Preface

This book is a complete guide to the IBM's relational database servers, known as DB2. DB2 is available on many operating systems, and the book has been written to cover the version available on Linux, UNIX, and Windows. Any significant differences in the implementation of DB2 on various operating systems are highlighted. If you are planning to become certified, or you would simply like to understand the powerful new DB2 database servers from IBM, then read on. Those interested in becoming an IBM Certified Professional will want to review the information found in Appendix A at the end of this book.

The book is divided into four parts:

- Part 1 — Introduction to DB2 (Chapters 1–4).
  Installing and configuring DB2 servers and clients are covered in Chapters 2–4.
- Part 2 — Using SQL (Chapters 5–10).
  The Structured Query Language (SQL) is discussed in Chapter 5, 6, and 7. Chapter 8 covers the new pureXML capabilities, while Chapter 9 discusses the SQL PL programming language. Database concurrency is discussed in Chapter 10.
- Part 3 — DB2 Database Administration (Chapters 11–14).
  Creating a DB2 database and its related table spaces is covered in Chapter 11. The common administration tasks are discussed in Chapters 12 and 13. Database monitoring and performance considerations are discussed in Chapter 14.
- Part 4 — Developing Applications with DB2 (Chapters 15–16).
  An introduction to application development for DBAs is given in Chapter 15. Chapter 16 deals with some of the DBA activities that are related to application development. Not all of the material in these chapters is necessary for you to pass your certification test, but it will definitely help you when applications go into production.

This book can be used as a self-study guide to help you prepare for the DB2 certification exams, or as a guide to DB2 on the Linux, UNIX, and Windows platforms. Experience with DB2 is the best way to prepare for any of the DB2 certification exams!

DB2 *Note*

More information about DB2 certification can be found at www.ibm.com/certify.

Conventions

Many examples of SQL statements, DB2 commands, and operating system commands are included throughout the book. SQL statements are usually displayed within a set of thin lines, and any of the mandatory sections of the statements are shown in uppercase letters. An example of an SQL statement is shown:

```
SELECT LNAME, FNAME FROM CANDIDATE
  WHERE LNAME = 'ZIKOPOULOS' OR
        LNAME = 'BAKLARZ'
```

SQL is not a case-sensitive language, so the above query would provide the same result regardless of the case of the SQL keywords or the database object (table names or column names). Of course, the data in the database is stored *exactly* as it was entered (including case). Therefore, the above query would only find the candidates with the last name of 'ZIKOPOULOS' or 'BAKLARZ'. If the data were stored as 'Zikopoulos', it would not be part of the result table.

If SQL keywords are referred to in the text portion of the book, they will be shown as a monospaced font. For example, the SELECT statement is used to retrieve data from a DB2 database.

DB2 commands will be shown using the same method as SQL keywords. For example, the CREATE DATABASE command lets you create a database. DB2 commands are issued from the Command Line Processor (CLP) utility. This utility will accept commands in upper- and lowercase letters. The CLP program itself is an executable called db2. In some operating systems, such as AIX®, the program names are case sensitive. Therefore, be careful to enter the program name using the proper case.

There are a few operating-system-specific commands in this book. If the commands must be in lowercase they will be shown as such. For example, the UNIX command to create a user is mkuser.

There are a few syntax diagrams shown in the book. We recommend that the Command Line Processor or the *DB2 Command Reference* be used to verify the syntax of DB2 commands. The *DB2 SQL Reference* should be used to verify the syntax of SQL statements. To emphasize a term or concept, the term is shown in **bold** type or emphasized with *italics*.

Contributions

The *DB2® 9 for Linux®, UNIX®, and Windows® DBA Guide, Reference, and Exam Prep* was updated for Version 9, making this the sixth edition. We would like to thank the many customers, colleagues, and technical support personnel we have worked with for their ongoing efforts to improve DB2 and their feedback on this book. In particular, we would like to thank:

- Bill Wong for his support of the two earlier versions.
- Susan Visser, for her continued encouragement and support in updating this book.
- Our publisher, Bernard Goodwin, for his guidance and infinite patience with us.
- Michelle Housley for working with our reviewers and making sure the feedback got back to us in a timely fashion.
- Elizabeth Ryan and her team of proofreaders, for finding and eliminating all spilling and gremmir mistakes in the text.

We appreciate the time and effort that our reviewers took in reading the material (as dull as some of it may be!) and providing their feedback. Their input and comments have made a considerable impact on the quality of the book. We'd like to thank:

- Rick Swagerman for his incredible insight into the SQL language, including features that we didn't think actually existed!
- Chris Eaton for his excellent transaction flow diagrams that formed a basis for our section on High Availability Disaster Recovery (HADR).
- Dale McInnis for reviewing our section on recovery and recommending some changes on how certain parameters were explained.
- Howard Fosdick for reviewing the entire book and suggesting some organizational changes that helped the flow of the material.
- Terry Mason for pointing out some jargon that needed better clarification for readers not familiar with them. We have also attempted to remove all noise words that would prevent him from buying this book!
- Nick Tchervenski for his unique ability at finding subtle errors in the examples. Some of these errors have been in prior editions and weren't found until now.
- Angela Yang for examining the many syntax diagrams and pointing out missing parameters as well as correcting the case on a number of the UNIX commands.
- The DB2 development team for their continued support of this book.
- Finally, a special thanks to Denis Vasconcelos who managed to find more formatting glitches than we thought were possible. He also tested many of the examples and made valuable suggestions throughout the book.

Acknowledgments

I'm always thankful that I have an understanding family (and dog and cat!) that could deal with the late nights and busy weekends when I was updating this book. You know that things are taking too long to get done when the cat eventually gives up on you and goes to bed.

Katrina had infinite patience during the creation of this book. Even though I would say (countless times!) it's almost done, she would nod her head in that understanding manner which really meant she didn't believe me. But, she supported my efforts and made sure I had the time to get things done.

Of course, my children were less sympathetic to my book writing, especially if it interfered with their social lives. However, the entire family chipped in and I couldn't have done this without their help and patience! Thanks Katrina, Geoff, Andrew, Tristan (cat), Ellie (dog), and Basil (dog-in-law)!

I'd also like to thank my in-laws, Jean and Pete, for their support. While they don't have a computer science background, they are interested in these books and even sometimes read them!

I have to also give additional credit to my mom. She had a tough life, growing up in Germany and being a prisoner of war during WW II. She had to deal with many challenges and never had the opportunity to further her education. Moving to Canada, Mom envisioned a better life for her children and she encouraged me to go to University and do the best I could. While Mom never learned about computers, she still reads my books and points out things in them to me. Thanks for all your encouragement Mom, and for reading the book.

George

I guess I should be thanking George for giving me the opportunity to join him on this book (if you knew the amount of work that went into this book, you'd understand why I'm saying "guess"). I also have to thank my wife, Kelly, and my angel, Chloë, for their understanding of the time commitment that goes into such a project, as well as ignoring (and not learning) the unpleasantries that echoed throughout the house when I suffered a blue screen after about six hours of unsaved work. Professionally, it's the usual list of suspects that help me to learn DB2 so I can help you learn it too; these folks know who they are at this point, so I'll just leave it at that.

I would like to dedicate this book to a number of people. Professionally, Jim Stittle. Jim has been a colleague of George and myself for a good many years. The guy is

"off-the-hook" smart, but never really lets people know it — very humble. He's a great guy, big-time role model (in and outside of IBM), and, quite honestly, I'm not sure if I'd be where I am today without him. So three cheers for Jim Stittle!

Of course, my parents: they should be the source of any dedication for any book I've written (I think I'm at 10 now). They've always encouraged higher learning (even funded it — if you guys have spare change, pass it along by the way) and are just great parents with lots of love for my budding family. So thanks Mom and Dad: there's a feeling you get when you know your parents do their best for you, and not everyone gets parents like that, so I'm lucky. Really lucky. Really, really lucky.

Finally, to a former high school teacher of mine at Moira Secondary School in Belleville, Ontario: Ken Smith. Ken was my basketball coach during those years. I was always a good athlete growing up, used to lots of athletic success across the board. Basketball was a different story. I was good, but didn't excel. To make things worse, the top six guys on my team could have all had scholarships. The point is that I was just average on a well-above-average team (for a town of 35,000 at the time, we were ranked as high as seventh provincially).

Ken gave up his weekends for years to take us to tournaments all around the province to let our team play the best and achieve. He gave up his morning or afternoons to coach us. Gave up his spare time to help a kid if he had some issues in math or anything else. The guy loved our team as if he was getting paid for it or if we were his own kids. This is the nature of person that really shapes you when you're in high school. Of course, during those years you're too cool to realize it at the time, but when you get older and have a kid and reflect, it hits you. But Ken was more than all of this. Ken always knew when he could do something special to really make your day.

I recall practicing hours and hours extra because my parents were coming to a game. Their attendance really weighed heavy on me because they had always seen great successes when it came to athletics, but they hadn't been to a basketball game where I was just average. Well, Ken knew how I felt and played me when I likely shouldn't have gotten played. It was just for a short time, I think I missed two free throws and got 2 fouls in 5 minutes (I can still see his smile now when I peered at him off the court). The point was he knew I felt uneasy about my stature as a basketball player and played me because my parents were there. I never really thanked him for that; so thanks. However, the thing he taught me the most, and I have to admit it sounds so cliché but it's true: work hard and good things will come. He just taught me that even when you're not the best, work at it like you are and good things will come. Leave your life's court with everything you've got, and good things will come.

When I look at my successes as IBM, this is one of the core pillars that have helped me to achieve at this great company. The best part is that I just saw Ken earlier this year while golfing one of the best rounds of my life. After talking to him in the middle of a hole (which I subsequently doubled — thanks for nothing, Ken), I realized that Ken is alive and well. Past dedications have been to folks that aren't with me anymore — it's an amazing feeling to tell someone how they impacted your life while they are still around. Thanks, Ken. I wonder if today's students have it this good.

Paul

About the Authors

George Baklarz, B. Math, M.Sc., Ph.D., has spent 22 years at IBM working on various aspects of database technology. From 1987 to 1991 he worked on SQL/DS as part of the product planning department, system test team, performance team, and application development group. In 1991, Baklarz was part of the team that helped moved the OS/2 ES database to Toronto to become part of the DB2 family of products. Since that time he has worked on vendor enablement, competitive analysis, product marketing, product planning, and technical sales support. Today, Baklarz is the Program Director responsible for Dynamic Warehousing Pre-Sales Support, and he works with customers to help them understand DB2 technology directions and uses their feedback to improve the product. When not traveling the world, Baklarz lectures at the University of Guelph, teaching relational database concepts to students. You can reach him at gbaklarz@uoguelph.ca.

Paul C. Zikopoulos, B.A., M.B.A., is an award-winning writer and speaker with the IBM Database Competitive Technology team. He has more than thirteen years of experience with DB2 and has written more than 150 magazine articles and is currently working on book number twelve. Zikopoulos has authored the books *Information on Demand: Introduction to DB2 9.5 New Features*; *DB2 9 Database Administration Certification Guide and Reference (6th Edition)*; *DB2 9: New Features*; *Information on Demand: Introduction to DB2 9 New Features*; *Off to the Races with Apache Derby*; *DB2 Version 8: The Official Guide*; *DB2: The Complete Reference*; *DB2 Fundamentals Certification for Dummies*; *DB2 for Dummies*; and *A DBA's Guide to Databases on Linux*. Zikopoulos is a DB2 Certified Advanced Technical Expert (DRDA and Cluster/EEE) and a DB2 Certified Solutions Expert (Business Intelligence and Database Administration). In his spare time, he enjoys all sorts of sporting activities, including running with his dog Chachi, avoiding punches in his MMA class, and trying to figure out the world according to Chloë, his daughter. You can reach him at paulz_ibm@msn.com.