

# Preface

The objective of this book is to give both innovative and classic knowledge about database integrity concepts. Chapters covering topics on several well-established research areas give the state of the art on basic database integrity issues, active databases, SQL databases and geographical databases, including integrity support in current SQL-compliant commercial systems. Chapters on novel subjects focus on specific problems on recent database paradigms.

Chapters 2 through 5 are included in the first group whereas chapters 6 to 10 conform the second group. A brief summary of each chapter is given in the proper section of the Chapter 1.

Chapter 2 describes from a high semantic level, the integrity problems in the real world focusing on the granularity of the involved concepts. In this sense, the first concept considered is the domain, later the relation and finally more complex restrictions. A mapping from real world constraints to database world constraints is the heart of the first part of this chapter, while the second part exemplifies how this mapping is seeing in SQL-compliant commercial products. The degree of adhesion of every product to the current SQL standard is analyzed, showing how it influences the mapping.

Chapter 3 addresses a very important topic in database design that has been almost neglected in the literature. It deals with some aspects of the transformation of conceptual schematas into logical ones, such as the Entity Relationship construct: the relationship and its associated cardinality constraints.

In the active database context, Chapter 4 surveys the interaction among active rules and integrity constraints from both the static point of view following the recent SQL standard and the dynamic point of view using temporal logic formalism.

Chapter 5 focuses on the relationship existing between the nature of spatial information, spatial relationships, and spatial integrity constraints. The authors propose the use of OMT-G, an object-oriented data model for geographic applications, at an early stage in the specification of integrity constraints in spatial databases.

Even though integrity constraints are usually used to define constraints on data, Chapter 6 illustrates their applicability in several contexts such as semantic query optimization, cooperative query answering, database integration and view update.

The main goal of Chapter 7 is to arrive at a coherent technology for deriving efficient SQL triggers from declarative specifications of arbitrary integrity constraints. In this chapter, the author describes how to implement advanced *datalog* technology for integrity checking in the framework of SQL, showing how to represent and evaluate arbitrarily complex constraints in SQL without incurring major disadvantages usually associated with integrity checking.

Chapter 8 focuses on the generalization of the well-known functional dependencies to object schemas, offering insights on one of the fundamental concepts of the object-oriented approach: object identity. Then the authors describe an approach to generalize functional dependencies to object functional dependencies.

Chapter 9 addresses concepts of a recently introduced paradigm: the Web as the database, and its implications regarding the progressive adaptation of database techniques to Web usage. This chapter deals with different issues related to integrity and its maintenance on the Web and introduces the reader to other related and open issues, such as the query problem and query optimization on the Web.

Finally, Chapter 10 introduces an approach to integrate integrity constraints to the system, as rules into a general (schema) to allow an easy way to define the semantics of a complex data model. This approach is scalable since rules systems can, at any time, be expanded to incorporate concepts of new applications.

Summing up, this book provides an exciting opportunity to understand relevant topics on integrity in databases, and to find out current trends and solutions for consistency problems in different database paradigms.

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