



# Conceptual Data Modeling and Database Design: A Fully Algorithmic Approach, Volume 1: The Shortest Advisable Path

By Christian Mancas

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This new book aims to provide both beginners and experts with a completely algorithmic approach to data analysis and conceptual modeling, database design, implementation, and tuning, starting from vague and incomplete customer requests and ending with IBM DB/2, Oracle, MySQL, MS SQL Server, or Access based software applications. A rich panoply of solutions to actual useful data sub-universes (e.g. business, university, public and home library, geography, history, etc.) is provided, constituting a powerful library of examples.

Four data models are presented and used: the graphical Entity-Relationship, the mathematical EMDM, the physical Relational, and the logical deterministic deductive Datalog ones. For each one of them, best practice rules, algorithms, and the theory beneath are clearly separated. Four case studies, from a simple public library example, to a complex geographical study are fully presented, on all needed levels.

Several dozens of real-life exercises are proposed, out of which at least one per chapter is completely solved. Both major historical and up-to-date references are provided for each of the four data models considered.

The book provides a library of useful solutions to real-life problems and provides valuable knowledge on data analysis and modeling, database design, implementation, and fine tuning.

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### **Editorial Review**

#### Review

"What Christian Mancas wanted to do is to write the best possible book on real, pragmatic database design available, bar none. He succeeded. . . This book will find its way into the literature on database design and development. It has a good number of ideas that must be considered in any design task. It uses a sample-based approach and is thus easy to understand. It supports digestion due to nice exercises. And, finally it discusses in details also the result of a design in different DBMS languages. So, a reader can be sure that the book guides to the right track."

?Bernhard Thalheim, Department of Computer Science, Christian-Albrechts-University Kiel, Germany  
(from the Foreword)

"Covers the classical data management topics that any computer professional should master. . . . This volume is a gentle yet rigorous and extensive introduction to the main topics in data management, with concrete examples on several popular database systems. There are lots of detailed examples, and each concept is covered in detail, and from several perspectives, using alternative definitions or notations where needed. The book ensures that no reader is left behind, and all potential questions are answered. . . . Best suited for the practitioner who wants to achieve a thorough understanding of the fundamental concepts in data management. . . . This volume is an important first step in understanding the complexities of data today."

?Dan Suciu, Professor, University of Washington, Seattle, USA (from the Foreword)

"One of the biggest problems in nowadays applications is the management of data. Analyzing and structuring large amounts of data relies on understanding and being able to describe its properties and constraints. Professor Christian Mancas's exceptionally well-documented work, A Conceptual Data Modeling and Database Design, gives the basic insights of the database models and their importance as a foundation for the complex applications. This book guides the reader throughout real-life scenarios, providing essential software engineering advice. Indeed, by addressing some of the problems people usually encounter when designing a database, Professor Mancas pedagogically connects the end user's requirements to the notions of entities and relations between them. Meanwhile, the mathematical analysis and proofs sustain the theoretical background of the statements and provide a complete view of the possible algorithmic optimizations. The first volume, A Fully Algorithmic Approach: The Shortest Advisable Path, represents an important contribution in the learning process as it advocates best practice rules in database designs with clear explanations and practical exercises.

"This first volume mainly presents Professor Mancas's point of view of the database design state of the art (enriched with his main original contributions to the E-RDM and RDM). I am looking forward for the second volume of this book that will mainly present his most important contribution to the conceptual data modeling and database design: his (Elementary) Mathematical Data Model [(E)MDM], as well as MatBase, his KDBMS prototype based on both (E)MDM, E-RDM, RDM, and Datalog."

?Andra Hugo, PhD, University of Bordeaux, France

"Modern scientific and business challenges, the proliferation of personal computers and intelligent gadgets, the Internet and industries' large amounts of data, all fuel a huge need of database management systems. The

book by C. Mancas is an excellent introduction to pragmatic database design and development. Presented in a gentle manner, with many examples, the book is suited to a large category of readers, from computer science and engineering students to the practitioners of the domain."

?Cristian S. Calude, Chair Professor, Department of Computer Science, University of Auckland, New Zealand

#### About the Author

**Christian Mancas, PhD**, is currently an associate professor with both the Mathematics and Computer Science Departments of Ovidius University, Constanta, Romania, and the Engineering Taught in Foreign Languages Department (Computer Science and Telecommunications in English stream) of Politehnica University, Bucharest, Romania (as an invited professor). Since 2012, he is also a database architect with Asentinel International srl, Bucharest, a subsidiary of Asentinel LLC, Memphis, Tennessee. His specialties include university teaching, R&D, business analysis, conceptual data and knowledge modeling and querying, client-server, hierarchical software architecture, object-oriented, event-driven design, structured development, complex project and small IT company management, Datalog, SQL, C#, XML programming, etc.

Professor Christian Mancas has published dozens of scientific papers (in Romania, USA, Austria, and Greece), which have been indexed by ACM Digital Library, Zentralblatt, Scopus, DBLP, Arnetminer, Researchr, TDGS, SCEAS, etc. He has also published three books in Romanian and dozens of reviews (mostly in USA, including ACM Reviews). He was a program committee member and session chairman for several software conferences in USA, Austria, and Romania, and he is a member of several associations (including ACM, the Romanian Mathematics Sciences Society, and the International Who's Who of Professionals). Since 2006, his biography is included in Marquis *Who's Who in the World* and *Who's Who in Science and Engineering* and Hubners' *Who's Who in Romania*.

Since 1990, he also worked for several IT startups, including his own DATASIS Consult srl (co-owned with his good friend and faculty colleague Ion Draghicescu) and DATASIS ProSoft srl (who had 25 programmers working for the design and development of several ERP-type database applications for customers from France, UK, Switzerland, USA, Israel, Greece, and Romania).

His main research areas are conceptual data and knowledge modeling and querying; database design, implementation, and optimization; as well as the architecture, design, development, fine-tuning, and maintenance of data and knowledge base management systems.

Dr. Mancas graduated in 1977 from the Computers Department of Politehnica University of Bucharest, Romania, with a thesis on Generating Parsers for LR(k) Grammars, under the supervision of Professor Dan Luca Serbanati. Up until the fall of communism in 1990, he worked as a software engineer and, since 1980, R&D manager of a state-owned Computer Center in Bucharest (contributing to the design, development, and maintenance of a dedicated ERP), also conducting (from time to time) computer programming labs at Politehnica University of Bucharest, but for political reasons, he was not accepted for PhD studies. He started this program under the supervision of Professor Cristian Giumale in 1992 and obtained his PhD in 1997 from the above department, with a thesis on Conceptual Data and Knowledge Modeling.

## **Users Review**

### **From reader reviews:**

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#### **Theresa Nash:**

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