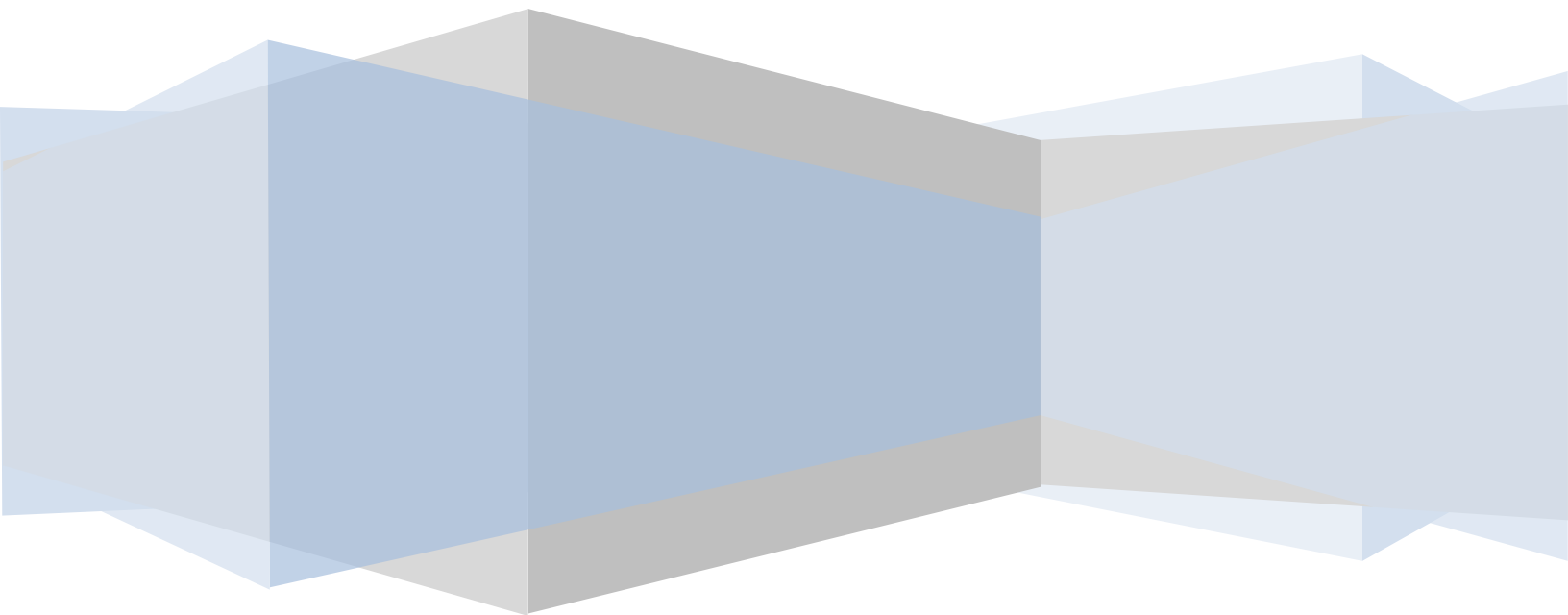


# MySQL Essentials



MySQL Essentials – Edition 1.0

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## Table of Contents

|            |  |    |
|------------|--|----|
| Chapter 1. | About MySQL Essentials .....                                     | 9  |
| Chapter 2. | Database Basics.....   | 10 |
| 2.1        | What is a Database?.....   | 10 |
| 2.2        | Understanding Database Tables .....                              | 10 |
| 2.3        | Introducing Database Schema .....                                | 10 |
| 2.4        | Columns and Datatypes .....                                      | 11 |
| 2.5        | Database Rows .....  | 11 |
| 2.6        | Introducing Primary Keys .....                                   | 11 |
| 2.7        | What is SQL?.....  | 12 |
| Chapter 3. | MySQL Database Architecture.....                                 | 13 |
| Chapter 4. | The mysql Command-Line Tool .....                                | 14 |
| 4.1        | The mysql Command-line Utility.....                              | 14 |
| 4.2        | mysql Command-Line Arguments.....                                | 15 |
| 4.3        | mysql Commands.....  | 21 |
| 4.4        | Summary .....  | 22 |
| Chapter 5. | The MySQL Administrator Tool.....                                | 23 |
| 5.1        | Getting and Installing MySQL Administrator .....                 | 23 |
| 5.2        | Connecting to the Database Server .....                          | 23 |
| 5.3        | Using the MySQL Administator .....                               | 26 |
| 5.4        | Summary .....  | 27 |
| Chapter 6. | The MySQL Query Browser.....                                     | 28 |
| 6.1        | Getting and Installing MySQL Query Browser.....                  | 28 |
| 6.2        | Connecting the MySQL Query Browser to a Database Server .....    | 28 |
| 6.3        | A Tour of MySQL Browser .....                                    | 29 |
| 6.4        | Executing SQL Statements .....                                   | 31 |
| 6.5        | Summary .....  | 32 |
| Chapter 7. | Creating New Databases and Tables with MySQL Administrator ..... | 33 |

|             |   |    |
|-------------|---|----|
| 7.1         | Creating a New Database .....                         | 33 |
| 7.2         | Creating New Tables .....                             | 35 |
| Chapter 8.  | Creating Databases and Tables Using SQL Commands..... | 38 |
| 8.1         | Creating a New MySQL Database.....                    | 38 |
| 8.2         | Creating Tables with SQL.....                         | 39 |
| 8.3         | Understanding NULL and NOT NULL Values .....          | 39 |
| 8.4         | Primary Keys.....                                     | 40 |
| 8.5         | AUTO_INCREMENT.....                                   | 40 |
| 8.6         | Defining Default Values during Table Creation .....   | 41 |
| 8.7         | MySQL Database Engine Types .....                     | 41 |
| Chapter 9.  | Updating and Deleting MySQL Tables .....              | 43 |
| 9.1         | Altering a MySQL Table .....                          | 43 |
| 9.1.1       | Adding and Deleting Table Columns.....                | 43 |
| 9.1.2       | Renaming Tables and Columns.....                      | 44 |
| 9.1.3       | Changing the Data Type of a Column .....              | 44 |
| 9.2         | Deleting a Database Table.....                        | 45 |
| Chapter 10. | Inserting Data into a MySQL Database .....            | 46 |
| 10.1        | The Basics of Data Insertion.....                     | 46 |
| 10.2        | Inserting a Complete Row .....                        | 46 |
| 10.3        | Adding Multiple Rows to a Table .....                 | 47 |
| 10.4        | Inserting Results from a SELECT Statement.....        | 48 |
| 10.5        | Reducing the INSERT Performance Load .....            | 49 |
| Chapter 11. | Updating and Deleting MySQL Data .....                | 50 |
| 11.1        | Updating Database Data .....                          | 50 |
| 11.2        | Ignoring Update Errors.....                           | 51 |
| 11.3        | Deleting Database Data.....                           | 51 |
| 11.4        | Summary .....   | 52 |
| Chapter 12. | Retrieving Data From a MySQL Database.....            | 53 |

|             |   |    |
|-------------|---|----|
| 12.1        | Retrieving a Single Column.....                                   | 53 |
| 12.2        | Using SELECT to Retrieve Multiple Columns.....                    | 53 |
| 12.3        | Restricting Number of Results .....                               | 54 |
| 12.4        | Eliminating Duplicate Values from Results .....                   | 55 |
| 12.5        | Summary .....   | 56 |
| Chapter 13. | Sorting Data Retrieved from a MySQL Database.....                 | 57 |
| 13.1        | Sorting Data from a SELECT Statement.....                         | 57 |
| 13.2        | Sorting on Multiple Columns .....                                 | 59 |
| 13.3        | Sorting Data in Descending Order.....                             | 60 |
| 13.4        | Summary .....   | 61 |
| Chapter 14. | Using WHERE to Filter MySQL Data .....                            | 62 |
| 14.1        | The Basics of the WHERE Clause .....                              | 62 |
| 14.2        | Comparison Operators.....   | 63 |
| 14.2.1      | Checking for NULL Values .....                                    | 65 |
| 14.3        | Searching within Range Values .....                               | 65 |
| 14.4        | Summary .....   | 65 |
| Chapter 15. | Advanced MySQL Data Filtering - AND, OR, NOT and IN.....          | 66 |
| 15.1        | Filtering Data Using the <i>OR</i> Operator .....                 | 66 |
| 15.2        | Filtering Data Using the <i>AND</i> Operator.....                 | 67 |
| 15.3        | Combining <i>AND</i> and <i>OR</i> Operators .....                | 67 |
| 15.4        | Understanding Operator Precedence .....                           | 68 |
| 15.5        | Specifying a Range of Conditions using the <i>IN</i> Clause ..... | 68 |
| 15.6        | Using the <i>NOT</i> Operator.....                                | 69 |
| 15.7        | Summary .....   | 69 |
| Chapter 16. | MySQL Wildcard Filtering using LIKE .....                         | 70 |
| 16.1        | What are Wildcards?.....  | 70 |
| 16.2        | Single Character Wildcards .....                                  | 70 |
| 16.3        | Multiple Character Wildcards .....                                | 71 |

|             |   |    |
|-------------|---|----|
| 16.4        | Summary .....                                       | 73 |
| Chapter 17. | MySQL Regular Expression Searches .....             | 74 |
| 17.1        | What are Regular Expressions?.....                  | 74 |
| 17.2        | Regular Expression Character Matching .....         | 74 |
| 17.3        | Matching from a Group of Characters .....           | 75 |
| 17.4        | Matching from a Range of Characters .....           | 75 |
| 17.5        | Handling Special Characters.....                    | 76 |
| 17.6        | Regular Expressions and Whitespace Characters ..... | 77 |
| 17.7        | Matching by Character Type .....                    | 77 |
| 17.8        | Regular Expression Repetition Metacharacters.....   | 79 |
| 17.9        | Matching by Text Position.....                      | 81 |
| Chapter 18. | Joining Tables in MySQL.....                        | 83 |
| 18.1        | How Does a Join Work?.....                          | 83 |
| 18.2        | Performing a Cross-Join .....                       | 84 |
| 18.3        | Equi-Join (aka the Inner Join) .....                | 85 |
| 18.4        | Performing a Left Join or a Right Join .....        | 86 |
| 18.5        | Creating Joins with WHERE and USING.....            | 88 |
| Chapter 19. | An Introduction to MySQL Views.....                 | 90 |
| 19.1        | Creating a Basic View .....                         | 90 |
| 19.2        | Joins and Views .....                               | 91 |
| 19.3        | Getting Information About a View.....               | 93 |
| 19.4        | Deleting a View .....                               | 93 |
| 19.5        | Replacing a View .....                              | 93 |
| Chapter 20. | MySQL Calculations and Concatenations .....         | 94 |
| 20.1        | Performing Calculations on Retrieved Data.....      | 94 |
| 20.2        | Concatenating Data Fields.....                      | 95 |
| 20.3        | Trimming Trailing Whitespace from Text.....         | 97 |
| 20.4        | Trimming Leading Whitespace from Text .....         | 98 |

|  |     |
|--|-----|
| Chapter 21. Manipulating Text in MySQL.....                  | 99  |
| 21.1 MySQL String Manipulation Functions.....                | 99  |
| Chapter 22. MySQL Mathematical Functions.....                | 103 |
| 22.1 MySQL Arithmetic Functions.....                         | 103 |
| 22.2 Summary .....   | 105 |
| Chapter 23. Working with Dates and Times in MySQL.....       | 106 |
| 23.1 Date and Time Formats.....                              | 106 |
| 23.2 Creating Date and Time Fields .....                     | 106 |
| 23.3 Date and Time Formats.....                              | 107 |
| 23.4 Date and Time Functions .....                           | 107 |
| 23.5 Inserting Date and Time Values into Table Columns ..... | 109 |
| 23.6 Retrieving Data Based on Date and Time Criteria .....   | 111 |
| 23.7 Summary .....   | 111 |
| Chapter 24. MySQL Data Aggregation Functions .....           | 112 |
| 24.1 The MySQL Aggregate Functions .....                     | 112 |
| 24.2 Using the Aggregate Functions .....                     | 112 |
| 24.3 Using the MySQL AVG() Function.....                     | 113 |
| 24.4 Using the MySQL COUNT() Function.....                   | 113 |
| 24.5 Using the MySQL MAX() Function .....                    | 114 |
| 24.6 Using the MySQL MIN() Function.....                     | 115 |
| 24.7 Using the SUM() Function .....                          | 115 |
| 24.8 Using Multiple Aggregate Functions .....                | 115 |
| Chapter 25. MySQL Users and Security .....                   | 117 |
| 25.1 MySQL Security .....                                    | 117 |
| 25.2 Getting Information about Users.....                    | 117 |
| 25.3 Creating a New MySQL User .....                         | 118 |
| 25.4 Deleting a MySQL User.....                              | 119 |
| 25.5 Renaming a MySQL User .....                             | 119 |

25.6 Changing the Password for a MySQL User ..... 120

25.7 User Privileges ..... 120

## Chapter 1. About MySQL Essentials

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Before the arrival of MySQL, implementing a database was typically a complex and expensive task involving the purchase, installation and maintenance of a proprietary database management system from a vendor such as Oracle or IBM. In contrast, MySQL provides a free, open source database management system that is easy to install, implement and maintain. In addition, MySQL is fast, extremely reliable and widely deployed by many companies and organizations throughout the world.

It is not an exaggeration to say that MySQL has brought the power of a fully featured, scalable relational database management system into the reach of anyone with a computer and the desire to build a data driven application or web site. With this goal in mind, MySQL Essentials is designed to provide a step by step path to proficiency with MySQL.

Beginning with the basics of relational databases and the installation of MySQL, the book goes on to cover everything needed to successfully build, maintain and secure MySQL based databases.

## Chapter 2. Database Basics

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### 2.1 What is a Database?

The chances are that if you have ever logged into a web site or purchased an item on the internet you have interacted with a database in some way. Anything that involves the retrieval or storage of information on a computer system is most likely to involve a database. In fact, databases are the core of just about every application that relies on data of some form to complete a task.

The first step in learning MySQL is to understand the difference between a *database* and a *database management system (DBMS)*. The term *database* refers to the entity that stores the actual data (such as ID numbers, names and addresses for example) in a structured way. A *database management system (DBMS)* on the other hand, refers to the software used to store, access and manipulate the data stored in the *database*. All interactions with the database are always performed via the *DBMS*.

Modern databases and database management systems are not restricted to storing just text. Today, databases are used to store such items as images, videos and software objects.

### 2.2 Understanding Database Tables

Database *Tables* provide the most basic level of data structure in a database. Each database can contain multiple tables and each table is designed to hold information of a specific type. For example, a database may contain a *customer* table which contains the name, address and telephone number for all the customers of a particular business. The same database may also include a *products* table used to store the product descriptions with associated product codes for the items sold by the business.

Each table in a database is assigned a name which must be unique within that particular database. A table name, once assigned to a table in one database, may only be re-used within the context of a different database.

### 2.3 Introducing Database Schema

*Database Schema* define the characteristics of the data stored in a database table. For example, the table schema for a customer database table might define that the customer name is a string of no more than 20 characters in length, and that the customer phone number is a numerical data field of a certain format.

Schema are also used to define the structure of entire databases and the relationship between the various tables contained in each database.

## 2.4 Columns and Datatypes

It is helpful at this stage to begin to view a database table as being similar to a spreadsheet where data is stored in rows and columns.

Each column represents a data field in the corresponding table. For example, the name, address and telephone data fields of a table are all *columns*.

Each column, in turn, is defined to contain a certain *datatype* which dictates the type of data the column can contain. A column designed to store numbers would, therefore, be defined as a numerical datatype.

## 2.5 Database Rows

Each new record that is saved to a table is stored in a row. Each row, in turn, consists of the columns of data associated with the saved record.

Once again, consider the spreadsheet analogy described earlier in this chapter. Each entry in a customer table is equivalent to a row in a spreadsheet and each column contains the data for each customer (name, address, telephone etc). When a new customer is added to the table, a new row is created and the data for that customer stored in the corresponding columns of the new row.

*Rows* are also sometimes referred to as *records* and these terms can generally be used interchangeably.

## 2.6 Introducing Primary Keys

Each database table must contain one or more columns that can be used to uniquely identify each row in the table. This is known in database terminology as the *Primary Key*. For example, a table may use a bank account number column as the primary key. Alternatively, a customer table may use the customer's social security number of the primary key.

Primary keys allow the database management system to uniquely identify a specific row in a table. Without a primary key it would not be possible to retrieve or delete a specific row in a table because there can be no certainty that the correct row has been selected. For example, suppose a table existed where the customer's last name had been defined as the primary key. Imagine then the problem that might arise if more than one customer called "Smith" was recorded in the database. Without some guaranteed way to uniquely identify a specific row it would be impossible to ensure the correct data was being accessed at any given time.

Primary keys can comprise a single column or multiple columns in a table. To qualify as a single column primary key, no two rows can contain matching primary key values. When using

multiple columns to construct a primary key, individual column values do not need to be unique, but all the columns combined *must be unique*.

Finally, whilst primary keys are not mandatory in database tables their use is strongly recommended.

## 2.7 What is SQL?

As discussed previously, a *database management system* (DBMS) provides the means to access the data stored in a database. One of the key methods for achieving this is via a language called the Structured Query Language. This is usually abbreviated to SQL and pronounced *Sequel*.

SQL is essentially a very simple and easy to use language designed specifically to enable the reading and writing of database data. Because SQL contains a small set of keywords it can be learned quickly. In addition, SQL syntax is more or less identical between most DBMS implementations, so having learned SQL for one system, it is likely that your skills will transfer to other database management systems.

Throughout the remainder of this book particular attention will be paid to explaining the key SQL commands so that the reader will be proficient in using SQL to read and write database data.