DATABASE SECURITY

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PREPARING TOMORROW'S
INFORMATION
SECURITY
PROFESSIONALS

Database Security

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Brief Contents

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Introduction

Over the last several decades, we have made great advancements in maintaining the confidentiality, integrity, and availability of our networked environments. These achievements are greatly due to the strides that have been made within our educational degree programs. Security research is funded at the highest rates in history, and security courses have become fundamental requirements in almost every IT-related program. Unfortunately, very little emphasis is placed on database security and as a result, IT and security professionals are left uninformed and underprepared to protect their company's most precious assets, their databases. Databases are the most valuable resources that we have. They contain our identities and hold our deepest secrets. Individuals, companies, and even countries could not exist without database security—it is our livelihood that is at stake in this technologically dependent world.

Approach and Audience

This textbook is a detailed guide to maintaining the confidentiality, integrity, and availability of a database environment. From preinstallation to postsecurity auditing, this book provides a comprehensive and in-depth explanation of database security strategies and offers general IT skills and the security know-how that professionals must have to face the growing number of threats to network security.

It has been written for information system and security administrators and analysts and emphasizes best practices in database security strategies. This book does not assume prior knowledge of databases and has been written in a casual style for both technical and nontechnical readers. It can be used in almost any basic or advanced information security or database administration course.

Organization and Chapter Descriptions

- Part I:
  - **Chapter 1** provides a full understanding of security and information technology. It defines the different types of security, intruders, attack strategies, and viruses. Security architecture is explored, along with global policy and disaster plans.
  - **Chapter 2** offers a well-rounded discussion of databases, from the definition of basic schema objects to an in-depth description of the architecture of an Oracle, MySQL, and SQL database.
- Part II:
  - **Chapters 3, 4, and 5** provide step-by-step installation guides and security practices for different vendors. Chapter 3's focus is MySQL, Chapter 4 focuses on SQL Server, and Chapter 5 focuses on Oracle 11g. With the foundation provided in the first five chapters, the student is well prepared to move on to much more advanced security concepts.
- Part III:
  - **Chapter 6** identifies authentication and authorization by covering topics such as profiles, privileges, and roles and by offering insight into how they are administered through specific vendors such as MySQL, SQL Server, and Oracle.
  - **Chapters 7 and 8** investigate the rarely explored topic of SQL injection. Based on cutting-edge research, Chapter 7 teaches learners how to identify SQL injection vulnerability and common injection strategies, while Chapter 8 explores examples of exploits and informs readers of defense techniques.
- Part IV:
  - Finally, **Chapters 9 and 10** introduce students to database security testing and auditing, covering vendor-specific processes.

Features

- *Thoughtfully organized*—The text is divided into four main parts to make finding and comparing implementation processes quick and easy.
- *Implementation focuses*—Addressing widely used database implementation, this text demonstrates how to prevent and solve problems with a practical mind-set.
- *SQL injection discussion*—SQL injection poses great challenges to database and security professionals, and *Database Security* is one of the only books on the market to address the topic.
- *Chapter Objectives*—Each chapter begins with a detailed list of the concepts to be mastered. This list gives you a quick reference to the chapter's contents and serves as a useful study aid.
- *Security In Your World*—In each chapter, real-world examples demonstrate viable solutions for various types of threats and intrusions to SQL Server, Oracle, and MySQL databases.
- *Chapter Summary*—Each chapter ends with a summary of the concepts introduced in the chapter. This is a helpful tool for reviewing the material covered in each chapter.
- *Key Terms*—All terms in the chapter introduced with bold text are gathered together in the key terms list at the end of the chapter, with full definitions for each term. This list encourages a more thorough understanding of the chapter's key concepts and is a useful reference.

- *Review Questions*—The end-of-chapter assessment begins with review questions that reinforce the main concepts and techniques covered in each chapter. Answering these questions helps ensure that you have mastered important topics.
- *Case Projects*—One of the best ways to reinforce learning about database security is to practice using the many tools security professionals use. The case projects at the end of the chapters give you practice in applying what you have learned.
- *Hands-On Projects*—Each chapter closes with one or more hands-on projects that help you evaluate and apply the material you have learned. To complete these projects, you must draw on real-world common sense as well as your knowledge of the technical topics covered to that point in the book.

Text and Graphic Conventions

Wherever appropriate, additional information and exercises have been added to this book to help you better understand what is being discussed in the chapter. Icons throughout the text alert you to additional materials. The icons used in this textbook are as follows:

The Note icon is used to present additional helpful material related to the subject being described.

Tips offer extra information on resources and how to solve problems.

Caution icons warn you about potential mistakes or problems and explain how to avoid them.

Each Hands-On Project in this book is preceded by the Activity icon and a description of the exercise that follows.

Case Project icons mark end-of-chapter case projects, which are scenario-based assignments that ask you to apply what you have learned.

Instructor Resources

The Instructor Resources CD includes the following materials (also available online at www.cengage.com):

Electronic Instructor's Manual—The Instructor's Manual that accompanies this book includes additional material to assist in class preparation, including suggestions for classroom activities, discussion topics, and additional activities.

Solutions—The instructor resources include solutions to all end-of-chapter material, including review questions and case projects.

PowerPoint presentations—This book comes with Microsoft PowerPoint slides for each chapter. They're included as a teaching aid for classroom presentation, to make available to students on the network for chapter review, or to be printed for classroom distribution. Instructors, please feel free to add your own slides for additional topics you introduce to the class.

ExamView®—ExamView®, the ultimate tool for objective-based testing needs, is a powerful test generator that enables instructors to create paper-, LAN-, or Web-based tests from test banks designed specifically for their Cengage Course Technology text. Instructors can utilize the ultraefficient QuickTest Wizard to create tests in less than five minutes by taking advantage of Cengage Course Technology's questions banks, or customize their own exams from scratch.

Figure files—All figures and tables in the book are reproduced on the Instructor Resources CD in bitmap format. Similar to the PowerPoint presentations, they're included as a teaching aid for classroom presentation, to make available to students for review, or to be printed for classroom distribution.

- Instructor Resources CD (ISBN 978-1-435-45391-3)

Software and System Requirements

Oracle 11g Release 2 (11.2.0.1.0)

2 GB of RAM

Virtual memory double the amount of RAM

5.22 GB of disk space

32-bit 550 MHz processor minimum or a 64-bit AMD64, or Intel extended memory

256-color video

SQL Server 2008 R2

1 GB of RAM

3.6 GB disk space

1.4 GHz processor or faster

SuperVGA display

.NET Framework 3.5 SP1

SQL Server Native Client

SQL Server setup support files

MySQL 5.5.13

512 MB of RAM

200 MB of disk space

550 MHz processor

256-color video

About the Authors

Alfred Basta, Ph.D., is a Professor of Mathematics, Cryptology, and Information Security. He is a member of the Editorial Board for the *Norwich University Journal of Information Assurance*, and conducts professional speaking engagements on Internet security and networking.

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Special love goes to my fiancé Tony, for his never-ending words of encouragement and whose constant, steadfast belief in me is what inspired the confidence that made this book a reality. *Thank you for knowing me better than I know myself, I love you!*

Finally, I would like to dedicate this book to my son, Anthony, my greatest motivation for finishing. *The stars are always within reach my sweetie, so never stop believing in the magic that life has to offer.*

—Melissa Zgola

To my wife Nadine
"It is the continuing symphony of your loving thoughts, caring actions, and continuous support that stands out as the song of my life."

To our daughter Rebecca, our son Stavros
"Fix your hearts upon God, and love Him with all your strength, for without this no one can be saved or be of any worth. Develop in yourselves an urge for a life of high and noble values. You are like little birds that will soon spread your wings and fly."

To my mother
"You are a never-ending melody of goodness and kindness. You are without equal in this world."

And to the memory of my father
"If one is weighed by the gifts one gives, your values given are beyond estimation."

—Alfred Basta

Thanks to my writing team for patiently answering my endless questions and giving me the chance to participate on this project. You are great examples of how instructors should be and now

I know that gift flows out of the classroom as well! I would like to thank the Cengage Learning staff for their support during the process. This was a great learning and growth experience for me! A huge thank-you also goes out to my friends and family who supported me during this project.

—Dana Bullaboy

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