



P r o f e s s i o n a l E x p e r t i s e D i s t i l l e d

SQL Server 2014 Development Essentials

Design, implement, and deliver a successful database solution
with Microsoft SQL Server 2014

Basit A. Masood-Al-Farooq

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PUBLISHING professional expertise distilled

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BIRMINGHAM - MUMBAI

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Credits

Author

Basit A. Masood-Al-Farooq

Project Coordinator

Sageer Parkar

Reviewers

Basavaraj Biradar

Brenner Grudka Lira

David Loo

Richard Louie

José (Cheo) Redondo

Proofreaders

Simran Bhogal

Ameesha Green

Indexers

Rekha Nair

Tejal Soni

Acquisition Editor

Neha Nagwekar

Graphics

Ronak Dhruv

Content Development Editor

Neil Alexander

Production Coordinators

Kyle Albuquerque

Saiprasad Kadam

Conidon Miranda

Technical Editor

Pankaj Kadam

Copy Editors

Insiya Morbiwala

Sayanee Mukherjee

Aditya Nair

Cover Work

Kyle Albuquerque

About the Author

Basit A. Masood-Al-Farooq is an internationally known Lead SQL DBA, trainer, and technical author with twelve years' experience of the Microsoft technology stack. He is an accomplished development and production SQL Server DBA with a proven record of delivering major projects on time and within budget. He is an expert at evaluating the clients' needs against the capabilities of the SQL Server product set, with the objective of minimizing costs and maximizing functions by making innovative use of advance capabilities. Basit has authored numerous SQL Server technical articles on various SQL Server topics for different SQL Server community sites, which include SQLMag.com, MSSQLTips.com, SQLServerCentral.com, SSWUG.org, SQL-Server-Performance.com, and SearchSQLServer.com.

He has also developed and implemented many successful database infrastructures, data warehouses, and business intelligence projects. He holds a Master's degree in Computer Science from London Metropolitan University and industry-standard certifications from Microsoft, Sun, Cisco, Brainbench, ProSoft, and APM, which include MCITP Database Administrator 2008, MCITP Database Administrator 2005, MCDBA SQL Server 2000 and MCTS .NET Framework 2.0 Web Applications. He also has a good understanding of ITIL principles.

He can be reached via Twitter (@BasitAali), his blog (<http://basitaalishan.com>), or via LinkedIn (<http://uk.linkedin.com/in/basitfarooq>).

He was a technical reviewer for *SQL Server 2012 Reporting Services Blueprints*, *Marlon Ribunal and Mickey Stuewe*, Packt Publishing and *Reporting with Microsoft SQL Server 2012*, *James Serra and Bill Anton*, Packt Publishing.

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About the Reviewers

Basavaraj Biradar holds a Master's degree in Computer Applications with gold medals from Gulbarga University, India. Besides these, he has a Microsoft Certified Professional certification in SQL Server 2000. Basavaraj has a rich experience of more than 13 years in designing and developing databases for complex, large, online systems. Currently, Basavaraj is working as Senior Technical Lead in a major IT security company.

Basavaraj writes blogs regularly at <http://sqlhints.com> on SQL Server technologies and his articles are quite popular in the industry. Basavaraj speaks about SQL Server in Microsoft User Group meetings and in his company as well. You may contact Basavaraj through his e-mail ID, basav@sqlhints.com.

Brenner Grudka Lira has been a data analyst and DBA at Neurotech since 2012. He has a Bachelor's degree in Computer Science and a postgraduate degree in Project Management, both from the Catholic University of Pernambuco in Recife, Brazil.

He also has experience in building and modeling data warehouses and has knowledge in SQL Server and MySQL database management. Today, he is dedicated to the study of project management and database tuning.

He has reviewed *Microsoft SQL Server 2012 Integration Services: An Expert Cookbook*, *Reza Rad and Pedro Perfeito*; *Oracle BI Publisher 11g: A Practical Guide to Enterprise Reporting*, *Daniela Bozdoc*; and *Getting Started with SQL Server 2014 Administration*, *Gethyn Ellis*, all by Packt Publishing.

David Loo is a senior software professional with over 25 years' experience in both software development and people management. He is respected for his ability to focus teams on service excellence and for designing and implementing practical process improvements and solutions. He is always on the lookout for ways to contribute his knowledge and experience of software development, team-building, and development best practices.

He has reviewed *Getting Started with SQL Server 2012 Cube Development*, Simon Lidberg and *Getting Started with SQL Server 2014 Administration*, Gethyn Ellis, both by Packt Publishing.

Richard Louie is a Senior Business Intelligence Developer with over 20 years' experience in software development and project management. He has extensive hands-on experience in Oracle and Microsoft SQL for ETL, SSIS, SSRS, SSAS, and VB.Net. Richard is a graduate of the University of California, Irvine in Information and Computer Science, and is ASQ Green Belt Certified.

He has reviewed *Getting Started with SQL Server 2012 Cube Development*, Simon Lidberg and *Getting Started with SQL Server 2014 Administration*, Gethyn Ellis, both by Packt Publishing.

José (Cheo) Redondo is a consultant, educator, mentor, and evangelist of technology databases and a SQL Server MVP in Latin America, specializing in enterprise databases and business intelligence solutions since 1998. Since that time, he has been providing consulting services and specialized education through academic and business-user groups. He gives conferences to the PASS Community (SQLSaturday events) in Latin America and the US in Spanish, and has been leading SQL PASS Venezuela for several years now. You can follow Cheo on Twitter at @redondoj or contact him through his blog, El Blog de Cheo Redondo in Spanish (<http://redondo.j.wordpress.com/>), or his e-mail, redondoj@gmail.com.

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Preface

Microsoft SQL Server is an enterprise database server that is the cornerstone of modern business applications and is in the center of the business processes of many leading organizations. The latest release of Microsoft SQL Server, SQL Server 2014, has many new features. These new features of SQL Server 2014 let you design, build, and deploy high-performance OLTP applications. Especially, the new in-memory technology of SQL Server 2014 helps you to design and implement high-performance OLTP applications. According to Microsoft, in some situations, implementing the new SQL Server 2014 in-memory technology for existing OLTP applications can improve the performance of these applications by 10 times. This book will provide you with all the skills you need to successfully design, build, and deploy databases using SQL Server 2014. Starting from the beginning, this book gives you an insight into the key stages of the SQL Server database process, provides you with an in-depth knowledge of the SQL Server database architecture, and shares tips to help you design the new database.

By sequentially working through the steps in each chapter, you will gain hands-on experience in designing, creating, and deploying SQL Server databases and objects. You will learn how to use SQL Server 2014 Management Studio and the advanced Transact-SQL queries to retrieve data from the SQL Server database. You will also learn how to add, modify, and delete data stored within a database. You will use Transact-SQL statements to create and manage advanced database objects that include scalar and table-valued functions, views, stored procedures, and triggers. Finally, you will learn about how the SQL Server 2014 relation engine works, how indexes and statistics improve query performance, and the new SQL Server 2014 in-memory technologies.

What this book covers

Chapter 1, Microsoft SQL Server Database Design Principles, explains the database design process and the architecture and working of the SQL Server 2014 Storage Engine. This chapter covers the database development life cycle in detail, including the normalization and denormalization process, benefits of choosing appropriate data types, and the functioning of the SQL Server 2014 Storage Engine.

Chapter 2, Understanding DDL and DCL Statements in SQL Server, introduces the reader to the SQL Server 2014 Transact-SQL language elements and SQL Server 2014 Management Studio (SSMS 2014). This chapter explains Transact-SQL DDL, DCL, and DML language elements in detail, and how you can use them to create, manage, and secure SQL Server 2014 databases, schemas, and tables. This chapter also shows you how you can use SQL Server Management Studio to create and manage SQL Server 2014 databases, schemas, and tables. Finally, this chapter covers the purpose of SQL Server 2014 system databases and highlights the advantages and disadvantages of database recovery models.

Chapter 3, Data Retrieval Using Transact-SQL Statements, demonstrates how to query data from tables, how to write multiple table queries, and how to group, organize, and pivot result set data. This chapter explores the basic form of the SELECT statement and how it can be used to query data from tables. This chapter also highlights the different categories of built-in T-SQL functions and how you can use them in your SELECT statements. This chapter also explains different techniques that you can use to combine data from multiple tables, how to organize the data, and how to generate the summary data by grouping or pivoting it. Finally, this chapter covers the purpose of the CTE and SQL Server 2014 windowing functions and how to use them to quickly solve complex analytical tasks.

Chapter 4, Data Modification with SQL Server Transact-SQL Statements, illustrates how to add, modify, and delete data in tables using Transact-SQL DML statements. This chapter covers how to add data to a table using the INSERT statement, how to delete the data using the DELETE statement, and how to update existing data using the UPDATE statement. This chapter also covers the SELECT...INTO, MERGE, and TRUNCATE TABLE statements, and it highlights the key new enhancements of these statements in SQL Server 2014.

Chapter 5, Understanding Advanced Database Programming Objects and Error Handling, covers reusable programming objects that includes views, stored procedures (normal and natively compiled), functions and triggers (based on either DDL or DML), SQL Server 2014 control-of-flow statements, and structured error handling blocks. This chapter shows you how you can declare and use variables and how you can use control-of-flow statements to control your program execution. Next, it explains the purpose of views, stored procedures, user-defined functions, and triggers, and highlights the guidelines and restrictions to design each of these programmable objects. This chapter also illustrates how to handle errors that occur within Transact-SQL batches and programmable objects using the TRY...CATCH construct.

Chapter 6, Performance Basics, explains performance-related features of SQL Server 2014. This chapter first explains the architecture of the SQL Server Relational Engine. Then, it introduces the architecture of the SQL Server 2014 in-memory technology. Next, it covers all SQL Server 2014 index types and how they can be used to achieve optimal query performance while reducing the overall response time. Then, it explores the architectural differences of B-tree, Bw-tree, and xVelocity columnstore indexes. Finally, it explains core performance topics such as SQL Server query optimization statistics, SQL Server transactions and locks, and tools that come with SQL Server 2014 Database Engine, which you can use to monitor and troubleshoot its Database Engine performance.

What you need for this book

The following are the software prerequisites to run the samples in the book:

- Windows 7.0 SP1 or later
- SQL Server 2014 Developer edition
- SQL Server Management Studio
- AdventureWorks2012 sample database, which is available for download from the CodePlex site at <http://msftdbprodsamples.codeplex.com/downloads/get/478214>

Who this book is for

If you want to learn how to design, implement, and deliver successful database solutions with SQL Server 2014, this is the book for you.

Conventions


In this book, you will find a number of styles of text that distinguish between different kinds of information. Here are some examples of these styles, and an explanation of their meaning.


Code words in text, database table names, folder names, filenames, file extensions, pathnames, dummy URLs, user input, and Twitter handles are shown as follows: "Each row in the `Customer` table represents an individual customer."

A block of code is set as follows:

```
[default]
DECLARE @Table2 TABLE (
  COL1 [int],
  COL2 [varchar] (30),
  COL3 [datetime],
  INDEX [ixc_col3] CLUSTERED (col3)
    WITH (FILLFACTOR=80),
  INDEX [ixnc_col1_col2] NONCLUSTERED (col1, col2)
    WITH (FILLFACTOR=80)
);
```

New terms and **important words** are shown in bold. Words that you see on the screen, in menus or dialog boxes for example, appear in the text like this: "Right-click on **User-Defined Data Types** and choose **New User-Defined Data Type**."

 Warnings or important notes appear in a box like this.

 Tips and tricks appear like this.

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1

Microsoft SQL Server Database Design Principles

Database design is one of the most important tasks in the **Systems Development Life Cycle (SDLC)**, also referred to as **Application Development Life Cycle (ADLC)**. That's because databases are essential for all businesses, and good design is crucial to any business-critical, high-performance application. Poor database design results in wasted time during the development process and often leads to unusual databases that are unfit for use.

We'll be covering the following topics in this chapter:

- The database design process and considerations
- The table design process, which includes identifying entities and attributes, creating a relationship between entities, and ensuring data integrity
- The basics of data normalization
- The SQL Server database architecture
- The importance of choosing the appropriate data type

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