

Chapter 5

Advanced Data Modeling

Chapter Focus

- The first part of the chapter covers the Extended Entity Relationship Model.
 - a. the use of entity super types and subtypes is presented.
 - b. specialization hierarchy example in Figure 5.2 is used to illustrate the main constructs.
 - c. the benefits of attribute inheritance and relationship inheritance are presented.
 - d. Remember that an entity supertype and an entity subtype are related in a 1:1 relationship.
 - e. Emphasis is put on the use of the subtype discriminator and the concept of overlapping and disjoint constraints in relation to entity subtypes is presented.
 - f. The completeness constraint indicates whether all entity supertypes must have at least one subtype.
 - g. the specialization and generalization hierarchies are explored.
 - h. Finally, the use of entity clusters as an alternative method to simplify crowded data models are explained.
- The second part of the chapter covers the importance of proper primary key selection.
 - a. It starts by clearly stating the function of a PK -- identification -- and how that function differs from the descriptive nature of the other attributes in an entity. The use of PKs to uniquely identify each entity instance is emphasized.
 - b. natural keys, primary keys, and surrogate keys are presented again.
 - c. the primary key guidelines that specify the PK characteristics. PKs must be unique, non-intelligent, they do not change over time, they are ideally composed of a single attribute, they are numeric, and they are security compliant.
 - d. Finally, a contrast between the use of surrogate and composite primary keys presented. Remember, composite primary keys are useful in composite entities where each primary key combination is allowed only once in the M:N relationship.
- The third part of the chapter covers four special design cases:
 - a. Implementing 1:1 relationships.
 - b. Maintaining the history of time-variant data.
 - c. Fan traps.
 - d. Redundant relationships.

Chapter Data Modeling

Graeme C. Simsion, Graham C. Witt



Chapter Data Modeling:

Data Modeling Essentials Graeme C. Simson, 1994 *Data Modeling Essentials* is a comprehensive guide to data modeling for commercial information systems Data modeling is presented as a design activity which offers opportunities for creativity and innovation

[Database Modeling and Design](#) Toby J. Teorey, Sam S. Lightstone, Tom Nadeau, H.V. Jagadish, 2011-02-10 *Database Modeling and Design* Fifth Edition focuses on techniques for database design in relational database systems This extensively revised fifth edition features clear explanations lots of terrific examples and an illustrative case and practical advice with design rules that are applicable to any SQL based system The common examples are based on real life experiences and have been thoroughly class tested This book is immediately useful to anyone tasked with the creation of data models for the integration of large scale enterprise data It is ideal for a stand alone data management course focused on logical database design or a supplement to an introductory text for introductory database management In depth detail and plenty of real world practical examples throughout Loaded with design rules and illustrative case studies that are applicable to any SQL UML or XML based system Immediately useful to anyone tasked with the creation of data models for the integration of large scale enterprise data

The Software Principles of Design for Data Modeling Samanta, Debabrata, 2023-09-12 *The Software Principles of Design for Data Modeling* written by Debabrata Samanta of Rochester Institute of Technology in Kosovo offers a practical and comprehensive solution to the challenges of designing effective software architecture for data modeling This book covers key topics such as gathering requirements modeling requirements with use cases testing the system building entity relationship models building class models in UML with patterns of data modeling and software quality attributes and use case modeling It also includes case studies of relational and object relational database schema design The unique approach of this book lies in its unifying method for designing software architecture for data modeling It addresses specific design issues for various types of software systems including object oriented client server service oriented component based real time and software product line architectures With its practical guidance standard method for modeling requirements and analysis and comprehensive coverage of key topics and case studies this book is a must read for anyone interested in designing effective software architecture for data modeling whether you are an academic scholar or a professional in the field

Data Modeling with Tableau Kirk Munroe, 2022-12-30 Save time analyzing volumes of data using best practices to extract model and create insights from your data Key Features Master best practices in data modeling with Tableau Prep Builder and Tableau Desktop Apply Tableau Server and Cloud to create and extend data models Build organizational data models based on data and content governance best practices Book Description Tableau is unlike most other BI platforms that have a single data modeling tool and enterprise data model for example LookML from Google's Looker That doesn't mean Tableau doesn't have enterprise data governance it is both robust and very flexible This book will help you build a data driven organization with the proper use of Tableau governance models

Data Modeling with Tableau is an extensive guide complete with step by step explanations of essential concepts practical examples and hands on exercises As you progress through the chapters you will learn the role that Tableau Prep Builder and Tableau Desktop each play in data modeling You ll also explore the components of Tableau Server and Cloud that make data modeling more robust secure and performant Moreover by extending data models for Ask and Explain Data you ll gain the knowledge required to extend analytics to more people in their organizations leading to better data driven decisions Finally this book will get into the entire Tableau stack and get the techniques required to build the right level of governance into Tableau data models for the right use cases By the end of this Tableau book you ll have a firm understanding of how to leverage data modeling in Tableau to benefit your organization What you will learn Showcase Tableau published data sources and embedded connections Apply Ask Data in data cataloging and natural language query Exhibit features of Tableau Prep Builder with hands on exercises Model data with Tableau Desktop through examples Formulate a governed data strategy using Tableau Server and Cloud Optimize data models for Ask and Explain Data Who this book is for This book is for data analysts and business analysts who are looking to expand their data skills offering a broad foundation to build better data models in Tableau for easier analysis and better query performance It will also benefit individuals responsible for making trusted and secure data available to their organization through Tableau such as data stewards and others who work to take enterprise data and make it more accessible to business analysts

Data Modeling with Microsoft Excel Bernard Obeng Boateng, 2023-11-30 Save time analyzing volumes of data using a structured method to extract model and create insights from your data Key Features Acquire expertise in using Excel s Data Model and Power Pivot to connect and analyze multiple sources of data Create key performance indicators for decision making using DAX and Cube functions Apply your knowledge of Data Model to build an interactive dashboard that delivers key insights to your users Purchase of the print or Kindle book includes a free PDF eBook Book Description Microsoft Excel s BI solutions have evolved offering users more flexibility and control over analyzing data directly in Excel Features like PivotTables Data Model Power Query and Power Pivot empower Excel users to efficiently get transform model aggregate and visualize data Data Modeling with Microsoft Excel offers a practical way to demystify the use and application of these tools using real world examples and simple illustrations This book will introduce you to the world of data modeling in Excel as well as definitions and best practices in data structuring for both normalized and denormalized data The next set of chapters will take you through the useful features of Data Model and Power Pivot helping you get to grips with the types of schemas snowflake and star and create relationships within multiple tables You ll also understand how to create powerful and flexible measures using DAX and Cube functions By the end of this book you ll be able to apply the acquired knowledge in real world scenarios and build an interactive dashboard that will help you make important decisions What you will learn Implement the concept of data modeling within and beyond Excel Get transform model aggregate and visualize data with Power Query Understand best practices for data structuring in MS Excel

Build powerful measures using DAX from the Data Model Generate flexible calculations using Cube functions Design engaging dashboards for your users Who this book is for This book is for Excel users looking for hands on and effective methods to manage and analyze large volumes of data within Microsoft Excel using Power Pivot Whether you re new or already familiar with Excel s data analytics tools this book will give you further insights on how you can apply Power Pivot Data Model DAX measures and Cube functions to save time on routine data management tasks An understanding of Excel s features like tables PivotTable and some basic aggregating functions will be helpful but not necessary to make the most of this book

Data Modeling for MongoDB Steve Hoberman,2014-06-01 Congratulations You completed the MongoDB application within the given tight timeframe and there is a party to celebrate your application s release into production Although people are congratulating you at the celebration you are feeling some uneasiness inside To complete the project on time required making a lot of assumptions about the data such as what terms meant and how calculations are derived In addition the poor documentation about the application will be of limited use to the support team and not investigating all of the inherent rules in the data may eventually lead to poorly performing structures in the not so distant future Now what if you had a time machine and could go back and read this book You would learn that even NoSQL databases like MongoDB require some level of data modeling Data modeling is the process of learning about the data and regardless of technology this process must be performed for a successful application You would learn the value of conceptual logical and physical data modeling and how each stage increases our knowledge of the data and reduces assumptions and poor design decisions Read this book to learn how to do data modeling for MongoDB applications and accomplish these five objectives Understand how data modeling contributes to the process of learning about the data and is therefore a required technique even when the resulting database is not relational That is NoSQL does not mean NoDataModeling Know how NoSQL databases differ from traditional relational databases and where MongoDB fits Explore each MongoDB object and comprehend how each compares to their data modeling and traditional relational database counterparts and learn the basics of adding querying updating and deleting data in MongoDB Practice a streamlined template driven approach to performing conceptual logical and physical data modeling Recognize that data modeling does not always have to lead to traditional data models Distinguish top down from bottom up development approaches and complete a top down case study which ties all of the modeling techniques together This book is written for anyone who is working with or will be working with MongoDB including business analysts data modelers database administrators developers project managers and data scientists There are three sections In Section I Getting Started we will reveal the power of data modeling and the tight connections to data models that exist when designing any type of database Chapter 1 compare NoSQL with traditional relational databases and where MongoDB fits Chapter 2 explore each MongoDB object and comprehend how each compares to their data modeling and traditional relational database counterparts Chapter 3 and explain the basics of adding querying updating and deleting data in MongoDB Chapter 4 In

Section II Levels of Granularity we cover Conceptual Data Modeling Chapter 5 Logical Data Modeling Chapter 6 and Physical Data Modeling Chapter 7 Notice the ing at the end of each of these chapters We focus on the process of building each of these models which is where we gain essential business knowledge In Section III Case Study we will explain both top down and bottom up development approaches and go through a top down case study where we start with business requirements and end with the MongoDB database This case study will tie together all of the techniques in the previous seven chapters Nike Senior Data Architect Ryan Smith wrote the foreword Key points are included at the end of each chapter as a way to reinforce concepts In addition this book is loaded with hands on exercises along with their answers provided in Appendix A Appendix B contains all of the book s references and Appendix C contains a glossary of the terms used throughout the text

Fuzzy Logic in Data Modeling Guoqing Chen,2012-12-06 also in THE KLUWER INTERNATIONAL SERIES ON ASIAN STUDIES IN COMPUTER AND INFORMATION SCIENCE Volume 2 Data Modeling Essentials Graeme C. Simson,Graham C. Witt,2001 This essential guide focuses on data quality and why the data model is so important plus includes essential material on developing a real model and covers organization of the modeling task and managing compromises **Data Modeling Fundamentals** Paulraj Ponniah,2007-06-30 The purpose of this book is to provide a practical approach for IT professionals to acquire the necessary knowledge and expertise in data modeling to function effectively It begins with an overview of basic data modeling concepts introduces the methods and techniques provides a comprehensive case study to present the details of the data model components covers the implementation of the data model with emphasis on quality components and concludes with a presentation of a realistic approach to data modeling It clearly describes how a generic data model is created to represent truly the enterprise information requirements **MySQL Workbench: Data Modeling & Development** Michael McLaughlin,2013-04-30 MySQL Workbench Data Modeling and Development helps developers learn how to effectively use this powerful product for database modeling reverse engineering and interaction with the database without writing SQL statements MySQL Workbench is a graphical user interface that developers can use to create and maintain MySQL databases without coding The book covers the interface and explains how to accomplish each step by illustrating best practices visually *Beginning Database Design* Gavin Powell,2006 From the 1 source for computing information trusted by more than six million readers worldwide Database Modeling Step by Step Gavin Powell,2020-01-06 With the aim of simplifying relational database modeling Database Modeling Step by Step presents the standard approach to database normalization and then adds its own approach which is a more simplistic intuitive way to building relational database models Going from basics to contemporary topics the book opens with relational data modeling and ends with BigData database modeling following a road map of the evolution in relational modeling and including brief introductions to data warehousing and BigData modeling A break down of the elements of a model explains what makes up a relational data model This is followed by a comparison between standard normalization and a more simplistic intuitive

approach to data modeling that a beginner can follow and understand A brief chapter explains how to use the database programming language SQL Structured Query Language which reads from and writes to a relational database SQL is fundamental to data modeling because it helps in understanding how the model is used In addition to the relational model the last three chapters cover important modern world topics including denormalization that leads into data warehouses and BigData database modeling The book explains how there is not much to logical data modeling in BigData databases because as they are often schema less which means that BigData databases do not have schemas embedded into the database itself they have no metadata and thus not much of a logical data model Online bonus chapters include a case study that covers relational data modeling and are available at the author s web site www.oracletroubleshooter.com/datamodeling.html

Data Modeling Essentials Graeme Simsion,Graham Witt,2004-12-03 Data Modeling Essentials Third Edition covers the basics of data modeling while focusing on developing a facility in techniques rather than a simple familiarization with the rules In order to enable students to apply the basics of data modeling to real models the book addresses the realities of developing systems in real world situations by assessing the merits of a variety of possible solutions as well as using language and diagramming methods that represent industry practice This revised edition has been given significantly expanded coverage and reorganized for greater reader comprehension even as it retains its distinctive hallmarks of readability and usefulness Beginning with the basics the book provides a thorough grounding in theory before guiding the reader through the various stages of applied data modeling and database design Later chapters address advanced subjects including business rules data warehousing enterprise wide modeling and data management It includes an entirely new section discussing the development of logical and physical modeling along with new material describing a powerful technique for model verification It also provides an excellent resource for additional lectures and exercises This text is the ideal reference for data modelers data architects database designers DBAs and systems analysts as well as undergraduate and graduate level students looking for a real world perspective Thorough coverage of the fundamentals and relevant theory Recognition and support for the creative side of the process Expanded coverage of applied data modeling includes new chapters on logical and physical database design New material describing a powerful technique for model verification Unique coverage of the practical and human aspects of modeling such as working with business specialists managing change and resolving conflict

A Complete System for Estimating the Quantities and Costs of Frame and Brick Houses Alfred J. Donley,1926 Handbook of Research on Innovations in Database Technologies and Applications Viviana E. Ferraggine,Jorge H. Doorn,Laura C. Rivero,2009-01-01 This book provides a wide compendium of references to topics in the field of the databases systems and applications Provided by publisher Data Management Richard T. Watson,1999 Using organisational memory as a motivating feature this book teaches the critical value of data to an organisation and how to manage it effectively The text concentrates on how databases are used and designed as well as other management

technologies *A Hypothetical Enhanced Renewable Energy Utilization (EREU) Model for Electricity Generation in Thailand* Thomas Andexer, 2008-10-29 Master's Thesis from the year 2008 in the subject Environmental Sciences grade Passed Assumption University of Thailand College of Internet Distance Education CIDE School of Business Administration course Master Thesis Project language English abstract This thesis presents a research project entitled A Hypothetical Enhanced Renewable Energy Utilization EREU Model for Electricity Generation in Thailand This research is motivated by Thailand's rapidly increasing electricity consumption caused by the country's long standing above average economic growth Consequently the rising electricity demand can only be satisfied by continuously growing electricity imports and thus creating a significant burden to Thailand's national budget Further more Thailand is heavily dependent on natural gas reserves for electricity generation however these are expected to be depleted within only three decades and global price levels for conventional fuels are increasingly volatile with an ascending tendency as well Therefore Thailand faces an urgent need to strategically plan for the broad utilization of domestic renewable energy resources which is essential for a more diversified and thus sustainable electricity generation as well as for the nation's endeavor to become an energy hub within the South East Asian region Under these circumstances this research conducts a comprehensive literature review regarding the past development as well as the current situation of renewable energy utilization in Thailand which concludes in the identification of the importance of renewable energy in the given context and closes with both a distinctive need assessment and a conceptual framework for Thailand's future renewable energy strategy Subsequently the research introduces a unique primary research endeavor in the form of an explorative expert interview survey which succeeds in a substantial collection of qualitative and in depth data These valuable data is first objectively analyzed and second subjectively interpreted and summarized to become the major source for the derivation of a multitude of potential strategic recommendations for an enhanced future renewable energy utilization development in Thailand Finally the entirety of these recommended strategic approaches based on both the secondary and primary research are assembled to develop the Enhanced Renewable Energy Utilization EREU model for electricity generation in Thailand as the fundamental finding of this thesis and research project respectively *Data Modeling Made Simple with CA ERwin Data Modeler r8* Donna Burbank, Steve Hoberman, 2011-08-01 Data Modeling Made Simple with CA ERwin Data Modeler r8 will provide the business or IT professional with a practical working knowledge of data modeling concepts and best practices and how to apply these principles with CA ERwin Data Modeler r8 You'll build many CA ERwin data models along the way mastering first the fundamentals and later in the book the more advanced features of CA ERwin Data Modeler This book combines real world experience and best practices with down to earth advice humor and even cartoons to help you master the following ten objectives 1 Understand the basics of data modeling and relational theory and how to apply these skills using CA ERwin Data Modeler 2 Read a data model of any size and complexity with the same confidence as reading a book 3 Understand the difference between conceptual logical and

physical models and how to effectively build these models using CA ERwin's Data Modeler's Design Layer Architecture 4 Apply techniques to turn a logical data model into an efficient physical design and vice versa through forward and reverse engineering for both top down and bottom up design 5 Learn how to create reusable domains naming standards UDPs and model templates in CA ERwin Data Modeler to reduce modeling time improve data quality and increase enterprise consistency 6 Share data model information with various audiences using model formatting and layout techniques reporting and metadata exchange 7 Use the new workspace customization features in CA ERwin Data Modeler r8 to create a workflow suited to your own individual needs 8 Leverage the new Bulk Editing features in CA ERwin Data Modeler r8 for mass metadata updates as well as import export with Microsoft Excel 9 Compare and merge model changes using CA ERwin Data Modeler's Complete Compare features 10 Optimize the organization and layout of your data models through the use of Subject Areas Diagrams Display Themes and more Section I provides an overview of data modeling what it is and why it is needed The basic features of CA ERwin Data Modeler are introduced with a simple easy to follow example Section II introduces the basic building blocks of a data model including entities relationships keys and more How to examples using CA ERwin Data Modeler are provided for each of these building blocks as well as real world scenarios for context Section III covers the creation of reusable standards and their importance in the organization From standard data modeling constructs such as domains to CA ERwin specific features such as UDPs this section covers step by step examples of how to create these standards in CA ERwin Data Modeling from creation to template building to sharing standards with end users through reporting and queries Section IV discusses conceptual logical and physical data models and provides a comprehensive case study using CA ERwin Data Modeler to show the interrelationships between these models using CA ERwin's Design Layer Architecture Real world examples are provided from requirements gathering to working with business sponsors to the hands on nitty gritty details of building conceptual logical and physical data models with CA ERwin Data Modeler r8 From the Foreword by Tom Bilcze President CA Technologies Modeling Global User Community Data Modeling Made Simple with CA ERwin Data Modeler r8 is an excellent resource for the ERwin community The data modeling community is a diverse collection of data professionals with many perspectives of data modeling and different levels of skill and experience Steve Hoberman and Donna Burbank guide newbie modelers through the basics of data modeling and CA ERwin r8 Through the liberal use of illustrations the inexperienced data modeler is graphically walked through the components of data models and how to create them in CA ERwin r8 As an experienced data modeler Steve and Donna give me a handbook for effectively using the new and enhanced features of this release to bring my art form to life The book delves into advanced modeling topics and techniques by continuing the liberal use of illustrations It speaks to the importance of a defined data modeling architecture with soundly modeled data to assist the enterprise in understanding of the value of data It guides me in applying the finishing touches to my data designs

Building J2EE Applications with the Rational Unified Process Peter Eeles, Kelli

Houston, Wojtek Kozaczynski, 2003 PLEASE PROVIDE SUMMARY

Army Paperwork James Alfred Moss, 1917

The Enigmatic Realm of **Chapter Data Modeling**: Unleashing the Language is Inner Magic

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