product, collect the information needed to fill the order, and charge the customer for the product.

3. **Plan the database.**
   Decide what information needs to be stored. Decide how to store it for quick and easy access.

4. **Develop a detailed plan for the methods to use in carrying out the general behavior tasks that you develop in Step 2.**
   For instance, “collect the information needed to fill the order” can expand to:
   a. Display a form.
   b. Verify the information submitted in the form.
   c. Store the information in a database.

5. **Plan the Web pages.**
   How many Web pages need to be displayed? For instance, do you need a form and a feedback page? A product information page? A page that looks like a chess board? Design the look and feel of the Web pages.

**Additional planning**

The application plan is a basis for other project planning. You need to develop a schedule for your project. You also need to develop a resource plan.
Developing a schedule

The most important date for your project is the date the application goes live. That is, the date when outside users can begin using the application. In some cases, you are given the date, and you need to determine the resources you need to meet the date. In other cases, you have finite resources and you must estimate the date when the application will be ready to go live.

You can use the application plan to estimate the number of man hours needed to build the application. The calendar time required depends on how many programmers are working on the application. A project that takes 100 hours will take one programmer 2½ weeks to finish, assuming the programmer makes optimum use of every hour of a 40-hour week. Two programmers can finish the application (theoretically) in 1¼ weeks.

When scheduling, be sure to allow some time for those tasks required by Murphy’s Law — rewriting vanished code, time lost due to bubonic plague, electric outages caused by lightening, and so forth. Also, be sure to allow time for testing and writing documentation.

When planning your timeline, remember that some tasks can proceed simultaneously, but other tasks must proceed sequentially. For instance, if one of your tasks is to buy a computer, the programming can’t start until after the computer arrives.

Project management software can be useful when developing a schedule. It keeps track of the tasks, the resources, and the critical events along the way. It charts the tasks into a timeline, showing the **critical path** — the series of tasks that must be completed on time in order for the project to be completed on time.

Planning the resources

Resources include both human and material resources. Your software plan and the project delivery date determine the human resources required. Your plan needs to schedule the availability of the human resources. If you need to hire more people, include that time in your schedule. If you plan to use existing staff, plan the project time into their schedules.

Make sure that material resources are available when they’re needed. For instance, if you need to buy a new computer for the project, you need to start the purchasing process so that the computer will arrive before it’s needed. For the applications in this book, you need PHP and MySQL, so you need to plan their availability. Is the software currently installed? Does it need upgrading? If it’s not installed, who will install and administer it? When can the administrator have it available?
Include a list of resources needed, both human and material, as part of your project plan. For projects such as the applications in this book, personnel and computers are required resources. However, for your specific project, many other resources might be needed. For instance, artwork or photos of products may be required. Written copy for an online catalog might be needed. You might want a reference book or two. A list of resources can help prevent dead time spent waiting for needed resources.
Security is an important issue for computing in general and Web sites in particular. Security is not an on/off condition; it’s a continuum ranging from no security to total security. No security is a computer set up in the middle of a mall where anyone can use it. Total security is a computer locked in a safe where no one can use it.

Your Web site security is somewhere between the two extremes. Your Web site must be available for access from the Internet; otherwise, no one can see your Web pages. Your goal is to limit what visitors to your Web site can do while allowing them to download your Web pages and, for the applications in this book, to enter information into a form. However, you certainly don’t want visitors to be able to reformat your hard disk or delete all the files on your Web site.

Web site security is a tradeoff between security measures and ease of use. For instance, if you require visitors to log in, the Web site is more difficult for them to use. They must enter user IDs and passwords, which means that they must remember their user IDs and passwords (or at least remember where they put the papers where they wrote that information down). Some Web sites require a login for security, however, even though the site becomes more difficult to use. Just be sure that the login is really necessary. Some visitors might not use the site because of the login requirement.
The more security you add, the more difficult the site is to use, so you don’t want to use more security than necessary. One consideration in deciding how tight your security needs to be is the importance of the information you are protecting. If you’re storing top-secret government information or a treasure trove of credit card numbers, you must implement a high level of security. If you’re saving family recipes, however, you probably need very little security.

PHP and MySQL each has its own security features and issues. I discuss these issues in detail in this chapter. In addition, there are security issues concerning the computer that houses your Web site and the Internet connection to your Web site. Computer and Internet security issues are the domain of the system administrator, not the programmer. This is a book about building applications, so I don’t discuss system security.

Understanding Security Risks

Security is another word for protection. Just as you protect your home from invasion, you protect your computer from invasion. Although the majority of visitors to your Web site are customers with no intention beyond using the services you offer, not all people are honest and well-intentioned. Some are bad guys with nefarious purposes, such as:

- **Stealing stuff:** The intruder hopes to find a file sitting around full of valid credit card numbers or the secret formula for eternal youth.
- **Trashing your Web site:** The miscreant wants to destroy your Web site. Or add graffiti to it. Some people think this is funny. Some people do it to prove that they can. Or, you may have really annoyed someone.
- **Harming your visitors:** A malicious person can add things to your Web site that harm or steal from the people who visit your site.

When you design your Web site, you must consider security issues. You must design security as well as functionality. You need to consider the possible misuses of your Web site and design prevention for identified misuses into your site.

Building Security into Your PHP Scripts

PHP is used to build dynamic Web sites. Web sites are by definition accessible from the Internet, making them open to possible infiltration and theft. In addition, the dynamic aspect of PHP allows users to add information — possibly malicious information — to your Web site. However, alert and informed programming can minimize the security risks on your Web site.
Don’t trust any information from an outside source

Don’t store or use any information from an outside source without checking whether it contains the expected information. This is your number one commandment. If you remember this commandment, the applications you write won’t be vulnerable to the common security problems present in many applications.

Identifying outside sources

Information in your PHP scripts is stored and used in variables. Your script assigns values to variables with statements of the following format:

```php
$varname = value;
```

The value can be one of the following types:

- **A literal value:** A number or a string, as shown in a statement as follows:
  ```php
  $num = 1;
  $str1 = "Hello";
  ```
  The information originates in the script, not outside the script. This type of value is safe and can be used as is, without checking.

- **A variable:** Information from one variable is stored in another variable, as shown in the following statement:
  ```php
  $varname2 = $varname1;
  ```
  This statement might be safe if `$varname1` originates in the script. However, if `$varname1` contains information from an outside source, it must be treated as suspicious information. Check it before storing or using it.

Some outside information sources are the following:

- **URLs:** PHP reads information from the end of the URL when a file is downloaded. The information consists of variable name/value pairs.
- **POST data:** PHP reads data that is submitted via the `POST` method.
- **Cookies:** PHP reads data from cookies. *Cookies* are information that’s stored on the user’s computer and sent to the server when the user accesses your site.

Information received from outside sources can contain anything, including information that can damage or compromise your Web site. All information from outside sources needs to be checked and filtered. The remainder of this section discusses some ways of checking and filtering the information.
Specifying the source of the information

When you use information from a source outside the script, be sure it’s coming from the expected source. For instance, if you pass information in a hidden variable in a form, be sure you get the information from the $_POST array. For instance, suppose your application logs in a customer and then passes the authorization variable, such as login=yes, in a hidden variable in the form. When you check whether a user is authorized to view a Web page, you need to use code such as the following:

```php
if(!$_POST['login'] == "yes")
{
    echo "You are not logged in";
}
```

Then, if a user tried to access your Web site with the following URL:

`http://www.yoursite.com?login=yes`

the user would not be able to see the page because the authorization variable is in $_GET['login'], not in $_POST['login'].

Getting form variables from the $_POST array is the most secure method. If you check the authorization variable in $_REQUEST['login'], the user would appear to be logged in because the elements of both the $_POST and the $_GET arrays are included in $_REQUEST.

Another method is to turn the register_globals setting on in php.ini. Then, a variable called $login would be available. You could use the following check:

```php
if($login != "yes")
{
    echo "You are not logged in";
}
```

However, this code also doesn’t check where the information came from. If the user accessed your site with the login variable in the URL, the user would appear to be logged in.

The most secure programming checks the source of the information. You should leave register_globals turned off, which is the default, and get the information from the appropriate superglobal array. This alone isn’t enough for secure programming. However, it can help make your application more secure.

Checking the data type of outside information

Your PHP script should check all information received from an outside source to be sure it contains the expected information.
You can check the type of information contained in a variable. PHP provides functions that check information. For instance, if you expect the information to be an integer, you can check it as follows:

```php
if(!is_int($_POST['age']))
{
  echo "Data is not an integer";
}
```

PHP provides several functions that check data type, such as `is_array`, `is_bool`, `is_double`, `is_float`, `is_numeric`, `is_scalar`, `is_string`, and others. Use these functions to check information from outside sources.

**Cleaning outside information**

A lot of the outside information is in strings. Strings can contain any characters, including characters that can cause problems for your application, your database, or visitors to your Web site. For instance, HTML tags can potentially cause problems. A user might enter script tags, such as `<script>`. The script can execute and perform actions, such as deleting all files or dropping a database.

PHP provides two functions that can clean the data, thus rendering it harmless:

- **strip_tags**: This function removes all text enclosed by `<` and `>` from the data. It looks for an opening `<` and removes it and everything else, until it finds a closing `>` or reaches the end of the string. You can include specific tags that you want to allow. For instance, the following statement removes all tags from a character string except `<b>` and `<i>`:
  ```php
  $last_name = strip_tags($last_name, "<b><i>");  
  ```

- **htmlspecialchars**: This function changes some special characters with meaning to HTML into an HTML format that allows them to be displayed without any special meaning. The changes are
  - `<` becomes `&lt;`
  - `>` becomes `&gt;`
  - `&` becomes `&amp;`

  In this way, the characters `<` and `>` can be displayed on a Web page without being interpreted by HTML as tags. The following statement changes these special characters:
  ```php
  $last_name = htmlspecialchars($last_name);  
  ```

If you’re positive that you don’t want to allow your users to type any `<` or `>` characters into a form field, use `strip_tags`. However, if you want to allow `<` or `>` characters, you can safely store them after they have been processed by `htmlspecialchars`. 
Checking outside information with regular expressions

You can use regular expressions to check whether data is in a reasonable format. If the information doesn’t make sense, it’s probably not something that you want to store in your database. For instance, if the user types a name into a form, you can check whether it seems like a real name by matching patterns. You know that a name consists mainly of letters and spaces. Other valid characters might be a hyphen (–), as in the name Smith-Jones, and a single quote (‘), as in O’Hara. You can check the name by setting up a pattern that’s a string containing only letters, spaces, hyphens, and single quotes and then matching the name to the pattern. If the name doesn’t match — that is, if it contains characters not in the pattern, such as numerals or a question mark (?) — it’s not a real name.

Regular expressions consist of literal characters and special characters. Literal characters are normal characters, with no other special meaning. A c is a c with no meaning other than it’s one of the 26 letters in the English alphabet. Special characters have special meaning in the pattern, such as the asterisk (*) when used as a wild card. Table 2-1 shows the special characters used in regular expressions.

<table>
<thead>
<tr>
<th>Character</th>
<th>Meaning</th>
<th>Example</th>
<th>Match</th>
<th>Not a Match</th>
</tr>
</thead>
<tbody>
<tr>
<td>^</td>
<td>Beginning of line.</td>
<td>^c</td>
<td>cat</td>
<td>my cat</td>
</tr>
<tr>
<td>$</td>
<td>End of line.</td>
<td>c$</td>
<td>tic</td>
<td>stick</td>
</tr>
<tr>
<td>.</td>
<td>Any single character.</td>
<td>.</td>
<td>Any string that contains at least two characters</td>
<td></td>
</tr>
<tr>
<td>?</td>
<td>Preceding character is optional.</td>
<td>mea?n_</td>
<td>mean, men</td>
<td>moan</td>
</tr>
<tr>
<td>( )</td>
<td>Groups literal characters into a string that must be matched exactly.</td>
<td>m(ea)n</td>
<td>mean</td>
<td>men, mn</td>
</tr>
<tr>
<td>[ ]</td>
<td>Encloses a set of optional literal characters.</td>
<td>m[ea]n</td>
<td>men, man</td>
<td>mean, mn</td>
</tr>
<tr>
<td>Character</td>
<td>Meaning</td>
<td>Example</td>
<td>Match</td>
<td>Not a Match</td>
</tr>
<tr>
<td>-----------</td>
<td>---------</td>
<td>---------</td>
<td>-------</td>
<td>-------------</td>
</tr>
<tr>
<td>-</td>
<td>Represents all the characters between two characters.</td>
<td>m[a-c]n</td>
<td>man, mbn, mcn</td>
<td>mdn, mun, maan</td>
</tr>
<tr>
<td>+</td>
<td>One or more of the preceding items.</td>
<td>door[1-3]+</td>
<td>door111, door131</td>
<td>door, door55</td>
</tr>
<tr>
<td>*</td>
<td>Zero or more of the preceding items.</td>
<td>door[1-3]*</td>
<td>door, door311</td>
<td>door4, door445</td>
</tr>
<tr>
<td>{ , }</td>
<td>The starting and ending number of a range of repetitions.</td>
<td>a{2,5}</td>
<td>aa, aaaaa</td>
<td>a, xx3</td>
</tr>
<tr>
<td>\</td>
<td>The following character is literal.</td>
<td>m*n</td>
<td>m*n</td>
<td>men, mean</td>
</tr>
<tr>
<td>(</td>
<td></td>
<td>)</td>
<td>A set of alternate strings.</td>
<td>(Tom</td>
</tr>
</tbody>
</table>

Literal and special characters are combined to make patterns, which are sometimes long, complicated patterns. A string is compared to the pattern, and if it matches, the comparison is true.

PHP provides functions that compare strings to regular expressions. You can use the function `ereg()`, as follows:

```php
ereg("regexp",$varname);
```

The following code fragment tests whether the information is a valid zip code:

```php
$regexp = "^[0-9]{5}(-[0-9]{4})?$"
if(!ereg($regexp,$_POST['zip']))
{
  echo "Not a valid zip code<br>";
}
```

The regular expression breaks down as follows:

- `^[0-9]{5}` — Any string that begins with five numbers
- `\-` — A literal hyphen
- `[0-9]{4}` — Any string of numbers that is four digits long
- `( )?` — Groups the last two parts of the pattern and makes them optional
Another useful code fragment might be:

```php
$regexp = "^.*@.*\.com$"
if(!ereg($regexp,$_POST['email']))
{
    echo "Not a valid email address<br>";
}
```

This code accepts only e-mail addresses that end with .com. (E-mail addresses can end with other characters.) Another regular expression is used in this code:

```php
$regexp = "^[A-Za-z' -]{1,50}$"
if(!ereg($regexp,$_POST['last_name']))
{
    echo "Not a valid name<br>";
}
```

This regular expression accepts only letters, single quotes, blank spaces, and hyphens. If any other character shows up in the string, the last name is rejected as invalid.

PHP also provides Perl-compatible regular expressions for people who are familiar with Perl. You can use the function `preg_match` with Perl-compatible regular expressions.

### Storing information

In your scripts, you frequently need to store and retrieve information. For instance, in an online ordering application (such as the one in Chapter 6), you need to store the customer information, such as name and address, for shipping the order, and you also need to store the items that the customer orders. You can store information by using any of the following mechanisms:

- **Text file:** You can store information in a text file on the Web server. This solution is fast and easy. However, anyone who has access to the Web server can access the text file.

- **Cookies:** Small amounts of information can be stored in a cookie. However, the information is stored on the user’s computer, not on the Web server, which means that it can be changed. In addition, bad guys have techniques for stealing cookies, obtaining the information stored in them.

- **Session variables:** PHP session information is stored in a file on the Web server. The file is stored outside the Web space, so no one can access the session file from the Web.

- **Database:** You can store the information in a database. This is the most secure method because the database has security features of its own in addition to the security features provided by PHP. However, this method requires the most work and the most overhead.
You must protect the information you store. The protection measures needed depend on the importance of the information stored. If you’re storing a credit card number or social security number, you need much greater protection for the data than if you’re storing the customer’s favorite color.

**Using system calls**

Some scripts require you to access the operating system. None of the applications in this book need to use operating system commands, but some applications do, such as applications that manage files or disk space. You can perform tasks that access your disk space in either of the following ways:

- **PHP functions:** PHP provides many functions for use with files and directories, such as `copy`, `rename`, `delete`, `mkdir`, `readfile`, and many others.
- **Executing system commands:** PHP allows you to execute system commands. That is, you can enter a system command, just as if you were working in the operating system. You can put the command in backticks (``) or use one of three PHP functions: `system()`, `exec()`, or `passthru()`.

As long as you execute commands by using only information from within the script, the commands are safe. However, if you use information from any outside source, the potential for damage is high. You certainly don’t want your users to be able to execute a command such as `rm *`, which deletes all files in the current directory.

Executing system commands is more dangerous. For instance, suppose you want to allow your user to rename a file. You might allow the user to enter the filename to change in a form and then build the following statement in your script:

```php
system("mv $_POST['oldname'] $_POST['newname'] ");
```

Then, suppose your user typed the following into the form fields:

```
file1.txt
file2.txt;rm *
```

The statement you build and execute is the following:

```php
system("mv file1.txt file2.txt;rm *");
```

When the command executes, all the files in the directory are deleted.

Clearly, if you’re going to execute system commands containing information from an outside source, you must check the information carefully. You find techniques for checking and cleaning data in the section “Don’t trust any information from an outside source” earlier in this chapter.
Using PHP file system functions is much safer than executing system commands with the system functions. For instance, the previous operation could be done using a statement like the following:

```php
rename($_POST['oldname'],$_POST['newname']);
```

The function accepts only valid filenames, and so it is much more secure. Use a PHP function whenever you can find one that does what you need to do. Use the general function that lets you execute any system command only when absolutely necessary. And check any outside information very carefully.

## Handling errors

Error messages display information when errors are encountered. Some of this information can be very useful to bad guys. The more a bad buy knows about your system, the more likely he is to figure out a way to break into it. For instance, an error message can tell the bad guy which database you’re using or how the Web page is programmed or designed.

When you’re developing your application, you want PHP to give you as much information as possible to help you identify problems in your script. However, when your Web site is available to the public, you no longer want this information displayed.

One way to handle errors is to shut off the error functions in `php.ini`. Using PHP settings, you can stop error messages from being displayed in your Web pages. If you want, you can log errors into a file that you can review. Then, you can turn the error display functions on for specific files only. That is, when you’re developing a script, you can turn errors on for that script only.

The following settings in `php.ini` are related to error message display:

- `display_errors = On` (displays error messages in a Web page)
- `log_errors = Off` (sends error messages to a log file)
- `error_log = filename` (specifies the log file name)

Bad guys can deliberately send errors to your Web site, causing error messages to display useful information. The following settings are more secure than the preceding settings:

- `display_errors = Off`
- `log_errors = On`
- `error_log = /var/log/php_error_log`
Setting `display_errors` to off prevents error messages from being displayed in your Web page. When you turn `log_errors` on, it sends the error messages to the log file. The `error_log` setting defines the log file.

When you’re developing a script, you can put the following line in the top of the script:

```php
ini_set("display_errors", "On");
```

This statement in a script displays errors for this script only. Thus, you can see errors while developing, but you can remove the statement when your script becomes available to the public.

**MySQL Security**

Data in databases is more secure than in flat files, cookies, or sessions because DBMS (Database Management System) software provides its own security features. MySQL provides a security system for protecting your data that restricts access based on account names and passwords. In addition, each account has permission settings that specify what the user can do when using the account to access MySQL. MySQL security might seem complicated, but its security features provide valuable protection for your data.

**Setting up accounts and passwords**

Accessing a MySQL database is a two-step process:

1. **Connect to the MySQL server.**
   
   This step requires a valid user account and password.
   
   The MySQL server might be located on the same computer you are using to access it or on another computer that you access over a network. It’s more secure to locate MySQL on a separate computer. Ideally, the MySQL computer is behind a firewall. If the MySQL computer accepts only internal traffic, such as traffic from your Web server, and not traffic from outside your organization, it’s much more secure.

2. **Access the data in the database.**
   
   An SQL query is used for this step. MySQL provides a system of permissions that specify what an account can do to the data. For instance, an account might be set up so that users can select data but cannot insert nor update data.
When MySQL is installed, some accounts are set up by default. The information used to control access to your data is stored in a MySQL database named `mysql`.

**Understanding the MySQL security database**

When MySQL is installed, it automatically creates a database called `mysql`. All the information used to protect your data is stored in this database, including account names, hostnames, passwords, and permissions.

Permissions are stored in columns. The format of each column name is `permission_priv`, where `permission` is one of the query permissions you can set for MySQL. For instance, the column containing ALTER permissions is named `alter_priv`. The value in each permission column is `Y` or `N`, meaning yes or no. So, for instance, in the `user` table (which I describe in the following list), you would find a row for an account and a column for `alter_priv`. If the account field for `alter_priv` contains `Y`, the account can be used to execute an ALTER query. If `alter_priv` contains `N`, the account doesn’t have permission to execute an ALTER query.

The `mysql` database has the following tables:

- **User table**: This table stores permissions that apply to all the databases and tables. It contains a row for each valid account with user name, hostname, and password. The MySQL server will reject a connection for an account that doesn’t exist in this table.

- **Db table**: This table stores permissions that apply to a particular database. It contains a row for the database, which gives permissions to an account name and hostname. The account must exist in the `user` table for the permissions to be granted. Permissions that are given in the `user` table overrule permissions in this table.

- **Host table**: This table controls access to a database depending on the host. The `host` table works with the `db` table. If a row in the `db` table has an empty field for the host, MySQL checks the `host` table to see whether the `db` has a row there. In this way, you can allow access to a `db` from some hosts but not from others. For instance, say you have two databases: `db1` and `db2`. The `db1` database has information that is very sensitive, so you want only certain people to see it. The `db2` database has information that you want everyone to see. If you have a row in the `db` table for `db1` with a blank `host` field, you can have two rows for `db1` in the `host` table. One row can give all permissions to users connecting from a specific host, whereas another row can deny privileges to users connecting from any other host.
**tables_priv table**: This table stores permissions that apply to specific tables.

**columns_priv table**: This table stores permissions that apply to specific columns.

You can see and change the tables in `mysql` directly if you’re using an account that has the necessary permissions. You can use SQL queries such as `SELECT`, `INSERT`, `UPDATE`, and others.

### Setting up accounts

MySQL is installed with default accounts, one of which is the root account. In some cases, the root account is installed without a password. In other cases, the installation procedure requests you to enter a password for the root account. The root account needs a password. If it is installed without a password, you should give it one immediately. The root account is well known, and a bad guy might try the root account on your system just to see whether it’s there and unprotected.

The root account is set up with all possible permissions, including the ability to shut down your server. You should restrict access to this powerful account. Never allow users to access your database with this account.

You should set up specific accounts for the purpose of accessing your databases from PHP. Give the accounts only the permissions they really need. If your script will only retrieve data from the database, only `SELECT` permission is needed by the account that accesses the database. You can provide even more security by using different accounts for different purposes. You can set up one account with `SELECT` permission only and a different account for use with `INSERT` queries that doesn’t have `SELECT` permission. Thus, if one account is compromised, the damage it can do is limited.

When you set up an account, you specify the password, the name of the computer allowed to access the database using this account, and the permissions. However, you can change these at any time.

You can add or modify an account by changing the `mysql` database directly with `INSERT` and `UPDATE` queries. Or you can use the `GRANT` query, an SQL query for adding or modifying accounts.

### Adding accounts with the GRANT query

Here is the general format for a `GRANT` query:

```
GRANT permission (columns) ON tablename
    TO accountname@hostname IDENTIFIED BY 'password'
```
You must fill in the following information:

- **permission (columns):** You must list at least one permission. You can limit each permission to one or more columns by listing the column name in parentheses following the permission. If no column name is listed, the permission is granted on all columns in the table(s). You can list as many permission and columns as needed, separated by commas. See the MySQL manual for a list of all permissions (dev.mysql.com/doc/mysql/en/privileges-provided.html). For instance, a GRANT query might start with this:

  ```sql
  GRANT select (firstName, lastName), update, insert (birthdate) ...
  ```

- **tablename:** This indicates which tables the permission is granted on. At least one table is required. You can list several tables, separated by commas. The possible values for *tablename* are

  - *tablename:* The entire table named *tablename* in the current database. You can use an asterisk (*) to mean all tables in the current database. If you use an asterisk and no current database is selected, the privilege will be granted to all tables on all databases.

  - *databasename.tablename:* The entire table named *tablename* in *databasename*. You can use an asterisk (*) for either the database name or the table name to mean all. Using *.* grants the permission on all tables in all databases.

- **accountname@hostname:** If the account already exists, it is given the indicated permissions. If the account doesn’t exist, it’s added. The account is identified by the *accountname* and *hostname* as a pair. If an account exists with the specified account name but a different hostname, the existing account isn’t changed; a new one is created.

- **password:** This is the password that you’re adding or changing. A password isn’t required. If you don’t want to add or change a password for this account, leave out the entire phrase IDENTIFIED BY ‘password’.

The GRANT query to add a new account for use in the PHP programs for a database named *Catalog* might be

```sql
GRANT select ON Catalog.* TO phpuser@localhost
       IDENTIFIED BY 'mysecretpassword'
```

If an account already exists, you can add or change passwords with the following GRANT query:

```sql
GRANT select ON * TO phpuser@hostname
       IDENTIFIED BY ''
```

The existing password is replaced with a blank, leaving the account with no password — and that isn’t usually a good idea.
Accessing MySQL from PHP scripts

To access MySQL from PHP scripts, you need to use the account name and password that you have set up for use in your PHP scripts. Consequently, the account information must be available to your scripts. You need to protect this information as well as possible.

Don’t put the account information in the script. Store the information in a separate file. For instance, you might use a file similar to the following:

```php
<?php
$host = "localhost";
$user = "phpuser";
$password = "asdf321";
$database = "Catalog";
?>
```

You can then include the file in your script, so that your MySQL connect statement would look as follows:

```php
$conn = mysqli_connect($host,$user,$password,$database);
```

You can store the file in a secure location outside your Web space so that no one can access it from the Web. PHP allows you to specify a directory for include files. When you use the `include` statement in your script, PHP looks for the file in the include directory.

You specify the include directory in the `php.ini` file, as follows:

```ini
include_path = ".:/php/includes"     (Linux, Unix)
include_path = ".;c:\php\includes"   (Windows)
```

You can specify as many paths as you want. The preceding statements both specify two paths: dot (.), which means the current directory, and `/php/includes`. The paths are separated by a colon (:) for Linux and a semicolon (;) for Windows.

You can store your file containing the account information in the include directory and access it in the script with the following statement:

```php
include("Vars.inc");
```

PHP searches for `Vars.inc` in the paths specified in the `include_path` statement, searching the directories in the order they are listed.
**Understanding SQL injection attacks**

When you use information from an outside source to build an SQL query, you might be vulnerable to an SQL injection attack. In an *SQL injection attack*, a bad guy inserts characters into an SQL query, changing it into a query that affects your application.

**Using quotes to change your query**

When you use unchecked data from a form to build an SQL query, you provide the bad guy with a golden opportunity to create an SQL statement that serves his purposes. For instance, suppose you used the following code to allow a user to log in:

```php
$user = $_POST['user_id'];
$password = $_POST['password'];
$sql = "SELECT COUNT(*) FROM Customer
WHERE user_id='$user' and password='$password';"
```

If the SQL query returns any count higher than 0, the **user_id** and password exist in the database and the user is logged in. In this case, the data entered into the form by the user is used without any checking. Suppose a user entered the following user name into the form:

' or 1=1 --

Your SQL query would then be:

```sql
SELECT COUNT(*) FROM Customer WHERE user_id=' or 1=1 -- and password='$password'
```

This query will always return a count higher than 1 because 1=1 is always true. In addition, the `--` makes the rest of the query into a comment, which is ignored by SQL. Consequently, this user is now logged in.

Unauthorized access is bad enough. Depending on the structure of your database, however, a bad guy might be able to construct queries that seriously damage your database. For instance, a query might be changed into two or more queries, adding a damaging query. The use of multiple queries is discussed in the next section.

**Building multiple queries**

Many databases allow more than one query to be executed at a time, usually separated by a semicolon (;). A bad guy might be able to enter data into a field that creates a malicious SQL query. Suppose you’re building a query from information the user enters into a form. The query you’re building is:

```sql
SELECT email FROM Member WHERE last_name='$_POST['name'] '
Suppose the user enters the following into the name field in the form:

```sql
Smith';DROP TABLE Member --
```

Your query would then be:

```sql
SELECT email FROM Member
WHERE last_name='Smith';DROP TABLE Member --
```

After you execute this query, you are left wondering where your database table went.

Adding a query that harms your application is less of a danger in MySQL than in other databases. Until MySQL 4.1, MySQL didn’t accept multiple queries in a single request. Beginning with MySQL 4.1, multiple queries can be executed, but you must use a specific function, `mysqli_multi_query`, to send multiple queries. If you don’t use this function, users can’t use the type of attack shown in the preceding query.

**Escaping quotes**

One measure to protect your database is to escape the quotes in any information that is going to be sent to your database. With a `\` in front of a quote, it is treated as a literal character by the database, not as a special character with special meaning. The quote is stored in the database as a character, rather than triggering the database to take an action. For example, if the example in the preceding section were escaped, it would look as follows:

```sql
SELECT COUNT(*) FROM Customer WHERE user_id='\' or 1=1 --
and password='$password'
```

SQL would see the `\` as any other character, not as the quote that closes the `user_id` field. It would interpret the entire string until the quote in front of `$password` as the `user_id`. The query is not valid SQL in this form. The query would cause an error.

PHP provides two features useful for escaping quotes, as follows:

- **Magic quotes**: A setting in your `php.ini` file that is turned on by default. When magic quotes is turned on, information received by the PHP script is automatically escaped. In other words, when you retrieve information from the `$_POST` array, any quotes are already escaped.

- **The `addslashes` function**: A PHP function that escapes quotes. A matching ` stripslashes` function removes the slashes when needed, such as when you want to display the information on the Web page, without displaying a bunch of ugly slashes.
Magic quotes are turned on by default. However, not all data is meant to be sent to the database. When you display data, without storing it in the database, the slashes must be removed. In general, tuning magic quotes off is preferable. While magic quotes are handy to prevent beginners from making dangerous mistakes, adding/removing slashes with the functions allows you more control over your script. Just remember to add slashes to any data you send to your database.

**Checking and filtering information**

Escaping the quotes in data sent to the database is not enough to prevent all SQL injection attacks. The bad guys can be very creative. You need to check all data received from outside sources. (Heard that somewhere before?)

At the very least, you need to check for semicolons. Semicolons are seldom required in legitimate data. I know no one named Jo;ann. In most cases, you can check that the information is in a reasonable format. For more information about checking your data, see the section “Don’t trust any information from an outside source” earlier in this chapter.

**Backing up your databases**

You must back up your databases. If an attack destroys your databases, you must be able to replace them quickly. MySQL provides a utility that creates backups for you.

To back up your database, use the `mysqldump` utility located in the `bin` subdirectory of the directory where MySQL is installed. You start `mysqldump` by typing a command. If you’re using Windows, you need to open a command prompt window.

Use one of the following commands to back up a database:

```
mysqldump --user=accountname --password=password databasename > path/backupfilename
```

You can change into the `bin` directory to type the command. Or, you can type the path to `mysqldump` when entering the command, such as:

```
c:\mysql\bin\mysqldump ...
```

For example, to back up a database named Catalog, you might use the following command:
After running `mysqldump`, the file `/backups/Catalog.bak` contains all the SQL queries needed to re-create Catalog.

Backups should be made at certain times — at least once per day. If your database changes frequently, you might want to back up more often. For example, you might want to back up to the backup directory hourly, but back up to another computer once a day. In fact, for monumentally important data, you should have more than one backup and store one backup off-site, in case the building burns down.

### Using a Secure Web Server

Your Web server and the browsers of its visitors communicate by sending messages. The browser requests a file that contains the HTML for a Web page. The server sends the information in the file. The communication between server and browser is not secure. Someone on the Internet between you and the person requesting your Web pages can read the messages that are being sent. If your site collects or sends credit card numbers or other secret information, you must use a secure Web server to protect this data.

Secure Web servers use Security Sockets Layer (SSL) to protect communication sent to and received from browsers. This is similar to the scrambled telephone calls that you hear about in spy movies. The information is encrypted (translated into coded strings) before it is sent across the Web. The receiving software decrypts it into its original content. In addition, your Web site uses a certificate that verifies your identity. Using a secure Web server is extra work, but it’s necessary for some applications.

You can tell when you’re communicating using SSL. The URL begins with `HTTPS`, rather than `HTTP`.

Information about secure Web servers is specific to the Web server that you’re using. To find out more about using SSL, look at the Web site for the Web server that you’re using. For instance, if you’re using Apache, check out two open-source projects that implement SSL for Apache at [www.modssl.org](http://www.modssl.org) and [www.apache-ssl.org](http://www.apache-ssl.org). Commercial software is also available that provides a secure server based on the Apache Web server. If you’re using Microsoft Internet Information Server (IIS), search for SSL on the Microsoft Web site at [www.microsoft.com](http://www.microsoft.com).
Part II
Building a User Authentication Application

The 5th Wave
By Rich Tennant

"What I’m looking for are dynamic Web applications and content, not Web innuendoes and intent."
In this part, I provide two applications that restrict Web sites (or sections of Web sites) to authorized users only. The two applications use two different methods — procedural and object oriented — to authorize users.
Many applications require the user to log in. For example, most applications for online shopping require the user to log in before purchasing merchandise or services. Sometimes users can’t view any pages in the Web site without entering a password, and sometimes only part of the Web site is password-protected.

Because requiring users to enter a user ID and a password before viewing Web pages is needed so often, user authentication is built into HTTP (Hypertext Transfer Protocol), the language that Web servers and browsers use to communicate when transferring Web page content. I provide a short refresher on the WWW (World Wide Web) and HTTP in the following section, “Understanding HTTP Authentication.”

You can use HTTP’s built-in user authentication features or build your own login application from scratch. HTTP authentication is quicker and easier because it’s ready and able to collect and verify user IDs and passwords; you don’t have to write code for this task. However, HTTP authentication has some disadvantages, as I describe in the following list:

- **Look and feel**: The screen that requests password info is presented by your browser. It’s a simple gray screen where the user enters a user ID and a password. You can’t control its appearance.

- **Behavior**: The response to valid and invalid user IDs and passwords is set and controlled by the browser. For example, Internet Explorer allows only three invalid entries and then stops, whereas Netscape allows the user to reenter the information forever. You can’t change the set behavior.
Passwords: Valid user IDs and passwords must be provided in advance. The HTTP authentication function checks the user information against stored valid information to verify the user ID and password. HTTP authentication provides no facility for users to register online.

HTTP authentication is most useful for simple applications. For example, you might want to protect sections of your intranet, making them viewable only by staff members from a specific department, such as accounting or sales. Simple password protection in which a user enters a password provided by the department head might work well for such an application. Because the Web page is internal, its appearance might be less important than the appearance of Web pages presented to potential customers. In this chapter, I show you how to develop an application by using HTTP authentication.

If you want a more complicated application, such as one in which users can register online, or if the look and feel of the application are important, you probably want to build the application by writing your own code for all the functions. In Chapter 4, you find out how to build a user authentication application from scratch.

**Understanding HTTP Authentication**

HTTP authentication is built into HTTP (Hypertext Transfer Protocol). HTTP is the language that browsers and Web servers use to communicate. HTTP is the foundation that makes the WWW work.

**Understanding how the WWW works**

When a user types a URL into a browser, the browser sends an HTTP message out onto the WWW, requesting to view the file specified by the URL. The HTTP request might look like the following:

GET /Index.php HTTP/1.1

In addition to the initial request for the file, other HTTP messages, called HTTP headers, can be sent. For instance, a header is sent specifying where the file is to be found, as follows:

GET /index.php HTTP/1.1
Host: www.myowncompany.com
When the Web server at www.myowncompany.com receives the request, it searches the root directory of its Web space for a file named index.php. If it finds the file, the Web server sends some HTTP headers to the requesting browser containing information about what is being sent, followed by the contents of index.php. For instance, the Web server sends a status line such as the following:

HTTP/1.1 200 OK

This status line informs the browser that the file was found. If the file isn’t found, the following status line is sent:

HTTP/1.1 404 Not found

In addition, other headers can be sent following the status line, as shown in this example:

HTTP/1.1 200 OK
Date: Mon, 31 May 2004 10:05:44 GMT
Content-Type: text/html
Content-length: 210

The headers provide the current date and time and tell the browser what type of information to expect and the length of the file contents. After the HTTP headers are sent, the content of the requested file is sent.

**Requesting a password-protected file**

In some cases, when the Web server receives a request for a file, it finds the file but determines that the file is password-protected. For example, when you use the Apache Web server, you can specify to Apache that all the files in a directory require the user to enter a password before Apache can send the file contents to the browser. The details of designating files as password-protected are discussed later in this chapter.

When the Web server receives a request for a protected file, it responds with the following status line:

HTTP/1.1 401 Unauthorized
WWW-Authenticate: Basic realm="Realm"

When the browser receives the authenticate header line, it displays a dialog box requesting the user to enter a user name and password. The display differs somewhat by browser, but all are similar. Figure 3-1 shows the dialog box displayed by Internet Explorer.
When the user enters a user name and password, the browser sends a second request for the file, followed by a header that contains the user name and password entered by the user, as follows:

```
GET /SecretFile.php HTTP/1.1
Host: www.myowncompany.com
Authorization: Basic stringofcharacters
```

*stringofcharacters* is the user ID and password, encoded and separated by a colon. The user ID and password are encoded for transmission, not encrypted for security. If you’re building a high security application, you need to use SSL (Secure Sockets Layer) to protect the information during transmission, which I discuss in Chapter 2.

**Authorizing access**

When the Web server receives the file request with the authorization header, the included user name and password must be tested to determine whether they’re valid. Apache automatically checks the password based on Apache directives that tell Apache what user name/password combinations are valid. If the information is valid, the contents of the requested file are displayed. If the user name/password combination is not valid, the user is given the opportunity to reenter the information one or more times, depending on which browser is being used. Setting up your Web site for Apache HTTP authorization is described in the section “Using HTTP Authentication with Apache.”

Alternatively, you can write code in your PHP script that checks the user name/password information in the authorization header. The information is available in your PHP script in `$_SERVER['PHP_USER_AUTH']` and `$_SERVER['PHP_USER_PW']`. I show you how to build a login application with this method in the sections that describe designing and building the application with PHP, later in this chapter.
Using HTTP Authentication with Apache

You can set up HTTP authentication by using Apache alone, without PHP or MySQL. After you use this approach to set up authentication, Apache automatically prompts for a user name and password and checks the information that the user enters against a list of valid user names and passwords. Although this approach is quick and easy to set up, it’s also simplistic, inflexible, restricted in scope and function, and slow if you have a large number of valid user names and passwords. However, it’s perfect for some types of user login, allowing quick and easy authentication for situations with a restricted number of users and that don’t require anything more complicated. For instance, you might want to set up a password-protected directory on your intranet for each department, providing the department staff members with a user name and password for their specific areas.

You use instructions to Apache, called directives, to set up your authentication application. Directives allow you to specify the files that are password-protected and the valid user names and IDs. The simplest way to use Apache directives for authentication is to create a file called .htaccess (notice the period at the beginning of the filename).

Configuring Apache

When Apache starts, it executes the directives in its configuration file, usually called httpd.conf, located in a subdirectory called conf in the directory where Apache is installed. This configuration file generally allows access to all the Web pages stored in files in your Web space — htdocs by default, unless the location was changed in the Apache configuration file. To restrict access to certain files, you put a file called .htaccess, which contains Apache directives that specify authentication, into the directory that you want to password-protect. The Apache directives in the .htaccess file override the directives in the configuration file that were executed when Apache started. However, an Apache directive in the configuration file can tell Apache to ignore the commands in the .htaccess file. Before you can password-protect directories with an .htaccess file, you must be sure that Apache can execute the directives in the .htaccess file.

To make sure that Apache can execute directives in the .htaccess file, open the file httpd.conf. In Windows, choose Start: Programs: Apache HTTPD Server: Configure Apache Server. Look through the file for a line similar to the following line that identifies the top directory in your Web space:

```
<Directory "C:/Program Files/Apache Group/Apache/htdocs">
```

This line means that the following Apache directives apply to this directory only. Shortly after this line, you might find a line similar to the following:
AllowOverride None

This line tells Apache to ignore all the directives in any .htaccess file. You can change this line to the following line:

AllowOverride Authconfig

This line tells Apache to allow the directives in the .htaccess file that are related to HTTP authentication to override the authentication directives executed when Apache was started.

Creating the .htaccess File

The .htaccess file contains the Apache directives needed for HTTP authentication. Create a file called .htaccess (notice the filename begins with a period) in the directory that you want to password-protect. The .htaccess file specifies directives that apply to the directory where it’s located and all subdirectories under its directory. The contents of the file should be as follows:

 AuthUserFile "c:\secret\.htpass
 AuthGroupFile /dev/null
 AuthName "Accounting Department"
 AuthType Basic
 Require valid-user

Here’s a closer look at the file contents:

- The first line specifies a file containing the list of valid users for this directory. The procedures for creating the password file are discussed in the next section, “Creating the password file.”

  Store the password file in a directory outside of your Web space. It’s much more secure there than in a directory that visitors from the Web can access. In this case, the directory is in c:\secret, not anywhere under htdocs.

- The second line specifies a group file; in this case, no group file exists (designated by /dev/null). A group file contains a list of groups that are allowed to access the files in this directory.

- AuthName is the name of the section that is protected. This name can be anything you want and is displayed in the window where the user enters a user name and password.

- AuthType is specified as Basic. Digest is the other type of authentication, which is more secure but also more complicated. I don’t discuss Digest authentication in this book.

- The last line states that only a valid user — a user found in the file specified on the first line — can access files in this directory.
The .htaccess file applies to the directory where it resides and all subdirectories of this directory. However, another .htaccess file in a subdirectory of this directory would override the directives in this .htaccess file.

Creating the password file

The password file contains all the valid user name/password pairs. Apache provides a program to use to create the password file. The program, called htpasswd, is automatically installed in the bin subdirectory in the directory where Apache is installed, such as c:\Apache\bin\htpasswd.exe.

To create a password file, type a command similar to the following at the command line (the command prompt in Windows):

c:\Apache\bin\htpasswd -c c:\secret\.htpass janet

This command creates a file called .htpass in the directory c:\secret. It adds one line to the file for the user name janet and prompts you to enter a password for the user name janet. The -c in the command line stands for create and should be used only when you’re creating the file. You can add user name/password lines to the file as follows:

c:\Apache\bin\htpasswd c:\secret\.htpass boss

If you use -c with the command to add a line to an existing password file, the file is overwritten by a new file with the same name; any lines in the existing file are gone. Don’t use -c unless you want to create a new file.

You can name the file that contains the valid user names anything you want. The name .htpass is commonly used but isn’t required. The information is stored in the file and looks like this:

janet:$apr1$Hr......$DS8EPQBQbqxRXt9hUFoq3/

Notice that the password isn’t stored in a form that humans can read.

Although you can store the password file anywhere on your computer, it’s best to store it outside your Web space so that it’s more secure. You tell Apache where the file is located with a line similar to the following line in your .htaccess file, as discussed in the preceding section:

AuthUserFile /usr/local/apache/secret/.htpass

This command tells Apache to look for valid user names in the file /usr/local/apache/secret/.htpass.
Apache HTTP authentication in action

After you create the .htaccess and password files, Apache implements user authentication without any further intervention by you. When Apache receives a request to view a file in a directory containing your .htaccess file, the dialog box requesting a user name and password is automatically displayed. When the user clicks the button to submit a user name and password, Apache compares the information entered to the list of valid user name/password pairs in your password file. If it finds a match, it sends the Web page contents to the user’s browser.

The behavior when the user name and password are not found in the password file depends on the browser. For instance, Internet Explorer allows the user to try three times and then stops, displaying the message Authorization Required. Netscape, on the other hand, displays a message that says Authorization Failed. Try Again? and provides an OK button and a Cancel button. Netscape allows the user to keep clicking OK and reentering user name and password combinations forever or until the user clicks the Cancel button.

Most browsers offer the user the option to cancel by clicking a button. When the user clicks Cancel, the message Authorization Required is displayed.

After the user has entered a valid user name/password combination, the user is authorized to view all the password-protected Web pages during the session. The user does not have to reenter the password every time a new file is requested. The authorization is valid until the browser is closed, ending the browser session.

Designing an HTTP Authentication Application in PHP

In the rest of this chapter, I discuss using HTTP authentication in a PHP script. The basic function of the HTTP authentication application is to protect files. Only users who have entered valid user names and passwords are allowed to view the protected pages. The HTTP authentication application requires an existing set of stored user names and passwords. The application compares the provided user name and password to the stored list of valid information, and if the provided user name and password match a stored pair, the user is granted access to the protected files.
Using HTTP authentication with PHP on Windows

A PHP authentication script that uses HTTP headers to prompt for login information from the user won’t work unless PHP is installed as an Apache module, not as CGI. If you currently have a working installation of PHP, you can determine which mode your PHP is starting with by checking your Apache configuration file httpd.conf. This file is usually installed in the subdirectory conf in the directory where Apache is installed, such as c:\Program Files\Apache Group\Apache\conf\httpd.conf.

Open httpd.conf. You can usually open it by selecting a menu item on your Start➪Programs menu. For example, on Windows 2000, choose Start➪Programs➪Apache HTTPD Server➪Configure Apache Server➪Edit the httpd.conf Configuration File. The configuration file is opened in a default editor, such as Notepad or WordPad. Look for one or both of the following lines:

LoadModule php5_module "c:/php/php5apache.dll"
Action application/x-httpd-php /php/php-cgi.exe

If you’re using Apache 2, the LoadModule line might look like:

LoadModule php5_module "c:/php/php5apache2.dll"

The LoadModule Apache configuration directive starts PHP as an Apache module. The Action directive starts PHP in CGI mode. In many cases, both directives are in the httpd.conf file, but one starts with a #, which means it’s a comment and not an active directive.

If the Action directive is currently active (that is, the LoadModule directive is either missing or has a # as its first character), your PHP is installed as a CGI. You must change PHP to an Apache module before HTTP authentication will work in your PHP scripts. To change PHP to an Apache module, follow these steps:

1. Find the LoadModule line mentioned previously in your httpd.conf file. If you find it with a # at the beginning of the line, remove the #. If you don’t find the line, add it.

2. Find the Action line mentioned previously and insert a # at the beginning of the line.

3. Find the following line in your httpd.conf file and remove the # from the beginning of the line. If you don’t find this line in your httpd.conf file, add it — without the #.

   #AddModule mod_php5.c


5. Be sure your php_mysql.dll or php_mysqli.dll file is in your system directory (Win98: Windows\system; Win2000: Winnt\system32; WinXP: Windows\system32). If your MySQL dll file isn’t currently in your system directory, check your php.ini file to see which one is active in your current installation and copy the correct file to the system directory.

6. Restart Apache.

You should be able to find a menu item on your start menu, such as Start➪Programs➪Apache HTTP Server➪Control Apache Server➪Restart.

If you’re using a PHP 4 installation, the steps are slightly different. For instance, the module dll is named php4_apache.dll. See the PHP Web site, www.php.net, for instructions for PHP 4.
To design the application, you specify in detail the functionality of the application, as follows:

1. Check to see whether a user ID and password have been sent by the browser with the request for the protected Web page.
2. If a user name and password are not included in the request for the Web page, prompt the user to enter a user name and password.
3. When the user enters a user name and password, resend the Web page request, adding a header containing the user name and password entered by the user.
4. When a user name and password are included with the Web page request, check whether the user name and password are in the list of valid user information. If not, display an error message and give the user the opportunity to enter another user name and password.
5. If the user has entered a valid user name and password, display the contents of the Web page in the user’s browser.

To use HTTP authentication with PHP on Windows, you must have PHP installed as an Apache module, not as CGI. For more information, see the nearby sidebar, “Using HTTP authentication with PHP on Windows.”

Creating a User Database

In the HTTP authentication application, a list of valid user names and passwords is stored, and the user name and password provided by the user are compared to the stored information to check whether they’re valid. The list of valid information can be stored in flat files or in your favorite database. In this example, the valid user information is stored in a MySQL database. In the next few sections, I explain how to create the database.

Designing the user database

The database design is simple: It needs to contain only a user name and a password for each user account. The date on which the account was created is also useful information.

For this design, the database is named UserAccount. It contains one table called Valid_User, and the table design is shown in Table 3-1. The table contains three fields: user_name, password, and create_date. All the fields are required; none is allowed to be blank. The primary key is user_name.
<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>user_name</td>
<td>CHAR(10)</td>
<td>User name for the user account (primary key)</td>
</tr>
<tr>
<td>password</td>
<td>CHAR(255)</td>
<td>Password for the account</td>
</tr>
<tr>
<td>create_date</td>
<td>DATE</td>
<td>Date when the account was added to the table</td>
</tr>
</tbody>
</table>

### Creating the user database

The following SQL statement creates the user database:

```sql
CREATE DATABASE UserAccount;
```

The following SQL statement creates the table:

```sql
CREATE TABLE Valid_User (
    user_name     CHAR(10)  NOT NULL,  
    password      CHAR(255) NOT NULL,  
    create_date   DATE      NOT NULL,  
    PRIMARY KEY(user_name) );
```

### Accessing the user database

You can access the database from your PHP script with the MySQL functions that are built into PHP. You can use either the mysql functions or the mysqli functions, depending on which version of PHP and MySQL you are using and which function module is activated in your `php.ini` file. In this book, the applications use the mysqli functions. I explain the version differences for PHP and MySQL in Chapter 1.

You need to provide the information that the MySQL functions need, such as a MySQL account name and password. This is not related to any other account name or password that you have, such as a password to log on to the system.

If you’re using PHP 4, the mysqli functions aren’t available. You need to use the mysql functions. The syntax is slightly different. You find out about the difference between the mysql and mysqli functions in Appendix C.
In this application, I have stored the information needed by the PHP mysqli functions in a separate file called `Vars.inc`. This file is stored in a directory outside my Web space, for security reasons. The file contains information similar to the following:

```php
<?php
    $host = "localhost";
    $user = "admin";
    $passwd = "";
    $database = "UserAccount";
?>
```

Notice the PHP tags at the beginning (`<?php`) and the end (`?>`) of the file. If these tags aren’t included, the information might display on the Web page for the whole world to see, which is not what you want.

### Building the Authentication Application in PHP: The Procedural Approach

One script can provide all the functionality needed for this application. When the script `Auth.php` is first accessed, it prompts the user for a user name and password. After the user types a user name and password and clicks the button to submit them, the program tests whether the user name/password combination is valid.

The flow of the application script is controlled by an `if` statement that tests whether a user name and password have been entered. The following is the general design of the application script:

```php
if (user name and password have not been submitted)
    Prompt the user to enter a user name and password
else (user name and password have been submitted)
    1 Test whether user name and password match a user name and password in the valid user database.
    2 If user name and password are valid, display the content of the protected Web page.
    3 If user name and/or password are not valid, prompt the user again for login information.
```

The HTTP authentication application script (`Auth.php`) is shown in Listing 3-1.
Listing 3-1: The Script That Collects and Tests the User Name and Password

```php
<?php
/* Program: Auth.php
 * Desc: Program that prompts for a user name and
 *       password from the user using HTTP authentication.
 *       The program then tests whether the user
 *       name and password match a user name and password
 *       pair stored in a MySQL database.
 */

// Testing whether the user has been prompted for a user name
if(!isset($_SERVER['PHP_AUTH_USER']))    #10
{
    header('WWW-Authenticate: Basic realm="secret section"');
    header('HTTP/1.0 401 Unauthorized');        #13
    exit("This page requires authentication!");    #14
}

// Testing the user name and password entered by the user
else
{
    include("Vars.inc");                     #20
    $user_name = trim($_SERVER['PHP_AUTH_USER']);   #21
    $user_password = trim($_SERVER['PHP_AUTH_PW']);  #22
    $connection = mysql_connect($host,$user,$password) or die("Couldn't connect to server.");    #24
    $db = mysql_select_db($database,$connection) or die("Couldn't select database.");          #25
    $sql = "SELECT user_name FROM Valid_User
            WHERE user_name = '{$user_name}'
            AND password = md5('{$user_password}');";
    $result = mysql_query($sql) or die("Couldn't execute query.");                            #31
    $num = mysql_num_rows($result);                                                             #32
    if ($num < 1) // user name/password not found
    {
        exit("The User Name or password you entered
               is not valid.<br>");
    }
}

// Web page content.
include("Welcome.inc");                                                                 #40
?>
```

Some of the lines in Listing 3-1 end with line numbers. The following discussion refers to the line numbers in the listing to discuss the script and how it works:

#10 Begins an `if` block that executes when the script first starts, before the user has entered a user name and password. The `if` statement tests whether a user name has been entered by testing whether the
element PHP_AUTH_USER exists in the $SERVER superglobal array. If it does not exist, the user has not entered a user name, and the if block executes. The if block sends two HTTP headers (lines 12 and 13) that tell the Web server that this file is password-protected. The Web server then sends the headers that tell the browser to prompt for a user name and password.

#14 Is executed only if the user clicks the Cancel button.

#15 Ends the if block.

#18 Begins an else block that executes when the user has been prompted for a user name and password. The else block executes if the element PHP_AUTH_USER exists in the $SERVER superglobal array. When the user clicks the button to submit a user name and password, the element is created. Even if the user didn’t type anything in the user name field, the element is created containing a blank string, causing the else block to execute.

#20 Lines 20 to 31 create and execute the SQL query that tests whether the user name and password exist in the MySQL database of valid user name/password combinations.

#20 Includes the file Vars.inc that contains the information necessary to access the database.

#21 Gets the user name from the $SERVER superglobal array. Trims the value to remove any blank spaces typed by the user. Line 22 does the same for the password submitted by the user.

#27 Lines 27 to 29 create the SQL query that tests the user name and password. Notice that the password supplied by the user is put into a md5() function. This is a MySQL function that encrypts the password for security reasons. The password stored in the database is encrypted with the MySQL md5 function. Therefore, when you test the password entered by the user, you need to use md5() on it before you compare it to the password in the database.

#32 Creates $num, which contains the number of records found containing the user name and password combination entered by the user.

#33 Begins an if block that executes if the user name and password entered are not found in the database. This if block prints a message and then stops the script.

#37 Ends the invalid user name if block.

#38 Ends the else block.

#39 The script from this line executes if the user name and password are valid. The contents of the Web page go here. This script just displays a welcome message. You can put anything you want on your Web page, such as a list of links to the Web pages in your password-protected area.
Includes the file that contains the contents of the Web page. In this case, the file is named Welcome.inc. Listing 3-2 shows the contents of Welcome.inc.

When the script in Listing 3-1 first executes, it displays a window that prompts for your password (Lines 10 to 15). The exact appearance and function of the window depend on the browser. Figure 3-2 shows the dialog box displayed by Firefox with the user name and password already typed by the user.

After the user types a correct user name and password, the Web page is displayed. In this application, a simple welcome page is displayed, using a PHP variable containing the user name. Listing 3-2 shows the code that displays the welcome page.

```php
<?php
/* File: Welcome.inc
 * Desc: HTML code that displays the Welcome Web page.
 * Uses one PHP variable, $user_name.
 */
echo "<html><head><title>Welcome</title></head>
<body>
<p align='center'>Hello, $user_name</p>
<p align='center'>Welcome to my secret page</p>
</body></html>";
?>
```

When the user enters a valid user name and password, the Web page shown in Figure 3-3 is displayed.
Object-oriented programming requires that you create and use objects to provide the application's functionality. You first identify the objects needed for the application, and then you write the classes that define the objects, including the methods that the application needs. When the objects are ready, you write the application script that creates and uses the objects.

Developing the objects

This HTTP authentication application must prompt for the user’s login name and password. After the user submits the login information, the application must compare the information submitted against the user account information stored in a database. If the user name and password are valid, the application displays the contents of the Web page. The following objects are needed for the application:

- **PasswordPrompter**:Prompts for and collects the user’s login information.
- **Database**: Container that stores the data for the application.
- **Account**: User account with its associated user information.
- **WebPage**: Web page to be displayed by a browser.

The details for each object are discussed in the next sections.
Writing the PasswordPrompter class

The PasswordPrompter object, which displays the prompt window where the user enters a user name and password, is central to the application. The PasswordPrompter object uses the built-in HTTP authentication features to display the window. When the user submits the information, it’s available in the PHP script in the $_SERVER superglobal array.

The properties

The PasswordPrompter class requires only one property.

private $realm;

$realm is a string of your choosing that is displayed when the application prompts for the user name and password.

The code

Listing 3-3 contains the complete code for the PasswordPrompter class. The constructor and the single method are discussed in detail after the code listing. Notice the line numbers at the ends of some of the lines of code. The discussion following the listing refers to the line numbers.

### Listing 3-3: The Code for the PasswordPrompter Class

```php
<?php
/* Class: PasswordPrompter
 * Desc: Class that displays a window that requests a user password. The user name and password typed into the window are returned to the script in the superglobal array $_SERVER.
 */
class PasswordPrompter
{
    private $realm; // String passed to constructor

    function __construct($realm) #12
    {
        if(is_string($realm))
        {
            $this->realm = $realm;
        }
        else
        {
            throw new Exception("Argument must be a string.");
        }
    }
}
```

Continued
**The constructor**

The constructor expects a string to be passed into it. The string is stored as the realm (see line 12), the name of the section of the Web site that is password-protected. The name can be any string. It’s displayed in the dialog box that prompts users for their login information. If the information passed is not a string, an exception is thrown with a message.

**displayPrompt**

Lines 26 to 28 send HTTP headers to the Web server. The Web server responds with headers that cause the browser to display a window that prompts for a user name and password.

The code on line 30 executes only if the user clicks the Cancel button.

**Using the PasswordPrompter class**

You can create a PasswordPrompter object as follows:

```php
$prompt = new PasswordPrompter("secret place");
```

If the parameter passed isn’t a string, an exception is thrown, with a message.

**Writing the Database class**

In order to authenticate the login information entered by the user, a list of valid user name/password combinations must be available. The Database class defines an object where the data is stored. In this application, it’s a MySQL database. Listing 3-4 shows the code for the Database class.
The properties

The Database properties information needed to connect to the database.

private $connection;
private $database_name;
private $host;
private $user;
private $password;

$connection contains an object that represents the connection to the database. $database_name contains the name of the currently selected database. If no database has been selected, $database_name is NULL. The host, user, and password aren't required by the class as defined here; these properties aren't used. However, for a different application, additional methods might require these properties.

The code

Listing 3-4 contains the complete code for the Database class. The constructor and both of the methods are discussed in detail after the code listing. Notice the line numbers at the ends of some of the lines of code. The discussion following the listing refers to the line numbers.

Listing 3-4: THE CODE FOR THE DATABASE CLASS

```php
<?php
/* Class: Database
 * Desc: Class that connects to a MySQL database.
 */
class Database
{
    private $cxn; // database connection object
    private $database_name;
    private $host;
    private $user;
    private $password;

    function __construct($filename)
    {
        include("$filename");
        if(!$this->cxn = new mysqli($host,$user,$passwd)) #16
        {
            throw new Exception("Database is not available.
                Try again later.");
            email("dadmin@ourplace.com","DB Problem",
                "MySQL server is not responding. ".
                $this->cxn->error());
            exit();
        }
    }

    function connect($password)
    {
        $this->cxn = new mysqli($host,$user,$password);
        if($this->cxn->connect_errno)
        {
            throw new Exception("Connection Failure.
                Couldn't connect to database.");
            email("dadmin@ourplace.com","DB Problem",
                "MySQL server is not responding. ".
                $this->cxn->error());
            exit();
        }
    }
}
```

Continued
The constructor

The constructor creates the connection and stores the properties. The host, user, and password must be passed when the new Database object is created so that the connection can be made. The following numbers refer to line numbers in the code in Listing 3-4:

```php
Listing 3-4: (Continued)

    $this->host = $host;                     #25
    $this->user = $user;
    $this->password = $passwd;
}

function useDatabase($dbname)
{
    if(!$result = $this->cxn->query("SHOW DATABASES")) #32
    {
        throw new Exception("Database is not available.
            Try again later");
        email("dbadmin@ourplace.com","DB Problem",
            "MySQL server is not responding. 
            
            "$this->cxn->error()");
        exit();
    }
    else #41
    {
        while($row = $result->fetch_row())
        {
            $databases[] = $row[0];
        }
    }
    if(in_array($dbname,$databases) ||
        in_array(strtolower($dbname),$databases)) #49
    {
        $this->database_name = $dbname;
        $this->cxn->select_db($dbname);
        return TRUE;
    }
    else #55
    {
        throw new Exception("Database $dbname not found.");
        return FALSE;
    }
}

function getConnection()
{
    return $this->cxn;
}
?>
```
Begins an if block that executes if the database connection fails. The block throws a new exception with a message, e-mails the database administrator that the database is down, and exits.

Lines 25 to 27 execute if the database connection is successful. The lines store the properties in the object.

The connection ($cxn) is stored in a property so that it can be used whenever the database connection is needed.

**useDatabase**

The `useDatabase` method selects a database. The name of the database is passed when the method is executed. The method checks to make sure that the specified database exists before selecting it.

The following discussion refers to line numbers in Listing 3-4:

Begins an if block that executes if the database query fails. The block throws a new exception with a message, e-mails the database administrator that the database is down, and exits.

Begins an else block that executes when the query runs successfully. The query returns a list of available databases in the result set. This block stores the database names in an array named `$databases`.

Begins an if block that executes if the database the user wants to select exists. The database name is stored in a property. The database is selected. The method returns `TRUE`.

Begins an else block that executes if the database passed in the method isn’t found. An exception is thrown, with a message stating that the database isn’t found. The method returns `FALSE`.

**getConnection**

The `getConnection` method returns the value stored in the `$connection` property — the connection for the database. This can be used wherever the connection to the database is needed.

**Using the Database class**

You can create a `Database` object as follows:

```php
$filename = "Vars.inc";
$db = new Database($filename);
$select = $db->useDatabase("UserAccount");
```

If the `new` statement can’t create a new `Database` object, it throws an exception with the following message:

**Database is not available. Try again later.**
After the statements, $select contains FALSE if the database doesn’t exist. If the database is successfully selected, $select contains TRUE.

The database selected remains in effect until you select a different database or the script ends. You can change the database selected at any time by using the useDatabase method again.

Writing the Account class

The Account class stores and retrieves the information about a user. In this application, the user account contains only three bits of information: the user name, password, and date the account was created. For other applications, the user account might store more information, such as the user’s address, phone, and credit card number. In the database for this application (described earlier in this chapter in “Creating a User Database”), the user’s information is uniquely identified by the $user_name.

The properties
The Account properties store the information needed to access the account row in the database.

```php
private $userID = NULL;
private $cxn;
private $table_name;
private $message;
```

$UserID is the field that identifies the account information in the table, $userID stores the information from the $user_name field in the database. $table_name stores the name of the table in the database where the account information is located.

$cxn stores an object that represents the connection to the database where the account information is stored.

$message is a string that is stored by some methods when they execute.

The code
Listing 3-5 contains the complete code for the Account class. I discuss the constructor and each of the three methods in detail after the code listing. Notice the line numbers at the ends of some of the lines of code. The discussion following the listing refers to the line numbers.
<?php
/*  Class:  Account
*  Desc:   A user account stored in a database. Represents
*          the account information stored in one record
*          in a table.
*/
class Account
{
    private $userID = NULL;
    private $cxn;           // database connection object
    private $table_name;
    private $message;

    function __construct( mysqli $cxn,$table)
    {
        $this->cxn = $cxn;
        if(is_string($table))
        {
            $sql = "SHOW TABLES LIKE '".$table.'";
            $result = $this->cxn->query($sql);
            if($result->num_rows > 0)
            {
                $this->table_name = $table;
            }
            else
            {
                throw new Exception("$table is not a table
                in the database");
                return FALSE;
            }
        }
        else
        {
            throw new Exception("Second parameter is not a
            valid table name");
            return FALSE;
        }
    }

    function selectAccount($userID)
    {
        $userID = trim($userID);
        $sql = "SELECT user_name FROM $this->table_name
        WHERE user_name =".$userID.";"
        if(!$result = $this->cxn->query($sql))
        {
            throw new Exception("Couldn't execute query: "
            .$this->cxn->error());
            return FALSE;
        }
    }
Continued
The constructor

The constructor tests the connection and the table name that are passed to it to ensure that the parameters are in the proper format and stores them in properties. There is no default for these values; the values must be passed when the Account object is created.

```php
if($result->num_rows < 1 ) #51
{
    $this->message = "Account $userID does not exist!";
    return FALSE;
}
else #57
{
    $this->userID = $userID;
    return TRUE;
}
}

function comparePassword($form_password) #66
{
    if(!isset($this->userID))
    {
        throw new Exception("No account currently selected");
        exit();
    }
    $sql = "SELECT user_name FROM $this->table_name
        WHERE user_name ='$this->userID' AND
        password = md5('$form_password')";
    if(!$result = $this->cxn->query($sql)) #74
    {
        throw new Exception("Couldn't execute query: ".mysql_error());
        exit();
    }
    if($result->num_rows < 1 ) #80
    {
        $this->message = "Incorrect password for account $this->userID!";
        return FALSE;
    }
    else #86
        return TRUE;
}

function getMessage()
{
    return $this->message;
}
?>
```
#16 Stores the database connection in the property.

#17 Begins an if block that executes if the table name passed is a string. The table name is checked to see whether it exists.

#19 Lines 19 to 20 create and execute an SQL query that tests whether a table exists with the name that was passed to the constructor.

#21 Begins an if block that executes if the table exists. The table name is stored in the $table property.

#25 Begins an else block that executes when the table does not exist. The script throws an exception with a message and returns FALSE.

#32 Begins an else block that executes if the table name is not a string. The script throws an exception with a message and returns FALSE.

selectAccount

This method stores the user_name of the currently active account. The user name is passed when selectAccount is called. The method checks whether the user name exists in the database. If it’s found, the user name is stored in $userID.

#42 The userID passed to selectAccount is trimmed to remove any blank spaces accidentally typed by the user before or after the user name.

#43 Lines 43 and 44 create an SQL query to select an account that has a user_name that matches the user name passed in userID. The table name property is used in the SQL query.

#45 Begins an if block that executes when the query fails. An exception is thrown, with a message, and the method returns FALSE.

#51 Begins an if block that executes when the number of rows returned by the query is less than 1, meaning that the user name passed to the method was not found in the database table. A message is stored in $message, and FALSE is returned.

#57 Begins an else block that executes when the number of rows returned by the query is not less than 1, meaning that the user name was found in the database table. The method stores the user name in the $userID property and returns TRUE.

comparePassword

This method compares the password passed to the method with the password stored in the database for the current account. This method fails if no account has been selected.
Begins an if block that executes when no account has been selected. If no user name is stored in the $userID property, the script throws an exception with a message and exits.

Lines 71 to 73 construct an SQL query that selects a record with the user name for the current account and the password passed to the method.

Begins an if block that executes if the query does not execute successfully. The script throws an exception with a message and exits.

Begins an if block that executes if the password provided by the user doesn’t match the password stored in the database. That is, if the query returned less than 1 row. The method stores a message and returns FALSE.

Begins the else block that executes if the password supplied by the user matches the password stored in the database table. The else block returns TRUE.

get\_Message
This method returns the content of the $message property.

Using the Account class
To use the Account class, you must pass it a database connection. In addition, the correct database must be selected. Therefore, to create an account object, you can use statements similar to the following:

```php
$db = new Database("Vars.inc");
$db->useDatabase("UserAccount");
$acct = new Account($db->getConnection(),"Valid_User");
```

When the new Account object is created, a previously created database connection object is passed to it, along with the name of the table where the account information is stored.

In most cases, you want to select a specific account from the database with a statement similar to the following:

```php
$acct->selectAccount("janet");
```

If the user name janet doesn’t exist in the database table, FALSE is returned. An account must be selected before you can use comparePassword, as follows:

```php
$acct->comparePassword("secret");
```

If you use comparePassword before selecting an account, the script throws an exception and exits.
Writing the WebPage class

The WebPage class is used frequently throughout this book whenever a Web page needs to be displayed. The WebPage class has a single function: to display a Web page. The class expects the name of a file that contains the code that defines the Web page to be passed. If the Web page displays any information stored in PHP variables, an array of the data to be displayed in the Web page must also be passed.

The properties

The WebPage properties store the information needed to display the Web page.

```php
private $filename;
private $data;
```

$filename is the name of the file that contains the code that defines the Web page — HTML code and perhaps some PHP code for parts of the Web page that use PHP variables. The file that defines the Web page for the authentication application presented in this chapter is named Welcome.inc. The same file is used for the procedural code and is shown in Listing 3-2.

$data is an array that contains the PHP variables for the Web page. If information contained in PHP variables is displayed on the page, the PHP variables must be passed in an array. If no PHP variables are displayed, $data can be NULL.

The code

Listing 3-6 contains the complete code for the WebPage class. The constructor and the single displayPage method are discussed in detail after the code listing. Notice the line numbers at the ends of some of the lines of code. The discussion following the listing refers to the line numbers.

**LISTING 3-6: THE CODE FOR THE WEBPAGE CLASS**

```php
<?php
/*  Class:  WebPage
*  Desc:   Class that stores the information needed to display a Web page.
*/
class WebPage
{
    private $filename;
    private $data;

    function __construct($filename,$data=NULL) #11
```
The constructor

When a WebPage object is instantiated, the filename and the data that are passed to the constructor are stored in the properties.

1. The constructor definition includes a default value for $data: NULL. If no value is passed for data, NULL is stored in the $data property. This gives the object the flexibility to store and display Web pages that are only HTML as well as Web pages that contain PHP variables.

2. Begins an if/else statement that tests whether the filename passed is a string. If it’s a string, it’s stored in a property. If it’s not a string, the else block executes, which throws an exception and exits.

3. Begins an if/else statement that tests whether the data passed is in an array. The if statement executes if the data is NULL or is an array and stores the data passed to the constructor in the $data property. The else block that begins on line 26 executes when the data is not passed in an array. A new exception is thrown with a message, and the program exits.
displayPage
This method displays the Web page based on the information stored in the properties.

#34 Extracts the PHP variables for the $data array. If no PHP variables are used in the Web page, no data was passed, and $data is NULL. To prevent a notice from being displayed when $data is NULL, an @ is used before the extract function.

#35 Includes a file that defines the Web page based on the filename stored in the $filename property.

Using the WebPage class
A WebPage object is created with a statement similar to one of the following:

```
$page1 = new WebPage("Welcome.inc");
$page2 = new WebPage("Welcome.inc",$data);
```

You can use the first statement to create a WebPage object when the Web page contains only HTML code and no PHP variables. The second statement creates an object that contains PHP variables to display in the Web page.

When the second parameter is passed, it must be an array. If a second parameter is included that is not an array (for instance, just a string or an integer), an exception is thrown with the following message:

Data must be passed in an array

Writing the Auth-OO script

The application script creates and uses the objects to provide the application's functionality. For the HTTP authentication application, the script must prompt the user to enter a user name and password and then check whether the user name and password are valid. Listing 3-7 shows the application script Auth-OO.php.

The flow of the application script is controlled by an if statement that tests whether a user name and password have been entered, by testing whether the $_SERVER array contains the user name. The following is the general design of the application script:

```
if (user name and password have not been submitted)
    Prompt the user to enter a user name and password

else (user name and password have been submitted)
    1 Test whether user name and password match a user name and password in the valid user database.
    2 If user name and password are valid, display the
If user name and/or password are not valid, prompt the user again for login information.

```php
<?php
/* Program: Auth-00.php
 * Desc: Program that prompts for a user name and password from the user using HTTP authentication. The program then tests whether the user name and password match a user name and password pair stored in a MySQL database. */

require_once("PasswordPrompter.class");
require_once("Database.class");
require_once("Account.class");
require_once("WebPage.class");

//Testing whether the user has been prompted for a user name
if(!isset($_SERVER['PHP_AUTH_USER']))
{
    try
    {
        $prompter = new PasswordPrompter("secret section");
        $prompter->displayPrompt();
    }
    catch(Exception $e)
    {
        echo $e->getMessage();
        exit();
    }
}

// Testing the user name and password entered by the user
else
{
    try
    {
        $db = new Database("Vars.inc");
        $db->useDatabase("UserAccount");
    }
    catch(Exception $e)
    {
        echo $e->getMessage();
        exit();
    }
    try
    {
        $acct = new Account($db->getConnection(),"Valid_User");
    }
    catch(Exception $e)
    {
        echo $e->getMessage();
        exit();
    }
}
```
The application program has a single `if/else` statement to prompt for and test a user name/password pair. If the user has not submitted login information, the script prompts for a user name and password. When the user submits the login information, the user name and password are compared to the valid user accounts stored in the MySQL database. If the information is valid, the contents of the Web page are sent to the user. (The following discussion refers to line numbers in Listing 3-7.)

### Lines 10 to 13
Lines 10 to 13 include the files that contain the classes needed for the application. `require_once` is used so that the class is not accidentally included more than once.

### Line 16
Begins an `if` block that executes if the user has not submitted a user name. If `$_SERVER['PHP_AUTH_USER']` isn't set, the user hasn’t submitted a password, so a `PasswordPrompter` object is created and displayed, resulting in a window that prompts for a user name and password.
Begins an else block that executes when the user enters login information in the HTTP password window. The user name and password submitted by the user are available to the script in the $_SERVER superglobal array in the elements PHP_AUTH_USER and PHP_AUTH_PW.

Creates a Database object.

Selects the database that contains the user account information. If useDatabase fails (returns FALSE) because "UserAccount" doesn't exist, a message is displayed, and the scripts stops.

Lines 45 and 46 create an Account object.

Begins an if block that selects the account based on the user name submitted by the user. If selectAccount fails (returns FALSE) because the user name isn't found in the database, a message is displayed, and the scripts stops.

Ends the if block that selects the account.

Begins an if block that compares the password submitted by the user with the password stored in the database. If the passwords don't match (the method returns FALSE), a message is displayed, and the script exits.

End of the if block the compares the passwords.

End of the else block that tests the user login information against the valid login information in the database. The script goes past this line only if the login information submitted by the user is valid.

Creates an array of data to be displayed on the Web page. The array contains only one element: user_name.

Creates a new WebPage object containing the welcome Web page. The filename passed to the WebPage object is Welcome.inc. This is the same file that is used for the procedural script shown previously in Listing 3-2.

Displays the welcome WebPage. The Web page that is displayed is the same welcome page displayed by the procedural script (refer to Figure 3-3).

Notice that many of the lines in the script are in try blocks. Methods that can throw an exception should be in try blocks. If an object method throws an exception that you don’t catch, you get a fatal error similar to the following:

Fatal error: Uncaught exception 'Exception' with message 'Database is not available.' in c:\Database.class:18
Chapter 4
User Login Application

In This Chapter
► Designing the login Web page
► Building the database to store user information
► Writing procedural code for the login application
► Developing and using objects to program the login application

Many Web sites are secret or have secret sections. Such Web sites require users to log in before they can see the secret information. Here are two examples of when Web sites might restrict access:

► Many online merchants require customers to log in so that their information can be stored for future transactions. These companies must protect the customers’ information, particularly financial information, from public view.

► Many Web sites grant access only to certain people. For example, company information might be restricted to company staff or members of a certain department. Another example is when information is available for sale, so the information must be restricted to people who have paid for it.

If you have a Web site that needs protection, be sure to implement a user login application. User login applications can be quite simple, such as an application in which the administrator sets up a list of valid users. Anyone who tries to access a protected file is prompted to enter a user name and password that is checked against the list of valid users. A login application can also be much more complicated. It can allow Web site visitors to register for access, setting up their own accounts. The application might collect information from customers as they register. The application might provide the ability for users to manage their own accounts. The features that a login application can provide are wide and varied.

A user login application is one of the most common applications on the Web, so I’m sure you’ve had the experience of logging in to one. In this chapter, I show you how to build your own user login application.
If you need only a simple login screen, the application that I provide in Chapter 3 might be sufficient for your needs; it uses the built-in HTTP authentication features of browsers. The login application in this chapter is more complex. It allows users to register or to log in if they’re already registered and collects and stores information from users when they register. It provides a fairly complex login Web page with two forms: one for login and one for registration. If you need to provide this additional functionality and control the look and feel of your login application, this chapter is for you.

### Designing the Login Application

The basic function of the login application is to allow registered users to enter the Web site and to block access to users who have not registered. The application also allows users to register, storing their information in a database. To meet this functionality, the user login application should do the following:

- Give customers the option to register for Web site access or to log into the Web site if they’re already registered.
- Display a registration form that allows new customers to type their registration information.
  
  I discuss the information you need to collect in the form in the following section, “Creating the User Database.”
- Validate the information submitted in the form.
  
  Make sure the required fields are not blank and the submitted information is in the correct format.
- Store the validated information in the database.
- Display a login form that asks for the registered customer’s user name and password.
- Compare the user name and password that a user enters with the user names and passwords in the database. If a match is found, send a Web page from the site to the customer. If no match is found, give the customer the opportunity to try to log in again.

### Creating the User Database

The application design calls for a database that stores user information. The database is the core of this application. A login application must store user names and passwords, at the very least, but often you’ll want to store additional information as well.
Designing the database

Your first design task is to decide what information you want to store. At a minimum, you need to store a user name and password that the user can use to log in. It’s also useful to know when the user account was created. In deciding what information to collect during user registration, you need to balance your urge to collect all the potentially useful information that you can think of against your users’ urge to avoid time-consuming forms and reluctance to give out personal information. One compromise is to ask for some optional information; users who don’t mind will enter it, and those who object can just leave it blank.

Some information is required for your Web site to perform its function. For instance, users can readily see that a site that will be sending them something needs to collect their names and addresses. However, they might not see why it’s necessary for you to have their phone numbers. Even if you require a phone number, users sometimes enter fake ones. So unless you have a captive audience, such as your employees, who must give you everything you ask for, think carefully about what information to collect. It’s easy for irritated users to leave your Web site. It’s not like they drove miles to your store and looked hours for a parking space. They can leave with just a click.

For the sample application in this chapter, the Web site is an online store that sells products. Thus, you need to collect the customers’ contact information, and you need their phone numbers in case you need to contact them about their orders. Most customers are willing to provide phone numbers to reputable online retailers, recognizing that problems with an order might necessitate the merchant contacting them. The remainder of this section discusses the details of the information and its storage in a MySQL database.

The database contains only one table. The customer information is stored in the table, one record (row) for each customer. The fields needed for the table are shown in Table 4-1. The table contains 12 fields. The first three fields, user_name, password, and create_date, are required and cannot be blank. The remaining fields contain the customer’s name, address, phone number, and fax number and are allowed to be blank. The first field, user_name, is the primary key.

<table>
<thead>
<tr>
<th>Table 4-1</th>
<th>Database Table: Customer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable Name</td>
<td>Type</td>
</tr>
<tr>
<td>user_name</td>
<td>VARCHAR(20)</td>
</tr>
<tr>
<td>create_date</td>
<td>DATE</td>
</tr>
</tbody>
</table>
Table 4-1 (continued)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>password</td>
<td>VARCHAR(255)</td>
<td>Password for the account</td>
</tr>
<tr>
<td>email</td>
<td>VARCHAR(50)</td>
<td>Customer’s e-mail address</td>
</tr>
<tr>
<td>last_name</td>
<td>VARCHAR(50)</td>
<td>Customer’s last name</td>
</tr>
<tr>
<td>first_name</td>
<td>VARCHAR(40)</td>
<td>Customer’s first name</td>
</tr>
<tr>
<td>street</td>
<td>VARCHAR(50)</td>
<td>Customer’s street address</td>
</tr>
<tr>
<td>city</td>
<td>VARCHAR(50)</td>
<td>City where customer lives</td>
</tr>
<tr>
<td>state</td>
<td>CHAR(2)</td>
<td>Two-letter state code</td>
</tr>
<tr>
<td>zip</td>
<td>CHAR(10)</td>
<td>Zip code, five numbers or zip + 4</td>
</tr>
<tr>
<td>phone</td>
<td>CHAR(15)</td>
<td>Phone number where customer can be reached</td>
</tr>
<tr>
<td>fax</td>
<td>CHAR(15)</td>
<td>Customer’s fax number</td>
</tr>
</tbody>
</table>

Building the database

You can create the MySQL database with the following SQL statement:

```
CREATE DATABASE CustomerDirectory;
```

The following SQL statement creates the table:

```
CREATE TABLE Customer (  
  user_name     VARCHAR(20)    NOT NULL,  
  create_date   DATE           NOT NULL,  
  password      VARCHAR(255)   NOT NULL,  
  last_name     VARCHAR(50),  
  first_name    VARCHAR(40),  
  street        VARCHAR(50),  
  city          VARCHAR(50),  
  state         CHAR(2),  
  zip           CHAR(10),  
  email         VARCHAR(50),  
  phone         CHAR(15),  
  fax           CHAR(15),  
  PRIMARY KEY(user_name) );
```
Accessing the database

PHP provides MySQL functions for accessing your database from your PHP script. The MySQL functions are passed the information that’s needed to access the database, such as a MySQL account name and password. This is not related to any other account name or password that you have, such as a password to log in to the system.

Several new features became available with MySQL 4.1. To access the new features, you must use the mysqli functions, rather than the mysql functions. To use the mysqli functions, you must use PHP 5. The mysqli functions are not available with PHP 4. You can still use the mysql functions and PHP 4 to interact with MySQL 4.1, but you can’t use some of the new features. The mysqli functions are very similar to the mysql functions, but some differences exist. Read about MySQL and PHP versions in Chapter 1. Read about mysql/mysqli functions in Appendix C. Read about the mysqli (MySQL Improved) module at [www.php.net/manual/en/ref.mysqli.php](http://www.php.net/manual/en/ref.mysqli.php).

In this application, I have stored the information needed by the PHP mysql functions in a separate file called Vars.inc. This file is stored in a directory outside my Web space, for security reasons. The file contains information similar to the following:

```php
<?php
    $host = "localhost";
    $user = "admin";
    $passwd = "";
    $database = "CustomerDirectory";
?>
```

Notice the PHP tags at the beginning (<?php) and the end (?>) of the file. If these tags are not included, the information might display on the Web page for the whole world to see, which is not at all what you want.

Adding data to the database

This database is intended to hold data entered by customers — not by you. When the application is first made available to customers, it’s empty until customers add data. When you test your application programs, the scripts add a row to the database. You might want to add a row with a user name and password for your own use when testing the scripts.
Building the Login Web Page

Customers log in to your protected Web site via an HTML form on a Web page. The login application design, developed earlier in this chapter, calls for two forms: one form to allow new customers to register and another form to allow registered customers to log in. You need to develop the login Web page, making decisions on its functionality and its look and feel.

Designing the login Web page

In your Web travels, you’ve probably seen many different designs for login pages. You might already have ideas for your login page. The design presented here is not the only possible one, just one I like. Feel free to change any part of it.

In this design, both forms are presented on a single Web page. The forms are displayed in two sections, side by side. Each form has its own section heading, form fields, and submit button. The login form allows people to enter their user names and passwords; the registration form requests much more information from customers. Figure 4-1 shows what the login Web page looks like when it’s displayed in a browser.
The code for the login Web page is the same whether you’re using the procedural approach or the object-oriented approach to build your application. The code for the login Web page is stored in separate files that are included when the application needs to display the login page. Thus, the code that defines the Web page is separate from the PHP code that provides the logic of the application.

The code for the login page consists of two files: the code that defines the look and feel of the page and the code that provides the specific information for the page.

Writing the code for the login page

The login Web page provides two forms: a login form and a registration form, side by side. The code that creates the page is in two separate files, as follows:

- **double_form.inc**: Contains the code that defines the look and feel of the Web page. It produces a Web page with two side-by-side forms and can be used to create any Web page that needs two side-by-side forms. This file does not include specific information, such as the names and values of the text fields displayed in the forms. You must use another file in conjunction with this file to create the Web page. The other file contains the specific information, such as field names, for the Web page.

- **fields_login.inc**: Contains the specific information for the login Web page. When used with `double_form.inc`, it displays a customer login Web page. A different file with different fields can be used with `double_form.inc` to create a Web page that displays forms with fields unrelated to customer logins.

The remainder of this section shows the details of these files. The second file is short and easier to understand, so I discuss it first in Listing 4-1. Then when explaining the first file (`double_form.inc`) in Listing 4-2, I refer to the information contained in `fields_login.inc`.

**Writing fields_login.inc**

The file shown in Listing 4-1 provides seven arrays that contain the specific information displayed in the login Web page. The arrays are as follows:

- **$page**: Elements that are displayed at the top and bottom of the page. These elements span the entire page, not just one of the forms.

- **$elements_1**: Elements that are displayed at the top and bottom of the first form (the form on the left). This array contains text to display at the top and bottom of the form and the text to display on the submit button.
$elements_2$: Similar elements for the second form (the form on the right).

$fields_1$: The names and labels for the fields to be displayed in the first form. The array keys are the field names in the form and the array values are the labels that are displayed in the form next to the fields.

$length_1$: The lengths of the fields in the first form. It’s not necessary to define lengths for the fields, but you can if you want. For example, you can make all the fields the same length. I prefer to define lengths for fields as a security measure; it restricts the number of characters that a user can type into a field, limiting some of the opportunities for a bad guy to enter evil things into your forms.

$fields_2$: The names and labels for the fields in the second form. The array keys are the field names. Because these fields are stored in the database, the array keys are the same names used in the database table. The array values are the labels that are displayed in the form next to the fields. For instance, the field name used in the database is $first_name$, but the label in the form is much clearer and more attractive as $First Name$.

$length_2$: The lengths of the fields in the second form. The length of the fields is the same as the length of the fields defined in the database.

Setting up your elements and fields in this separate file, rather than including them in the file with the HTML code for the form, greatly simplifies the design and maintenance of the form. You can easily see the fields and elements in this separate file, as well as easily edit and modify them.

**Listing 4-1: The File That Contains the Arrays Needed for the Login Page**

```php
<?php
/* File: fields_login.inc
 * Desc: Contains arrays with the field names and form elements for the login Web page. The arrays named with 1 are displayed in form 1 and those named with 2 are displayed in form 2. The forms are defined in the file double_form.inc.
 */
$page = array( "title" => "Customer Login Page",
 "top" => "",
 "bottom" => "Send questions and comments to admin@ourplace.com",
);

$elements_1 = array( "top" => "Returning Customers:
 &lt;span style="font-size: 80%;
 font-weight: 100%"&gt;
 &lt;i&gt;Login here&lt;/i&gt;&lt;/span&gt;",
 "bottom" => "",
 "submit" => "Login"
```
Notice that the arrays are defined in a structured format. You could use much less space to define the arrays, but this format makes the values clear and easy to change if necessary.

Notice that some of the values are blank, such as $element_1["bottom"]="". In this particular Web page, I didn't want to include any text at the top of the page or at the bottom of the forms. However, for another form using double_form.inc, you might want to include values for these elements.
**Writing double_form.inc**

The script `double_form.inc`, shown in Listing 4-2, contains the code that defines how the Web page looks. It includes HTML code for the forms and for tables to organize the page. The code includes variables where specific information is needed. The variable values are provided in the previous file, `fields_login.inc`. For example, the script includes the following line that defines the Web page title:

```php
<head><title><?php echo $page['title']?>></title></head>
```

The variable `$page['title']` is found in the file `fields_login.inc`, where it is set to "Customer Login Page".

---

**Listing 4-2: The Script That Defines Two Side-by-Side HTML Forms**

```php
<?php
/* File: double_form.inc
 * Desc: Contains the code for a Web page that displays
 * two HTML forms, side by side in a table.
 */
include("functions.inc"); #6
<?
<head><title><?php echo $page['title']?></title></head>
<body style="margin: 0">
<h1 align="center"><?php echo $page['top']?></h1>
<hr size="10" noshade>
<table border="0" cellpadding="5" cellspacing="0">
<?php
############
# Form 1 #
############

<tr>
<td width="33%" valign="top">
<p style="font-size: 110%; font-weight: bold">
<?php echo $elements_1['top']?>
<p></td></tr>
</table>
```
Chapter 4: User Login Application

```php
{ 
    if(ereg("pass", $field)) #38
        $type = "password";
    else
        $type = "text";
    echo "<tr><td style="text-align: right; 
         font-weight: bold">$value</td>
          <td><input type='$type' name='$field' 
         value='".@$field."'
         size='{$length_1[$field]}'
         maxsize='{$length_1[$field]}'>$</td></tr>
    </td></tr>
} #49
?>
<tr> 
    <td colspan="2" style="text-align: center" >
        <br />
        <input type="submit" name="Button"  
            value="<?php echo $elements_1['submit']??"">
    </td></tr>
</table>
</form>
<?php 

<!-- Column that separates the two forms -->
<td style="background-color: gray"></td>

<?php

############
# Form 2  #
############ #66

<?php

    if (isset($_SERVER['PHP_SELF'])) #77
    { 
        echo "<tr> 
            <td colspan='2' style="font-weight: bold; font-style: italic; 
                font-size: 90%; color: red">" 
                {$GLOBALS['message_2']}<p></td></tr>"; 
    }
    foreach($fields_2 as $field => $value) #85
    { 
        if($field == "state") #87
            {
```
The following numbers refer to the line numbers in Listing 4-2:

#6 Includes a file containing functions used in this script. The file functions.inc is shown in Listing 4-3.
Lines 8 to 12 are an HTML section. The HTML code defines the top of the Web page. Lines 8 and 10 have a small PHP section that echoes a variable. The variable values are found in the fields_login.inc file. Line 12 begins the table that organizes the Web page.

Lines 18 to 25 contain HTML code that opens the first table cell, displays the text at the top of the cell, and produces the form tag. A second table, inside this first cell, is started to hold the form fields.

Opens the PHP section that produces the form fields.

Begins an if block that displays a message. If the item "message_1" exists in theGLOBALS array, message_1 is displayed. The message is set into the global array in the application script when errors are found in the information entered by the user. If the form is displayed for the first time, before the user enters anything, or if no errors occur, theGLOBALS element message_1 doesn’t exist.

Lines 36 to 49 contain a foreach block that displays all the fields in the form. The foreach statement walks through the $fields_1 array that is set in the file fields_login.inc.

 Starts an if statement that sets a value for $type — a variable used in the input field code. The input field is type text for all fields except the password field, which is type password.

Lines 42 to 48 contain the echo statement that outputs the HTML code for the field. The echo statement is executed once for each element in the $fields_1 array. PHP variables are used for the specific information, such as field names, in the statement.

Starts an HTML section (lines 51 to 59) that displays the submit button for form 1 and closes the tags for form 1.

HTML code that displays a column that separates the two forms.

An HTML section (lines 67 to 75) that opens the second table cell, displays the text at the top of the cell, and produces the form tag. A second table, inside this second cell, is started to hold the form fields.

Opens the PHP section that produces the form fields.

Begins an if block that displays a message. If the item "message_2" exists in theGLOBALS array, message_2 is displayed. The message is set into the global array in the application script when errors are found in the information entered by the user. If the form is displayed for the first time, before the user enters anything, or if no errors occur, theGLOBALS element message_2 doesn’t exist.

Lines 85 to 119 contain a foreach block that displays all the fields in the form. The foreach statement walks through the $fields_2 array that is set in the file fields_login.inc.
#87 Starts an if block that executes only for the state field. A
drop-down list of states is displayed rather than the simple text
field that is displayed for all the other fields. Lines 96 to 97 use
the functions included on line 6.

#105 Starts an else block that executes for all fields except the
state field.

#107 Starts an if statement that sets a value for $type — a variable
used in the input field code. The input field is type text for all
fields except the password field, which is type password.

#111 Lines 111 to 117 contain the echo statement that outputs the
HTML code for the field. The echo statement is executed once
for each element in the $fields_2 array. PHP variables are
used for the specific information, such as field names, in the
statement.

#121 Starts an HTML section that displays the submit button for form 2,
closes the tags for form 2, and displays the page text at the bottom of
the Web page.

In double_form.inc, the state field in form 2 is a drop-down list. The code
that creates the list uses two functions stored in the functions.inc file
that’s included on line 6. Listing 4-3 shows the code for the two functions.

**LISTING 4-3: FUNCTIONS THAT CREATE ARRAYS OF STATE NAMES AND CODES**

```php
<?php
function getStateCode()
{
    $stateCode = array(1=> "AL" ,
                       "AK" ,
                       "AZ" ,
                       ...
                       "WY" );
    return $stateCode;
}

function getStateName()
{
    $stateName = array(1=> "Alabama",
                       "Alaska",
                       "Arizona",
                       ...
                       "Wyoming" );
    return $stateName;
}
?>
```
The functions are called on lines 92 and 93 of Listing 4-2. The arrays created by these functions are used to create the drop-down list of states in the `for` statement that starts on line 94 of Listing 4-2.

**Displaying the login Web page**

The file `double_form.inc` is used in conjunction with `fields_login.inc` to display the login Web page. Although the approach to displaying the form might be different in the procedural script versus the object-oriented script, the code that displays the form is the same, as follows:

```php
include("fields_login.inc");
include("double_form.inc");
```

The file containing the arrays of information used when the form is displayed must be included first so that the arrays are available when needed.

If you want to display any information in the form fields, the information must also be available. For instance, if the user submits a form with an error and you redisplay the form, you want the redisplayed form to contain the information the user typed. To do this, you use a variable in the value parameter of the input tag, such as `value="$first_name"`. The variables you use in the input tags must be available.

When the customer submits the form, the information the user typed is passed to the script in the `$_POST` superglobal array. If you redisplay the form, you can get the information from this array to display in the form by using the PHP `extract` function, as follows:

```php
extract($_POST);
```

In this case, the following code displays the form:

```php
extract($_POST);
include("fields_login.inc");
include("double_form.inc");
```

**Building the Login Application: The Procedural Approach**

The login application has one main script that’s organized into three basic sections:

- A section that executes the first time the login page is displayed, before the user clicks a button
A second section that executes when the user clicks the Login button
A third section that executes when the user clicks the Register button

A switch statement controls the program flow based on which button is clicked. The following is an overview of the script’s structure:

```php
switch (Button)
{
    case "Login":
        1 Test whether the user name is in the database. If not, redisplay the form with an error message.
        2 Test whether the password is correct. If not, redisplay the form with an error message.
        3 When login succeeds, display the protected Web page.
    case "Register":
        1 Test whether all the fields are filled in. If not, redisplay the form with an error message.
        2 Test whether the information is in the correct format. If not, redisplay form with an error message.
        3 When information is correct, store it in database.
        4 When registration succeeds, display the protected Web page.
    case "default":
        Display the Login Web Page with blank form fields.
}
```

The default case executes if neither the Login button nor the Register button is clicked.

**Writing the application script**

Listing 4-4 shows the code for the login application script.

```
<?php
/* Program: Login.php
  * Desc:  Main application script for the User Login application. It provides two options: (1) login
  *        using an existing User Name and (2) register a new user name. User Names and passwords are
  *        stored in a MySQL database.
  */
  session_start();

Listing 4-4: Login Application Code
```
include("functions_main.inc");
$table_name = "Customer";
$next_program = "SecretPage.php";

switch (@$_POST['Button'])
{
  case "Login":
    $cxn = Connect_to_db("Vars.inc");
    $sql = "SELECT user_name FROM $table_name WHERE user_name='$_POST[fusername]'";
    $result = mysqli_query($cxn,$sql)
      or die("Couldn't execute query 1");
    $num = mysqli_num_rows($result);
    if($num == 1)
      {
        $sql = "SELECT user_name FROM $table_name WHERE user_name='$_POST[fusername]' AND password=md5('$_POST[fpassword]')";
        $result2 = mysqli_query($cxn,$sql)
          or die("Couldn't execute query 2.");
        $row = mysqli_fetch_assoc($result2);
        if($row)
          {
            $_SESSION['auth']="yes";
            $_SESSION['logname'] = $_POST['fusername'];
            header("Location: $next_program");
          }
        else
          {
            $message_1="The Login Name, '$_POST[fusername]' exists, but you have not entered the correct password! Please try again.<br>
";
            extract($_POST);
            include("fields_login.inc");
            include("double_form.inc");
          }
      }
    elseif ($num == 0) // login name not found
      {
        $message_1 = "The User Name you entered does not exist! Please try again.<br>
";
        extract($_POST);
        include("fields_login.inc");
        include("double_form.inc");
      }
  }
  case "Register":
    /* Check for blanks */
    foreach($_POST as $field => $value)
      {
        if ($field != "fax")
          {
            if ($value =="")
              { }
          }
    }
  }
}
LISTING 4-4: (Continued)

```php
$blanks[] = $field;
}
}
if(isset($blanks))
{
    $message_2 = "The following fields are blank. Please enter the required information: ";
    foreach($blanks as $value)
    {
        $message_2 .= "$value, ";
    }
    extract($_POST);
    include("fields_login.inc");
    include("double_form.inc");
    exit();
}
/* validate data */
foreach($_POST as $field => $value)
{
    if(!empty($value))
    {
        if(eregi("name",$field) and !eregi("user",$field) and !eregi("log",$field))
        {
            if (!ereg("^[A-Za-z']-\{1,50}$",$value))
            {
                $errors[] = "$value is not a valid name.";
            }
        }
        if(eregi("street",$field) or eregi("addr",$field) or eregi("city",$field))
        {
            if(!ereg("^[A-Za-z0-9,\'-]{1,50}$",$value))
            {
                $errors[] = "$value is not a valid address or city.";
            }
        }
        if(eregi("state",$field))
        {
            if(!ereg("^[A-Za-z]$",$value))
            {
                $errors[] = "$value is not a valid state.";
            }
        }
        if(eregi("email",$field))
        {
            if(!ereg("^\.+@.+\..+$",$value))
            {
                $errors[] = "$value is not a valid email
```
Chapter 4: User Login Application

address.

if(eregi("zip",$field))
{
    if(!ereg("^[0-9]{5,5}([-0-9]{4,4})?$","$value")
    {
        $errors[] = "$value is not a valid zipcode.";
    }
}
if(eregi("phone",$field) or eregi("fax",$field))
{
    if(!ereg("^[0-9]{7,20}$","$value")
    {
        $errors[] = "$value is not a valid phone number. ";
    }
}

foreach($_POST as $field => $value)
#
{
    if($field != "Button")
    
    if($field == "password")
    {
        $password = strip_tags(trim($value));
    }
    else
    {
        $fields[] = $field;
        $value = strip_tags(trim($value));
        $values[] = addslashes($value);
        $$field = $value;
    }
}
if(@is_array($errors))
#
{
    $message_2 = "";
    foreach($errors as $value)
    {
        $message_2 .= $value." Please try again<br /">"
    }
    include("fields_login.inc");
    include("double_form.inc");
    exit();
}
$user_name = $_POST["user_name"];
#

/* check to see if user name already exists */
nych = Connect_to_db("Vars.inc");
$sql = "SELECT user_name FROM $table_name"
LISTING 4-4: (Continued)

WHERE user_name='$user_name';  #158
$result = mysqli_query($cxn,$sql)
or die("Couldn't execute query.");

$num = mysqli_num_rows($result);  #170
if ($num > 0)  #171
{
$message_2 = "$user_name already used. Select another
User Name.";
include("fields_login.inc");
include("double_form.inc");
exit();
}
else  #179
{
	$today = date("Y-m-d");  #181
	$fields_str = implode("","$fields");
	$values_str = implode("",’”$values");
	$fields_str .=",create_date";
	$values_str .="".’".,"'.$today;
	$fields_str .=",password";
	$values_str .= "".’".,"'.$md5("".’$password."’)";
	$sql = "INSERT INTO $table_name ";
	$sql .= "(".’$fields_str.”")
	$sql .= "VALUES ";
	$sql .= "(".’".$values_str.”")
mysqli_query($cxn,$sql) or die(mysqli_error($cxn));
$_SESSION['auth']='yes';  #193
$_SESSION['logname'] = $user_name;  #194
/* send email to new Customer */
$emess = "You have successfully registered. ";
$emess .= "Your new user name and password are: ";
$emess .= "\n\n\n$user_name\n
password\n
We appreciate your interest. \n\nIf you have any questions or problems,";
$emess .= " email service@ourstore.com";  #202
$subj = "Your new customer registration";  #203
$mailsend=mail("$email","$subj","$emess");  #204
header("Location: $next_program");  #205
break;  #207

default:  #209
    include("fields_login.inc");
    include("double_form.inc");

?>
The numbers in the following explanation refer to the line numbers in Listing 4-4:

#9  Starts a PHP session.
#10  Includes the file containing the function Connect_to_db, which is used later in the script.
#11  Declares a variable that contains the name of the database table where your customer information is stored.
#12  Declares a variable that contains the name of the script that is the opening Web page of your protected Web site. The script executes when your customer successfully logs in.
#14  Starts the switch statement that comprises the rest of the script. The switch statement tests the value of the Button element in the $_POST superglobal array. The Button element exists only if a user has clicked one of the Submit buttons in the forms.
#16  Begins the case that executes when the Button element has the value of Login — that is, when the user clicked the submit button labeled Login. The statements from line 14 to line 52 are part of the Login case. This case block checks the user name and password submitted against the user names and passwords stored in the database.
#17  Connects to the database by using the function included on line 10.
#18  Lines 18 to 21 build and execute an SQL query to select a record from the database with the user name submitted by the user.
#22  Checks how many records were found that matched the user name submitted by the user. Possible values are 0 or 1.
#23  Begins an if block that executes if 1 record was found. This block checks whether the user entered the correct password.
#25  Lines 25 to 30 build and execute an SQL query to select a record with the user name and password submitted by the user and, after the query is executed, check how many records were found.
#31  Begins an if block that executes if a record was found, meaning that the password is correct. Two session variables are set, and the protected Web page content is displayed.
#37  Begins an else block that executes if no record was found, meaning that the password was incorrect. An error message is created, and the login Web page is redisplayed with the error message.
#47  Begins an elseif block that executes if no record was found with the user name submitted by the user. An error message is created, and the login Web page is redisplayed with the error message.
Begins the case block that executes when Button has the value of Register, meaning that the customer clicked the Register submit button. The statements from line 53 to line 180 compose the Register block.

Starts a foreach loop that checks whether each field of the form is blank. If the field name is not fax (which is not a required field), the field name of any field with a blank value is added to an array named $blanks.

Begins an if block that executes if $blanks is an array — that is, if any fields had blank values. An error message is created that includes the names of the blank fields, and the form is redisplayed with the error message.

Starts a foreach loop that checks the format of the information in each field.

Begins an if block that executes if the value is not blank. Lines 57 to 79 of the script processed the information for blank fields. Therefore, any fields that are blank when they reach this line are fields that are allowed to be blank because they’re not required. The format testing is not needed on blank fields.

The if block (83 to 133) checks each of the fields with information to ensure that the information is in an acceptable format. An if block is executed when specific field names are found and compares the value in each field with a regular expression specific to the field. If the information in the field doesn’t match the regular expression, an appropriate error message is stored in the array called errors.

Starts a foreach loop that processes each field, removing any beginning or trailing blank spaces and any HTML tags. The password is stored in a variable named password. All other fields are stored in two arrays. $fields contains the field names, which need no extra processing. $values contains the values to be inserted into the database, with any quotes escaped. In addition, each value is stored in a variable named with the field name.

If you have magic quotes turned on in the php.ini file, you don’t need to escape the quotes here. The quotes are escaped automatically for the POST data. However, you have more control if you turn magic quotes off and escape the quotes in the script. Whichever way you do it, it’s important that the quotes be escaped before data is stored in the database. See Chapter 2 for a discussion of escaping quotes to protect against SQL Injection attacks.

Begins an if block that executes when the $errors array exists, meaning that at least one error was found. An error message is created, and the form is redisplayed with the error message.

Lines 165 to 170 create and execute a query to select a record with the user name entered by the user. Duplicate user names are not allowed in the database.
Begins an if block that executes if a record is found, meaning that
the user name is already in use. An error message is created, and the
login page is redisplayed along with the error message.

Begins an else block that executes if no record is found, meaning
that the user name is not in use — it’s available.

Stores today’s date.

Lines 182 to 192 build and execute the SQL query that inserts
the new record into the database. The $fields and $values
arrays are converted to strings with the implode function. The
strings are then used to create an INSERT query to add the
record for the newly registered user.

Stores a session variable indicating the user successfully
logged in.

Stores a session variable with the user’s new user name.

Lines 196 to 204 create and send an e-mail message to the new
user.

Displays the protected Web page content.

Begins the default case block. This block executes if neither of the
two preceding cases is true. That is, this block executes if the user
didn’t click either the Login or Registration submit button. This block
displays the login Web page with blank form fields.

The login application script calls a function to connect to the database. The
file containing the function code is included on line 9. Listing 4-5 shows the
function code.

```
<?php
/* Function: Connect_to_db
 * Desc: Connects to a MySQL database. The name of
 *       a file containing the database variables
 *       is passed to the function.
 */
function Connect_to_db($filename)
{
    include($filename);
    $cxn = mysqli_connect($host, $user,$passwd)
        or die ("Couldn't connect to server.");
    $db = mysqli_select_db($cxn,$database)
        or die ("Couldn't select database.");
}
?>
```

Listing 4-5: The Connect_to_db Function
This function gets the information it needs from a separate file. The filename is passed when the function is called. The file contents are something like the following, with your own information, of course:

```php
<?php
$host = "localhost";
$user = "admin";
$passwd = "";
$database = "CustomerDirectory";
?>
```

You should store this file outside your Web space for security reasons. If you set your `include_path` in your `php.ini` file to a location outside your Web space, you can store files there and include them without using a complete pathname.

### Protecting your Web pages

The Web pages in your protected Web site or section of your Web site are no different than any other Web pages. You just want to restrict them to members who are logged in. To do this, you start a session and check whether the user is logged in at the top of every page.

If the user logs in through the `Login.php` application script described in the previous section, a session is started, and the value "yes" is stored in a session variable, as follows:

```php
$_SESSION['auth'] = "yes";
```

You probably want to use your own variable name and value as well as your own filename. `Vars.inc` is fairly obvious, as is `$auth = "yes"`. It’s better if the name and value are less guessable. For instance, you might want to use something totally irrelevant and misleading, such as `Flower.inc`, `$Brad="Pitt"`. Of course, now that these suggestions are published in a book, they aren’t good choices either.

Thus, at the top of every script, you check to see whether the `auth` session variable is set for the user. You must add the following statements to the top of every script that you want available only to logged in users:

```php
session_start();
if (@$_SESSION['auth'] != "yes")
{
    header("Location: Login.php");
    exit();
}
```

When `session_start` executes, PHP checks for an existing session. If one exists, it sets up the session variables.
The if statement checks to see if the auth session variable is set to yes. If it isn’t set to yes or if it doesn’t exist, it means the user is not logged in, in which case the script displays the login Web page and exits. Otherwise, if auth is set to yes, it means the user is logged in, and the script continues to display the Web page.

Building the Login Application:
The Object-Oriented Approach

Object-oriented programming requires that you create and use objects to provide the functionality. You first identify the objects needed for the application, and then you write the classes that define the objects, including the methods that the application needs. When the objects are ready, you write the application script that creates and uses the objects.

Developing the objects

The login application needs to perform the following tasks:

- Collect and process information in a form
- Store information in a database when a customer registers
- Check a user’s password
- Allow the authenticated user to visit pages on the Web site during the user session
- Send the user an e-mail

The following list of objects reflects the tasks this application must perform:

- **WebForm**: A form is central to this application. The form allows customers to register or to enter their user names and passwords if they’re already registered. The WebForm class provides the form for the application. It collects and processes the information typed by a user.

- **Database**: The application stores the customer information in a database. The Database class provides the container that stores the data.

- **Account**: The information entered by the customer needs to be associated with a customer account. The Account class stores and retrieves the customer information.

- **Session**: Typically, you want customers to be able to view more than one page during a visit without having to log in to each page. The time period that a customer spends at your Web site, from when he logs in to
your Web site until he leaves it, is called a session. The Session class allows a visitor to stay logged in for an entire session.

Email: The application sends an e-mail to customers when they register, to let them know that the registration was successful. The Email class contains and manages the e-mail message.

The details for each object are discussed in the following sections.

Writing the WebForm class

One of the most important objects is the form. The definition for the form object is coded in the WebForm class. This class is a general class that can be used to display any form and collect and process the data from any form, not just from the login form used in this application.

The WebForm class displays a form on a Web page, collects the information, reformats the information, and validates the information format, redisplaying the form when incorrect information is detected. WebForm contains four properties, a constructor, and 13 methods.

The properties

The WebForm properties store information needed to define and manage the form and its data. The properties are as follows:

```php
private $form;
private $fields;
private $data;
private $not_required;
```

The first two properties are the names of the files that are needed to display the form. These files are described in the section “Writing the code for the login page,” earlier in this chapter.

The last two properties are arrays. $data contains the information submitted by the customer in the form. The key of each element is a field name — the field name used in both the form and the database table. $not_required is an array containing the field names of fields that are allowed to be blank.

The checkForBlanks method uses this array to identify the fields that are not errors when left blank.

The code

Listing 4-6 contains the complete code for the WebForm class. Each method is discussed in detail after the code listing. Notice the line numbers at the ends of some code lines. The discussion following the listing refers to the line numbers.
<?php
/*  Class:  WebForm
*  Desc:   Class that collects, stores, and processes
*          information in an HTML form.
*/

class WebForm
{
    private $form;       //filename
    private $fields;     //filename
    private $data;       //array
    private $not_required; //array

    function __construct($form,$fields,$data=NULL)
    {
        if(is_string($form) and is_string($fields)) #16
            {
                $this->form = $form;
                $this->fields = $fields;
            }
        else #21
            {
                throw new Exception("First 2 parameters
                                    must be filenames");
            }
        if($data == NULL OR is_array($data)) #26
            {
                $this->data = $data;
            }
        else #30
            {
                throw new Exception("Form data must be passed
                                    in an array");
            }
    }

    function setFieldsNotRequired($not_required) #37
    {
        if(!is_array($not_required))
            {
                throw new Exception("Fields must be passed
                                    in an array");
            }
        else
            {
                $this->not_required = $not_required;
            }
    }
}

Continued
LISTING 4-6: (Continued)

```php
function displayForm()
{
    @extract($this->data);
    include($this->fields);
    include($this->form);
}

function getAllFields()
{
    return $this->data;
}

function checkForBlanks()
{
    if(sizeof($this->data) < 1 )
        throw new Exception("No form data available");
    foreach($this->data as $key => $value)
    {
        if($value == "")
        {
            $match = false;
            if(is_array($this->not_required))
            {
                foreach($this->not_required as $field)
                {
                    if($field == $key)
                    {
                        $match = true;
                    }
                }
                if($match == false)
                {
                    $blanks[] = $key;
                }
            }
            if($match == false)
            {
                $blanks[] = $key;
            }
        }
    }
    if(isset($blanks))
        return $blanks;
    else
        return TRUE;
}

function verifyData()
{
    if(sizeof($this->data) < 1 )
        throw new Exception("No form data available.");
    foreach($this->data as $key => $value)
    {
        if(!empty($value))
        {
            if(ereg("name",$key) and !ereg("log",$key)
```
and !eregi("user",$key))
{
    $result = $this->checkName($value);
    if(is_string($result))
        $errors[$key] = $result;
}
if(eregi("addr",$key) or eregi("street",$key) or eregi("city",$key))
{
    $result = $this->checkAddress($value);
    if(is_string($result))
        $errors[$key] = $result;
}
if(eregi("email",$key))
{
    $result = $this->checkEmail($value);
    if(is_string($result))
        $errors[$key] = $result;
}
if(eregi("phone",$key) or eregi("fax",$key))
{
    $result = $this->checkPhone($value);
    if(is_string($result))
        $errors[$key] = $result;
}
if(eregi("zip",$key))
{
    $result = $this->checkZip($value);
    if(is_string($result))
        $errors[$key] = $result;
}
if(eregi("state",$key))
{
    $result = $this->checkState($value);
    if(is_string($result))
        $errors[$key] = $result;
}

if(isset($errors))
    return $errors;
else
    return TRUE;
}

function trimData()
{
    foreach($this->data as $key => $value)
    {
        $data[$key] = trim($value);
    }
    $this->data = $data;
}

Continued
function stripTagsFromData()
{
    foreach($this->data as $key => $value)
    {
        $data[$key] = strip_tags($value);
    }
    $this->data = $data;
}

function checkName($field)
{
    if(!ereg("^[A-Za-z']\{1,50}\$","$field")
    {
        return "$field is not a valid name. Please try again.";
    }
    else
        return TRUE;
}

function checkAddress($field)
{
    if(!ereg("^[A-Za-z0-9,.']\{1,50}\$","$field")
    {
        return "$field is not a valid address. Please try again.";
    }
    else
        return TRUE;
}

function checkZip($field)
{
    if(!ereg("^[0-9]\{5\}(\-[0-9]\{4\})?\$","$field")
      return "$field is not a valid zip code. Please try again.";
    else
      return TRUE;
}

function checkPhone($field)
{
    if(!ereg("^[0-9]\{7,20\}\$","$field")
      return "$field is not a valid phone number. Please try again.";
    else
      return TRUE;
}

function checkEmail($field)
{
The constructor

The constructor checks to see whether the information passed to the class is the correct type of data. If it is, it stores the data. If it isn’t, it throws an exception with the appropriate message. On line 16, the constructor checks whether the first two parameters, which need to be filenames, are strings. On line 26, it checks whether the data that is passed in the third parameter is in an array. The data is also allowed to be NULL, which allows the form to be displayed the first time, before the customer has entered information and submitted it. Thus, you can create a WebForm object with either of the following statements:

```php
$form = new WebForm("file1.inc","file2.inc",$_POST);
$form = new WebForm("file1.inc","file2.inc");
```

If you use the second form, the $data property is NULL. This won’t cause an error.

**setFieldsNotRequired**

The setFieldsNotRequired method checks to see whether the parameter passed is an array. If it is, it stores it in a property. If not, it throws an exception with the appropriate message.

**displayForm**

This displayForm method displays the form. It extracts the data from the $data property where it’s stored. An @ is used to suppress the error messages so that the form can be displayed without any data. The two files that define the form are then included. These two files can define any type of form with fields and elements you want to use. For this application, I use the files described earlier in this chapter that define a login Web page with two forms.

```php
if(!ereg("^.+@.+\..+$",$field))
    return "$field is not a valid email address.
    Please try again.");
else
    return TRUE;
}
function checkState($field)
{
    if(!ereg("^[A-Za-z]",$field))
        return "$field is not a valid state.
        Please try again.");
    else
        return TRUE;
}
?>
getAllFields

The getAllFields method returns the $data property array that contains the data in the form.

checkForBlanks

The checkForBlanks method checks each field in the form to see whether it contains information. If invalid blank fields are found, it returns an array containing the field names of the blank fields. The following explanation refers to line numbers in Listing 4-6:

#64 Checks whether $data contains an array of data. If not, it throws an exception stating that no data is currently in the form.
#67 Starts a foreach loop that walks through the $data array. The foreach loop checks for blank fields. An array is built that contains the field names of all blank fields.
#69 Begins an if block that executes if the field is blank. The block ends on line 86.
#71 Sets the variable $match equal to false.
#72 Starts an if block that executes if any field names are stored in $not_required. If so, the current field is compared to each value in $not_required, and if a match is found, $match is set to true. After the current field is checked against the field names in $not_required, line 82 checks whether a match was found. If $match = false, the current field name is not in the array of fields that can be blank, which means that the field is not allowed to be blank, and the field name is added to an array called $blanks.
#88 After all the blank fields are processed, an if statement checks whether any field names were added to the array $blanks. If so, the array is returned. Otherwise, if the $blanks array is empty, the method returns TRUE, meaning that all the fields are okay.

verifyData

The verifyData method checks each field to ensure that the information submitted in the field is in a reasonable format. For instance, you know that “hi you” is not a reasonable format for a zip code. A zip code must be in one of two formats: either 12345 or 12345-6789. If you check the information submitted by your customer for reasonable formats, you can catch many typos. You can also prevent the bad guys from entering malicious code into your form fields.

Checking data is a balancing act. You want to catch as much bad information as possible. However, you don’t want to stop legitimate information from getting through. For instance, if you limit a phone number to numbers only, any phone numbers with a hyphen or parentheses — as in (123) 555-6789 — or
other legitimate characters would be stopped as errors. Think carefully about what information you want to allow or screen out for any field.

This method checks the information from specific fields against regular expressions that match the information allowed in those fields. The following explanation refers to line numbers in Listing 4-6:

#96 Checks whether $data contains any information. If not, the method throws an exception with an appropriate message.

#98 Starts a foreach loop that walks through the array in the $data property. The foreach loop checks the format of all the data fields. Any format errors found are added to an array called $errors.

#100 Begins an if block that executes if the field is not blank. Blank fields are not checked because they would always be incorrect, but some fields are allowed to be blank. The method checkForBlanks is usually used before this method to catch any blank fields that are not allowed to be blank. In this if block, the information in each field is checked against an appropriate regular expression.

#102 Begins an if block that executes if the field name contains "name", such as first_name, and does not include "log" or "user". The requirements for names are more restrictive than for user names, so this statement excludes field names that might be user names. On line 105, the information in the field is passed to the checkName method, which compares the value to the regular expression for names. If checkName approves the value, it returns TRUE. If the value doesn’t match the regular expression, checkName returns an informative message. The checkName method is discussed later in this section.

Line 106 checks the value returned by checkName. If it’s a string, which means that the value didn’t pass muster, the string is added to an array named $errors.

#109 Begins an if block that executes if the field name contains "addr" or "street" or "city". It processes the field information as described for line 102. The method checkAddress is called.

#116 Begins an if block that executes if the field name contains "email". The method checkEmail is called.

#122 Begins an if block that executes if the field name contains "phone" or "fax". The method checkPhone is called.

#128 Begins an if block that executes if the field name contains "zip". The method checkZip is called.

#134 Begins an if block that executes if the field name contains "state". The method checkState is called. Even though the state field is a drop down list, you need to check its format. Bad guys can change the field to a text field and send it with some malicious code in the field.
After all the field values have been processed, the method checks whether any strings were added to the array `$errors`. If so, the array is returned. If not, meaning that all the field information is okay, the method returns `TRUE`.

This `WebForm` class verifies fields that are commonly collected in forms, such as addresses and phone numbers. To use this class to verify data in a form with less common fields, such as age or birthday or favorite hobbies, you can add methods to the class that check your specific information.

Or, if you expect to use the different forms frequently, you can create classes to represent the different forms you use. For instance, you can have a class `WebForm` that contains all the methods in this `WebForm` class except the methods that verify data. Then you can have two (or more) classes, such as `WebFormAddress` and `WebFormPersonal`, that have `WebForm` as a parent and contain only the methods that verify data. For instance, you can define `WebFormAddress extends WebForm` and `WebFormPersonal extends WebForm`. In this case, the two child classes inherit all the methods of `WebForm`, so they don’t need to contain those methods themselves. They need to contain only the methods for verifying data because those are the methods that are different in `WebFormAddress` than in `WebFormPersonal`.

*trimData, stripTagsFromData*

A PHP function is applied to each value in the `$data` property. The resulting values are stored in `$data`. The `trim` function removes leading and trailing blanks from a string. The `strip_tags` function removes any HTML tags from the string, which is important for security.

*checkName, checkAddress, checkZip, checkPhone, checkEmail, checkState*

These methods compare the values sent to them with regular expressions for the type of data expected. For instance, `checkZip` checks the string passed to it to see whether it consists of five numbers or five numbers followed by a dash and four numbers.

If the comparison against the regular expression fails, a message is returned stating that the field is invalid. If the string is okay, the method returns `TRUE`.

**Writing the Database class**

The `Database` class provides the connection to the database where the customer information is stored. The `Database` class is developed in Chapter 3; see Listing 3-4 for the `Database` class code.
The methods provided by the Database class are as follows:

- **The constructor**: Creates a connection to a MySQL database. Expects to be passed a file name, which contains the hostname, account name, and password necessary to access MySQL. A Database object is created with the following statement:

  ```php
  $db = new Database("Vars.inc");
  ```

- **useDatabase**: Selects a database and stores the database name. Expects to be passed a database name. Checks whether the database exists and returns a message if the database doesn’t exist. The method is used as follows:

  ```php
  $db->useDatabase("Customer");
  ```

- **getConnection**: Returns the connection that is established and stored in the constructor. The method is used as follows:

  ```php
  $db->getConnection();
  ```

## Writing the Account class

The Account class specifies the record in the database table that contains the customer account information. The Account class that is developed in Chapter 3 is used in this application, but I’ve added a method in this chapter. See Listing 3-5 for the Account class used in Chapter 3. In this chapter, the method `createNewAccount` is added to the Account class. The code for this new method is shown in Listing 4-7.

### Summary of account methods

The methods provided by the Account class are as follows:

- **The constructor**: Creates a connection to a MySQL table where account information is stored. Expects to be passed a database connection and a table name. The method checks whether the parameters passed are in the correct format. It also checks whether the database table exists.

  An Account object is created with the following statement:

  ```php
  $acct = new Account($connection,"tablename");
  ```

  An Account object is often created for use with a Database object. You can create it with the following statements:

  ```php
  $db = new Database("Vars.inc");
  $acct = new Account($db->getConnection,"tablename");
  ```

- **selectAccount**: This method stores the `user_name` of the currently active account. The user name is passed when `selectAccount` is called. The method checks whether the user name exists in the database. The method is used with the following statement:

  ```php
  $acct->getConnection();
  ```
getMessage: This method returns the content of the $message property. The method is used with the following statement:

```
acct->getMessage();
```

comparePassword: This method compares the password passed to the method with the password stored in the database for the current account. This method fails if no account has been selected. Use selectAccount to select an active account before using this method. The method is used with the following statement:

```
acct->comparePassword("secret");
```

createNewAccount: This method stores customer information into a new record in the database table, creating a new account. The information is passed to this method in an array. This method assumes that the data has already been cleaned and verified and is ready to be stored in the database. The method is used with the following statement:

```
acct->createNewAccount($data_array);
```

createNewAccount
This method stores customer information into the database table in a new record. This method accepts the data from an array and stores it without checking it. The data should be cleaned and validated before it’s passed to this method.

Each element in the array passed to this method stores the customer information with the field name as the key. This method first creates two arrays: one containing the keys and one containing the customer information. It then reformats each array into a string. Finally, it builds the SQL query to insert the new record, putting the strings in the appropriate location in the query, and executes the query to create the new record.

The code for createNewAccount is shown in Listing 4-7.

```php
function createNewAccount($data) {
    if(!is_array($data)) {
        throw new Exception("Data must be in an array.");
        return FALSE;
    }
    foreach($data as $field => $value) {
        if($field != "password" and $field != "Button") {
            // Code continues here...
        }
    }
}
```
The numbers in the following discussion refer to the line numbers in Listing 4-7:

#97 Starts an if block that executes if the data passed is not an array, in which case an exception is thrown.

#102 Begins a foreach loop that walks through the array of data that was passed. The loop creates two arrays: $fields, which contains the field names, and $values, which contains the field data.

#104 Screens out the fields password, which gets special processing later, and Button, which should not be added to the arrays because it’s not really a field name.

#106 Builds the $fields array with the field names from the data array keys.

#107 Builds the $values array. Because the values in this array are going to be inserted into the database, quotes are escaped before the values are added to the array.

If you have magic quotes turned on in the `php.ini` file, you don’t need to escape the quotes here. The quotes are escaped automatically for the POST data. However, you have more control if you turn magic quotes off and escape the quotes in the script. Whichever way you do it, it’s important that the quotes be escaped before data is stored in the database. See Chapter 2 for a discussion of escaping quotes to protect against SQL Injection attacks.
Calls the PHP `implode` function, which turns the `$fields` array into a string, with a comma between each field name.

Calls the PHP `implode` function, which turns the `$values` array into a string, with a quote, a comma, and a second quote (",") between each value. Notice that a double quote is added to the beginning of the string. This string forms the VALUES section of the query, and the values need to be enclosed in quotes.

Stores the current date in `$today`.

Lines 113 to 116 add the field names and values for the fields `create_date` and `password` to the appropriate strings.

Lines 117 and 118 create the SQL query that inserts the data into the database table.

Begins an `if` block that executes if the query fails. The `if` block throws a new exception with the MySQL error message.

Begins an `else` block that executes if the query succeeds in storing the new account information. The block returns `TRUE`.

Writing the `Session` class

The `Session` class is used so that the customer doesn’t have to log into every page on the protected Web site. The `Session` class starts a PHP session and stores session variables.

The properties

The `Session` class needs only one property, which contains a message stored by a method.

```php
private $message;
```

The code

Listing 4-8 contains the complete code for the `Session` class. The constructor and each of the four methods is discussed in detail after the code listing. Notice the line numbers at the ends of some of the lines of code. The discussion following the listing refers to the line numbers.

```
<?php
 /* Class: Session
  * Desc: Opens and maintains a PHP session.
```
class Session {
    private $message;

    function __construct() {
        session_start();
    }

    function getVariable($varname) {
        if(isset($_SESSION['$varname'])) {
            return $_SESSION['$varname'];
        } else {
            $this->message = "No such variable in this session";
            return FALSE;
        }
    }

    function storeVariable($varname, $value) {
        if(!is_string($varname)) {
            throw new Exception("Parameter 1 is not a valid variable name.");
            return FALSE;
        } else {
            $_SESSION['$varname'] = $value;
        }
    }

    function getMessage() {
        return $this->message;
    }

    function login(Account $acct, $password) {
        if(!$acct->comparePassword($password)) {
            return FALSE;
        }
        $this->storeVariable("auth","yes");
        return TRUE;
    }
}
The constructor
The constructor starts the PHP session. The PHP session_start function checks to see whether a session already exists. If not, it starts a new session. If so, it continues the existing session. The constructor doesn’t expect any information to be passed. Thus, the statement to create a Session object is

$sess = new Session();

getVariable
This method returns the value of a stored PHP session variable. It checks whether the variable exists in the session. If it does, the method returns the variable value. If the variable doesn’t exist, the method returns FALSE and stores an informative message.

storeVariable
This method stores a PHP session variable. The method expects two values: a string that is the variable name and a value for the variable. The following numbers refer to line numbers in Listing 4-8:

#29 Begins an if block that executes when the first parameter is not a string. The block throws an exception with a message stating that the parameter is not a valid variable name.

#35 Begins an else block that executes if the parameter is a string. The block stores the information in the $_SESSION superglobal array and uses the variable name as the key.

getMessage
This method returns the contents of the $message property.

login
This method logs an Account into the session.

#44 Notice that the method expects two arguments: an Account object and a string that is a password. The name of the object that is expected is included in the method signature. If $acct is not an Account object, a fatal error occurs, as follows:

Fatal error: Argument 1 must be an object of class Account in c: \Session.class on line 39

#46 Calls the comparePassword method of the Account object that was passed to the login method. If the comparePassword method fails, the login method returns FALSE.
If the comparePassword method does not fail, the login method stores a PHP session variable called auth with a value of "yes". This variable can be checked on other pages in the session to see if the user is logged in. You can change this method to store a different variable name and value if you prefer. In fact, you can make the method more general by having the name and value of the authorization variable passed rather than coded right in the method.

After storing the authorization variable, the login method returns TRUE.

Writing the Email class

After a new customer successfully registers, the application sends a verification e-mail message to the e-mail address provided by the customer.

The properties

The Email class stores the information needed to send an email message.

```php
private $message;
private $addr;
private $subj;
```

$message contains the contents of the message. $addr contains the email address to which the message will be sent. $subj contains the text line that will be the subject line of the e-mail message.

The code

Listing 4-9 contains the complete code for the Email class. The four methods are discussed in detail after the code listing. Notice the line numbers at the ends of some of the lines of code. The discussion following the listing refers to the line numbers.

<table>
<thead>
<tr>
<th>LISTING 4-9: THE CODE FOR THE EMAIL CLASS</th>
</tr>
</thead>
</table>
| <?php
  /*  Class:  Email
   *  Desc: Stores an email message.
   */
  class Email
  {
    private $message;
    private $addr;
  }
  Continued |
private $subj;

function setMessage($message) {
    if(!is_string($message))
        throw new Exception("Message must be a string");
    else
        {
            $this->message = $message;
            return TRUE;
        }
}

function setAddr($addr) {
    if(!is_string($addr))
        {
            throw new Exception("Address must be a string.");
            return FALSE;
        }
    else
        {
            $this->addr = $addr;
            return TRUE;
        }
}

function setSubj($subj) {
    if(!is_string($subj))
        throw new Exception("Subject must be a string");
    else
        {
            $this->subj = $subj;
            return TRUE;
        }
}

function sendEmail() {
    if(!empty($this->subj) and
        !empty($this->addr) and
        !empty($this->message))
        { #49
            if(!mail($this->addr,$this->subj,$this->message))
                throw new Exception("Email could not be sent.");
            else
                return TRUE;
        }
    else #58
        {
            
        }
    }
The constructor

The Email class doesn’t need a constructor because no actions need to be performed when the Email object is created.

setSubj, setAddr, setMessage

These methods store the information needed to send the e-mail message. Each method checks to see if the information passed is a string. If not, it throws an exception with an informative message. If so, it stores the information in the appropriate property and returns True.

sendEmail

This method sends the e-mail message.

#49 Begins an if block that executes if all the required information is available. If none of the required properties are empty, the e-mail is sent. If the e-mail send is successful, the method returns True. If the send fails, an exception is thrown with a message.

#58 Begins an else block that executes if any of the properties are empty. An exception is thrown with a message.

This Email class is very simple. You can easily see where additional methods could be useful. For instance, a method that allows more than one e-mail address to be saved might be useful. Another useful method could set e-mail headers, such as a from header. However, for this application, the methods are sufficient.

Writing the login application script

After writing all the class code needed for the login application, you write the application script that creates and uses the objects to provide the application’s functionality. The application script has the following general structure:

if (form has not been previously displayed and submitted)
    Display the Login Web Page with blank form fields
else (if the form has been submitted by the user)
    if (the user submitted the login form)
1. Test whether all the fields are filled in. If not, redisplay the form with an error message.
2. Test whether the user name is in the database. If not, redisplay the form with an error message.
3. Test whether the password is correct. If not, redisplay the form with an error message.
4. When login succeeds, display the protected Web page.

elseif (the user submitted the registration form)
1. Test whether all the fields are filled in. If not, redisplay the form with an error message.
2. Test whether the information is in the correct format. If not, redisplay form with error message.
3. When information is correct, store it in database.
4. Display the protected Web page.

The application program creates objects and uses their methods to perform these tasks. The application program script is shown in Listing 4-10.

**LISTING 4-10: THE LOGIN APPLICATION SCRIPT**

```php
<?php
/* Program: Login-OO.php
 * Desc: User Login Application script. The program displays the Login Web page. New customer registration information is validated and stored in a database. Existing customers' passwords are compared to valid passwords. */
require_once("WebForm.class");
require_once("Account.class");
require_once("Database.class");
require_once("Session.class");
require_once("Email.class");

try {
    $form = new WebForm("double_form.inc","fields_login.inc",$_POST);
}catch(Exception $e){
    echo $e->getMessage();
    exit();
}

//First time form is displayed. Form is blank. //
if (!isset($_POST['Button'])) {
    $form->displayForm();
    exit();
}

// Process form that has been submitted with user info //
```
{
    $sess = new Session(); #34
    try
    {
        $db = new Database("Vars.inc"); #37
        $db->useDatabase("CustomerDirectory"); #38
        $acct = new Account($db->getConnection(), "Customer");
    }
    catch(Exception $e)
    {
        echo $e->getMessage() . "\n<br>";
        exit();
    }

    // Login form was submitted //
    if (@$_POST['Button'] == "Login") #48
    {
        try
        {
            $blanks = $form->checkForBlanks(); #52
        }
        catch(Exception $e)
        {
            echo $e->getMessage();
            exit();
        }
        if(is_array($blanks)) #59
        {
            $GLOBALS['message_1'] = "User name or Password was blank. Please enter both.";
            $form->displayForm();
            exit();
        }
        try
        {
            if(!$acct->selectAccount($_POST['fusername'])) #69
            {
                $GLOBALS['message_1'] = $acct->getMessage(). " Please try again.";
                $form->displayForm();
                exit();
            }
            if(!$sess->login($acct,$_POST['fpassword'])) #76
            {
                $GLOBALS['message_1'] = $acct->getMessage(). " Please try again.";
                $form->displayForm();
                exit();
            }
            header("Location: SecretPage.php"); #83
            exit();
        }
    }
}
LISTING 4-10: (Continued)

```php
};
catch(Exception $e)
{
    echo $e->getMessage();
}

// Registration form was submitted //
elseif($_POST['Button'] = "Register")
{
    $not_required[] = "fax";
    try
    {
        $form->setFieldsNotRequired($not_required);
        $blanks = $form->checkForBlanks();
    }
    catch(Exception $e)
    {
        echo $e->getMessage();
    }
    if(is_array($blanks))
    {
        $GLOBALS['message_2'] = "The following required fields were blank. Please enter the required information: ";
        foreach($blanks as $value)
        {
            $GLOBALS['message_2'] .= "$value, ";
        }
        $form->displayform();
        exit();
    }
    $form->trimData();
    $form->stripTagsFromData();
    try
    {
        $errors = $form->verifyData();
    }
    catch(Exception $e)
    {
        echo $e->getMessage();
    }
    if(is_array($errors))
    {
        $GLOBALS['message_2'] = "";
        foreach($errors as $value)
        {
            $GLOBALS['message_2'] .= "$value<br> ";
        }
        $form->displayform();
        exit();
    }
    $newdata = $form->getAllFields();
```
try
{
if($acct->selectAccount($newdata['user_name'])) #140
{
    $GLOBALS['message_2'] =
    "Member ID already used."
    $form->displayForm();
    exit();
}
if(!$acct->createNewAccount($newdata)) #148
{
    echo "Couldn't create new account."
    "Try again later."
    exit();
}
$sess->storeVariable("auth","yes"); #154
$sess->storeVariable("logname",$newdata['user_name']);

$em = new Email(); #156
$em->setAddr($newdata['email']);
$em->setSubj("Your new customer registration");
$emess = "Your new customer account has been setup.
Your new user name and password are: 
\n\n\n";
$emess .= "\n\n\n\n$newdata['email']\n\n\n\n";
$emess .= "\n\n\n\n$newdata['password']\n\n\n\n";
$emess .= "\n\n\n\nWe appreciate your interest. 
\n\n\n";
$emess .= "\n\n\n\nIf you have any questions or problems,"
$emess .= " email service@ourstore.com"
$em->setMessage($emess);
$em->sendEmail(); #167
}
catch(Exception $e)
{
    echo $e->getMessage();
    exit();
}
header("Location: SecretPage.php");
}?

Notice that many of the statements in this script are enclosed in try/catch blocks. If a method throws an exception and the exception is not caught, a fatal error occurs as follows:

Fatal error: Uncaught exception 'Exception' with message 'Database is not available.' in c:\Database.class:56

Therefore, you need to catch any exception thrown by a method either in the method itself or in the script that uses the method.
The following explanation of the script refers to the line numbers in Listing 4-10:

- **#9** Lines 9 to 16 include all the needed files.
- **#15** Begins a `try/catch` block that creates the `WebForm` object.
- **#26** Begins an `if` block that executes if no button was clicked, meaning the form has not yet been submitted. The block displays the login Web page with blank form fields.
- **#32** Begins an `else` block that executes if a button was clicked, meaning the user submitted the form. This block does all the form processing and password authentication.
- **#34** Creates a `Session` object.
- **#37** Lines 37 and 38 create a `Database` object and select the correct database.
- **#39** Creates an `Account` object.
- **#48** Begins an `if` block that executes when the user submits the login form. This block tests whether the user name and password submitted are valid.
  - **#52** Checks the login form fields for blanks. None can be blank.
  - **#59** Begins an `if` block that executes if any fields are blank. An error message is created, and the form is redisplayed. Notice that the error message is stored in the `$GLOBALS` array so that the `WebForm` method has access to the message.
  - **#69** Begins an `if` block that executes when the user name is `not` found in the database. An error message is created, the form is redisplayed, and the script exits.
  - **#76** Begins an `if` block that executes when the password from the form does not match the password stored in the database for this user. An error message is created, and the form is redisplayed.
  - **#83** Displays a protected Web page. The name `SecretPage.php` is just a sample name. You want to use the name of a script on your Web site that you want the customers to see when they log in — in other words, the main, or home, page of your protected Web site.
  - **#93** Begins an `elseif` block that executes when the user submits the registration form. This block processes and stores the information from the form fields.
  - **#95** Creates an array containing the name of the field that is allowed to be blank. In this case, `fax` is the only field that can be left blank.
Sets the name of the field that is allowed to be blank.

Checks the form for blank fields. An array of the names of fields that are blank is returned. If fax is blank, it is ignored.

 Begins an if block that executes if the $blank array contains any elements — that is, if any fields are blank. An error message is created, and the form is redisplayed. Notice that the error message is stored in the $GLOBALS array so that the WebForm method has access to the message.

Trims the data in all the fields.

Removes any HTML tags from the data in the fields.

Checks that the data is in the correct format. The methods return an array of error messages if any data is incorrectly formatted.

 Begins an if block that executes if the $errors array contains any elements — that is, if any fields contain bad data. An error message is created, and the form is redisplayed with the error message.

 Gets the data from the WebForm object. You need to store the data from the object. You don’t store the data from the $_POST array that the user entered into the form because the data might have been changed on lines 120 and 121.

 Begins an if block that executes if the user name was found in the database. Duplicate user names are not allowed. An error message is created, and the form is redisplayed.

 Begins an if block that executes if the createNewAccount method fails. An error message is displayed, and the script exits.

 Stores the session variable that indicates that the user successfully logged in. The script reaches this line only when no error conditions were found.

 Stores the user name in a session variable for use later in the session.

 Lines 156 to 167 create and send an e-mail message to the customer that his or her new account has been successfully installed.

 Displays a protected Web page. The name SecretPage.php is just a sample name. You want to use the name of a script on your Web site that you want the customers to see when they log in — in other words, the main page (or home page) of your protected Web site.
Protecting your Web pages

The Web pages in your protected Web site or protected section of your Web site are no different than any other Web pages. You just want to restrict them to users who are logged in. To do this, you check whether the user is logged in at the top of every page.

If the user logs in via the Login-OO.php application script described in the preceding section, a session is started, and the value "yes" is stored in a session variable, as follows:

```
$sess->setVariable("auth","yes");
```

You can check this $auth session variable at the top of every protected Web page to see if it’s set to "yes". If so, the user is logged in. You can add the following statements to the top of every script to check the $auth session variable:

```
require_once("Session.class");
$sess = new Session();
if($sess->getVariable("auth") != "yes")
{
    header("Location: Login-OO.php");
    exit();
}
```

When you create the session object, PHP checks to see whether a current session exists for the user. If so, the current session variables are made available to the script.

The if statement tests whether the session variable $auth equals "yes". If $auth is not set to "yes" or if $auth doesn’t exist, the user isn’t logged in, and the if block is executed, taking the user to the login Web page and exiting the current script. If $auth is set to "yes", the script continues to display the Web page contents.

Adding Features to the Application

The login application in this chapter provides basic login functionality. Additional features can be added. Some common features of login applications that are not provided in this chapter are:

- **Forgotten password button**: It’s almost guaranteed that users will forget their passwords. Many applications provide a button that users can click when they can’t remember their passwords. Some applications e-mail the password to the user, and some provide a page where the user can change the password.
If you want to e-mail the user her password from the database, you need to use a different password encryption function, because `md5()`, used in this application, is a one-way encryption function. You can’t retrieve the password in its original form. The password is protected from everyone, even you. Many users feel more secure knowing that no one can find out their password. If you want two-way encryption so that you can decrypt the password and e-mail it to the user, check the AES and DES functions in MySQL or the `mcrypt` function in PHP.

Rather than retrieve the password and e-mail it to the user, which is basically an unsecure procedure, you can provide the users with a Web page where they can change their passwords. However, you need to be sure that only the actual account owner can change the password. Many applications request and store the answer to a security question, such as your mother’s maiden name, and require the correct answer before making any changes to the account.

✔️ **Account management:** Users move and change their phone numbers. Their e-mail addresses can change. A feature that allows users to change the information stored for their accounts is handy. Many login applications provide a “manage your account” button that provides Web pages where a user can change his address, phone number, password, and so forth.

You can add these common features or features that are very specific to your Web site. But first, I suggest that you get the application working as it is. Then, when it’s working, you can add features, one at a time. Don’t change too many things at once. Troubleshooting one feature at a time is easiest.

In general, adding features to the object-oriented application is easier than adding to the procedural application. One of the strengths of object-oriented programming is that you can add code without needed to change the existing code. If you believe your application is likely to grow in the future, you might be wise to build the object-oriented application.
“Ms. Lamont, how long have you been sending out bills listing charges for ‘Freight’, ‘Handling’, and ‘Sales Tax’, as ‘This’, ‘That’, and ‘The Other Thing’?”
In this part . . .

In this part, I provide two applications related to online sales. The first application displays a catalog of products (Chapter 5). The second application allows customers to purchase products online (Chapter 6). For each application, I show two different methods — procedural and object oriented.
Chapter 5
Online Catalog Application

In This Chapter
- Designing Web pages that display products
- Building the database to store product information
- Writing procedural code for the Catalog application
- Developing and using objects to program the Catalog application

The online catalog application is one of the most common applications on the Web. Whether the Web site is offered by an individual with a handful of products or a huge company with gazillions of products, the principle is the same. The customer needs to see the products and information about them before buying anything.

On many Web sites with catalogs, customers can purchase the catalog items online. In this chapter, I provide a catalog application that doesn’t include online purchasing functionality. The application in this chapter only displays the catalog. The application in Chapter 6 is an online purchasing application, which provides the ability to purchase catalog items online.

Designing the Online Catalog Application

The basic function of the online catalog application is to display a store’s products to the customers. If a store offers only a dozen products, you can just display them all on one page. However, a store generally offers many products, more than you can reasonably display on a single Web page. Usually, the products are categorized. A small number of products can be successfully categorized by one category level. If the store offers a large number of products, however, you might need to use two, three, or more category levels to successfully categorize the products into categories small enough to be displayed. For instance, the example in this chapter is a store that sells food products. I use two category levels for this example. Foods are categorized first at the high category level, such as fruit, vegetables, herbs, and so on. Second levels within the high level of fruit might be apple, orange, and cherry. The product might be Delicious or Granny Smith, which would be in the category fruit: apple.
If your products are categorized, the online catalog typically first displays a page showing the categories available. The customer can select a category to see all the products in that category. If you have several levels of categories, the customer might need to select successive categories before reaching the product Web page.

Even with categories, some stores might have many products in a single category. For instance, Sears probably has many products in the category “Dresses” or even “Evening Dresses.” A common practice when displaying a large number of products is to display only a certain number of products (often ten) on a page. The customer clicks a button to see the next set of products or the previous set of products.

To meet its basic functionality, the online catalog application should

- Display the product categories from which the user can select.
- Display the products in the category the user selects. It should display all the product information (price, description, and so on) needed by the customer. It should display the products one page at a time if the product list is quite long.

Creating the Catalog Database

The application design calls for a database that stores product information. The database is the catalog, the core of this application. The database stores the product names, ordering numbers, description, price, and any other relevant information, such as size, color, and so on.

Designing the Catalog database

Your first design task is to select the information you want to store. What you store depends on the type of product. You need to store any information that a customer might use when deciding which product to purchase. The store owner, who knows the products and what customers need to know, can provide this information along with graphics of the products. Some possible information to store might include

- **Product name**: Obviously, customers will need this information.
- **Product ID**: In most cases, the product name is not unique, so you usually need to store a product number, a unique number that identifies the product to the purchaser.
- **Product description**: A text description of the product.
Size: A product might come in sizes. Even when only one size is available, customers need information about the size for some purposes. For instance, you might have only one size coffee table for sale, but the customers still need to know the size to know whether it will fit in their living rooms.

Color: A product might come in several colors.

Price: Customers will surely want to know how much the products cost!

Product availability: Customers might also like to know when the product was added to the catalog, whether it’s in stock, or when it’s due to arrive.

You can add information for your use only to your product entry in the database. For instance, you might add information about the company that supplies you with the product. This information is stored in the database, but never displayed to customers.

The store in this example is called The Food Shop. It sells food items. At the present time, it sells fruit and vegetables, but the store owners hope to expand to other items soon.

The database contains only one table. The product information is stored one row per product. The fields needed for the table are shown in Table 5-1.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>catalog_number</td>
<td>INT(6)</td>
<td>Product identification number, assigned sequentially by MySQL (primary key).</td>
</tr>
<tr>
<td>name</td>
<td>VARCHAR(40)</td>
<td>Name of the individual product.</td>
</tr>
<tr>
<td>added_date</td>
<td>DATE</td>
<td>Date the product was added to the catalog.</td>
</tr>
<tr>
<td>category</td>
<td>VARCHAR(20)</td>
<td>First-level category name.</td>
</tr>
<tr>
<td>type</td>
<td>VARCHAR(20)</td>
<td>Second-level category name.</td>
</tr>
<tr>
<td>description</td>
<td>VARCHAR(255)</td>
<td>Description of the product.</td>
</tr>
<tr>
<td>price</td>
<td>DECIMAL(7,2)</td>
<td>Price of the product. All prices are entered at price per pound.</td>
</tr>
<tr>
<td>pix</td>
<td>VARCHAR(20)</td>
<td>Filename of the graphic file that contains an image of the product.</td>
</tr>
</tbody>
</table>
The table has eight fields. All fields except description are required and may not be blank. The description field is allowed to be blank when the product is entered. The description can be added later.

The catalog_number field is the product number that uniquely identifies the product. This number is used when the customer orders the product. This is an AUTO_INCREMENT field, so MySQL assigns numbers to it sequentially when the product is added to the database. In some stores, a meaningful product ID number is assigned and entered, rather than just a sequential number.

The pix field has a default filename. If no filename is entered, a default image file (Missing.jpg) that says “image not available” is entered.

**Building the Catalog database**

The following SQL statement creates this database:

```sql
CREATE DATABASE FoodCatalog;
```

The following SQL statement creates the table:

```sql
CREATE TABLE Food (  
catalog_number INT(6) NOT NULL AUTO_INCREMENT,  
name VARCHAR(20) NOT NULL,  
added_date DATE NOT NULL,  
category VARCHAR(20) NOT NULL,  
type VARCHAR(20) NOT NULL,  
description VARCHAR(255),  
price DECIMAL(7,2) NOT NULL,  
pix VARCHAR(20) NOT NULL DEFAULT "Missing.jpg",  
PRIMARY KEY(catalog_number) );
```

**Accessing the food database**

PHP provides MySQL functions for accessing your database from your PHP script. The MySQL functions are passed the information needed to access the database, such as a MySQL account name and password. This is not related to any other account name or password that you have, such as a password to log onto the system.

PHP provides two different sets of MySQL functions, as follows:

- **mysql**: MySQL functions developed for MySQL versions up to 4.0.
  Although you can continue to use these functions with newer versions of MySQL, you can’t use some of the advanced features of MySQL. The functions are in the format `mysql_action()`, such as `mysql_connect()` and `mysql_query()`. Because you have used PHP and MySQL prior to reading this book, you should be familiar with these functions.
MySQL Improved functions developed to use the advanced features of MySQL 4.1 and later. The MySQL Improved extension is available only with PHP 5, not with PHP 4. The functions are in the format `mysqli_action()`, such as `mysqli_connect()` and `mysqli_query()`. In addition, the MySQL Improved extension includes some built-in classes, so you can use objects when working with your database.

Because MySQL 4.1 is now the recommended version on the MySQL Web site, I use the MySQL Improved functions in this chapter. I use the procedural functions when building the procedural programs. I use the object-oriented classes when building the object-oriented programs.

If you’re using PHP 4 or for other reasons want to use the mysql functions — rather than the mysqli functions — you might need to make small changes to the syntax. The mysqli functions are very similar to the mysql functions, but some differences exist. The syntax differences are shown in Appendix C. More information about the functions is available in the PHP manual at www.php.net/manual/en/ref.mysqli.php and www.php.net/manual/en/ref.mysql.php.

In this application, I have stored the information needed by the PHP mysqli functions in a separate file called `Vars.inc`. This file is stored in a directory outside my Web space for security reasons. The file contains information similar to the following:

```php
<?php
    $host = "localhost";
    $user = "admin";
    $passwd = "xy.34W";
    $database = "FoodCatalog";
?>
```

Notice the PHP tags at the beginning (`<?php`) and the end (`?>`) of the file. If you don’t include these tags, the information might display on the Web page for the whole world to see, which isn’t what you want at all.

### Adding data to the database

This database is intended to hold the information for all your products. You can enter the product information in any way you normally enter rows into your databases.

### Building the Catalog Web Pages

The online catalog requires two types of Web pages. One page displays an index of product categories, where customers select the category that interests them. If your catalog has subcategories, you may display the index page
more than once — once for each level of categories. The second type of page is the product page, which displays the product information for products in the selected category.

**Designing the catalog Web pages**

Online catalogs abound on the Web. You’ve undoubtedly seen many, each with a unique look and feel. However, different designs can provide the same functionality. You might already know exactly what design you want, but keep in mind that the most functional design for you depends a great deal on the type and quantity of products that you have in your catalog.

The catalog in this chapter offers foods. The information to be displayed for each product is the name, description, price, and a picture. The information fits easily on one or two lines across the screen. Other products might require more or less space on the screen. Some catalogs display one page per product.

You need to design two different types of pages: an index page that displays categories and a product page that displays the products in a category.

**Designing the index page**

The index page needs to display categories in a form so that users can select a category. In this design, the categories are displayed in a form with radio buttons. Figure 5-1 shows what the index page of the online catalog looks like when it’s displayed in a browser.
The code for the index page is stored in separate files that are included when the application needs to display the catalog index page. Thus, the code that defines the Web page is separate from the PHP code that provides the logic of the application.

The code for the catalog index page consists of two files: the code that defines the look and feel of the page and the code that provides the specific information for the page.

**Designing the products page**

The products page for a catalog needs to display products so that customers can see all the information about the product. If all the products don’t fit on a page, the product page needs to display as many times as necessary to show the customer all the products in the category. Some catalogs display just a list of products with a link to a page containing more information, which can sometimes be a complete page about one product.

In this design for the Food Shop, the information for the product fits on a line or two so that several products can be displayed on a page. One page of products is displayed at a time. At the bottom of a page, a form is displayed with submit buttons that users can press to see the next page, a previous page, or to return to the categories page. Figure 5-2 shows the products page of the online catalog displayed in a browser.

The code for the products page is stored in separate files, just like the code for the index page: the file that defines the look and feel of the page and the file that provides the specific information for the page.
Writing the code for the index page

The catalog index page provides a simple form that contains a list of categories. The Food Shop catalog contains two levels of categories. However, because the catalog doesn’t have a lot of categories at this time, both levels of categories can be displayed on one index page. Some catalogs might have so many categories that only the top-level categories are displayed on one index page. The customer would need to click a top-level category to see the second-level categories. In the Food Shop catalog, however, displaying the category levels separately isn’t necessary.

The code that creates the index page is in two separate files:

- **catalog_index_page.inc**: Contains the code that defines the look and feel of the Web page. It produces a Web page with a form that lists the categories. The first-level categories are headings. The second-level categories are listed under the related first-level category. Each second-level category is a radio button choice, so the customer can click the category of products he wants to see. This file doesn’t include specific information, such as the category names displayed by the radio buttons. Another file must be used in conjunction with this file to create the Web page.

- **fields_index_page.inc**: Contains the specific information for the Catalog Index Web page. When used with catalog_index_page.inc, it displays a form where customers can select a category. A different file could be used with catalog_index_page.inc to create a different Web page.

The remainder of this section shows the details of these files. The second file is short and easier to understand, so I discuss it first, in Listing 5-1. Then, when explaining the first file, catalog_index_page.inc in Listing 5-2, I can refer to the information contained in fields_index_page.inc. The same two files are used for both the procedural and the object-oriented applications.

**Writing fields_index_page.inc**

The file shown in Listing 5-1 provides information specific to the Web page. For this page, only one array is needed. The $page array contains elements that are displayed at the top and bottom of the entire page.

Setting up your elements and fields in this separate file, rather than including them in the file with the HTML code for the form, greatly simplifies the design and maintenance of the form. You can easily see and edit the fields and elements in this separate file.
Notice that the $page array is defined in a structured format. The array could be defined with much less space, but this format makes the values clear and easy to change if necessary.

**Writing catalog_index_page.inc**

This script contains the code that defines how the Web page looks. It includes HTML code for the forms and for tables to organize the page. The code includes variables where specific information is needed. The variable values are provided in the previous file, fields_index_page.inc. For example, the script includes the following line that defines the Web page title:

```php
<head><title><?php echo $page['title'] ?></title></head>
```

The variable $page['title'] is found in the file fields_index_page.inc, where it is set to “The Food Shop Catalog”.

---

**Listing 5-1: The File That Contains the Arrays Needed for the Index Page**

```php
<?php
/* File: fields_index_page.inc
* Desc: Builds the arrays needed to display the
* product categories for the catalog.
*/
$page = array( "title" => "The Food Shop Catalog",
"top" => "The Food Shop Catalog",
"bottom" => "Send questions and comments to admin@xFoodShop.com",
);
?>
```

---

**Listing 5-2: The Script That Defines the Catalog Index Page**

```php
<?php
/* File: catalog_index_page.inc
* Desc: Displays the categories for the catalog.
*/
?>
<html>
<head><title><?php echo $page['title'] ?></title></head>
<body>
<?php
/* Display text before form */
echo "<div style='margin-left: .1in'>
<h1 align='center'> {$page['top']} </h1><hr>
Continued
```

---

"139 Chapter 5: Online Catalog Application"
The following numbers refer to the bold line numbers in Listing 5-2:

#7 Includes a short PHP section that echoes the title.

#12 Includes a short PHP section that echoes the top heading in the Web page.

#15 Echoes the HTML for the form tag that starts the form.

#16 Starts a foreach loop that loops through the $food_categories array. The loop displays the array. The outside loop displays the first-level categories. The loop ends at line 26.

#20 Begins an inside foreach loop that displays the second level categories.

#27 Lines 27 to 29 echo the HTML that displays the submit button and ends the form. The submit button is named Products because it’s a button to display products.

#32 Displays the “bottom” element from the $page array.

Writing the code for the products page

The catalog products page displays a list of product information. Products are displayed one page at a time. A small form at the end of each page displays submit buttons for going to the next page, the previous page, and the index page.
The code that creates the products page is in two separate files:

- `catalog_product_page.inc`: Contains the code that defines the look and feel of the Web page. This file produces a Web page that lists the products in a table. After the tables, a small form is displayed with no fields, just the submit buttons. Hidden fields in the form pass needed information to the next page. This file doesn’t include the product information. Another file must be used in conjunction with this file to create the Web page.

  This file is a little different for the procedural application and the object-oriented application. The differences are pointed out following the code listing.

- `fields_product_page.inc`: Contains the specific information for the Catalog Products Web page. When used with `catalog_product_page.inc`, this file displays the product information. A different file could be used with `catalog_product_page.inc` to create a Web page that displays different product information.

  This file is the same for the procedural application and the object-oriented application.

The remainder of this section shows the details of these files. The second file is short and easier to understand, so I discuss it first, in Listing 5-3. Then, when explaining the first file, `catalog_product_page.inc` in Listing 5-4, I can refer to the information contained in `fields_product_page.inc`.

**Writing `fields_product_page.inc`**

The file shown in Listing 5-3 builds three arrays that contain the specific information displayed in the product page. The arrays are:

- `$page`: Contains elements that are displayed at the top and the bottom of the entire page.
- `$table_heads`: Contains elements that provide the headings for the table that displays the products.

In this separate file, you can easily see and modify the fields and elements.

### Listing 5-3: The File That Contains the Arrays Needed for the Product Page

```php
<?php

/* File:  fields_product_page.inc
 * Desc:  Builds the arrays needed to display the products
 *        page of the catalog.
 */

Continued
```
$page and $table_heads are created in structured array statements that are easy to see and maintain.

**Writing catalog_product_page.inc**

Listing 5-4 shows the code for `catalog_product_page.inc`. Like the `catalog_index_page.inc` file shown in Listing 5-2, this file defines the look and feel of the Web page. It includes the HTML code that displays the page. It also includes small sections that display the information from the file `fields_products_page.inc`.

Listing 5-4 shows the file used for the procedural application. After the listing, I discuss the changes that need to be made to use the file with the object-oriented application.

---

**LISTING 5-3: (Continued)**

```php
$page = array( "title" => "The Food Shop Catalog", "top" => "The Food Shop Catalog", "bottom" => "Send questions and comments to admin@xFoodShop.com", );
$table_heads = array("catalog_number" => "Cat No", "name" => "Food", "description" => "Food Description", "price" => "Price", "pix" => "Picture", );
?>
```

---

**LISTING 5-4: THE SCRIPT THAT DEFINES THE CATALOG PRODUCT PAGE**

```php
<?php
/* File:  catalog_product_page.inc
 * Desc:  Displays the products in the catalog for the selected category.
 */
?>
<html>
<head><title><?php echo $page['title'] ?></title></head>
<body>
<?php
echo "<div style='margin-left: .1in; margin-right: .1in'>
<h1 align='center'>{$page['top']}</h1>
<p><font size='+2'><b>{$_POST['interest']}</b></font>
<p align='right'>($n_products products found)
<?php
echo "<table border = '0' cellpadding = '3' width = '100%'>
<?php
echo "</div>
</body>
</html>
```
The following numbers refer to the bold line numbers in Listing 5-4:

#8 Includes a short PHP section that echoes the title.

#11 Lines 11 to 14 display the top section of the Web page, including a line that shows the category being listed (lines 12 and 13) and a line that shows how many total products were found for the category (line 14).
#15 Displays the table tag that begins the product table.
#17 Starts a foreach loop that displays the table headers in the first row of the table.
#22 Starts a for loop that loops through all the products in the $products array. This loop creates a table row for each product.
#24 Lines 24 to 33 display each information item in the product row.
#35 Echoes the tag that starts the form. The form is the last row of the product table and holds the next, previous, and new category buttons.
#36 Lines 36 to 38 create hidden variables that pass the information needed on the next page: $n_end and the category being displayed.
#40 Creates a wide cell where the Select Another Category submit button is displayed. The button is not given a name.
#43 Creates a wide cell on the right where the Next and Previous submit buttons are displayed.
#44 Begins an if statement that displays the Previous button. If the page being displayed isn’t the first page, the previous button is displayed. The Previous button is named Products.
#49 Begins an if statement that displays the Next button. If the last product isn’t yet displayed, the Next button is displayed. The Next button is named Products. Because both the Next and Previous buttons are named Products, the application script can test for the value of Products when deciding which products to display on the product page.
#55 Displays information at the bottom of the page.

**Changing catalog_product_page.inc for the object-oriented application**

The code in Listing 5-4 displays the products Web page when used with the procedural code. The file needs changes to work correctly with the object-oriented code.

Lines 24 to 33 display the product information on each row. In Listing 5-4, the information is displayed from an array named $products. This array is built from the information in the database in the Catalog.php script, described in Listing 5-5. For the object-oriented application, these lines need to be changed to display the information from an object. The object is created in the script Catalog-oo.php, shown in Listing 5-8.

To use the file with the object-oriented application, change lines 24 to 33 in Listing 5-4 to the following lines and call the new file catalog_product_page-oo.inc.

```php
echo "<tr>
    echo "<td align='right'>{$all[$i]->catalog_number}</td>
```

Displaying the catalog Web pages

Two files are used in conjunction to display each Web page. The files catalog_index_page.inc and fields_index_page.inc display the category page; the files fields_products_page.inc and catalog_product_page.inc (or catalog_product_page-oo.inc) display the products page.

The index Web page is displayed with the following code:

```php
include("fields_index_page.inc");
include("catalog_index_page.inc");
```

The products Web page is displayed in the procedural application with the following code:

```php
include("fields_products_page.inc");
include("catalog_product_page.inc");
```

The product page is displayed in the object-oriented application with the following code:

```php
include("fields_products_page.inc");
include("catalog_product_page-oo.inc");
```

The procedural script and the object-oriented script use slightly different code, but the same general approach. One file contains the code for the look and feel, appropriate for any catalog. The catalog-specific information is provided in a separate file that’s included when the “look and feel” file is included.

Building the Online Catalog Application: Procedural Approach

The Catalog application has one main script. The script is organized into two basic sections: one section that displays the index page and one that displays the products page. The index page section displays when the application first runs, before any buttons have been clicked. When the user clicks a button,
the script displays a Web page dependent on which button was pushed. The
following is an overview of the structure of the script:

if (Button)

   The Product button was pushed,
       1 Test whether a category was selected. If
           not, redisplay the index page.
       2 Display the products page.

   The Product button was not pushed,
       1 Display the index page.

Listing 5-5 shows the code for the online catalog application script.

LISTING 5-5: THE ONLINE CATALOG CODE

```php
<?php
    /* Program: Catalog.php
     * Desc: Displays a catalog of products. Displays two
     *       different pages: an index page that shows
     *       categories and a product page that is displayed
     *       when the customer selects a category.
     */
    include("functions_main.inc");
    $n_per_page = 2;
    if(isset($_POST['Products']))
    {
        if(!isset($_POST['interest']))
        {
            header("location: Catalog.php");
            exit();
        }
        else
        {
            if(isset($_POST['n_end']))
            {
                if($_POST['Products'] == "Previous")
                {
                    $n_start = $_POST['n_end'] - ($n_per_page);
                }
                else
                {
                    $n_start = $_POST['n_end'] + 1;
                }
            }
            else
            {
                $n_start = 1;
            }
            $n_end = $n_start + $n_per_page -1;
            $connect = connect_to_db("Vars.inc");
            $query_food = "SELECT * FROM Food WHERE
```
The numbers in the following explanation refer to the line numbers in Listing 5-5:

#8 Includes a file that contains the function Connect_to_db — a function used throughout the book. In this script, the function is used on line 36 and line 60.

#9 Sets $n_per_page, the number of products to be displayed on a single page. $n_per_page is set to 2, an unusually low number. It's more common to set the number to 10, but it depends on how many products entries fit on a page. You can set this number to any integer.

#10 Begins an if statement that executes if the customer clicks the submit button named Products.
Begins an *if* statement that executes if the customer did not select a category in the form. The category page is displayed again.

Begins an *else* statement that executes if the customer selected a category in the form. The products page is displayed.

Begins an *if* statement that executes if this is not the first page displayed. It checks which button was pressed. If the Previous button was pressed, $n_start is set back to the beginning of the previous page. If the Next button was pressed, the $n_start is set to the product after the last product displayed on the last page.

Begins an *else* block that executes if this is the first time the product page is displayed. It sets $n_start to 1.

Sets $n_end to $n_start plus the number of products to be displayed on the page, minus one.

Lines 36 to 39 build and execute a query that retrieves the product information for all the products in the selected category.

Lines 40 to 48 build an array named $products that contains all the selected product information.

Sets $n_products to the number of products in the category.

Begins an *if* statement that makes sure $n_end is higher than the number of products. If $n_end is more than the total number of products, $n_end is set to the last product.

Lines 54 to 55 display the product page.

Starts an *else* block that executes if the Product button wasn’t clicked. Either no button or the Select Another Category button was clicked. This block displays the categories page.

Lines 60 to 65 build and execute a query that retrieves all the categories in the database.

Lines 66 to 69 create an array of food categories.

Lines 70 to 71 display the category page.

The online catalog application script calls a function to connect to the database. The *functions_main.inc* file, called on line 8, contains the function code. Listing 5-6 shows the function code.

**Listing 5-6: The Connect_to_db Function**

```php
<?php
/* Function: Connect_to_db
 * Desc: Connects to a MySQL database. The name of
 *       a file containing the database variables
 */
```
This function gets the information it needs from a separate file. The filename is passed when the function is called. The file contents are something like the following:

```php
<?php
$host = "localhost";
$user = "admin";
$passwd = "";
$database = "FoodCatalog"
?>
```

Store this file outside your Web space for security reasons. If you set your `include_path` in your `php.ini` file to a location outside your Web space, you can store files there and include them without using a complete path name.

### Building the Online Catalog Application:
The Object-Oriented Approach

Object-oriented programming requires that you create and use objects to provide the functionality of the application. You first identify the objects needed for the application. Then you write the classes that define the objects, including the methods that the application needs. When the objects are ready, you write the application script that creates and uses the objects.

### Developing the Objects

The online catalog application needs to display information from a database. It needs to display two types of information from the database: a list of categories or a list of product information within a category. To display a catalog,
the application needs only one object: a Catalog object. I discuss the details for the Catalog object in the following sections.

**Writing the Catalog class**

The definition for the Catalog object is coded in the Catalog class. This class is a general class that you can use to display any catalog, not just the food catalog used in this chapter.

The Catalog class maintains a connection to the database where the product information is stored and returns or displays product information as needed. The Catalog class contains five properties, a constructor, and five methods.

**The properties**

The Catalog properties store information needed to define and manage the form and its data. The properties are

```php
private $cxn;
private $catalog_name;
private $host;
private $user;
private $password;
```

The first property is the connection to the MySQL database server. The second property is the catalog name, which is the name of the database where the product information is stored. The remaining properties are the information needed to access the database.

**The code**

Listing 5-7 contains the complete code for the Catalog class. I cover each method in detail after the code listing. Notice the line numbers at the ends of some of the lines of code. The discussion in the six subsections following the listing refers to the bold line numbers in Listing 5-7.

**LISTING 5-7: THE CATALOG CLASS**

```php
<?php
/* Class: Catalog
* Desc: Class that contains product information.
*/
class Catalog
{
    private $cxn;
    private $catalog_name;
    private $host;
```
private $user;
private $password;
function __construct($filename)
{
    if(is_string($filename))
    {
        include("$filename");
    } 
    else
    {
        throw new Exception("Parameter is not a filename");
    } 
    $this->cxn = new mysqli($host, $user, $passwd); #23
    if(mysqli_connect_errno()) #24
    {
        throw new Exception("Database is not available.
                              Try again later.");
        exit();
    }
    $this->host = $host;
    $this->user = $user;
    $this->password = $passwd;
}

function selectCatalog($database)
{
    $db = $this->cxn->select_db($database); #37
    if(mysqli_errno($this->cxn)) #38
    {
        if(mysqli_errno($this->cxn) == 1049) #40
            throw new Exception("$database does not exist");
        exit();
    }
    else
    {
        throw new Exception("Database is not available.
                              Try again later");
        exit();
    }
    $this->catalog_name = $database;
}

function getCategoriesAndTypes()
{
    $sql = "SELECT DISTINCT category, type FROM Food ORDER BY category, type";
    if(!$result = $this->cxn->query($sql))
    {
        throw new Exception(mysqli_error($this->cxn));
        exit();
    }
}
while($row = $result->fetch_array())
{
    $array_cat_type[$row['category']][
        ] = $row['type'];
}
return $array_cat_type;
}

function getAllofType($type)
{
    if(is_string($type))
    {
        $sql = "SELECT * FROM Food WHERE type='$type' ORDER BY name";
    }
    else
    {
        throw new Exception("$type is not a type.");
        exit();
    }
    if(!$result = $this->cxn->query($sql))
    {
        throw new Exception(mysqli_error($this->cxn));
        exit();
    }
    $n = 1;
    while($row = $result->fetch_object())
    {
        $array_all[$n] = $row;
        $n++;
    }
    return $array_all;
}

function displayCategories()
{
    $food_categories = $this->getCategoriesAndTypes();
    include("fields_index_page.inc");
    include("catalog_index_page.inc");
}

function displayAllofType($type, $page)
{
    if(is_string($type))
    {
        $all = $this->getAllofType($type);
    }
    else
    {
        throw new Exception("$type is not a type.");
        exit();
    }
    if(is_int($page))
    {
The constructor

The constructor creates a connection to the MySQL server. It gets the host-name, account name, and password for MySQL from a file; the filename is passed when the object is instantiated. The file can be stored in the include directory, as specified in the `php.ini` file. The constructor checks whether the information passed to the class is the correct type of data. If it is, it includes the file; if not, it throws an exception.

The constructor creates a connection to MySQL. The objects provided by the MySQL Improved (mysqli) extension are used. Line 23 creates a connection that is stored in the property `$cxn`. Line 24 begins an `if` statement that checks whether the connection was successful. If it failed, an exception is thrown.

The host name, account name, and password are stored in properties.
You can create a Catalog object with the following statement:

```
$food_catalog = new Catalog("Vars.inc");
```

### selectCatalog

The `selectCatalog` method sets the database to be used when accessing MySQL. The database name is passed. The stored connection is used to set the current database.

- **#37** Sets the database.
- **#38** Starts an `if` block that executes if the database was not successfully selected. The block checks whether the error is Error 1049, which would signal that the database doesn’t exist. If the error is 1049, an exception is created that informs the user that the database name given isn’t a valid database. If the error number isn’t 1049, an exception is created with a more generic error message.

This method can be used at any time to change the current database.

### getCategoryAndTypes

The `getCategoryAndTypes` method gets all categories and types and returns them in a multidimensional array. It creates and executes the appropriate `SELECT` query. A `while` statement builds a multidimensional array from the result set. The method returns the array.

### getAllofType

The `getAllofType` method gets all the product information for a given subcategory (type). The type is passed to the method.

- **#73** Begins an `if/else` block that checks whether the type name passed is a string. If so, the `if` block creates a `SELECT` query using the type passed. If not, the `else` block throws an exception.
- **#83** Executes the query. If the query fails, a new exception is thrown.
- **#89** Begins a `while` loop that builds an array of objects from the result set. Each product (row) is an object. The object properties are the field names and contain the information in the cell.

### displayCategories

The `displayCategories` method displays the category Web page. A multidimensional array of product categories is created by using the method `getCategoriesAndTypes`. The method displays the category page by including two files: one file contains additional variables needed for the food catalog, and the other file contains the code that defines the look and feel of the Web page. I discuss these two files in the “Building the Catalog Web Pages” section.
**displayAllofType**

The `displayAllofType` method displays all the products for a given type. The method gets the product info using the method `getAllofType`. The method displays the products by including two separate files: one that provides some additional variables and one that provides the code to define the look and feel of the Web page. The two files are discussed in the “Building the Catalog Web Pages” section.

#125 Begins an if statement that executes if this is not the first page displayed. It sets \$n_start to a value based on which button — Previous or Next — was pressed.

#127 Begins an if block that executes if the Previous button was clicked. \$n_start is set back to the beginning of the previous page.

#131 Begins an else block that executes if the Previous button was not clicked. The Next button was pressed. The \$n_start is set to the product after the last product displayed on the last page.

#136 Begins an else block that executes if this is the first time the product page is displayed. It sets \$n_start to 1.

#140 Sets \$n_end to \$n_start plus the number of products to be displayed on the page, minus one.

#141 Begins an if statement that makes sure \$n_end is higher than the number of products. If \$n_end is more than the total number of products, \$n_end is set to the last product.

#145 Lines 145 to 146 display the product page.

**Writing the catalog application script**

After writing all the class code needed for the online catalog application, you write the application script that creates and uses the objects to provide the application functionality. The application script has the following general structure:

```java
if (Button)
```

**The Products button was pushed,**

1. Test whether a category was selected. If not, redisplay the index page.
2. Display the products page.

**The Products button was not pushed,**

1. Display the index page.

The second choice (the Products button was not pushed) means that this is either the first time the page is displayed or the user clicked the Select Another Category button.
The application program creates objects and uses their methods to perform the tasks that I describe in the preceding section that describes the structure. The application program script is shown in Listing 5-8.

**LISTING 5-8: THE LOGIN APPLICATION SCRIPT**

```php
<?php
 /* Program: Catalog-oo.php
 * Desc: Displays a catalog of products. Displays two different pages: an index page that shows categories and a product page that is displayed when the customer selects a category.
 */
require_once("Catalog.class");
if(isset($_POST[\'Products\'])) {
    if(!isset($_POST[\'interest\'])) {
        header("location: Catalog-oo.php");
        exit();
    } else {
        try {
            $foodcat = new Catalog("Vars.inc");
            $foodcat->selectCatalog("FoodCatalog");
            $foodcat->displayAllofType($_POST[\'interest\'],2);
        } catch(Exception $e) {
            echo $e->getMessage();
            exit();
        }
    }
} else {
    try {
        $foodcat = new Catalog("Vars.inc");
        $foodcat->selectCatalog("FoodCatalog");
        $foodcat->displayCategories();
    } catch(Exception $e) {
        echo $e->getMessage();
        exit();
    }
}
?>
```
Notice that many of the statements in this script are enclosed in try/catch blocks. If a method throws an exception and the exception isn’t caught, the following fatal error occurs:

**Fatal error**: Uncaught exception 'Exception' with message 'Database is not available.' in c:\Database.class:56

Therefore, you need to catch any exception thrown by a method either in the method itself or in the script that uses the method.

The following explanation of the script refers to the line numbers in Listing 5-8:

#9 Begins an if statement that executes if a button named Products was pushed.

#11 Begins an if block that executes if the customer did not check a product category. The customer is returned to the category Web page.

#16 Begins an else block that executes if the user selected a category.

#20 Lines 20 to 22 display the product Web page. Line 20 creates a new Catalog object, line 21 selects the catalog to use, and line 22 displays the products.

#31 Begins an else block that executes if the user did not click a button named Products. This block displays the categories page. It will display the first time the script is called, when the user hasn’t clicked any button at all. It also executes when the user clicks the Select New Category button on the products page because that button is not named Products.

#35 Lines 35 to 37 display the categories Web page. Line 35 creates a new Catalog object, line 36 selects the catalog to use, and line 37 displays the categories.

**Growing the Catalog class**

The Catalog class in this chapter provides the essential features for the example application. However, you can easily see where additional methods would be very useful, perhaps even required. For instance, the class needs a method that gets individual fields for a particular food, so that you can retrieve the price for bermuda onions or delicious apples. Such a method might be called as follows:

```plaintext
getPrice("bermuda")
```
Other useful methods might include a method that adds a product to the catalog and another that removes products from the catalog.

One of the benefits of object-oriented programming is the ease of adding functionality to applications. Adding a method for new functionality is as simple as `eatFood("cake")`. 
Chapter 6
Shopping Cart Application

In This Chapter
- Designing the shopping cart application
- Building the online order database
- Writing procedural code for the shopping cart application
- Developing and using objects to program the shopping cart application

The Internet provides endless opportunities to buy things. In this chapter, I develop an online ordering system that provides product information in a catalog and a shopping cart to purchase the items. In Chapter 5, you see an online catalog application. The online catalog application provides information about products to potential customers. In this chapter, the shopping cart application provides the ability to buy the products in the catalog. The shopping cart does not stand alone. It needs the catalog to provide products for the customer to place in his or her shopping cart.

Designing the Shopping Cart Application

Shopping carts can be implemented in many ways. Your first task is to decide how to implement yours.

Basic application design decisions

You must make some fundamental programming design decisions before designing the user interface. Some basic considerations are:

- **Customer login**: Many stores require customers to register and log in before they can purchase products. Customer registration provides the store with information about its customers, such as phone numbers and e-mail addresses. Requiring logins also allows features that can’t be provided without the login process. For instance, you can’t provide a feature that allows customers to track their orders without requiring that the customer log in. If the customer isn’t required to log in, nothing prevents customers from looking at each other’s orders.
On the other hand, many customers avoid registrations. Some customers are suspicious that their information might be used for nefarious purposes, such as unwanted marketing calls or e-mails. Other customers are impatient with the process, flitting away to an easier site. Therefore, requiring a login might cost the store some sales.

The application in this chapter doesn’t require customer login. Anyone can purchase the products. Chapters 3 and 4 provide login applications that you can add to this application if you desire a customer login.

**Purchasing methods:** How may customers purchase the products? The easiest method is to send the order information in an e-mail to the sales department and invoice the customer. Or, to require a check from the user before shipping the products. However, most Web sites accept payment on the Web site. Web sites can quickly accept and approve credit card payments. Some sites accept PayPal payments, either in addition to or instead of credit card payments. PayPal is an Internet Web site that provides accounts that people can use to send or receive money over the Internet. For instance, a PayPal account can be used to pay for eBay purchases. In addition to providing account setup, the PayPal Web site provides merchant tools that you can use to accept payment easily via PayPal. See [www.paypal.com](http://www.paypal.com).

The application in this chapter accepts only credit cards.

**Credit card handling:** Accepting credit card payments raises security issues. If the customer is going to send you a credit card number, you need to implement SSL (Secure Socket Layers) for security, as I discuss in Chapter 2. If you store credit card numbers, you need to implement strong security. Storing credit card numbers allows quicker and easier purchasing for customers (because their credit information is on file) but increases the opportunity for bad guys to steal important information. In addition, some customers don’t want their credit information stored on your Web site. One possible solution, used at some online stores, is to allow customers to decide whether you store their credit card information.

The application in this chapter doesn’t save credit card information. The information is accepted, used, and then discarded, not stored in the database.

**Shipping fees:** Sending purchases to customers costs you money. The easiest solution to implement is a single, standard shipping and handling fee. Adding one amount to the total is a simple program step. The more difficult solution is to try to compute the actual shipping charge, allowing the customer to select the type of shipping used and computing the shipping charge based on the distance from your zip code to the customer’s zip code. The customers appreciate the more accurate cost, but the programming takes more time and effort.

The application in this chapter charges a shipping fee that is a flat fee per item.
Shopping cart: You can use several mechanisms to store the shopping cart while the customer continues to shop, before the order is submitted. The customer needs to be able to add and remove items from the shopping cart while putting together the final order. The most common techniques for storing the shopping cart contents are

- **Database table:** More secure, but more overhead.
- **Cookies:** The customer might have cookies turned off.
- **Session variables:** Less secure on a shared server.
- **Text file:** Easy, but less secure.

Other, less common methods are sometimes used.

The application in this chapter stores the shopping cart two different ways. The procedural program stores the shopping cart items in the MySQL database. The object-oriented program stores the shopping cart items in a session variable.

## Application functionality design

The basic function of the shopping cart application is to collect the information needed to complete a customer's purchase. The application should

- **Display the products so that the customer can select products to purchase.** This step is provided by the online catalog application, which I describe in detail in Chapter 5. However, you need to add some additional features to the catalog to allow online purchasing. I cover the additional features in this chapter.

- **Keep track of the products selected by the customer.** The customer should be able to see what he has already selected at any time. The customer should also be able to remove any selections.

- **Collect the information needed to ship the product to the customer.** You need the customer's name and address. Also, you need a phone number in case of delivery problems. An e-mail address is useful for communication. The application can also collect any information required to compute shipping charges.

- **Collect the information needed to charge the customer.** The application collects credit card information, a billing address, and the exact name associated with the credit card. In this chapter, the shipping and billing information are assumed to be the same. I do this to keep the example simple. However, for a real-world Web site, you can't assume this.

- **Provide feedback to the customer.** The customer needs to see the information that she entered at all steps along the way and be able to correct information. Not everyone has perfect typing skills.
Creating the Shopping Cart Database

The shopping cart database stores information about the orders. It stores general information about the order, such as the customers’ names and addresses, and the items selected for each order. Another important detail to know is when the order was submitted. This application also requires that the order store the product information, which appears in the online catalog. The application in this chapter sells products from The Food Shop catalog, which I describe in Chapter 5.

Designing the shopping cart database

The sample application in this chapter uses a database named OnlineOrders. The database contains two tables. One table stores information general to the order, such as name and address, order number, and so on. The second table stores a row for each item ordered, linked to the first table by the order number.

In addition, because the application needs to display the products, it needs access to the catalog database.

Designing the Customer_Order table

The table named Customer_Order contains information related to the order as a whole, as shown in Table 6-1.

You can’t name tables with MySQL-reserved words. This table seems like it ought to be named Order, but that’s a MySQL-reserved word. If you name your table Order, it generates a MySQL syntax error and you can spend hours staring at the query, convinced that there’s nothing wrong. You can see a list of reserved words at http://dev.mysql.com/doc/mysql/en/reserved-words.html.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>order_number</td>
<td>INT(6)</td>
<td>Integer assigned by AUTO_INCREMENT (primary key)</td>
</tr>
<tr>
<td>order_date</td>
<td>DATE</td>
<td>Date when order was added to table</td>
</tr>
<tr>
<td>shipping_fee</td>
<td>DECIMAL(9,2)</td>
<td>Total shipping cost for the order</td>
</tr>
<tr>
<td>sales_tax</td>
<td>DECIMAL(9,2)</td>
<td>Total sales tax for the order</td>
</tr>
</tbody>
</table>
### Variable Name Types and Descriptions

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>submitted</td>
<td>ENUM('yes', 'no')</td>
<td>Order status</td>
</tr>
<tr>
<td>ship_name</td>
<td>VARCHAR(50)</td>
<td>Ship to: name</td>
</tr>
<tr>
<td>ship_street</td>
<td>VARCHAR(50)</td>
<td>Street address</td>
</tr>
<tr>
<td>ship_city</td>
<td>VARCHAR(50)</td>
<td>City where the order is to be shipped</td>
</tr>
<tr>
<td>ship_state</td>
<td>CHAR(2)</td>
<td>Two-letter state code</td>
</tr>
<tr>
<td>ship_zip</td>
<td>CHAR(10)</td>
<td>Zip code. (Five numbers or zip+4)</td>
</tr>
<tr>
<td>email</td>
<td>CHAR(50)</td>
<td>Customer’s e-mail address</td>
</tr>
<tr>
<td>phone</td>
<td>CHAR(20)</td>
<td>Customer’s phone number</td>
</tr>
</tbody>
</table>

In this design, the order number is an integer assigned sequentially by MySQL. Some designs might use an order number with meaningful numbers and/or letters, such as dates or department codes.

The shipping fee and sales tax are stored in the order. Although they can be computed, the rates might change in the future. Therefore, when looking up an order, you want to know what the charges were at the time of the order.

### Designing the Order_Item Table

The table named `Order_Item` contains information on each item in the order, as shown in Table 6-2.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><code>order_number</code></td>
<td>INT(6)</td>
<td>Link to Customer_Order table (primary key 1)</td>
</tr>
<tr>
<td><code>item_number</code></td>
<td>INT(4)</td>
<td>Number assigned to each item (primary key 2)</td>
</tr>
<tr>
<td><code>catalog_number</code></td>
<td>INT(8)</td>
<td>Number assigned to the product in the catalog</td>
</tr>
<tr>
<td><code>quantity</code></td>
<td>DECIMAL(7,2)</td>
<td>Amount ordered</td>
</tr>
<tr>
<td><code>price</code></td>
<td>DECIMAL(9,2)</td>
<td>Price of the item</td>
</tr>
</tbody>
</table>
The *Order_Item* table has five fields. The first two fields together are the primary key. The price is stored so the actual price paid for this item can be recovered in the future, even if the price has changed.

**Designing the Food table**

The application uses the *Food* table from the online catalog that I design and explain in Chapter 5. (Specifically, check out Table 5-1.) The application could access the table from that database. However, I have added the *Food* table to the *OnlineOrders* database (which I design and explain in this chapter) to simplify the design.

**Building the shopping cart database**

You can create the MySQL database using any of the methods that I discuss in Chapter 1. The following SQL statement creates this database:

```sql
CREATE DATABASE OnlineOrders;
```

The following SQL statements create the tables:

```sql
CREATE TABLE Customer_Order (  
  order_number INT(6) NOT NULL AUTO_INCREMENT,  
  order_date DATE NOT NULL,  
  shipping_fee DECIMAL(9,2),  
  sales_tax DECIMAL(9,2),  
  submitted ENUM('yes','no'),  
  ship_name VARCHAR(50),  
  ship_street VARCHAR(50),  
  ship_city VARCHAR(50),  
  ship_state VARCHAR(2),  
  ship_zip VARCHAR(10),  
  email VARCHAR(50),  
  phone VARCHAR(20),  
  PRIMARY KEY(order_number) );
```

All fields in the preceding code are required to complete the order processing. However, only the first two fields are declared *NOT NULL*. When the application first inserts the order into the database, values are inserted into only the first two fields. The remaining fields are blank at that time; the values for those fields are added later. Consequently, the remaining fields must be allowed to be blank. The PHP application script must ensure that the fields contain the appropriate information.

```sql
CREATE TABLE Order_Item (  
  order_number INT(6) NOT NULL,  
  item_number INT(5) NOT NULL,  
  catalog_number INT(6) NOT NULL,  
  quantity DECIMAL(7,2) NOT NULL,  
  price DECIMAL(9,2) NOT NULL,  
  PRIMARY KEY(order_number,item_number) );
```
CREATE TABLE Food ( 
catalog_number INT(6) NOT NULL AUTO_INCREMENT,
name VARCHAR(20) NOT NULL,
added_date DATE NOT NULL,
category VARCHAR(20) NOT NULL,
type VARCHAR(20) NOT NULL,
description VARCHAR(255) NOT NULL,
price DECIMAL(7,2) NOT NULL,
pix VARCHAR(20) NOT NULL DEFAULT "Missing.jpg",
PRIMARY KEY(catalog_number) );

Accessing the shopping cart database

PHP provides MySQL functions for accessing your database from your PHP script. The MySQL functions are passed the information needed to access the database, such as a MySQL account name and password. This account name and password is not related to any other account name or password that you have, such as a password to log onto the system.

PHP provides two different sets of MySQL functions: mysql functions and mysqli functions. The mysqli functions are provided for access to features added in MySQL version 4.1. You can use the mysql functions with version 4.1, but you don’t have access to the newer features. The mysql or mysqli extension is activated when PHP is installed. You must use PHP 5 to use the mysqli functions.

Because MySQL 4.1 is now the recommended version on the MySQL Web site, I use the MySQL Improved (mysqli) functions in this chapter. I use the procedural functions when building the procedural programs. I use the object-oriented classes when building the object-oriented programs.

If you’re using PHP 4 or for other reasons want to use the mysql functions, rather than the mysqli functions, you might need to make small changes to the syntax. The mysqli functions are very similar to the mysql functions, but some differences exist. The PHP and MySQL versions are explained in Chapter 1. The syntax differences are shown in Appendix C. More information about the functions is available in the PHP manual at www.php.net/manual/en/ref.mysqli.php and www.php.net/manual/en/ref.mysql.php.

Adding data to the shopping cart database

The Food table contains the product information. You add this data to the database yourself, outside this application. To add items to the Food catalog, you can use the mysql client installed with MySQL, any MySQL administration application (such as phpMyAdmin [www.phpmyadmin.net] or MySQL Administrator, which you can download from MySQL
The order information is added to the database by the shopping cart application. When customers submit orders, the order and item information is added to the appropriate table.

**Building the Shopping Cart Web Pages**

The shopping cart application provides the customer with product information, displayed from an online catalog, similar to the online catalog application discussed in Chapter 5. The customer selects items from the catalog and puts them into a shopping cart. When the customer is satisfied with the contents of the shopping cart and submits the order, the application builds the order, collecting the shipping information and storing the chosen items.

**Designing the shopping cart Web pages**

The shopping cart application displays five Web pages, in the following order:

1. **Product information**: The application displays the product information from an online catalog, as I describe in Chapter 5. The catalog actually displays two different types of pages: the categories page and the product information page. The categories page is the same page designed in Chapter 5. The product page is similar, but has some added elements that are necessary for online purchasing.

2. **Shopping cart**: The shopping cart Web page displays the items that are currently in the shopping cart.

3. **Shipping form**: When the customer submits the order, the application displays a form to collect the shipping address and credit card information.

4. **Summary page**: The summary page displays all the order information, including the address.

5. **Confirmation page**: When the credit information is approved, the application displays a confirmation page, accepting the order and providing any information the customer needs. Alternatively, if the customer cancels the order, a cancellation page is displayed.

**Designing the product information Web page**

In Chapter 5, I describe the online catalog application that displays items from a catalog. The application in the current chapter also displays items from a catalog. Two types of pages are displayed. One page is the product categories page (refer to Figure 5-2). This page is the same for the shopping cart application as for the online catalog application.
The second type of page displays information for products in the selected category. The product page for the shopping cart application is similar to the product page described in the previous chapter (refer to Figure 5-2), but has some added components, as shown in Figure 6-1.

Notice the following additions on this page:

- **View Shopping Cart button**: A new submit button — View Shopping Cart — is added to the upper-right corner of the page that allows customers to view the current contents of their shopping carts. This button is also added to the categories page.

- **The lbs column**: This column allows customers to enter the quantity they want for each item. The food catalog allows users to specify the number of pounds desired. The items display with 0 (zero) pounds. The customer can change the amount.

- **Add Items to Shopping Cart button**: A new submit button — Add Items to Shopping Cart — is added.

The new elements on the page are added so the customer can select products to purchase.
Designing the shopping cart Web page

The application displays the items currently stored in the shopping cart, as shown in Figure 6-2.

The shopping cart provides three buttons that the customer can click:

- **Continue Shopping**: Returns the customer to the first catalog page.
- **Submit Order**: Submits an order for the items that are in the shopping cart.
- **Update Cart**: Allows the customer to change the items in the cart. The customer can change the number of pounds in the Amount column and click this button. The shopping cart is redisplayed with the changed amounts. If the number is changed to 0 (zero), the item is removed from the shopping cart.

Notice that three items are currently in the cart. Only two items were selected in the products page shown in Figure 6-1. The first item shown in the cart was stored in the cart previously; the two items were added.

Designing the shipping form Web page

The application collects the information needed to process and ship the order with the form shown in Figure 6-3.

![Figure 6-2: The shopping cart displayed by the shopping cart application.](image_url)
I've simplified the shipping information form for this sample application. For your application, you will probably need to collect a billing name and address, as well as a shipping name and address as shown. You also might need to collect a shipping method and other information.

**Designing the summary Web page**

The application displays a summary of the order, so the customer can catch any errors and correct them, as shown in Figure 6-4.

The summary page provides four buttons that the customer can click:

- **Continue Shopping**: Returns the customer to the first catalog page while retaining the information in the order.
- **Edit Shipping Information**: Returns the customer to the shipping information form where the customer can change the shipping information as necessary.
- **Cancel Order**: Cancels the order.
- **Submit Order**: Submits the order on the summary page. The customer is unable to make changes after this final submission.
The Food Shop must collect sales tax for customers living in Texas. Thus, the summary page shows sales tax. If the address were in a different state, no sales tax would be charged.

The Food Shop charges shipping at 25 cents per item. Thus, this three item order is charged 75 cents. This simple amount was chosen to simplify the example.

**Designing the confirmation page**

The confirmation page is specific to your store. It might simply be a repeat of the summary page. A confirmation page tells the customer that the order has been approved. It might also tell the customer when the order will be shipped and often provides the order number that the customer can use to track the order. I don’t develop a specific confirmation or cancellation page in this chapter. I believe you can handle that without my help. I just show you how to display it.
Writing the code for the product information page

The catalog products page displays a list of product information. Products are displayed one page at a time. Each page displays submit buttons for next, previous, and return to the index page.

The code that creates the products page is in two separate files, as follows:

- **shopping_product_page.inc**: Contains the code that defines the look and feel of the Web page. It produces a page that lists the products in a table. Another file must be used in conjunction with this file to create the page. The other file contains the specific information for the page.

- **fields_products_page.inc**: Contains the specific information for the Catalog Products Web page. When used with **shopping_product_page.inc**, it displays the product information. A different file with different products could be used with **shopping_product_page.inc** (see Chapter 5) to create a page that displayed different products.

I describe these two files in detail in Chapter 5. For this chapter, I add some elements to the Web page to allow online orders. In this section, I describe the added elements only.

Writing **fields_products_page.inc**

The **fields_products_page.inc** file is almost the same file that I describe in Chapter 5. It builds two arrays that contain the specific information displayed in the product page. The arrays are:

- **$page**: Contains elements that are displayed at the top and the bottom of the entire page.

- **$table_heads**: Contains elements that provide the headings for the table that displays the products.

The only difference between this file and the file of the same name in Chapter 5 is one additional element in the **$table_heads** array. The extra element is identified in the explanation following Listing 6-1.

The procedural and object-oriented files are the same.
The products page has one additional column in the product information row. The new column allows customers to enter the amount of the product they want to order. Therefore, the new column is added to the $table_heads array. The new column is the amount column.

Writing shopping_product_page.inc

The shopping_product_page.inc and shopping_product_page-oo.inc files are very similar to the catalog_product_page.inc and catalog_product_page-oo.inc files in Chapter 5. However, a few additions are required that allow the customer to order online. The file with the additions is shown in Listing 6-2. I describe only the lines that are changed in this section. For a complete description of all the lines, see the section “Writing the code for the products page” in Chapter 5.

The file for the procedural application is slightly different than the file for the object-oriented application. I first show the procedural file, and then I describe the changes needed to use the file with the object-oriented application.

The file shown in Listing 6-2 defines the look and feel of the Product page.

The products page has one additional column in the product information row. The new column allows customers to enter the amount of the product they want to order. Therefore, the new column is added to the $table_heads array. The new column is the amount column.

**LISTING 6-1: THE FILE THAT CONTAINS THE ARRAYS NEEDED FOR THE PRODUCT PAGE**

```php
<?php
/* File: fields__products_page.inc
 * Desc: Defines the variables and builds the arrays needed
 * to display the products page of the catalog.
 */
$page = array(
    "title"   => "The Food Shop Catalog",
    "top"    => "The Food Shop Catalog",
    "bottom" => "Send questions and comments
to admin@xFoodShop.com",
);
$table_heads = array(
    "catalog_number" => "Cat No",
    "name"           => "Food",
    "description"    => "Food Description",
    "price"          => "Price",
    "pix"            => "Picture",
    "amount"         => "lbs",
);
?>
```

The file shown in Listing 6-2 defines the look and feel of the Product page.

**LISTING 6-2: THE FILE THAT DEFINES THE PRODUCT PAGE**

```php
<?php
/* File: shopping_product_page.inc
 * Desc: Displays the products in the catalog for the
 * selected category.
 */
```
<?php
forder action='ShoppingCart.php' method='POST'>
    <p style='text-align: right'>
        <input type='submit' name='Cart' value='View Shopping Cart'>
    </form>
</div>

<h1 style='text-align: center'>{$page['top']}</h1>
<p style='font-size: 150%'><b>{$_POST['interest']}</b></p>
<p align='right'>($n_products products found)</p>
<table border='0' cellpadding='5' width='100%'>
    <tr>
        foreach($table_heads as $heading)
        {
            echo "<th>$heading</th>
        }
    </tr>
    foreach($table as $i)
    {
        echo "<td align='right'>
            {$products[$i]['catalog_number']}</td>
        <td>{$products[$i]['name']}</td>
        <td>{$products[$i]['description']}</td>
        <td>\${$products[$i]['price']} /lb</td>
        <td>
            <img src='images/{$products[$i]['pix']}'></td>
        <td style='text-align: center'><input type='text' name='item{$products[$i]['catalog_number']}' value='0' size='4'></td>
    </tr>
    echo "<input type='hidden' name='n_end' value='$n_end'>
    echo "<input type='hidden' name='interest' value='$_POST[interest]'">
    echo "<tr>
        <td colspan='2'> <input type='submit' value='Select another category'></td>
        <td colspan='2' style='text-align: center'><input type='submit' name='products' value='Add Items to Shopping Cart'>
        <td colspan='2' style='text-align: right'>
            if($n_end > $n_per_page)
            {
                echo "<input type='submit' name='products' value='Previous'>
            }
            if($n_end < $n_products)
            {
                #37
                echo "<td style='text-align: center'><input type='text' name='item{$products[$i]['catalog_number']}' value='0' size='4'></td>
                #40
                echo "</tr>
            }
            echo "<input type='hidden' name='n_end' value='$n_end'>
            echo "<input type='hidden' name='interest' value='$_POST[interest]'>
            echo "<tr>
                <td colspan='2'> <input type='submit' value='Select another category'></td>
                echo "<td colspan='2' style='text-align: center'><input type='submit' name='products' value='Add Items to Shopping Cart'>
                #51
            echo "<td colspan='2' style='text-align: right'>
            if($n_end > $n_per_page)
            {
                echo "<input type='submit' name='products' value='Previous'>
            }
            if($n_end < $n_products)
The numbers in the following explanation refer to the line numbers in Listing 6-2. I discuss only the elements added to the file in this chapter. For information about the original file, see the discussion that follows Listing 5-4.

#11 Lines 11 to 15 add the View Shopping Cart button in the upper-right corner of the products page. The button displays the current contents of the shopping cart.

#38 Lines 38 to 40 add an input text field to each item where customers can enter an amount to purchase. The name of the field is built using the catalog number of the product. For instance, the name of the text field might be `item11` or `item4002`. The default value is 0 (zero). The customer can change the value to the desired quantity. The name of the field is passed in the `$_POST` array, along with the quantity, where the processing program can obtain the catalog number from the field name.

#49 Lines 49 through 51 add an extra button named Products to the product page, which is labeled Add Items to Shopping Cart.

**Changing shopping_product_page.inc for use with the object-oriented application**

The code in Listing 6-2 displays the products Web page when used with the procedural code. The file needs changes to work correctly with the object-oriented code.

Lines 30 to 41 display the product information on each row. In Listing 6-2, the information is displayed from an array named `$products`. This array is built from the information in the database in the `ShopCatalog.php` script, described in Listing 6-11. For the object-oriented application, these lines need to be changed to display the information from an object. The object is created in the script `Orders-oo.php`, shown in Listing 6-18.
To use the file with the object-oriented application, change lines 30 to 41 in Listing 6-2 to the following lines and call the new file shopping_product_page-oo.inc:

```
echo "<tr>
    echo "<td align='right'>{$all[$i]->catalog_number}</td>
    echo "<td>{$all[$i]->name}</td>
    echo "<td>{$all[$i]->description}</td>
    echo "<td>$\${$all[$i]->price} /lb</td>
    echo "<td align='center'><img src='images/{$all[$i]->pix}'></td>
    echo "<td style='text-align: center'><input type='text' name='item{$all[$i]->catalog_number}' value='0' size='4'></td>
</tr>
```

As you can see, the variables are changed from arrays ($products[$i]['name']) to objects ($all[$i]->name).

**Writing the code for the shopping cart Web page**

The shopping cart page displays the items currently stored in the shopping cart. The customer can change the quantity ordered. The customer can return to the catalog to add more items or can submit the order.

In this chapter, the shopping cart is not implemented the same way in the procedural code and the object-oriented code. To show both methods, I implemented the shopping cart by storing the items in the MySQL table in the procedural code, but stored the items in a **SESSION** variable in the object-oriented code. As a result, the code that displays the Web pages is slightly different. The following sections show the code for both methods.

**Writing the shopping cart Web page files: The procedural method**

The code that creates the shopping cart page is in two separate files, as follows:

- **table_page.inc**: Contains the code that defines the look and feel of the Web page. It produces a page that lists the products in a table. Another file must be used in conjunction with this file to create the page. The other file contains the specific information for the page.

- **fields_cart.inc**: Contains the specific information for the shopping cart Web page. When used with table_page.inc, it displays the items stored in the shopping cart.
Listing 6-3 shows the file that defines the variables for the shopping cart Web page.

LISTING 6-3: THE FILE THAT CONTAINS THE VARIABLES FOR THE SHOPPING CART

```php
<?php
/* File:   fields_cart.inc
 * Desc:   Provides the information needed to display the 
 *         cart.
 */
$page = array("title"  => "The Food Shop Shopping Cart",
              "top"    => "The Food Shop",
              "top2"   => "Shopping Cart",
              "bottom" => "Send questions or problems to 
                           admin@xFoodShop.com"
          );
$table_headers = array( "Item","Cat No","Food",
                       "Amount","Price","Total");
$order_number = $_SESSION['order_number'];
$table_name = $order_number;
$cxn = connect_to_db("Vars.inc");
$sql_1 = "SELECT * FROM order_item 
            WHERE order_number='$order_number'";
$result = mysqli_query($cxn,$sql_1)
          or die("sql_1: ".mysqli_error($cxn));
$n_row = mysqli_num_rows($result);
if($n_row < 1)
{
    echo "Shopping Cart is currently empty<br>
         <a href='ShopCatalog.php'>Continue Shopping</a>
    ";
    exit();
}
$n=1;
while($row = mysqli_fetch_assoc($result))
{
    foreach($row as $field => $value)
    {
        if($field != "order_number")
        {
            $items[$n][$field]=$value;
            if($field == "catalog_number")
            {
                $sql_2 = "SELECT name,type FROM food WHERE 
                           catalog_number = '$row[catalog_number]'";
                $result2 = mysqli_query($cxn,$sql_2)
                          or die("sql_2: ".mysqli_error($cxn));
            }
        }
    }
}
```

The line numbers called out in Listing 6-2 correspond to the numbered explanations in the following bullets:

#14 Retrieves the order number from a session variable. The order number was stored in the session variable when the order was stored in the database, when the user clicked the Add Items to Shopping Cart button. The order number identifies this order in the database.

#16 Lines 16 to 20 retrieve all the items from the order_item table in the database. (In other words, these lines retrieve all the items currently stored in the shopping cart.)

#21 Sets $n_rows to the number of items found in the database for this order.

#22 Starts an if block that displays a message and a link when there are no items in the database for the specified order number.

#28 Sets a counter for the number of items.

#29 Starts a while loop that creates an array named $items that contains all the information about the items. The food name is retrieved from the catalog and added to the array.

Writing table_page.inc
Listing 6-4 shows the file that defines the look and feel of the shopping cart Web page.

```php
<?php
/*File:   table_page.inc
*Desc:   Defines an HTML page that displays items in a table of items with prices. A column named quantity and a column named price are multiplied together to get the item total price. The item totals are summed.
*/
Continued
```
Part III: Building Online Sales Applications

**LISTING 6-4: (Continued)**

```php
echo "<html>
    <head><title>{$page['title']}</title></head>

    <body>
        <h1 style='text-align: center'>{$page['top']}</h1>
        <h2 style='text-align: center'>{$page['top2']}</h2>
        <p style='font-weight: bold'>
            Order Number: $table_name<hr>
        </p>
        <table border = '0' style='width: 100%'>
            <form action='$_SERVER[PHP_SELF]' method='POST'>
                <tr>
                    foreach($table_headers as $header) {
                        echo "<th>$header</th>\n";
                    }
                    echo "</tr>";
                    echo "<tr><td colspan='6'><hr></td></tr>\n";
                    for($i=1;$i<=sizeof($items);$i++) {
                        echo "<tr>
                            {$items[$i]['item_number']}
                            {$items[$i]['catalog_number']}
                            {$items[$i]['name']}
                            <input type='text' name='quantity[$i]' value='{$items[$i]['quantity']}' size='4'> lbs</td>
                            $f_price = number_format($items[$i]['price'],2);
                            echo "<td style='text-align: right; width: 17%'>$f_price per lb.</td>\n"
                            $total = $items[$i]['quantity']*$items[$i]['price'];
                            $f_total = number_format($total,2);
                            echo "<td style='text-align: right'>$f_total</td>\n"
                            @$order_total = $order_total + $total;
                        }
                        $f_order_total = number_format($order_total,2);
                    }
                    <tr><td colspan='5' style='text-align: right; font-weight: bold'>Total</td>
                        <td style='text-align: right'>$f_order_total</td></tr>
                    <tr><td colspan='2' style='text-align: left'><input type='submit' name='Cart' value='Continue Shopping'></td>
                        <td colspan='2' style='text-align: center'><input type='submit' name='Cart' value='Submit Order'></td>
                        <td colspan='2' style='text-align: right'><input type='submit' name='Cart' value='Update Cart'></td>
                    </tr></table>
        </form>
    </body>
</html>
```
The numbered items in the following list refer to the line numbers in Listing 6-4:

#25 Starts a for loop that loops through the $items array, displaying each row in the shopping cart Web page. The loop ends on line 45.

#27 Lines 27 to 39 display each item in the row from the current $item element. The price is formatted as a dollar amount.

#40 Lines 40 to 43 display the total price. Line 40 computes the total cost, by computing price × quantity. Line 41 formats the total cost as a dollar amount. Line 42 to 43 display the line in the shopping cart Web page.

#44 Sums the item total to accumulate a total for the cart.

#48 Lines 48 to the end are HTML code that display the shopping cart total and the submit buttons.

Writing the shopping cart Web page files: The object-oriented method

The code that creates the shopping cart page is in two separate files, as follows:

✔ table_page-oo.inc: Contains the code that defines the look and feel of the Web page. It produces a page that lists the products in a table. Another file must be used in conjunction with this file to create the page. The other file contains the specific information for the page.

✔ fields_cart-oo.inc: Contains the specific information for the shopping cart Web page. When used with table_page-oo.inc, it displays the items stored in the shopping cart.

Writing fields_cart-oo.inc

Listing 6-5 shows the file that defines the variables for the shopping cart Web page.

```
<?php
/* File:  fields_cart-oo.inc
* Desc:  Builds the arrays needed to display the shopping cart.
*/
$page = array("title" => "Shopping Cart",
              "top"    => "The Food Shop",
              "top2"   => "Shopping Cart",
              "bottom" => "Send questions or problems to admin@xFoodShop.com"
           );
$table_headers = array( "Item","Cat No","Food",
                       "Amount","Price","Total" );
?>
```
Listing 6-6 shows the file that defines the variables for the shopping cart Web page.

### Listing 6-6: The File That Displays the Shopping Cart

```php
<?php
/*File: table_page-oo.inc
 *Desc: Defines an HTML page that displays items in a table of items with prices. A column named quantity and a column named price are multiplied together to get the item total price. The item totals are summed.
 */

echo "<html>
<head><title>{$page['title']}</title></head>
<body>
   
   <h1 style='text-align: center'>{$page['top']}</h1>
   
   <h2 style='text-align: center'>{$page['top2']}</h2>
   
   <p style='font-weight: bold'>$this->message<hr>
   
   <table border = '0' style='width: 100%'
   
   <form action='$_SERVER[PHP_SELF]' method='POST'>
   
   if(sizeof($this->items) > 0)
   
   
   { 
   echo "<tr>
   
   foreach($table_headers as $header)
   
   { echo "<th>$header</th><tr>
   
   echo "</tr>";
   
   foreach($this->items as $i)
   
   {
   echo "<tr>
   
   echo "<td width='5%'>".(($i+1)."</td><tr>
   
   $cat = new catalog("Vars.inc");
   
   $cat->selectCatalog("OnlineOrders");
   
   $cat_no = $this->items[$i]->getCatalogNumber();
   
   $food_name = $cat->getName($cat_no);
   
   echo "<td width='20%' style='text-align: center'>
   
   <input size='4' type='text' name='item$cat_no' value='".$this->items[$i]->getQuantity()." per lb</tr>
   
   $total = $this->items[$i]->getQuantity() *
   
   $this->items[$i]->getPrice();
   
   echo "<td style='text-align: right; width: 7%'> ".$total,2)."</td>
   
   @$order_total = $order_total + $total;
```
The following numbers refer to the line numbers in Listing 6-5:

#17 Begins an if block that executes if there are one or more items in the shopping cart. The variable $items is an array of item objects, stored in the ShoppingCart class, which I discuss later in this chapter. The ShoppingCart class is created in the orders application script. The if block displays the shopping cart Web page. The if block ends on line 65.

#26 Begins a for loop that loops through the $items array and displays the information for each item on the Web page. The for loop ends on line 48.

#30 Lines 30 to 33 get some information using a catalog object. For instance, line 33 gets the name of the item by using the getName method in the Catalog class. Lines 34 to 35 display the information obtained.

#44 Lines 43 to 44 accumulate the total for the shopping cart.

#49 Lines 49 through the end display the shopping cart total and the shopping cart submit buttons.
Begins an else block that executes when no items are stored in the shopping cart. The block displays a button that returns the customer to the catalog category page.

**Writing the code for the shipping information form**

The shipping information form collects the information needed to ship the product. It collects name, address, phone number, and other information. The code that displays the form is in two separate files, as follows:

- **single_form.inc:** Contains the code that defines the look and feel of the Web form. You must use another file in conjunction with this file to create the Web form. The other file contains the specific information such as the field names.

- **fields_ship_info.inc:** Contains the arrays and variables that are used by **single_form.inc** to display the shipping information Web form.

**Writing fields_ship_info.inc**

The **fields_ship_info.inc** file provides the information needed to display the shipping information Web form. The file shown in Listing 6-7 defines six arrays that contain the specific information displayed in the shipping information form. The arrays are:

- **$page:** Contains elements that are displayed at the top and the bottom of the entire page.

- **$ship_info:** Contains elements that provide the field names and labels for the shipping information form. For instance, one field name is **email.** The associated label that displays by the field in the form is **Email Address.**

- **$cc_types:** Contains elements that provide the types of credit cards the form accepts. The credit card types are displayed in a drop-down list in the form.

- **$length:** Contains the lengths that are allowed for each field in the form.

- **$elements:** Contains elements that are displayed at the top and bottom of the form. This array contains only text to display on the submit button.

- **$months:** Contains the months of the year. The months are displayed in a drop-down list for the credit card expiration date.

In addition, the file sets a variable that contains the current date and several variables that contain the shipping information currently stored in the database, which is displayed in the fields of the form.
The file used with the procedural script is slightly different from the file used with the object-oriented script. Listing 6-7 shows the file to be used with in the procedural application. After the listing, you find the changes required to use this file in the object-oriented script.

**LISTING 6-7: THE FILE THAT CONTAINS THE VARIABLES FOR THE SHIPPING INFORMATION FORM**

```php
<?php
/* File: fields_ship_info.inc
 * Desc: Contains arrays with the field names and form elements for the login Web page.
 */
$page = array("title" => "Food Shop Order: Shipping Information",
             "top"   => "Food Shop Order: Shipping Information",
             "top2"  => "Please fill in the information below",
             "bottom" => "Send questions and comments to admin@xFoodShop.com",
           );
$ship_info = array("email"       => "Email Address",
                   "ship_name"   => "Name",
                   "ship_street" => "Street",
                   "ship_city"   => "City",
                   "ship_state"  => "State",
                   "ship_zip"    => "Zip",
                   "phone"       => "Phone",
                   "cc_type"     => "Credit Card Type",
                   "cc_number"   => "Credit Card Number",
                   "cc_exp"      => "Expiration Date"
           );
$cc_types = array("visa"      => "Visa",
                  "mc"        => "Master Card",
                  "amex"      => "American Express"
           );
$length = array("email"       => "55",
                "ship_name"   => "40",
                "ship_street" => "55",
                "ship_city"   => "40",
                "ship_zip"    => "10",
                "phone"       => "15",
                "cc_number"   => "20"
           );
$elements = array("submit"      => "Continue");
$months = array(1=> "January", "February", "March",
                "April", "May", "June", "July",
                "August", "September",
                "September", "October", "November", "December"
           );

Continued
The numbers in the following explanation refer to the line numbers in
Listing 6-7:

#45 Starts an if block that executes if no POST data exists. No post data
exists when the user clicks the Edit Shipping Information button on
the summary page. This block gets the shipping information from the
database.

#47 Lines 47 to 53 create and execute an SQL query that selects the
shipping information from the database. Connect_to_db is a
function used frequently throughout this book and described in
Chapter 3. The function is stored in a file named functions_-
main.inc that is included in the three application scripts,
described in the section “Building the Shopping Cart Application:
The Procedural Approach.”

#54 Tests whether any shipping information was found.

#55 Starts an if block that executes if shipping information was
found. If so, the information is extracted into variables with the
field names.

Changing fields_ship_info.inc for use
in the object-oriented application

The first 44 lines of the file are the same for the procedural and object-oriented
versions.
The variables created in the remaining lines of the file are created in a class in the object-oriented application, rather than in this file. Therefore, to use the file in the object-oriented application, you need to remove the remaining lines (45 to 57). Name the file with lines 45 to 57 removed fields_ship_info-oo.inc.

**Writing single_form.inc**

The fields_ship_info.inc or fields_ship_info-oo.inc file provides the information needed to display the shipping information Web form. The single_form.inc file defines the look and feel of the shipping form. Listing 6-8 shows the file. You use the same file for the procedural and object-oriented scripts.

```php
<?php
/* File: single_form.inc
 * Desc: Contains the code for a Web page that displays
 *       an HTML form.
 * /
include("functions.inc");

if(isset($GLOBALS['message']))
#
{#13
  echo "<tr>
    <td colspan='2'
      style="font-weight: bold; font-style: italic;
      font-size: 90%; color: red">
      {$GLOBALS['message']}</td></tr>"; #28
}

foreach($ship_info as $field => $value)
#
{#21
  if($field == "ship_state")
  #3
  {
    $stateName=getStateName();
    $stateCode=getStateCode();
    for ($n=1;$n<=50;$n++)
    {
      echo "<tr><td style="text-align: right;
        font-weight: bold">State</td>
        <select name='ship_state'>";
    #28
    }
    $stateName=getStateName();
    $stateCode=getStateCode();
    for ($n=1;$n<=50;$n++)
    {
      echo "<tr><td style="text-align: right;
        font-weight: bold">State</td>
        <select name='ship_state'>";
    #28
    }
    break;
  }
  #23
}
```

Continued
LISTING 6-8: (Continued)

```php
{$state=$stateName[$n];
$scode=$stateCode[$n];
echo "<option value='$scode';
if($scode == @$_POST['state'] ||
  $scode == @$ship_state)
  echo " selected";
echo ">$state
;}
echo "</select>";
}
echo "</select>";
}
echo "</select>";
}
elseif($field == "cc_type")
{
    echo "<tr><td style="text-align: right;
    font-weight: bold">Credit Card Type</td>
    <td><select name='cc_type'>
    foreach($cc_types as $field => $value)
    {
        echo "<option value='$field';
        echo ">$value
;}
echo "</select>";
}
elseif($field == "cc_exp")
{
    echo "<tr><td style="text-align: right;
    font-weight: bold">Expiration Date</td>
    <td><select name='cc_exp_mo'>
    for($n=1;$n<=12;$n++)
    {
        echo "<option
        value='$n'>{$months[$n]}
;}
echo "</select>\n;echo "<select name='cc_exp_da'>
    for($n=1;$n<=31;$n++)
    {
        echo " <option value='$n'>$n
;}
    echo "</select>\n;echo "<select name='cc_exp_yr'>
    $start_yr = date("Y",$today);
    for($n=$start_yr;$n<=$start_yr+5;$n++)
    {
        echo " <option value='$n'>$n
;}
    echo "</select>\n;else
{
    echo "<tr><td style="text-align: right;
```
#13 Starts an if block that checks whether a message is stored in the $GLOBALS array. If so, the block displays the message at the beginning of the form. The application script stores the message when an error condition is encountered.

#21 Begins a foreach loop that loops through the $ship_info array. The ship_info array is built in fields_ship_info.inc.

#23 Starts an if block that executes when the field name is ship_state. Lines 23 to 39 display a drop-down list containing the states. Lines 28 to 29 call functions stored in the file functions.inc, which in included in line 6.

#42 Starts an elseif block that executes when the field name is cc_type. Lines 41 to 52 create a drop-down list containing the types of credit cards the customer can select.

#54 Starts an elseif block that executes when the field name is cc_exp. (That field contains the credit card expiration date.) Lines 53 through 77 create a drop-down list of dates the user can select.

#79 Starts an else block that executes for any other fields. Text input lines are displayed in the form for all remaining fields.

#91 The first line of an HTML section that displays the submit button and the ending tags for the form.

### Writing the code for the summary page

The summary Web page shows the final order to the customer. The customer can review the selected items and shipping information. The customer can
submit the displayed order or change it. The code that displays the summary page is in two separate files, as follows:

- **summary_form.inc**: Contains the code that defines the look and feel of the summary page. Another file must be used in conjunction with this file to provide the specific information.
- **fields_summary.inc**: Contains the arrays and variables that are used by summary_form.inc to display the summary page.

**Writing fields_summary.inc**

The fields_summary.inc file provides the information needed to display the summary page. The file shown in Listing 6-9 defines two arrays that contain the specific information displayed in the summary page. The arrays are:

- `$page`: Contains elements that are displayed at the top and the bottom of the entire page.
- `$table_headers`: Contains the column heads for the table that displays the order summary.

In addition, the file retrieves the order number from the session and stores it in `$order_number`, sets a variable with the shipping rate for the order, and sets a name for the table.

The file used with the procedural script is slightly different from the file used with the object-oriented script. Listing 6-9 shows the file to be used in the procedural application. After the listing, you find the changes required to use this file with the object-oriented script.

### Listing 6-9: The File That Provides the Information for the Summary Page

```php
<?php
/* File: fields_summary.inc
 * Desc: Builds the arrays needed to display a summary of the order.
 */
$page = array("title" => "The Food Shop Order Summary",
              "top"  => "The Food Shop Order Summary",
              "top2" => "Order Summary",
              "table" => "Order Number: ",
              "bottom" => "Send questions or problems to admin@xFoodShop.com"
           );
$table_headers = array( "Item","Cat No","Food",
                        "Amount","Price","Total");
$order_number = $_SESSION['order_number'];
$shipping_rate = .25;
$table_name = $order_number;
```

15
16
17
The following numbers in the explanation refer to the line numbers in Listing 6-9:

#15 Retrieves the order number from the session and stores it in $order_number.

#16 Stores the shipping rate in a variable.

#17 Stores a table name that is displayed in the summary page.

#18 Lines 18 to the end create an array of order information that is displayed in the summary form. Lines 18 to 22 connect to the order database and select all the items currently in the order. Line 23 sets $n_row to the number of items returned.

```php
$cxn = connect_to_db("Vars.inc");
$sql_ord = "SELECT * FROM order_item
    WHERE order_number='$order_number';"
$result = mysqli_query($cxn,$sql_ord)
    or die("sql_ord: ".mysqli_error($cxn));
$n_row = mysqli_num_rows($result);
if($n_row < 1)
    { echo "Shopping Cart is currently empty<br>
        <a href='ShopCatalog.php'>Continue Shopping</a>
    exit();
    } $n=1;
while($row = mysqli_fetch_assoc($result))
    { foreach($row as $field => $value)
        { if($field != "order_number")
            { $items[$n][$field]=$value;
                if($field == "catalog_number")
                { $sql_name = "SELECT name,type FROM food WHERE
                    catalog_number = '$row[catalog_number]';"
                    $result2 = mysqli_query($cxn,$sql_name)
                        or die("sql_name: ".mysqli_error($cxn));
                    $row = mysqli_fetch_row($result2);
                    $items[$n]["name"]=$row[0]." ".$row[1];
                }
            }
        }
    } $n++; }
?>
```
#24 Starts an if block that executes if no items were found. The block displays a message and provides a link that returns the user to the catalog.

#30 Lines 30 to 50 create the $items array that contains all the item information.

**Changing fields_summary.inc for use in the object-oriented application**

The first 17 lines of the file are the same for the procedural and object-oriented versions.

The variables created in the remaining lines of the file are created in a class in the object-oriented application, rather than in this file. Therefore, to use the file in the object-oriented application, you need to remove the remaining lines (18 to 50). Name the file fields_summary-oo.inc after you remove lines 18 to 50.

**Writing summary_page.inc**

The summary_page.inc file displays the summary Web page (see Listing 6-10). You use the same file with the procedural and object-oriented scripts.

### Listing 6-10: The File That Defines the Summary Page

```php
<?php
/*File:  summary_page.inc
*Desc:  Defines an HTML page that displays a summary
* of the order.
*/

echo "<html>
<head><title>{$page['title']}</title></head>
<body>

<h2 style='text-align: center'>{$page['top']}</h2>
<p style='position: absolute; margin-top: .25in; font-weight: bold'>Ship to:</p>
<p style='position: absolute; margin-top: .25in; margin-left: .75in'>$ship_name<br>
$ship_street<br>
$ship_city, $ship_state $ship_zip<br>
$phone<br>
$email<br>
</p>
<div style='margin-top: 1.5in'>
<p style='font-weight: bold'>{$page['table']}</p>
<table border = '0' style='width: 100%'>
<form action='$_SERVER[PHP_SELF]' method='POST'>
<tr>
foreach($table_headers as $header)
{
```

Chapter 6: Shopping Cart Application

```php
for($i=1;$i <= sizeof($items);$i++) #29
{
    echo "<tr>
        <td width='10%'>$i</td>
        <td width='10%'>
            {$items[$i]['catalog_number']}</td>
        <td>{$items[$i]['name']}</td>
        <td>{$items[$i]['quantity']}</td>
        $f_price = number_format($items[$i]['price'],2);
        echo "<td style='text-align: right; width: 17%'>
            $$f_price per lb.</td>\n";
    $total = $items[$i]['quantity'] * $items[$i]['price'];
    $f_total = number_format($total,2);
    echo "<td style='text-align: right; line-height: 200%'>
        $$f_total</td>\n";
    @$order_subtotal = $order_subtotal + $total;
} #46
$f_order_subtotal = number_format($order_subtotal,2);
if(substr($ship_zip,0,5) > 75000 #48
    && substr($ship_zip,0,5) < 80000)
{
    $taxrate = .0700;
}
else #55
{
    $taxrate = 0.0;
}
$f_sales_tax = $order_subtotal * $taxrate; #56
$f_shipping = number_format($shipping,2); #58
$order_total = $order_subtotal+$sales_tax+$shipping; #60
$f_order_total = number_format($order_total,2); #61
echo "<tr><td colspan='5' style='text-align: right; font-weight: bold'>Subtotal</td>
        <td style='text-align: right; line-height: 200%'>
            $$f_order_subtotal</td></tr>\n";
```

Continued
The numbers in the following explanation refer to the line numbers in Listing 6-10:

| #10 | Lines 10 to 17 display the shipping information at the top of the summary page. |
| #18 | Lines 18 to 28 display the top of the form and the table column names. |
| #29 | Lines 29 to 45 display the order items on the summary page. |
| #47 | Begins an *if/else* statement that sets the tax rate. Sales tax is charged for shipping addresses in Texas only. The tax rate is set by zip code. For orders with a Texas zip code, the tax rate is 0.07. Otherwise, the tax rate is 0 (zero). |
| #55 | Sales tax is computed by multiplying the total cost of the items by the tax rate. |
| #58 | The shipping cost is set by multiplying the number of items times the shipping rate per item. |
| #60 | The order total is computed by summing the item total, the sales tax, and the shipping cost. |
| #62 | The remaining lines display the item total, shipping cost, sales tax, order total, and then display the four submit buttons. |

```
LISTING 6-10: *(Continued)*

```$f_order_total</td></tr>
";
    echo "<tr><td colspan='2' style='text-align: left'>
        <input type='submit'
            value='Continue Shopping'></td>
";
    echo "     <td colspan='1' style='text-align: center'>
        <input type='submit' name='Ship'
            value='Edit Shipping Information'></td>
";
    echo "     <td colspan='1' style='text-align: right'>
        <input type='submit' name='Final'
            value='Cancel Order'></td>
";
    echo "     <td colspan='2' style='text-align: right'>
        <input type='submit' name='Final'
            value='Submit Order'></td>
";
    echo "</tr></table></form>
";
?>
```
Building the Shopping Cart Application:
The Procedural Approach

The shopping cart application has three application scripts, as follows:

- **ShopCatalog.php**: Manages and displays the catalog Web pages. When the customer clicks the Add Items to Shopping Cart button, the item information is stored in the database and the shopping cart is displayed.
- **ShoppingCart.php**: Manages and displays the shopping cart. Updates the shopping cart when the customer clicks the Update Cart button. When the customer clicks the Submit Order button, the application script displays the shipping information form.
- **ProcessOrder.php**: Processes the shipping information form, stores order information in the database, and displays the summary form. It processes the credit card and order information when the customer clicks the Submit Order button.

Writing ShopCatalog.php

The first script for the shopping cart application displays the catalog and stores the customer selections in the Shopping Cart. ShopCatalog.php is organized in nested if statements, based on which submit button the customer clicked, if any. The following is an overview of the structure of the script:

```
if (button named Products was clicked)

  if (button = "Add Items to Shopping Cart")
    1. Determine the order number
       If current order exists, get the number. If not, create a new order in the database and set the new order number to be the current order number.
    2. Store selected items in the database.
    3. Pass control to ShoppingCart.php, which displays the shopping cart.
  else (if button is not Add Items to Shopping Cart)
     Display catalog product page

else (button named Products was not clicked)
  display catalog categories page
```

This script runs when any of the following events happens:

- The customer enters the URL for ShopCatalog.php in the browser.
  Because this is the first script for the application, it runs correctly when started in the browser. In this case, no button is clicked, so the script drops to the final else statement and displays the catalog index page.
The customer clicks the Add Items to Shopping Cart button. This button is named Products, so the script enters the first if block. The second if checks the value of the button. The button matches so the script enters the second if block, where it adds the items to an existing order or creates a new order if no current order exists. It then starts the second script, ShoppingCart.php, which displays the shopping cart.

The customer clicks Next or Previous. These buttons are named Products, so the script enters the first if block. However, the button value doesn’t match the inner if statement, so the script enters the inner else block where it displays the next or previous items in the catalog product page.

The customer clicks the Select Another Category button. This button has no name, so the script drops to the final else statement and displays the catalog index page.

Listing 6-11 shows the code for ShopCatalog.php — the first application script in the online orders application.

```php
<?php
/* Program: ShopCatalog.php
 * Desc: Displays a catalog of products. Displays two different pages: an index page that shows different categories and a product page that is displayed when the customer selects a category. This version is used with a shopping cart for purchasing items.
 */
$n_per_page = 2;
session_start();
include_once("functions_main.inc");
if(isset($_POST['Products']) && isset($_POST['interest'])) #15
{
    if($_POST['Products'] == "Add Items to Shopping Cart")
    {
        if(!isset($_SESSION['order_number'])) #19
        {
            $connect = connect_to_db("Vars.inc");
            $today = date("Y-m-d");
            $sql_order = "INSERT INTO Customer_Order (order_date)
                        VALUES ('$today')";
            $result = mysqli_query($connect,$sql_order)
                or die("sql_order".mysqli_error($connect));
            $order_number = mysqli_insert_id($connect);
            $_SESSION['order_number'] = $order_number;
            $n_items = 0;
        }
    }
}
```
else
{
    $order_number = $_SESSION['order_number'];
    $n_items = $_SESSION['n_items'];
}

foreach($_POST as $field => $value)
{
    if(substr($field,0,4) == "item" && $value > 0)
    {
        $n_items++;
        $catalog_number = substr($field,4,strlen($field)-4);
        $connect = connect_to_db("Vars.inc");
        $sql_price = "SELECT price FROM Food WHERE catalog_number='$catalog_number';"
        $result = mysqli_query($connect,$sql_price)
            or die("sql_price: " . mysqli_error($connect));
        $row = mysqli_fetch_assoc($result);
        $sql_item = "INSERT INTO Order_Item (order_number,item_number,catalog_number,quantity,price) VALUES ($order_number,$n_items,$catalog_number, $value,{$row['price']})";
        $result = mysqli_query($connect,$sql_item)
            or die("sql_item: " . mysqli_error($connect));
    }
}
$_SESSION['n_items'] = $n_items;
header("Location: ShoppingCart.php");
exit();
}

else
{
    if(isset($_POST['n_end']))
    {
        if($_POST['Products'] == "Previous")
        {
            $n_start = $_POST['n_end']-($n_per_page);
        }
        else
        {
            $n_start = $_POST['n_end'] + 1;
        }
    }
    else
    {
        $n_start = 1;
    }

    $n_end = $n_start + $n_per_page -1;
    $connect = connect_to_db("Vars.inc");
    $query_food = "SELECT * FROM Food WHERE type='$_POST[interest]' ORDER BY name";
    Continued
The following explains the line numbers that appear in Listing 6-11:

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#10</td>
<td>Sets the number of items to be displayed on a page.</td>
</tr>
<tr>
<td>#12</td>
<td>Opens a session. The customer remains in a session throughout the online ordering process.</td>
</tr>
<tr>
<td>#14</td>
<td>Lines 14 to 15 start an <code>if</code> block that executes if the products button is found in the <code>$_POST</code> array and if the customer selected a category. The <code>if</code> block continues to line 102.</td>
</tr>
<tr>
<td>#17</td>
<td>Begins an <code>if</code> block that executes when the user clicks the Add Items to Shopping Cart button. The <code>if</code> block continues to line 61.</td>
</tr>
</tbody>
</table>
#19 Starts an if/else statement that sets the order number and the number of items in the cart. If no order number is found in the session, the if block inserts a new order into the database. The current date is inserted. MySQL inserts a sequential order number. Line 27 stores the order number for the new order in $order_number. Line 28 stores the new order number in the session. No items have yet been added to the order, so $n_items is set to 0 (zero). If an order number is found, the else block retrieves the order number and the number of items currently in the cart from the session.

#36 Starts a foreach loop that loops through the $_POST array. The loop ends on line 57.

#38 Begins an if block that executes for any fields in the array that contain the substring "item" in them and that have a value greater than 0. The value is the quantity the user entered. The field name contains the catalog number of the item. The if block enters the items into the order_item table. On line 37, the catalog number is extracted from the field name. The price is obtained from the catalog. The item information is inserted into the database. The if block ends on line 56.

#58 Stores the new number of items in the session.

#59 Runs the ShoppingCart.php script, which displays the shopping cart.

#62 Starts an else block that executes when the value of the Products button isn’t Add Items to Shopping Cart. The value of the button is Previous or Next. The block sets the item numbers for the first and last items to be displayed and builds an array that contains the product information ($products). The products page is displayed.

#103 Starts an else block that executes when the Products button isn’t clicked. The user clicks either no button or a button with a different name or no name. The catalog index page is displayed.

Writing ShoppingCart.php

The second script for the shopping cart application manages and displays the shopping cart. The user can change the quantity for the displayed items. If the quantity is changed to 0 (zero), the item is removed from the cart. The script is organized by a switch statement, executing code depending on the value of the button that the customer clicked. The following is an overview of the structure of the script:

```php
if (no order number exists in session)
    Display message that cart is empty and a link that
```
returns the user to the catalog index page.

switch (value of button named Cart)
  case: Cart = "Continue Shopping"
      start ShopCatalog.php, which will display
      the first catalog index page.
  case: Cart = Update Cart
      1. Update quantities in the database.
      2. Delete any items with 0 quantity.
      3. Renumber the items with sequential numbers.
      4. Redisplay the shopping cart.
  case: Cart = Submit Order
      Run the script ProcessOrder.php, which displays the
      shipping information form
  default:
    display shopping cart

Listing 6-12 shows the code for ShoppingCart.php — the second application
script in the shopping cart application.

LISTING 6-12: THE SHOPPINGCART APPLICATION SCRIPT FOR SHOPPING CART

```php
<?php
/* Program: ShoppingCart.php
 * Desc: Manages and displays the Shopping Cart.
 */
session_start();
include("functions_main.inc");
if(!isset($_SESSION['order_number'])
   or empty($_SESSION['order_number']))
{
    echo "Shopping Cart is currently empty<br>
         <a href='ShopCatalog.php'>Continue Shopping</a>
        ";
    exit();
}
switch (@$_POST['Cart'])
{
  case "Continue Shopping":
    header("Location: ShopCatalog.php");
    break;
  case "Update Cart":
    $connect = connect_to_db("Vars.inc");
    $order_number = $_SESSION['order_number'];
    $n = 1;
    /* Update quantities in database */
    foreach($_POST['quantity'] as $field => $value)
    {
      $sql_quant = "UPDATE Order_Item SET quantity='$value'
           WHERE item_number= '$n'
          AND order_number='$order_number'";
      $result = mysqli_query($connect,$sql_quant)
          or die("sql_quant: ".mysqli_error($connect));
      $n++;
```

/* Delete any items with zero quantity */
$sql_del = "DELETE FROM Order_Item
    WHERE quantity='0.00'
    AND order_number='$order_number';
$result = mysqli_query($connect,$sql_del)
    or die("sql_del: ".mysqli_error($connect));

/* Renumber items in database. First, put items in an
array. Next, delete all items from the database. Then,
re-insert items with new item numbers. */
$sql_getnew = "SELECT * from Order_Item
    WHERE order_number='$order_number';
$result = mysqli_query($connect,$sql_getnew)
    or die("sql_getnew: ".mysqli_error($connect));
$n_rows = mysqli_num_rows($result);
if($n_rows < 1)
    { echo "Shopping Cart is currently empty<br>
      <a href='Catalog'>Continue Shopping</a>
      
      exit(); 
    }
while($row = mysqli_fetch_assoc($result))
    { $items_new[]=$row; }
$sql_del2 = "DELETE FROM Order_Item
    WHERE order_number='$order_number';
$result = mysqli_query($connect,$sql_del2)
    or die("sql_del2: ".mysqli_error($connect));
for($i=0;$i<sizeof($items_new);$i++)
    {
        $sql_ord = "INSERT INTO Order_Item
            (order_number,item_number,catalog_number,
            quantity,price) VALUES
            ($order_number,$i+1,
            {$items_new[$i]['catalog_number']},
            {$items_new[$i]['quantity']},
            {$items_new[$i]['price']});
        $result = mysqli_query($connect,$sql_ord)
            or die("sql_ord: ".mysqli_error($connect));
    }
$_SESSION['n_items'] = $i;
include("fields_cart.inc");
include("table_page.inc");
break;
case "Submit Order":
    header("Location: ProcessOrder.php?from=cart");
    exit();
    break;
default:
    include("fields_cart.inc");
    include("table_page.inc");
    break;
} ?>
In the following discussion, the numbers refer to line numbers in Listing 6-12:

- **#5** Starts a session, maintaining the order for the user.
- **#7** Begins an if block that executes when no current order exists, displaying a message and a link to the catalog index page.
- **#14** Starts a switch statement for the values of a button named Cart.
- **#16** Begins the case block that executes if the button is Continue Shopping. The block displays the catalog index page.
- **#19** Begins the case block that executes if the button is Update Cart.
- **#23** Starts a foreach loop that updates the quantities for each item in the database.
- **#33** Lines 33 to 38 delete all the items in the database with 0 quantity.
- **#42** Lines 42 to 46 select the remaining items from the database.
- **#47** Starts an if block that executes when no items were found in the database. The if block displays a message and a link to the catalog.
- **#53** Starts a while loop that creates a new array ($items_new) containing the remaining items retrieved from the database.
- **#57** Deletes all the items from the database for the current order.
- **#61** Begins a for loop that inserts all the items in the new array ($items_new), created on line 53, into the database with sequential item numbers. The loop ends on line 72.
- **#73** Stores the current number of items in the session.
- **#74** Lines 74 and 75 display the shopping cart.
- **#77** Begins the case block that executes when the button value is Submit Order. The block runs the third shopping cart application script: ProcessOrder.php.
- **#81** Begins the default case block. The block displays the shopping cart.

**Writing ProcessOrder.php**

The third application script for the shopping cart application processes the order when the customer submits it. The script collects the shipping information, verifies the information that the customer enters, and displays the summary form. When the customer clicks a button on the summary form, the script accepts and processes the order and displays a confirmation page. The script is organized by a series of if/elseif statements, executing code
depending on the name and value of the button that the customer clicked.
The following is an overview of the structure of the script:

```php
if (no order number exists in session)
    Display message that cart is empty and a link that
    returns the user to the catalog index page.

if (script started from shopping cart)
    Display shipping information form
elseif (button name = "Summary")
    1. Check form for blank fields. If blanks are found,
       redisplay the form.
    2. Check format of form fields. If invalid data is found,
       redisplay the form.
    3. Insert shipping information into the order database.
    4. Display the summary form.
elseif (button name = "Ship")
    1. Update quantities in the database
    2. Delete any items with 0 quantity.
    3. Renumber the items with sequential numbers
    4. Redisplay the shopping cart
elseif (button name = "Final")
    switch (Button value)
        case: "Continue Shopping"
            Run ShopCatalog.php
        case: Cancel Order
            Display cancellation Web page
            Destroy session
        case: Submit Order
            Set order status to submitted
            Process credit information
            Send order to be filled
            Display order confirmation Web page

Listing 6-13 shows the code for ProcessOrder.php — the third application
script in the online orders application.

Listing 6-13: The ProcessOrder Application Script for Shopping Cart

```
if(@$_GET['from'] == "cart")
{
    include("fields_ship_info.inc");
    include("single_form.inc");
    exit();
}
elseif(isset($_POST['Summary']))
{
    foreach($_POST as $field => $value)
    {
        if ($value == "")
        {
            $blanks[] = $field;
        }
    }
    if(isset($blanks))
    {
        $message = "The following fields are blank.
                    Please enter the required information: ";
        foreach($blanks as $value)
        {
            $message .="$value, ";
        }
        extract($_POST);
        include("fields_ship_info.inc");
        include("single_form.inc");
        exit();
    }
    foreach($_POST as $field => $value)
    {
        if($field != "Summary")
        {
            if(eregi("name",$field))
            {
                if (!ereg("^[A-Za-z' -]{1,50}$",$value))
                {
                    $errors[] = "$value is not a valid name.";
                }
            }
            if(eregi("street",$field)or eregi("addr",$field) or
               eregi("city",$field))
            {
                if(!ereg("^[A-Za-z0-9.,'-]{1,50}$",$value))
                {
                    $errors[] = "$value is not a valid address
                    or city.";
                }
            }
            if(eregi("state",$field))
            {
                if(!ereg("[A-Za-z]",$value))
                {
                    $errors[] = "$value is not a valid state.";
                }
            }
        }
    }
}
if(eregi("email", $field))
{
    if(!ereg("^\@.+\.$", $value))
    {
        $errors[] = "$value is not a valid email address.";
    }
}

if(eregi("zip", $field))
{
    if(!ereg("^[0-9]{5}(\-[0-9]{4})?$", $value))
    {
        $errors[] = "$value is not a valid zipcode.";
    }
}

if(eregi("phone", $field))
{
    if(!ereg("^[0-9]{7,20}$", $value))
    {
        $errors[] = "$value is not a valid phone number.";
    }
}

if(eregi("cc_number", $field))
{
    $value = trim($value);
    $value = ereg_replace('.', '', $value);
    $value = ereg_replace('-', '', $value);
    $_POST['cc_number'] = $value;

    if($_POST['cc_type'] == "visa")
    {
        if(!ereg("^[4]{1,1}[0-9]{12,15}$", $value))
        {
            $errors[] = "$value is not a valid Visa number.";
        }
    }
    elseif($_POST['cc_type'] == "mc")
    {
        if(!ereg("^[5]{1,1}[0-9]{15,15}$", $value))
        {
            $errors[] = "$value is not a valid MasterCard number.";
        }
    }
    else
    {
        if(!ereg("^[3]{1,1}[0-9]{14,14}$", $value))
        {
            $errors[] = "$value is not a valid American Express number.";
        }
    }
}

$\$field = strip_tags(trim($value));
LISTING 6-13: (Continued)

```php
if(@is_array($errors))
{
    $message = "";
    foreach($errors as $value)
    {
        $message .= $value." Please try again<br />
    }
    include("fields_ship_info.inc");
    include("single_form.inc");
    exit();
}
/* Process data when all fields are correct */
foreach($_POST as $field => $value)
{
    if(!eregi("cc_",$field) && $field != "Summary"
    {
        $value = addslashes($value);
        $updates[] = "$field = '$value';
    }
}
$update_string = implode($updates,",");
$sql_ship = "UPDATE Customer_Order SET $update_string
    WHERE order_number='{$_SESSION['order_number']}'";
$cxn = connect_to_db("Vars.inc");
$result = mysqli_query($cxn,$sql_ship)
or die(mysqli_error($cxn));
extract($_POST);
include("fields_summary.inc");
include("summary_page.inc");
}
elseif(isset($_POST['Ship']))
{
    include("fields_ship_info.inc");
    include("single_form.inc");
}
elseif(isset($_POST['Final']))
{
    switch ($_POST['Final'])
    {
        case "Continue Shopping":
            header("Location: ShopCatalog.php");
            break;
        case "Cancel Order":
            include("fields_cancel.inc");
            include("cancel_message.inc");
            unset($_SESSION['order_number']);
            session_destroy();
            exit();
            break;
        case "Submit Order":
            $cxn = connect_to_db("Vars.inc");
```

In the following list, I explain the designated lines in Listing 6-12:

#5 Starts a session for the current order.
#7 Begins an if block that executes if there is no current order. It displays a message and a link to the catalog.
#13 Begins an if block that executes when the user clicks the Submit Order button in the shopping cart. The block displays the shipping information form.
#19 Begins an elseif block that executes when the user clicks the button named summary, which is the button that displays Continue in the shipping information form. The elseif block processes the information from the shipping information form. Lines 21 to 132 check the form fields. (I discuss form fields in more detail in Chapter 4.)
#21 Lines 21 to 40 checks for blank fields and redisplay the form if blanks are found.
#41 Lines 41 to 132 check the format of the information entered by the user. The form is redisplayed with an error message if any invalid formats are found.
#134 Starts a foreach loop that creates an array, called $update, that contains the shipping information. This array is used later to build the SQL statement that adds the shipping information to the database.
#136 Begins an if block that executes if the field doesn’t contain credit card information. This application doesn’t store the credit card information in the database. Consequently, the customer needs to reenter the credit card information if it’s needed again.
#142 Creates a string containing the shipping information.
#143 Lines 143 to 147 create and execute the SQL statement that adds the shipping information to the database.
Lines 148 to 150 display the summary Web page.

Begins an `elseif` block that executes when the button is named `Ship`. This condition is true when the user clicks the `Edit Shipping Information` button on the summary page. The block displays the shipping information form with the shipping information that is currently stored in the database.

Begins an `elseif` block that executes when the user clicks a button named `Final`. These buttons are displayed on the summary Web page.

Starts a `switch` statement based on which `Final` button the user clicks.

Starts the `case` block that executes when the value of the `Final` button is `Continue Shopping`. The block runs the `ShopCatalog.php` script, which displays the catalog index page.

Starts the `case` block that executes when the value of the `Final` button is `Cancel Order`. The block displays a cancellation Web page, by including two files, and destroys the session. Notice that the two include statements have a comment mark (`#`) at the beginning of the line. These two statements are commented out because the cancellation Web page isn’t provided in this chapter, in the interests of saving space. You need to develop a cancellation page that is specific to your order process.

Starts the `case` block that executes when the value of the `Final` button is `Submit Order`. The block sets the order status to `Submitted='yes'`.

Calls a function that processes the credit card information. I don’t provide this function because it depends on which credit card processing company you use. The company will provide you with the information needed to write the function. In general, the function sends the credit information to the company and receives a code from them that either accepts or rejects the credit charge. Notice that the statement in the listing has a comment mark (`#`) at the beginning of the line so that it doesn’t actually execute. It’s just there to show you a possible statement to use.

Calls a function that sends the order information to the person/department responsible for filling and shipping the order. This function depends on your internal procedures. The function might send an e-mail notice to the shipping department, or your process might be altogether different. This statement is also commented out because I don’t provide the function.

Displays an order confirmation (or not accepted) Web page by including two files. The files are not provided, so the include statements are commented out. You need to write your own files to include at this location.
Building the Shopping Cart Application: The Object-Oriented Approach

Object-oriented programming requires that you create and use objects to provide the functionality of the application. You first identify the objects needed for the application. Then you write the classes that define the objects, including the methods that the application needs. When the objects are ready, you write the application script that creates and uses the objects.

Developing the objects

The shopping cart application needs to display products from the catalog. It stores the customer’s choices in a shopping cart. It stores the order shipping information and the items ordered in a database. The following list of objects reflects the tasks this application needs to perform:

- **Catalog**: The Catalog class returns and displays product information as needed.
- **Database**: The application stores the product information in a database. The Database class provides the container that stores the data.
- **Item**: The customer orders items. The items are stored in the shopping cart and stored in the order database. The Item class stores and retrieves information about the item.
- **ShoppingCart**: The shopping cart holds the items currently selected by the customer. The customer can add items to and delete items from the cart.
- **Order**: The shipping and credit information for the order needs to be associated with the items in the order. The Order class stores and retrieves all the information about the order that is stored in the database.

#181 Calls a function that sends an e-mail to the customer. This function call is commented out, because I don’t provide the email function. You need to write a function that creates and sends an e-mail message specific to your business. Sending an e-mail is shown in detail in Chapter 4.

#182 Destroys the session. The user can’t make any changes to the order after clicking the Submit Order button on the summary page.
WebForm: A form is used to collect the shipping and credit information from the customer. The WebForm class provides the form for the application. It collects and processes the information typed by the customer.

WebPage: The WebPage class displays a Web page that includes information from PHP variables. The WebPage class is used frequently throughout this book whenever a Web page needs to be displayed.

Email: The application sends an e-mail to customers when they order, letting them know that the order has been accepted and other information about their orders. The Email class contains and manages the e-mail message.

I discuss the details for each class in the following sections.

Writing the Catalog class

The Catalog class maintains a connection to the database where the product information is stored. The Catalog class returns or displays product information as needed. I develop the Catalog class in Chapter 5. I add two additional methods to the class for the shopping cart application. (Refer to Listing 5-7 for the Catalog class code.) I describe the new methods, getName and getPrice, later in this section.

The methods provided by the Catalog class are:

- **The constructor:** Creates a connection to a MySQL database. The constructor expects to be passed a filename of the file that contains the hostname, account name, and password necessary to access MySQL. The following statement creates a Database object:

  ```php
  $db = new Database("Vars.inc");
  ```

- **useDatabase:** Selects a database and stores the database name. The method expects to be passed a database name. It checks whether the database exists and returns a message if the database doesn’t exist.

- **getConnection:** Returns the connection that is established and stored in the constructor.

- **getName:** Returns the product name. This method expects to be passed a catalog number. This method is added in this chapter. The code is shown in Listing 6-14.

- **getPrice:** Returns the price. This method expects to be passed a catalog number. This method is added in this chapter. The code is shown in Listing 6-14.

The code for the getName and getPrice methods is shown in Listing 6-14.
The `getName` method

The `getName` method returns the product name, formatted as name-space-type. For instance, in this application, the method returns Delicious Apple or Mandarin Orange.
The method tests that the catalog number passed to it contains only numbers. For other applications, the catalog number might have a different format that contains letters or other characters. The if statement needs to test the format of the catalog number in as much detail as possible.

If the catalog number has the correct format, an SQL query is built to select the needed information from the database. The query is executed. The information returned by the query is added to a string with the correct format. The formatted information is returned. You can call the method as follows:

```php
$product_name = $catalog->getName("1004");
```

where "1004" is the catalog number for the product.

**The getPrice method**

The `getPrice` method returns the product price. An SQL query is built to select the price from the database and executed. The method returns the price. The syntax for calling the method is shown here:

```php
$product_price = $catalog->getPrice($catalog_number);
```

**Writing the Item class**

The `Item` class is a fundamental class. The customer orders items. The item object stores and retrieves the information about an item that the customer selected.

**The properties**

The `Item` properties store information about the item. The properties are:

```php
private $catalog_number;
private $quantity;
private $name;
private $price;
```

The first property is the number needed to locate the item in the catalog database. The second property is the quantity of the item entered by the customer. The remaining properties are the name and the price for the item, information obtained from the catalog.

**The code**

Listing 6-15 contains the complete code for the `Item` class. After the code listing you can find details about each method.
Chapter 6: Shopping Cart Application

LISTING 6-15: THE ITEM CLASS

```php
<?php
/* Name: Item.class
* Desc: Represents an item in the order.
*/
class Item
{
    private $catalog_number;
    private $quantity;
    private $name;
    private $price;

    function __construct($cat_no, $quantity)
    {
        if(is_string($cat_no) && is_numeric($quantity))
        {
            $this->quantity = $quantity;
            $this->catalog_number = $cat_no;
            $cat = new Catalog("Vars.inc");
            $cat->selectCatalog("OnlineOrders");
            $this->name = $cat->getName($cat_no);
            $this->price = $cat->getPrice($cat_no);
        }
        else
        {
            throw new Exception("Parameter is not a valid catalog number and quantity");
        }
    }

    function getCatalogNumber()
    {
        return $this->catalog_number;
    }

    function getQuantity()
    {
        return $this->quantity;
    }

    function getPrice()
    {
        return $this->price;
    }

    function getName()
    {
        return $this->name;
    }
}
?>
```
The constructor

The constructor collects and stores the information for the item. The catalog number and the quantity are passed when a new Item is created. The constructor stores the catalog number and quantity in the Item properties. The constructor retrieves the remaining two properties from the catalog database and stores them in the Item properties.

An item is created as follows:

```php
$item1 = new Item(5007, 3)
```

**getCatalogNumber, getQuantity, getPrice, getName**

These methods return the specified item information. The methods are used as follows:

```php
$price = getPrice();
```

Writing the ShoppingCart class

The shopping cart is a major component of the shopping cart application. It holds the items currently selected by the customer.

**The properties**

The shopping cart properties store the items in the shopping cart, along with information needed by the shopping cart to display the cart correctly.

```php
private $items = array();
private $message;
private $n_items = 0;
```

The first property is an array of objects that contains the items currently stored in the shopping cart. The second property is a message that appears when the shopping cart is displayed. The third property is the number of items currently stored in the cart.

**The code**

Listing 6-16 contains the complete code for the ShoppingCart class. I cover each method in detail after the code listing.
<?php
/* Name: ShoppingCart.class
* Desc: Creates a shopping cart—a structure that
*       holds items.
*/
class ShoppingCart
{
    private $items = array();
    private $message;
    private $n_items = 0;

    function __construct()
    {
        if(isset($_SESSION['items']))
        {
            $this->items = $_SESSION['items'];
            $this->n_items = sizeof($this->items);
        }
        $this->message = "Shopping Cart contains
            {$this->n_items} items."
    }

    function addItem(Item $item)
    {
        $this->items[] = $item;
        $_SESSION['items'] = $this->items;
        $this->n_items++;
        $this->message = "Shopping Cart contains
            {$this->n_items} items."
    }

    function getAllItems()
    {
        return $this->items;
    }

    function getMessage()
    {
        return $this->message;
    }

    function displayCart($file_fields,$file_page)
    {
        include($file_fields);
        include($file_page);
    }

    function updateCart($new_array)
    {
        if(is_array($new_array))
        {

Continued
The constructor

The constructor sets the three properties. The default values set an empty array and the number of items is 0. The constructor looks for an array of items in the session. If it finds it, it stores it in the $items property and sets the number of items to the size of the array. If no items are stored in the session, the properties retain the default settings for an empty cart. The third property, $message, is set to a string of text that shows the number of items in the cart.

The object is created without passing any arguments, as follows:

```php
$cart = new ShoppingCart();
```

When the shopping cart is created, either it is new and empty or it contains the items stored for the session.

addItem

The addItem method adds an item to the cart. It expects to receive an item object. It adds the item to the item array and stores the new array in the session variable. This method also increments the number of items stored and updates the message with the new number of items. You use the method as follows:

```php
$cart->addItem($item5);
```

where the $item5 variable contains an item object.
**getAllItems, getMessage**

The `getAllItems` and `getMessage` methods get the specified properties. The `getAllItems` method returns the array of item objects stored in the cart properties. The `getMessage` method returns the stored message. Neither method expects an argument to be passed.

**displayCart**

The `displayCart` method displays the shopping cart on a Web page. The names of the files that provide the fields and define the page are passed to the method. You can use the methods as follows:

```php
$cart = new ShoppingCart();
$cart->displayCart("fields_cart-oo.inc","table_page.inc");
```

**updateCart**

The `updateCart` method updates an existing cart. It expects an array containing the information for all the items to be in the updated cart. The method replaces the existing array of items with the a new array of items created from the information passed to the method.

The array passed to the method should contain keys in the format `itemnnnn` where `nnnn` is the catalog number of an item. The value is the quantity for the item. A sample array might contain the following:

```php
$item_array[item1003] = 1
$item_array[item27] = 2.5
$item_array[item673] = 1.7
```

The `$_POST` array (which is sent when the user clicks the submit button in the shopping cart Web page) contains similar elements, such as:

```php
$item_array[item1003] = 1
$item_array[item27] = 2.5
```

For each element in the array, the method extracts the catalog number from the key, passes the catalog number and the quantity to create an item object, and adds the new item object to an array of objects. When all the elements have been added to the new array of objects, the new array is stored in the object property `$items` and in the session variable. The number of items is incremented and stored.

**Writing the Database class**

The `Database` class provides the connection to the database where the customer information is stored. I develop the `Database` class in Chapter 3. See Listing 3-4 for the `Database` class code.
The methods provided by the Database class are:

- **The constructor**: Creates a connection to a MySQL database. The constructor expects to be passed a filename where the hostname, account name, and password necessary to access MySQL are stored. A Database object is created with the following statement:

  ```
  $db = new Database("Vars.inc");
  ```

- **useDatabase**: Selects a database and stores the database name. The method expects to be passed a database name. It checks whether the database exists and returns a message if the database doesn’t exist.

- **get Connection**: Returns the connection that is established and stored in the constructor.

**Writing the Order class**

The order contains all the information needed to complete the customer’s purchase. It contains the shipping and credit information and the item information for each item ordered. The order information is stored in a database.

**The properties**

The Order properties store information about the order. The properties are:

```
private $order_number;
private $cxn;
private $table;
```

The first property is the number needed to identify the order in the database. The remaining two properties contain the information needed to access the order in the database.

**The code**

Listing 6-17 contains the complete code for the Order class. After the code listing, you can find a discussion about each method.

**LISTING 6-17: THE ORDER CLASS**

```php
<?php
/* Class: Order
 * Desc: Class that holds orders.
 */

class Order
{
    private $order_number;
```
private $order_info;
private $order_items=[];
private $cxn;
private $table;

function __construct(mysqli $cxn,$table)
{
    $this->cxn = $cxn;
    if(is_string($table))
    {
        $this->table = $table;
    }
    else
    {
        throw new Exception("$table is not a valid table name.");
    }
}

function createOrder()
{
    $today = date("Y-m-d");
    $sql = "INSERT INTO $this->table (order_date) VALUES ('$today')";
    if($result = $this->cxn->query($sql))
    {
        $this->order_number = $this->cxn->insert_id;
        $_SESSION['order_number'] = $this->order_number;
    }
    else
    {
        throw new Exception("Database is not available. Try again later");
    }
}

function getOrderNumber()
{
    return $this->order_number;
}

function addCart(ShoppingCart $cart)
{
    foreach($cart->getAllItems() as $n => $item)
    {
        $cat_no = $item->getCatalogNumber();
        $quantity = $item->getQuantity();
        $price = $item->getPrice();
        $sql = "INSERT INTO Order_Item (order_number,catalog_number,
                        quantity,item_number,price)
                        VALUES ($this->order_number,$cat_no,
                        $quantity,($n+1),$price)";
        Continued
$result = $this->cxn->query($sql);
}
}

function selectOrder($order_number)
{
    if(is_int($order_number))
    {
        $this->order_number = $order_number;
    }
    else
    {
        throw new Exception("$order_number is not an integer.");
    }
}

function getOrderInfo()
{
    $sql = "SELECT * FROM $this->table WHERE order_number='$this->order_number'";
    if($result = $this->cxn->query($sql))
    {
        return $result->fetch_assoc();
    }
    else
    {
        throw new Exception("Database is not available. Try again later");
    }
}

function getItemInfo()
{
    $sql = "SELECT item_number,catalog_number,quantity,price FROM order_item WHERE order_number='$this->order_number'";
    if($result = $this->cxn->query($sql))
    {
        $n=1;
        while($row=$result->fetch_assoc())
        {
            foreach($row as $field => $value)
            {
                $item[$n][$field] = $value;
            }
            $cat = new Catalog("Vars.inc");
            $cat->selectCatalog("OnlineOrders");
            $item[$n]['name'] = $cat->getName($item[$n]['catalog_number']);
            $n++;
        }
    }
return $item;
}
else
{
    throw new Exception("Database is not available. Try again later");
}
}

function updateOrderInfo($data)
{
    if(!is_array($data))
    {
        throw new Exception("Data must be in an array.");
        exit();
    }
    $sql = "UPDATE $this->table SET ";
    foreach($data as $field => $value)
    {
        if(ereg("ship",$field) || $field == "phone"
            || $field == "email")
        {
            $data_array[] = "$field='$value'";
        }
    }
    $sql .= implode($data_array,',');
    $sql .= "WHERE order_number='$this->order_number'";
    if(!$result = $this->cxn->query($sql))
    {
        throw new Exception("Database is not available. Try again later");
    }
    return true;
}

function displayOrderSummary($field_info,$field_page)
{
    $data = $this->getOrderInfo();
    $items = $this->getItemInfo();
    extract($data);
    if(is_string($field_info) and is_string($field_page))
    {
        include($field_info);
        include ($field_page);
    }
    else
    {
        throw new Exception("Requires two valid filenames.");
    }
}
The constructor
The constructor stores the information needed to connect to the database. It expects to be passed a connection and a table name. The connection is a database connection provided by a Database object. The constructor stores the information in the Order properties.

You can create an Order object as follows:

```php
$db = new Database("Vars.inc");
$db->selectDatabase("OnlineOrders");
$order = new Order($db->getConnection(),"Customer_Order");
```

createOrder
The createOrder method inserts a new order into the order database using an SQL query. Today’s date is stored. The MySQL AUTO_INCREMENT feature creates the order number. The new order number is stored in the order property and in a session variable. The method returns true if the order is successfully created.

selectOrder
The selectOrder method sets the order number in the Order to the order number passed to it. Any information retrieved later from the database is retrieved based on the order number property.

addCart
The addCart method adds all the items in a shopping cart to the order. The method expects to be passed a ShoppingCart object. The method uses a foreach loop to loop through all the items in the shopping cart. The information from each item object is used to build an SQL query that inserts the item into the order_item table.

getOrderInfo
The getOrderInfo method returns an associative array containing all the information from the customer_order table. It includes the name and address, phone, date created, and other order-level information. It creates an SQL SELECT query that selects all the information. No parameter is expected.

getItemInfo
The getItemInfo method returns a multidimensional array containing all the information for all the items in the order. The information for each item in the array includes all the fields from the order_item table in the database, plus the product name retrieved from the catalog.
The method executes a query that gets all the information from the order_item table. A while loop processes each item row in turn. A foreach loop runs for each row, adding each field to the array element resulting in a multi-dimensional array. After the foreach loop finishes, the method retrieves the product name from the catalog and adds it to the array.

**updateOrderInfo**

The updateOrderInfo method updates the shipping information in the customer_order table of the database. The method expects an array of shipping information, such as the $_POST array from the shipping information form. An SQL UPDATE query is created from the data in the $data array.

The query is built with an opening section and phrases for each field, such as ship_name=John Smith. Each update phrase is added to a new array, $data_array. After all fields have been processed and added to the new array, the implode function is used to convert the array into a string suitable for use in the query. The WHERE clause is then added to the end of the query.

The method can be used with a statement similar to the following:

```php
$order->updateOrderInfo($_POST);
```

updateOrderInfo returns true when the information is updated successfully.

**displayOrderSummary**

The displayOrderSummary method displays a summary of the order. The names of the two files that define the summary page are passed. The summary page is displayed by including the two files.

**Writing the WebForm class**

The WebForm is used to display and process the shipping information form. I create and explain the WebForm class in Chapter 4. The class is shown in Listing 4-6.

The methods in the WebForm class that the shopping cart application script uses are:

- **The constructor:** Stores the properties needed to display the form correctly. Two files — an information file and a file that defines the look and feel — are required. The two filenames are passed when the WebForm object is created and stored in two properties. The data for the form fields can be passed, but can be left out and the form fields will be blank. You can create the object by using either of the following statements:

  ```php
  $form = new WebForm("file1.inc","file2.inc",$_POST);
  $form = new WebForm("file1.inc","file2.inc");
  ```
displayForm: This method displays the form. It extracts the data from the $data property where it is stored. An @ is used to suppress the error messages so that the form can be displayed without any data. The form is displayed by including the two files that define the form. These two files can define any type of form, with fields and elements you want to use. For this application, I use the files I describe earlier in this chapter — `fields_ship_info-oo.inc` and `single_form.inc` — which define the shipping information form.

checkForBlanks: Checks each field in the form to see whether it contains information. If the method finds invalid blank fields, it returns an array containing the field names of the blank fields.

verifyData: This method checks each field to ensure that the information submitted in the field is in a reasonable format. For instance, you know that “hi you” is not a reasonable format for a zip code. This method checks the information from specific fields against regular expressions that match the information allowed in that field. If invalid data is found in any fields, the method returns an array containing messages that identify the problems.

trimData, stripTagsFromData: A PHP function is applied to each value in the $data property. The resulting values are stored in $data. The trim function removes leading and trailing blanks from a string. The strip_tags function removes any HTML tags from the string, important for security.

Writing the WebPage class

I use the WebPage class throughout this book whenever I need to display a Web page. The WebPage object is a Web page that displays information in PHP variables, along with HTML code. The code that defines the Web page is in a separate file. You include the file to display the Web page. I develop and explain the WebPage class in Chapter 3. You can see the WebPage class listing in Listing 3-6.

The WebPage class includes the following methods:

The constructor: Stores a filename and the data needed to display the page. Expects to be passed the filename of the file that contains the HTML code that defines the Web page. It also expects to be passed an array containing any data that needs to be displayed in the page. A WebPage object can be created with a statement similar to the following:

```php
$web_page1 = new WebPage("define_page.inc", $data);
```

displayPage: Displays the Web page. The method extracts the information in the $data array and includes the HTML file.
Writing the Email Class

After a customer successfully submits an order, the application sends a confirmation e-mail message to the e-mail address provided by the customer. (You can find out about the Email class in Chapter 4, and the code is shown in Listing 4-9.)

Writing the shopping cart application script

After writing all the class code needed for the shopping cart application, you write the application script that creates and uses the objects to provide the application functionality. The application script is organized as an if statement with nested if statements. The if statements execute based on the name and value of the submit buttons. Table 6-3 shows the buttons used throughout the application. The table shows the text displayed on the button, the Web page where the button appears, and the name given to the button in the input tag.

<table>
<thead>
<tr>
<th>Displays</th>
<th>Web Page</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select a Category</td>
<td>Catalog index</td>
<td>Products</td>
</tr>
<tr>
<td>Continue Shopping</td>
<td>Catalog Product</td>
<td>(No name)</td>
</tr>
<tr>
<td>Continue Shopping</td>
<td>Shopping Cart</td>
<td>(No name)</td>
</tr>
<tr>
<td>Continue Shopping</td>
<td>Summary</td>
<td>(No name)</td>
</tr>
<tr>
<td>Add Items to Cart</td>
<td>Catalog Product</td>
<td>Cart</td>
</tr>
<tr>
<td>Previous</td>
<td>Catalog Product</td>
<td>Cart</td>
</tr>
<tr>
<td>Next</td>
<td>Catalog Product</td>
<td>Cart</td>
</tr>
<tr>
<td>Submit Order</td>
<td>Shopping Cart</td>
<td>Ship</td>
</tr>
<tr>
<td>Update Cart</td>
<td>Shopping Cart</td>
<td>Cart</td>
</tr>
<tr>
<td>Continue</td>
<td>Shopping information form</td>
<td>Summary</td>
</tr>
<tr>
<td>Edit Shipping Info</td>
<td>Summary</td>
<td>Ship</td>
</tr>
<tr>
<td>Submit Order</td>
<td>Summary</td>
<td>Final</td>
</tr>
<tr>
<td>Cancel Order</td>
<td>Summary</td>
<td>Final</td>
</tr>
</tbody>
</table>
The following text gives a general overview of the application script:

```php
if (Button name = Products)
    Display catalog products page for the category selected.
elseif (Button name = Cart)
    if (Button = Update Cart)
    1. Update items and quantities in shopping cart.
    2. Display cart.
    elseif (Button = Add Items to Cart)
    1. Add the selected items to shopping cart.
    2. Display shopping cart.
elseif (Button name = Ship)
    1. If current order exists, get order number from the
       session variable. If not, create a new order.
    2. Display shipping information form.
elseif (Button name = Summary)
    1. Check form information for blanks. If blanks found,
       redisplay form with error message.
    2. Check form information for correct format. If
       invalid information found, redisplay form with error
       message.
    3. Add shipping information from form to database.
    4. Add the items in the shopping cart to the database.
    5. Display summary form.
elseif (Button name = Final)
    if (Button = "Submit Order")
    1. Update order status to submitted.
    2. Process credit card information.
    3. Submit order to be filled and shipped.
    4. Send confirmation email to customer.
    5. Display confirmation Web page.
    elseif (Button = "Cancel Order")
    1. Update order status to cancelled.
    2. Display cancellation Web page.
    3. Destroy session.
else
    Display catalog index page
```

The application program creates objects and uses their methods to perform
the tasks that I describe in the preceding application overview. You see the
application program script in Listing 6-18.

**List 6-18: THE SHOPPING CART APPLICATION SCRIPT**

```php
<?php
/* Program: Orders-oo.php
 * Desc: Handles all functions of the Online Orders
 *       application. The submit button name is tested
 *       to determine which section of the program
 *       executes.
 */
require_once("Item.class");
require_once("Catalog.class");
```
require_once("ShoppingCart.class");
require_once("WebForm.class");
require_once("WebPage.class");
require_once("Order.class");
require_once("Database.class");
include("functions_main.inc");

session_start();

if(isset($_POST['Products']) && isset($_POST['interest']))
{
    try
    {
        $catalog = new Catalog("Vars.inc");
        $catalog->selectCatalog("OnlineOrders");
        $catalog->displayAllofType($_POST['interest'],2);
    }
    catch(Exception $e)
    {
        echo $e->getMessage();
        exit();
    }
}

elseif(isset($_POST['Cart']))
{
    $cart = new ShoppingCart();
    if($_POST['Cart'] == "Update Cart")
    {
        try
        {
            $cart->updateCart($_POST);
        }
        catch(Exception $e)
        {
            echo $e->getMessage();
            exit();
        }
    }
}

elseif($_POST['Cart'] == "Add Items to Cart")
{
    foreach($_POST as $field => $value)
    {
        if(ereg("item",$field) && $value > 0)
        {
            try
            {
                $cat_no = substr($field,4);
                $item = new Item($cat_no,$value);
                $cart->addItem($item);
            }
            catch(Exception $e)
            {
                echo $e->getMessage();
                exit();
            }
        }
    }
}
Listing 6-18: (Continued)

```php
try
{
    $cart->displayCart("fields_cart-oo.inc",
                        "table_page-oo.inc");
}
catch(Exception $e)
{
    echo $e->getMessage();
    exit();
}

elseif(isset($_POST['Ship']))
{
    try
    {
        $db = new Database("Vars.inc");
        $db->useDatabase("OnlineOrders");
        $order = new Order($db->getConnection(),
                           "Customer_Order");
        if(isset($_SESSION['order_number']))
        {
            $order->selectOrder($_SESSION['order_number']);
        }
        else
        {
            $order->createOrder();
        }
        $ord = $order->getOrderNumber();
        $info = $order->getOrderInfo();
        $form = new WebForm("single_form.inc",
                           "fields_ship_info.inc",$info);
        $form->displayForm();
    }
    catch(Exception $e)
    {
        echo $e->getMessage();
        exit();
    }
}
elseif(isset($_POST['Summary']))
{
    try
    {
        $form = new WebForm("single_form.inc",
                           "fields_ship_info-oo.inc",$_POST);
        $blanks = $form->checkForBlanks();
    }
    catch(Exception $e)
    {
        echo $e->getMessage();
        exit();
    }
}
{  
echo $e->getMessage();  
}
if(is_array($blanks)) #117
{
    $GLOBALS['message'] = "The following required fields were blank. Please enter the required information: ";
    foreach($blanks as $value)
    {
        $GLOBALS['message'] .= "$value, ";
    }
    $form->displayform();
    exit();
}
$form->trimData(); #129
$form->stripTagsFromData();
try
{
    $errors = $form->verifyData();
}
catch(Exception $e)
{
    echo $e->getMessage();
}
if(is_array($errors))
{
    $GLOBALS['message'] = "";
    foreach($errors as $value)
    {
        $GLOBALS['message'] .= "$value<br> ";
    }
    $form->displayForm();
    exit();
}
try
{
    $db = new Database("Vars.inc"); #151
    $db->useDatabase("OnlineOrders");
    $order =
    new Order($db->getConnection(),"Customer_Order");
    $order->selectOrder($_SESSION['order_number']);

    // Add shipping form info to db
    $order->updateOrderInfo($_POST);

    // Add items to db
    $cart = new ShoppingCart(); #161
    $order->addCart($cart);

    // display summary form
    $order->displayOrderSummary("fields_summary-oo.inc", "summary_page.inc");

    Continued
LISTING 6-18: (Continued)

```php
} catch(Exception $e)
{
    echo $e->getMessage();
}

elseif(isset($_POST['Final']))
{
    if($_POST['Final'] == "Submit Order")
    {
        $db = new Database("Vars.inc");
        $db->useDatabase("OnlineOrders");
        $order = new Order($db->getConnection(),
                          "Customer_Order");
        $order->selectOrder($_SESSION['order_number']);
        if(processCC())
            {
            $order->setSubmitted();
            $order->sendToShipping();
            $order->sendEMailtoCustomer();
            $confirm = new webPage("confirm_page.inc",$data);
            $confirmpage->displayPage();
        }
        else
            {
            $order->cancel();
            $unapp = new webPage("not_accepted_page.inc",$data);
            $unapp->displayPage();
            unset($_SESSION['order_number']);
            unset($_SESSION);
            session_destroy();
        }
    }
    else
    {
        $catalog = new Catalog("Vars.inc");
        $catalog->selectCatalog("OnlineOrders");
        $catalog->displayCategories();
    }
} else
{
    $catalog = new Catalog("Vars.inc");
    $catalog->selectCatalog("OnlineOrders");
    $catalog->displayCategories();
} ?>```
The following numbered items discuss the numbered lines in Listing 6-18:

#16 Opens an existing session or, if no session exists, opens a new session.

#17 Begins an if block that executes when the user clicks the Products button with a product category selected. The block displays the catalog product page for the selected category.

#31 Begins an elseif block that executes when the user clicks the Cart button.

#33 Creates a ShoppingCart object. The ShoppingCart class constructor looks for items in the session. If existing items are found in the session variable $items, they are loaded into the cart object. If $items isn't found in the session, the cart is set up empty.

#34 Begins an if block that executes when the user clicks the Update Cart button. The block updates the quantities and items in the shopping cart.

#46 Begins an elseif block that executes when the user clicks the Add Items to Cart button. Line 48 starts a foreach loop the loops through the $_POST array. When an array element key contains item and the quantity is greater than 0, the catalog number is extracted from the field name (line 54) and an item object is created (line 55) and added to the cart (line 56).

#68 Lines 68 to 69 display the shopping cart.

#77 Begins an elseif block that executes when the user clicks the Ship button. This block displays the shipping information form.

#81 Lines 81 to 84 create an order object.

#85 Starts an if/else statement that sets the order number. If the order number is found in a session variable, the order property is set to the session order number. If not, a new order is created with a new order number.

#93 Lines 93 to 97 display the shipping information form, with the shipping information from the order database.

#105 Begins an elseif block that executes when the user clicks the Summary button. This block processes the information from the shipping information form.

#109 Lines 109 to 128 check the $_POST array for blank form fields. If blanks are found, the form is redisplayed with an error message.

#129 Lines 129 to 148 check the format of the data in the elements in the $_POST array. If invalid data is found, the form is redisplayed with an error message.
Lines 151 to 158 add the shipping information to the database. This line is not reached until the shipping information has been validated.

Lines 161 to 162 add the items in the shopping cart to the order database.

Lines 165 to 166 get the information from the database and display the summary Web page.

Starts an elseif block that executes when the user clicks the Final button. This block processes the final order. The customer can cancel or submit the order. If submitted, the order is either approved or not approved.

Starts an if block that executes when the user clicks the Submit Order button. The block creates an order object.

Starts an if block that executes when the credit card processing company approves the credit charge. The function processCC isn’t included in this chapter. You must write this function yourself because it is different for different credit processing companies. The company tells you what the function needs to do. In general, you send the credit information to the company computer, which processes the credit charge. A code for success or failure is returned to your function.

Sets the status of the order in the database to be approved.

Sends the order to be filled and shipped. This method isn’t included in the Order class in this chapter. You need to write the method to fulfill orders per your company procedures.

Lines 187 and 188 display a confirmation Web page. You need to write confirmation_page.inc to include the information that you want your customers to know, such as shipping date, shipping method, and so on.

Starts an else block that executes when the credit charge is not approved. The block cancels the order, displays a not approved Web page, and destroys the session. The file not_accepted_page.inc is not provided in this chapter. You need to write the HTML for this file with the information you want the customer to have.

Starts an else block that executes when the customer clicks the Cancel Order button. The block cancels the order, displays a cancellation page, and destroys the session. You need to write the file, cancel_page.inc yourself.

Begins an else block that executes when the user clicks no button or a button without a name. The block displays the catalog index page.
Adding Features to the Application

The shopping cart application in this chapter provides basic online ordering functionality. However, you can add even more features. Some common features of a shopping cart applications that aren’t provided in this chapter include

- **Login:** As I discuss at the beginning of this chapter, many online merchants require customers to log in before they can order. You can add this feature with the login application provided in Chapter 4.

  Some sites allow customers to purchase items without logging in, but offer them the option of saving their information for faster checkout during their next order.

  This application doesn’t save the credit card information. Some users trust well-known merchants to store their credit card numbers. It provides faster checkout. It’s more trouble, but more customer friendly, to make credit card storage optional. Customers will be happier if you ask their permission before storing their credit card numbers.

- **Order Tracking:** Customers appreciate the opportunity to track their orders. It’s difficult to provide this feature without a login. If you allow a customer to see the details of an order by simply entering the order number, there’s really nothing to prevent that customer from looking at any order number in your system.

- **Inventory:** For some companies, the database that holds information about the product also keeps track of the inventory of products. Customers receive immediate information regarding the availability of an item. The database can also let purchasing know when the quantity of a product is low.

You can add these common features or other features that are very specific to your Web site. I suggest that you get the application working as it is first. Then, when it’s working, you can add features one at a time. Don’t change too many things at once. It’s easiest to troubleshoot one feature at a time.

In general, adding features to the object-oriented application is easier than adding to the procedural application. One of the strengths of object-oriented programming is that you can add code without needed to change the existing code. If you believe your application is likely to grow in the future, building with the object-oriented application would be wise.
Part IV
Building Other Useful Applications

The 5th Wave  By Rich Tennant

"The engineers lived on Jolt and cheese sticks putting this product together, but if you wanted to just use 'cola and cheese sticks' in the Users Documentation, that's okay too. We're pretty loose around here."
In this part . . .

In this part, I provide two independent applications. The first application, discussed in Chapter 7, is a Content Management System (CMS) that allows users to post their documents on a Web site. The second application, discussed in Chapter 8, is a Forum application that allows users to read and post messages on a public bulletin board.
A content management system (CMS) is a general term for a Web site that can have its content, flow, and/or look and feel managed by using an administrative, Web-based interface. A CMS allows a non-technical user to update a Web site’s content with ease. This alleviates the need to have a programmer present to change code for each piece of content the user wishes to publish. A CMS won’t put programmers out of work, but a properly constructed CMS can make their lives easier because they won’t be needed for every little change to the site content. By enabling the Web site’s users to maintain the content for the site, maybe you’ll finally be able to take that vacation! Before you buy that plane ticket and pack your scuba gear, however, take a look at this chapter, in which I show you how to build a CMS.

Designing the CMS Application

Before you design the user interface, you must make some fundamental programming design decisions, such as

- **Content types**: The goal of a CMS is to make Web site content totally user-driven, alleviating the need for programmers to make code changes to change the Web site. However, the designer of a CMS will have to decide how robust the CMS should be. Some CMS systems provide a WYSIWYG editor and a complex hierarchy for organizing sections of the Web site. In this chapter I show you a sample intranet CMS. It provides...
an area for each department in a company. Each department’s area of
the Web site will have a section for News, Events, Meeting Materials, and FAQ. Therefore, the hierarchy and the types of content the Web site will manage are somewhat limited, but the design of the CMS makes it easy to add a new department or to add a new content type (with no additional code).

Permissions: A CMS usually needs to know who is using the Web site so that appropriate menus are displayed. An intranet is usually a set of internal Web applications that allow a company to share information within the organization. In the example CMS in this chapter, any member of a given department can create or modify content for that department. A user cannot edit content for a department in which the user does not belong. For instance, an employee in the Sales Department cannot edit content in the Information Technology Department’s section of the Web site. So, the CMS application needs to have a login screen. The user accounts need to identify which department the user is in. I develop the login program used for this application in Chapter 4, and I describe the issues and code in that chapter as well. Using the login program in this application requires some minor changes, which I detail later in this chapter.

Handling Uploads: Intranets are valuable tools because of the information that is available on them. To allow users to share documents, you need to provide a way for the users to upload files. In the sample CMS in this chapter, the user can upload documents. The CMS simply keeps track of the filename and the content to which it is associated. For example, if a user wants to post an FAQ where the question being posed is “How do I sign up for the 401K?”, the user posting the FAQ will be able to answer the FAQ and also post related documents, perhaps forms that the people browsing the Web site will find useful.

Creating the CMS Database

The database stores information about users, departments, content types, content items, and downloads. The user table helps you determine the department to which a user belongs. The department table gives you information about a department, such as its name and a description of what the department does. The content type table defines the types of content that the Web site can accommodate. The content and download tables store the details that the users will be interested in. The CMS can determine whether a user is allowed to modify or edit content if the user belongs to the department in which the user is browsing.
**Designing the CMS database**

The sample application in this chapter uses a database named IntranetCMS. The database needs tables that contain the user, department, and content data. The database contains the following five tables:

- **Dept_User**: Stores information about the users, including which department they work in.
- **Department**: Stores a name and description for each department.
- **Content_Type**: Stores an ID and description for each type of content that the user can store.
- **Content**: Stores information about a content item, such as title and description, date created, who created it, and other information.
- **Content_Download**: Stores the filenames of any documents that can be downloaded. Each item is connected to an item in the Content table.

Auto increment columns in each of the tables help to tie all the information together. The dept_id column is used in the Department, Dept_User, and Content tables. The content_id (the auto increment column of the Content table) ties a piece of content to any associated downloads, stored in the Content_Download table.

**Designing the Dept_User Table**

The Dept_User table, shown in Table 7-1, contains user information, including the dept_id that will tie each user to a specific department.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>user_name</td>
<td>VARCHAR(255)</td>
<td>User identifier (primary key)</td>
</tr>
<tr>
<td>dept_id</td>
<td>INT</td>
<td>Department identifier (see Table 7-2)</td>
</tr>
<tr>
<td>first_name</td>
<td>VARCHAR(255)</td>
<td>User’s first name</td>
</tr>
<tr>
<td>last_name</td>
<td>VARCHAR(255)</td>
<td>User’s last name</td>
</tr>
<tr>
<td>password</td>
<td>VARCHAR(255)</td>
<td>User’s password</td>
</tr>
<tr>
<td>create_date</td>
<td>TIMESTAMP</td>
<td>Date (and time) user’s record was created</td>
</tr>
<tr>
<td>email</td>
<td>VARCHAR(255)</td>
<td>E-mail address</td>
</tr>
</tbody>
</table>
The user_name and password will be used to gain access to the site. The dept_id column will be useful when the CMS needs to decide whether a user can add or modify content in a section of the Web site.

**Designing the Department table**

The Department database table, shown in Table 7-2, is a simple table that stores the name and a short description for a department. The dept_id column is an identity column that is also used in other tables, allowing content and users to be associated with a department.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>dept_id</td>
<td>SERIAL</td>
<td>Department's unique ID (primary key)</td>
</tr>
<tr>
<td>name</td>
<td>VARCHAR(255)</td>
<td>Department's name</td>
</tr>
<tr>
<td>description</td>
<td>VARCHAR(255)</td>
<td>Long description of what the department does in the company</td>
</tr>
</tbody>
</table>

What kind of column is SERIAL? SERIAL is a built-in alias for BIGINT UNSIGNED NOT NULL AUTO_INCREMENT. Save your fingers from typing that and use the alias to build an auto increment column. However, keep in mind that the storage required for a BIGINT is 8 bytes whereas the storage for an INT is 4 bytes. Storage requirements for MySQL data types are found here: http://dev.mysql.com/doc/mysql/en/storage-requirements.html.

The department list in the example CMS could have been hard-coded into the PHP code, but what if the company you work for merges with another company and suddenly a bunch of new departments exist? By storing the department information in the database, you can make the Web site more manageable. Isn’t that the goal of a content management system? You want the users and the system — not the programmers — to manage information. The more the CMS can manage itself, the more opportunities you will find to build more and more exiting applications. If you had to do all the content maintenance for the Web sites you build, you might find yourself continuously changing little pieces of the Web site for your clients or end users.

**Designing the Content_Type table**

Table 7-3 shows the table structure that will allow the CMS to keep track of the different types of content that can be posted on the Web site.
The list of content types could have been hard-coded into the Web site’s PHP code, but, again, by making this kind of information database-driven you make the Web site flexible enough to accommodate many future content types.

**Designing the Content table**

The Content table is a generic table for keeping any type of content. In a more complex CMS, this task might not be feasible with a single table, but it does the trick for this example application. Table 7-4 shows the columns for the Content table. A simple piece of content has a number of attributes associated with it, such as the date and time at which the content item was created and the date and time at which the content item was last modified.

### Table 7-4 Database Table: Content

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>content_id</td>
<td>SERIAL</td>
<td>Content identifier (primary key).</td>
</tr>
<tr>
<td>dept_id</td>
<td>INT</td>
<td>This column identifies the department to which this content belongs (see Table 7-2).</td>
</tr>
<tr>
<td>content_type</td>
<td>INT</td>
<td>This column identifies the type of content being stored in this record (see Table 7-3).</td>
</tr>
<tr>
<td>title</td>
<td>VARCHAR(255)</td>
<td>Short description for the content.</td>
</tr>
<tr>
<td>description</td>
<td>TEXT</td>
<td>Long description for the content.</td>
</tr>
<tr>
<td>content_date</td>
<td>DATE</td>
<td>Date when the content is relevant or when some event occurs.</td>
</tr>
<tr>
<td>create_date</td>
<td>TIMESTAMP</td>
<td>Date content item was created.</td>
</tr>
<tr>
<td>created_by</td>
<td>VARCHAR(255)</td>
<td>User name of the user who created this content item.</td>
</tr>
</tbody>
</table>
Table 7-4 (continued)

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>last_upd_date</td>
<td>TIMESTAMP</td>
<td>Date content item was last modified.</td>
</tr>
<tr>
<td>last_upd_by</td>
<td>VARCHAR(255)</td>
<td>User name of the user that last modified this content item.</td>
</tr>
</tbody>
</table>

The Content table uses a TEXT column for the long description because the VARCHAR and CHAR data types have a length limit of 255 (in MySQL 4.x and previous versions). Using a TEXT column type, if the content is very verbose, it won’t get cut off because a TEXT column can handle up to $2 + 2^{16}$ bytes. The description is the bulk of the content item, and it is displayed by using a TEXTAREA element in the HTML form when the user has edit permissions.

**Designing the Content_Download table**

A list of downloadable documents might be associated with each content item from the Content table (shown in Table 7-4). Table 7-5 shows the simple table that essentially ties a document with a content item. The name of the file will be used in the display.

Table 7-5 Database Table: Content_Download

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>download_id</td>
<td>SERIAL</td>
<td>Download identifier, primary key.</td>
</tr>
<tr>
<td>content_id</td>
<td>INT</td>
<td>This column identifies the content item to which this download belongs (see Table 7-4).</td>
</tr>
<tr>
<td>name</td>
<td>VARCHAR(255)</td>
<td>The name of the uploaded file.</td>
</tr>
</tbody>
</table>

The Content_Download table is very simple in the sample CMS implemented in this chapter. If you want to make the download functionality more robust, you can also keep track of the size of the file, the file type, and so on. In the sample application, I implement a simple upload and download capability.

**Building the CMS database**

The following SQL statement creates this database:

```
CREATE DATABASE IntranetCMS;
USE IntranetCMS;
```
The following SQL statements create the tables:

```sql
DROP TABLE IF EXISTS Department;

CREATE TABLE Department (  
department_id SERIAL,  
name VARCHAR(255) NOT NULL,  
description VARCHAR(255) NOT NULL,  

PRIMARY KEY (department_id)
);

DROP TABLE IF EXISTS Content_Type;

CREATE TABLE Content_Type (  
type_id SERIAL,  
name VARCHAR(255) NOT NULL,  

PRIMARY KEY (type_id)
);

DROP TABLE IF EXISTS Content;

CREATE TABLE Content (  
content_id SERIAL,  
department_id INT NOT NULL,  
content_type INT NOT NULL,  
title VARCHAR(255) NOT NULL,  
description TEXT NOT NULL,  
content_date DATE,  
create_date TIMESTAMP  
 DEFAULT now() NOT NULL,  
created_by VARCHAR(255) NOT NULL,  
last_upd_date TIMESTAMP NOT NULL,  
last_upd_by VARCHAR(255) NOT NULL,  

PRIMARY KEY(content_id)
);

DROP TABLE IF EXISTS Dept_User;

CREATE TABLE Dept_User (  
user_name VARCHAR(255) UNIQUE NOT NULL,  
department_id INT NOT NULL,  
first_name VARCHAR(255) NOT NULL,  
last_name VARCHAR(255) NOT NULL,  
password VARCHAR(255) NOT NULL,  
create_date TIMESTAMP  
 DEFAULT now() NOT NULL,  
email VARCHAR(255),
```
Why drop tables before creating them? Well, when I’m developing a new Web site, I find it helpful to have a file that I can use to quickly re-create the database structure all at once. I can then use all or part of this “script” as I fine-tune the structure of the database. The `drop table if exists` statement in the file just saves me some time while I copy and paste the `data definition language` (DDL) into the MySQL client window. DDL statements are a subset of SQL statements that are used to create or modify database objects and their structure.

The following SQL statements fill the `Content_Type` table with the content types that are to appear in the CMS:

```sql
INSERT Content_Type (name) values ('News');
INSERT Content_Type (name) values ('Events');
INSERT Content_Type (name) values ('FAQ');
INSERT Content_Type (name) values ('Meeting Materials');
```

The following SQL statements fill the `Department` table with the departments in the fictitious company in this chapter’s CMS example:

```sql
INSERT Department (name, description) values ('Human Resources', 'Bringing the right people together to get the job done.');
INSERT Department (name, description) values ('Sales', 'Our experienced sales team markets our great products to the public.');
INSERT Department (name, description) values ('Distribution', 'We get the goods to the customers.');
INSERT Department (name, description) values ('Information Technology', 'Building the applications that give us the edge.');
```
Accessing the CMS database

In the sample CMS in this chapter, as in previous chapters, the database credentials are stored in a file named `Vars.inc`. The contents of this file contain your account and password, similar to the following:

```php
<?php
    $host = "localhost";
    $user = "admin";
    $passwd = "";
    $database = "IntranetCMS";
?>
```

Designing the CMS Web Pages

The CMS application has a login page and content pages that have five levels of browsing, as follows:

1. **Login**: The CMS application requires users to register and log in before they can browse content. I took the login page for this application from Chapter 4 and slightly modified it; I describe the changes in Listing 7-1.

2. **Home page**: The home page simply displays a list of the departments that make up the company’s intranet. The department descriptions are displayed in the main body of the page; along the left side of the page are links to the departments in the intranet. See Figure 7-1.

3. **Department page**: From the home page, the user clicks a single department. At the department-level page, the content types are listed in the main section of the page and on the left, as shown in Figure 7-2.

4. **Content List page**: From the Department page, the user clicks a content area, such as New, Events, or FAQ. The content area contains a list of items for the department and content type that the user selected. In Figure 7-3, the FAQs are listed for the Human Resources Department. If the user browsing this page isn’t a member of the Human Resources Department, she won’t see the Edit or Delete links. (The Edit and Deleted links are located in the far right column.)

5. **Content Detail page**: From the Content List page, the user can view the details of a single content item, including any downloads. The left side of the page lists any available downloads associated with the content item, and the main body of the page includes the details of the content item, including the creation date and creator of the content item. In Figure 7-4, a single FAQ’s details are displayed for the Human Resources department. This shows a user that is part of the Human Resources department. If she weren’t a Human Resources employee, she would see a read-only view of the content, like the one shown in Figure 7-5.
Figure 7-1: The Intranet home page, where the departments in the company are listed.

Figure 7-2: The content types are listed for the Human Resources Department page.
Figure 7-3: The Human Resources FAQ List page.

Figure 7-4: The Human Resources FAQ Detail page.
Building the CMS Application:
Procedural Approach

The CompanyHome.php file contains the logic for organizing the data for the main display of the CMS. It figures out whether the user is looking at the main page, a department-level page, a content list page, or a detail page. It fills in elements of the $page array. The $page array is used in the company.inc program to construct the HTML display. This CMS intranet Web site requires that the people browsing it are registered users who have logged in to the system. Some intranet sites require only a login to gain access to administrative parts of the Web site. In the example in this chapter, the Web site requires users to be logged in to browse any of the content. The include file company.inc does the HTML work with the data that was set up by CompanyHome.php.

Writing the login code

The example in this chapter uses a very simple login and authentication scheme. The application assumes that the users that belong in a department have permission to create, edit, or delete any of the content for that department. Furthermore, the application allows the users signing up to choose the
department in which they work. In a real-world application, this is quite a leap of faith. If you create a CMS system, you should implement a system that can appropriately identify users and apply the appropriate entitlements. To keep things simple in this chapter, you reuse the `Login.php` code from Chapter 4, Listing 4-4. A few modifications are needed, however; I identify those changes in Listing 7-1.

**Listing 7-1: Login.php Changes**

```php
$table_name = "Dept_User";
$next_program = "CompanyHome.php";

$sql = "SELECT user_name, dept_id FROM $table_name"

$_SESSION['user_dept'] = $row['dept_id'];
$_SESSION['user_name'] = $row['user_name'];

$_SESSION['dept_id'] = $dept_id;
$_SESSION['user_name'] = $user_name;
```

Following is a description of the lines changed from the `Login.php` found in Chapter 4:

**#11** The database tables used in the CMS application are different from the database tables used in Chapter 4. You change line 11 to use the `Dept_User` table designed earlier in this chapter.

**#12** The page to which `Login.php` will redirect the user upon a successful login or registration is changed to the home page for the CMS application, `CompanyHome.php`.

**#25** The application stores the user name and department ID in the session to use later in the application. The field `dept_id` is added to the `SELECT` query started on this line so that the department ID can be stored in the session.

**#33** Stores the department ID in the session.

**#34** Stores the user name in the session. Lines 33 and 34 stored different bits of information on these lines in `Login.php` in Chapter 4.

**#192** [and **#193**] Chapter 4 stored a flag in the session to indicate that the user had been authenticated (`auth`), and it stored the user’s ID (`logname`). The CMS application in this chapter stores the user name (`user_name`) and department identifier (`dept_id`) in the session variable. The `user_name` comes in handy when the CMS needs to store information about the person adding or changing content in the system. The department ID (`dept_id`) helps the CMS keep track of the department for which the user has permission to add or modify content.
The file in Listing 7-2 is copied from Chapter 4 (specifically, from Listing 4-1) and is also altered a bit to meet the needs of the CMS application in this chapter. The biggest difference is that the list of departments is constructed by connecting to the database and querying the Department table. The list of departments is needed for the Department drop-down list on the login page, thus allowing the user to select the department in which he is a member.

```php
<?
/* File: fields_login.inc
 * Desc: Contains arrays with the field names and form elements for the login Web page.
 */
include_once("functions_main.inc");

$page = array( "title" => "Login Page",
               "top"   => 
               "bottom" => "Send questions and comments to admin@ourplace.com",
               );

$elements_1 = array( "top" => "Returning Home:
    <span style="font-size: 80%;
    font-weight: 100\%">
    <i>Login here</i></span",
                       "bottom" => ",
                       "submit" => "Login"
               );

$elements_2 = array("top" => "New Users:
    <span style="font-size: 80%;
    font-weight: 100\%">
    <i>Register here</i></span",
                      "bottom" => ",
                      "submit" => "Register"
               );

$fields_1 = array("fusername" => "User Name",
                   "fpassword" => "Password",
               );

$length_1 = array("fusername" => "10",
                  "fpassword" => "10"
               );

$types_1 = array("fusername" => "text",
                 "fpassword" => "password"
               );

$fields_2 = array("user_name" => "User Name",
                   "password" => "Password",
                   "email" => "Email Address",
                   "first_name" => "First Name",
                   "last_name" => "Last Name",
               );
```
The `double_form.inc` file in Listing 7-3 was copied from Chapter 4, Listing 4-2, and was altered a bit, too. The biggest difference is that there is now code that builds the department drop-down list, starting at line 85.

```php
"dept_id" => "Department"
);
$types_2 = array("user_name" => "text",
    "password" => "password",
    "email" => "text",
    "first_name" => "text",
    "last_name" => "text",
    "dept_id" => "select"
);
$length_2 = array("user_name" => "20",
    "password" => "8",
    "email" => "55",
    "first_name" => "40",
    "last_name" => "40",
);
$options = array();

$connection = Connect_to_db("Vars.inc");
$results = mysqli_query($connection, "SELECT dept_id, name
FROM Department
ORDER BY name");
while($row = mysqli_fetch_assoc($results)) {
    $options['dept_id'][$row['dept_id']] = $row['name'];
}
?>

LISTING 7-3: DEFINING TWO SIDE-BY-SIDE HTML FORMS

```php
/* File: double_form.inc
 * Desc: Contains the code for a Web page that displays
 *       two HTML forms, side by side in a table.
 */
<?php
<head><title><?php echo $page['title']?></title></head>
<body style="margin: 0">
<h1 align="center"><?php echo $page['top'] ?></h1>
<hr size="10" noshade>
<table border="0" cellpadding="5" cellspacing="0">
<?php
Continued
14_575872 ch07.qxd  5/27/05  6:27 PM  Page 249
```
250

Part IV: Building Other Useful Applications
LISTING 7-3: (Continued)
#############
## Form 1 #
#############
?>
<tr>
<td width=”33%” valign=”top”>
<p style=”font-size: 110%; font-weight: bold”>
<?php echo $elements_1[‘top’]?></p>
<!-- Beginning of form 1 (left) -->
<form action=<?php echo $_SERVER[‘PHP_SELF’]?>
method=”POST”>
<table border=”0”>
<?php
if (isset($GLOBALS[‘message_1’]))
#27
{
echo “<tr>
<td colspan=’2’
style=\”font-weight: bold;
font-style: italic;
font-size: 90%; color: red\”>
{$GLOBALS[‘message_1’]}<p></td></tr>\n”;
}
foreach($fields_1 as $field => $value)
#36
{
$type = $types_1[$field];
echo “<tr><td style=\”text-align: right;
font-weight: bold\”>$value</td>
<td><input type=’$type’ name=’$field’
value=’”.@$$field.”’
size=’{$length_1[$field]}’
maxsize=’{$length_1[$field]}’>
</td></tr>\n”;
}
#46
?>
<tr>
<td colspan=”2” style=”text-align: center” >
<br />
<input type=”submit” name=”Button”
value=”<?php echo $elements_1[‘submit’]?>”>
</td></tr>
</table>
</form>
</td>
<!-- Column that separates the two forms -->
<td style=”background-color: gray”></td>
<?php
#############
## Form 2 #
#############
?>
<td width=”67%”>
<p style=”font-size: 110%; font-weight: bold”>

#63


<?php echo $elements_2['top'] ?>

<!-- Beginning of Form 1 (right side) -->
<form action=<?php echo $_SERVER['PHP_SELF']?> method="POST">
<p>
<table border="0" width="100%">
<?php
if (isset($GLOBALS['message_2']))
{
    echo "<tr>
        <td colspan='2' style="font-weight: bold; font-style: italic; font-size: 90%; color: red">
            {$GLOBALS['message_2']}
        </td></tr>
    
}$GLOBALS['message_2']"</p></td></tr>

foreach($fields_2 as $field => $value) {
    $type = $types_2[$field];
    if($type == "select") {
        echo "<tr><td style="text-align: right; font-weight: bold">$fields_2[$field]</td>
            <td><select name='$field'>
            foreach ($options[$field] as $opt_id => $opt_name) {
                echo "<option value='$opt_id';" if (@$_GET[$field] == $opt_id) echo " selected;" echo ">$opt_name
            } echo "</select>
        }
    }
    else
    {
        echo "<tr><td style="text-align: right; font-weight: bold">$value</td>
            <td><input type='$type' name='$field'
                value='"'.$$field.'" size='{$length_2[$field]}'
                maxsize='{$length_2[$field]}'>
        </td></tr>
    }
</tbody></table></form>
</p>
</td>

Continued
Following is a description of the numbered lines of code that appear in `double_form.inc`, in Listing 7-3:

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#27</td>
<td>Checks for the existence of an error message that is stored in the <code>$_GLOBALS</code> array. If it is set, the error message is displayed.</td>
</tr>
<tr>
<td>#36</td>
<td>For each element in the <code>$fields_1</code> array, which is used in the login form, a form input element is constructed.</td>
</tr>
<tr>
<td>#48</td>
<td>At line 48, the submit button is displayed. This button, if clicked, will make the form submit to <code>Login.php</code> and the user’s user name and password will be evaluated.</td>
</tr>
<tr>
<td>#63</td>
<td>The form created after line 63 is the registration form.</td>
</tr>
<tr>
<td>#74</td>
<td>The <code>isset</code> function call checks for the existence of an error message that is stored in the <code>$_GLOBALS</code> array. If set, the error message is displayed.</td>
</tr>
<tr>
<td>#82</td>
<td>The <code>foreach</code> statement starts a loop through the elements that should be displayed on the registration form, as defined by the <code>$fields_2</code> array. Line 84 looks up the HTML element type for the field in the <code>$types_2</code> array (that is defined in <code>fields_login.inc</code>).</td>
</tr>
<tr>
<td>#85</td>
<td>This block of code creates the drop-down list of departments. In a real-life CMS, you will probably find tighter security. In the CMS example in this chapter, the user is trusted to choose her department. Remember, a user associated with a certain department has administrative rights for that department. A real-life CMS should include another layer of administration where a “super-user” can grant or revoke administrative privileges.</td>
</tr>
<tr>
<td>#101</td>
<td>In the HTML around line 101, a form input element is constructed. The length of the element is defined in the <code>$length_2</code> array (found in <code>fields_login.inc</code>).</td>
</tr>
<tr>
<td>#111</td>
<td>At line 111, the submit button is displayed. This button, if clicked, will make the form submit to <code>Login.php</code>, and <code>Login.php</code> will process registration information. If the validation succeeds the user will be forwarded on to the Intranet home page. If there is an error found while validating the registration information, the login page will be redisplayed and the errors will be noted on the screen in red text.</td>
</tr>
</tbody>
</table>
Writing CompanyHome.php, a data retrieval file

CompanyHome.php is responsible for setting up the data elements used by company.inc, a file that will display the HTML interface. CompanyHome.php is structured as a switch statement, with case blocks for each browse level. The browse level reflects the level in the site hierarchy at which the user is browsing, starting at the home page and drilling down to the content detail level. The browse level is passed in the URL. The switch statement tests the browse level and executes the appropriate case block. The following is an overview of the structure of the script:

switch (browse_level)

    case "home":
        1 Get the list of departments from the Department database table.
        2 Use the list of departments to build left-hand links to the departments.
        3 Use the list of departments to build the main body text of the Web page that will include the department description text.

    case "department":
        1 Get the list of content types supported in the CMS from the Content_Type database table.
        2 Use the list of content types to build left-hand links to the content type pages for the selected department.
        3 Use the list of content types to build main body text of links to the content type pages for the selected department.

    case "content":
        1 Get the list of content items based on the department and content type that the user has selected.
        2 If no content items exist, display a message indicating this.
        3 If content items exist, list the items in a table.
        4 If the user has administrative permissions in this department, display links that allow the user to add or edit the content item.

    case "details":
        1 Get the list of content details based on the department, content type, and content item that the user has selected.
        2 If the user is an administrator, show a form that includes elements that allow the user to upload files.
        3 Show any downloadable files in the left-hand section of the Web page.
Listing 7-4 contains the PHP code that sets up data elements that are going to be used to display the Web pages.

```php
<?php
/* Program: CompanyHome.php
 * Desc: Displays a Web page that has four levels:
 *          1) the home page, 2) a department page, 3) a
 *          content list page, and 4) a detail page.
 */
if (!isset($_SESSION)) #7
    session_start();

include_once("functions_main.inc");

$page = array( #12
    "title" => "The Company Intranet",
    "header" => "The Company Intranet",
    "bottom" => "Copyright(R) 2005",
    "left_nav_links" => array(),
    "body_links" => array(),
    "col_headers" => array(),
    "data_rows" => array(),
);

$admin = FALSE;
$base_url = "CompanyHome.php";
$trail = "<a href='$base_url'>Home</a>"; #24
if (!isset($_SESSION['user_name']))
    header("Location: Login.php"); #27
else
{
    if (isset($_SESSION['user_dept'])
        && isset($_GET['dept_id'])) #32
    {
        $admin = $_SESSION['user_dept'] == $_GET['dept_id'];
    }

    $cxn = Connect_to_db("Vars.inc");
    $left_nav_links = array();
    $page["browse_level"] = #38
        isset($_GET['browse_level']) ?
            $_GET['browse_level'] : "home";

    switch ($page["browse_level"])
    { #42
        case "home":
            $sql = "SELECT name, dept_id, description
                      FROM Department
                      ORDER BY name";
            $results = mysqli_query($cxn, $sql);
```
$body_links = "";
while($row = mysqli_fetch_assoc($results)) #50
{
    $link = "$base_url?dept_id=$row['dept_id']" . 
            "&browse_level=department";
    $page['left_nav_links'][$link] = $row['name'];
                      $row['description'];
}
$page['left_nav_header'] = "Departments"; #59
$page['top'] = "Welcome to our Intranet";
$page['body_text'] = "Welcome to our Intranet 
    where each department shares content with " 
    "the whole company. You can update your " 
    "own departments content too with our simple " 
    "interface.<p>Vist the departments' " 
    "home pages: $body_links";
break;

case "department": #70
    $dept_id = $_GET['dept_id'];
    $sql = "SELECT name, dept_id, description 
        FROM Department 
        WHERE dept_id = $dept_id ORDER BY name";
    $results = mysqli_query($cxn, $sql);
    $row = mysqli_fetch_assoc($results);
    $dept_name = $row['name'];
    $dept_desc = $row['description'];
    $page['left_nav'] = "$dept_name Content";
    $page['body_text'] = "$dept_name - $dept_desc";
    $sql = "SELECT a.name, a.type_id, 
        count(b.content_id) 
        FROM Content_Type a 
        LEFT OUTER JOIN Content b on 
            a.type_id = b.content_type 
            and b.dept_id = $dept_id 
        GROUP BY a.name, a.type_id ORDER BY name";
    $results = mysqli_query($cxn, $sql);

$body_links = "";
while($row = mysqli_fetch_assoc($results)) #92
{
    $link = "$base_url?dept_id=$dept_id" 
           . 
           "$&type_id=$row['type_id']" 
             . "&browse_level=content";
    $page['left_nav_links'][$link] = $row['name'];
    $body_links .= "<li><a href="" . $link . "">" . $row['name'] . "</a>";
}
$page['left_nav_header'] = "Content Index";

Continued
LISTING 7-4: (Continued)

```php
$page["top"] = $dept_name;
$page["body_text"] = "$dept_name - $dept_desc "
   . "<p>Vist the departments' 
   . "areas: $body_links";
$trail .= " - <a href='$base_url?dept_id=$dept_id" 
   . "&browse_level=department'>$dept_name</a>";
break;

case "content":
   #110
   $dept_id = $_GET['dept_id'];
   $type_id = $_GET['type_id'];
   $sql = "SELECT a.name, a.type_id, b.title,
   b.description, b.content_date,
   b.create_date, b.created_by,
   b.last_upd_date, b.last_upd_by,
   c.name as dept_name, content_id
FROM Content_Type a, Department c
LEFT OUTER JOIN Content b on
   a.type_id = b.content_type
   and a.type_id = b.content_type
   and b.dept_id = $dept_id
   and b.content_type = $type_id
WHERE c.dept_id = $dept_id
ORDER BY content_date DESC";
$results = mysqli_query($cxn, $sql);

$body_links = "";
$content_count = 0;
$page["body_text"] = "";

while($row = mysqli_fetch_assoc($results))
   {#132
      if (!isset($area_name) && $type_id == $row["type_id"])
      {
         $area_name = $row["name"]; 
         $dept_name = $row["dept_name"];
      }
      $link = "$base_url?dept_id=$dept_id"
         . "&type_id=" . $row['type_id']
         . "&browse_level=content";
      $page["left_nav_links"][$link] = $row['name'];
      if (!isset($row["content_id"]))
         continue;

      $content_id = $row["content_id"]; 
      $content_count++;
      $link = "$base_url?dept_id=$dept_id"
         . "&type_id=$type_id&browse_level=content";
      $page["left_nav_links"][$link] = $row['name'];
   }
```

$page["data_rows"][] = $row;

if ($content_count == 0) {  #156
    $page["body_text"] = "There are no $area_name content items for $dept_name";
}  
if ($admin) {  #161
    $page["body_text"] .= "<p>[<a href='$base_url?dept_id=$dept_id
. &browse_level=details&type_id=$type_id
. &content_id='>add</a>];
}
$page["col_headers"]["title"] = "$area_name Title";
$page["col_headers"]["content_date"] = "$area_name Date";
$page["col_headers"]["create_date"] = "Created On";
$page["col_headers"]["created_by"] = "Created By";
$page["col_headers"]["last_upd_date"] = "Last Updated On";
$page["col_headers"]["last_upd_by"] = "Last Updated By";

$page["left_nav_header"] = "Content";  #176
$page["top"] = "$dept_name - $area_name";
$trail .= " - <a href='$base_url?dept_id=$dept_id
. &browse_level=department'>$dept_name</a>";
$trail .= " - <a href='$base_url?dept_id=$dept_id
. &browse_level=content
. &type_id=$type_id'>$area_name</a>";
break;

case "details":  #185
    $dept_id = $_GET['dept_id'];
    $type_id = $_GET['type_id'];

    $sql = "SELECT a.name as dept_name, b.name FROM Department a, Content_Type b
    WHERE b.type_id = $type_id
    and a.dept_id = $dept_id
    ORDER BY name";
    $results = mysqli_query($cxn, $sql);
    $body_links = "";
    $content_count = 0;

    while($row = mysqli_fetch_assoc($results)) {  #198
        $area_name = $row["name"];
        $dept_name = $row["dept_name"];

        if (!isset($row["content_id"])) #203
            continue;

        Continued
$content_count++;
$link = "$base_url?dept_id=$dept_id"
 . "&type_id=$row['type_id']"
 . "&browse_level=content";
$page["left_nav_links"][$link] = $row['name'];
$body_links .= "<li><a href="" . $link
 . "">" . $row['name'] . "</a>";
}
$create_date = date("m/d/y", time());
$created_by = $_SESSION["user_name"];  
$last_upd_by = $_SESSION["user_name"];  
$content_id = $_GET["content_id"];  
$edit = $admin && (@$_GET["edit"] == "true"
 || $content_id == "");

if ($content_id != "") {  
    Connect_to_db("Vars.inc");
    $sql = "SELECT content_id, dept_id, content_date,
            content_type as type_id, title,
            description, create_date,
            created_by, last upd date, last upd by
        FROM Content
        WHERE content_id = $content_id";
    $results = mysqli_query($cxn, $sql);
    if ($row = mysqli_fetch_assoc($results)) {
        foreach ($row as $key => $value)
            $$key = $value;
    }
    $sql = "SELECT download_id, file_name
        FROM Content_Download
        WHERE content_id = $content_id";
    $results = mysqli_query($cxn, $sql);
    while($row = mysqli_fetch_assoc($results))  
        {
            $download_id = $row["download_id"];
            $file_name = $row["file_name"];
            $link = "files/$download_id/$file_name";
            $page["left_nav_links"][$link] = $file_name;
        
        if ($edit)
            $page["left_nav_links"][$link] .= "</a>
            [a href="Admin.php"
             . "?action=DeleteDownload&download_id=$down_load_id"
             >del</a>];
    }
}

foreach ($_GET as $name => $value)
$name = $value;

$edit = $admin && (@$_GET["edit"] == "true" || $content_id == "")

$page["top"] = "$dept_name - $area_name";

if ($edit) #264
{
    $page["body_text"] = "<center><u>Add Downloads</u></center>
    for ($i = 0; $i < 3; $i++)
    {
        $page["body_text"] .=
            "<br><input type='file' name='upload_file$i'>";
    }

    $page["body_text"] .= "
    <center> <p />
    <center>  
        <input type='reset' name='action' value ='Reset Form'>
        <input type='submit' name='action' value ='Cancel'>
        <input type='submit' name='action' value ='Save Changes'>
    </center>
    
    $page["top"] .= " Edit/Create";
}
else
{
    $page["body_text"] =
            "<a href='javascript:history.go(-1)'>Back</a>";
}

$page["left_nav_header"] = "Downloads";
$strail .= " - <a href='$base_url?dept_id=$dept_id'
    . "&browse_level=department'">$dept_name</a>"

$strail .= " - <a href='$base_url?dept_id=$dept_id'
    . "&browse_level=content"
    . "&type_id=$type_id'">$area_name</a>"

break;
}

include("company.inc");
?

14_575872 ch07.qxd  5/27/05  6:27 PM  Page 259

Chapter 7: Building a Content Management System
Following is a description of the numbered lines of code that appear in CompanyHome.php, shown in Listing 7-4:

#7  Lines 7 and 8 ensure that a session has been started. The isset call at line 7 is used because Admin.php, which also has a session_start call, uses this file in an include call. Without the isset check for the $_SESSION variable, a notice might be displayed, like this: “Notice: A session had already been started — ignoring session_start().” This notice would display on your PHP page if the error_reporting level (set in the php.ini file) includes the E_NOTICE level.

#12  Lines 12 to 19 set up some strings and arrays that will be used in company.inc to display the Web page. You can change the title, header, and bottom variables to reflect the name of your company. The left_nav, body_links, col_headers, and data_rows elements are actually lists of data elements.

#24  Here a variable named $trail is defined. This string will be used to build a trail of links that will represent the hierarchy of the site that the user has traversed. In Figure 7-3 earlier in this chapter, you see the trail includes Home, the department being browsed (Human Resources), and the content area being browsed (FAQ).

#27  Line 27 and 28 check that the user is registered and has logged in. You can remove these lines if you want to open up the Web site to unregistered users. Some intranet Web sites don’t require a login unless the user is trying to enter an administrative part of the site.

#32  Lines 30 to 34 set the $admin variable to either TRUE or FALSE. The $admin variable, defined at line 22, is used to determine whether a user has administrative privileges to the area of the Web site that the user is browsing.

#38  Lines 38 to 40 set up the browse_level variable (really an element in the $page array). The browse level determines whether the user is looking at

- The company’s home page (browse_level of "home")
- A department’s home page (browse_level of "department")
- A content item list (browse_level of "content")
- The detailed view of a single content item (browse_level of "details")

#42  Line 42 contains a switch statement that executes a block of code that depends on the level of hierarchy at which the user is browsing.

#50  Line 50 gathers the departments that make up the company’s intranet. The design of the Department table (Table 7-2) enables flexible addition of new departments (or removal of departments that have been axed).
#59 Lines 59 to 66 fill in some page-level variables. The “home”
browse_level represents the main home page (as seen in Figure 7-1).
At this level, the departments are listed. The left_nav_header, top,
and body_text elements of the $page array are set here. To make the
CMS more managed (and less programmer-dependant), you can have
the CMS get these strings from the database. Of course, to make the
CMS truly user-managed, you have to build an interface to change
these strings.

#70 Lines 70 to 88 are used to build the department-level display as
shown in Figure 7-2 (shown earlier). The SQL that ends at line 88 uses
an OUTER JOIN clause to make sure that all the content types are
retrieved from the Content_Type table. If a regular join (INNER JOIN)
were used here, then if there were no content items in the Content
table for the department, no rows would get returned. The OUTER
JOIN clause gets the content types (from the Content_Type table)
regardless of if no content items exist (in the Content table).

#92 Begins a loop through the list of content types. At lines 94 to 96, the
link to the content list is constructed.

#110 Begins a block of code that builds the content-level display, as shown
in Figure 7-3, earlier in the chapter.

#132 Begins a loop through the list of content items. When the execution is
at this point in the code, the program knows the department and con-
tent type in which the user is browsing.

#144 At line 144, a check for content_id is done. If content_id isn’t set,
the loop continues its next iteration. The content_id variable can
be null because of the LEFT OUTER JOIN clause in the SQL. The
code constructs the left-hand links to the content types regardless
of whether there are items in the Content table. Line 153 assigns the
data_rows element of the $page array to the results of the query.

#156 Line 156 checks the number of content items processed in the previ-
ous loop. If there are no content items, a message is displayed so that
the user doesn’t simply see a blank page.

#161 Begins a block of code that will add an administrative “add” link if the
user is an administrator of the department being browsed.

#176 Lines 176 and 177 set up some display items to let the user know that
the level of data being browsed is the content level. Lines 178 to 181
set up the trail of links that helps the user determine where in the
Web site hierarchy she is browsing.

#185 Begins a block of code that builds the content detail-level display, as
shown in Figure 7-4 and Figure 7-5.

#198 Begins a loop through the list of content items. When the execution is
at this point in the code, the program knows the department, the con-
tent type, and the exact content item to which the user has browsed.
At line 203 (like at line 144), a check for content_id is done. If the content_id variable isn’t set, the loop continues its next iteration.

If the $content_id contains a value, the code knows that the user is editing an existing content item. If this $content_id variable is empty, then the user is creating a new item.

Begins a block of code that builds the list of downloads for a content item. In Figure 7-5, shown earlier, you can see in the left area of the Web page that one download is available.

Begins a block of code that will add an administrative “del” link if the user is an administrator of the department being browsed. The “del” link will allow the user to delete the specific download item.

Begins a loop through the $_GET array and sets up variables based on submitted HTML form elements.

Begins a block of code used to build links for administrative actions. Users who aren’t administrators in a department in which they are browsing won’t see any administrative links and will be restricted to a read-only view of the data.

This is the end of the CompanyHome.php script. At this point in the program’s execution, the data needed to construct the HTML has been set up. Now, the company.inc file is included to actually build the HTML display.

Writing company.inc, the main HTML display file

The preceding code file, CompanyHome.php (shown in Listing 7-4), does most of the work of determining where the user is in the hierarchy of the Web site, if the user is an administrator, and what the title is of the Web page. The next code file, company.inc — shown in Listing 7-5 — does the display work. It parses the data lists set up in CompanyHome.php and builds the HTML.

Listing 7-5: Building the Home and Department HTML Display

```php
<?php
    /* File: company.inc
     * Desc: Contains the code for a Web page that displays
     *        company and department data.
     */
    include_once("functions_main.inc");
> <html>
```
Chapter 7: Building a Content Management System

<head><title><?php echo $page['title']?></title></head>
<body style="margin: 0">
<h3 align="center"><?php echo $page['top']?></h3>
<div style="font-size: 70%; font-weight: bold">
  <?php echo $trail ?></div>
<hr size="10" noshade>
<table border="0" cellpadding="5" cellspacing="0">
  #######
  ## Left Nav #
  #######
</table>
<tr>
  <td width="20%" valign="top">
    <p style="font-size: 110%; font-weight: bold">
      <?php echo $page['left_nav_header']?></p>
    <table border="0" cellspacing='3' cellpadding='3' 
      width='100%'bgcolor='gray'>
      <!-- Column that separates the two forms -->
      <td style="background-color: gray"></td>
    </table>
    </td>
  </tr>
  <td width="80%" valign="top">
    <form method="POST" action="Admin.php"
      enctype="multipart/form-data">
      if ($page['browse_level'] == "details")
      {
        include("fields_content.inc");
        include("content_form.inc");
      }
      else if (@$content_count > 0)
      {
        echo "<table cellspacing='3' cellpadding='3'
          width='100%'bgcolor='gray'>
          "
      }
    </form>
  </td>
</tr>
</table>
</body>
LISTING 7-5: (Continued)

```php
<tr bgcolor='lightgray'>
    foreach ($page["col_headers"] as $key => $display)
    {
        echo "<th >$display</th>
    }
    echo "<th nowrap>&nbsp;</th>
</tr>
foreach ($page["data_rows"] as $row)
{
    echo "<tr bgcolor=white>
    foreach ($page["col_headers"] as $key => $display)
    {
        if (ereg("date", $key))
            $row[$key] = date("m/d/y", strtotime($row[$key]));
        echo "<td nowrap>".$row[$key]."</td>
    }
    echo "<th nowrap>[";
    if ($admin)
    {
        echo "<a href="Admin.php?action=delete"
            . 
            "&dept_id=$dept_id&type_id=$type_id&content_id="
            . $row["content_id"] . 
            ">delete</a>"
    }
    echo "<a href="CompanyHome.php?"
        . 
        "&dept_id=$dept_id&type_id=$type_id&content_id=
        . $row["content_id"] .
        "&browse_level=details&edit=false"
        . "&view=</a>"
    if ($admin)
    {
        echo "<a href="CompanyHome.php?"
            . 
            "&dept_id=$dept_id&type_id=$type_id&content_id="
            . $row["content_id"] .
            "&browse_level=details&edit=true"
            . "edit</a>"
    }
    echo "</th></tr>
}
echo 
```
```
Following is a description of the lines of numbered code that appear in company.inc, shown in Listing 7-5:

#6 Line 6 ensures that the file that has the code for connecting to the database in included once.

#16 Begins an HTML row and the left column that contains either the departments (when the user is at the home page), the content types (when the user is at a department page), or the available downloads (when the user is viewing a content item’s details).

#27 Begins the loop of the links on the left. If no links exist, a no items yet message is displayed.

#50 If the user is looking at a specific content item, the HTML is built by the included files.

#55 If more than one content item is listed, an HTML table listing the content items is constructed. Lines 57 to 65 set up the beginning of the HTML table.

#66 Begins the loop that builds a row in the HTML table for each content item.

#76 If the user is an administrator, a link to delete the content item is added to the display.

#86 If the user is an administrator, a link to edit the content item is added to the display.

Writing the content detail code

The Web site is designed in such a way that the user will drill down to the details. The home page and the department page don’t list the full details of a single content item. The content detail page has all the information related to a single content item.

Writing fields_content.inc, setting up fields for the detail page

This next file — fields_content, shown in Listing 7-6 — sets up the elements to display on the content item form. The $fields associative array maps the form element IDs to display names. Some form names are left blank because they are hidden.
The $fields associative array sets up the key to display mapping. The values of this associative array will be used in the labels on the HTML form. The $types associative array sets up the key to HTML type mapping. The values of this associative array determine the type of HTML element to use in the HTML form. The $length array maps an element key to the length of the HTML text box to be used in the display.

**Writing content_form.inc, the content item detail display code**

This next file — content_form, shown in Listing 7-7 — works as a form for editing data for a content item and also as a read-only view of a content item. If the user is an administrator, the form is shown, but non-administrators see only a read-only view of the data.
LISTING 7-7: BUILDING THE CONTENT DETAIL HTML DISPLAY

```php
<?php
/* File: content_form.inc
 * Desc: Contains the display code for a content item.
 */
?>
<p>
<table border="0" width="100%">
<?php
if (isset($GLOBALS['message_2']))
{
    echo "<tr>
        <td colspan='2' style="font-weight: bold;
         font-style: italic;
         font-size: 90%; color: red">
            {$GLOBALS['message_2']}<p></td></tr>
    
}$edit = $admin && @$_GET['edit'] == "true"
    || @$content_id == "");
foreach($fields as $field => $value)
{
    $type = $types[$field];
    if ($type != "hidden" && !$edit)
    {
        $type = $type == "date" ? "datelabel" : "label";
    }
    switch ($type) {
        case "hidden":
            echo "<input type='hidden'
            ."name="\$field" value="".\$\$field."\"">
            break;
        case "datelabel":
            if (!isset($$field) || $$field == "")
                break;
            $$field = date("m/d/Y", time($$field));
        case "label":
            echo "<tr>
                <td nowrap valign=top
                style="text-align: right;
                font-weight: bold">$value</td>
                <td valign=top>".\$\$field."</td></tr>
            break;
        case "date":
            if (isset($$field) && $$field != "")
                $$field = date("m/d/Y", time($$field));
        case "text":
            echo "<tr>
                <td valign=top nowrap
                style="text-align: right;
```
Following is a description of the numbered lines that appear in `content_form.inc`, shown in Listing 7-7:

**#10** Begins a block of code that, if `message_2` is set in the `$_GLOBALS` array, displays the error text that is stored in the array element.

**#19** The `$edit` variable gets set to either `TRUE` or `FALSE`. If the user is an administrator and the user clicked the Edit link to get to the detail page, `$edit` is set to `TRUE` and the page shows up in the edit mode. Otherwise, `$edit` is set to `FALSE` and the page appears in a read-only view.

**#21** Begins a loop through the form elements. HTML is constructed based on the attributes set in the `$types` array and whether the user can edit the content item.

**#28** Begins a `switch` statement that looks at the type of the element and builds the HTML based on that type.
Writing Admin.php, the data manipulation code

When writing code that is going to make changes to data, you can never be too careful when validating that the user has proper access to modify data, that the data being submitted is valid, and that related data relationships are valid. In the CMS example in this chapter, some validation is done, but for simplicity’s sake only a couple checks are in place. Ideally, you should look at every line of code and ask yourself whether someone could in any way maliciously (or accidentally) reach an invalid state in the code. You can use the built-in assert function while debugging your code to check any code assumptions.

The brains of the CMS reside in the Admin.php file. Items are added, deleted, and modified in this code file. The form built in the content_form.inc file will post its form elements to Admin.php. Admin.php has to validate data, redirect the user to the next display, and save the data to the database.

Here is the basic flow of the administrative PHP file (Admin.php), which is shown in its entirety in Listing 7-8:

Loop through the submitted form elements.

Examine the action that the user is performing:

```
switch (action)
{
    case "delete":
        1 Delete the content details from the Content table for the content item that the user is trying to delete.
        2 Delete any download items from the Content_Download table that are associated with the content item that the user is deleting.

    case "Save Changes":
        1 Organize and validate the form elements being submitted.
        2 If the user is saving a new content item, insert a new row into the Content database table.
        3 If the user is saving an existing content item, update a row in the Content database table.
        4 Loop through the files that have been uploaded and add their details to the Content_Download table.

    case "DeleteDownload":
        1 Delete from the Content_Download table a single item.
```
<?php
/* File: Admin.php
 * Desc: Perform any data manipulation tasks, like
 *       creating, editing, or deleting content items.
 */
session_start();
include_once("functions_main.inc");

foreach ($_POST as $name => $value) #9
    $$name = $value;
foreach ($_GET as $name => $value) #11
    $$name = $value;

if (!isset($action)) #14
    header("Location: CompanyHome.php");

if (!isset($create_date)) #17
    $create_date = date("Y-m-d", time());
else
    $create_date = time($create_date);
if (!isset($content_date))
    $content_date = date("Y-m-d", time());
else
    $content_date = strtotime($content_date);

$last_upd_date = date("Y-m-d", time());
if (!isset($created_by))
    $created_by = $_SESSION["user_name"]; #18
else
    $created_by = $SESSION["user_name"]; #19

if (!isset($last_upd_by))
    $last_upd_by = $SESSION["user_name"]; #20
else
    $last_upd_by = $SESSION["user_name"]; #21

$cxn = Connect_to_db("Vars.inc");
switch ($action) #35
{
    case "delete": #37
        $sql = "DELETE FROM Content
                WHERE content_id=$content_id";
        mysqli_query($cxn, $sql);
        $sql = "DELETE FROM Content_Download
                WHERE content_id=$content_id";
        mysqli_query($cxn, $sql);
        break;

    case "Save Changes": #48
        $message_2 = "";
        if ($content_date <= 0)
            $message_2 = "<li>Invalid Content Date";
if ($title == "")
$message_2 .= "<li>Title cannot be left blank"; #65

if ($message_2)
$message_2 = "Please correct these errors: $message_2"; #75

if ($message_2 != "")
{
    include("CompanyHome.php");
    exit();
}

if ($content_id)
{
    $sql = "UPDATE Content
            SET title = '$title',
                description = '$description',
                content_date = '$content_date',
                last_upd_date = '$last_upd_date',
                last_upd_by = '$last_upd_by'
            WHERE content_id = $content_id"; #87
    mysqli_query($cxn, $sql);
    if (!$content_id)
        $content_id = mysqli_insert_id($cxn); #92

    foreach ($_FILES as $file) #94
    {
        $file_name = $file["name"]; #103
        if ($file["size"] <= 0)
            continue;

        $sql = "INSERT Content_Download (content_id, file_name)
                VALUES ($content_id, '$file_name')";
        mysqli_query($cxn, $sql);
        $file_id = mysqli_insert_id($cxn);
        $dest_dir = "files".DIRECTORY_SEPARATOR.$file_id;
        $dest_file = $dest_dir.DIRECTORY_SEPARATOR.$file_name;

        Continued
Following is a description of the numbered lines that appear in Admin.php, shown in Listing 7-8:

#9 Begins a loop through the form elements that have been submitted to Admin.php by using the POST form method.

#11 Begins a loop through the form elements that have been submitted to Admin.php by using the GET form method.
When the form from content_form.inc is submitted to Admin.php, it should supply an action. Without an action (that gets set in the $action variable), the code won’t know whether the user is trying to add, delete, or modify a content item. Therefore, if no action has been supplied, the user is sent back to the home page by the header directive. The "Location: pathname" header directive tells the user's browser to go to another location. There are other headers that are useful when designing dynamic Web sites. The "Pragma: no-cache" header directive tells the user's browser how to manage caching. The "Expires: GMT time" header directive can help make sure timely content is refreshed. (Note that these are not used in this chapter.)

For new content items, the creation date is created from scratch by using the time() function. In this file, you see the time, strtotime, and date functions used. The time function creates an integer storing the milliseconds since January 1, 1970, GMT, also known as the UNIX Epoch. The strtotime function is used to parse a generic date string in an attempt to retrieve a real-time value. (A -1 returned from this function means that PHP cannot determine the time value of the string passed in as a variable.) The date function will take a time variable and apply a formatting to it.

Begins a switch block that examines the action that the user wants to take for a content item. The user might be adding a new content item, adding a new download item, deleting a content item, deleting a download item, or editing a content item's details.

Begins a block of code that deletes a content item. Associated download items are also deleted in lines 42 to 44.

Begins a block of code that saves changes to a content item. Lines 49 to 58 validate some of the submitted form elements. At line 63, if there are any problems found while validating the submitted form, the user is sent back to the content details page.

At lines 65 to 74, SQL is constructed for updating an existing content item that the user is attempting to update. The code knows that this is an item to edit (as opposed to being a new item) because the check for the $content_id variable passes.

At lines 75 to 85, SQL is constructed for a creating a new content item.

Lines 87 to 89 connect to the database and execute the SQL that will either create or update a content item.

Lines 91 and 92 will fill in the $content_id variable if the item is a new item. The mysql_insert_id function will retrieve from the database the value of the identity column from the most recently inserted row.

Begins a loop that will save each uploaded file that the user has attached. In Figure 7-4 (shown earlier), you see an Add Downloads section of the Web page where, using the Browse button, the user can upload a file. Three downloads are shown by default, but you can add
more after saving the content item details if the user returns to the edit view of the content item.

#103 The file is stored in the file system by using a path that includes the identifier of the row ($file_id) in the Content_Download table. Notice the DIRECTOR_SEPARATOR constant. This built-in constant helps ensure that your code is portable across different operating systems. If you were to hard-code a backslash (\) as the directory separator (like C:\www\files), then if you ever had to relocate your code to a UNIX or Mac server you might find that your code failed when trying to access an invalid file path.

#107 Checks for the existence of the destination directory. This directory should be unique, so you could insert additional error checking code here to display a system error if the $dest_dir directory already exists. The directory is created at line 109.

#113 Checks for the existence of the destination file. It shouldn’t already exist, but your PHP code should never assume too much about the state of the system. At line 115, the file that was uploaded by the user is moved to the destination that the CMS has constructed, the $dest_dir directory. The move_uploaded_file function call is necessary because PHP will eventually remove any uploaded files that it stored in the temporary file location (determined by the upload_tmp_dir value in the php.ini file). The PHP code in the example in this chapter does not restrict the file upload size. You can restrict the size of uploaded files in one of two ways:

✔️ Change the upload_max_filesize setting in the php.ini file.
✔️ Add a hidden input field to the HTML form named MAX_FILE_SIZE and enter a value (in bytes) in the HTML input’s value field.

#121 At line 121 is a block of code for deleting a download item. The first SQL query retrieves the dept_id and type_id values from the database for the download item that is being deleted. This is done so that the next page being displayed has enough information to maintain the user’s place in the hierarchy of the Web site being browsed.

#132 Delete the database information pertaining to the download item. Notice that the file hasn’t been deleted from the file system. To do this, the code would need to retrieve the path of the download item (before the database row is deleted) and then use the unlink function to delete the actual file.

#142 At this point in the code’s execution, all data manipulation has been done, and the code redirects the user (via the Location header directive) to the home page.
Building the CMS Application: Object-Oriented Approach

When designing an object-oriented system, designers can define the object model first — including the properties, methods, and constructors of the objects — without filling in all the code that will eventually reside in the objects. By first designing the high-level objects, designers, programmers, and users can conceptually view a system and hopefully find any holes in the design before writing a bunch of code. Furthermore, with an object model design in place, the coding tasks can be broken up among multiple programmers. As long as the programmer knows the methods of an object, she can write code that uses objects that someone else coded. For more information on designing an object-oriented system, check out *An Introduction to Object-Oriented Analysis: Objects and UML in Plain English*, 2nd Edition, by David William Brown (Wiley).

Writing the object model

In the section “The objects” I tell you about the classes that make up the object model for the CMS in this chapter. The object-oriented code is functional and reuses much of the procedural code. The biggest difference between the procedural code and the object-oriented code is that a set of objects have been created to encapsulate the underlying data objects.

If you look at the DDL defined earlier in this chapter (in the “Designing the Content_Type table” section), you see a direct correlation between the underlying database tables and the following classes. The object models that you design for other applications might not always reflect your database structure.

The CMS example in this chapter consists of departments, content areas, content items, and downloads. Each of these things can be represented using objects. For instance, a Department object has methods that reveal the name and description of a department.

The objects

The Department, ContentType, ContentItem, and ContentDownload classes are used in this chapter and help to make up the object model for the CMS. I describe them here, along with a couple other classes:

- **Department**: This class represents a department within a company’s organization. The CMS application in this chapter cares only about the department’s name, description, and its underlying ID in the database. This class has only read-only methods because the CMS application has no mechanism for modifying the department list. The department list is
driven by the contents of the Department table. A possible enhancement to the CMS example in this chapter would be an administrative module that would allow administrators to add new departments to the system.

- **ContentType:** Within the CMS, a user can browse a number of content types, such as New, Events, and FAQs. The ContentType class helps the CMS categorize the content data. The class contains only an ID and a name. The content type list is driven by the contents of the Content_Type table. A possible enhancement to the CMS example in this chapter would be an administrative module that would allow administrators to add new content types to the system.

- **ContentItem:** This class is the workhorse of the CMS. This class encapsulates the data that users are creating or editing. The underlying data is stored in the Content table in the database. This class has save and delete functions so that changes to the object can be reflected in the database.

- **ContentDownload:** This class, representing data stored in the Content_Download table, simply exposes a filename and ID. The save and delete functions allow the PHP code to persist the object’s details to the database.

- **BaseInfo:** The classes outlined in the preceding bullets have a couple things in common: a name and an identifier. The BaseInfo class is the common denominator among the other classes. This class allows you to simplify all the other classes because the common code has been centralized in one class.

- **Database:** This class encapsulates the setup of the database connection. The getConnection function is used by consumers of this object to get the database connection. A benefit of object-oriented programming (OO programming) is that implementation details can be in a black box. In other words, code that uses the Database class doesn’t need to know how the class sets up database connections. Consumer code cares only about the methods that objects make available.

- **WebForm:** The WebForm class provides forms for the application. It collects and processes the information typed by a user.

### Creating static finder methods

How do you get data from the database into an object representation in your PHP code? There are several approaches to this. You could build a single PHP file to search for data and instantiate the appropriate objects. You could put the object instantiation code wherever the need for objects arises. In the example in this chapter, the factory approach is used. A factory method is responsible for taking some search parameters and returning the desired object or objects. Factory methods have a simple, straightforward job: They just churn out objects. The finder methods have static scope. This means that the factory methods do not require an instantiated object to execute. For
regular class methods, the object has to be instantiated (created) with the `new` keyword before its methods can be used. Static methods do not need to be executed within an object context.

The static finder methods for the objects in the object model in this chapter reside in the objects’ code. Therefore, each class is responsible for locating the underlying data from the database and instantiating the objects that represent the data. For instance, the `Department` object has a method, `findAll`, that returns an array of `Department` objects. The `findById` method returns a single object (or `NULL` if no data is found in the database for the ID that is supplied as a parameter to the method call). The name of each of the finder method begins with `find`.

A static method is called by using the format `ClassName::staticMethodName()`. This is different from an object method call, which looks like `$variableName->methodName()`. Here are some more illustrations of code that use object methods versus static method calls:

```php
# Object instantiation
$object_instance = new MyObject();

# Object method call
echo $object_instance->getDescription();

# Static method call, returns an array of objects
$object_array = MyObject::findAllData();

# Static method call, returns a single object
$object_instance = MyObject::findById($id);

# Object method call
echo $object_instance->getName();
```

**Creating getter and setter methods**

Objects reveal their details through *getter methods*. These methods, usually with a name beginning with `get`, return an object’s attributes. If you were designing an `Employee` object, you might implement these getter methods: `getFirstName`, `getLastName`, `getIdNumber`, `getAge`, and so on. *Setter methods*, on the other hand, are methods that enable consumers of the objects to set an object’s attributes. Some setter methods of an `Employee` object might include `setFirstName`, `setLastName`, `setDepartment`, `setAge`, and so on.

**Writing a basic data class**

When creating an object model, you can often *factor out (or generalize)* common attributes and functions into a base class. In the CMS in this chapter, each of the data objects has an identifier and a name. These properties, along with a *static* helper function to retrieve a database connection, will make up the base class, `BaseInfo.class`. 
The properties

The `BaseInfo` properties store the ID and name of an item. The properties are:

```php
protected $id;
protected $name;
```

The first property, `$id`, is the underlying identifier of the column. The `$name` property is a displayable name or title for the item. Notice that these properties are `protected`, which means that the properties cannot be accessed from consumers of the object. However, subclasses do have access to these properties.

The code

Listing 7-9 contains the complete code for the `BaseInfo` class. I discuss each method in detail after the code listing.

```php
<?php
/* Name: BaseInfo.class
 * Desc: Base Class from which the data objects can extend. The ID and name are common among all the data objects. Also, the database connection can be obtained from this class. */
include_once("Database.class");

class BaseInfo
{
    protected $id;
    protected $name;

    function __construct($id, $name)
    {
        $this->id = $id;
        $this->name = $name;
    }

    protected static function getConnection()
    {
        $db = new Database("Vars.inc");
        $db->useDatabase("IntranetCMS");
        return $db->getConnection();
    }

    public function getId()
    {
        return $this->id;
    }
}
```
The constructor
The constructor requires an identifier and a name. These parameters are used to assign values to the properties of the object.

getConnection
This method simply instantiates a Database object and uses its getConnection method to return the database connection. The method is static because the finder methods, which are static too, need to obtain a database connection to perform a search.

getId, getName
The $id value is exposed by the getId function. In object-oriented programming, you should try to declare functions to get and set internal attributes instead of exposing class variables by making them public. This helps to ensure that a class strictly controls its internal state. The getName method returns the name of the object.

Writing the Department class
The Department class encapsulates the information that makes up a department within the organization. This includes the department name, description, and the department ID.

The properties
The Department object’s properties store information about a single department within the organization. The properties are:

protected $description;

Notice that this class defines one property, but the class really has three properties. The other two properties (ID and name) are defined in the BaseInfo class. Because the Department class is a subclass of the BaseInfo class, the Department class has inherited the BaseInfo class’s properties.
The code

Listing 7-10 contains the complete code for the `Department` class. I discuss each method in detail after the code listing.

### Listing 7-10: The `Department` Class

```php
<?php
/* Name: Department.class
 * Desc: Class containing details for a department and the content within the department.
*/
include_once("BaseInfo.class");

class Department extends BaseInfo {
    protected $description; #10

    function __construct($id, $name, $desc) {
        parent::__construct($id, $name); #14
        $this->description = $desc;
    }

    public function getDescription() { #18
        return $this->description;
    }

    public static function findAll() { #25
        $cxn = parent::getConnection();
        $sql = "SELECT dept_id, name, description
              FROM Department
              ORDER BY name";
        $results = $cxn->query($sql);
        if (!$results) {
            throw new Exception("Problem getting data: " + $cxn->error);
        }
        $depts = array();
        while ($row = $results->fetch_assoc()) { #36
            $depts[] = new Department($row['dept_id'], $row['name'], $row['description']);
        }
        return $depts;
    }

    public static function findById($id) {
        $cxn = parent::getConnection();
        return null; #40
    }
}
```
The constructor
The base class doesn’t have all the properties needed to represent a department, so an additional property is declared to represent the long description for a department at line 10. Remember that the $id and $name properties from the base class, BaseInfo, are also accessible in this class. The constructor is needed to handle the additional $description property. The parent class’s constructor is called on line 14 so that the $id and $name properties get set.

getDescription
This new method at line 18 exposes the $description property.

findAll, findById
These methods are static finder functions. In the object model in this design, the code that does the searching resides in the classes themselves. The findAll function will return an array of instantiated objects that meet the search parameters. At line 25, a database connection is retrieved by using a function defined in the parent class. At line 36 is a loop that will fill the return array with new Department objects. findById will return a single object for the search if there is a matching row in the database for the identifier.

Writing the ContentType class
This class is very simple. It represents a content type available in the CMS. A content type has only an ID and a name. These properties were already
coded in the base class, so the only other code that needs to go in this class is the code that will handle the searching and instantiating of `ContentType` objects.

**The properties**

The `ContentType` class doesn’t define any properties, but it will use the properties that are defined in the super class (also called the parent class), the `$id` and `$name` properties.

**The code**

Listing 7-11 contains the complete code for the `ContentType` class. I discuss each method in detail after the code listing.

```php
Listing 7-11: THE CONTENTTYPE CLASS
<?php
/* Name: ContentType.class
 * Desc: Class containing details for a content type available in the CMS.
 */
include_once("BaseInfo.class");

class ContentType extends BaseInfo
{

    public static function findAll() #11
    {
        $cxn = parent::getConnection();
        $sql = "SELECT type_id, name
               FROM Content_Type
               ORDER BY name";
        $results = $cxn->query($sql);
        if (!$results)
        {
            throw new Exception("Problem getting data: " + $cxn->error());
        }
        $types = array();
        while ($row = $results->fetch_assoc())
        {
            $types[] = new ContentType($row['type_id'], $row['name']);
        }
        return $types;
    }

    public static function findById($id) #32
    {
        $cxn = parent::getConnection();
        $sql = "SELECT type_id, name
               FROM Content_Type
               WHERE type_id = $id";
        $results = $cxn->query($sql);
        if (!$results)
        {
            throw new Exception("Problem getting data: " + $cxn->error());
        }
        $types = array();
        while ($row = $results->fetch_assoc())
        {
            $types[] = new ContentType($row['type_id'], $row['name']);
        }
        return $types;
    }
}
```
The constructor

This class doesn’t explicitly define a constructor because the one defined in the parent class (BaseInfo.class) meets the needs of this class too. So there’s no code for a constructor in this class file.

findAll, findById

These methods are static finder functions. findAll at line 11 returns an array of objects, and findById at line 32 returns a single object (if the search yields a row in the database).

Writing the ContentItem class

The ContentItem class is the base class representing the different types of content items available in the CMS. This class can be extended because some content items might have more or fewer details tied to the content item. For instance, in Listing 7-13 the FAQ class is defined. The showColumn function returns FALSE when the content_date string is passed in as a parameter. For an FAQ content item, this content_date isn’t relevant for the end user, therefore the overridden class will enable the display interface to ignore the field.

The properties

The Department object’s properties store information about a single department within the organization. The properties are

protected $description;
protected $content_date;
protected $create_date;
protected $created_by;
protected $last_upd_date;
protected $last_upd_by;

The properties $id and $name are inherited from the BaseInfo class, so they aren’t redefined here. The $description property is a string that represents the main body of a content item. The $content_date property reflects that date on which a content item is relevant; in the case of an event content item, the $content_type property is used to signify the date of the listed event. The $created_by, $create_date, $last_upd_date, and $last_upd_by properties are used for basic auditing the content item.

The code
Listing 7-12 contains the complete code for the ContentItem class. I discuss each method in detail after the code listing.

```
<?php
 /* Name: ContentItem.class */
 /* Desc: Class containing details for a single content item. */
 include_once("BaseInfo.class");

class ContentItem extends BaseInfo
{
    protected $description; #10
    protected $content_date;
    protected $create_date;
    protected $created_by;
    protected $last_upd_date;
    protected $last_upd_by;

    function __construct($id, $title, $desc, #17
                          $content_date, $create_date, $created_by,
                          $last_upd_date, $last_upd_by)
    {
        parent::__construct($id, $title);
        $this->description = $desc;
        $this->content_date = $content_date;
        $this->create_date = $create_date;
        $this->created_by = $created_by;
        $this->last_upd_date = $last_upd_date;
        $this->last_upd_by = $last_upd_by;
    }

    public function setName($name) #31
```
{ $this->name = $name;
}

public function getDescription() {
    return $this->description;
}

public function setDescription($desc) {
    $this->description = $desc;
}

public function getContentDate() {
    return date("m/d/y", strtotime($this->content_date));
}

public function setContentDate($content_date) {
    $this->content_date = strtotime($content_date);
}

public function getCreationDate() {
    return date("m/d/y", strtotime($this->create_date));
}

public function setCreationDate($create_date) {
    $this->create_date = strtotime($create_date);
}

public function getCreatedBy() {
    return $this->created_by;
}

public function getLastUpdDate() {
    return date("m/d/y", strtotime($this->last_upd_date));
}

public function getLastUpdBy() {
    return $this->last_upd_by;
}

public function setLastUpdBy($last_upd_by) {
    $this->last_upd_by = $last_upd_by;
}
### Listing 7-12: (Continued)

```php
public static function findById($content_id) { #86
    $cxn = parent::getConnection();
    $sql = "SELECT content_id, title, description,
              content_date, create_date,
              created_by, last_upd_date, last_upd_by
        FROM Content
        WHERE content_id = $content_id";

    $results = $cxn->query($sql);
    if (!$results) {
        throw new Exception("Problem getting data: " +
                              $cxn->error);
    }
    $row = $results->fetch_assoc();

    return ContentItem::getContentItem($row); #103
}

public static function findByDeptType($dept_id, $content_type) { #129
    $cxn = parent::getConnection();
    $sql = "SELECT content_id, title, description,
              content_date, create_date,
              created_by, last_upd_date, last_upd_by
        FROM Content
        WHERE content_type = $content_type
              and dept_id = $dept_id";
    $results = $cxn->query($sql);
    if (!$results) {
        throw new Exception("Problem getting data: " +
                              $cxn->error);
    }
    $ret_array = array();
    while ($row = $results->fetch_assoc()) #123
        $ret_array[] = ContentItem::getContentItem($row);

    return $ret_array;
}

public static function getContentItem($row) { #129
    if (!$row)
        return NULL;

    return new ContentItem($row['content_id'], $row['title'],
                          $row['description'], $row['content_date'],
                          $row['create_date'], $row['created_by'],
```
$row['last_upd_date'], $row['last_upd_by']);
}

public function save($dept_id = NULL, $type_id = NULL) #140
{
    if (isset($this->id)) #142
    {
        $sql = "UPDATE Content
            SET title = '$this->name',
            description = '$this->description',
            content_date = '$this->content_date',
            last_upd_date = now(),
            last_upd_by = '$this->last_upd_by'
            WHERE content_id = $this->id";
    }
    else #152
    {
        $sql = "INSERT Content (dept_id, content_type,
            title, description, content_date,
            create_date, created_by,
            last_upd_date, last_upd_by)
            VALUES ($dept_id, $type_id,
            '$this->name',
            '$this->description', '$this->content_date',
            now(), '$this->created_by',
            now(), '$this->last_upd_by')";
    }

    $cxn = parent::getConnection();
    $cxn->query($sql);

    if (!isset($this->id))
        $this->id = $cxn->insert_id;

    return $this->id;
}

public function delete() #174
{
    if (!isset($this->id))
        return;

    $sql = "DELETE FROM Content
        WHERE content_id = $this->id";
    $cxn = parent::getConnection();
    $results = $cxn->query($sql);
    if (!$results)
    {
        throw new Exception("Problem deleting data: " +
            $cxn->error);
    }

    $sql = "DELETE FROM Content_Download

Continued
The constructor

The constructor sets up the properties of the ContentItem class at line 17. Remember, the $id and $name properties aren’t defined in this class because they have already been defined in the parent class. Within the constructor the parent class’s constructor is also called so that the base class’s properties get set properly.

setName, setDescriptionn, setContentDate, setCreationDate, setLastUpdBy

The setter methods change the object’s internal state. For instance, a call to setName at line 31 changes the $name property, which is actually defined in the BaseInfo class. These setter functions don’t persist the data changes to the database. That is the responsibility of the save and delete functions.

cDateString, getCreationDate, getLastUpBy, getLastUpDate

The getter methods expose the properties of the object. Without these methods, the outside world wouldn’t be able to retrieve the details of the object’s properties. The getDescription method at line 36 will return the long description of the content item.

findById, findByDeptType

Line 106 begins the definition of a function that returns an array of ContentItem objects for a given department and content type, whereas the findById method at line 86 returns a single ContentItem object based on the ID of the content item.

save, delete

The save function is responsible for saving a new or modified ContentItem object to the database, whereas the delete function removes its details from the database. At line 142, the isset function call helps the save function decide whether the ContentItem object ($this) is a new or existing object.
in the database. If the ID hasn’t yet been set in the object, the code considers the ContentItem to be a brand new content item.

**getContentItem**

The `getContentItem` function is used by the finder functions to instantiate a single ContentItem object from a single row returned from the database, like at line 103. The `getContentItem` function simplifies the code that instantiates a new object.

**Writing the ContentDownload class**

This is another simple object that represents a single row in the database. In this case, a ContentDownload item represents a row in the `Content_Download` table. Notice that this object doesn’t define a constructor because the constructor defined in the parent class fits the needs of this class. Just some additional finder functions are needed along with the data manipulation methods.

**The properties**

The ContentDownload class doesn’t define any properties, but it will use the properties that are defined in the parent class: the `$id` and `$name` properties.

**The code**

Listing 7-13 contains the complete code for the ContentDownload class. I discuss each method in detail after the code listing.

```
<?php
/* Name: ContentDownload.class
 * Desc: Class containing details for a content item's downloadable file.
 */
include_once("BaseInfo.class");

class ContentDownload extends BaseInfo
{
    public static function findByContentId($content_id) #10
    {
        $ret_arr = array();

        $cxn = parent::getConnection();
        $sql = "SELECT download_id, file_name
```
**LISTING 7-13: (Continued)**

```
FROM Content_Download
WHERE content_id = $content_id"
$results = $cxn->query($sql);
if (!$results)
{
    throw new Exception("Problem getting data: " + $cxn->error);
}
while($row = $results->fetch_assoc())
{
    $download_id = $row["download_id"];
    $file_name = $row["file_name"];

    $ret_arr[] =
        new ContentDownload($download_id, $file_name);
}
return $ret_arr;
}

public static function findById($file_id) #36
{
    $ret_arr = array();
    $cxn = parent::getConnection();
    $sql = "SELECT download_id, file_name
        FROM Content_Download
        WHERE download_id = $file_id";
    $results = $cxn->query($sql);
    if (!$results)
    {
        throw new Exception("Problem getting data: " + $cxn->error);
    }
    if ($row = $results->fetch_assoc())
    {
        $download_id = $row["download_id"];
        $file_name = $row["file_name"];

        return new ContentDownload($download_id, $file_name);
    }
    return NULL;
}

public function save() #61
{
    $sql = "INSERT Content_Download (content_id, file_name)
        VALUES ($this->id, '$this->name')";
    $cxn = parent::getConnection();
    $results = $cxn->query($sql);
```
The constructor
This class doesn’t explicitly define a constructor because the one defined in
the parent class (BaseInfo.class) meets the needs of this class too. You
can save a lot of typing when writing object-oriented code.

findByContentId, findById
These methods are static finder functions. The findByContentId method at
line 10 returns an array of objects, and findById at line 36 returns a single
object (if the search yields a row in the database).

save, delete
The save (line 61) and delete (line 79) methods ensure that data is either
saved to the database or removed from the database.

Writing the Database class
The Database class provides the connection to the database where the user,
department, and content data are stored. I develop the Database class in
Chapter 3. See Listing 3-4 for the Database class code.
The methods provided by the `Database` class are:

- **The constructor:** This method creates a connection to a MySQL database. It also expects to be passed the hostname, account name, and password necessary to access MySQL. A `Database` object is created with the following statement:

  ```php
  $db = new Database($host, $user, $password);
  ```

- **useDatabase:** This method selects a database and stores the database name. It expects to be passed a database name. It also checks whether the database exists and returns a message if the database doesn’t exist.

- **getConnection:** This method returns the connection that is established and stored in the constructor.

**Writing the `WebForm` class**

The `WebForm` class is used to display the page with the login and registration forms. I create and explain the `WebForm` class in Chapter 4. The class is shown in Listing 4-6.

The methods in the `WebForm` class that are used in this application are:

- **The constructor:** The constructor stores the properties needed to display the form correctly. Two files — an information file and a file that defines the look and feel — are required. The two filenames are passed when the `WebForm` object is created and stored in two properties. The data for the form fields can be passed, but can be left out, and the form fields will be blank. You can create the object by using either of the following statements:

  ```php
  $form = new WebForm("file1.inc","file2.inc",$_POST);
  $form = new WebForm("file1.inc","file2.inc");
  ```

- **displayForm:** This method displays the form. It extracts the data from the `$_data` property where it is stored.

- **checkForBlanks:** This method checks each field in the form to see whether it contains information. If invalid blank fields are found, it returns an array containing the field names of the blank fields.

- **verifyData:** This method checks each field to ensure that the information submitted in the field is in a reasonable format. If invalid data is found in any field, the method returns an array containing messages that identify the problems.

- **trimData, stripTagsFromData:** A PHP function is applied to each value in the `$_data` property. The resulting values are stored in `$_data`. The `trim` function removes leading and trailing blanks from a string. The `strip_tags` function removes any HTML tags from the string, which is important for security.
Writing the code for the login page

The object-oriented login page — Login-OO.php — from Chapter 4 (Listing 4-10) is modified here to deal with the tables and PHP files in this chapter. Listing 7-14 highlights the changes.

Login-OO.php requires three additional classes that are not used by other programs in the CMS application: Account.class, Session.class, and Email.class. I don’t describe these classes in this chapter. For more information on these classes and how they are used in the login application, see the object-oriented application section in Chapter 4.

### Listing 7-14: Login-OO.php Changes

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>38</td>
<td>$db-&gt;useDatabase(&quot;intranetCMS&quot;); #38</td>
</tr>
<tr>
<td>39</td>
<td>$acct = new Account($db-&gt;getConnection(),&quot;Dept_User&quot;);</td>
</tr>
<tr>
<td>83-174</td>
<td>header(&quot;Location: CompanyHome-OO.php&quot;);</td>
</tr>
<tr>
<td>154</td>
<td>$sess-&gt;storeVariable(&quot;user_name&quot;,$newdata['user_name']); $sess-&gt;storeVariable(&quot;user_dept&quot;,$newdata['dept_id']);</td>
</tr>
</tbody>
</table>

Following is a description of the lines that were changed from the Login-OO.php file in Chapter 4:

- **#38** Changes the name of the database.
- **#39** The name of the database table that stored user details has been changed to use the Dept_User table.
- **#83** Upon successful login or registration, the user’s browser is redirected to the application’s main display PHP, CompanyHome-OO.php. The header directive sends a command to the user’s browser. If you have HTML being sent to the browser before a header directive has been sent, the directive call will create an error because all headers must be sent before any content is displayed.
- **#154** Chapter 4 stored a flag in the session to indicate that the user had been authenticated ("auth"), and it stored the user’s ID ("logname"). The CMS application in this chapter stores the user name ("user_name") and department identifier ("dept_id") in the session variable.
Writing fields_content.inc and content_form.inc

The fields_content.inc (refer to Listing 7-6) and content_form.inc (refer to Listing 7-7) files from the procedural code section can be reused for the object-oriented approach to coding the CMS application.

Writing the display code

CompanyHome-OO.php is very similar to CompanyHome.php defined earlier in this chapter (in Listing 7-4). The only real difference is that the object model defined in the “Writing the Object Model” section is leveraged. Because the object code handles the database retrieval and persistence details, the display code is alleviated from needing to know about the database structure. This is the beautiful thing about OO code: You can create layers of abstraction that can make it possible to change the internals of objects without having to change the consumers of the objects in the object model.

Writing CompanyHome-OO.php

CompanyHome-OO.php — shown in Listing 7-15 — is responsible for setting up the data elements used by company-OO.inc, a file that will display the HTML interface.

```
<?php
/* Program: CompanyHome-OO.php
 * Desc: Displays a Web page that has four levels:
 * 1) the home page, 2) a department page, 3) a content list page, and 4) a detail page.
 */
if (!isset($_SESSION))
    session_start();

include_once("functions_main.inc");
include_once("Department.class");
include_once("ContentType.class");
include_once("ContentItem.class");
include_once("ContentDownload.class");

$page = array(
    "title" => "The Company Intranet",
    "header" => "The Company Intranet",
    "bottom" => "Copyright(R) 2005",
);```

$admin = FALSE;
$base_url = "CompanyHome-OO.php";
$trail = "<a href='$base_url'>Home</a>";
if (!isset($_SESSION['user_name']))
    header("Location: Login-OO.php");
else
{
    if (isset($_SESSION['user_name'])
        && isset($_GET['dept_id']))
    {
        $admin = $_SESSION['user_dept'] == $_GET['dept_id'];
    }

    $left_nav_links = array();
    $page['browse_level'] =
        isset($_GET['browse_level']) ?
            $_GET['browse_level'] : "home";
    switch ($page['browse_level'])
    {
        case "home":
            try
            {
                $departments = Department::findAll();
            }
            catch(Exception $e)
            {
                echo $e->getMessage();
                exit();
            }
            $body_links = "";
            foreach ($departments as $department)
            {
                $link = "$base_url?dept_id=" . $department->getId()
                        . "&browse_level=department";
                $body_links .= "<li><a href="" . $link
                    . "">" . $department->getName() . "</a> - "
                    . $department->getDescription();
            }
            $page['left_nav_header'] = "Departments";
            $page['top'] = "Welcome to our Intranet";

Continued
```php
$pagina["body_text"] = "Welcome to our Intranet "
   . "where each department shares content with "
   . "the whole company. You can update your "
   . "own departments content too with our simple "
   . "interface.<p>Vist the departments' "
   . "home pages: $body_links"
break;

case "department":
    $dept_id = $_GET['dept_id'];
    try
    {
        $department = Department::findById($dept_id);
    }
    catch(Exception $e)
    {
        echo $e->getMessage();
        exit();
    }
    $dept_name = $department->getName();
    $dept_desc = $department->getDescription();

    $pagina["left_nav"] = "$dept_name Content";
    $pagina["body_text"] = "$dept_name - $dept_desc";

    $body_links = "";
    $content_types = ContentType::findAll();
    foreach ($content_types as $content_type)
    {
        $link = "$base_url?dept_id=$dept_id"
            . 
                ".type_id=" . $content_type->getId()
            . 
                ".browse_level=content";
        $pagina["left_nav_links"][$link] =
            $content_type->getName();
        $body_links .= 
            
            . 
                
        "&<a href=" . $content_type->getName() . 
            
        ". $body_links = "<li><a href=" . $link
            . "">" . $content_type->getName() . 
            . "</a>";
    }
    $pagina["left_nav_header"] = "Content Index";
    $pagina["top"] = $dept_name;
    $pagina["body_text"] = "$dept_name - $dept_desc "
        . "Vist the departments' "
        . "areas: $body_links"
    $trail .= " - <a href="$base_url?dept_id=$dept_id"
        . 
            . "$browse_level=department">$dept_name</a>";
break;

case "content":
    $dept_id = $_GET['dept_id'];
    $type_id = $_GET['type_id'];
    try
    {
```
$department = Department::findById($dept_id);  #122
}
} catch(Exception $e)
{
    echo $e->getMessage();
    exit();
}

$dept_name = $department->getName();
$body_links = "";
$page["body_text"] = "";
try
{
    $content_types = ContentType::findAll();  #134
}
} catch(Exception $e)
{
    echo $e->getMessage();
    exit();
}
foreach ($content_types as $content_type)
{
    $link = "$base_url?dept_id=$dept_id".
    "$type_id="$content_type->getId().
    "&browse_level=content";
    $page["left_nav_links"][$link] =
    $content_type->getName();
    if ($content_type->getId() == $type_id)
    $area_name = $content_type->getName();
}
$page["data_rows"] =
    ContentItem::findByDeptType($dept_id, $type_id);
if (sizeof($page["data_rows"]) == 0)  #153
{
    $page["body_text"] = "There are no $area_name content items for $dept_name";
}

if ($admin)
{
    $page["body_text"] .=
    "<p>[<a href='"base_url?dept_id=$dept_id".
    "&type_id="$area_name".
    "&browse_level=details&type_id=$type_id".
    "&content_id='add</a>];"
}

$page["col_headers"]["title"] = "$area_name Title";
$page["col_headers"]["content_date"] =
    "$area_name Date";
$page["col_headers"]["create_date"] = "Created On";
$page["col_headers"]["created_by"] = "Created By";
$page["col_headers"]["last_upd_date"] =
    "Last Updated On";
$page["col_headers"]["last_upd_by"] =
    "Last Updated By";

Continued
"Last Updated By";
$last_upd_by = $_SESSION["user_name"];
$content_id = $_GET["content_id"]; #198
if ($content_id != "") {
    $content_item = ContentItem::findById($content_id); #200
    $title = $content_item->getName();
    $content_date = $content_item->getContentDate();
    $description = $content_item->getDescription();
    $create_date = $content_item->getCreationDate();
    $created_by = $content_item->getCreatedBy();
    $last_upd_date = $content_item->getLastUpdDate();
    $last_upd_by = $content_item->getLastUpdBy();
    $downloads = #207
        ContentDownload::findByContentId($content_id); #209
    foreach($downloads as $download) {
        $download_id = $download->getId();
        $file_name = $download->getName();
        $link = "files/$download_id/$file_name";
        $page["left_nav_links"][$link] = $file_name;
        if ($edit)
            $page["left_nav_links"][$link] .= ";</a>
                [<a href="Admin-OO.php" .
                    "?action=DeleteDownload&download_id=$download_id&"
                    . "dept_id=$dept_id&type_id=$type_id"
                    . "dept_id=$dept_id&type_id=$type_id"
                    >del</a>]*";
    }
}
}
Following is a description of the numbered lines of code that appear in CompanyHome-OO.php, shown in listing 7-15:

#11 Lines 11 to 14 ensure that the class definitions are included so that the object model outlined earlier can be put into action.

#31 Here the OO login application from Chapter 4 is leveraged.

#48 The home page display is handled in this block of the switch statement.
The static method call finds all the departments in the intranet. The array returned from this function contains Department objects.

Each Department object is examined in this loop so that the department name and description can be displayed on the home page.

The department-level display is handled in this block of the switch statement.

At this point in the program’s execution, the user has clicked a specific department. The $department variable becomes an instantiation of the Department class when the findById function returns.

Lines 90 and 91 retrieve some details about the department.

Line 97 gets the list of content types in the CMS, each content type being represented by a ContentType object.

Begins a loop through all the ContentType objects. The objects’ details will be used to build the links to the content areas for the selected department.

The content list display is handled in this block of the switch statement.

This static function call retrieves an object representing the selected department.

The static function call will find all the content types in the system.

At line 151 the list of content items is added to a page-level variable so that company-00.inc will be able to build the display of all the objects’ data.

Begins a block of code that will display an informational message if there are no content items for the selected department and content type.

The block of code executed when a user is looking at the details for a single content item.

Lines 186 to 189 get details for the display from objects.

If the $content_id variable contains a value, the details of the content item are retrieved by using the finder function at line 199.

Lines 200 to 206 show the details of the content item being extracted from the object using the getter functions.

The downloadable files associated with the selected content item are retrieved.

Begins the loop that builds links to the downloadable files by using the details from the ContentDownload objects.
Writing company-OO.inc, the main display code

Here the objects set up in CompanyHome-OO.php — the file shown in Listing 7-16 — are leveraged to build the HTML display. Other than the use of these objects, not much else is different from the procedural version of this file, company.inc.

### Listing 7-16: Building the HTML Display

```php
<?php
/* File: company-OO.inc
   * Desc: Contains the code for a Web page that displays
   *       company and department data.
   */
include_once("functions_main.inc");
?>
<html>
<head><title><?php echo $page['title'] ?></title></head>
<body style="margin: 0">
<h3 align="center"><?php echo $page['top'] ?></h3>
<div style="font-size: 70%; font-weight: bold">
 <?php echo $trail ?></div>
<hr size="10" noshade>
<table border="0" cellpadding="5" cellspacing="0">
<?php
#############
## Left Nav #
#############
?>
<tr>
<td width="20%" valign="top">
<p style="font-size: 110%; font-weight: bold">
<?php echo $page['left_nav_header'] ?></p>
<table border="0">
<?php
foreach($page['left_nav_links'] as $link => $label)
{
    echo "<tr><td >";
    "<a href="$link">$label<p><p></td></tr>
";
}
if (sizeof($page['left_nav_links']) == 0)
    echo "<i>no items yet</i>";
?>
</table>
</td>
<!-- Column that separates the two forms -->
<td style="background-color: gray"></td>
<?php
Continued
```
Part IV: Building Other Useful Applications

LISTING 7-16: (Continued)

```php
<?php
if ($page['browse_level'] == "details") {
    include("fields_content.inc");
    include("content_form.inc");
}
else if (sizeof($page['data_rows']) > 0) {
    echo "<table cellspacing='3' cellpadding='3'
    width='100%'bgcolor='gray'>
    <tr bgcolor='lightgray'>
    foreach ($page['col_headers'] as $key => $display) {
        echo "<th >$display</th>
    }
    echo "<th nowrap>&nbsp;</th>
    </tr>
    foreach ($page['data_rows'] as $content_item) {
        echo "<tr bgcolor=white>
        echo "<td nowrap"> . $content_item->getName() . "</th>
        echo "<td nowrap"> . $content_item->getContentDate()
        echo "<td nowrap"> . $content_item->getCreationDate()
        echo "<td nowrap"> . $content_item->getCreatedBy()
        echo "<td nowrap"> . $content_item->getLastUpdBy()
        #68
        if ($admin) {
            echo "<a href="Admin-00.php?action=delete"
            &dept_id=$dept_id&type_id=$type_id&content_id="
            . $content_item->getId() . ">delete</a>
        }
        echo "<a href="CompanyHome-00.php?"n
            &dept_id=$dept_id&type_id=$type_id&content_id="
            . $content_item->getId() . "&browse_level=details&edit=false"n
            . "view</a>
```

Following is a description of the numbered lines of code that appear in CompanyHome-OO.php (shown in Listing 7-16):

#68 Lines 68 to 79 show the use of the objects to get the content item details. For each column displayed in the HTML table, a different function is used to get the value. Keep in mind that the data in this object maps back to data stored in the database. However, this display code doesn’t know about the data, how it is stored, or how it is retrieved. As long as the objects can be leveraged, the display can be constructed.

Writing fields_content.inc and content_form.inc

The fields_content.inc and content_form.inc files from the procedural code section can be reused for the object-oriented approach to coding the CMS application.

Writing Admin-OO.php, the data manipulation code

The data manipulation code is simpler than the procedural code in this chapter because the SQL code isn’t executed in the administrative PHP code. Instead, the administrative PHP, Admin-OO.php, operates on objects.
The save and delete functions of the objects are used to modify the underlying data. This differs from the procedural Admin.php file, where SQL to manipulate the data is defined within the PHP itself. The OO code removes the need to have SQL in the administrative PHP file. In Listing 7-17, the PHP code simply uses method calls to manipulate the underlying data.

```
<?php
/* File: Admin-OO.php
 * Desc: Perform any data manipulation tasks, like
 *        creating, editing, or deleting content items.
 */
session_start;
include_once("functions_main.inc");
include_once("ContentItem.class");
include_once("ContentDownload.class");

foreach ($_POST as $name => $value)
  $$name = $value;
foreach ($_GET as $name => $value)
  $$name = $value;
if (!isset($action))
  header("Location: CompanyHome-OO.php");

if (!isset($create_date))
  $create_date = date("Y-m-d", time());
else
  $create_date = strtotime($create_date);
if (!isset($content_date))
  $content_date = date("Y-m-d", time());
else
  $content_date = strtotime($content_date);

$last_upd_date = date("Y-m-d", $content_date);
if (!isset($created_by))
  $created_by = $_SESSION["user_name"];  
if (!isset($last_upd_by))
  $last_upd_by = $_SESSION["user_name"];

switch ($action)
{
  case "delete":
    $content_item = ContentItem::findById($content_id);
    try
    {
      $content_item->delete();
    }
    catch(Exception $e)
    {
```

LISTING 7-17: UPDATING THE DATABASE AND SAVING UPLOADED FILES
echo $e->getMessage();
exit();
}

break;

case "Save Changes":
$message_2 = "";
if ($content_date <= 0)
  $message_2 = "<li>Invalid Content Date";
if ($title == "")
  $message_2 .= "<li>Title cannot be left blank";
if ($message_2)
  $message_2 = "Please correct these errors: $message_2";
if ($message_2 != "")
  {
    include("CompanyHome-OO.php");
    exit();
  }
if ($content_id)
  {
    try
    {
      $content_item = ContentItem::findById($content_id);
    }
    catch(Exception $e)
    {
      echo $e->getMessage();
      exit();
    }
    $content_item->setName($title);
    $content_item->setDescription($description);
    $content_item->setLastUpdBy($last_upd_by);
    $content_id = $content_item->save();
  }
else
  {
    $content_item = new ContentItem(NULL, $title, $description, $content_date, $create_date, $created_by, $last_upd_date, $last_upd_by);
    $content_id = $content_item->save($dept_id, $type_id);
  }
foreach ($_FILES as $file)
  {
    $file_name = $file["name"];
    if ($file["size"] <= 0)
      continue;
    $download = new ContentDownload($content_id, $file_name);
    $file_id = $download->save();
  }
  
Continued
Following is a description of the numbered lines in Admin-OO.php, shown in Listing 7-17:

#8 The two types of data that can be changed by users of the CMS, represented by the ContentItem and ContentDownload classes, are used in Admin-OO.php.
The block of code beginning at line 37 uses the `ContentItem` class’s static finder function to get the single content item object that the user wishes to delete. The object’s `delete` function is called to remove the underlying data from the database. `Admin-OO.php` doesn’t need to know how this is accomplished because the object-oriented approach allows such details to be encapsulated in the class’s code.

#65 Begins a block of code that updates an existing content item.

#81 Begins a block of code that creates a new content item.

#89 Begins a loop that saves any uploaded files to the database. Again, the details of how the information is saved to the database is abstracted from the code in `Admin-OO.php`.

#114 This is where the details for a single downloadable file are looked up. After the information is located, it’s removed via the `ContentDownload` object’s `delete` function.

**Enhancing the Content Management System**

The CMS you see in this chapter is very generic. It supports a number of content types, but the user interface, the data, and the object model don’t differ much for each content type. The object model could be further developed so that, perhaps, a `News` object and an `Event` object would have more attributes that are relevant to the object model’s specific content type. For instance, an `Event` content type could be implemented so that users could register for one or more events.

A well-designed CMS should organize content so that, if the volume of data grows, browsing through and searching for content doesn’t become tedious. Paging is a useful feature for simplifying navigation through long lists of content items. Also, a keyword search is a nice tool that enables users to quickly locate a number of related but distinct content items.
Chapter 8
Hosting Discussions with a Web Forum

In This Chapter

- Understanding how a Web forum works
- Building a database to store and organize messages
- Building and designing the forum
- Designing a procedural application that hosts discussions
- Using inheritance to simplify your object-oriented code

A Web forum is a popular way to let your Web site visitors communicate with you and with each other. A forum is like a community bulletin board where one visitor can leave a message and other visitors can read that message and reply to it with messages of their own. In a lively forum, you can typically find questions (and answers); tips and techniques; reviews (for products, books, restaurants, and so on); and links to other resources.

Designing the Forum Application

The basic function of a Web forum is to store, organize, and display messages. When you navigate to a forum site (by using a Web browser, such as Firefox or Konqueror), you see a page that displays a list of forums. For example, if the site hosts discussions related to household pets, you might see forums named Cats, Dogs, Reptiles, and Others. Underneath each forum, you might see a list of topics owned by the forum. Within the Cats forum, for example, you might see topics such as Cat Breeds, Health Issues, Feeding, and Bad Habits. The Dogs forum might hold a similar set of topics. If you look inside the Reptiles forum, you might find Amphibians, Snakes, Lizards, Housing, and Feeding.

When you click a topic, your browser moves to a new page that displays a list of the threads owned by the topic. A thread is a collection of messages, all of which share the same topic. From this page, you can click a thread to display the messages owned by that thread or you can click the Start a New Thread...
button to create a new thread. When you navigate to a specific thread, you see a list of all the messages in that thread. Each message displays the author (that is, the e-mail address of the user who posted the message); the date/time that the message was posted; and the body of the message. To reply to a message, just click the Reply button next to that message.

The heart of the forum application is a set of tables that organize the messages created by your users. When a user posts a new message, the text of the message is stored as a single row in a table that I call Post. Each Post contains a bit of bookkeeping information (such as the author of the message, the date the message was posted, and so on). To organize the messages in your forum, you can add a few layers on top of the Post table to group messages into similar areas of discussion. Each Post belongs to a single Thread. Each Thread belongs to a single Topic. Each Topic belongs to a single Forum. All together, you need four tables to organize messages the way I describe: Forum, Topic, Thread, and Post.

Forums and topics are different from threads and posts in several respects. You, the forum administrator, create the forums and topics. Your users create threads and posts. To create a new forum, you simply add a row to the Forum table. To create a new topic, add a row to the Topic table. When a user posts a message, he can start a new thread or reply to an existing thread. To start a new thread, the user clicks the Start a New Thread button, types in a subject for the thread, and types in the body of the message. When he clicks the Post Message button, a new row is inserted into the Thread table and a new row is inserted into the Post table. To add a message to an existing thread, the user clicks the Reply To button and types in the body of the message. (Note that he doesn’t have to enter a subject for the message — the subject is inherited from the message that he’s replying to.) When he clicks the Post Reply button, a new row is inserted into the Post table (and the related Thread is updated to indicate the date of the most recent message).

You need to consider the security of your forum. Will you allow any visitor to start new threads? Must a user register (and log in) before she can reply to an existing thread? The forum application that you develop in this chapter takes a middle-of-the-road approach to security. Only a forum administrator can add new forums and new topics. Anyone can start a new thread or reply to an existing one. Throughout this chapter, I point out a few changes that you can make to adjust the security policy to fit your needs.

---

**Creating the Forum Database**

This application has four layers of organization. Looking from the top down, you start with a forum, which contains one or more topics. Each topic contains
a collection of zero or more threads. (A topic is empty until someone starts a thread.) Each thread contains a collection of one or more posts, all sharing the same subject. Looking at the forum structure from the bottom up, each message is owned by a single thread, each thread is owned by a single topic, and each topic is owned by a single forum.

**Designing the Forum database**

The sample application in this chapter uses a database named **Forum**. The forum application defines four tables: **Forum**, **Topic**, **Thread**, and **Post**. Each table contains an **id** column — every row is uniquely identified by its **id**. To link the tables together into a hierarchy, every **Post**, **Thread**, and **Topic** contains the unique identifier of its parent. For example, a **Post** is owned by a **Thread**; if you look inside a **Post**, you see a column named **parent_thread** that contains the **id** of the parent **Thread**. In a similar fashion, each **Thread** contains a **parent_topic** and each **Topic** contains a **parent_forum**.

**Designing the Forum table**

The **Forum** table contains information about each forum. Table 8-1 shows the layout of the **Forum** table.

<table>
<thead>
<tr>
<th>Table 8-1</th>
<th>Database Table: Forum</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable Name</strong></td>
<td><strong>Type</strong></td>
</tr>
<tr>
<td>id</td>
<td>INTEGER UNSIGNED</td>
</tr>
<tr>
<td>name</td>
<td>VARCHAR(100)</td>
</tr>
<tr>
<td>description</td>
<td>TEXT</td>
</tr>
</tbody>
</table>

The **Forum** table is straightforward; it exists only to organize similar topics into meaningful groups. Each row contains a unique identifier (**id**), a name, and a description. The **id** column is defined as an **auto_increment** column so that the MySQL server assigns a unique value to each row. The forum **name** is required, but the **description** is optional.

**Designing the Topic table**

The **Topic** table contains information about each topic. Table 8-2 shows the layout of the **Topic** table.
The `Topic` table is very similar to the `Forum` table; the `Topic` table exists only to organize similar threads into meaningful groups. Every row in the `Topic` table belongs to some row in the `Forum` table. The `parent_forum` in any given `Topic` identifies the owner of the `Topic` (that is, `Topic.parent_forum` will contain the `Forum.id` value of the `Forum` that owns the `Topic`). The `id` column serves as a unique identifier for the `Topic` and, like the `Forum.id` column, the MySQL server assigns a value to this column each time you add a new `Topic`. `Topic.name` is required and `Topic.description` is optional.

### Designing the Thread table

The `Thread` table contains information about each thread. The `Thread` table is shown in Table 8-3.

<table>
<thead>
<tr>
<th>Table 8-3 Database Table: Thread</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable Name</strong></td>
</tr>
<tr>
<td>parent_topic</td>
</tr>
<tr>
<td>id</td>
</tr>
<tr>
<td>subject</td>
</tr>
<tr>
<td>replies</td>
</tr>
<tr>
<td>last_post</td>
</tr>
</tbody>
</table>
The Thread table is a bit more complex than the Forum and Topic tables. Each Thread belongs to a Topic and the Thread.parent_topic column contains the Topic.id of the owner. Like the Forum and Topic tables, each Thread is uniquely identified by a server-assigned id. When a user starts a new Thread, she must provide a subject. The replies column contains a count of the number of messages in the thread (minus one — the first message in a thread doesn’t count as a reply). The last_post column contains the time and date of the most recent message added to any given Thread. You add a new record to the Thread table each time a user starts a new discussion. You update Thread.replies and Thread.last_post each time a message is added to the thread.

**Designing the Post table**

The Post table contains information about each post. The Post table is shown in Table 8-4.

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>parent_thread</td>
<td>INTEGER UNIGNED</td>
<td>Thread to which this post belongs.</td>
</tr>
<tr>
<td>in_reply_to</td>
<td>INTEGER UNIGNED</td>
<td>If this message is the first message in a thread, in_reply_to is NULL; otherwise, in_reply_to contains the ID of some other Post.</td>
</tr>
<tr>
<td>Id</td>
<td>INTEGER UNIGNED</td>
<td>Unique identifier for post (primary key).</td>
</tr>
<tr>
<td>author</td>
<td>VARCHAR(100)</td>
<td>Name of user who posted this message.</td>
</tr>
<tr>
<td>date</td>
<td>TIMESTAMP</td>
<td>Date that this message was posted.</td>
</tr>
<tr>
<td>body</td>
<td>TEXT</td>
<td>Text of message.</td>
</tr>
</tbody>
</table>

Each message is stored as a single row in the Post table. Notice that you aren’t storing a subject with each Post — instead, the subject is stored in the Thread that owns the Post. The in_reply_to column contains the id of another Post. If a Post is the first message in a Thread, in_reply_to will be NULL; otherwise, the Post must be a reply to some other message. The author column contains the name of the user who posted the message. The date column stores the time and date that the message was added — the MySQL server automatically timestamps each row when it is added it to the table.
The parent_thread, parent_topic, and parent_forum columns link the forum tables together into a hierarchy.

You can find the thread that owns a given post by executing a query such as

```
SELECT * FROM Thread WHERE Thread.id = Post.parent_thread;
```

Similarly, you can find the topic that owns a thread with the query

```
SELECT * FROM Topic WHERE Topic.id = Thread.parent_topic;
```

You can find the forum that owns a topic with the query

```
SELECT * FROM Forum WHERE Forum.id = Topic.parent_forum;
```

To find all the topics belonging to a forum, use

```
SELECT * FROM Topic WHERE Topic.parent_forum = Forum.id;
```

To find all the threads belonging to a topic, use

```
SELECT * FROM Thread WHERE parent_topic = Topic.id;
```

To find all messages that belong to a thread, use a query such as

```
SELECT * FROM Thread, Post WHERE parent_thread = Thread.id;
```

If you want to tighten the security policy for your site, you must create an additional table that keeps track of registered users. The Login application that you develop in Chapter 4 provides everything you need to register and authenticate visitors.

**Building the forum tables**

The following SQL query creates this database:

```
CREATE DATABASE Forum
```

The following CREATE TABLE statements create all the tables you need for the forums application.

```
CREATE TABLE Forum (
    id INTEGER UNSIGNED NOT NULL auto_increment,
    name VARCHAR(100) NOT NULL,
    description TEXT,
    PRIMARY KEY(id) );
```

```
CREATE TABLE Topic (
    parent_forum INTEGER UNSIGNED NOT NULL,
    id INTEGER UNSIGNED NOT NULL auto_increment,
    name VARCHAR(100) NOT NULL,
    description TEXT,
    PRIMARY KEY(id) );
```
```sql
CREATE TABLE Thread (
parent_topic INTEGER UNSIGNED NOT NULL,
id INTEGER UNSIGNED NOT NULL auto_increment,
subject TEXT NOT NULL,
replies INTEGER UNSIGNED,
last_post TIMESTAMP,
PRIMARY KEY(id) );

CREATE TABLE Post (parent_thread INTEGER UNSIGNED NOT NULL,
in_reply_to INTEGER UNSIGNED,
id INTEGER UNSIGNED NOT NULL auto_increment,
author VARCHAR(100) NOT NULL,
date TIMESTAMP,
body TEXT,
PRIMARY KEY(id) );
```

## Accessing the forum tables

To interact with the MySQL server, your PHP scripts use the mysql (or mysqli) API that comes with PHP. By using the mysql functions, you can connect to a MySQL server, execute queries and other SQL statements, and retrieve results from the server. When you `fetch` (or retrieve) a row of data from the MySQL server, you can ask PHP to deliver the row in many different forms. If you call the `mysql_fetch_array` function, you get an array of values, indexed by column number. If you call `mysql_fetch_assoc`, you get an associative array, indexed by column name. You can also ask mysql to return a row in the form of an object. (The resulting object has one field for each column in the row. The name of the field corresponds to the name of the column.)

In this application, I fetch each row of data into an associative array. An associative array offers three advantages over an enumerated array:

- **When you access a member of an associate array, your code is self-documenting.** `$thread['parent_topic']` is much more descriptive than `$thread[2]`.

- **Your code is self-maintaining.** If you change the `SELECT` statement that creates a result set, `$thread['parent_topic']` always refers to a `parent_topic`, but `$thread[2]` might refer to the wrong column. (Consider what would happen if you add a column to the beginning of the `SELECT` list.)

- **You can easily convert an associative array into a set of “normal” variables by using the `extract` function.** For example, if you have an associative array that contains columns named `parent_topic`, `name`, and `description`, you can `extract` the array, and you’ll have three new variables: `$parent_topic`, `$name`, and `$description`. 

---

*Chapter 8: Hosting Discussions with a Web Forum*
PHP provides two different sets of MySQL functions: mysql functions and mysqli functions. The mysqli functions were developed to allow the use of features that were added in MySQL version 4.1. You can use the mysql functions with version 4.1, but you don’t have access to the newer features. The mysql or mysqli extension is activated when PHP is installed. You must use PHP 5 to use the mysqli functions.

Because MySQL 4.1 is now the recommended version on the MySQL Web site, I use the MySQL Improved (mysqli) functions in this chapter. I use the procedural functions when building the procedural programs. I use the object-oriented classes when building the object-oriented programs.

If you’re using PHP 4 or for other reasons want to use the mysql functions — rather than the mysqli functions — you might need to make small changes to the syntax. The mysqli functions are very similar to the mysql functions, but some differences exist. I explain the PHP and MySQL versions in Chapter 1. The syntax differences are shown in Appendix C. More information about the functions is available in the PHP manual at www.php.net/manual/en/ref.mysqli.php and www.php.net/manual/en/ref.mysql.php.

In this application, I have stored the information needed by the PHP mysql functions in a separate file called forumVars.inc. This file is stored in a directory outside my Web space, for security reasons. The file contains information similar to the following:

```php
<?php
    $host = "localhost";
    $user = "admin";
    $passwd = "";
    $database = "Forum";
?>
```

Notice the PHP tags at the beginning (<<?php>) and the end (?>) of the file. If you forget those tags, a visitor to your Web site will see the username and password required to log into your MySQL server, which is not at all what you want.

### Adding data to the database

To cut down on the number of forms required by this application, you need to maintain two of these tables (Forum and Topic) directly. Visitors to your site maintain the other two tables (Thread and Post) by using the forms that I describe later in this chapter.

To create a new forum, simply insert (by using an INSERT query) a new row into the Forum table, like this:

```sql
INSERT INTO Forum (name, description)
VALUES ('Cats', 'All things kitty');
```
Notice that you can omit the id column and MySQL will assign a unique number for you. If you let MySQL assign an id for your Forum, you can find the value that the server chose by calling the LAST_INSERT_ID function. To create a new topic, you need to know the id of the Forum that should own the topic. Creating a new topic is almost as easy as creating a new forum; just insert (INSERT) a new row into the Topic table:

```
INSERT INTO Topic (parent_forum, name, description )
VALUES ( 1, 'Cat Breeds', 'Discussions regarding different breeds' );
INSERT INTO Topic (parent_forum, name, description )
VALUES ( 1, 'Health Issues', 'Keeping your felines healthy and happy' );
```

You must create at least one Forum and one Topic before your forum site will be usable.

### Building the Forum Web Pages

A visitor interacts with your forum application through a series of HTML Web pages. Some of the pages display simple HTML tables; others display HTML forms that the user must complete in order to proceed to the next page. Each page is dynamically created, which means that the data displayed to the user comes from one or more tables stored in the MySQL server.

### Designing the Forum Web Pages

The forum application displays the following five Web pages:

- **Forums:** This page lists all the forums and the topics available in each forum.
- **Threads:** This page lists all the threads in the selected topic. This page is displayed when the user clicks a Topic link in the Forums page.
- **Messages:** This page displays all the messages in a thread. This page is displayed when the user clicks a thread link in the Threads page.
- **New Message:** This page displays a form where the user can create and post a message. This page is displayed when the user clicks the Start a New Thread link.
- **Reply:** This page displays a form where the user can reply to a message. This page is displayed when the user clicks the reply button.

The same files are used in both the procedural and object-oriented code to display all five pages. The next few sections describe the pages and the files that display the pages.
Designing the Forums page

The Forums page displays all the forums and topics available. Figure 8-1 shows the Forums page.

The Forums page displays the names of the forums. In this case, two forums are displayed: General and Debugging. The name and description of topics within the forums are displayed. In this case, the Debugging forum has two topics: GDB and DDD.

Designing the Threads page

The Threads page (see Figure 8-2) displays all the threads available for a topic. This page is displayed when the user clicks a topic name on the forums page.

The Threads page displays the subject, number of replies, author, and date and time of the most recent reply. Below the list of threads is a link that allows the user to create a new thread.
Designing the Messages page

The Messages page (see Figure 8-3) displays all the messages in a thread. This page is displayed when the user clicks a thread subject on the Threads page.

The Messages page displays all the messages in a thread. The display has two columns: Author and Message. The e-mail address of the author and the date and time the message was posted are displayed in the first column. A link that allows the user to reply to the message is also displayed in the first column. The second column displays the contents of the message. If the user clicks the Reply link next to a message, a page with a form where the user can post a reply is displayed.

Designing the New Message page

The New Message page (see Figure 8-4) displays a form where the user can enter a new message. This page is displayed when the user clicks the Start a New Thread link on the Threads page.

The New Message page displays a form with three fields for users to enter their e-mail address, the subject of the message, and the message contents. The user clicks the Post Message button when finished typing the message. The message posts and returns the user to the Threads page, where the new message now appears in the list.

Designing the Reply page

The Reply page (see Figure 8-5) displays a form where the user can reply to a message. This page is displayed when the user clicks the Reply link next to any message on the Messages page.
Figure 8-4: The New Message page displayed by the forum application.

Figure 8-5: The Reply page displayed by the Forum application.
The Reply page displays a form with two fields for users to enter their e-mail addresses and their reply contents. The subject of the message that the user is replying to is displayed. The user clicks the Post Message button when finished typing the message. The message posts and returns the user to the Messages page, where the reply now appears in the list.

**Writing the code for the Forums page**

The Forums page is the first page displayed when the application starts. It displays a list of all the forums and topics available. The user can click any topic to display a page showing a list of threads available in the topic.

The code that displays the forums page is shown in Listing 8-1.

---

Listing 8-1: The File That Defines the Forums Page

```php
<?php
/* Program: viewForums.inc
 * Desc: Program that displays all forums and the topics within each forum. Each topic displays a link to the threads within that topic.
 */

include("functions_viewforums.inc");
?>
<html>
<head><title>Forums</title>
<link rel="stylesheet" href="Forums.css" type="text/css"></head>
<body>
<?php
$cxn = Connect_to_db("forumVars.inc");
$result = mysqli_query($cxn,"SELECT * FROM Forum");
if ($result == 0)
{
    echo "<b>Error ",
    echo mysqli_errno($cxn).": ",mysqli_error($cxn);
    echo "</b>";
}
else
{
    echo "<table width="100%"
    style="width:100%; max-width:1000px; margin:0 auto; text-align:left; border-collapse:collapse;">
    <tr><td width="100%"
    class="forumline" cellspacing="2" border="0" align="center"></td></tr>
    DisplayForumsHeader();
    for( $i = 0; $i < mysqli_num_rows( $result ); $i++ )
```
The numbers in the following list refer to the line numbers in Listing 8-1:

#16 Connects to the MySQL server with a function called Connect_to_db. The function is in the file functions_main.inc that is included in the viewForums.php application script. The function code is shown in Listing 8-15.

#17 Executes a query that returns all rows in the Forum table.

#18 If the query in line 17 fails, an error message is displayed.

#26 If the query in line 17 succeeds, the program displays the table with the forums and topics and continues to line 21. The call to DisplayForumsHeader (which I describe in the next section) writes the HTML column headers to the Web page.

#31 The loop at lines 31 through 39 reads through each row in the Forum table, displays the forum name, and calls the DisplayTopics function to display each topic belonging to the forum. As you will see in functions_viewforums.inc, the DisplayTopics function also contains a loop that reads through a MySQL result set. You commonly see this nested loop structure when you’re dealing with tables that are related to each other in a parent/child relationship. The outer loop reads through the rows in the parent table and the inner loop reads through the details rows in the child table.

Listing 8-2 shows the supporting functions (DisplayForumsHeader and DisplayTopics) that viewForums.inc uses.
The following is a description of the numbered lines of code that appear in functions_viewforums.inc in Listing 8-2:

#6 The DisplayForumsHeader function creates column headers for this Web page.
DisplayTopics is called (by viewForums.inc) once for each forum. This function displays all topics owned by a single forum — the $forumID argument contains the ID of the parent forum.

The for loop beginning at line 21 reads through each Topic owned by the given $forumID. For each topic, the page displays (from left to right) a blank column that indents the each topic to the right of its parent forum, the topic name, and the topic description.

The first <td> item for each topic is a non-breaking space that fills the leftmost column.

The second <td> item contains a link to another page (viewTopic) that displays the threads owned by a topic. The user sees the name of the topic. The link points to a parameterized Web page and looks something like viewTopic.php?topicID=id (where id identifies the topic you want to view).

Finally, DisplayTopics displays the topic description in the rightmost column and then terminates the HTML table row.

Writing the code for the Threads page

The Threads page displays when the user clicks a topic link on the Forums page. It displays a list of all the threads available for the selected topic. The user can click any thread to show all the messages available for the thread. The page also displays a Start a New Thread link, which, when clicked, displays a page where the user can post a new message. The code that displays the page is shown in Listing 8-3.

Listing 8-3: The File That Displays the Threads Page

```php
<?php
/* Program: viewTopic.inc
 * Desc: Program that displays the discussion threads within a selected topic. Each thread displays a link to the posts within that thread.
 */

include("functions_viewtopics.inc");
echo '<html';
echo '<head';
echo '<title>Topic ' . $_GET['topicID'] . '</title>'; #12
echo '<link rel="stylesheet" href="Forums.css" type="text/css"></head>';
echo '<body'>;
$query = "SELECT Thread.*, date, author
```
The following is a description of the lines of code that appear in Listing 8-3:

**#12** The Web page produced by this script displays all threads belonging to a particular topic. The forwarding page (that is, the page that you’re coming from) includes a topic ID in the URL for this page. You can find that ID in the variable \$_GET['topicID']. Line 12 displays the topic ID in the browser’s title bar — if you prefer, you could write code to look up the topic name in the database and display that instead.
Connects to the MySQL server with the connection options specified in forumVars.inc. Connect_to_db is a function defined in the file functions_main.inc that is included in the viewTopic.php script.

The query built on lines 16 to 21 reads all threads belonging to the given topic. It also reads author and original posting date from the first message in each thread. (Remember, you can find the first message in a thread by looking for a Post whose in_reply_to column is NULL.) The query is executed on line 22.

Begins an if block that executes if no threads were found. An error message is displayed.

Begins an else block that executes if a thread is found. This block displays the thread information in a table.

The DisplayThreadsHeader function creates the column headers for the HTML table.

Starts a loop that reads through each Thread that belongs to the topic of interest. As the loop reads each Thread, it creates a new row in the HTML table. Each row displays the subject under discussion, the number of replies, the author of the first message in the thread, and the date and time of the most recent message.

The subject is actually a link to a another page that displays all of the messages within that thread. The users sees the thread subject, the URL contains the thread ID as a parameter and looks something like viewThread.php?threaded=47.

You see three calls to the AddField function (which you see in the next section). AddField creates a styled <td> (table data) element by extracting a column from the $thread associative array — when you call AddField, you provide an associative array, a column name, and a style name; AddField does the rest. In this case, AddField displays Thread.replies, Post.author, Thread.last_post.

The DisplayThreadsHeader and AddField functions are defined in a separate include file, functions_viewtopic.inc, shown in Listing 8-4.

### Listing 8-4: Supporting Functions for viewTopic.inc

```php
<?php
/* File: functions_viewtopic.inc
 * Desc: Supporting functions for the viewTopic.inc file.
 */

/* Function: DisplayThreadsHeader
 * Desc: Displays the column headers
 */
```
Following is a description of the lines of code numbered in Listing 8-4:

**#9** The `DisplayThreadsHeader` function creates the column headers for an HTML table. This particular table contains a list of the discussion threads within a specific topic, so you see labels for `Subject`, `Replies`, `Author`, and `Most Recent Post`.

**#30** The `AddField` function creates a `<td>` (table data) element. The caller provides an associative array (presumably a row produced by a MySQL query), a column name, and a CSS style name. `AddField` extracts the desired value from the array and generates a `<td>` element that will be displayed in the requested style. `AddField` is a simple but useful function: If you want to use it in your own applications, you might want to add some extra error checking (for example, you might want to ensure that the column named by the caller actually exists in the associative array).
**Writing the code for the Messages page**

The Messages page displays when the user clicks a thread link on the Threads page. All the messages for the selected thread are displayed, one row per message. The author, the date and time the message was posted, and the message content are shown for each message. The user can click the Reply link for any message to display the reply page, where the user can create and post a reply. If you want to enforce a tighter security policy in your forum so that only properly authenticated users can post messages, simply omit (or disable) the Reply link unless the user has logged in. See Chapter 4 for more information regarding user registration and authentication.

The code that displays the page is shown in Listing 8-5.

---

**LISTING 8-5: THE FILE THAT DISPLAYS THE MESSAGES PAGE**

```php
<?php
/* Program: viewThread.inc
 * Desc: Program that displays a thread of discussion.
 */

include("functions_viewthread.inc");
?>
<html>
<head>
<?php
echo '<title>Thread ' . $_GET['threadID'] .'</title>';
#12
echo '<link rel="stylesheet" href="Forums.css" type="text/css"></head>';

echo '<body'>;
$cxn = Connect_to_db("forumVars.inc");
#16
$query = "SELECT id, author, date, body
FROM Post
WHERE parent_thread = ". $_GET['threadID']";
$result = mysqli_query( $cxn, $query );
#20
if ($result == 0)
{
    echo "Error: " . mysqli_error($cxn);
}
else
{
    echo "<table width="100%"
    class="forumline "cellpadding="4"
    cellspacing="2" border="0" align="center">
    ";
    DisplayPostsHeader();
    #31
    for( $i = 0; $i < mysqli_num_rows( $result ); $i++ )
    #32
    {
```
Following is a description of the lines of code in Listing 8-5:

#12 This script produces a Web page that displays all messages (posts) belonging to a given thread. Line 12 displays the thread ID in the title bar. The thread ID is passed in the URL to identify which thread should be displayed. For example, the URL for this page is similar to: viewThread.php?threadID=47. The script retrieves the thread ID from the variable $_GET['topicID'].

#16 Connects to the database. The Connect_to_db function is stored in the file functions_main.inc, which is included in the viewThread.php script.

#17 The query built on lines 17 to 19 selects the author, id, date, and body from every message belonging to the selected thread. The author, date, and body are displayed. The ID values is used to generate a Reply To link. The query is executed on line 20.

#21 Begins an if block that displays an error message when no messages are found for the thread.

#25 Begins an else block that executes when messages are found for the thread. The block displays an HTML table with each message shown on a separate row.

#31 The call to DisplayPostsHeader creates the column headers for the HTML table. (I show you DisplayPostsHeader in the functions_viewthread.inc code listing.)
The Reply To button links to another Web page (produced by the postReply.php script shown later in this chapter). The URL for the Reply To button includes a message ID and looks like this: postReply.php?replyTo=52.

Begins a for loop that loops through the result set and displays each Post in a separate row. Each Post is displayed in two columns. The first column contains the message author’s name, the post date, and a Reply To button. The author name is displayed above the other elements and each element is assigned its own CSS style so that you can easily customize the look and feel by changing the corresponding styles (postAuthor, postDate, and postReply) in the style sheet.

The DisplayPostsHeader function is defined in functions_viewthread.inc, shown in Listing 8-6.

```
<?php
/* File: functions_viewthread.inc
 * Desc: Supporting functions for the viewThread.php program.
 */

/* Function: DisplayPostsHeader
 * Desc: Displays the column headers for the table that shows the Post information
 */
function DisplayPostsHeader()
{
    echo '<tr>
        <th class="postHeader" height="25" nowrap="nowrap">Author</th>
        <th class="postHeader" nowrap="nowrap">Message</th>
    </tr>
}
?>
```

The DisplayPostHeader function creates the column headers for an HTML table that displays each message in a thread. viewThread.inc calls this function after starting the HTML table.
Writing the code for the New Message page

The New Message page provides a form where the user can create and post a new message. The code that creates the new message page is in two separate files, as follows:

- **messageForm.inc**: Contains the code that defines the look and feel of the Web page. It produces a form that lets users post a new message. Another file must be used in conjunction with this file to create the page. The other file contains the specific information for the page. This file is used to display both the New Message page and the Reply page. The pages are different because different files are used in conjunction with this file.

- **messageFields.inc**: Contains the specific information for the New Message page. When used with messageForm.inc, it displays the New Message page. A different file with different information could be used with messageForm.inc to create a page that displayed a different form.

These two files are the same for the procedural application and the object-oriented application. I describe the two files in the following sections.

Writing messageFields.inc

The messageFields.inc file provides the specific information for the new message page. This file defines five arrays that, when interpreted by messageForm.inc (which I cover in Listing 8-7), are translated into HTML elements. The arrays are:

- **$page**: This array stores the elements displayed in the browser's titlebar (\$page['title']), at the top of the page (\$page['top']), and at the bottom of the page (\$page['bottom']).

- **$elements**: This array contains the elements displayed at the top and bottom of the form (and the label to display on the submit button). The members of the $page array form a visual frame around the members of the $elements array. This arrangement is a matter of preference and you can adjust the layout to fit your own personal style.

- **$fields**: Each member of this array describes a field that is displayed on the form. The key defines the name of the field and the value provides a label that is displayed to the left of the field.

- **$types**: This array defines the type of HTML control used to display each field in the $fields array. For example, the $fauthor field is displayed in an input control while $fbody is displayed in a textarea control.
$styles: Defines the style assigned to each field in the $fields array. Because the Web pages utilize a CSS (cascading style sheet), most of the names you see in the $styles array refer to a CSS style. (The exception is $styles['ftopicID'], which creates a hidden HTML control.)

Listing 8-7 shows the messageFields.inc file.

```php
<?php
/* File: messageFields.inc
 * Desc: Contains arrays with the field names and form elements for the forum post form.
 */
$page = array( "title" => "Starting new thread in topic: $ftopic",
               "top" => "Starting new thread in topic: $ftopic",
               "bottom" => "Send questions and comments to admin@ourplace.com",
               );

$elements = array( "top" => "",
                   "bottom" => "",
                   "submit" => "Post Message"
                   );

$fields = array( "author" => "Your e-mail address",
                 "subject" => "Subject",
                 "body" => "Message",
                 "ftopicID" => "",
                 );

$types = array( "author" => 'input type="text" size="30"',
                "subject" => 'input type="text" size="30"',
                "body" => 'textarea rows="5" cols="60"',
                "ftopicID" => 'input type="hidden"'
                );

$styles = array( "author" => "postAuthor",
                "subject" => "postSubject",
                "body" => "postBody",
                "ftopicID" => "hidden"
                );
?>
```

Writing messageForm.inc

Listing 8-8 shows the messageForm.inc file. messageForm.inc converts the form description (see Listing 8-7) into an HTML form and displays that form to the user.
LISTING 8-8: THE FILE THAT DISPLAYS THE NEW MESSAGE AND REPLY PAGES

```php
<?php
/* File: messageForm.inc
 * Desc: Displays a Web page that lets the user post a
 *       reply to a new message.
 */

<head><title><?php echo $page['title'] ?></title>
    <link rel="stylesheet" href="Forums.css" type="text/css">
</head>

<h2 align="center"><?php echo $page['top'] ?></h2>
<hr size="10" noshade>
<p style="font-size: 110%; font-weight: bold"><?php echo $elements['top'] ?></p>
<form action=<?php echo $_SERVER['PHP_SELF'] ?> method="POST">
    <table border="0">
    <?php
        if (isset($GLOBALS['message_2'])) {
            echo "<tr>
                <td colspan='2' style="font-weight: bold; font-style: italic;
                font-size: 90%; color: red">
                    {$GLOBALS['message_2']}<p></td></tr>
            }
        foreach($fields as $field => $value) {
            echo "<tr>
                DisplayField($value, $field, @$field, $types[$field],
                $styles[$field]);
            echo "</tr>"; #32
        }
        if (isset($GLOBALS['message_2'])) {
            echo "<tr>
                <td colspan='2' style="font-weight: bold; font-style: italic;
                font-size: 90%; color: red">
                    {$GLOBALS['message_2']}<p></td></tr>
            }
        }
    </table></form>
    <hr size="10" noshade>
    <div style="text-align: center; font-size: 75%"><?php echo $page['bottom'] ?></div></body></html>
```

This script translates the $page, $elements, $fields, $types, and $styles associative arrays into an HTML page.
The following numbers correspond to the lines in Listing 8-8:

#7 Displays $page['title'] in the browser title bar.

#11 The $page['top'] element is centered across the top of the Web page.

#14 Displays the $elements['top'] string value. The postFields.inc file puts an empty string into $elements['top'], but you can add your own message there if you like.

#16 Begins a table. The HTML controls defined by postFields.inc are displayed inside an HTML table so that the labels and controls line up nicely.

#19 Begins a foreach loop that loops through each field in the $fields array and creates a new row in the HTML table for each element in the array. To actually create the table elements, this script calls the DisplayField function (see Listing 8-16). DisplayField expects five arguments: a label, a field name, a value, a control type, and a style name.

For example, the first element in the $fields array is "fauthor" => "Your e-mail address". DisplayField paints the element value ("Your e-mail address") as a label and uses element key (fauthor) to create an HTML control named fauthor. The value of the field is found by dereferencing $field. In other words, if $field is set to fauthor and $fauthor contains me@home, then $$field evaluates to the string me@home. The control type (textarea, input, and so on) is found by using the field name (fauthor, fbody, and so on) as an index into the $types array. Similarly, the style is found by using the field name as an index into the $styles array.

#37 The last row in the HTML table contains the submit button. The button label is derived from $element['submit']. (In this case, the button is labeled Post Message.)

Writing the code for the Reply page

The Reply page provides a form where the user can reply to a post. The code that creates the reply page is in two separate files, as follows:

- messageForm.inc: Contains the code that defines the look and feel of the Web page. It produces a form that lets users post a reply. Another file must be used in conjunction with this file to create the page.
- This is the same file used to produce the post message page, described in the previous section. It produces the reply page, rather than the post message page, because a different file is used in conjunction with it. To
produce the reply page, this file is used with the replyFields.inc file. In the previous section, this file was used in conjunction with the messageFields.inc file to produce the post message page.

- **replyFields.inc**: Contains the specific information for the reply page. When used with messageForm.inc, it displays the Reply page. A different file, with different information, is used with messageForm.inc to create a page that displays a different form, such as the post message page described in the previous section.

These two files are the same for the procedural application and the object-oriented application. I describe the replyFields.inc file in the following section.

**Writing replyFields.inc**

The replyFields.inc file provides the specific information for the Reply page. This file also defines five arrays that, when interpreted by the file messageForm.inc (which I cover in Listing 8-8), are translated into HTML elements. The arrays are:

- **$page**: This array stores the elements displayed in the browser’s title bar (\$page['title']), at the top of the page (\$page['top']), and at the bottom of the page (\$page['bottom']).
- **$elements**: This array contains the elements displayed at the top and bottom of the form (and the label to display on the submit button). The members of the $page array form a visual frame around the members of the $elements array. This arrangement is a matter of preference and you can adjust the layout to fit your own personal style.
- **$fields**: Each member of this array describes a field that is displayed on the form. The key defines the name of the field and the value provides a label that is displayed to the left of the field.
- **$types**: This array defines the type of HTML control used to display each field in the $fields array. For example, the $fauthor field is displayed in an input control while $fbody is displayed in a textarea control.
- **$styles**: Defines the style assigned to each field in the $fields array. Because the Web pages utilize a CSS, most of the names you see in the $styles array refer to a CSS style. (The exception is $styles['ftopicID'], which creates a hidden HTML control.)

Listing 8-9 shows the replyFields.inc file. This file defines the content of the HTML form displayed to the user and, together with the Forums.css stylesheet, defines the appearance of each element in the form.
The $fields, $types, and $styles arrays describe five HTML controls:

- **author**: An input field where you expect the user to enter his or her e-mail address.
- **body**: A text area where you expect the user to type in the text of the message.
- **fresponse**: A text area that displays the text of the message that the user is replying to.
- **freplyto**: A text area where you expect the user to type in the text of the message that the user is replying to.
- **fsubject**: A text area where you expect the user to type in the subject of the message that the user is replying to.
Building the Forum Application: Procedural Approach

The Forum application has five application scripts, as follows:

- **viewForums.php**: Displays the forums Web page, which displays a list of the forums and topics available.
- **viewTopic.php**: Displays the threads Web page, which displays a list of the threads in a topic.
- **viewThread.php**: Displays the messages Web page, which displays a list of the messages in a thread.
- **postMessage.php**: Builds, displays, validates, and processes an HTML form using the strategies outlined in Chapters 3 and 4. When the user creates a new thread, the Web server runs **postReply.php** twice. The first time through, **postMessage.php** displays a form that shows the topic that will own the new thread and a number of empty fields. When the user completes the form and clicks the Post Message button, **postMessage.php** executes again — this time it validates the input and, if everything looks okay, writes the new message to the database.
- **postReply.php**: Builds, displays, validates, and processes the HTML form used in the reply page. The script is similar to the post Message script. However, **postMessage** creates both a message and thread, while **postReply** creates a message but updates an existing thread. This script runs when the user clicks a Reply link in the messages page. The thread ID is passed to this script in the URL.

Writing **viewForums.php**

The **viewForums.php** script (shown in Listing 8-10) is very simple. It simply includes the **viewForums.inc** file that displays the Web page. This script is run first, starting the application by displaying the forums Web page. Other scripts run when links or buttons are clicked.
The script includes a file containing functions needed by the `viewForums.inc` file and then includes `viewForums.inc`.

**Writing `viewTopic.php`**

The `viewTopic.php` script is the same as the `viewForums.php` script, except that it includes the `viewTopic.inc` file that displays the Threads Web page. This script runs when the user clicks a topic name in the forums page. Listing 8-11 shows `viewTopic.php`.

```php
<?php
/* Program: viewTopic.php
 * Desc: Displays the threads page.
 */
include("functions_main.inc");
include("viewTopic.inc");
?>
```

The script includes a file containing functions needed by the `viewTopic.inc` file and then includes `viewTopic.inc`.

**Writing `viewThread.php`**

The `viewThread.php` script is the same as the `viewForums.php` script, except that it includes the `viewThread.inc` file that displays the Messages Web page. This script runs when the user clicks a thread name in the threads page. Listing 8-12 shows `viewThread.php`.

```php
<?php
/* Program: viewThread.php
 * Desc: Displays the threads page.
 */
include("functions_main.inc");
include("viewThread.inc");
?>
```
The script includes a file containing functions needed by the `viewForums.inc` file and then includes `viewforums.inc`.

### Writing `postMessage.php`

The `postMessage.php` script starts when the user clicks the Start a New Thread link. The `postMessage.php` script builds, displays, validates, and processes an HTML form. The following is an overview of the structure of the script:

```php
switch (Button)
{
    case "Post Message":
        Save new message in thread
    break;
    case default:
        Show HTML form for creating new messages.
}
```

Listing 8-13 shows the `postMessage.php` program.
$cxn = Connect_to_db("forumVars.inc");
// Create the new Thread #14
$sql = "INSERT INTO Thread(parent_topic,subject) ";
$sql .= "VALUES( ";
$sql .= $POST['ftopicID'] . ","."";
$sql .= addslashes(htmlentities($POST['subject']))."')";
if(!mysqli_query($cxn, $sql))
{
    echo "Error: ".mysqli_error($cxn);
}
$parentThread = mysqli_insert_id($cxn); #23
// Encode any quote characters #24
$author = strip_tags($POST['author']);
$author = mysqli_real_escape_string($cxn,$author);
$body = htmlentities($POST['body']);
$body = mysqli_real_escape_string($cxn,$body);
// And add the new message to the Post table #29
$query = "INSERT INTO Post (parent_thread,author,body)"
$query .= "VALUES( ";
$query .= $parentThread . ","."";
$query .= "," . $author . ","."";
$query .= "," . $body . ");
$result = mysqli_query($cxn, $query);
if( $result == 0 )
    echo "Error: ".mysqli_error($cxn);
else
{
    echo '<meta http-equiv="Refresh" content="3;">'; #40
    echo 'url=viewTopic.php?topicID=';
    echo $POST['ftopicID'] . "'/>
    echo "<b>Your message has been posted. In a moment you will be automatically returned to the topic.</b>";
}
break;
}
default: #50
{
    $parentTopic = $_GET['topicID'];
    $cxn = Connect_to_db("forumVars.inc");
    $sql = "SELECT name FROM Topic WHERE id = $parentTopic";
    $result = mysqli_query($cxn, $sql);
    if( $result == 0 )
    {
        echo "Error: ".mysqli_error($cxn);
        exit();
    }
    $topic = mysqli_fetch_assoc($result);
    $author = ";
    $subject = ";
    $body = "
}
The following numbered items refer to the line numbers in Listing 8-13:

#9 The switch statement detects which phase the script is running in. If the user has filled in the form and clicked the Post Message button, $_POST['Button'] is set to Post Message. If the user has not yet seen the form, $_POST['Button'] is undefined (in fact, the entire $POST superglobal array is undefined).

#11 The case statement executes when the user completes the form and clicks Post Message.

#15 Lines 15 to 18 build an INSERT query that creates a new row in the Thread table. The htmlentities function is used on line 18 to convert any HTML tags in the subject to entities. This protects against dangerous text entered into the form by bad guys. The addslashes function is used to escape any quotes in the subject.

#23 If the INSERT statement succeeds, you can call the mysqli_insert_id function to retrieve the auto-generated ID of the new thread.

#25 Lines 25 to 28 prepare the input data for insertion into the database. You see two calls to the mysqli_real_escape_string function. The first call escapes any quotes that the user typed into the author field. The second takes care of any quotes in the body field. You might be wondering why you need to prepare the text entered by the user. Consider a simple INSERT statement that adds a single piece of data to a MySQL table:

```
INSERT INTO myTable VALUES( '$userData' );
```

Assume that a Web user provided the value for $userData by filling in a form. If the user typed in a value in the form that you’re expecting, say “Good kitty”, the INSERT statement translates to:

```
INSERT INTO myTable VALUES( 'Good kitty' );
```

But consider what would happen if, instead, the user typed in the value “There’s a good kitty”. If you simply plug this text into the INSERT statement, the embedded quote mark will produce a syntax error:

```
INSERT INTO myTable VALUES( 'There's a good kitty' );
```
As far as the MySQL server is concerned, the string begins at the first quote and ends at the second quote — the rest of the text between the parentheses is a syntax error. A call to `mysqli_real_escape_string` will translate “There’s a good kitty” into “There\’s a good kitty”, making it safe to use in a MySQL statement.

#29 Lines 30 to 35 build and execute the `INSERT` query that inserts the new message into the `Post` table.

#40 By the time you reach line 40, all of the necessary database updates have completed and the new message has been posted. The only thing left to do is to send the user somewhere useful. The `<meta>` tag you produce at line 40 automatically redirects the browser back to the `viewThread` page after a delay of three seconds, giving the user a chance to read the “post successful” message. Using an automatic refresh this way means that the user still gets some feedback (the “post successful” message), but won’t have to click another button to get back to the thread display.

#50 The `default` case executes when the user first navigates to this Web page. The code in this section prepares the form and displays it to the user.

#62 After retrieving the topic name from the `Topic` table, the fields that are about to be displayed to the user are initialized. In this case, the user must enter a value for `$author`, `$subject`, and `$body` so those fields are initialized to empty strings. *(Note: If you decide to add user registration and authentication to your forum application, you should set the user’s e-mail address in the `$author` field and disable that control.)* The `$ftopic` variable displays the name of the topic that owns the new thread. `$ftopicID` is a hidden control that shuttles the topic ID from one phase to the next.

#67 The two `include` directives that you see at lines 67 and 68 display the new message page. I describe the files `messageFields.inc` and `messageForm.inc` in the earlier section “Writing the code for the new message page.”

**Writing `postReply.php`**

The `postReply.php` script starts when the user clicks the Reply link for any message. The `postReply.php` script builds, displays, validates, and processes an HTML form. The ID of the post the user is replying to is passed in the URL. The following is an overview of the structure of the script:

```php
switch (Button) {
  case "Post Message":
    Get parent id
    Save new reply in thread
```
Update thread

```
case default:
    Show HTML form for creating reply.
```

Listing 8-14 shows the postReply.php script.

```
Listing 8-14: postReply.php

<?php

/* Program: postReply.php */
* Desc: Script that posts a reply to a message. */

include("functions_main.inc");
include("functions_post.inc");

switch( @$_POST['Button'])
{
    case "Post Message":
    {
        $cxn = Connect_to_db("forumVars.inc");

        // Find the parent_thread of the message that the user
        // is replying to
        $query = "SELECT parent_thread FROM Post
                    WHERE id = " . @$_POST['freplyto'];
        $result = mysqli_query( $cxn, $query );
        $thread = mysqli_fetch_assoc( $result );

        // Encode any quote characters
        $author = strip_tags($_POST['author']);
        $author = mysqli_real_escape_string($cxn,$author);
        $body = htmlentities($_POST['body']);
        $body = mysqli_real_escape_string( $cxn, $body );

        // And add the new message to the Post table
        $query = "INSERT INTO Post
                    (parent_thread, in_reply_to, author, body) VALUES( ";
        $query .= "" . $thread['parent_thread'] . "," .
        $query .= "" . @$_POST['freplyto'] . "," .
        $query .= "" . $author . "," .
        $query .= "" . $body . "" .
        $result = mysqli_query( $cxn, $query );
        if( $result == 0 )
            echo "Error: ".mysqli_error($cxn);
        else
        {

```

Continued
Following is a description of the lines of code in Listing 8-14:

#8 The switch statement detects which phase the script is running in. If the user has filled in the reply form and clicked the Post Message link, $_POST['Button'] is set to Post Message. If the user hasn’t yet seen the form, $_POST['Button'] is undefined.

#10 The first case statement executes after the user has completed the form and clicked the Post Message button.
Every post is owned by a single thread, and a new message is owned by the same thread that owns the message to which the user is replying. Lines 16 to 17 build the query that retrieves the ID of the thread that owns the original message. You could also include the parent thread ID as a second parameter in the URL, like this postReply.php?replyTo=47&parentThread=52.

Lines 21 to 24 prepare the input data for insertion into the database. The strip_tags and htmlentities functions remove or convert HTML tags. The mysqli function escapes any quotes.

After the user-entered data has been made safe, you can insert the new message into the Post table. Lines 26 to 33 build and execute the INSERT query.

If the new message is successfully added to the Post table, lines 38 to 45 build and execute an UPDATE query that modifies last_post date and the number of replies in the parent thread.

The <meta> tag you see automatically redirects the browser back to the viewThread page after a delay of three seconds.

This case statement (the default case) executes when the user first navigates to this Web page. The code in this section displays a form to the user.

When you display the reply form to the user, you want the user to see the subject and content of the message that he’s replying to. That information is stored in two places: The subject is found in the parent thread, and the message content is stored in the original post. The Connect_to_db function that connects to the database on line 58 is stored in the functions_main.inc file included at line 5.

Lines 59 to 63 build and execute the query that retrieves the subject and contents of the message being replied to.

The form displayed to the user contains five fields (which I explain in the next section). The code starting at line 65 defines the data displayed to the user by assigning initial values to those five fields.

The two include directives that you see at lines 70 and 71 display the reply page. The files replyFields.inc and messageForm.inc are described in the earlier sections “Writing the code for the new message page” and “Writing the code for the reply page.”

Writing the supporting functions

The scripts in this application make use of a small set of functions stored in separate files. All the scripts use the function Connect_to_db stored in the file functions_main.inc. The two scripts that post messages — postMessage.php and postReply.inc — include the file functions_post.inc that defines a function used to display the forms.
**Writing functions_main.inc**

This file contains one function used by all the scripts. Listing 8-15 shows the file.

### Listing 8-15: The Function That Connects to the Database

```php
<?php
/*  File:      functions_main.inc
*  Function:  Connect_to_db
*  Desc:      Connects to a MySQL database. The name of
*             a file containing the database variables
*             is passed to the function.
*/
function Connect_to_db($filename)
{
    include($filename);
    $cxn = mysqli_connect($host, $user,$passwd)
        or die ("Couldn't connect to server.");
    $db = mysqli_select_db($cxn,$database)
        or die ("Couldn't select database.");
    return $cxn;
}
?>
```

The `Connect_to_db` function that you see here is identical to the `Connect_to_db` function you see throughout the book. The call must provide the name of a file (`$filename`) that defines a set of connection options (`$host`, `$user`, `$passwd`, and `$database`). Given the name of a file that contains connection options, `Connect_to_db` connects to a MySQL server and returns a connection handle.

**Writing functions_post.inc**

This file contains one function that adds an HTML field to a form. Listing 8-16 shows the file.

### Listing 8-16: The File That Defines the DisplayField Function

```php
<?php
/*  File:      functions_post.inc
*  Desc:      Supporting functions for postMessage and postReply.
*/

function DisplayField( $label,$field,$value,$type,$style )
{
    $typeTags    = explode(" ", $type );
    $controlType = $typeTags[0];
```
The caller provides a string ($label) that displays to the left of the field, a name for the field ($field), an initial value ($value), a field type ($type), and the name of a display style ($style).

The only tricky part of this function is that when you’re creating an <input> element the initial value (the value displayed to the user) is specified as an attribute. When you’re creating a <textarea> element, the initial value is specified as the value of the element. In other words, if you’re creating an <input> element, you specify the value like this:

<input name="fieldName" value="initial value">

But if you’re creating a <textarea> element, you specify the value like this:

<textarea name="fieldName">initial value</textarea>

This part of the function is handled by an if/else statement that begins on line 16.

---

**Building the Forum Application:**

**The Object-Oriented Approach**

From the user’s perspective, the forum application behaves the same way whether you’ve written it in a procedural fashion or you’ve used an object-oriented approach. A visitor to your Web site sees the same HTML tables and HTML forms regardless of which method you’ve chosen. The object-oriented
version of this application uses the same set of tables as the procedural version and produces the same set of Web pages.

Object-oriented programming requires that you create and use objects to provide the functionality of the application. You first identify the objects needed for the application. Then you write the classes that define the objects, including the methods that the application needs. When the objects are ready, you write the application script that creates and uses the objects.

**Developing the objects**

The Forum application stores and displays messages that are posted by users. It displays lists of forums, topics, and threads, so that the user can view and reply to any posted messages. The following list of objects reflects the tasks this application needs to perform.

- **TableAccessor**: A class that provides a means to retrieve data from a given table. This is a master class, providing general methods for accessing all types of tables. The Post class and the Thread class are subclasses that extend the TableAccessor class, providing methods for accessing specific types of tables.

- **Post**: The Post class provides a simple interface to the Post table. The Post class extends the TableAccessor class by adding two methods and overriding one of the methods defined in TableAccessor.

- **Thread**: The Thread class provides a convenient interface to the Thread table. The Thread class extends the TableAccessor class by adding two methods.

- **Database**: The application stores the forum information in a database. The Database class provides the container that stores the data.

- **WebForm**: A form is central to this application. The form allows customers to register or to enter their usernames and passwords if they’re already registered. The WebForm class provides the form for the application. It collects and processes the information typed by a user.

The first three classes are developed to access the forum database. To interact with a MySQL table from a PHP program, you need to

1. Connect to the database.
2. Select the data that you need.
3. Access the values that you select.
4. Process any error messages you might encounter.
Those operations are pretty much the same regardless of which table you’re dealing with.

Instead of creating separate classes that contain nearly identical code, I show you how to create a single class, `TableAccessor`, that defines a common set of methods required to access any table. Next, you extend the `TableAccessor` class, creating a `TableAccessor` class that adds the methods that you need in order to interact with the `Thread` table. (The keyword `extend` indicates that the class being defined inherits from the other class.) When you create an object of type `Thread`, because of inheritance you’re also creating an object of type `TableAccessor` — anything that you can do with a `TableAccessor` object you can also do with a `Thread` object. You then extend the `TableAccessor` to create a `Post` class that provides access to the `Post` table. The `postReply` script accesses two tables (`Thread` and `Post`), so I don’t create `Forum` or `Topic` classes, but you could do that in a similar manner if those classes were needed.

**Writing the `TableAccessor` class**

Instead of interacting with the MySQL server directly, the `TableAccessor` class provides a more convenient way to retrieve data from a given table.

**The properties**

The `TableAccessor` properties store connection, table, and row information. The properties are

protected $cxn;
protected $table_name;
protected $message;
protected $currentRow;

The `$cxn` property is a database connection handle, the `$table_name` property represents the name of a MySQL table, and the `$currentRow` property holds the resultset contents. The `$message` property is used to convey any error messages.

**The code**

Listing 8-17 contains the complete code for the `TableAccessor` class. After the code listing you can find a discussion about each method. Notice the line numbers at the ends of some of the lines of code. The discussion following the listing refers to the line number.
<?php

class TableAccessor {
    protected $cxn;
    protected $table_name;
    protected $message;
    protected $currentRow;

    function __construct(mysqli $cxn, $table) {
        $this->cxn = $cxn;
        if(is_string($table)) {
            $sql = "SHOW TABLES LIKE '$table';";
            $table_res = mysqli_query($cxn, $sql);
            $nrow = mysqli_num_rows($table_res);
            if($nrow > 0) {
                $this->table_name = $table;
            } else {
                throw new Exception("$table is not a table in the database");
                return FALSE;
            }
        } else {
            throw new Exception("Second parameter is not a valid table name");
            return FALSE;
        }
    }

    function selectByID($id) {
        $id = trim($id);
        $sql = "SELECT * FROM $this->table_name WHERE id = $id";
        if(!$result = mysqli_query($this->cxn, $sql)) {
            throw new Exception("Couldn't execute query: ",
                                $this->cxn);
            return FALSE;
        }
        if(mysqli_num_rows($result) > 0) {
            $this->currentRow = mysqli_fetch_assoc($result);
            return TRUE;
        } else {
            return FALSE;
        }
    }
}

LISTING 8-17: TABLEACCESSOR.class
The constructor

The constructor tests the connection and the table name that are passed to it to ensure that the parameters are in the proper format and stores them in properties. There is no default for these values; the values must be passed when the Account object is created.

11 Stores the database connection in the property.
12 Begins an if block that executes if the table name passed is a string. The table name is checked to see whether it exists.
14 Lines 14 to 15 create and execute an SQL query that tests whether a table exists with the name that was passed to the constructor.
#17 Begins an **if** block that executes if the table exists. The table name is stored in the `$table` property.

#21 Begins an **else** block that executes when the table does not exist. The script throws an exception with a message and returns **FALSE**.

#28 Begins an **else** block that executes if the table name is not a string. The script throws an exception with a message and returns **FALSE**.

**selectByID**

This method retrieves a single row from the table. The row is identified by its `id` column. `selectByID` doesn’t return the content of the row, it returns **TRUE** or **FALSE** to indicate whether the requested row was found. If the `selectByID` function can’t find the row that is being looked up, it stores a message in the object explaining that no such object exists in the data — that can be retrieved by calling the `getMessage` method. The following numbers refer to line number in Listing 8-17.

#38 Because all the forum tables contain a column named `id`, you can simply hard-code a **SELECT** statement in this method. If you want to extend `TableAccessor` to access a table that doesn’t contain a column named `id` (or if you need to access the table by some other set of columns), you can override the `selectByID` method in your own class. (In fact, you do just that when you create the `Post` class a little later.)

#48 If `selectByID` finds the requested row, it stores the row values in `this->currentRow` (which is a protected member of the `TableAccessor` class) and returns **TRUE** to indicate success.

#54 If `selectByID` can’t find the requested row, it stores a message in `this->message` and returns **FALSE**.

**getValues**

Returns one or more values from the current row. How many values are returned depends on the type of argument passed to the method. The following numbers refer to line numbers in Listing 8-17:

#62 If you call this method with a **NULL** argument (or with no arguments), `getValues` returns the current row.

#66 If you want to retrieve a specific set of columns from the current row, call `getValues` with an array that contains the names of the columns that you want. `getValues` returns the requested values in the form of an associative array.

#74 You can also call `getValues` with the name of a single column, and it returns the value in that column.
getMessage
Returns the text of the most recent error message.

getConnection
Returns the database connection stored inside this object.

Writing the Thread class

The Thread class provides a convenient interface to the Thread table. After you create a Thread object, you can use it to call any of the methods defined by class Thread or by class TableAccessor. That means, for example, that you can retrieve a specific row in the Thread table by calling $thread->selectByID (assuming that $thread is an object of type Thread). The Thread class extends TableAccessor by adding two methods: updateTimeStamp and createNew.

The code

The complete code for the Thread class is shown in Listing 8-18. After the code listing you can find a discussion about each method. Notice the line numbers at the ends of some of the lines of code. The discussion following the listing refers to the line numbers.

Listing 8-18: The Thread Class

```php
<?php
    /* Class: Thread
     * Desc: Represents a thread.
     */
    require_once("TableAccessor.class");

    class Thread extends TableAccessor
    {
        function updateTimeStamp($threadID) #9
        {
            $sql = "UPDATE Thread SET last_post = now() WHERE id = $threadID";
            return(mysqli_query($this->cxn,$sql));
        }

        function createNew($topic,$subject) #16
        {
            $subject=mysqli_real_escape_string($this->cxn,$subject);
            $sql = "INSERT INTO Thread(parent_topic, subject)
                VALUES( $topic, '$subject' )";
            return(mysqli_query($this->cxn,$sql));
        }
    }

    // Other methods go here...

    // The discussion here refers to the line numbers...

    // Continued...

    // List other methods here...

    // The discussion here refers to the line numbers...

    // Continued...

    // List other methods here...
```

Continued
updateTimeStamp

This method executes a single UPDATE statement that assigns the value now() (a function executed by the MySQL server) to Thread.last_post. If the UPDATE statement succeeds, updateTimeStamp returns TRUE; otherwise, it returns FALSE.

createNew

This method inserts a new row into the Thread table. The caller provides the ID of the parent topic and a string containing the subject of the thread. The Thread.replies and Thread.last_post columns are set to NULL. Thread.id is defined as an auto_increment column so the MySQL server will assign a unique identifier to the new Thread. At line 21, if the new INSERT statement succeeds, createNew returns the id of the new thread. The mysqli package makes it easy to find the auto-generated id value — just look in the connection->insert_id property.

updateReplies

This method adds 1 to the replies field in the Thread table of the database. It gets the number of replies currently in the database. It then updates the field, setting the new value to the current (retrieved) value plus 1.
Writing the Post class

Like the Thread class, the Post class provides a simple interface to a MySQL table. The Post class extends the TableAccessor class by adding two methods (postReply and postMessage) and re-implementing, or overriding, one of the methods defined by the master class (selectByID).

When you select a row from the Post table, it’s often convenient to retrieve the subject of the parent thread as well: The selectByID method implemented by the Post class does just that. The selectByID method offered by the base class (TableAccessor) doesn’t know how to join two tables, so the Post class must override the selectByID method simply by supplying its own version.

The postReply and postMessage methods both add a new row to the Post table: postReply adds a message to an existing thread and postMessage creates a new message and a new thread.

The code

The complete code for the Post class is shown in Listing 8-19. After the code listing you can find a discussion about each method. Notice the line numbers at the ends of some of the lines of code. The discussion following the listing refers to the line numbers.

<table>
<thead>
<tr>
<th>LISTING 8-19: THE POST CLASS</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;?php</td>
</tr>
<tr>
<td>/* Class: Post</td>
</tr>
<tr>
<td>* Desc: Stores a post.</td>
</tr>
<tr>
<td>*/</td>
</tr>
<tr>
<td>require_once(&quot;TableAccessor.class&quot;);</td>
</tr>
<tr>
<td>require_once(&quot;Thread.class&quot;);</td>
</tr>
<tr>
<td>class Post extends TableAccessor</td>
</tr>
<tr>
<td>{</td>
</tr>
<tr>
<td>function selectByID($id)</td>
</tr>
<tr>
<td>{</td>
</tr>
<tr>
<td>$id = trim($id);</td>
</tr>
<tr>
<td>$sql = &quot;SELECT date, body, subject, parent_thread FROM Post, Thread WHERE Post.id = $id AND Thread.id = Post.parent_thread&quot;;</td>
</tr>
<tr>
<td>if(!$result = mysqli_query($this-&gt;cxn,$sql))</td>
</tr>
<tr>
<td>{</td>
</tr>
<tr>
<td>throw new Exception(&quot;Couldn't execute query: &quot;, mysqli_error($this-&gt;cxn));</td>
</tr>
<tr>
<td>}</td>
</tr>
<tr>
<td>if( mysqli_num_rows($result) &gt; 0 )</td>
</tr>
<tr>
<td>}</td>
</tr>
<tr>
<td>}</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Continued</td>
</tr>
</tbody>
</table>
LISTING 8-19: (Continued)

```php
{
$this->currentRow = mysqli_fetch_assoc($result);
    return TRUE;
} else {
    $this->message = "Post $id does not exist!";
    return FALSE;
}

function postReply($parent,$replyTo,$author,$body) #34 {
    // Encode any quote characters
    $author = mysqli_real_escape_string($this->cxn,$author);
    $body   = mysqli_real_escape_string( $this->cxn, $body );
    $sql = "INSERT INTO Post
    (parent_thread, in_reply_to, author, body)
    VALUES($parent, $replyTo, '"$author', '"$body')";
    if(mysqli_query($this->cxn,$sql))
    { return $this->cxn->insert_id; #44
    } else {
        throw new Exception("Can't execute query insert: " .mysqli_error($this->cxn));
        return NULL;
    }
}

function postMessage($topic,$subject,$author,$body) #54 {
    $thread = new Thread($this->getConnection(),'Thread');
    $parent_thread = $thread->createNew($topic,$subject);
    // Encode any quote characters
    $author = mysqli_real_escape_string($this->cxn,$author);
    $body   = mysqli_real_escape_string( $this->cxn, $body );
    $sql = "INSERT INTO Post (parent_thread, author, body)
    VALUES($parent_thread,'$author', '$body')";
    if(mysqli_query($this->cxn,$sql))
    { return $this->cxn->insert_id;
    } else {
        throw new Exception("Can't execute query insert: " .mysqli_error($this->cxn));
        return NULL;
    }
}
}
?>
**selectByID**

This method overrides the `selectByID` method defined by class `TableAccessor`. When you call `selectByID` through a `Post` object, you’re calling the method defined at line 10 in Listing 8-19. On the other hand, if you call `selectByID` through a `Thread` object, you’re calling the `selectByID` defined in class `TableAccessor` (because class `Thread` does not override `selectByID`). The `selectByID` method defined by `Post` is very similar to the `selectByID` defined by `TableAccessor`. In fact, the only difference is that this version joins the `Post` and `Thread` tables rather than selecting from a single table.

**postReply**

This method adds a new message to the `Post` table. This method runs when a user replies to an existing message. The caller provides the ID of the parent thread, the ID of the message that the user is replying to, the author, and the body of the new message. As always, you should use `mysqli_real_escape_string` to clean up any data that comes from the outside world (that is, from the user’s Web browser). At line 44, if the message is successfully added to the `Post` table, `postReply` returns the auto-generated ID of the new row.

**postMessage**

Like `postReply`, `postMessage` adds a new message to the `Post` table. This method is invoked when a user starts a new thread of discussion. The caller must provide the ID of the topic that the thread belongs to, the subject of the thread, the author, and the body of the message. At line 56, `postMessage` must create a new row in the `Thread` table. Rather than dealing directly with the `Thread` table, `postMessage` creates a `Thread` object and asks that object to create a new row. The `$thread->createNew` method returns the ID of the new thread. After you have the ID of the parent thread, you can INSERT a new row into the `Post` table. Notice that the `INSERT` statement omits the `in_reply_to`, `id`, and `date` columns. The new row contains a NULL `in_reply_to` value to indicate that it is the first message in a new thread (that is, the new message isn’t a reply to some other message). The MySQL server automatically assigns values to the `date` and `id` columns. Like `postReply`, `postMessage` returns the ID of the newly created `Post`.

**Writing the Database class**

The `Database` class provides the connection to the database where the customer information is stored. I develop the `Database` class in Chapter 3. See Listing 3-4 for the `Database` class code.
The methods provided by the `Database` class are:

- **The constructor**: Creates a connection to a MySQL database. The constructor expects to be passed a filename where the hostname, account name, and password necessary to access MySQL are stored. A `Database` object is created with the following statement:
  
  ```php
  $db = new Database("forumVars.inc");
  ```

- **useDatabase**: Selects a database and stores the database name. The method expects to be passed a database name. It checks whether the database exists and returns a message if the database doesn’t exist.

- **getConnection**: Returns the connection that is established and stored in the constructor.

---

## Writing the `WebForm` class

The `WebForm` is used to display and process the new message and reply forms. I create and explain the `WebForm` class in Chapter 4. The class is shown in Listing 4-6.

The methods in the `WebForm` class that this application uses are:

- **The constructor**: Stores the properties needed to display the form correctly. Two files — an information file and a file that defines the look and feel — are required. The two filenames are passed when the `WebForm` object is created and stored in two properties. The data for the form fields can be passed, but can be left out and the form fields will be blank. You can create the object by using either of the following statements:
  
  ```php
  $form = new WebForm("file1.inc","file2.inc",$_POST);
  $form = new WebForm("file1.inc","file2.inc");
  ```

- **displayForm**: This method displays the form. It extracts the data from the $data property where it is stored. An @ to suppress the error messages so that the form can be displayed without any data. The form is displayed by including the two files that define the form. These two files can define any type of form, with fields and elements you want to use. For this application, I use the files I describe earlier in this chapter — `replyFields.inc`, `messageFields.inc`, and `messageForm.inc`.

- **checkForBlanks**: Checks each field in the form to see whether it contains information. If it finds invalid blank fields, it returns an array containing the field names of the blank fields.

- **verifyData**: This method checks each field to ensure that the information submitted in the field is in a reasonable format. For instance, you know that “hi you” is not a reasonable format for a zip code. This method checks the information from specific fields against regular expressions that match the information allowed in that field. If invalid
data is found in any fields, the method returns an array containing messages that identify the problems.

✓ trimData, stripTagsFromData: A PHP function is applied to each value in the $data property. The resulting values are stored in $data. The trim function removes leading and trailing blanks from a string. The strip_tags function removes any HTML tags from the string, important for security.

Writing the Forum application scripts

The Forum application has five application scripts, as follows:

✓ viewForums-OO.php: Displays the forums Web page, which displays a list of the forums and topics available.

✓ viewTopic-OO.php: Displays the threads Web page, which displays a list of the threads in a topic.

✓ viewThread-OO.php: Displays the messages Web page, which displays a list of the messages in a thread.

✓ postMessage-OO.php: Builds, displays, validates, and processes the HTML form used on the new message page.

✓ postReply-OO.php: Builds, displays, validates, and processes the HTML form used in the reply page. The script is similar to the postMessage-OO script. However, postMessage creates both a message and thread, while postReply creates a message but updates an existing thread. This script runs when the user clicks a Reply link in the messages page. The thread ID is passed to this script in the URL.

Writing viewForums-OO.php

The viewForums-OO.php script simply includes the viewForums.inc file that displays the Web page. This script is run first, starting the application by displaying the forums Web page. Other scripts run when links or buttons are clicked. Listing 8-20 shows viewForums-OO.php.

<table>
<thead>
<tr>
<th>Listing 8-20: The Script That Displays the Forums Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>```php</td>
</tr>
<tr>
<td>/* Program: viewForums-OO.php</td>
</tr>
<tr>
<td>* Desc: Displays the forums page.</td>
</tr>
<tr>
<td>*/</td>
</tr>
<tr>
<td>include(&quot;functions_main.inc&quot;);</td>
</tr>
<tr>
<td>include(&quot;viewForums.inc&quot;);</td>
</tr>
<tr>
<td>?&gt;</td>
</tr>
</tbody>
</table>
| ```
The script includes a file containing functions needed by the `viewForums.inc` file and then includes `viewForums.inc`. The `viewForums.inc` file is the same file used for the procedural application, shown in Listing 8-1, with the exception of line 38. The following two lines show the line to be changed. The first line is the line from the procedural application; the second line is the line as needed for the object-oriented application.

```php
DisplayTopics($forum['id'],$cxn,"viewTopic.php");#38
DisplayTopics($forum['id'],$cxn,"viewTopic-OO.php");#38
```

**Writing `viewTopic-OO.php`**

The `viewTopic-OO.php` script is the same as the `viewForums-OO.php` script, except that it includes the `viewTopic.inc` file that displays the Threads Web page. This script runs when the user clicks a topic name in the forums page. Listing 8-21 shows `viewTopic-OO.php`.

```php
<?php
/* Program: viewTopic-OO.php
 * Desc: Displays the threads page.
 */
include("functions_main.inc");
include("viewTopic.inc");
?>
```

The script includes a file containing functions needed by the `viewTopic.inc` file and then includes `viewTopic.inc`. The `viewTopic.inc` file is the same file used for the procedural application, shown in Listing 8-3, with the exception of two lines. The first line that must be changed is line 40, shown here:

```php
echo '<a href="viewThread.php?threadID='. $thread['id'] .'">';
```

In this line, `viewThread.php` needs to be changed to `viewThread-OO.php`. The second line that needs to be changed is line 51, shown here:

```php
echo '<b><a href="postMessage.php?topicID='$_GET['topicID'] .'">';
```

In this line, `postMessage.php` needs to be changed to `postMessage-OO.php`. 
Writing viewThread-OO.php

The viewThread-OO.php script is the same as the viewForums-OO.php script, except that it includes the viewThread.inc file that displays the Messages Web page. This script runs when the user clicks a thread name in the threads page. Listing 8-22 shows viewThread-OO.php.

```
<?php
/* Program: viewThread-OO.php
 * Desc: Displays the messages page.
 */
include("functions_main.inc");
include("viewThread.inc");
?>
```

The script includes a file containing functions needed by the viewForums.inc file and then includes viewforums.inc. The viewTopic.inc file is the same file used for the procedural application, shown in Listing 8-3, with the exception of line 41, shown here:

```
echo   '<a href="postReply.php?replyTo='.$post['id']."
```

In this line, postReply.php needs to be changed to postReply-OO.php.

Writing the postMessage-OO application script

The postMessage-OO program is invoked when you click the Start a New Thread link on the Threads page. postMessage-OO creates and displays an HTML form and waits until you click the submit button (which, in this case, is labeled Post Message). After you click the submit button, the postReply-OO program re-invokes itself — the $_POST[] array contains the data that you entered. The second time around, postReply-OO validates the data that you entered and, if everything looks okay, writes your new message to the MySQL database.

Listing 8-23 shows the postReply-OO.php script.
LISTING 8-23: THE SCRIPT THAT POSTS A NEW MESSAGE

```php
<?php
/* Program: postMessage-OO.php
 * Desc: Program that posts a new message and starts
 *       a new thread.
 */
require_once("WebForm.class");
require_once("Database.class");
require_once("TableAccessor.class");
require_once("Post.class");
require_once("functions_post-OO.inc");
require_once("forumVars.inc");

try
{
    if(!isset($_POST['Button']))
    {
        $parentTopic = $_GET['topicID'];
        $db = new Database("forumVars.inc");
        $db->useDatabase("forumTest");
        $topic = new TableAccessor($db->getConnection(),
                                   "Topic" );
        if( !$topic->selectByID($parentTopic))
        {
            echo $topic->getMessage()."<br>";
            exit();
        }
        $_POST['author']    = "";
        $_POST['subject']   = "";
        $_POST['body']      = "";
        $_POST['ftopic']    = $topic->getValues( "name");
        $_POST['ftopicID']  = $parentTopic;
    }
    $form = new WebForm("messageForm.inc",
                        "messageFields.inc", $_POST);
}
catch(Exception $e)
{
    echo $e->getMessage();
    exit();
}
if(!isset($_POST['Button']))
{
    $form->displayForm();
    exit();
}
else
{
    if( !validate($form))
    {
        $form->displayform();
    }
    else
    {
        $form->displayForm();
    }
}
```
The following numbers refer to the line numbers in Listing 8-23.

#6  Includes the files needed by this application script. The classes are included, including the WebForm and Database classes that are developed and explained in Chapters 3 and 4.

#15  Begins an if block that executes if the user did not click the submit button. This means that the user clicked the Start a New Thread link. The blank form should be displayed.

#17  Gets the topic ID that was passed in the URL.

#19  Lines 19 to 32 set up the default values to be displayed in the new message form.

#34  Creates a WebForm object with the default values.

#42  Starts an if block that executes if the user did not click the Post Message button. The form is displayed with the default values.

#47  Starts an else block that executes if the user clicked the Post Message button. The information the user enters in the form is validated, to determine if reasonable information was submitted. If the information is not valid data, the form is redisplayed with an error message. If the information is valid, the new message is stored in the database.

#69  Returns the user to the messages Web page.
Writing the postReply-OO application script

The postReply-OO program is invoked when the user clicks the Reply To button to reply to an existing message. postReply-OO creates and displays an HTML form and waits until the user clicks the submit button (which, in this case, is labeled Post Message). After the user clicks the submit button, the postReply-OO program starts again — the $_POST[] array contains the data that the user entered. The second time around, postReply-OO validates the data that the user entered and, if everything looks okay, writes the new message to the MySQL database.

Listing 8-24 shows the postReply-OO.php script.

```php
<?php
/* Program: postReply-OO.php
 * Desc: Program that posts a reply to an existing message. This program displays a form to the user and processes the form when the user clicks the submit button.
 */
require_once("WebForm.class");
require_once("Database.class");
require_once("Post.class");
require_once("Thread.class");
require_once("functions_post-OO.inc");
require_once("forumVars.inc");
try
{
    if(!isset($_POST['Button']))
    {
        $replyTo = $_GET['replyTo'];
        $db = new Database("forumVars.inc");
        $db->useDatabase("Forum");
        $post = new Post($db->getConnection(), "Post");
        if( !$post->selectByID($replyTo))
        {
            echo $post->getMessage()."<br>";
            exit();
        }
        $postData = $post->getValues(array("body","subject"));
        $_POST['author'] = "";
        $_POST['body'] = "";
        $_POST['fsubject'] = $postData['subject'];
        $_POST['fresponse'] = $postData['body'];
        $_POST['freplyto'] = $replyTo;
        $_POST['subject'] = $postData['subject'];
    }
    $form = new WebForm("messageForm.inc",
                        "replyFields.inc",$_POST);
```
} catch(Exception $e) {
    echo $e->getMessage();
    exit();
}
if(!isset($_POST['Button'])) #44 {
    $form->displayForm();
    exit();
}
else {
    if( !validate($form)) #51 {
        $form->displayform();
        exit();
    }
    $newdata = $form->getAllFields(); #56
    extract( $newdata ); #57
    $db = new Database("forumVars.inc"); #58
    $db->useDatabase("Forum");
    $post = new Post($db->getConnection(), "Post");
    if( !$post->selectByID($_POST['freplyto'])) {
        echo $post->getMessage()."<br>";
        exit();
    }
    $parent_thread = $post->getValues("parent_thread"); #66
    $newMessage = $post->postReply($parent_thread,
        $_POST['freplyto'], $author, $body);
    if( $newMessage == NULL ) {
        echo "Couldn't post new message.
            Try again later."
        exit();
    }
    else {
        $thread = new Thread($db->getConnection(),"Thread");
        $thread->updateTimestamp( $parent_thread ); #78
        $thread->updateReplies( $parent_thread ); #79
        echo '<meta http-equiv="Refresh" content="3;url=viewThread-00.php?threadID=' . $parent_thread . '"></meta>
            Your message has been posted. In a moment you
            will be automatically returned to the
            thread.";
    }
}?>
Following is a description of the numbered lines of code that appear in postReply-OO.php in Listing 8-24:

#8  This program uses the Database and WebForm classes that you develop in Chapters 3 and 4 (respectively); refer to those chapters for full details.

#17  Remember: This program runs in two distinct phases. In the first phase, it builds (and displays) an HTML form and waits for the user to click the submit button. In the second phase, the user has (presumably) completed the form and postReply-OO should process the values provided by the user. To distinguish between the two phases, you test the $_POST['Button'] variable — if that variable is undefined (not set), you’re running in the first phase. If $_POST['Button'] is defined, the user has completed the form and $_POST contains the data entered.

#19  Arriving at line 19 means that this form is being displayed to the user for the first time. Lines of code fill in the initial values that will be displayed on the form.

#20  When the reply form displays, the user should see the subject of the message to which she is replying, as well as an editable text area for the body of the reply message. To find the subject, postReply-OO creates a Database object (calling the constructor with the login parameters imported from forumVars.inc) and a Post object.

#23  The Post class provides a number of useful methods that make it easy to work with the Post table. The first method, selectByID, executes a SELECT statement that retrieves the Post whose ID matches $replyTo. selectByID does not return the values retrieved; it merely stores them inside the $post object. If selectByID can’t find the requested Post, it stores an error message in $post and makes that message accessible through the getMessage method.

#28  The Post class also provides a method that lets you access the values retrieved by selectByID: getValues. You can call getValues three ways. If you call getValues with the name of a column, getValues returns the value of that column (as retrieved by selectByID). If you call getValues with an array of column names, getValues returns an associative array containing the values that you requested. If you call getValues without any arguments (or with a NULL argument), it returns the entire row (in the form of an associative array) retrieved by selectByID. Line 28 extracts the body and subject values from $post.

#29  postReply-OO uses the WebForm class to display an HTML form to the user. The initial values displayed on that form are found in the $_POST array. Lines 29 through 34 store the appropriate values in $_POST. The user is expected to fill in the author and body so those fields are blanked out. The fsubject and fresponse fields are initialized to the values found in the original message. freplyto is initialized to the message ID found in the forwarding URL.
By the time the program arrives at line 35, the $_POST array contains the values displayed on the form. If the form is being shown for the first time, $_POST contains the initial values that will be displayed to the user. If the user has already completed the form (and clicked the Submit button), $_POST contains the values that the user typed into the form.

Now that the form has been created and prepared, an if/else statement determines how to display the form, depending on the value of the button. If the user hasn't yet seen the form, $_POST['Button'] will be undefined, $form->displayForm will be called and the program will exit. If the user has completed the form, $_POST['Button'] is set and the program jumps down to line 48.

Begins the else statement that executes if the user clicked the submit button. The call to validate($form) checks the content entered by the user and returns either TRUE or FALSE. If the data fails verification, validate returns FALSE — in that case, simply display the form again. (The $form object stores an error message that it displays to the user.)

If validate succeeds (implying that the data entered by the user looks okay), you can call $form->getAllFields to retrieve those values. As I show you in Chapter 4, getAllFields returns an associative array that contains both the field names (the keys) and the field values.

The $newdata array contains elements such as author=>"bruce@example.com" and body=>"This is my message". The call to extract creates a new variable for each member of the $newdata array. The name of the variable matches the key and the value of the variable matches the value of the array element. For example, extract would create two new variables: $author and $body. $author would hold the string "bruce@example.com", and $body would be set to "This is my message". After you extract the values in $newdata, you have (at least) five new variables: $author, $body, $fsubject, $fresponse, and $freplyto.

At this point, most of the information needed to create a new message in the Post table has been obtained. The one last piece is the ID of the parent thread. The forwarding page provided the original message ID in the URL, but the message needs to be looked up in the database to find out which thread it belonged to. First, a database connection is established by using the login parameters found in forumVars.inc. Then a new Post object is instantiated and selectByID is called to retrieve the original message.

The call to getValues grabs the parent_thread from the row retrieved by selectByID. Now a new message can be saved to the Post table by calling $post->postReply. If successful, postReply returns the auto-generated ID of the new message. If postReply fails, it returns NULL.
If postReply succeeds, the last_post timestamp in the parent thread is updated. The Thread class defines a method (updateTimestamp) that does just that — you provide the thread ID, and updateTimestamp does the rest.

If postReply succeeds, the replies field in the parent thread is updated. The Thread class defines a method (updateReplies) that does just that — you provide the thread ID and updateReplies does the rest.

The only thing left to do is to send the user somewhere useful. The <meta> tag redirects the browser back to the viewThread-00 page after a delay of three seconds, giving the user a chance to read the “post successful” message.

Writing the supporting functions

The scripts in this application make use of a small set of functions stored in separate files. All the scripts use the function Connect_to_db stored in the file functions_main.inc. The two scripts that post messages — postMessage.php and postReply.inc — include the functions_post.inc file that defines a function used to display the forms.

Writing functions_main.inc

This file contains one function used by three of the scripts. Listing 8-25 shows the file.

Listing 8-25: The Function That Connects to the Database

```php
<?php
/* File: functions_main.inc
 * Function: Connect_to_db
 * Desc: Connects to a MySQL database. The name of a file containing the database variables is passed to the function.
 */
function Connect_to_db($filename)
{
    include($filename);
    $cxn = mysqli_connect($host, $user,$passwd)
        or die("Couldn't connect to server.");
    $db = mysqli_select_db($cxn,$database)
        or die("Couldn't select database.");
    return $cxn;
}
?>
```
The `Connect_to_db` function that you see here is identical to the `Connect_to_db` function you see throughout the book. The call must provide the name of a file (`$filename`) that defines a set of connection options (`$host`, `$user`, `$passwd`, and `$database`). Given the name of a file that contains connection options, `Connect_to_db` connects to a MySQL server and returns a connection handle.

**Writing functions_post-OO.inc**

This file contains one function that adds an HTML field to a form. Listing 8-26 shows the file.

---

**LISTING 8-26: THE FILE THAT DEFINES TWO FUNCTIONS NEEDED BY THE SCRIPTS**

```php
<?php
/* File: functions_post-OO.inc
 * Desc: Supporting functions for postMessage-OO and postReply-OO.
 */

function DisplayField( $label,$field,$value,$type,$style )
{
    $typeTags = explode(" ", $type);
    $controlType = $typeTags[0];
    $result = '<td style="formLabel">';
    $result .= $label;
    $result .= '</td>
';
    if( ereg("input", $controlType ) ) #14
    {
        $result .= " <td><$type class='$style' name='$field'
            value='$value'></td>
";
    }
    else
    {
        $result .= "<$type name='$field' class=""$style"">";
        $result .= $value;
        $result .= '</$controlType></td>
";
    }
    echo $result;
}

function validate( $form ) #29
{
    try
    {
        $blanks = $form->checkForBlanks(); #33
    } catch(Exception $e)
    {
Continued
```
This file contains two functions needed by the postMessage-OO and postReply-OO scripts. The first function is DisplayFields. The calling statement provides a string ($label) that displays to the left of the field, a name for the field ($field), an initial value ($value), a field type ($type), and the name of a display style ($style).

The only tricky part of this function is that, when you’re creating an <input> element, the initial value (the value displayed to the user) is specified as an attribute. When you’re creating a <textarea> element, the initial value is specified as the value of the element. In other words, if you’re creating an <input> element, you specify the value like this:

```php
Listing 8-26: (Continued)
```
But if you’re creating a `<textarea>` element, you specify the value like this:

```
<textarea name="fieldName">initial value</textarea>
```

This part of the function is handled by an `if/else` statement that begins on line 16.

The second function is `Validate`, which processes the information typed into the form by the user.

#29  The calling statement passes an array of data to this function.
#33  Checks for blank fields that should contain data.
#39  Begins an `if` block that executes if blank fields are found. The form is re-displayed with an error message.
#50  Processes the data entered by a user. Removes blank spaces from the beginning and end. The script doesn’t reach this line unless no blank fields are found.
#51  Removes any HTML tags from the data.
#54  Checks the data for valid formats.
#60  Begins an `if` block that executes if information was found with an invalid format. The form is re-displayed with an error message.
#69  Returns `true` when the data is all okay — no blanks and no invalid format found.

**Possible Enhancements**

If you’ve made it to this point, you have a complete Web forum application. Invite a few visitors to your site, and you’ll have lively discussions popping up in no time. To wrap up this chapter, here are a few enhancements that you might want to consider:

**User registration/authentication:** You can easily integrate the Login application that you develop in Chapter 3 if you want to require visitors to register (and log in) at your site before they can post new messages.

**Threading:** Some forums thread messages together to make the relationship between message and reply easier to see. When the user clicks the Reply button in this application, the system keeps track of the relationship between the existing messages that have been created and the message that the user is replying to (that information is stored in the `Post.in_reply_to` column). If you want to display messages in threaded order, you simply have to sort them appropriately and indent each reply.
BBcode: If you’ve visited many Web forums, you’ve probably encountered a feature known as BBCode. BBCode is an easy way for a novice user to mark up a message. For example, to italicize a phrase, you simply type in [i]this is italicized[/i]; to include a smiley face, just type in :-) The PHP Extension and Application Repository (PEAR) provides a package, HTML_BBCodeParser, that can convert BBCode into equivalent HTML form.

Forum Management: After your forum is up and running for a while, you’ll probably find a few tasks that you’d like to automate. You might want to create a Web form that makes it easier to add (and remove) Forum and Topic records. You might want another form that truncates a thread or consolidates two similar threads. You can manage your forum from the MySQL command line, but Web forms can certainly simplify the task. Just be sure to secure any management tools that you create, so they can’t fall in the wrong hands.

File uploads/downloads: Most Web forums provide a way for a visitor to attach a file to a message. If you’re hosting a forum devoted to household pets, your users will surely want to share photos. Check out the HTTP_Upload package at PEAR (pear.php.net) to see how to add this feature to your forum.

Search tools: The MySQL server provides a set of full-text search functions that you might want to add to your forum. You can use a full-text search to find words and phrases within any table in your MySQL server. The most useful search (in this application) locates messages by searching the Post.body and Thread.subject columns.
“okay, well, I think we all get the gist of where Jerry was going with the site map.”
In this part . . .

Chapter 9 contains tips for application development based on my experiences. They can serve as short-cuts for you on your journey to becoming a Web developer.

Chapter 10 contains a list of Web sites where you can find code libraries and other useful information about applications.
Chapter 9

Ten Hints for Application Development

In This Chapter

- Writing code that’s easy to maintain
- Getting help from discussion lists

A

n application can be a five line script that outputs Hello World!. Application development for this script is pretty simple. However, an application is likely to be more complex, often requiring many scripts and many coordinated programmers. Application development for a complex application can be very tricky. This chapter includes some suggestions for coding practices that will make development proceed more smoothly, no matter how complicated the application is.

Plan First

Restrain your desire to jump in and start coding immediately. A plan, on paper, is essential. A plan should answer the following questions:

- What tasks does your application need to perform?
- What programming methods will you use to implement each task?
- How do the tasks interact with each other?
- How easy is your application to maintain?
- How will you add features to the application in the future?
- How does the application meet the needs of the user?

Nothing is more painful than realizing after half your application is coded that you forgot an important factor and must start all over again.
**Be Consistent**

Many decisions are made in the course of coding an application. Make each decision once and then be consistent throughout the application. For instance, decide on naming conventions at the beginning and use the same conventions throughout. If you use all lowercase letters for variables and camel caps for function names at the beginning of your application or in one class, use the same conventions throughout the application or in all classes. Consistency makes the code much easier to understand and to maintain.

**Test Code Incrementally**

A program consists of many code blocks. Building and testing an application proceeds best when each small code block is tested on its own. Test a simple piece of code until it performs as expected. Add functionality to the code one element at a time, testing as each new piece of code is added. For instance, if a program task requires a loop within a loop, build and test one loop. When it works, add the other loop.

**Remember Those Who Follow**

Keep your code as simple and easy to read as possible. At some point in the future, someone will try to understand your code so they can maintain or modify it. Code that can’t be easily understood is a problem, no matter how clever it might seem or how many lines shorter it is.

**Use Constants**

Constants greatly simplify maintenance. If you use the same value more than once in your application, such as a tax rate or a company name, store it in a constant and use the constant in your application. This serves two purposes. First, the constant name is much more enlightening than an obscure number to someone reading the code. That is, TAX_RATE is much more informative than 6.5. Secondly, if the value changes, you have to change it only once, at the beginning of the program, rather than finding and changing it in many places in your application.
Write Reusable Code

Look for opportunities to write reusable code. Any time you find yourself writing the same code in different parts of the application, write a function. It saves a great deal of time and makes the program much easier to read. Over a period of time, you will build up a library of functions that you can use in many different applications.

Of course, if you’re writing object-oriented code, you’re always writing reusable code.

Separate Page Layout from Function

Maintenance is easier if you separate the Web page layout code from the program logic code. You can write the code that displays the page in a separate file, a file that outputs HTML code. The main PHP script that contains the program logic can include the file containing the display code when the page needs to be displayed. Given this separation, it’s much easier to change the look of a Web page. You change only the display code in the layout file; you don’t need to change any of the program logic code.

Don’t Reinvent the Wheel

Before you spend hours writing a piece of code that refuses to do what you want it to do, search the Internet for the code that you need. Thousands of PHP developers are willing to share their code. PHP code repositories store code for various purposes, perhaps exactly the purpose you have in mind. Chapter 10 provides a list of places to find code.

If your application is a common one, you might be able to find a ready-made application that you can use, instead of building your own. Many PHP applications — for free or to purchase — are available on the Internet. Several applications are available for Content Management Systems, Shopping Carts, Message Boards, Templating Systems, and many other uses. Try googling for a complete solution before deciding that you must build your own.
Use the Discussion Lists
Frequently, but Wisely

Users of PHP and MySQL are more than willing to help if you are stumped. Take advantage of this resource. However, be sure your question is organized and to-the-point. “I tried to access my database but it didn’t work. What should I do?” is not a message that anyone can answer. And, anyone who responds is likely to point out the foolishness of this message that doesn’t provide any details. Include the following information in a message asking for help:

- Supply the software and versions that you are using, such as Windows XP, PHP 5.0.2, MySQL 4.1.7, Apache 1.3.27.
- Explain what you did, in detail. If your problem is that the code produces an error message or the code doesn’t give you the results you expected, include the code. If your code is a huge program, include just enough code to show the problem. Or, perhaps, construct a simplified piece of code that has the problem.
- State what you expected the outcome to be.
- State what actually happened differently than your expected outcome.

In addition, be sure to do your homework before you ask a question. Read the manual. Google for answers. Turn to the list only when other resources fail. You can find a document with a lot of good advice about asking questions on a list at www.catb.org/~esr/faqs/smart-questions.html.

The most useful lists for PHP and MySQL help are

- www.php.net/mailing-lists.php
- http://lists.mysql.com

Document Everything

While you’re writing an application, the details seem indelibly burned into your mind. However, in six months, when you want to make changes to the application, you’ll be amazed to discover that most of those details are gone. So don’t depend on your memory. Write down all your decisions. Use comments liberally in your scripts.
One advantage of PHP is that its developers are willing to share code. Several online code libraries are available where you can obtain code donated by experienced PHP programmers. Whatever your need, you can often find code that you can use as is or with a little modification. There’s no need to reinvent the wheel for every programming task.

SourceForge.net

SourceForge.net is the largest repository of open-source code and applications available on the Internet. You can find software for all purposes at this site. Many of the projects on SourceForge are large software applications that you can download and use. For instance, phpmyadmin, a popular application used to manage MySQL databases, is available on SourceForge.

You don’t need to log in to SourceForge to download software. You can find software written specifically in PHP by following these steps:

1. Click the Software Map tab at the top.
2. Click Programming Language in the column on the right.
3. Click PHP in the column of alphabetically listed programming languages on the left.

As of today, SourceForge.net shows over 9,000 projects in PHP.
WeberDev

http://weberdev.com

WeberDev is one of the most comprehensive resources for PHP programmers. Started in 1998 as a page to post examples, the site has grown dramatically and includes both code snippets and complex programs. The almost 4,000 examples (as of this writing) fall into the following major categories: PHP, MySQL, JavaScript, and Databases. You can download the code without logging into the site. User comments about the code are displayed with the code. WeberDev also provides articles, manuals, discussion forums, a coding contest, templates, PHP Web logs (blogs), and other resources.

You can register on WeberDev and receive a password. Logging in allows you to add code, post to the discussion forums, add comments to code examples, enter a coding contest with prizes, receive a newsletter, receive notification when new examples are added to the site, and other advantages. You must provide your name and e-mail address to register. You can elect not to receive e-mail from the site when you register.

PHP Classes

www.phpclasses.org

PHP Classes is a repository for hundreds of classes written in PHP. You can search or browse through many categories or by author to find classes. User ratings are provided with the class information. You don't need to log in to download the code. This Web site also provides reviews of PHP books.

Codewalkers

http://codewalkers.com

The Codewalkers Web site calls itself “A resource for PHP and SQL developers.” You can find code in the following categories: Content Management, Database Related, Date and Time, Discussion Boards, E-Mail, File Manipulation, Link Farm, Look and Feel, Miscellaneous, Searching, Site Navigation, Statistics and Counters, and User Management. Each code submission displays a rating provided by site visitors. The code gallery contains both procedural and object-oriented code. The site also offers tutorials, reviews of books and software, a coding contest, and forums for discussions.
The site provides a member registration and login. You don’t need to register as a member of the site to download code, but you must register before you can contribute code. You can post to the forums without logging in, but you must register to use some advanced features of the forums. Registration requires a user ID and a password that you create. An e-mail address is also required. Other information is requested but not required.

**PHP Builder**

[www.phpbuilder.com](http://www.phpbuilder.com)

PHP Builder is a Web site containing a variety of resources for PHP coders. It provides a library of code snippets, scripts, and functions for a broad range of uses. You can search for code in such categories as databases, calendars, shopping carts, games, graphics, and many others. In addition, you can find news and a list of useful articles as well as search for jobs or people available for hire.

**HotScripts.com**

[www.hotscripts.com](http://www.hotscripts.com)

HotScripts is an Internet directory to programming-related resources. HotScripts provides information and scripts for PHP, CGI, Perl, JavaScript, and ASP. Almost 10,000 scripts are currently listed for PHP.

The listing for each program provides information about the software, with a link to the Web page for the software. Each listing also includes reviews and ratings of the software provided by visitors.

**Zend**

[http://zend.com](http://zend.com)

The Zend Web site includes a code gallery. Zend is the company that develops the PHP engine. You don’t need to log in to the Web site to download code. PHP code is available for categories such as math, databases, algorithms, new, most requested, and top rated. Visitors can post ratings of the software.
Many other resources are available here, including some excellent articles. Zend, in partnership with WeberDev (which I describe earlier in this chapter), sponsors a PHP coding contest.

**PHP Freaks**

www.phpfreaks.com

PHP Freaks offers about 600 scripts in several categories. It also provides easy access to the ten most popular scripts and the newest scripts. Ratings of the code are provided. You don’t need to log in to download scripts or to add a script. However, you must provide a name and valid e-mail address to add a script.

The site also provides articles and tutorials, news, and forums. The Web site states that it has, as of this writing, 25,189 active members.

**PX: The PHP Code Exchange**

http://px.sklar.com

PX allows users to post and download PHP code. It’s a simple Web site that just provides access to code. The home page consists of a list of categories for browsing and a field for entering search terms. You don’t need to be logged in to download code, but you must register and log in before you can post or rate code.

**Free PHP and MySQL Hosting Directory**

www.oinko.net/freephp

This site is a list of free Web hosting companies that offer PHP. Hosts are rated up to five stars.
"Why, of course. I’d be very interested in seeing this new milestone in the project."
In this part . . .

This part provides a brief introduction of object-oriented programming (Appendix A) and also a summary of concepts and syntax for object-oriented programming in PHP (Appendix B).

Appendix C provides information on PHP functions used to interact with MySQL. It provides tables for converting from mysql functions to mysqli functions and/or mysqli objects.

Appendix D discusses the useful goodies you can find on the CD: all the code from the book, a list of useful PHP- and MySQL-related links, and a bonus chapter that shows you how to build and manage a mailing list.
Appendix A

Introducing Object-Oriented Programming

If you’re unfamiliar with the concepts and terminology of object-oriented programming, this appendix is for you. I explain the principles and terms of object-oriented programming here. In Appendix B, I describe how to write object-oriented programs. If you are familiar with the vocabulary and concepts of object-oriented programming and know object-oriented programming using another language, such as Java or C++, you can go directly to Appendix B where I explain the syntax of PHP’s object-oriented programming features.

Understanding Object-Oriented Programming Concepts

*OO programming* (that is, object-oriented programming) is an approach to programming that uses objects and classes. As I explain in Chapter 1, changing from procedural programming to object-oriented programming is more than just using a different syntax. It’s a different way of analyzing programming problems. The program is designed by modeling the programming problem. For example, a programmer designing a program to support a company’s sales department might look at the programming problem in terms of the relationships among customers and sales and credit lines — in other words, in terms of the design of the sales department itself.

Object-oriented programming developed new concepts and new terminology to represent those concepts. This section introduces and explains the major object-oriented programming concepts.
Objects and classes

The basic elements of object-oriented programs are *objects*. It’s easiest to understand objects as physical objects. For example, a bicycle is an object. It has properties, such as color, model, and tires, which are also called *attributes*. A bike has things it can do, too, such as move forward, turn, park, and fall over.

In general, objects are nouns. A person is an object. So are animals, houses, offices, customers, garbage cans, coats, clouds, planets, and buttons. However, objects are not just physical objects. Often objects, like nouns, are more conceptual. For example, a bank account is not something you can hold in your hand, but it can be considered an object. So can a computer account. Or a mortgage. A file is often an object. So is a database. Orders, e-mail messages, addresses, songs, TV shows, meetings, and dates can all be objects.

A *class* is the code that is used to create an object — the template or pattern for creating the object. The class defines the properties of the object and defines the things the object can do — its responsibilities. For example, you write a class that defines a bike as two wheels and a frame and lists the things it can do, such as move forward and change gears. Then when you write a statement that creates a bike object using the class, your new bike is created following the pattern in your class. When you use your bike object, you might find that it is missing a few important things, such as a seat or handlebars or brakes. Those are things you left out of the class when you wrote it.

As the person who writes a class, you know how things work inside the class. But it isn’t necessary to know how an object accomplishes its responsibilities in order to use it; anyone can use a class. I have no clue how a telephone object works, but I can use it to make a phone call. The person who built the telephone knows what’s happening inside it. When new technology is introduced, the phone builder can open my phone and improve it. As long as he doesn’t change the interface — the keypad and buttons — it doesn’t affect my use of the phone at all.

Properties

Objects have *properties*, also sometimes called *attributes*. A bike might be red, green, or striped. Properties — such as color, size, or model for a bike — are stored inside the object. Properties are set up in the class as variables. For example, the color attribute is stored in the object in a variable and given a descriptive name such as `$color`. Thus, the bike object might contain `$color = red`.

The variables that store properties can have default values, can be given values when the object is created, or can have values added or modified.
later. For example, a house might be created white, but when it is painted
later, $color is changed to chartreuse.

**Methods**

The things that objects can do are sometimes referred to as responsibilities. For example, a bike object can move forward, stop, and park. Each thing an object can do — each responsibility — is programmed into the class and called a method.

In PHP, methods use the same syntax as functions. Although the code looks like the code for a function, the distinction is that methods are inside a class.

Classes are easier to understand and use when method names are descriptive of what they do, such as `stopBike` or `getColor`. Methods, like other PHP entities, can be named with any valid name but are often named with camel caps, by convention (as shown in the previous sentence).

The method are the interface between the object and the rest of the world. The object needs methods for all its responsibilities. Objects should interact with the outside world only through their methods. If your neighbor object wants to borrow a cup of sugar, for example, you want him to knock on your door and request the sugar. You don’t want him to just climb in the kitchen window and help himself. Your house object should have a front door, and neighbor objects should not be able to get into your house without using the front door. In other words, your house object has a method for `openFrontDoor` that the neighbor must use. The neighbor should not be able to get into the house any other way. Opening the front door is something your house object can do, via a method called `openFrontDoor`. Don’t leave any open windows in your object design.

A good object should contain all it needs to perform its responsibilities but not a lot of extraneous data. It should not perform actions that are another object’s responsibility. The car object should travel and should have everything it needs to perform its responsibilities, such as gas, oil, tires, engine, and so on. But the car object should not cook and does not need to have salt or frying pans. And the cook object should not transport the kids to soccer practice.

**Abstraction**

*Abstraction* is an important concept in object-oriented programming. When you’re designing a class, you need to abstract the important characteristics of the object to include in your class, not include every single property and
responsibility you can think of. You abstract the characteristics that are
important for your application and ignore the characteristics that are irrele-
vant for your task.

Suppose you’re developing an application for a grocery store. Your applica-
tion will assist with the work schedule for the grocery clerks, so you design
a checkout clerk object. You can include many characteristics of the grocery
clersks, such as name, age, hair color, hours worked per week, and height.
However, your goal is to abstract the grocery clerk characteristics that are rel-
evant to the scheduling task. Age, hair color, and height are not useful infor-
mation. However, the grocery clerks’ names and the hours they’re scheduled
to work per week are necessary for the schedule, so those characteristics are
included in the object.

Methods are similarly abstracted for their relevance. Such methods as
startWork and stopWork are needed for the application, but brushesTeeth
and drivesCar are not.

Inheritance

Objects should contain only the properties and methods they need. No
more. No less. One way to accomplish that is to share properties and meth-
ods between classes by using inheritance. For example, suppose you have
two Car objects: a sedan and a convertible You could write two classes: a
Sedan class and a Convertible class. However, a lot of the properties and
responsibilities are the same for both objects. Both have four wheels, both
have color, and both move forward in the same way. Inheritance enables you
to eliminate the duplication.

You can write one class called Car, which stores the information, such as
setColor and setEngine_size, and provides the methods, such as openDoor
and moveBackward, used by both types of cars. You can then write two sub-
classes: Sedan and Convertible. The Car class is called the master class or
the parent class. Sedan and Convertible are the subclasses, which are
referred to as child classes, or the kids, as my favorite professor fondly
referred to them.

Child classes inherit all the properties and methods from the parent class.
But they can also have their own individual properties and methods, such as
$sunroof = yes or $sunroof = no for the Sedan class and lowerTop and
raiseTop methods for the Convertible class. A $sunroof property doesn’t
make sense for the Convertible, because it isn’t going to have a sun roof,
ever. The lowerTop or raiseTop methods make no sense for the Sedan
because you can’t lower its top.
A child class can contain a method with the same name as a method in a parent class. In that case, the method in the child class takes precedence for a child object. You can use the method in the parent class by specifying it specifically, but if you don’t specify the parent method, the child class method is used. For instance, the cars both can move forward. In most cases, they move forward the same, regardless of the type of car, so you put a method called moveForward in the Car class so both child classes can use it. However, suppose that the Convertible moves forward differently than the Sedan (for instance, all convertibles are standard shift, but a sedan can be standard or automatic). You can put a method called moveForward in the Convertible class that would override the method in the parent class with the same name.

**Information hiding**

*Information hiding* is an important design principle in object-oriented programming. The user of a class doesn’t need to know how an object performs its actions. The user just needs to know the interface of the object in order to use it.

For instance, take a look at a checking account. As the user of a checking account, you need to know how to pay money from your account to your landlord. You know that you can pay money from the account to your landlord by writing a check with your landlord’s name on the payee line. You don’t know the details involved when your landlord cashes that check; you don’t know who handles the check, where the check is stored, or where or how the teller enters the information about the check into the bank’s computers, or any similar details You don’t need to know. You need to know only how to write the check. The bank can alter its procedures, such as using a different teller or changing the computer program that handles the transaction, without affecting you. As long as the bank doesn’t change the interface between you and the bank, such as how you fill out the check, you continue to use the bank without knowing about any internal changes.

If you’re writing a banking application that includes an account object, the same principles apply. The account class needs to include a method such as cashCheck. The person using the class needs to know how to pass the information, such as the payee and the amount of the check, to the cashCheck method. However, the person using the cashCheck method doesn’t need to know how the method performs its actions, just that the check is cashed. The person writing the class can change the internal details of the cashCheck method, but as long as the interface doesn’t change, the user of the class isn’t affected.
The same principle applies to properties of an object. For instance, the checking account object needs to know the balance in the account. However, no one outside the class should be able to change the balance directly. The balance should be accessible only to bank employees, such as the teller. The balance should not be public, where anyone can change it.

To accomplish information hiding in PHP (and other languages), you use keywords to designate public versus private properties and methods. Private properties and methods can be accessed only by methods contained in the class, not by statements outside the class. Appendix B explains the details of using public and private properties and methods.

Creating and Using the Class

By their nature, object-oriented programs require a lot of planning. You need to develop a list of objects — along with their properties and responsibilities — that covers all the functionality of your application. Each object needs to contain all the information and methods needed to carry out its responsibilities without encroaching on the responsibilities of other objects. For complicated projects, you might need to do some model building and testing before you can be reasonably confident that your project plan includes all the objects it needs.

After you decide on the design of an object, you can create and then use the object. The steps for creating and using an object follow:

1. Write the class statement.
   The class statement is a PHP statement that is the blueprint for the object. The class statement has a statement block that contains PHP code for all the properties and methods that the object has.

2. Include the class in the script where you want to use the object.
   You can write the class statement in the script itself. However, it is more common to save the class statement in a separate file and use an include statement to include the class at the beginning of the script that needs to use the object.

3. Create an object in the script.
   You use a PHP statement to create an object based on the class. This is called instantiation.

4. Use the new object.
   After you create a new object, you can use it to perform actions. You can use any method that is inside the class statement block.

Appendix B provides the details needed to complete the preceding steps.
If you know object-oriented (OO) programming in another language, such as Java or C++, and just want to know how object-oriented programming is implemented in PHP, you are in the right place. In this appendix, I tell you how to write PHP programs by using object-oriented programming methods, assuming you already understand object-oriented terminology and concepts. If you don’t know object-oriented programming concepts and terminology, check out Appendix A, where I introduce object-oriented programming.

Much of the syntax that I describe in this appendix is valid only for PHP 5 and doesn’t work in PHP 4.

**Writing a Class Statement**

You write the class statement to define the properties and methods for the class.

**The class statement**

The class statement has the following general format:

```php
class className
{
    #Add statements that define the properties
    #Add all the methods
}
```
Naming the class

You can use any valid PHP identifier for the class name, except reserved words — words that PHP already uses, such as `echo`, `print`, `while`, and so on. The name `stdClass` is not available because PHP uses the name `stdClass` internally. In addition, PHP uses `Iterator` and `IteratorAggregate` for PHP interfaces, so those names are not available. In general, if you use the name of a PHP command or function for a class name, you get a parse error that looks something like the following error for a class named `echo`:

Parse error: parse error, unexpected T_ECHO, expecting T_STRING in d:\Test.php on line 24

If you use a name that PHP already uses for a class, you get a fatal error similar to the following:

Fatal error: Cannot redeclare class stdClass in d:\Test.php on line 30

Adding the class code

You enclose all the property settings and method definitions in the opening and closing curly brackets.

The next few sections show you how to set properties and define methods within the class statement. For a more comprehensive example of a complete class statement, see the section “Putting it all together,” later in this appendix.

Setting properties

When you’re defining a class, declare all the properties in the top of the class. PHP does not require property declarations, but classes with declarations are much easier to understand. It’s poor programming practice to leave them out.

Declaring public properties

Use `public` to declare public properties when needed, as follows:

```php
class Airplane
{
    public $owner;
    public $passenger_capacity;
    public $gas;
    Method statements
}
```
You can leave out the keyword `public`. The property is then public by default. However, the code is easier to understand with the word `public` included.

You can also use constants as properties, with the following format:

```php
const SIZE = 20;
```

**Declaring private properties**

You can declare properties either private or protected by using a keyword:

- `private`: No access from outside the class, either by the script or from another class.
- `protected`: No access from outside except from a class that is a child of the class with the protected attribute or method.

You can make an attribute private as follows:

```php
private $gas = 0;
```

With the attribute specified as private, a statement that attempts to access the attribute directly gets the following error message:

```
Fatal error: Cannot access private property Airplane::$gas in c:\testclass.php on line 17
```

The `public` and `private` declarations are new with PHP 5. In PHP 4, all properties were declared as follows:

```php
var $gas = 0
```

However, the new `public` and `private` keywords replace `var` in PHP 5. If you use `var` in PHP 5, your script still runs correctly, but you receive an `E_STRICT` warning as follows:

```
Strict Standards: var: Deprecated. Please use the public/private/protected modifiers in c:\test.php on line 5
```

Don’t use the `var` keyword, because it will possibly be removed in a future version of PHP.

While testing new code during development, you want to see all the messages (error, warning, notice, strict) that PHP can display. The information is useful for debugging new code. The error setting `E_ALL` doesn’t include the “strict” messages. So, use the setting `E_ALL | E_STRICT`. You, of course, should turn off these messages when the application is made available to users, because any error messages provide information that’s useful for the bad guys. At this point, you can turn error messages off, or better still, write them to a log file.
**Setting values for properties**

To set or change a property variable’s value when you create an object, use the constructor (which I describe in “Writing the constructor,” later in this appendix). Or, to set or change the property variable’s value after you create the object, use a method you write for this purpose.

You can set default values for the properties, but the values allowed are restricted. You can declare a simple value but not a computed one, as detailed in the following examples:

✔️ The following variable declarations are allowed as default values:

```php
private $owner = "DonaldDuckAirLines";
piecewise $passenger_capacity = 150;
piecewise $gas = 1000;
```

✔️ The following variable declarations are not allowed as default values:

```php
private $color = "DonaldDuck"." AirLines";
piecewise $passenger_capacity = 30*5;
piecewise $gas = 2000-1000;
```

An array is allowed in the variable declaration, as long as the values are simple, as follows:

```php
private $doors = array("front","back");
```

**Adding methods**

Methods specify what an object can do. Methods are included inside the class statement and are coded in the same format as functions. For example, your checking account might need a method that deposits money into the account. You can have a variable called balance that contains the amount of money currently in the account. You can write a method that deposits a sum into the $balance. You can add such a method to your class as follows:

```php
class CheckingAccount
{
    private $balance = 0;
    function depositSum($amount)
    {
        $this->balance = $this->balance + $amount;
        echo "$${amount} deposited to your account";
    }
}
```

This looks just like any other function, but it’s a method because it’s inside a class. Methods can use all the formatting of functions. For instance, you can specify a default value for your parameters as follows:

```php
function depositSum($amount=0)
```
If no value is passed for $amount, $amount is 0 by default.

PHP provides some special methods with names that begin with __ (two underscores). These methods are handled differently by PHP internally. This appendix discusses three of these methods: construct, destruct, and clone. Don’t begin the names of your own methods with two underscores unless you’re taking advantage of a PHP special method.

You can make methods private or protected in the same way you can make properties private or protected: by using the appropriate keyword. If you don’t use any keyword for a method, it’s public by default.

It’s good programming practice to hide as much of your class as possible. Only make methods public that absolutely need to be public.

A static method is a method that can be accessed directly, without instantiating an object first. You declare a method static by including a keyword, as follows:

static function functionname()

For details on using a static method, see the section “Using a Class,” later in this appendix.

Accessing properties and methods

When you write methods for your class, you often want to access the properties of the class or other methods in the same class. A special variable — $this — is available for accessing properties and methods within the same class. You use the variable as follows:

$this->varname
$this->methodname

You can use $this in any of the following statements as shown:

$this->gas = 2000;
$product[$this->size] = $price;
if($this->gas < 100)
  {echo $this->gas};

As you can see, you use $this->varname in all the same ways you would use $varname.

Notice that a dollar sign ($) appears before this but not before gas. Don’t use a dollar sign before gas — as in $this->$gas — because it changes the meaning of your statement. You might or might not get an error message, but it isn’t referring to the variable $gas inside the current class.
The following class includes a method to add gas to your car: \texttt{addGas}.
However, you want to be sure that people buy the gas that is added; you
don’t want any stolen gas in your car. So, you make the gas property and
the \texttt{addGas} method private. You add a \texttt{buyGas} method for public use, as
follows:

\begin{verbatim}
class Car
{
    private $gas = 0;
    private function addGas($amount)
    {
        $this-&gt;gas = $this-&gt;gas + $amount;
        echo "$amount gallons added to gas tank";
    }
    function buyGas($amount)
    {
        $this-&gt;addGas($amount);
    }
}
\end{verbatim}

In this class, the only way that gas can be added to the car from outside the
class is with the \texttt{buyGas} method. The \texttt{$gas} property is private, so it can’t be
modified from outside the class. The \texttt{addGas} method is also private. The only
public method for adding gas is the \texttt{buyGas} method, which accesses the
\texttt{addGas} method by using \texttt{$this-&gt;addGas}. If a statement outside the class
attempts to add to \texttt{$gas} directly or to use \texttt{addGas}, a fatal error is displayed,
as follows:

\texttt{Fatal error: Call to private method Car::addGas() in c:\testcar.php on line 10}

You can’t use the special variable \texttt{$this} in a static method because \texttt{$this}
refers to the current object and you don’t necessarily create an object when
accessing a static method.

You can’t use \texttt{$this} to access class constants. Instead, you use a line like the
following to access a class constant named \texttt{SIZE}:

\begin{verbatim}
$this-&gt;gas = self::SIZE;
\end{verbatim}

\textit{Writing the constructor}

The \textit{constructor} is executed automatically when an object is created by using
the class as a pattern. In PHP, only one constructor is allowed. A constructor
is not required.
The constructor has a special name so that PHP knows to execute the method when an object is created. Constructors are named __construct (two underscores). A constructor method looks similar to the following:

```php
function __construct()
{
    $this->balance = 100;   # account is opened with $100
    echo "Current balance is $$this->balance.";
}
```

This constructor defines the new bank account. When the account is created, it has $100 in it (a reward for opening the account).

Prior to PHP 5, constructors had the same name as the class. You might run across classes written in this older style. PHP 5 looks first for a method called __construct() to use as the constructor. If it doesn’t find one, it looks for a method that has the same name as the class and uses that method for the constructor. Thus, older classes still run under PHP 5. If your class has both a method named __construct() and a method with the same name as the class, a message warns you that you are redefining the constructor, and then the script proceeds, using __construct() and ignoring the method with the same name as the class.

**Putting it all together**

Your class can have as few or as many properties and methods as it needs. These methods can be very simple or very complicated, but the goal of object-oriented programming is to make the methods as simple as is reasonable. Rather than cram everything into one method, it’s better to have several smaller methods and have one method call another, as in the following example:

```php
class Message
{
    private $message = "No message";
    function __construct($message)
    {
        $this->message = $message;
    }
    function displayMessage()
    {
        echo $this->message."\n";
    }
    function changeMessage($new_message)
    {
        $this->message = $new_message;
        echo "The message was changed to: ";
        $this->displayMessage();
    }
}
```
This simple Message class has a constructor, two methods, and one property. The property is the text of the message, which is passed into the object when the object is created and stored in the property variable when the constructor executes. The displayMessage method displays the message stored in the property. The changeMessage method changes the text of the message and then uses the displayMessage method to display the changed message text.

**Using inheritance in your class**

A class can be a subclass that inherits properties and methods from a parent class. Suppose you need two car objects: a sedan and a pickup truck. The two objects have many similarities, such as four wheels, an engine, and a steering wheel. However, the two objects also have differences, such as trunk versus bed, two doors versus four doors, passenger capacity, cargo capacity, and so on. You can write a parent class, Car, that contains the similarities and a subclass, Pickup, that contains the properties and methods that are unique to the pickup. You write the Pickup class as follows:

```php
class Pickup extends Car
{
    Add the property statements
    Add the methods
}
```

The object created from this class has access to all the properties and methods of both the Car class and the Pickup class. The Car class, however, does not have access to properties or methods in the child class Pickup. You can access the properties and methods of the parent from a child class by using either of the following statements:

```php
$this->gas
parent::gas
```

If you add a method to a child class with the same name as a method in the parent class, the child class method overrides the parent class method. That is, if you create a child object and call the method, then the child method rather than the parent method is used. If the signature (the number of arguments passed) for the child method doesn’t match the signature of the parent method, a warning is displayed.

To prevent a method from being overridden in a child class, use the keyword final with the method in the parent class, as follows:

```php
final function functionname()
```
You can prevent a class from being inherited by declaring it final, as follows:

```php
final class classname
```

### Using a Class

The class code needs to be in the script that uses the class. Define the class before you use it. Most commonly, the class is stored in a separate include file and is included in any script that uses the class.

To use an object, you first create the object from the class. Then that object can perform any methods that the class includes. Only static methods can be used without creating an object first.

### Creating an object

To create (or instantiate) an object, use statements with the following format:

```php
$obj = new classname(value, value,...);
```

For example, to create a `Message` object, use the following statement:

```php
$message = new Message("Slow. Aardvark crossing.");
$message2 = new Message("Happy 100th Birthday!");
```


Different objects created from the same class are independent entities. If you change the message in `$message`, it doesn’t affect the message in `$message2`. You can copy an object by using PHP’s `__clone` method, which I describe later in this appendix.

### Using methods

After you create the object and store it in a variable, you can use any method in the class, except private or protected methods, with statements of the following format:

```php
$message->displayMessage();
$message->changeMessage("Stop. Aardvark in crosswalk.");
```
Static methods can be used directly from outside the class, without creating an object first. The following example is a class with a static method:

class TestStatic
{
  static function writeMessage()
  {
    echo "I am a static method";
  }
}

You can access this method directly in your script with the following statement:

TestStatic::writeMessage();

**Accessing properties**

After you create an object, you can access the public properties with the following statements:

```php
$my_message->message;
$my_message2->message;
```

However, private and protected properties can’t be accessed this way. They can be accessed only from inside a class. It’s good programming practice to hide as much of your class as possible. Only make properties public that absolutely need to be public, which is seldom the case.

**Using Exceptions**

PHP provides an error-handling class called Exception that you can use to handle undesirable things that happen in your script. For example, in the Car class, you might keep track of the gas in the car and stop the car when it runs out of gas. You expect your program to detect 0 gallons and react. You don’t expect the gas in the gas tank to be a negative amount; you consider that to be an exception, and you want to be sure that won’t happen in your script. To deal with this, you can write a routine that uses the Exception class to watch for a negative gas amount. The following statements check for this situation:

```php
$gas = $gas - 5;
try
{
```
if ($this->gas < 0) {
    throw new Exception( "Negative amount of gas.");
}

catch (Exception $e) {
    echo $e->getMessage();
    echo "\n<br />\n";
    exit();
}

The preceding script contains a try block and a catch block:

- In the try block, you test a condition. If the condition is TRUE, you throw an exception — in other words, you create an Exception object. The Exception object has a property that stores the message you sent when you threw the exception.

- In the catch block, you catch the exception and call it $e. Then you execute the statements in the catch block. One of the statements is a call to a method called getMessage in the Exception class. The getMessage method returns the message that you stored, and your statement echoes the returned message. The statements then echo the end-of-line characters so the message is displayed correctly. The script stops on the exit statement.

If no exception is thrown, the catch block has nothing to catch, and it’s ignored. The script proceeds to the statements after the catch block.

### Copying Objects

PHP provides a method you can use to copy an object: __clone (with two underscores). If your class contains a __clone method, PHP uses the method to copy; if the class doesn’t contain a __clone method, PHP uses its default __clone method, which copies all the properties as is. As shown by the two underscores beginning its name, the clone method is a special method, and thus is called differently, as shown in the following example.

For example, you can write the following class:

class Car {
    private $gas = 0;
    private $color = "red";
    function addGas($amount) {
        $this->gas += $amount;
    }
}
Using this class, you can create an object and copy it as follows:

```php
$firstCar = new Car;
$firstCar->addGas(10);
$secondCar = clone $firstCar;
```

After these statements, you have two cars:

- **$firstCar**: This car is red and contains 10 gallons of gas. The 10 gallons were added with the `addGas` method.
- **$secondCar**: This car is red but contains 0 gallons of gas. The duplicate car is created by using the `__clone` method in the `Car` class. This method sets `$gas` to 0 and doesn’t set `$color` at all.

If you didn’t have a `__clone` method in the `Car` class, PHP would use a default `__clone` method that would copy all the properties, making `$secondCar` both red and containing 10 gallons of gas.

### Destroying Objects

You can create and destroy an object with the following statements:

```php
$myCar = new Car;
unset($myCar);
```

After `$myCar` is unset, the object no longer exists.

PHP provides a method that is automatically run when an object is destroyed: `__destruct`. For example, the following class contains a `__destruct` method:

```php
class Tower
{
    function __destruct()
    {
        echo "The tower is destroyed";
    }
}
```

When you destroy the object with an `unset` statement, the `__destruct` method runs, and the output is echoed. The `__destruct` method is not required.

### Using Abstract Classes

PHP allows you to use *abstract methods* — patterns that specify the methods to be used and the information to be passed, but don’t contain any code. Any class that contains an abstract method must be declared abstract. An abstract class can contain both abstract methods and methods that are not abstract. You define an abstract class with a keyword, as follows:

```php
abstract class Message
{
    protected $messageContent;
    function __construct($text)
    {
        $this->messageContent = $text;
    }
    abstract public function displayMessage($color);
}
```

An object can’t be created from an abstract class. The function of an abstract class is to serve as a parent for one or more child classes. The abstract class specifies the methods, including abstract methods that contain no code. The following two child classes actually implement the `displayMessage` method:

```php
class BiggestMessage extends Message
{
    public function displayMessage($color)
    {
        echo "<h1 style="color: $color">\n            $this->messageContent</h1>";
    }
}
class BigMessage extends Message
{
    public function displayMessage($color)
    {
        echo "<h2 style="color: $color">\n            $this->messageContent</h2>";
    }
}
```

Notice that the child classes do not contain a constructor. When an object is created from either child class, the constructor from the parent class is used. Both child classes must implement the abstract method specified in the parent class. If `displayMessage` is not included in a child class, a fatal error occurs. Notice that the implementation of `displayMessage` is different in
each class, specifying different sized text. However, because the abstract method in the parent class specifies one argument ($color) for the method, the child classes must implement the abstract method with one argument.

Notice that the child classes can access the $messageContent property in the parent class. A child class can access a protected property. If the property were private, the child class would get an error message when trying to access it.

### Using Interfaces

Interfaces, like abstract classes, can’t be instantiated. Interfaces differ from abstract classes in that all methods in an interface must be abstract. You define an interface as follows:

```php
interface Moveable
{
    abstract public function moveForward($distance);
}
```

Then suppose you have a `Car` class as follows:

```php
Class Car
{
    protected $gas = 0;
    function __construct()
    {
        $this->gas = 10;
    }
}
```

You can create a subclass as follows:

```php
Class Sedan extends Car implements Moveable
{
    public function moveForward($distance)
    {
        $this->gas = $this->gas - $distance * $mileage;
    }
}
```

When a `Sedan` object is created, it adds 10 gallons to $gas as coded in its parent, the `Car` class. It also implements the `Moveable` interface, which means it must implement a moveForward method that accepts one parameter.

You can implement more than one interface by using the following format:

```php
Class Baby implements Feedable, Washable, Changeable
```
Testing an Object

You can test an object to determine its class by using the `instanceof` operator, as follows:

```php
if( $myCar instanceof Car )
    echo "It's a car!";
```

This statement returns `TRUE` whether `$myCar` is a `Car` or is created by a child class of `Car`, such as when `$myCar` is a `Sedan`.

Object-Oriented Concepts That PHP 5 Omits

If you're familiar with object-oriented programming in other languages, you might find that some features you're accustomed to using aren't available in PHP 5:

- **Polymorphism**: PHP doesn't allow more than one method, even a constructor, to have the same name in a class. Therefore, you can't implement polymorphism as you're used to doing. You can't have two or more methods with the same name in the same class that accept different types or numbers of variables. Some people use switches and other mechanisms to implement the functionality of polymorphism.

- **Multiple inheritance**: PHP doesn't allow multiple inheritance. A class can only inherit from one parent class.
Appendix C
The MySQL and MySQL Improved Extensions

PHP interacts with MySQL by using built-in functions. Currently, PHP provides two sets of functions for use when accessing MySQL databases: the MySQL extension (mysql) and the MySQL Improved extension (mysqli).

The MySQL extension is enabled automatically when PHP 4 is installed. The functions provided by this extension have the format

```
mysql_action(parameters);
```

where `action` is the part of the function name that indicates what the function does, and `parameters` are the parameters that the function requires. For instance, the following is a typical function:

```
$connect = mysql_connect($host,$user,$password);
```

The function connects to the MySQL server and returns a connection that is stored in `$connect`.

The MySQL extension isn’t enabled automatically when you install PHP 5. You need to activate it yourself, as described in the installation instructions provided on the PHP Web site (www.php.net).

The MySQL extension can interact with MySQL versions 4.0 and 4.1. However, several additional features were added with MySQL 4.1. To take advantage of the new features, you must use the MySQL Improved extension. You activate mysqli, instead of mysql, when installing PHP 5. The functions provided by this extension have a similar format:

```
mysqli_action(parameters);
```

The beginning of the function name is mysqli, rather than mysql. Parameters are also passed to the mysqli functions. In some cases, the syntax is the same, such as for the following function:

```
$connect = mysqli_connect($host,$user,$password);
```
However, for some functions the syntax is slightly different, as shown in the following two functions:

```php
mysql_select_db($dbname, $connect);
mysqli_select_db($connect, $dbname);
```

Notice that the parameters are in a different order.

The MySQL Improved extension also provides objects for those who prefer object-oriented programming. Basically, it provides two objects with several methods available. The two objects used in the applications in this book are:

```php
$connect = new mysqli($host, $user, $password);
$result = $connect->query("SELECT * FROM Test_table");
```

$connect is an object that represents a connection to the MySQL server.
$result is an object that contains the results from an SQL query. Both objects have several methods. For instance, as shown in the preceding code, query is a method in the mysqli class, used in the second line to return the $result object. You can see a complete list of all the objects and queries available in the mysqli extension at [www.php.net/manual/en/ref.mysqli.php](http://www.php.net/manual/en/ref.mysqli.php).

In this book, I use mysqli functions in the procedural programs and mysqli objects in the object-oriented programs. You can convert any script to use a different method of interacting with MySQL. For instance, if you prefer to use PHP 4, you can enable the mysql extension and convert the functions to mysql functions.

The following two tables show the differences in syntax for statements used in the applications in this book. The tables assume that the parameters are passed in variables. For instance, the connection to the MySQL server is stored in a variable named $connect, as shown previously in this section. The results of a query are stored in a variable named $result.

Table C-1 compares mysql and mysqli functions. Table C-2 compares mysqli functions with mysqli methods.

### Table C-1 Syntax for mysql and mysqli Functions

<table>
<thead>
<tr>
<th>mysql Function</th>
<th>mysqli Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>mysql_connect($host, $user, $passwd)</td>
<td>mysqli_connect($host, $user, $passwd)</td>
</tr>
<tr>
<td>mysql_errno() or mysql_errno($connect)</td>
<td>mysqli_errno($connect)</td>
</tr>
<tr>
<td>mysql_error() or mysql_error($connect)</td>
<td>mysqli_error($connect)</td>
</tr>
<tr>
<td><strong>mysql Function</strong></td>
<td><strong>mysqli Function</strong></td>
</tr>
<tr>
<td>------------------------------------</td>
<td>--------------------------------------</td>
</tr>
<tr>
<td>mysql_fetch_array($result)</td>
<td>mysqli_fetch_array($result)</td>
</tr>
<tr>
<td>mysql_fetch_assoc($result)</td>
<td>mysqli_fetch_assoc($result)</td>
</tr>
<tr>
<td>mysql_fetch_row($result)</td>
<td>mysqli_fetch_row($result)</td>
</tr>
<tr>
<td>mysql_insert_id($connect)</td>
<td>mysqli_insert_id($connect)</td>
</tr>
<tr>
<td>mysql_num_rows($result)</td>
<td>mysqli_num_rows($connect)</td>
</tr>
<tr>
<td>mysql_query($sql) or</td>
<td>mysqli_query</td>
</tr>
<tr>
<td>mysql_query($sql, $connect)</td>
<td>($connect, $sql)</td>
</tr>
<tr>
<td>mysql_select_db($dbname)</td>
<td>mysqli_select_db</td>
</tr>
<tr>
<td></td>
<td>($connect, $dbname)</td>
</tr>
</tbody>
</table>

**Table C-2** | **mysqli Functions and Object-Oriented Statements**

<table>
<thead>
<tr>
<th><strong>mysqli Function</strong></th>
<th><strong>mysqli Method or Property</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>mysqli_connect($host, $user, $passwd)</td>
<td>new mysqli($host, $user, $passwd)</td>
</tr>
<tr>
<td>mysqli_errno($connect)</td>
<td>$connect-&gt;errno</td>
</tr>
<tr>
<td>mysqli_error($connect)</td>
<td>$connect-&gt;error</td>
</tr>
<tr>
<td>mysqli_fetch_array($result)</td>
<td>$result-&gt;fetch_array()</td>
</tr>
<tr>
<td>mysqli_fetch_assoc($result)</td>
<td>$result-&gt;fetch_assoc()</td>
</tr>
<tr>
<td>mysqli_fetch_row($result)</td>
<td>$result-&gt;fetch_row()</td>
</tr>
<tr>
<td>mysqli_insert_id($connect)</td>
<td>$connect-&gt;insert_id</td>
</tr>
<tr>
<td>mysqli_num_rows($result)</td>
<td>$result-&gt;num_rows</td>
</tr>
<tr>
<td>mysqli_query($connect, $sql)</td>
<td>$connect-&gt;query($sql)</td>
</tr>
<tr>
<td>mysqli_select_db($connect, $dbname)</td>
<td>$connect-&gt;select_db($dbname)</td>
</tr>
</tbody>
</table>

Note that some items in the object-oriented column do not have parentheses () at the end of the statement. This means that those items are properties, not methods. Thus, they are used as variables, as in the following:

```php
echo $connect->error;
```
Appendix D

About the CD

I’ve included a CD to provide you with all the source code that I present in the book. I wanted to save you all that typing. And because I had the CD anyway, I decided to stick in a list of links to PHP and MySQL sites that I think you’ll find useful. In this appendix, I describe the computer requirements for using the CD. I also tell you about the material you can find on the CD and how to access that material. I end the appendix with a brief troubleshooting section that I hope you won’t need.

System Requirements

Make sure that your computer meets the minimum system requirements shown in the following list. If your computer doesn’t match up to most of these requirements, you might have problems using the files on the CD. For the latest and greatest information, please refer to the ReadMe file located at the root of the CD-ROM.

- A PC with a Pentium or faster processor, or a Mac OS computer with a Power PC-based or faster processor
- Microsoft Windows 98 or later, or Mac OS system software 8.5 or later, or Linux OS
- At least 32MB of total RAM installed on your computer, but for best performance, at least 64MB of RAM
- A CD-ROM drive
- A monitor capable of displaying at least 256 colors or grayscale
- A modem with a speed of at least 14,400 bps

If you need more information on the basics, check out these books published by Wiley: *PCs For Dummies*, 9th Edition, by Dan Gookin; *Macs For Dummies*, 8th Edition, by David Pogue; *iMacs For Dummies*, 4th Edition by Mark L. Chambers;
Using the CD

To install the items from the CD to your hard drive, follow these steps.

**Note for Linux Users:** Mount the CD and browse to the Author directory on the CD to access the source code files.

1. **Insert the CD into your computer’s CD-ROM drive.**
   
   The license agreement appears.

   **Note to Windows users:** The interface won’t launch if you have autorun disabled. In that case, choose Start ➤ Run. In the dialog box that appears, type `D:\start.exe`. (Replace D with the proper letter if your CD-ROM drive uses a different letter. If you don’t know the letter, see how your CD-ROM drive is listed under My Computer.) Click OK.

   **Note for Mac Users:** When the CD icon appears on your desktop, double-click the icon to open the CD, and then double-click the Start icon.

2. **Read through the license agreement, and then click the Accept button if you want to use the CD.**

   After you click Accept, the License Agreement window won’t appear again.

   The CD interface appears. The interface allows you to install the programs and run the demos with just a click of a button (or two).

What You Can Find on the CD

The following sections are arranged by category and provide a summary of the files you can find on the CD. If you need help with installing the items provided on the CD, refer to the installation instructions in the preceding section.

**Source code files**

All the application code in this book is located in the Author directory on the CD. The source code files provided will work with PHP on Macintosh, Linux,
UNIX, Windows 98/NT/2000/XP, and many other operating systems. These files contain all the application code from the book. The structure of the code directory is

Author/Authentication/Procedural
Author/Authentication/00

Author/Login/Procedural
Author/Login/00

Author/Catalog/Procedural
Author/Catalog/00

Author/ShoppingCart/Procedural
Author/ShoppingCart/00

Author/CMS/Procedural
Author/CMS/00

Author/Forum/Procedural
Author/Forum/00

Author/MailingList/Procedural

**Links to useful PHP and MySQL information**

In addition to all the source code files on the CD, you can also find a list of links that will take you to Web sites containing additional information about PHP and MySQL.

I describe each of the following sites in Chapter 10:

- http://zend.com
- www.sourceforge.net
- http://weberdev.com
- www.phpclasses.org
- http://codewalkers.com
- www.phpbuilder.com
- www.hotscripts.com
- www.phpfreaks.com
- http://px.sklar.com
- www.oinko.net/freephp
The following three sites wouldn’t fit into Chapter 10, but they’re useful, so I include them on the CD, too:

- http://janet.valade.com: My Web site, where you can find any errors or updates to the application code.

A bonus chapter

The bonus chapter on the CD covers building an application that manages mailing lists. A mailing list is essentially a group of recipients. When you send a message to a mailing list, the message is distributed to each recipient. A polite, well-behaved mailing list application asks you to voluntarily subscribe before it sends any messages to you. (An impolite application simply gathers a collection of e-mail addresses and sends annoying advertisements to each recipient.) The mailing list application that I develop in this bonus chapter is a polite one. Users subscribe/unsubscribe themselves from the mailing lists and can send messages only to lists that they are subscribed to.

In addition, the application stores an archive of every message and a copy of every attachment. Users can look at any message and attachment in the archive. In addition to the features provided to all users, the application recognizes a special type of user — an administrator, who has special privileges. The administrator can create new mailing lists, send e-mail to a list that he or she is not subscribed to, and purge old messages.

The code for this application is provided on the CD, along with the code from the other chapters. However, although the other chapters provide both procedural and object-oriented code, this chapter presents only a procedural application. The bonus chapter contains some code that is a little more advanced than the code in the other chapters. You might view this application as intermediate, rather than introductory. However, the chapter provides plenty of detailed explanation for the code. I give you all the information you need to understand the code.

Troubleshooting

If any source code programs on the CD fail with error messages when run in your PHP/MySQL environment, check my Web site for information. The Web
site provides information and corrections for problems or errors reported by readers. Corrected and updated versions of files might be available (http://janet.valade.com).

**Customer Care:** If you have trouble with the CD-ROM, please call the Wiley Product Technical Support phone number at (800) 762-2974. Outside the United States, call (317) 572-3994. You can also contact Wiley Product Technical Support at www.wiley.com/techsupport. John Wiley & Sons provide technical support only for installation and other general quality control items. For technical support on the applications themselves, consult the program’s vendor or author.

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abstract classes, 403–404
abstraction, 387–388
accessing
methods, 395–396, 399–400
MySQL databases, 33–34
MySQL from PHP scripts, 37
properties, 395–396
Account class (HTTP authentication application)
code, 66–68
comparePassword method, 69–70
constructor, 68–69
properties, 66
selectAccount method, 69
Account class (user login application)
comparePassword method, 112
constructor, 111
createNewAccount method, 112–114
getMessage method, 112
selectAccount method, 111
accounts (MySQL)
creating, 35–36
modifying, 35
passwords, 35–36
permissions, 35
root, 35
activating MySQL, 12–13
addCart method, 220
AddField method, 327
addItem method, 214
addslashes function, 39
Admin-00.php script, 303–307
Admin.php script, 269–274
AllowOverride Authconfig directive, 50
AllowOverride None directive, 50
Apache Web server
configuration file, 49
encryption, 41
.htaccess file, 50–51
HTTP authentication, 49–52
password file, 51
PHP, 53
security, 41
Security Sockets Layer (SSL), 41
application development
consistency in coding style, 376
constants, 376
discussion lists, 378
documentation, 378
PHP source code, 377
planning, 19–22, 375
readability of code, 376
resource planning, 21–22
reusable code, 377
schedule, 21
separating page layout from function, 377
testing code incrementally, 376
application scripts
accessing MySQL, 37
Admin-00.php, 303–307
Admin.php, 269–274
Auth-00.php, 73–76
Catalog-oo.php, 155–157
CompanyHome-00.php, 294–300
CompanyHome.php, 253–262
error handling, 32–33
Login-00.php, 119–125, 293
login.php, 92–100, 246–249
Orders-oo.php, 224–230
outside sources, 25–30
postMessage-00.php, 361–363
postMessage.php, 339–342
postReply-00.php, 364–368
postReply.php, 342–345
ProcessOrder.php, 200–207
ShopCatalog.php, 193–194, 196–197
ShoppingCart.php, 197–200
system calls, 31–32
viewForums-00.php, 359–360
viewForums.php, 337–338
viewThread-00.php, 361
viewThread.php, 338–339
viewTopic-00.php, 360
viewTopic.php, 338
applications
content management system (CMS), 235–236
HTTP authentication application, 52
mailing list application, 414
object-oriented code, 15–16
online catalog application, 131–132
procedural code, 15–16
shopping cart application, 159–161
user login application, 77–78
Web forum, 309
Arachnoid Web site, 17
Arachnophilia programming editor, 17
attributes (objects), 386–387
authentication. See HTTP authentication authentication application
Account object, 60, 66–70
Auth-OO.php script, 73–76
Database object, 60, 62–66
features, 52
functionality, 54
object-oriented code, 60–73
PasswordPrompter object, 60–62
procedural code, 56–60
user database, 54–56
WebPage object, 60, 71–73
welcome page, 59–60
AuthName section (.htaccess file), 50
Auth-OO.php script, 73–76
author control (Web forum), 336
author’s Web site, 414–415
AuthType section (.htaccess file), 50

• B •
backups for MySQL databases, 40–41
backward compatibility, 10
Barebones Web site, 17–18
BaseInfo class
code, 278–279
constructor, 279
description, 276
getConnection method, 279
getId method, 279
getName method, 279
properties, 278
BBCode, 372
BBEdit programming editor, 17
body control (Web forum), 336
bonus chapter (CD-ROM), 414
Brown, David William (An Introduction to Object-Oriented Analysis: Objects and UML in Plain English, 2nd Edition), 275
built-in functions
addslashes, 39
MySQL extension, 12–13, 407–409
MySQL Improved extension, 12–13, 407–409
strip_tags, 110, 222, 292, 359
trim, 110, 222, 292, 359

• C •
cart application
Add Items to Shopping Cart button, 167
Cancel Order button, 169
Catalog class, 208–210
confirmation of order Web page, 170
Continue Shopping button, 168–169
cookies, 161
credit card handling, 160
customer feedback, 161
customer login, 159–160, 231
database, 162–166
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
database, 162–166
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
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databases, 161
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dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
cookies, 161
credit card handling, 160
customer feedback, 161
customer login, 159–160, 231
datebase, 162–166
datebase class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161
database class, 216
databases, 161
dataflow, 161

ShoppingCart class, 212–215
ShoppingCart.php script, 197–200
shopping_product_page.inc file, 171–175
single_form.inc file, 182, 185–187
storing contents, 161
Submit Order button, 168–169
summary of order Web page, 169–170
summary_form.inc file, 188
summary_page.inc file, 190–192
table_page.inc file, 175, 177–179
table_page-oo.inc file, 179
Update Cart button, 168
View Shopping Cart button, 167
WebForm class, 221–222
WebPage class, 222
catalog application
Catalog class, 150–155, 157–158
Catalog-oo.php script, 155–157
database, 132–135
functionality, 131–132
functions_main.inc file, 148–149
index Web page, 136–140, 145
object-oriented code, 149–155
procedural code, 145–149
products Web page, 137, 140–145
Catalog class (catalog application)
adding functionality, 157–158
code, 150–153
constructor, 153–154
displayAllOfType method, 155
displayCategories method, 154
getAllofType method, 154
getCategoryAndTypes method, 154
properties, 150
selectCatalog method, 154
Catalog class (shopping cart application)
constructor, 208
getConnection method, 208
getName method, 208–210
getPrice method, 208–210
useDatabase method, 208
Catalog-oo.php script, 155–157
CD-ROM
bonus chapter, 414
helpful Web site links, 413–414
installing, 412
license agreement, 412
ReadMe file, 411
source code files, 412–413
system requirements, 411
technical support, 415
troubleshooting, 414–415
Chambers, Mark L. (iMacs For Dummies, 4th Edition), 411–412
checkAddress method, 110
checkEmail method, 110
checkForBlanks method (WebForm class)
content management system, 292
shopping cart application, 222
user login application, 108
Web forum application, 358
checkName method, 110
checkPhone method, 110
checkState method, 110
checkZip method, 110
child classes, 388–389
class files, 13
class statement
accessing methods/properties, 395–396
class code, 392
constructor, 396–397
format, 391
methods, 394–395
naming classes, 392
properties, 392–394
classes
abstract classes, 403–404
Account class (HTTP authentication application), 66–70
Account class (user login application), 111–114
BaseInfo class, 276, 278–279
Catalog class (catalog application), 150–155
Catalog class (shopping cart application), 208–210
child classes, 388–389
ContentDownload class, 276, 289–291
ContentItem class, 276, 283–289
ContentType class, 276, 282–283
Database class (content management system), 276, 292
Database class (HTTP authentication application), 62–66
Database class (shopping cart application), 216
Database class (user login application), 110–111
Database class (Web forum application), 357–358
defined, 386
Department class, 275–276, 279–281
Email class (shopping cart application), 223
Email class (user login application), 117–119
classes (continued)
Exception class, 400–401
inheritance, 398–399
instantiation, 390
Item class, 210–212
master class, 388
methods, 387, 394–395, 399–400
naming, 392
Order class, 216–221
parent class, 388
PasswordPrompter class, 61–62
Post class, 355–357
properties, 400
Session class, 114–117
ShoppingCart class, 212–215
subclasses, 388–389
TableAccessor class, 349–353
Thread class, 353–354
WebForm class (content management system), 276, 292
WebForm class (shopping cart application), 221–222
WebForm class (user login application), 102–110
WebForm class (Web forum application), 358–359
WebPage class (HTTP authentication application), 71–73
WebPage class (shopping cart application), 222
CMS (content management system)
Admin-00.php script, 303–307
Admin.php script, 269–274
BaseInfo class, 276, 278–279
CompanyHome-00.php script, 294–300
CompanyHome.php script, 253–262
company.inc file, 262–265
company-00.inc file, 301–303
content detail Web page, 243, 245–246
content list Web page, 243, 245
content types, 235–236
ContentDownload class, 276, 289–291
content_form.inc file, 266–268, 294, 303
ContentType class, 276, 283–289
ContentType class, 276, 282–283
database, 236–243
Database class, 276, 292
defined, 235
Department class, 275–276, 279–281
department Web page, 243–244
double_form.inc file, 249–252
enhancements, 307
fields_content.inc file, 265–266, 294, 303
home Web page, 243–244
intranet, 236
keyword search, 307
login Web page, 243–244
Login-00.php script, 293
login.php script, 246–249
paging navigation, 307
permissions, 236
uploading files, 236
WebForm class, 276, 292
code. See also PHP source code
Account class (HTTP authentication application), 66–68
BaseInfo class, 278–279
Catalog class (catalog application), 150–153
consistency, 376
constants, 376
ContentDownload class, 289–291
ContentType class, 284–288
ContentType class, 282–283
customizations, 1–2
Database class (HTTP authentication application), 62–64
Database class (user login application), 110
Department class, 280–281
Email class, 117–118
Item class, 210–211
object-oriented code, 15–16
Order class, 216–219
PasswordPrompter class, 61
Post class, 355–357
procedural code, 15–16
readability, 376
reusable code, 377
separating page layout from function, 377
Session class, 114–115
ShoppingCart class, 212–214
TableAccessor class, 349–351
testing code incrementally, 376
Thread class, 353–354
WebForm class, 102–107
WebPage class (HTTP authentication application), 71–72
Codewalkers Web site, 380–381
CompanyHome-00.php script, 294–300
CompanyHome.php script, 253–262
company.inc file, 262–265
company-00.inc file, 301–303
comparePassword method, 69–70, 112
| Constants, 376 |
| Constructors |
| Account class (HTTP authentication application), 68–69, 111 |
| Account class (user login application), 111 |
| BaseInfo class, 279 |
| Catalog class (catalog application), 153–154 |
| Catalog class (shopping cart application), 208 |
| ContentDownload class, 291 |
| ContentItem class, 288 |
| ContentType class, 283 |
| Database class (content management system), 292 |
| Database class (HTTP authentication application), 64–65 |
| Database class (shopping cart application), 216 |
| Database class (user login application), 111 |
| Database class (Web forum application), 358 |
| Department class, 281 |
| Email class, 119 |
| Item class, 212 |
| names, 397 |
| Order class, 220 |
| PasswordPrompter class, 62 |
| PHP constraints/requirements, 396 |
| Session class, 114, 116 |
| ShoppingCart class, 214 |
| TableAccessor class, 351–352 |
| WebForm class (content management system), 292 |
| WebForm class (shopping cart application), 221 |
| WebForm class (user login application), 107 |
| WebForm class (Web forum application), 358 |
| WebPage class (HTTP authentication application), 72 |
| WebPage class (shopping cart application), 222 |
| Content management system (CMS) |
| Admin-00.php script, 303–307 |
| Admin.php script, 269–274 |
| BaseInfo class, 276, 278–279 |
| CompanyHome-00.php script, 294–300 |
| CompanyHome.php script, 253–262 |
| company.inc file, 262–265 |
| company-00.inc file, 301–303 |
| content detail Web page, 243, 245–246 |
| content list Web page, 243, 245 |
| content types, 235–236 |
| ContentDownload class, 276, 289–291 |
| content_form.inc file, 266–268, 294, 303 |
| ContentItem class, 276, 283–289 |
| ContentType class, 276, 282–283 |
| database, 236–243 |
| Database class, 276, 292 |
| defined, 235 |
| Department class, 275–276, 279–281 |
| department Web page, 243–244 |
| double_form.inc file, 249–252 |
| enhancements, 307 |
| fields_content.inc file, 265–266, 294, 303 |
| home Web page, 243–244 |
| intranet, 236 |
| keyword search, 307 |
| login Web page, 243–244 |
| Login-00.php script, 293 |
| login.php script, 246–249 |
| paging navigation, 307 |
| permissions, 236 |
| uploading files, 236 |
| WebForm class, 276, 292 |
| ContentDownload class |
| code, 289–291 |
| constructor, 291 |
| delete method, 291 |
| description, 276 |
| findByContentId method, 291 |
| findById method, 291 |
| properties, 289 |
| save method, 291 |
| content_form.inc file, 266–268, 294, 303 |
| ContentItem class |
| code, 284–288 |
| constructor, 288 |
| delete method, 288 |
| description, 276 |
| findByDeptType method, 288 |
| findById method, 288 |
| getContentType method, 288 |
| getContentDate method, 288 |
| getItemCountItem method, 289 |
| getCreationDate method, 288 |
| getLastUpDate method, 288 |
| getLastUpdBy method, 288 |
| properties, 283–284 |
| save method, 288 |
| setContentDate method, 288 |
| setCreationDate method, 288 |
| setDescription method, 288 |
| setLastUpdBy method, 288 |
| ContentItem class |
| code, 282–283 |
| constructor, 283 |
Content Type class (continued)
description, 276
findAll method, 283
findById method, 283
properties, 282
controls (Web forum)
author, 336
body, 336
freplyto, 337
fresponse, 336
fsubject, 337
conventions used for PHP code, 1–2
cookies
customer information, 30
shopping cart application, 161
copying objects, 401–402
createNew method, 354
createNewAccount method, 112–114
createOrder method, 220
creating
.htaccess file, 50–51
MySQL accounts, 35–36
objects, 390, 399
password file, 51
credit card handling, 160
current directory, 14
customer feedback, 161
customer information
cookies, 30
databases, 30
security, 30–32
session variables, 30
text files, 30
customer login (shopping cart application), 159–160, 231

D

data definition language (DDL), 242
Database class (content management system)
constructor, 292
description, 276
getConnection method, 292
useDatabase method, 292
Database class (HTTP authentication application)
code, 62–64
constructor, 64–65
getConnection method, 65
properties, 63
useDatabase method, 65–66
Database class (shopping cart application), 216
Database class (user login application)
code, 110
constructor, 111
getConnection method, 111
useDatabase method, 111
Database class (Web forum application), 357–358
Database Management System (DBMS), 33
databases
accessing, 33–34
backups, 40–41
catalog database, 132–135
content management system (CMS), 236–243
customer information, 30
MySQL security database, 34–35
shopping cart application, 161–166
User database, 78–81
Web forum application, 311–317
DBMS (Database Management System), 33
DDL (data definition language), 242
delete method, 288, 291
Department class
code, 280–281
constructor, 281
description, 275–276
findById method, 281
getByld method, 281
getDescription method, 281
properties, 279
destroying objects, 402–403
directives
AllowOverride Authconfig, 50
AllowOverride None, 50
directories
current directory, 14
include directory, 14
discussion application
author control, 336
BBCode, 372
body control, 336
database, 311–317
Database class, 357–358
enhancements, 371–372
file uploads/downloads, 372
forum management, 372
Forums Web page, 317–318, 321–322
freplyto control, 337
fresponse control, 336
fssubject control, 337
functionality, 309
functions_main.inc file, 346, 368–369
functions_post.inc file, 346–347
functions_post-00.inc file, 369–371
messageFields.inc file, 331–332
messageForm.inc file, 331–334
Messages Web page, 317, 319, 328–330
New Message Web page, 317, 319–320, 331–334
Post class, 355–357
postMessage-00.php script, 361–363
postMessage.php script, 339–342
postReply-00.php script, 364–368
postReply.php script, 342–345
replyFields.inc file, 335–337
search tools, 372
security, 310
TableAccessor class, 349–353
Thread class, 353–354
threading, 371
threads, 309–310
Threads Web page, 317–318, 324–327
topics, 310
user registration/authentication, 371
viewForums.inc file, 321–323
viewForums-00.php script, 359–360
viewForums.php script, 337–338
viewThread.inc file, 328–330
viewThread-00.php script, 361
viewThread.php script, 338–339
viewTopic.inc file, 324–327
viewTopic-00.php script, 360
viewTopic.php script, 338
WebForm class, 358–359
discussion lists, 378
displayAllofType method, 155
displayCart method, 215
displayCategories method, 154
displayForm method (WebForm class)
  content management system, 292
  shopping cart application, 222
  user login application, 107
  Web forum application, 358
DisplayForumsHeader method, 323
displayOrderSummary method, 221
displayPage method, 73, 222
displayPrompt method, 62
DisplayThreadsHeader method, 327
DisplayTopics method, 324
documentation, 378
double_form.inc file
  shopping cart application, 249–252
  user login application, 83, 86–90
Dreamweaver MX, 19

• E •
editors
  Arachnophilia, 17
  BBEdit, 17
  common features, 17
demos, 16
  EditPlus, 17
  Emacs, 17
  HomeSite, 18
  HTML-Kit, 18
  TextWrangler, 18
  Vim, 18
  EditPlus programming editor, 17
  Emacs programming editor, 17
  Email class (shopping cart application), 223
  Email class (user login application)
    code, 117–118
    constructor, 119
    properties, 117
    sendEmail method, 119
    setAddr method, 119
    setMessage method, 119
    setSubj method, 119
  encryption, 41
  error handling, 32–33
  escaping quotes, 39–40
  Exception class, 400–401
  exceptions, 400–401

• F •
factory method, 276
fields_cart.inc file, 175–177
fields_cart-oo.inc file, 179–182
fields_content.inc file, 265–266, 294, 303
fields_login.inc file, 83–85
fields_products_page.inc file, 171–172
fields_ship_info.inc file, 182–184
fields_ship_info-oo.inc file, 184–185
fields_summary.inc file, 188–190
fields_summary-oo.inc file, 190
files
class files, 13
image files, 14
include files, 13–14
password-protected files, 47–48
PHP script files, 13
uploading files (CMS), 236
findAll method
    ContentType class, 283
    Department class, 281
findByContentId method, 291
findByDeptType method, 288
findById method
    ContentDownload class, 291
    ContentItem class, 288
    ContentType class, 283
    Department class, 281
finder methods, 276–277
forgotten passwords, 267–277
forms
    content management system, 276, 292
    shopping cart application, 221–222
    user login application, 102–110
    Web forum application, 358–359
forum application
    author control, 336
    BBCode, 372
    body control, 336
database, 311–317
    Database class, 357–358
    enhancements, 371–372
    file uploads/downloads, 372
    forum management, 372
    Forums Web page, 317–318, 321–322
    freplyto control, 337
    fresponse control, 336
    fssubject control, 337
functionality, 309
    functions_main.inc file, 346, 368–369
    functions_post.inc file, 346–347
    functions_post-00.inc file, 369–371
    messageFields.inc file, 331–332
    messageForm.inc file, 331–334
    Messages Web page, 317, 319, 328–330
    New Message Web page, 317, 319–320, 331–334
    Post class, 355–357
    postMessage-00.php script, 361–363
    postMessage.php script, 339–342
postReply-00.php script, 364–368
postReply.php script, 342–345
replyFields.inc file, 335–337
search tools, 372
security, 310
TableAccessor class, 349–353
Thread class, 353–354
threading, 371
threads, 309–310
Threads Web page, 317–318, 324–327
topics, 310
user registration/authentication, 371
viewForums.inc file, 321–323
viewForums-00.php script, 359–360
viewForums.php script, 337–338
viewThread.inc file, 328–330
viewThread-00.php script, 361
viewThread.php script, 338–339
viewTopic.inc file, 324–327
viewTopic-00.php script, 360
viewTopic.php script, 338
WebForm class, 358–359
Forums Web page, 317
Forums Web page (Web forum), 318, 321–322
Free PHP and MySQL Hosting Directory Web site, 382
freplyto control (Web forum), 337
fresponse control (Web forum), 336
fssubject control (Web forum), 337
functions
    addslashes, 39
    MySQL extension, 12–13, 407–409
    MySQL Improved extension, 12–13, 407–409
    strip_tags, 110, 222, 292, 359
    trim, 110, 222, 292, 359
functions_main.inc file
    online catalog application, 148–149
    Web forum application, 346, 368–369
functions_post.inc file, 346–347
functions_post-00.inc file, 369–371
getConnection method
BaseInfo class, 279
Catalog class, 208
Database class (content management system), 292
Database class (HTTP authentication application), 65
Database class (shopping cart application), 216
Database class (user login application), 111
Database class (Web forum), 358
TableAccessor class, 353
getContentPane method, 288
getContentItem method, 289
getCreationDate method, 288
getDescription method, 281
getId method, 279
getItemInfo method, 220–221
getLastUpDate method, 288
getLastUpdBy method, 288
getMessage method, 112, 116, 215, 353
getName method
BaseInfo class, 279
Catalog class, 208–210
Item class, 212
getOrderInfo method, 220
getPrice method
Catalog class, 208–210
Item class, 212
getQuantity method, 212
getter methods, 277
getValues method, 352
getVariable method, 116
Gookin, Dan (PCs For Dummies, 9th Edition), 411
GRANT queries, 35–36
group file (.htaccess file), 50

handling errors, 32–33
HomeSite programming editor, 18
hosted discussion application
author control, 336
BBCode, 372
body control, 336
database, 311–317
Database class, 357–358
enhancements, 371–372
file uploads/downloads, 372
forum management, 372
Forums Web page, 317–318, 321–322
freplyto control, 337
fresponse control, 336
fssubject control, 337
functionality, 309
functions_main.inc file, 346, 368–369
functions_post.inc file, 346–347
functions_post-00.inc file, 369–371
messageFields.inc file, 331–332
messageForm.inc file, 331–334
Messages Web page, 317, 319, 328–330
New Message Web page, 317, 319–320, 331–334
Post class, 355–357
postMessage-00.php script, 361–363
postMessage.php script, 339–342
postReply-00.php script, 364–368
postReply.php script, 342–345
replyFields.inc file, 335–337
search tools, 372
security, 310
TableAccessor class, 349–353
Thread class, 353–354
threading, 371
threads, 309–310
Threads Web page, 317–318, 324–327
topics, 310
user registration/authentication, 371
viewForums.inc file, 321–323
viewForums-00.php script, 359–360
viewForums.php script, 337–338
viewThread.inc file, 328–330
viewThread-00.php script, 361
viewThread.php script, 338–339
viewTopic.inc file, 324–327
viewTopic-00.php script, 360
viewTopic.php script, 338
WebForm class, 358–359
HotScripts Web site, 381
.htaccess file
AuthName section, 50
AuthType section, 50
creating, 50–51
group file, 50
passwords, 50
HTML controls (Web forum)
author, 336
body, 336
freplyto, 337
fresponse, 336
fssubject, 337
HTML-Kit programming editor, 18
HTTP authentication
Apache Web server, 49–52
behavior, 45
look and feel, 45
passwords, 46
HTTP authentication application
Account object, 60, 66–70
Auth-00.php script, 73–76
Database object, 60, 62–66
features, 52
functionality, 54
object-oriented code, 60–73
PasswordPrompter object, 60–62
procedural code, 56–60
user database, 54–56
WebPage object, 60, 71–73
welcome page, 59–60
HTTP headers, 46–47

I

IDE (Integrated Development Environment)
common features, 18–19
demos, 16
Dreamweaver MX, 19
Komodo, 19
PHPEdit, 19
Zend Studio, 19
iMacs For Dummies, 4th Edition (Mark L. Chambers), 411–412
image files, 14
include directory, 14
include files
company.inc file, 262–265
company-00.inc file, 301–303
content_form.inc file, 266–268, 294, 303
defined, 13–14
double_form.inc file, 83, 86–90, 249–252
fields_cart.inc file, 175–177
fields_cart-00.inc file, 179–182
fields_content.inc file, 265–266, 294, 303
fields_login.inc file, 83–85
fields_products_page.inc file, 171–172
fields_ship_info.inc file, 182–184
fields_ship_info-00.inc file, 184–185
fields_summary.inc file, 188–190
fields_summary-00.inc file, 190
functions_main.inc file, 148–149, 346, 368–369
functions_post.inc file, 346–347
functions_post-00.inc file, 369–371
location of, 13–14
messageFields.inc file, 331–332
messageForm.inc file, 331–334
replyFields.inc file, 335–337
shopping_product_page.inc file, 171–175
single_form.inc file, 182, 185–187
summary_form.inc file, 188
summary_page.inc file, 190–192
table_page.inc file, 175, 177–179
table_page-oo.inc file, 179
viewForums.inc file, 321–323
viewThread.inc file, 328–330
viewTopic.inc file, 324–327
index Web page (catalog), 136–140, 145
information hiding, 389–390
inheritance, 388–389, 398–399
installing CD-ROM, 412
instantiation, 390
Integrated Development Environment (IDE)
common features, 18–19
demos, 16
Dreamweaver MX, 19
Komodo, 19
Maguma, 19
PHPEdit, 19
Zend Studio, 19
interfaces, 404
intranet application
Admin-00.php script, 303–307
Admin.php script, 269–274
BaseInfo class, 276, 278–279
CompanyHome-00.php script, 294–300
CompanyHome.php script, 253–262
company.inc file, 262–265
company-00.inc file, 301–303
content detail Web page, 243, 245–246
content list Web page, 243, 245
content types, 235–236
ContentType class, 276, 289–291
content_form.inc file, 266–268, 294, 303
ContentItem class, 276, 283–289
ContentType class, 276, 282–283
database, 236–243
Database class, 276, 292
defined, 235
Department class, 275–276, 279–281
department Web page, 243–244
double_form.inc file, 249–252
enhancements, 307
fields_content.inc file, 265–266, 294, 303
home Web page, 243–244
keyword search, 307
login Web page, 243–244
Login-00.php script, 293
login.php script, 246–249
paging navigation, 307
permissions, 236
uploading files, 236
WebForm class, 276, 292
An Introduction to Object-Oriented Analysis: Objects and
UML in Plain English, 2nd Edition (David William
Brown), 275
inventory (shopping cart application), 231
Item class
code, 210–211
constructor, 212
getCatalogNumber method, 212
getName method, 212
getPrice method, 212
getQuantity method, 212
properties, 210

• K •

keyword search (content management system), 307
Komodo IDE, 19

• L •

LeBlanc, Dee-Ann (Linux For Dummies, 6th Edition), 412
license agreement (CD-ROM), 412
Linux For Dummies, 6th Edition (Dee-Ann LeBlanc), 412
literal characters (regular expressions), 28–29
login application
Account class, 101, 111–114
account management features, 127
Database class, 101, 110–111
double_form.inc file, 83, 86–90
Email class, 102, 117–119
features, 77
fields_login.inc file, 83–85
Forgotten password button, 126–127
functionality, 78
login Web page, 82–91
Login-00.php script, 119–125
login.php script, 92–100
object-oriented code, 101–119
procedural code, 91–100
Session class, 101–102, 114–117
session variables, 100–101, 126
User database, 78–81
WebForm class, 101–110
login method, 116–117
Login-00.php script
content management system (CMS), 293
user login application, 119–125
login.php script
content management system (CMS), 246–249
user login application, 92–100

• M •

Macromedia
Dreamweaver MX, 19
HomeSite, 18
Web site, 18–19
Macs For Dummies, 8th Edition (David Pogue), 411
magic quotes, 39–40, 98, 113
Maguma IDE, 19
mailing list application, 414
master class, 388
messageFields.inc file, 331–332
messageForm.inc file, 331–334
Messages Web page (Web forum), 317, 319, 328–330
methods
accessing, 395–396, 399–400
addCart, 220
AddField, 327
addItem, 214
checkAddress, 110
checkEmail, 110
checkForBlanks, 108, 222, 292, 358
checkName, 110
checkPhone, 110
checkState, 110
checkZip, 110
class statements, 394–395
comparePassword, 69–70, 112
createNew, 354
createNewAccount, 112–114
createOrder, 220
defined, 387
delete, 288, 291
displayAllOfType, 155
displayCart, 215
methods (continued)
displayCategories, 154
displayForm, 107, 222, 292, 358
DisplayForumsHeader, 323
displayOrderSummary, 221
displayPage, 73, 222
displayPrompt, 62
DisplayThreadsHeader, 327
DisplayTopics, 324
factory method, 276
findAll, 281, 283
findById, 281, 283, 288, 291
finder method, 276–277
getAllofType, 154
getCatalogNumber, 212
categoryAndTypes, 154
getConnection, 65, 111, 208, 216, 279, 292, 353, 358
getContentDate, 288
getContentItem, 289
getCreationDate, 288
description, 288
getId, 279
getItemInfo, 220–221
getLastUpDate, 288
getLastUpdBy, 288
setMessage, 119
setName, 288
setSubj, 119
getter methods, 277
getValues, 352
getVariable, 116
login, 116–117
postMessage, 357
postReply, 357
save, 288, 291
selectAccount, 69, 111
selectById, 352
selectById method, 357
selectOrder, 220
sendEmail, 119
setAddr, 119
setContentDate, 288
setCreationDate, 288
setDescription, 288
setFieldsNotRequired, 107
setLastUpdBy, 288
setMessage, 119
setName, 288
setSubj, 119
setter methods, 277
static methods, 276–277, 395
storeVariable, 116
updateCart, 215
updateOrderInfo, 221
updateReplies, 354
updateTimeStamp, 354
useDatabase, 65–66, 111, 208, 216, 292, 358
verifyData, 108–110, 222, 292, 358–359
modifying
MySQL accounts, 35
source code, 16
multiple inheritance, 405
MySQL
accessing from PHP scripts, 37
activating, 12–13
data definition language (DDL), 242
reserved words, 162
security, 33–35
MySQL accounts
creating, 35–36
modifying, 35
passwords, 35–36
permissions, 35
root, 35
MySQL databases
accessing, 33–34
backups, 40–41
catalog database, 132–135
content management system (CMS), 236–243
customer information, 30
MySQL security database, 34–35
shopping cart application, 161–166
User database, 78–81
Web forum application, 311–317
MySQL extension, 12–13, 407–409
MySQL Improved extension, 12–13, 407–409
MySQL versions
backward compatibility, 10
MySQL 4.0, 11
MySQL 4.1, 11
MySQL 5.0, 11
mysqldump utility, 40–41
\**N**

naming
- classes, 392
- constructors, 397

New Message Web page (Web forum), 319–320, 331–334

\**O**

object-oriented code, 15–16

object-oriented programming (OOP)
- abstract classes, 403–404
- abstraction, 387–388
- accessing methods, 399–400
- attributes, 386–387
- class statement, 391–394
- classes, 386
- constructor, 396–397
- copying objects, 401–402
- creating objects, 399
- defined, 385
- destroying objects, 402–403
- exceptions, 400–401
- information hiding, 389–390
- inheritance, 388–389, 398–399
- instantiation, 390
- interfaces, 404
- methods, 387, 394–395
- multiple inheritance, 405
- objects, 386
- polymorphism, 405
- properties, 386–387, 395
- testing objects, 405

objects
- attributes, 386–387
- copying, 401–402
- creating, 390, 399
- defined, 386
- destroying, 402–403
- methods, 387
- properties, 386–387
- testing, 405

online catalog application
- Catalog class, 150–155, 157–158
- Catalog-oo.php script, 155–157
- database, 132–135
- functionality, 131–132
- functions_main.inc file, 148–149
- index Web page, 136–140, 145

object-oriented code, 149–155

procedural code, 145–149

products Web page, 137, 140–145

online ordering application
- Add Items to Shopping Cart button, 167
- Cancel Order button, 169
- Catalog class, 208–210
- confirmation of order Web page, 170
- Continue Shopping button, 168–169
- cookies, 161
- credit card handling, 160
- customer feedback, 161
- customer login, 159–160, 231
- database, 162–166
- Database class, 216
- databases, 161
- Edit Shipping Information button, 169
- Email class, 223
- fields_cart.inc file, 175–177
- fields_cart-oo.inc file, 179–182
- fields_products_page.inc file, 171–172
- fields_ship_info.inc file, 182–184
- fields_ship_info-oo.inc file, 184–185
- fields_summary.inc file, 188–190
- fields_summary-oo.inc file, 190
- functionality, 161
- inventory, 231
- Item class, 210–212
- Order class, 216–221
- order tracking, 231
- Orders-oo.php script, 223–230
- PayPal, 160
- ProcessOrder.php script, 200–207
- product information Web page, 166–167
- purchasing methods, 160
- session variables, 161
- shipping fees, 160
- shipping form Web page, 168–169
- ShopCatalog.php script, 193–197
- shopping cart Web page, 168
- ShoppingCart class, 212–215
- ShoppingCart.php script, 197–200
- shopping_product_page.inc file, 171–175
- single_form.inc file, 182, 185–187
- storing contents, 161
- Submit Order button, 168–169
- summary of order Web page, 169–170
- summary_form.inc file, 188
- summary_page.inc file, 190–192
online ordering application (continued)
table_page.inc file, 175, 177–179
table_page-oo.inc file, 179
Update Cart button, 168
View Shopping Cart button, 167
WebForm class, 221–222
WebPage class, 222
OOP (object-oriented programming)
abstract classes, 403–404
abstraction, 387–388
accessing methods, 395–396, 399–400
attributes, 386–387
class statement, 391–394
classes, 386
constructor, 396–397
copying objects, 401–402
creating objects, 399
defined, 385
destroying objects, 402–403
exceptions, 400–401
information hiding, 389–390
inheritance, 388–389, 398–399
instantiation, 390
interfaces, 404
methods, 387
multiple inheritance, 405
objects, 386
polymorphism, 405
properties, 386–387, 395
testing objects, 405
Order class
addCart method, 220
code, 216–219
constructor, 220
createOrder method, 220
displayOrderSummary method, 221
getItemInfo method, 220–221
getOrderInfo method, 220
properties, 216
selectOrder method, 220
updateOrderInfo method, 221
order tracking (shopping cart application), 231
Orders-oo.php script, 223–230
outside information, 25–30

password file, creating, 51
PasswordPrompter class
code, 61–62
constructor, 62
displayPrompt method, 62
properties, 61
passwords
forgotten passwords, 126–127
.htaccess file, 50
HTTP authentication, 46
MySQL accounts, 35–36
password-protected files, 47–48
PayPal Web site, 160
PCs For Dummies, 9th Edition (Dan Gookin), 411
Perl-compatible regular expressions, 30
permissions
content management system (CMS), 236
MySQL accounts, 35
phone number for Wiley Product Technical Support, 415
PHP Builder Web site, 381
PHP Classes Web site, 380
PHP Freaks Web site, 382
PHP script files, 13
PHP scripts
accessing MySQL, 37
Admin-oo.php, 303–307
Admin.php, 269–274
Auth-oo.php, 73–76
Catalog-oo.php, 155–157
CompanyHome-oo.php, 294–300
CompanyHome.php, 253–262
error handling, 32–33
Login-oo.php, 119–125, 293
login.php, 92–100, 246–249
Orders-oo.php, 223–230
outside sources, 25–30
postMessage-oo.php, 361–363
postMessage.php, 339–342
postReply-oo.php, 364–368
postReply.php, 342–345
ProcessOrder.php, 200–207
ShopCatalog.php, 193–194, 196–197
ShoppingCart.php, 197–200
system calls, 31–32
viewForums-oo.php, 359–360
viewForums.php, 337–338
viewThread-oo.php, 361
viewThread.php, 338–339

• P •

paging navigation (content management system), 307
parent class, 388
viewTopic-00.php, 360
viewTopic.php, 338

PHP source code
application development, 377
CD-ROM, 412–413
class files, 13
Codewalkers Web site, 380–381
conventions, 1–2
Free PHP and MySQL Hosting Directory Web site, 382
HotScripts Web site, 381
include files, 13–14
modifying, 16
PHP Builder Web site, 381
PHP Classes Web site, 380
PHP Freaks Web site, 382
PHP script files, 13
PX Web site, 382
SourceForge.net Web site, 379
WeberDev Web site, 380
Zend Web site, 381–382

PHP versions
backward compatibility, 10
PHP 4, 11–12
PHP 5, 11–12
PHPEdit, 19
planning for application development, 19–22, 375
Pogue, David (Macs For Dummies, 8th Edition), 411

polymorphism, 405
Post class
code, 355–356
postMessage method, 357
postReply method, 357
selectByID method, 357
postMessage method, 357
postMessage-00.php script, 361–363
postMessage.php script, 339–342
postReply method, 357
postReply-00.php script, 364–368
postReply.php script, 342–345
private properties, 393
procedural code, 15–16
ProcessOrder.php script, 200–207
product catalog application
Catalog class, 150–155, 157–158
Catalog-00.php script, 155–157
database, 132–135
functionality, 131–132
functions_main.inc file, 148–149
index Web page, 136–140, 145
object-oriented code, 149–155
procedural code, 145–149
products Web page, 137, 140–145
product inventory (shopping cart application), 231
programming editors
Arachnophilia, 17
BBEdit, 17
common features, 17
demos, 16
EditPlus, 17
Emacs, 17
HomeSite, 18
HTML-Kit, 18
TextWrangler, 18
Vim, 18

properties
accessing, 395–396
Account class, 66
BaseInfo class, 278
Catalog class, 150
class statements, 392–395
ContentDownload class, 289
ContentItem class, 283–284
ContentType class, 282
Database class, 63
defined, 386–387
Department class, 279
Email class, 117
Item class, 210
Order class, 216
PasswordPrompter class, 61
private properties, 393
public properties, 392–393
Session class, 114
ShoppingCart class, 212
TableAccessor class, 349
values, 394
WebForm class, 102
WebPage class, 71

public properties, 392–393
publishing system
Admin-00.php script, 303–307
Admin.php script, 269–274
BaseInfo class, 276, 278–279
CompanyHome-00.php script, 294–300
CompanyHome.php script, 253–262
company.inc file, 262–265
company-00.inc file, 301–303
content detail Web page, 243, 245–246
resource planning for application development, 21–22
restricted access to Web sites, 77
reusable code, 377
root account (MySQL), 35

save method, 288, 291
schedule for application development, 21
scripts
accessing MySQL, 37
Admin-00.php, 303–307
Admin.php, 269–274
Auth-00.php, 73–76
Catalog-oo.php, 155–157
CompanyHome-00.php, 294–300
CompanyHome.php, 253–262
error handling, 32–33
Login-00.php, 119–125, 293
login.php, 92–100, 246–249
Orders-oo.php, 223–230
outside sources, 25–30
postMessage-00.php, 361–363
postMessage.php, 339–342
postReply-00.php, 364–368
postReply.php, 342–345
ProcessOrder.php, 200–207
ShopCatalog.php, 193–194, 196–197
ShoppingCart.php, 197–200
system calls, 31–32
viewForums-00.php, 359–360
viewForums.php, 337–338
viewThread-00.php, 361
viewThread.php, 338–339
viewTopic-00.php, 360
viewTopic.php, 338
search tools (Web forum), 372
security
customer information, 30–32
DBMS (Database Management System), 33
error handling, 32–33
importance of, 23
MySQL, 33–35
outside information, 25–30
secure Web servers, 41
SQL injection attack, 38–40
Web forum, 310
Web servers, 41
Web sites, 23–24

MySQL, 33–35
outside information, 25–30
secure Web servers, 41
SQL injection attack, 38–40
Web forum, 310
Web servers, 41
Web sites, 23–24
Security Sockets Layer (SSL), 41
selectAccount method, 69, 111
selectByID method
  Post class, 357
  TableAccessor class, 352
selectOrder method, 220
sendEmail method, 119
separating page layout from function, 377
Session class
  code, 114–115
  constructor, 116
  getMessage method, 116
  getVariable method, 116
  login method, 116–117
  properties, 114
  storeVariable method, 116
session variables
  customer information, 30
  shipping cart application, 161
  user login application, 100–101, 126
setAddr method, 119
setContentDate method, 288
setCreationDate method, 288
setDescription method, 288
setFieldsNotRequired method, 107
setLastUpdBy method, 288
setMessage method, 119
setName method, 288
setSubj method, 119
setter methods, 277
shipping fees (shopping cart application), 160
ShopCatalog.php script, 193–197, 196–197
shopping cart application
  Add Items to Shopping Cart button, 167
  Cancel Order button, 169
  Catalog class, 208–210
  confirmation of order Web page, 170
  Continue Shopping button, 168–169
cookies, 161
credit card handling, 160
customer feedback, 161
customer login, 159–160, 231
database, 162–166
Database class, 216
databases, 161
Edit Shipping Information button, 169
Email class, 223
fields_cart-oo.inc file, 179–182
fields_products_page.inc file, 171–172
fields_ship_info.inc file, 182–184
fields_ship_info-oo.inc file, 184–185
fields_summary.inc file, 188–190
fields_summary-oo.inc file, 190
functionality, 161
inventory, 231
Item class, 210–212
Order class, 216–221
order tracking, 231
Orders-oo.php script, 223–230
PayPal, 160
ProcessOrder.php script, 200–207
product information Web page, 166–167
purchasing methods, 160
session variables, 161
shipping fees, 160
shipping form Web page, 168–169
ShopCatalog.php script, 193–197
shopping cart Web page, 168
ShoppingCart class, 212–215
ShoppingCart.php script, 197–200
shopping_product_page.inc file, 171–175
single_form.inc file, 182, 185–187
storing contents, 161
Submit Order button, 168–169
summary of order Web page, 169–170
summary_form.inc file, 188
summary_page.inc file, 190–192
table_page.inc file, 175, 177–179
table_page-oo.inc file, 179
Update Cart button, 168
View Shopping Cart button, 167
WebForm class, 221–222
WebPage class, 222
ShoppingCart class
  addItem method, 214
code, 212–214
constructor, 214
displayCart method, 215
getAllItems method, 215
getMessage method, 215
properties, 212
updateCart method, 215
ShoppingCart.php script, 197–200
shopping_product_page.inc file, 171–175
single_form.inc file, 182, 185–187
source code
  application development, 377
  CD-ROM, 412–413
class files, 13
Codewalkers Web site, 380–381
conventions, 1–2
Free PHP and MySQL Hosting Directory Web site, 382
HotScripts Web site, 381
include files, 13–14
modifying, 16
PHP Builder Web site, 381
PHP Classes Web site, 380
PHP Freaks Web site, 382
PHP script files, 13
PX Web site, 382
SourceForge.net Web site, 379
WeberDev Web site, 380
Zend Web site, 381–382
SourceForge.net Web site, 379
special characters (regular expressions), 28–29
SQL injection attack, 38–40
SSL (Security Sockets Layer), 41
static methods, 276–277, 395
status line (Web servers), 47
storeVariable method, 116
strip_tags function, 110, 222, 292, 359
subclasses, 388–389
summary_form.inc file, 188
summary_page.inc file, 190–192
syntax
  MySQL extension, 408–409
  MySQL Improved extension, 407–409
system calls, 31–32
system requirements for CD-ROM, 411

T

TableAccessor class
  code, 349–351
  constructor, 351–352
  getConnection method, 353
  getMessage method, 353
  getValues method, 352
  properties, 349
  selectByID method, 352
  table_page.inc file, 175, 177–179
  table_page-oo.inc file, 179
technical support for CD-ROM, 415

U

updateCart method, 215
updateOrderInfo method, 221
updateReplies method, 354
updateTimeStamp method, 354
uploading files
  content management system, 236
  Web forum, 372
useDatabase method
  Catalog class, 208
  Database class (content management system), 292
  Database class (HTTP authentication application), 65–66
  Database class (shopping cart application), 216
  Database class (user login application), 111
user login application
  Account class, 101, 111–114
  account management features, 127
  Database class, 101, 110–111
  double_form.inc file, 83, 86–90
  Email class, 102, 117–119
  features, 77
  fields_login.inc file, 83–85
  Forgotten password button, 126–127
  functionality, 78
  login Web page, 82–91
  Login-00.php script, 119–125
  login.php script, 92–100
object-oriented code, 101–113, 115–119
procedural code, 91–100
Session class, 101–102, 114–117
session variables, 100–101, 126
User database, 78–81
WebForm class, 101–110

values of properties, 394
verifyData method (WebForm class)
content management system, 292
shopping cart application, 222
user login application, 108–110
Web forum application, 358–359
versions of MySQL
  backward compatibility, 10
MySQL 4.0, 11
MySQL 4.1, 11
MySQL 5.0, 11
versions of PHP
  backward compatibility, 10
PHP 4, 11–12
PHP 5, 11–12
viewForums.inc file, 321–323
viewForums-00.php script, 359–360
viewForums.php script, 337–338
viewThread.inc file, 328–330
viewThread-00.php script, 361
viewThread.php script, 338–339
viewTopic.inc file, 324–327
viewTopic-00.php script, 360
viewTopic.php script, 338
Vim programming editor, 18

Web forum application
  author control, 336
BBCode, 372
body control, 336
database, 311–317
Database class, 357–358
enhancements, 371–372
file uploads/downloads, 372
forum management, 372
Forums Web page, 317–318, 321–322
freplyto control, 337
fresponse control, 336
fsubject control, 337
functionality, 309
functions_main.inc file, 346, 368–369
functions_post.inc file, 346–347
functions_post-00.inc file, 369–371
messageFields.inc file, 331–332
messageForm.inc file, 331–334
Messages Web page, 317, 319, 328–330
New Message Web page, 317, 319–320, 331–334
Post class, 355–357
postMessage-00.php script, 361–363
postMessage.php script, 339–342
postReply-00.php script, 364–368
postReply.php script, 342–345
replyFields.inc file, 335–337
search tools, 372
security, 310
TableAccessor class, 349–353
Thread class, 353–354
threading, 371
topics, 310
Threads Web page, 317–318, 324–327
Web pages (catalog)
  index, 136–140, 145
  products, 137, 140–145
Web pages (content management system)
  content detail, 243, 245–246
  content list, 243, 245
  department, 243–244
  home, 243–244
  login, 243–244
Web pages (Web forum)
  Forums, 317–318, 321–322
  Messages, 317, 319, 328–330
  New Message, 319–320, 331–334
Web pages (continued)
Threads, 317–318, 324–327
Web servers
encryption, 41
security, 41
status line, 47
Web site security, 23–24
Web sites
Arachnoid, 17
author’s, 414–415
Barebones, 17–18
Codewalkers, 380–381
EditPlus, 17
Emacs, 17
Free PHP and MySQL Hosting Directory, 382
HotScripts, 381
HTML-Kit, 18
Komodo, 19
Macromedia, 18–19
PayPal, 160
PHP Builder, 381
PHP Classes, 380
PHP Freaks, 382
PHPEdit, 19
PX, 382
restricted access, 77
SourceForge.net, 379
Vim, 18
WeberDev, 380
Wiley Product Technical Support, 415
Zend, 381–382
Zend Studio, 19
WeberDev Web site, 380
WebForm class (content management system)
checkForBlanks method, 292
constructor, 292
description, 276
displayForm method, 292
strip_tags function, 292
trim function, 292
verifyData method, 292
WebForm class (shopping cart application)
checkForBlanks method, 222
constructor, 221
displayForm method, 222
displayPage method, 222
strip_tags function, 222
trim function, 222
verifyData method, 222
WebForm class (user login application)
checkAddress method, 110
checkEmail method, 110
checkForBlanks method, 108
checkName method, 110
checkPhone method, 110
checkState method, 110
checkZip method, 110
code, 102–107
constructor, 107
displayForm method, 107
getFields method, 108
properties, 102
setFieldsNotRequired method, 107
strip_tags function, 110
trim function, 110
verifyData method, 108–110
WebForm class (Web forum application), 358–359
WebPage class (HTTP authentication application)
code, 71–72
constructor, 72
displayPage method, 73
properties, 71
WebPage class (shopping cart application), 222
Wiley Product Technical Support, 415
Windows 98 For Dummies (Andy Rathbone), 412
Windows 2000 Professional For Dummies (Andy Rathbone), 412
Windows XP For Dummies, 2nd Edition (Andy Rathbone), 412

• Z •

Zend Studio, 19
Zend Web site, 381–382
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