DATABASE DESIGN:
Normalization – Exercises & Answers

staffNo	dentistName	patientNo	patientName	appointment		surgeryNo
				date	time	
S1011	Tony Smith	P100	Gillian White	12-Aug-03	10.00	S10
S1011	Tony Smith	P105	Jill Bell	13-Aug-03	12.00	S15
S1024	Helen Pearson	P108	Ian MacKay	12-Sept-03	10.00	S10
S1024	Helen Pearson	P108	Ian MacKay	14-Sept-03	10.00	S10
S1032	Robin Plevin	P105	Jill Bell	14-Oct-03	16.30	S15
S1032	Robin Plevin	P110	John Walker	15-Oct-03	18.00	S13

Figure 1: Details of patient dental appointments.

(a) The table shown in Figure 1 is susceptible to update anomalies. Provide examples of insertion, deletion, and modification anomalies.

Answers:

This table is not well structured, un-normalized containing redundant data. By using a **bottom-up** approach we analyzing the given table for anomalies. First observation, we see multiple values in an appointment column and this of course violate the 1NF. By assuming the staffNo and patientNo as candidate keys, there are many anomalies exist.

Insertion anomalies:

To insert a new patient particular that makes an appointment with the designated Doctor, we need to enter the correct detail for the staff. For example, to insert the details of new patient in patientNo, patientName and an appointment, we must enter the correct details of the doctor (staffNo, dentistName) so that the patient details are consistent with values for the designated Doctor for example, S1011.
To enter new patient data that doesn't have Doctor to be assigned we can't insert NULL values for the primary key.

Deletion anomalies:

If we want to delete a patient named Ian MacKay for example, two records need to be deleted as in row 3 and 4. This anomaly also obvious when we want to delete the dentistName, multiple records needs to be deleted to maintain the data integrity.
When we delete a Dentist record, for example Tony Smith, the details about his patients also lost from the database.

Normalization Exercises And Answers

Ryan Stephens

Normalization Exercises And Answers:

SQL in 24 Hours, Sams Teach Yourself Ryan Stephens,2021-12-07 In just 24 lessons of one hour or less Sams Teach Yourself SQL in 24 Hours helps you use SQL to build effective databases efficiently retrieve data and manage everything from performance to security This Seventh Edition is thoroughly revised and reorganized for faster learning and a deeper understanding of modern SQL development Based on standardized SQL throughout it teaches using new sample code based on the free easy to use Oracle Database Express XE You ll find more hands on examples than ever culminating in an all new Bonus Exercises Workshop with even more real world practice This guide s straightforward step by step approach shows you how to work with database structures objects queries tables and more In just hours you will be applying advanced techniques from transactions and joins to complex data retrieval using views and subqueries Step by step instructions carefully walk you through the most common SQL tasks Practical hands on examples show you how to apply what you learn Quizzes and exercises help you test your knowledge and stretch your skills Notes and tips point out shortcuts and solutions Learn how to Master core relational database concepts SQL concepts and language components Clearly understand your data Set up databases and plan efficient database designs Define entities and relationships establish data structures and create database objects Normalize raw databases into logically organized tables Edit relational data and tables and manage transactions Write effective well performing queries Categorize summarize sort group and restructure data Work with dates and times Join tables in queries use subqueries and combine multiple queries Optimize performance with indexes and other techniques Administer databases and manage users Secure databases and data Sams Teach Yourself SQL in 24 Hours Ronald R. Plew,Ryan K. Stephens,2003 A new edition of this title is available ISBN 10 0672330180 ISBN 13 9780672330186 Sams Teach Yourself SQL in 24 Hours Third Edition presents the key features of SQL Structured Query Language in an easy to understand format with updated code examples notes diagrams exercises and quizzes New material covers more information on transactions constructs embedded databases and object oriented programming In this edition the authors include examples based on a database like MySQL a very popular open source database **Database Design and Relational Theory** C. J. Date,2019-12-12 Create database designs that scale meet business requirements and inherently work toward keeping your data structured and usable in the face of changing business models and software systems This book is about database design theory Design theory is the scientific foundation for database design just as the relational model is the scientific foundation for database technology in general Databases lie at the heart of so much of what we do in the computing world that negative impacts of poor design can be extraordinarily widespread This second edition includes greatly expanded coverage of exotic and little understood normal forms such as essential tuple normal form ETNF redundancy free normal form RFNF superkey normal form SKNF sixth normal form 6NF and domain key normal form DKNF Also included are new appendixes including one that provides an in depth look into the crucial notion of data consistency Sequencing of topics has

been improved and many explanations and examples have been rewritten and clarified based upon the author s teaching of the content in instructor led courses This book aims to be different from other books on design by bridging the gap between the theory of design and the practice of design The book explains theory in a way that practitioners should be able to understand and it explains why that theory is of considerable practical importance Reading this book provides you with an important theoretical grounding on which to do the practical work of database design Reading the book also helps you in going to and understanding the more academic texts as you build your base of knowledge and expertise Anyone with a professional interest in database design can benefit from using this book as a stepping stone toward a more rigorous design approach and more lasting database models What You Will Learn Understand what design theory is and is not Be aware of the two different goals of normalization Know which normal forms are truly significant Apply design theory in practice Be familiar with techniques for dealing with redundancy Understand what consistency is and why it is crucially important Who This Book Is For Those having a professional interest in database design including data and database administrators educators and students specializing in database matters information modelers and database designers DBMS designers implementers and other database vendor personnel and database consultants The book is product independent **Sams Teach Yourself SQL in 24 Hours** Ryan Stephens,Ron Plew,Arie D. Jones,2011-05-13 In just 24 sessions of one hour or less you ll learn how to use SQL to build effective databases efficiently retrieve your data and manage everything from performance to security Using this book s straightforward step by step approach you ll learn hands on through practical examples Each lesson builds on what you ve already learned giving you a strong real world foundation for success The authors guide you from the absolute basics to advanced techniques including views transactions Web data publishing and even powerful SQL extensions for Oracle and Microsoft SQL Server Step by step instructions carefully walk you through the most common SQL tasks Quizzes and Exercises at the end of each chapter help you test your knowledge By the Way notes present interesting information related to the discussion Did You Know tips offer advice or show you easier ways to perform tasks Watch Out cautions alert you to possible problems and give you advice on how to avoid them Learn how to Understand what SQL is how it works and what it does Define efficient database structures and objects Normalize raw databases into logically organized tables Edit relational data and tables with DML Manage database transactions Write effective well performing queries Categorize summarize sort group and restructure data Work with dates and times Join tables in queries use subqueries and combine multiple queries Master powerful query optimization techniques Administer databases and manage users Implement effective database security Use views synonyms and the system catalog Extend SQL to the enterprise and Internet Master important Oracle and Microsoft SQL Server extensions to ANSI SQL Introducing Python Bill Lubanovic,2019-11-06 Easy to understand and fun to read this updated edition of Introducing Python is ideal for beginning programmers as well as those new to the language Author Bill Lubanovic takes you from the basics to more

involved and varied topics mixing tutorials with cookbook style code recipes to explain concepts in Python 3 End of chapter exercises help you practice what you ve learned You ll gain a strong foundation in the language including best practices for testing debugging code reuse and other development tips This book also shows you how to use Python for applications in business science and the arts using various Python tools and open source packages **Logic and Databases** C. J. Date,2007 Logic and databases are inextricably intertwined The relational model in particular is essentially just elementary predicate logic tailored to fit the needs of database management Now if you re a database professional I m sure this isn t news to you but you still might not realize just how much everything we do in the database world is or should be affected by predicate logic Logic is everywhere So if you re a database professional you really owe it to yourself to understand the basics of formal logic and you really ought to be able to explain and perhaps defend the connections between formal logic and database management And that s what this book is about What it does is show through a series of partly independent and partly interrelate essays just how various crucial aspects of database technology some of them very familiar others maybe less so are solidly grounded in formal logic It is divided into five parts Basic Logic Logic and Database Management Logic and Database Design Logic and Algebra Logic and the Third Manifesto There s also a lengthy appendix containing a collection of frequently asked questions and some answers on various aspects of logic and database management Overall my goal is to help you realize the importance of logic in everything you do and also I hope to help you see that logic can be fun

SAMS Teach Yourself Database Programming with Visual Basic 6 in 21 Days Curtis Smith,Michael Amundsen,1998 Ready to use building blocks for integrated circuit design Why start coding from scratch when you can work from this library of pre tested routines created by an HDL expert There are plenty of introductory texts to describe the basics of Verilog but Verilog Designer s Library is the only book that offers real reusable routines that you can put to work right away Verilog Designer s Library organizes Verilog routines according to functionality making it easy to locate the material you need Each function is described by a behavioral model to use for simulation followed by the RTL code you ll use to synthesize the gate level implementation Extensive test code is included for each function to assist you with your own verification efforts Coverage includes Essential Verilog coding techniques Basic building blocks of successful routines State machines and memories Practical debugging guidelines Although Verilog Designer s Library assumes a basic familiarity with Verilog structure and syntax it does not require a background in programming Beginners can work through the book in sequence to develop their skills while experienced Verilog users can go directly to the routines they need Hardware designers systems analysts VARs OEMs software developers and system integrators will find it an ideal sourcebook on all aspects of Verilog development **Sams Teach Yourself SQL in 21 Days** Ryan K. Stephens,Ronald R. Plew,2003 Sams Teach Yourself SQL in 21 Days Fourth Editionprovides a sold foundation in understanding the fundamentals of SQL Structured Query Language SQL is the query language used by relational databases such a Oracle Microsoft Access and

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