

Preface

MYSQL IS THE MOST WIDELY used database system in the Open Source sector. There are many reasons why this is so:

- MySQL is fast.
- MySQL is stable.
- MySQL is easy to learn.
- MySQL runs on popular operating systems (Windows, Linux, Mac OS X, various flavors of Unix).
- MySQL applications can be created in a great variety of programming languages (such as C, C++, C#, Java, Perl, PHP, Python, VB, and VB.NET).
- MySQL is extensively documented on the Internet, and there are many books on the subject available.
- MySQL is available for many applications free of charge (GPL license).
- Since the licensing restrictions of GPL are unacceptable for many commercial applications, there are reasonably priced commercial licenses and optional support contracts.

MySQL is on the verge of repeating in the database market the success achieved by Linux in the operating system sector. In combination with PHP or Perl, MySQL is providing the database system for more and more web sites. (A favorite combination is Linux + Apache + MySQL + Perl or PHP. Such systems are called “LAMP systems” for short.) MySQL is not just for small web sites; it is used by large firms with huge amounts of data, such as Yahoo!, Slashdot, and Google.

What Does This Book Offer?

This book provides a complete application- and example-oriented introduction to the database system MySQL. No previous knowledge, either of SQL or database design, is assumed.

The introductory Part I of the book begins with an extensive introduction on installation under Windows and Linux. We also consider the installation of components that are used in combination with MySQL (Apache, PHP, phpMyAdmin, Perl, Connector/MyODBC). Building on this, our first example will show the basic use of MySQL and PHP.

Part II, “Fundamentals,” provides a large amount of background material on the use of various user interfaces, on the database language SQL, on the proper design of databases, on the use of InnoDB tables, on the access system of MySQL, and on many other topics on administration (such as backups, logging, and replication).

In Part III, “Programming,” we emphasize the language PHP: Three chapters cover basic techniques of programming and show how to construct two extensive examples (bookkeeping, a discussion forum). Most of the PHP examples can be tried out live on my web site. We deal with other programming languages, too, with chapters devoted to Perl, Java, C/C++, and VB/VB.NET/C#.

We end the main text with a reference section (Part IV) that provides an overview of the SQL commands of MySQL, the commands and options of the administrative tools, and the functions of important programming interfaces (PHP, Perl, C, Java).

Finally, there are several appendices, comprising (A) a glossary of terms, (B) breaking news on the forthcoming MySQL version 4.1, (C) information on the example files for this book (available at www.apress.com), and (D) a bibliography with suggestions for further reading.

In combination with the example databases and programs, this book should provide a good foundation for the development of your own database applications. In this I wish you much fun and success.

Michael Kofler, August 2003

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What Is New in the Second Edition?

There is much that is new. This book has been completely revised, from the first page to the last. (It took as long to produce this second edition as to write the first edition from scratch!) The following list indicates the most important changes:

- **MySQL:** The book now covers MySQL 4.0 and to some extent MySQL 4.1. These changes appear throughout the entire book, from installation to the reference section to the appendixes.
- **User interface:** This book describes the new user interface MySQL Control Center and the latest version of phpMyAdmin.
- **SQL recipes:** There is a new chapter in the introduction on SQL that provides answers to frequently asked SQL questions: How can I process the first/last *n* data records? How can duplicate records be located? How are sub`SELECT` commands formed in MySQL 4.0 and 4.1? How can a full-text search be accomplished efficiently?
- **InnoDB tables, transactions, rules for integrity:** A new chapter is devoted to the InnoDB table format. InnoDB tables enable the execution of transactions with *row level locking* and the protection of the integrity of relations between tables (foreign key constraints).
- **Security, access rights:** Chapter 9 deals with all the innovations dealing with access rights (MySQL privileges). A new section gives a number of practical tips on solving problems with establishing connections.
- **Administration:** Everything related to administration is contained in a single clearly structured chapter. New sections deal with the administration of InnoDB tables and server tuning (including Query Cache).

- **PHP:** All PHP examples have been reworked in PHP 4.3. The HTML code generated from the PHP examples is now largely XHTML compatible. The PHP text has been divided over four chapters and is now more clearly structured. In Chapter 11, on techniques of PHP programming, we now also deal with storing images (file upload/download).
- **Java:** A new chapter describes programming of Java and JSP applications on the basis of JDBC and Connector/JDBC.
- **C/C++:** A new chapter discusses the development of C and C++ programs.
- **VB6:** A new example program demonstrates the use of BLOBs.
- **VB.NET, C#:** A new section in Chapter 17 deals with the development of ADO.NET applications with the programming languages VB.NET and C#.
- **Reference:** The three reference chapters have been thoroughly brought up to date and expanded with new sections (C functions, JDBC classes).
- **MySQL 4.1:** Appendix B brings together all known changes in MySQL 4.1: improved character set support (including Unicode), the use of subSELECTs, the management of geometric and geographic data (GIS), the use of precompiled commands (*prepared statements*), etc.

What Does This Book Not Offer?

Several chapters in this book deal with the programming of MySQL applications in a variety of programming languages, such as PHP, Perl, C, C++, Java, and Visual Basic. These chapters assume that the reader is familiar with the specific programming language. (There is simply no room in this book to offer an introduction to a number of programming languages.) In other words, you will profit from, say, the PHP chapter in this book only if you are already familiar with the programming language PHP.

Example Programs, Source Code

To the extent that we are dealing with web applications, almost all of the applications in this book can be tried out directly on my website (www.kofler.cc). The source code for all the examples is available at www.apress.com in the downloads section.

In the longer program listings in this book you will find at the beginning of the example a comment line that specifies the file name appearing in the example files on the web site, for example,

```
<!-- php-programming/simpleinput.php -->
```

To save space, sometimes only the most interesting passages in the program code are printed.

Versions

The functionality of MySQL and of the programs, programming languages, and libraries placed in its environment changes with every new version—which sometimes appear weekly. The following overview indicates which versions I have worked with (explanations of the various names will appear at appropriate places in the book):

- **Apache:** Versions 1.3.*n* and 2.0.*n*.
- **Connector/J:** Version 3.0.6.
- **Connector/ODBC (formerly MyODBC):** Version 3.51.06.
- **gcc:** Version 3.2
- **Java:** Version 1.4.1 (Windows) and 1.3.1 (Linux).
- **JSP:** see Tomcat.
- **Linux:** MySQL and other programs were tested for this book under Linux and Windows. Under Linux, the distributions Red Hat 8.0 and 9.0 (beta 3) and SuSE 8.1 and 8.2 (beta 5) were used.
- **MySQL:** Version 4.0.14. In most of the example programs, however, compatibility with MySQL 3.23.*n* was taken into account, since this version is still in use by many Internet service providers. On the other hand, the latest developments of MySQL 4.1 were tested with a development version (alpha version, from end of July 2003), as described in Appendix B.
- **Connector/C++:** Version 1.7.9.
- **Perl:** Versions 5.6 and 5.8.
- **PHP:** Versions 4.2 and 4.3. As file identifier, the suffix *.php is generally used.
- **phpMyAdmin:** Version 2.4.
- **Tomcat:** Version 4.0.4 (Java Servlet 2.2, Java Server 1.1).
- **Visual Basic, VBA, ADO:** Visual Basic programs were developed and tested with VB6 and VBA6 and ADO versions 2.1 and 2.7.
- **Visual Basic .NET, C#, ADO.NET, ASP.NET:** All of these are based on Visual Studio .NET 2002 (.NET Framework 1.0).
- **Windows:** All tests under Windows were carried out with Windows 2000. In principle, everything should be valid for Windows NT 4, Windows XP, and future versions of Windows.