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Advanced Database Technology and Design

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Advanced Database Technology and Design

Mario Piattini
Oscar Díaz
Editors



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Preface

Since computers were introduced to automate organization management, information system evolution has influenced data management considerably. Applications demand more and more services from information stored in computing systems. These new services impose more stringent conditions on the currently prevailing client/server architectures and relational database management systems (DBMSs). For the purpose of this book, those demands can be arranged along three aspects, namely:

Enhancements on the structural side. The tabular representation of data has proved to be suitable for applications, such as insurance and banking, that have to process large volumes of well-formatted data. However, newer applications such as computer-aided manufacturing or geographic information systems have a tough job attempting to fit more elaborate structures into flat records. Moreover, the SQL'92 types are clearly insufficient to tackle time or multimedia concerns.

Improvements on the behavioral side. Data are no longer the only aspect to be shared. Code can, and must, be shared. DBMS providers are striving to make their products evolve from data servers to code servers. The introduction of rules to support active and deductive capabilities and the inclusion of user-defined data types are now part of that trend.

Architectural issues. New applications need access to heterogeneous and distributed data, require a higher throughput (e.g., large number of transactions in e-commerce applications), or need to share code. The client/server architecture cannot always meet those new demands.

This book aims to provide a gentle and application-oriented introduction to those topics. Motivation and application-development considerations, rather than state-of-the-art research, are the main focus. Examples are extensively used in the text, and a brief selected reading section appears at the end of each chapter for readers who want more information. Special attention is given to the design issues raised by the new trends.

The book is structured as follows:

Part I: Fundamentals

Chapter 1 gives an overview of the evolution of DBMS and how its history has been a continuous effort to meet the increasing demands of the applications. Chapter 2 provides a gentle introduction to the key concepts of conceptual modeling.

Part II: Advanced Technologies

This part presents technological and design issues that we need to face to address new application requirements. The first two chapters deal with rule management, Chapter 3 covers active database systems, and Chapter 4 deductive ones. Chapter 5 examines the concepts of temporal databases and the problems of time management. Chapters 6 and 7 discuss two different ways of introducing object orientation in database technology: the more evolutionary one (object-relational DBMSs) and the more revolutionary one (object-oriented DBMSs). Chapter 8 discusses the issues related to multimedia databases and their management. Chapters 9 and 10 present distributed and mobile DBMSs, respectively. Chapter 11 focuses on security concerns by discussing secure DBMSs. Chapter 12 introduces a new approach to DBMS implementation: component DBMSs.

Part III: Advanced Design Issues

Part III looks at two topics that are necessary for obtaining databases of a certain level of quality. Chapter 13 examines various concepts associated with computer-aided database design that claim to be an effective way to improve database design. Chapter 14 concentrates on considering quality issues in database design and implementation.

As for the audience, the book is targeted to senior undergraduates and graduate students. Thus, it is mainly a textbook. However, database professional and application developers can also find a gentle introduction to these topics and useful hints for their job. The prerequisites for understanding the book are a basic knowledge of relational databases and software engineering. Some knowledge of object-oriented technology and networks is desirable.

We would like to thank Artech House, especially Viki Williams, and Marcela Genero of UCLM for their support during the preparation of this book.

It is our hope that the efforts made by the distinct authors to provide a friendly introduction to their respective areas of expertise will make the reader's journey along the database landscape more pleasant.

*Mario Piattini
Oscar Díaz
August 2000*

Part I:
Fundamentals

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