# Accelerated SQL Server 2008

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*This book is dedicated to Jim Gray, whose early work with SQL Server paved the way for the enterprise-ready data platform it is today.*

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# About the Authors

**ROBERT E. WALTERS** is a data platform technology specialist with Microsoft. He specializes in navigating customers through the powerful features and functionality of relational databases. Rob's extensive experience with Microsoft SQL Server started more than 8 years ago, when he worked as a consultant for Microsoft Consulting Services in Denver, Colorado. Shortly after the dot-com bubble burst, Rob returned to Microsoft's headquarters and worked as a program manager in the SQL Server product unit. There, he owned various features within SQL Server, including SQL Server Agent, various management features, and the security for the database engine.

Rob coauthored *Programming Microsoft SQL Server 2005* (Microsoft Press) and *Pro SQL Server 2005* (Apress). He holds a Bachelor of Science in Electrical Engineering from Michigan State University and a Master of Business Administration from Seattle University.

When not thinking about databases, Rob enjoys spending time with his wife, children, and two Saint Bernard dogs.

**MICHAEL COLES** has worked in the information technology industry for more than a decade, with an emphasis on database-enabled applications. Previously, he worked in a wide range of industries, including retail, manufacturing, and insurance, to name a few. He currently serves as a database architect and applications developer for a consulting firm specializing in business intelligence solutions. Michael lives in New Jersey, and spends his spare time commuting to and from New York City.

**FABIO CLAUDIO FERRACCHIATI** is a prolific writer on cutting-edge technologies. Fabio has contributed to more than a dozen books on .NET, C#, Visual Basic, and ASP.NET. He is a .NET Microsoft Certified Solution Developer (MCSD) and lives in Rome, Italy. You can read his blog at `http://www.ferracchiati.com`. Fabio also was the technical reviewer for this book.

**ROBERT RAE** works as a senior technology specialist in enterprise architecture, focusing on large enterprise accounts for Microsoft. In this role, Robert helps customers better understand how to leverage Microsoft application platform capabilities within their enterprise architectures. Robert spends the vast majority of his time focused on database solutions for business intelligence, data quality, high availability, disaster recovery, and development. Prior to joining Microsoft Robert spent 12 years as president of a consulting firm that focused on enterprise integration and enabling software as a service.

**DONALD FARMER** has been a member of the Microsoft Business Intelligence team for 7 years. He has worked on both the Analysis Services and Integration Services product teams. Donald is now a principal program manager for SQL Server Analysis Services, working to build the new generation of analytic technology, including predictive analysis, within the Microsoft business intelligence offering. Donald is a popular speaker at international events for both business and technical audiences, with a wide range of interests including data integration, information quality, metadata intelligence, and master data management. He is the author of a number of books and articles. Prior to joining Microsoft, Donald worked not only on business intelligence projects, but also in fields as varied as medieval archaeology and fish farming.

# Acknowledgments

As most of you know, writing a technical book requires hundreds of hours of researching, outlining, writing, editing, and reviewing content. I could not have done it without the support of many people. I would like to give a special thanks to the following folks, who gave me valuable feedback and provided timely answers to questions: Dan Jones, Bill Ramos, Richard Waymire, Euan Garden, Steven Gott, Peter Saddow, Srini Acharya, Rick Negrin, Dom Arvisais, and Michiel Wories.

Most of all, I would like to thank my wife and family for giving me the support I needed to get this book done.

Thanks!

Robert E. Walters (*lead author*)

# Introduction

Before I describe the contents of this book and why I think you should just take it over to the counter and buy it, I would like to give you an insider's look at the SQL Server 2008 product development cycle. I believe this insight will provide you with a deeper understanding of how SQL Server is continuing to evolve. The rest of this book will show you why SQL Server is enterprise-ready.

For the past 5 years, I was a program manager at Microsoft in the SQL Server product unit. During this time, I owned various features within the product, including SQL Server Agent, SQL Server Express, and most recently, database security.

When I joined SQL Server in 2002, the product team was in year 3 of planning and implementing the Yukon (SQL Server 2005) release. One of my first responsibilities was to own the Create Database/Database Properties dialog in SQL Server Management Studio. After working with the user interface (UI) design team and various UI developers, we crafted the interesting grid-based dialog that you see today in Management Studio. However, arriving at the implemented Create Database dialog was not as straightforward as we wanted.

In our organization, we had separate teams writing the UI, writing the Server Management Objects (SMO) code to support the UI, and writing the code in the database engine itself. One of the more common issues we faced was the orchestration of the three separate teams working on a particular feature. Each of the three teams didn't necessarily put the same priority on the work, and this resulted in situations like having a UI that did nothing because either the SMO or database team didn't write the code to support it at the time. In the end, when it came time to ship the product, there were some features that had no UI support in SQL Server Management Studio. For example, try to manage Service Broker in Management Studio in SQL Server 2005. I will save you the time—there isn't much there.

So why am I airing our dirty laundry? Well, it's not because I want everyone to enjoy the smell. It's because I want to tell you about the dramatic improvements in efficiency that have been made, resulting in a better product for you, the SQL Server customer.

With respect to our software development issues, the upper management in the SQL Server product unit actually cared about the problems people in the product team experienced. When SQL Server 2005 was released, the management set aside a bunch of folks, locked them away (not literally), and had them come up with solutions to the problems. What came as a result was called the SQL Engineering System (SES), which has fundamentally changed the way Microsoft develops SQL Server.

As with other versions of the product, we started with the core themes of the release. In SQL Server 2008's case, these were as follows: mission-critical platform, dynamic development, beyond relational data, and pervasive business insight. These were not just marketing buzzwords, but actually meant something in the SES process. Then another, smaller group came up with scenarios that matched each of these themes. One of the scenarios I was involved with was "secure platform for data." This scenario dealt with issues around data protection. As program managers, we helped define the various improvements that would support this scenario. My specific assignments were the security-related improvements, such as transparent database encryption, Extensible Key Management, and auditing improvements. So, everything we did in the product boiled down to an improvement based on a scenario that was part of a major theme. This kept everyone focused on the common goals for the release.

To address the issues around the mechanics of software development, the SES process defined a number of other measures. One of these measures was a globally ranked improvement list (GRIL), which numbered each improvement across the entire product. The idea was one team couldn't say it had no time to help out another team if that other team was working on a higher-ranked improvement. This ascending list helped keep the hoarding of resources within teams to a minimum and allowed for better collaboration between teams. With a single ranked list, it was also possible to ensure that when an improvement was being made, all teams affected (those dealing with management tools, the database engine, setup, and so on) were brought in and contributed resources as needed.

The end result of the SES process to you, the user of SQL Server, is the following: the quality of the Community Technical Preview (CTP) releases is very high. This is because, by the time each feature is checked in, it has full SMO, tools, and SQL Server Books Online documentation. The improvements made to the product add much more value, since they interact with more parts of the product. Take Resource Governor, for example (a topic covered in Chapter 5 of this book). That improvement affected multiple teams within the product and would have failed miserably if everyone were not in sync and did not treat the feature with the same priority. Finally, it is possible for SQL Server to ship more frequently, since the quality of the code in the main code branch is near release quality.

# Who This Book Is For

SQL Server 2008 is an evolution of the third generation of the SQL Server platform. With every release of the product come new features for the database administrator and developer to explore. Because we can't possibly cover absolutely everything in SQL 2008, we focus on the key features and functionality that will rapidly boost your knowledge and skills of this great product. If you know what the acronym DBA stands for and have an interest in SQL Server 2008, then this book is for you!

# Valuable Resources

As a SQL Server user, you may have thought of a suggestion to enhance SQL Server, or you may have found an issue with the product. The SQL Server team has a web site that allows you to submit feedback, as well as download the latest CTP releases of the product: `http://connect.microsoft.com/sqlserver`. Don't think that what you submit goes into some database and no one ever reads it. Well, never mind the first part of that statement—the comments actually do go into a database, but people from the product team really do read them! Feedback that is entered using the SQL Server Connect web site automatically goes into our issue-tracking database, and program managers and others from the respective feature areas periodically comb through the entries. So don't think you are wasting your time by submitting suggestions and issues. On the contrary, they are all read and responded to by SQL Server team members.

The Microsoft Developer Network (MSDN) forums provide an opportunity to post questions and have them answered by the community and those in the product team. The SQL Server forums can be found at `http://forums.microsoft.com/msdn/default.aspx?forumgroupid=19&siteid=1`. These forums are very active, with thousands of posts in each topic. The response time is quick, as members of the product team actively monitor and respond to postings.

# How This Book Is Structured

This book is written in such a way that you can read through the book cover to cover or dip in and out for specific topics. It is structured into 21 chapters divided into four parts, as follows:

*Part 1, Overview of SQL Server*: Chapter 1 discusses the vision for SQL Server 2008, the various editions of SQL Server, and SQL Server consolidation. Chapter 2 covers SQL Server installation and configuration. The experience of installing SQL Server 2008 is completely new, and those of us who have suffered battle scars installing previous versions of SQL Server will be in for a pleasant surprise.

*Part 2, Enterprise Data Platform*: The eight chapters in this part cover key improvements related to relational database concepts.

- Chapter 3 covers Policy Management (PM), the new policy-based framework for SQL Server. The possibilities of PM are endless. Examples of use include allowing administrators to lock down server configurations and enforce that developers use proper naming conventions when creating their objects in the database.
- Chapter 4 is about the key high availability (HA) features in SQL Server 2008, including database snapshots, Windows clustering, SQL Server replication, and other ways to reduce downtime. However, its focus is database mirroring, the newest of the HA technologies.
- Chapter 5 explores the enhancements in SQL Server 2008 as they relate to managing and monitoring resources, increasing performance by optimizing storage, and improving query performance. Specific features covered include the Data Collector, Resource Governor, backup and data compression, and sparse column support, to name a few.
- Chapter 6 covers the core security concepts included in SQL Server, as well as the new auditing feature in SQL Server 2008.
- Chapter 7 discusses encryption capabilities in SQL Server, which have been expanded enough to make encryption a topic for its own chapter! This chapter covers encrypting data using SQL Server, as well as the new transparent database encryption and extensive key management features of SQL Server 2008.
- Chapter 8 covers automation and monitoring. The plethora of tools available in SQL Server contributes to its ease of use compared with other relational database products on the market. SQL Server 2008 includes a new PowerShell provider, as well as a new event framework called Extended Events. This chapter covers these topics, as well as others, including SQL Server Agent, maintenance plans, and SQLCMD.
- Chapter 9 is about Service Broker, which is in its second release with SQL Server 2008. This chapter provides an overview of Service Broker and discusses the key improvements in SQL Server 2008, including message priorities and the SSBDiagnose diagnostic utility.
- Chapter 10 explores the Full-Text Search (FTS) feature in SQL Server 2008, which is more integrated into the database engine than in previous versions of SQL Server.

*Part 3, Development in SQL Server*: The eight chapters in this part cover topics important to developers, such as Transact-SQL (T-SQL) changes and LINQ to SQL.

- Chapter 11 introduces new datatypes. SQL Server 2008 comes with a bunch of new datatypes, including types for dates and times that are time-zone aware, hierarchical types, and spatial types. You'll also learn about the new filestream feature, which allows for large objects to be stored directly on the file system, while still having the transactional consistency of the database engine.

- Chapter 12 covers T-SQL for developers. T-SQL continues to be evolved in SQL Server 2008. Investments were made in new syntax, including the `MERGE` statement, which is an ISO/ANSI standard-specified statement that allows users to express multiple Data Manipulation Language (DML) actions (`INSERT`, `UPDATE`, and `DELETE`) against a specified target table based on join conditions with a source table. This and other T-SQL enhancements are discussed in depth in this chapter.
- Chapter 13 covers T-SQL for DBAs. Locking enhancements, filtered indexes, and table partitioning are among the many features that the database administrator should be aware of and utilize in SQL Server 2008.
- Chapter 14 discusses the role of .NET inside SQL Server. It also walks through programming, debugging, and deploying a common language runtime (CLR) stored procedure.
- Chapter 15 expands on the .NET discussion in the previous chapter and includes coverage of user-defined datatypes, functions (both scalar and table-valued), aggregates, and triggers.
- Chapter 16 provides an overview of the XML technology as it relates to SQL Server. It takes a broad look at XPath and XML Schema support in SQL Server 2008, and then drills down into how to get XML into and out of the database.
- Chapter 17 investigates native XML support in SQL Server 2008, via the XML datatype. You'll learn how to create XML columns, insert data into those columns, and then retrieve that XML data using XQuery.
- Chapter 18 covers Language Integrated Query (LINQ), a Microsoft .NET Framework component that adds native data-querying capabilities to .NET languages. This chapter explores the relationship between LINQ and SQL Server.

*Part 4, Business Intelligence in SQL Server*. The three chapters in this part discuss the tools and features that are the business intelligence offering of Microsoft.

- Chapter 19 covers Reporting Services, an extremely popular feature within the SQL Server product. Investments in the Reporting Services engine were made in SQL Server 2008, allowing it to handle massive amounts of reporting. This chapter covers the core concepts of Reporting Services, as well as the many enhancements to Reporting Services in SQL Server 2008.
- Chapter 20 focuses on Analysis Services. Databases store data, but they become truly profitable when the data can be used and interpreted to provide business intelligence. Powered by a robust Business Intelligence Development Studio (BIDS) environment, SQL Server Analysis Services is a major player in the business intelligence market. This chapter covers the advancements in Analysis Services in SQL Server 2008.
- Chapter 21 covers SQL Server Integration Services, Microsoft's Extract, Transform, and Load (ETL) tool. This chapter guides you through all of the Integration Services concepts, including data flow, control flow, and transformation tasks, using plenty of examples. You'll learn about the new Integration Services tasks, including an enhanced lookup operator that will support more flexible levels of caching. There is also new profiling data quality functionality, which will provide advanced algorithms for identifying patterns within data values.

# Errata

Apress makes every effort to make sure that there are no errors in the text or code. However, mistakes happen, and we recognize the need to keep you informed of any mistakes as they're discovered and corrected. An errata sheet will be made available on the book's main page at `http://www.apress.com`. If you find an error that hasn't already been reported, please let us know.

# Contacting the Authors

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