

JDBC Metadata, MySQL, and Oracle Recipes

A Problem-Solution Approach



Mahmoud Parsian

JDBC Metadata, MySQL, and Oracle Recipes: A Problem-Solution Approach

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This book is dedicated to my dears

my beautiful wife, Behnaz;

my gozal daughter, Maral;

my gibldiz son, Yaseen, who taught me how to play Yu-Gi-Oh!

*my mother, Monireh, who taught me my mother
language and introduced me to the world of computer science;*

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who taught me honesty and hard work;*

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and my brother, Ahmad

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About the Author



MAHMOUD PARSIAN is a Sun-certified Java programmer and a senior lead software engineer at Ask Jeeves (<http://www.ask.com>). Mahmoud earned his PhD in computer science from Iowa State University (Ames, Iowa) and has been working in the software industry for more than 22 years. His expertise is in Java technology, JDBC, database design/development, and server-side Java programming. Mahmoud's current project is MyJeeves (<http://myjeeves.ask.com>).

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- Cisco Systems Leadership Award, Cisco Systems; June 2000
- Individual Achievement Award, Cisco Systems; July 2000
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About the Technical Reviewer



SUMIT PAL is a Java and J2EE technical architect. He has more than 12 years of experience in software development and has worked for Microsoft and Oracle as a full-time employee. He has a master's degree in computer science.

Sumit loves to swim and play badminton and now loves to crawl with his little baby daughter.

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Introduction

This book focuses on database metadata (data about data) or annotation-based code recipes for JDBC API for use with Oracle and MySQL. The book provides complete and working solutions for performing database metadata tasks using JDBC. You can cut and paste solutions from this book to build your own database metadata applications. All the solutions have been compiled and tested against two leading databases: MySQL and Oracle. This book is ideal for anyone who knows some Java (can read/write basic Java programs) and some JDBC (can read/write basic queries using JDBC and SQL) and wants to learn more about database and result set metadata. Each section of this book is a complete recipe (including the database setup, the solution, and the solutions for both MySQL and Oracle), so you can use the code directly in your projects (although sometimes you may need to cut and paste only the sections you need). You may adopt my solutions to other databases (such as Microsoft SQLServer, DB2, PostgreSQL) by just changing the database parameters (such as the driver, database URL, or database username/password).

What Is in This Book?

This book provides solid solutions and guidelines for using JDBC metadata to solve tough problems, such as how to write customized metadata for `RowSet(s)` and how to retrieve your tables/views names from the database as a URL. Most of the solutions presented in this book have been used and tested in real-world database applications. In fact, I have designed and developed all the JDBC code for MyJeeves (<http://myjeeves.ask.com>) using the same philosophies you'll find in this book. You can cut and paste the provided solutions and tailor them to your own JDBC metadata applications. For production environments, you should replace my `getConnection()` method with a production-quality connection pool management product (such as Apache's DBCP or Excalibur).

What Is the Focus of This Book?

The main focus of this book is to show how to use database metadata (`DatabaseMetaData`) and result set metadata (`ResultSetMetaData`) by JDBC API. All of the JDBC's metadata is discussed, and I have provided lots of examples for MySQL and Oracle databases. You may use all of these metadata recipes freely (no copyrights attached to these recipes!). This book focuses on the JDBC metadata API for database application writers. Also, you may use my recipes for reverse-engineering the whole database, for developing GUI-based database applications, and for developing SQL adapters and connectors.

What This Book Is Not

This book is not designed to teach the Java programming language, JDBC, and the basics of object-oriented programming. I assume you already know the basics of Java, JDBC, SQL, and object-oriented programming.

What Is the Structure of This Book?

This book is filled with database metadata recipes: it asks real metadata questions and provides real, compiled working answers. You can use Java/JDBC to access many kinds of database metadata (such as database table types and tables/columns names) for relational database management systems (including Oracle, MySQL, DB2, SQL Server, and Access, to mention a few).

The goal of this book is to provide step-by-step instructions for using JDBC metadata with two popular relational databases: Oracle and MySQL. I selected these two databases for the following reasons:

- Oracle is the de facto standard in the commercial database applications of major companies.
- MySQL is a high-speed, open-source relational database (you can even use a debugger to debug your JDBC method calls).

For every metadata problem raised, you'll see two solutions: one expressed using the Oracle database and the other one in MySQL.

What Does JDBC Metadata Do?

In a nutshell, JDBC is a Java API for executing SQL statements (such as querying a database, inserting new records, creating a table, and so on). JDBC makes it possible to perform three tasks:

- Establish a connection with a relational database.
- Using the established database connection, send SQL statements (such as a select, insert, update, metadata request, and so on) and result sets.
- Process the result sets (retrieved from the database).

JDBC allows Java programs (applets and applications) to communicate with relational databases (so-called SQL databases) easily and efficiently. JDBC consists of classes in the package `java.sql` and some JDBC extensions in the package `javax.sql`. Both of these packages are included in the Java 2 Standard Edition (J2SE) version 1.5 (which covers JDBC 3.0).

On the other hand, JDBC metadata (data about data) deals with database metadata and result set metadata. Using JDBC's metadata API, you should be able to answer the following questions:

- What are the column names/types for a SQL query?
- What are table types for a database?

- What are table/view/stored procedure names?
- What is the signature of a stored procedure?
- What is a RowSet's and ResultSet's metadata?
- Is a given database read only?
- What are table/column privileges?

I have answered all of these questions, plus much, much more.

Who Is This Book For?

This book is for software engineers and database application developers who know the basics of Java and JDBC. I also assume you know the basics of the Java programming language (writing a class, defining a new class from an existing class, using basic control structures such as while-loop, if-then-else, and so on). Also, I assume you have a basic understanding of relational databases concepts and SQL. Like in any Apress recipe book, you are encouraged to tweak the solutions presented to fit your own database metadata applications and discover new database metadata solutions using Java/JDBC technology. You can also customize these solutions/recipes as you apply them to a particular metadata problem.

What Software Is Used in This Book?

When developing solutions and examples for this book, I used the following software and programming environments:

- Relational databases:
 - Oracle 9i Enterprise Edition Release 9.2.0.1.0 (from <http://www.oracle.com>)
 - Oracle 10g Release 10.1.0.2.0 (from <http://www.oracle.com>)
 - MySQL 4.1.7 (from <http://www.mysql.com>)
 - MySQL 5.0.0 (from <http://www.mysql.com>)
- Programming languages:
 - Java programming language, J2SE 1.4.2 (from <http://java.sun.com>)
 - Java programming language, J2SE 5.0 (from <http://java.sun.com>)
- Operating systems:
 - Linux Enterprise Edition (from <http://www.redhat.com>)
 - Windows XP Professional (from <http://www.microsoft.com>)
- Web servers
 - Tomcat (<http://jakarta.apache.org/tomcat/>)

All programs in this book were tested with J2SE 1.4.2 and J2SE 5.0 (from <http://java.sun.com/>). Examples are given in mixed operating system environments (Linux and Windows XP Professional). For all examples and solutions, I developed them using basic text editors (such as Notepad from Microsoft, TextPad from <http://www.textpad.com>, and vi in Linux) and compiled them using the Java command-line compiler (javac).

Comments and Questions for This Book?

I am always interested in your feedback and comments regarding the problems and solutions described in this book. Please e-mail comments and questions for this book to admin@jdbccookbook.com. You can also find me at <http://www.jdbccookbook.com>.