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Beginning Microsoft® SQL Server® 2012 Programming

Paul Atkinson, Robert Vieira

BEGINNING MICROSOFT® SQL SERVER® 2012 PROGRAMMING

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This book is dedicated to my parents, and to the unique perspective they provide from the union of the often professorial Atkinsons and the utterly hilarious Walshes. If any fraction of their wit has leaked through into its pages, this book will have succeeded.

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ABOUT THE AUTHORS

PAUL ATKINSON has been working with database technology since his days at Microsoft in the early 1990s, where he learned Microsoft Access first as a side project and later as a support rep. From there he went on to get a degree in Computer Science from Portland State University, rode the dot-com wave as a DBA, and came out of the dot-com bust as a contractor primarily in the health care industry. Currently, Paul works for Huron Healthcare as a BI Architect and Team Lead developing both traditional and real-time BI solutions. His training classes in high-performance T-SQL programming are among the most popular course offerings available at Huron. Paul, his wife Kristin, and their daughter Maureen love living in Portland, Oregon. When he's not working or writing Paul plays on multiple soccer teams, and otherwise keeps busy as a mountain biker, snowboarder, hasher, bicycle commuter, chairman of the school site council, proud member of the Timbers Army, and semi-professional chocolatier. As Robert Heinlein wrote, specialization is for insects.

ROBERT VIEIRA is a Software Architect with Huron Consulting Group and is considered one of the leading authorities on Microsoft SQL Server. He speaks at conferences nationally and is well known for his unique tutorial approach in his teaching and writing.

ABOUT THE TECHNICAL EDITOR

ERIC ALDINGER is a quality assurance engineer working out of Portland, Oregon. He spends much of his time working on thorny data integration and data warehousing issues on green field development projects. Editing this text proves the improbable axiom that a University of California, Riverside, literature degree is good for something outside of academia, given enough time. Eric has many hobbies, none of which are of interest to readers of this book.

ACKNOWLEDGMENTS

NOBODY COMPLETES A PROJECT like this alone. Crafting a technical book that's readable despite the fairly dry material found therein takes an enormous amount of time and dedication, and that's not from the author — it's from those who support, guide, and encourage him. While there are many who helped with this, my first foray, there are a few without whom I'd never have gotten through it.

Rob Vieira, whose efforts early on helped create the genre of the developer-centric SQL Server book, has probably contributed more to this title than anyone — even me. Besides laying down a framework, Rob has also been a mentor and a friend, and without him, I'd never have started on this effort at all. That said, I'm sure he'll be pleased when I've finished, since he's probably bored of my escaping work before 6:00 to come home and write.

Bob Elliott, for giving me the chance based on nothing but a recommendation (albeit a good one).

Kristin Atkinson, my wife of more than 15 years now; you have carried the house on your shoulders since I picked up this project. Each night I come home and sit down to write, and you've taken care of every other thing. Not only have you cleared the path, but you've made an excellent sounding board. This book is as much yours as it is anyone's, and by now you probably know more about SQL Server than any other artisan chocolatier I know.

Maureen Spears, you have phenomenal tolerance for my first-timer mistakes and questions, not to mention delays. Your help, attitude, and feedback have kept my enthusiasm up long after it could have flagged.

Eric Aldinger, by stepping up and enthusiastically accepting the role of technical editor, you've ensured the errata section on this title will be ridiculously clean. Once we're done here we need to spend less time on technical books and more on bikes.

CONTENTS

INTRODUCTION

OUT OF EVERY ENDING COMES the beginning of something new. This title has been Rob Vieira's for many years, and now he's wrapping up that chapter of his life while I begin a new chapter of my own — and the first chapter of this text. Likewise, you, as a reader, are also entering something of a transition; you know something about programming, probably, but you're about to begin a completely new experience as a programmer of relational databases in general and Microsoft SQL Server 2012 in particular.

Database programming is a pretty big shift from most other kinds of software engineering. If you're at all like me, something brought you from your early programming experience (6502-based machines in BASIC for me) to databases. For me it happened at Microsoft in the early '90s, supporting a beta product that flew under the radar; I was asked to track certain aspects of the work I was doing in Access (2.0 at that time). Once I learned to do that, I was hooked, and a couple years on the Access support queue (learning SQL Server 4.2 and beyond as well) sealed the deal.

Working with SQL Server is a whole different animal from ordinary procedural programming. You get to think in mathematical and set-based terms, and learn how to ask carefully for what you want without spelling out how to actually accomplish the work. Transitioning from procedural programming to this kind of thinking without help is like trying to make a paradigm shift without a clutch. And yet this language, SQL, has a certain simplicity to it sometimes that makes it a pleasure to work with, once you learn how to think like it thinks.

I learned from immersion, from Microsoft's internal trainers, and from peers; what I wished for at the time was a book I could read that would give me the concepts and the functional knowledge to understand what I was seeing and know what was out there that I didn't know about yet. This book is the book I wanted, which means if you're in that early learning phase with T-SQL, it's probably the book you need as well.

This is a step-by-step tutorial, providing you the concepts you need in bite-sized pieces presented in an orderly way, each building on the last. The whole reason it exists is that you'd likely have a terrible time picking up such a completely new set of concepts by choosing topics out of an online help database. Books are still, in 2012, a great way to learn new ideas.

My hope is that, in this book, you find something that covers all of the core elements of SQL Server with the same success that we had in the original *Professional SQL Server Programming* titles. When you're done, you should be set to be a highly functional SQL Server 2012 programmer and, with any luck, you'll enjoy the unique challenges of database programming for years to come.

WHO THIS BOOK IS FOR

It is almost sad that the word "beginner" is in the title of this book. Don't get me wrong; if you are a beginner, this title is for you. But it is designed to last you well beyond your beginning days. What is covered in this book is necessary for the beginner, but there is simply too much information

for you to remember all of it all the time, and so it is laid out in a fashion that should make a solid review and reference book even for the more intermediate, and, yes, even advanced user.

The beginning user will want to start right at the beginning. Things are designed such that just about everything in this book is a genuine "need to know" sort of thing. With the possible exception of the chapters on XML, Reporting Services, and Integration Services, every item in this book is fundamental to you having the breadth of understanding you need to make well-informed choices on how you approach your SQL Server problems. Even these three topics are increasingly fundamental to being a serious SQL Server developer.

For the intermediate user, you can probably skip perhaps as far as Chapter 7 or 8 to start. Although I still recommend scanning the prior chapters for holes in your skills or general review, you can probably skip ahead with little harm done and get to something that might be a bit more challenging for you.

Advanced users, in addition to utilizing this as an excellent reference resource, will probably want to focus on Chapter 12 and beyond. Virtually everything from that point forward should be of some interest (the new debugging, transactions, XML, BI, Reporting Services, Integration Services, and more!).

WHAT THIS BOOK COVERS

Well, if you've read the title, you're probably not shocked to hear that this book covers SQL Server 2012 with a definite bent toward the developer's perspective.

SQL Server 2012 is the latest incarnation of a database management system that has now been around for more than two decades. It builds on the base redesign that was done to the product in version 7.0 — this time adding some brilliant analysis and reporting functionality, among other things. This book focuses on core development needs of every developer, regardless of skill level. The focus is highly oriented to just the 2012 version of the product, but there is regular mention of backward-compatibility issues, as they may affect your design and coding choices.

HOW THIS BOOK IS STRUCTURED

The book is designed to become increasingly more advanced as you progress through it, but, from the very beginning, I'm assuming that you are already an experienced developer — just not necessarily with databases. In order to make it through this book, you do need to already have understanding of programming basics such as variables, data types, and procedural programming. You do not have to have seen a query before in your life (though I suspect you have).

The focus of the book is highly developer-oriented. This means that it will, for the sake of both brevity and sanity, sometimes gloss over or totally ignore items that are more the purview of the database administrator than the developer. You will, however, be reminded of administration issues either as they affect the developer or as they need to be thought of during the development process — you'll also take a brief look at several administration-related issues in Chapter 21.

The book makes a very concerted effort to be language independent in terms of your client-side development. VB, C#, C++, Java, and other languages are generally ignored (it focuses on the server side of the equation) and treated equally where addressed.

In terms of learning order, you'll start by learning the foundation objects of SQL, and then move on to basic queries and joins. From there, you can begin adding objects to your database and discuss items that are important to the physical design — then it is on to the more robust code aspects of SQL Server scripting, stored procedures, user-defined functions, and triggers. After a short tutorial on business intelligence, you'll have a look at a few of the relatively peripheral features of SQL Server. Last but not least, you can wrap things up with a bit of important material on administration meant to help you keep the databases you develop nice and healthy.

NOTE *This book is a tutorial, but there's reference material online you might want to refer to even after you're done. This bonus material, including a full reference containing system functions and a document of very simple connectivity examples, is available at* `www.wrox.com`*. Once at the site, search for the book by its ISBN, which is 978-1-118-102282.*

WHAT YOU NEED TO USE THIS BOOK

In order to make any real, viable use of this book, you will need an installation of SQL Server. The book makes extensive use of the actual SQL Server 2012 management tools, so I highly recommend that you have a version that contains the full product, rather than just using SQL Server Express. That said, the book is focused on the kind of scripting required for developers, so even SQL Server Express users should be able to get the lion's share of learning out of most of the chapters. You will also need the AdvenureWorks sample database, the AdventureWorks database for BI and reporting, and a few custom databases installed. Instructions for accessing these databases can be found in the ReadMe file on this book's website (`www.wrox.com`).

A copy of Visual Studio is handy for working with this book, but most of the Visual Studio features needed are included in the Business Intelligence Studio that comes along with the SQL Server product.

CONVENTIONS

To help you get the most from the text and keep track of what's happening, I've used a number of conventions throughout the book.

TRY IT OUT

The *Try It Out* is an exercise you should work through, following the text in the book.

1. The exercises usually consist of a set of steps.

2. Each step has a number.
3. Follow the steps through with your copy of the database.

How It Works

After each *Try It Out*, the code you've typed will be explained in detail.

WARNING *Boxes with a warning icon like this one hold important, not-to-be-forgotten information that is directly relevant to the surrounding text.*

NOTE *The pencil icon indicates notes, tips, hints, tricks, and asides to the current discussion.*

- We *italicize* new terms and important words when we introduce them.
- We show keyboard strokes like this: Ctrl+A.
- We show filenames, URLs, and code within the text like so: `persistence.properties`.
- We present code in two different ways:

```
We use a monofont type with no highlighting for most code examples.

We use bold to emphasize code that's particularly important in the present
context.
```

SOURCE CODE

As you work through the examples in this book, you may choose either to type in all the code manually or to use the source code files that accompany the book. All the source code used in this book is available for download at `www.wrox.com`. When at the site, simply locate the book's title (use the Search box or one of the title lists) and click the Download Code link on the book's detail page to obtain all the source code for the book. Code that is included on the website is highlighted by the following icon:

Listings include the filename in the title. If it is just a code snippet, you'll find the filename in a code note such as this:

Code snippet filename