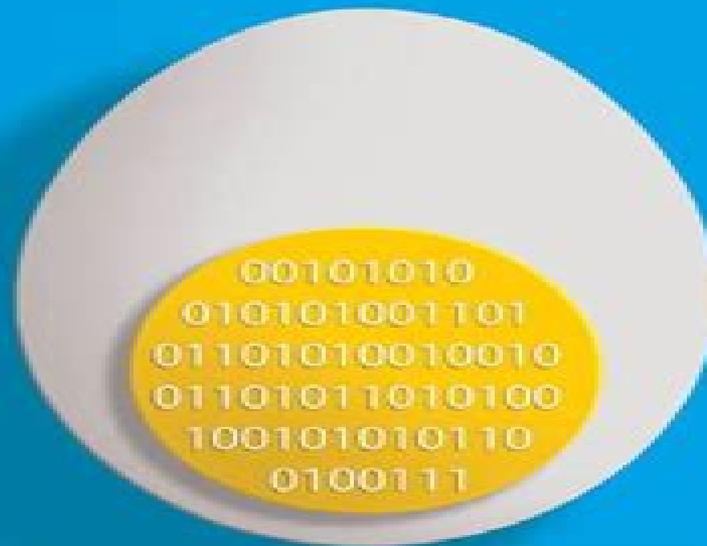


# NOSQL AND SQL DATA MODELING

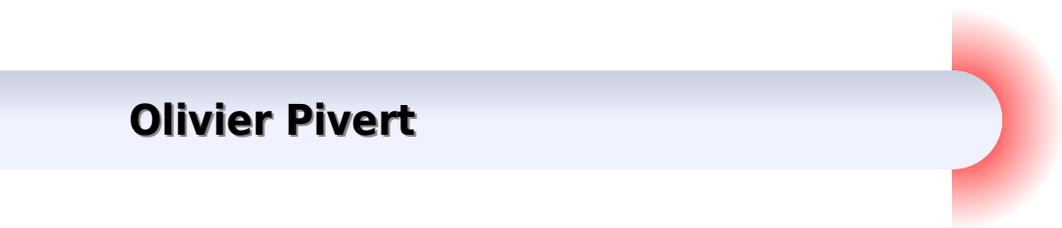
Bringing Together Data, Semantics, and Software



TED HILLS

# Nosql And Sql Data Modeling Bringing Together Data Semantics And Software

**Olivier Pivert**



## **Nosql And Sql Data Modeling Bringing Together Data Semantics And Software:**

*NoSQL and SQL Data Modeling* Ted Hills, 2016 How do we design for data when traditional design techniques cannot extend to new database technologies In this era of big data and the Internet of Things it is essential that we have the tools we need to understand the data coming to us faster than ever before and to design databases and data processing systems that can adapt easily to ever changing data schemas and ever changing business requirements There must be no intellectual disconnect between data and the software that manages it It must be possible to extract meaning and knowledge from data to drive artificial intelligence applications Novel NoSQL data organization techniques must be used side by side with traditional SQL databases Are existing data modeling techniques ready for all of this The Concept and Object Modeling Notation COMN is able to cover the full spectrum of analysis and design A single COMN model can represent the objects and concepts in the problem space logical data design and concrete NoSQL and SQL document key value columnar and relational database implementations COMN models enable an unprecedented level of traceability of requirements to implementation COMN models can also represent the static structure of software and the predicates that represent the patterns of meaning in databases This book will teach you the simple and familiar graphical notation of COMN with its three basic shapes and four line styles how to think about objects concepts types and classes in the real world using the ordinary meanings of English words that aren't tangled with confused techno speak how to express logical data designs that are freer from implementation considerations than is possible in any other notation how to understand key value document columnar and table oriented database designs in logical and physical terms how to use COMN to specify physical database implementations in any NoSQL or SQL database with the precision necessary for model driven development I believe that this is a breakthrough modeling technique and it is technique not just notation COMN provides notation to handle all of the constructs that E R techniques don't do well and it steps up to the problem of linking physical and conceptual models I'm convinced that COMN is the future of data modeling Dave Wells BI and Analytics Educator and Consultant Infocentric

**Bridging Relational and NoSQL Databases** Gaspar, Drazena, Coric, Ivica, 2017-11-30 Relational databases have been predominant for many years and are used throughout various industries The current system faces challenges related to size and variety of data thus the NoSQL databases emerged By joining these two database models there is room for crucial developments in the field of computer science Bridging Relational and NoSQL Databases is an innovative source of academic content on the convergence process between databases and describes key features of the next database generation Featuring coverage on a wide variety of topics and perspectives such as BASE approach CAP theorem and hybrid and native solutions this publication is ideally designed for professionals and researchers interested in the features and collaboration of relational and NoSQL databases

**Model and Data Engineering** El Hassan Abdelwahed, Ladjel Bellatreche, Mattéo Golfarelli, Dominique Méry, Carlos Ordonez, 2018-10-19 This book constitutes the refereed proceedings of the 8th International

Conference on Model and Data Engineering MEDI 2018 held in Marrakesh Morocco in October 2018 The 23 full papers and 4 short papers presented together with 2 invited talks were carefully reviewed and selected from 86 submissions The papers covered the recent and relevant topics in the areas of databases ontology and model driven engineering data fusion classification and learning communication and information technologies safety and security algorithms and text processing and specification verification and validation

On the Move to Meaningful Internet Systems: OTM 2019 Workshops  
Christophe Debruyne, Hervé Panetto, Wided Guédria, Peter Bollen, Ioana Ciuciu, George Karabatis, Robert Meersman, 2020-02-12 This volume constitutes the refereed proceedings of the Confederated International International Workshop on Enterprise Integration Interoperability and Networking EI2N Fact Based Modeling FBM Industry Case Studies Program ICSP International Workshop on Methods Evaluation Tools and Applications for the Creation and Consumption of Structured Data for the e Society Meta4eS and 1st International Workshop on Security via Information Analytics and Applications SIAnA 2019 held as part of OTM 2018 in October 2019 in Rhodes Greece As the three main conferences and the associated workshops all share the distributed aspects of modern computing systems they experience the application pull created by the Internet and by the so called Semantic Web in particular developments of Big Data increased importance of security issues and the globalization of mobile based technologies

Konsep Dasar Basis Data Ari Usman, Janeman Sumah, Pradani Ayu Widya Purnama, Fachri Auliansyah Siregar, Guntur Maha Putra, Reynaldi Siwalette, Nouval Trezandy Lapatta, Akmal Nasution, 2025-03-08 Buku ini membahas tentang konsep dasar basis data yang melibatkan pengorganisasian dan penyimpanan informasi dalam struktur yang terstruktur agar mudah diakses dikelola dan diperbarui Basis data biasanya menggunakan sistem manajemen basis data DBMS untuk mengelola data secara efisien Data dalam basis data disusun dalam tabel yang terdiri dari baris record dan kolom field Setiap tabel memiliki kunci utama yang unik untuk mengidentifikasi setiap entri Relasi antar tabel dapat dibentuk melalui kunci asing Model basis data yang umum digunakan adalah model relasional yang menyimpan data dalam tabel yang saling terkait Penggunaan basis data memungkinkan penyimpanan yang terorganisir mempermudah pencarian informasi serta mengurangi redundansi dan inkonsistensi data

**Digibeter - Data, processen en systemen in de zorg** Victor van Reijswoud, Vera Molenaar, 2025-06-10 html body data pb style AC9LJH8 justify content flex start display flex flex direction column background position left top background size cover background repeat no repeat background attachment scroll Op steeds meer terreinen in de gezondheidszorg zijn technologie en digitalisering een belangrijke bepalende factor geworden en vaak ook onmisbaar Toch worden zorgprofessionals nog maar mondjesmaat betrokken bij de ontwikkeling van nieuwe systemen of systeemverbeteringen De auteurs van dit boek houden een pleidooi voor het betrekken zijn van de zorgprofessionals in het hele traject van ontwikkeling naar implementatie van zorgtechnologie Voorwaardelijk hiervoor is dat zorgprofessionals kennis hebben van de wereld van technologie In dit boek wordt op een begrijpelijke manier uitleg gegeven over informatiesystemen data in de zorg proces en systeemverbetering

softwareontwikkeling Maar ook data ethiek en de rol van gebruikers komen aan de orde Dit boek is geschikt voor alle zorgprofessionals die meer eigenaarschap en zeggenschap willen nemen voor de digitalisering in de zorg en willen participeren in digitale vernieuwing Het bestaat uit een afwisseling van theorie casu stiek en opdrachten en kan worden gebruikt in opleidingen en de dagelijkse praktijk van zorgprofessionals Ervaringen met Digibeter Het boek geeft je inzicht over de opbouw en werking van digitale structuren waarin je stapsgewijs wordt meegenomen Je maakt kennis met de mogelijkheden en beperkingen van deze structuren en leert digitale verbanden te leggen waar je vooraf geen weet van hebt Claudia Cools verpleegkundige Mijzo Digibeter is in zijn opzet innoverend prikkelend en uitnodigend De kennis die ik heb opgedaan gebruik ik nog dagelijks bij het uitvoeren van mijn werkzaamheden als Hbo verpleegkundige Lotte de Boer verpleegkundige GGZ WNB DigiBeter daagt je uit om kennis te maken met de inzichten van de digitale wereld rondom jouw werkveld Je leert de processen te begrijpen die nodig zijn voor jouw ontwikkeling als professional en hoe je jouw werkveld hierin meeneemt Corrina Heemsbergen verpleegkundige i o GGZ E Digibeter is uniek en heeft mij echt een kijkje in andermans keuken gegeven De specifieke kennis en de toepassing in mijn eigen werkveld hebben verrassende inzichten gegeven Debbie Krol wijkverpleegkundige Thebe

**Graph Data Modeling for NoSQL and SQL** Thomas Frisendal, 2016

Master a graph data modeling technique superior to traditional data modeling for both relational and NoSQL databases graph document key value and column leveraging cognitive psychology to improve big data designs From Karen Lopez s Foreword In this book Thomas Frisendal raises important questions about the continued usefulness of traditional data modeling notations and approaches Are Entity Relationship Diagrams ERDs relevant to analytical data requirements Are ERDs relevant in the new world of Big Data Are ERDs still the best way to work with business users to understand their needs Are Logical and Physical Data Models too closely coupled Are we correct in using the same notations for communicating with business users and developers Should we refine our existing notations and tools to meet these new needs or should we start again from a blank page What new notations and approaches will we need How will we use those to build enterprise database systems Frisendal takes us through the history of data modeling enterprise data models and traditional modeling methods He points out quite contentiously where he feels we have gone wrong and in a few places where we got it right He then maps out the psychology of meaning and context while identifying important issues about where data modeling may or may not fit in business modeling The main subject of this work is a proposal for a new exploration driven modeling approach and new modeling notations for business concept models business solutions models and physical data models with examples on how to leverage those for implementing into any target database or datastore These new notations are based on a property graph approach to modeling data From the author s introduction This book proposes a new approach to data modeling one that turns the inside out For well over thirty years relational modeling and normalization was the name of the game One can ask that if normalization was the answer what was the problem There is

something upside down in that approach as we will see in this book Data analysis modeling is much like exploration Almost literally The data modeler wanders around searching for structure and content It requires perception and cognitive skills supported by intuition a psychological phenomenon that together determine how well the landscape of business semantics is mapped Mapping is what we do we explore the unknowns draw the maps and post the Here be Dragons warnings Of course there are technical skills involved and surprisingly the most important ones come from psychology and visualization again perception and cognition rather than pure mathematical ability Two compelling events make a paradigm shift in data modeling possible and also necessary The advances in applied cognitive psychology address the needs for proper contextual framework and for better communication also in data modeling and The rapid intake of non relational technologies Big Data and NoSQL

**Data Modeling With NoSQL Database** Sultan Ahmad,Ajit Singh,2021-03-30 An important step in database implementation is the data modeling because it facilitates the understanding of the project through key features that can prevent programming and operation errors In database technologies some of the new issues increasingly debated arenon conventional applications including NoSQL Not only SQL databases whichwere initially created in response to the needs for better scalability lowerlatency and higher flexibility in an era of bigdata and cloud computing Thesenon functional aspects are the main reason for using NoSQL database Data modeling has an important role to play in NoSQL environments The datamodeling process involves the creation of a diagram that represents the meaning of the data and the relationship between the data elements Thus understanding is a fundamental aspect of data modeling and a pattern for this kind of representation has few contributions for NoSQL databases This book explains a NoSQL data modeling standard introducing modeling techniques that can be used on document oriented databases We have considered Cassandra and Riak NoSQL databases because of the heterogeneous characteristics of each NoSQL database classification so that to fill the knowledge gap by studying the available non relational databases in order to develop a systematic approach for solving problems of data persistence using these technologies Ajit Sultan

**NoSQL and SQL Logical and Physical Data Modeling with COMN** Ted Hills,2017 The Concept and Object Modeling Notation COMN supports contextual logical and physical data modeling for NoSQL and SQL DBMSs In this advanced class Ted Hills will walk through two physical models for a hypothetical coffee shop business exploring a design for a document database for order capture and a traditional SQL database for data warehousing a Star Schema A COMN logical model ties it all together ensuring that the two very different physical database designs are representing the same logical data Along the way Ted will explain the COMN notation Resource description page

[Data Modeling with NoSQL Database](#) Ajit Singh,2022-11-06 An important step in database implementation is the data modeling because it facilitates the understanding of the project through key features that can prevent programming and operation errors In database technologies some of the new issues increasingly debated are non conventional applications including NoSQL Not only SQL databases which were initially created in response to the needs for better scalability lower latency and

higher flexibility in an era of bigdata and cloud computing These non functional aspects are the main reason for using NoSQL database Data modeling has an important role to play in NoSQL environments The data modeling process involves the creation of a diagram that represents the meaning of the data and the relationship between the data elements Thus understanding is a fundamental aspect of data modeling and a pattern for this kind of representation has few contributions for NoSQL databases This edition 3rd explains a NoSQL data modeling standard introducing modeling techniques that can be used on document oriented databases We have considered Cassandra and Riak NoSQL databases because of the heterogeneous characteristics of each NoSQL database classification so that to fill the knowledge gap by studying the available non relational databases in order to develop a systematic approach for solving problems of data persistence using these technologies Ajit [SQL & NoSQL Databases](#) Andreas Meier,Michael Kaufmann,2019-07-05 This book offers a comprehensive introduction to relational SQL and non relational NoSQL databases The authors thoroughly review the current state of database tools and techniques and examine coming innovations The book opens with a broad look at data management including an overview of information systems and databases and an explanation of contemporary database types SQL and NoSQL databases and their respective management systems The nature and uses of Big Data A high level view of the organization of data management Data Modeling and Consistency Chapter length treatment is afforded Data Modeling in both relational and graph databases including enterprise wide data architecture and formulas for database design Coverage of languages extends from an overview of operators to SQL and and QBE Query by Example to integrity constraints and more A full chapter probes the challenges of Ensuring Data Consistency covering Multi User Operation Troubleshooting Consistency in Massive Distributed Data Comparison of the ACID and BASE consistency models and more System Architecture also gets from its own chapter which explores Processing of Homogeneous and Heterogeneous Data Storage and Access Structures Multi dimensional Data Structures and Parallel Processing with MapReduce among other topics Post Relational and NoSQL Databases The chapter on post relational databases discusses the limits of SQL and what lies beyond including Multi Dimensional Databases Knowledge Bases and and Fuzzy Databases A final chapter covers NoSQL Databases along with Development of Non Relational Technologies Key Value Column Family and Document Stores XML Databases and Graphic Databases and more The book includes more than 100 tables examples and illustrations and each chapter offers a list of resources for further reading SQL NoSQL Databases conveys the strengths and weaknesses of relational and non relational approaches and shows how to undertake development for big data applications The book benefits readers including students and practitioners working across the broad field of applied information technology This textbook has been recommended and developed for university courses in Germany Austria and Switzerland *Advanced Standard SQL Dynamic Structured Data Modeling and Hierarchical Processing* Michael M. David, Lee Fesperman, 2013 This revised and updated edition of *Advanced ANSI SQL data modeling and structure processing* Pref [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

**NoSQL Data Models** Olivier Pivert,2018-07-30 The topic of NoSQL databases has recently emerged to face the Big Data challenge namely the ever increasing volume of data to be handled It is now recognized that relational databases are not appropriate in this context implying that new database models and techniques are needed This book presents recent research works covering the following basic aspects semantic data management graph databases and big data management in cloud environments The chapters in this book report on research about the evolution of basic concepts such as data models query languages and new challenges regarding implementation issues

**Usage-Driven Database Design** George Tillmann,2017-04-07 Design great databases from logical data modeling through physical schema definition You will learn a framework that finally cracks the problem of merging data and process models into a meaningful and unified design that accounts for how data is actually used in production systems Key to the framework is a method for taking the logical data model that is a static look at the definition of the data and merging that static look with the process models describing how the data will be used in actual practice once a given system is implemented The approach solves the disconnect between the static definition of data in the logical data model and the dynamic flow of the data in the logical process models The design framework in this book can be used to create operational databases for transaction processing systems or for data warehouses in support of decision support systems The information manager can be a flat file Oracle Database IMS NoSQL Cassandra Hadoop or any other DBMS Usage Driven Database Design emphasizes practical aspects of design and speaks to what works what doesn t work and what to avoid at all costs Included in the book are lessons learned by the author over his 30 years in the corporate trenches Everything in the book is grounded on good theory yet demonstrates a professional and pragmatic approach to design that can come only from decades of experience Presents an end to end framework from logical data modeling through physical schema definition Includes lessons learned techniques and tricks that can turn a database disaster into a success Applies to all types of database management systems including NoSQL such as Cassandra and Hadoop and mainstream SQL databases such as Oracle and SQL Server What You ll Learn Create logical data models that accurately reflect the real world of the user Create usage scenarios reflecting how applications will use a new database Merge static data models with dynamic process models to create resilient yet flexible database designs Support application requirements by creating responsive database schemas in any database architecture Cope with big data and unstructured data for transaction processing and decision support systems Recognize when relational approaches won t work and when to turn toward NoSQL solutions such as Cassandra or Hadoop Who This Book Is For System developers including business analysts database designers database administrators and application designers and developers who must design or interact with database systems

**Data Modeling in the NoSQL World** Ted Hills,2016 This presentation was recorded live at Data Modeling

Zone DMZ 2016 The venerable entity relationship E R modeling technique is very mature for SQL databases but doesn't translate well to many of the NOSQL databases This interactive workshop will introduce the Concept and Object Modeling Notation COMN pronounced common which can represent the new structures that NOSQL DBMSs support while still supporting traditional SQL DBMSs It also has more expressive power for modeling the real world entities that databases are about Topics to be covered include modeling notation for containment and multi valued attributes how to model schema less databases how to model the problem space and the solution space and the mapping between them [SQL and NoSQL Databases](#) Michael Kaufmann, Andreas Meier, 2023-06-29 This textbook offers a comprehensive introduction to relational SQL and non relational NoSQL databases The authors thoroughly review the current state of database tools and techniques and examine upcoming innovations In the first five chapters the authors analyze in detail the management modeling languages security and architecture of relational databases graph databases and document databases Moreover an overview of other SQL and NoSQL based database approaches is provided In addition to classic concepts such as the entity and relationship model and its mapping in SQL database schemas query languages or transaction management other aspects for NoSQL databases such as non relational data models document and graph query languages MQL Cypher the Map Reduce procedure distribution options sharding replication or the CAP theorem Consistency Availability Partition Tolerance are explained This 2nd English edition offers a new in depth introduction to document databases with a method for modeling document structures an overview of the document oriented MongoDB query language MQL as well as security and architecture aspects The topic of database security is newly introduced as a separate chapter and analyzed in detail with regard to data protection integrity and transactions Texts on data management database programming and data warehousing and data lakes have been updated In addition the book now explains the concepts of JSON JSON schema BSON index free neighborhood cloud databases search engines and time series databases The book includes more than 100 tables examples and illustrations and each chapter offers a list of resources for further reading It conveys an in depth comparison of relational and non relational approaches and shows how to undertake development for big data applications This way it benefits students and practitioners working across the broad field of data science and applied information technology **NoSQL for Mere Mortals** Dan Sullivan, 2015-04-06 The Easy Common Sense Guide to Solving Real Problems with NoSQL The Mere Mortals tutorials have earned worldwide praise as the clearest simplest way to master essential database technologies Now there's one for today's exciting new NoSQL databases NoSQL for Mere Mortals guides you through solving real problems with NoSQL and achieving unprecedented scalability cost efficiency flexibility and availability Drawing on 20 years of cutting edge database experience Dan Sullivan explains the advantages use cases and terminology associated with all four main categories of NoSQL databases key value document column family and graph databases For each he introduces pragmatic best practices for building high value applications Through step by step examples you'll discover how to choose the right

database for each task and use it the right way Coverage includes Getting started What NoSQL databases are how they differ from relational databases when to use them and when not to Data management principles and design criteria Essential knowledge for creating any database solution NoSQL or relational Key value databases Gaining more utility from data structures Document databases Schemaless databases normalization and denormalization mutable documents indexing and design patterns Column family databases Google s BigTable design table design indexing partitioning and Big Data Graph databases Graph network modeling design tips query methods and traps to avoid Whether you re a database developer data modeler database user or student learning NoSQL can open up immense new opportunities As thousands of database professionals already know For Mere Mortals is the fastest easiest route to mastery *Advanced Data Management* Lena Wiese,2015-10-29 Advanced data management has always been at the core of efficient database and information systems Recent trends like big data and cloud computing have aggravated the need for sophisticated and flexible data storage and processing solutions This book provides a comprehensive coverage of the principles of data management developed in the last decades with a focus on data structures and query languages It treats a wealth of different data models and surveys the foundations of structuring processing storing and querying data according these models Starting off with the topic of database design it further discusses weaknesses of the relational data model and then proceeds to convey the basics of graph data tree structured XML data key value pairs and nested semi structured JSON data columnar and record oriented data as well as object oriented data The final chapters round the book off with an analysis of fragmentation replication and consistency strategies for data management in distributed databases as well as recommendations for handling polyglot persistence in multi model databases and multi database architectures While primarily geared towards students of Master level courses in Computer Science and related areas this book may also be of benefit to practitioners looking for a reference book on data modeling and query processing It provides both theoretical depth and a concise treatment of open source technologies currently on the market SQL Server Data Modeling and Schema Design Steve Hoberman,Anthony Virgil,2024-01-08 Each book in the Align Refine Design series covers conceptual logical and physical data modeling schema design for a specific database product combining the best of data modeling practices with solution specific considerations which lead to effective communication tools and extensible datastore foundations Read SQL Server Data Modeling and Schema Design if you are a data architect or modeler who needs to expand your modeling skills to include SQL Server or if you are a database administrator or developer who knows SQL Server but needs to expand your schema design skills The book s introduction and three chapters cover the proven approach The introduction covers the three modeling characteristics of precise minimal and visual the three model components of entities relationships and attributes the three model levels of conceptual align logical refine and physical design the three modeling perspectives of relational dimensional and NoSQL and the three modeling challenges with NoSQL tactical strategy and cultural Next Chapter 1 covers Align Chapter 2 Refine and

Chapter 3 Design An animal shelter case study creates continuity across these three modeling levels If you are interested in learning how to build multiple database solutions read all the books in the Align Refine Design series Since each book is created from the same template once you read one you ll be able to pick up the techniques for another database solution quickly

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### **Nosql And Sql Data Modeling Bringing Together Data Semantics And Software Introduction**

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