



Oracle[®] 12c:
SQL

Joan Casteel

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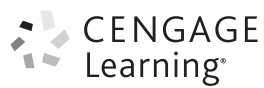
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ORACLE[®] 12c: SQL

Joan Casteel



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To Scott, a true teacher—one who never stops learning

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PREFACE

The past few decades have seen a proliferation of organizations that rely heavily on information technology. These organizations store their data in databases, and many choose Oracle database management systems to access their data. The current Oracle database version, Oracle 12c, is a database management system that enables users to create, manipulate, and retrieve data. The purpose of this textbook is to introduce students to basic SQL commands for interacting with Oracle 12c databases in a business environment. In addition, concepts relating to objectives of the current Oracle certification exams have been incorporated for students wanting to pursue certification.

The Intended Audience

This textbook has been designed for students in technical two-year or four-year programs who need to learn how to interact with databases. Although having an understanding of database design is preferable, an introductory chapter has been included to review the basic concepts of E-R modeling and the normalization process.

Oracle Certification Program (OCP)

This textbook covers the objectives of SQL Fundamentals Exams available: 1Z0-051 for Oracle 11g and Exam 1Z0-061 for Oracle Database 12c. Most objectives for Exam 1Z0-047, Oracle Database SQL Expert, are also covered. Any of these exams serve as the first exam in the Oracle Application Development and Oracle Database Administrator Oracle Certified Associate level certification tracks. Information about registering for these exams, along with other reference material, is available at www.oracle.com.

The Approach

The concepts introduced in this textbook are discussed in the context of a hypothetical real-world business: an online book retailer named JustLee Books. The company's business operation and the database structure are introduced and analyzed, and as commands are introduced throughout the textbook, they're modeled with examples using the JustLee Books database. Using consistent examples of a hypothetical company helps you learn the syntax of commands and how to use them in a real-world environment. In addition, a script file that generates the database is available to give you hands-on practice in re-creating examples and practicing variations of SQL commands to enhance your understanding.

To explain what a database is and how it's created, this textbook initially focuses on creating tables and learning how to perform data manipulation operations. After you're familiar with the database structure, the focus then turns to querying a database.

In Chapters 8 through 13, you learn how to retrieve data from the database, using the many options of a SELECT statement, including row filtering, joins, functions, and subqueries.

To reinforce the material, each chapter includes a chapter summary and, when appropriate, a syntax guide for the commands covered in the chapter. In addition, each chapter includes review questions and hands-on activities that test your knowledge and challenge you to apply that knowledge to solving business problems. A running case study that builds throughout the textbook provides a second real-world setting—a city jail system—as another opportunity to work with databases.

New to This Edition

Topics added covering new Oracle 12c features include:

- Extended data types
- Invisible columns
- Default column values
 - Specifying a value for NULL inserts
 - Based on a sequence value
- Identity columns
- Left outer join enhancements
- CROSS APPLY join method
- Pattern matching for trend analyses
- Enhanced Top-N-Query features

In addition, coverage of subquery factoring or use of the WITH clause has been added to Chapter 12.

Overview of This Book

The examples, assignments, and cases in this book help you achieve the following objectives:

- Issue SQL commands that retrieve data based on criteria specified by the user.
- Use SQL commands to join tables and retrieve data from joined tables.
- Perform calculations based on data stored in the database.
- Use functions to manipulate and aggregate data.
- Use subqueries to retrieve data based on unknown conditions.
- Create, modify, and drop database tables.
- Manipulate data stored in database tables.
- Enforce business rules by using table constraints.
- Create users and assign the privileges users need to perform tasks.

The chapters' contents build in complexity while reinforcing previous ideas. Chapter 1 introduces basic database management concepts, including database design. Chapter 2 shows how to retrieve data from a table. Chapter 3 explains how to create new database tables. Chapter 4 addresses the use of constraints to enforce business rules and ensure the integrity of table data. Chapter 5 explains adding data to a table, modifying existing data, and deleting data. Chapter 6 shows how to use a sequence to generate numbers, create

indexes to speed up data retrieval, and create synonyms to provide aliases for tables. Chapter 7 steps you through creating user accounts and roles and shows how to grant (and revoke) privileges to these accounts and roles. Chapter 8 explains how to restrict rows retrieved from a table, based on a given condition. Chapter 9 shows how to link tables with common columns by using joins. Chapter 10 describes the single-row functions supported by Oracle 12c. Chapter 11 covers the usage of multiple-row functions to derive a single value for a group of rows and explains how to restrict groups of rows. **Chapter 12** covers using subqueries to retrieve rows based on an unknown condition already stored in the database. Chapter 13 explains using views to restrict access to data and reduce the complexity of certain types of queries.

The appendixes support and reinforce chapter materials. **Appendix A** contains printed versions of the initial table structure and data for the JustLee Books database used throughout this textbook. **Appendix B** introduces the operation of the SQL*Plus and SQL Developer client software tools. **Appendix C** lists Oracle resources for further study. **Appendix D** introduces the SQL*Loader utility for importing data. **Appendix E** introduces basic SQL statement tuning concepts. **Appendix F** identifies SQL differences in some popular databases.

Features

To enhance your learning experience, each chapter in this textbook includes the following elements:

- **Chapter objectives:** Each chapter begins with a list of the concepts to be mastered by the chapter's conclusion. This list gives you a quick overview of chapter contents and serves as a useful study aid.
- **Running case:** A sustained example, the business operation of JustLee Books, is the basis for introducing new commands and practicing the material covered in each chapter.
- **Methodology:** As new commands are introduced in each chapter, the command syntax is shown and then an example, using the JustLee Books database, illustrates using the command in the context of business operations. This methodology shows you not only *how* the command is used, but also *when* and *why* it's used. The script file used to create the database is available so that you can work through the examples in this textbook, engendering a hands-on environment in which you can reinforce your knowledge of chapter material.
- **Tip:** This feature, designated by the Tip icon, provides practical advice and sometimes explains how a concept applies in the workplace.
- **Note:** These explanations, designated by the Note icon, offer more information on performing operations with databases.
- **Database Preparation:** These notes, placed at the end-of-chapter introductions, tell you which script from the student data files you should run in preparation for chapter examples and activities.
- **Caution:** This warning, designated by the Caution icon, points out database operations that, if misused, could have devastating results.
- **Chapter summaries:** Each chapter's text is followed by a summary of chapter concepts. These summaries are a helpful recap of chapter contents.

- **Syntax summaries:** Beginning with Chapter 2, a Syntax Guide table is included after each chapter summary to recap the command syntax covered in the chapter.
- **Review questions:** End-of-chapter assessment begins with review questions that reinforce the main ideas introduced in each chapter. These questions ensure that you have mastered the concepts and understand the information covered in the chapter.
- **Multiple-choice questions:** Each chapter contains multiple-choice questions covering the material in the chapter. Oracle certification-type questions are included to prepare you for the type of questions you can expect on certification exams and measure your level of understanding.
- **Hands-on assignments:** Along with conceptual explanations and examples, each chapter includes hands-on assignments related to the chapter's contents. The purpose of these assignments is to give you practical experience. In most cases, the assignments are based on the JustLee Books database and build on the examples in the chapter.
- **Advanced challenge:** This section poses another problem about the JustLee Books database for you to solve and is larger in scope than the hands-on assignments.
- **Case studies:** At the end of each chapter is a major case study, designed to help you apply what you have learned to real-world situations. These cases give you the opportunity to synthesize and evaluate information independently, examine potential solutions, and make recommendations, much as you would in an actual business situation. These cases use a database based on a city jail system.

Supplemental Materials

The following supplemental materials are available when this book is used in a classroom setting. All teaching tools available with this book are provided to instructors on the Cengage Learning Web site at www.cengagebrain.com.

- **Electronic Instructor's Manual:** The Instructor's Manual accompanying this textbook includes the following items:
 - Additional instructional material to assist in class preparation, including suggestions for lecture topics
 - A sample syllabus
 - When applicable, information about potential problems that can occur in networked environments
- **Cengage Learning Testing Powered by Cognero is a flexible, online system that allows you to:**
 - author, edit, and manage test bank content from multiple Cengage Learning solutions
 - create multiple test versions in an instant
 - deliver tests from your LMS, your classroom or wherever you want