

# Contents

<b>About the Author</b>	<b>iv</b>
<b>Acknowledgments</b>	<b>v</b>
<b>Introduction</b>	<b>xiii</b>
About This Book	xiv
Audience	xvi
Conventions Used	xvii
<i>Example 1</i>	xvii
<i>Example 2</i>	xvii
<b>1: IBM DB2 for Linux, UNIX, and Windows Certification</b>	<b>1</b>
DB2 10.1 and 10.5 for LUW Certification Roles	2
<i>IBM Certified Database Associate—DB2 10.1 Fundamentals</i>	2
<i>IBM Certified Database Associate—DB2 10.5 Fundamentals for LUW</i>	4
<i>IBM Certified Database Administrator—DB2 10.1 DBA for Linux, UNIX, and Windows</i>	6
<i>IBM Certified Database Administrator—DB2 10.5 DBA for LUW Upgrade from DB2 10.1</i>	9
<i>IBM Certified Advanced Database Administrator—DB2 10.1 for Linux, UNIX, and Windows</i>	12
Additional DB2 9.7 Certification Roles	14
<i>IBM Certified Application Developer—DB2 9.7 for Linux, UNIX, and Windows</i>	14
<i>IBM Certified Solution Developer—DB2 9.7 SQL Procedure</i>	16
The Certification Process	18
<i>Preparing for the Certification Exams</i>	18
<i>Arranging to Take a Certification Exam</i>	20
<i>Taking an IBM Certification Exam</i>	22

<b>2: Planning</b>	<b>35</b>
The DB2 Family	36
<i>DB2 Express-C</i>	38
<i>DB2 Express Server Edition</i>	40
<i>DB2 Workgroup Server Edition (WSE)</i>	42
<i>DB2 Enterprise Server Edition (ESE)</i>	44
<i>DB2 Advanced Workgroup Server Edition (AWSE)</i>	45
<i>DB2 Advanced Enterprise Server Edition (AESE)</i>	48
<i>DB2 for z/OS</i>	48
Other DB2 Add-on Products	48
<i>IBM DB2 BLU Acceleration In-Memory Offering</i>	49
<i>IBM DB2 Business Application Continuity Offering</i>	49
<i>IBM DB2 Encryption Offering</i>	49
<i>IBM Advanced Recovery Feature</i>	50
<i>IBM DB2 Performance Management Offering</i>	50
Database Workloads	51
<i>Optimized Solutions for Each Workload Type</i>	53
DB2 10.5 with BLU Acceleration	57
<i>BLU Acceleration Design Principles</i>	58
<i>When to Use BLU Acceleration</i>	68
DB2 10.5 Compatibility Features	69
<i>Enabling One or More Optional Compatibility Features</i>	72
<b>3: Security</b>	<b>75</b>
Controlling Database Access	76
Authentication	76
<i>Where Authentication Takes Place</i>	77
Authorities and Privileges	79
<i>Administrative Authorities</i>	80
<i>Privileges</i>	82
Granting Authorities and Privileges	89
<i>The GRANT Statement</i>	90
<i>GRANT Statement Examples</i>	93
Revoking Authorities and Privileges	94
<i>REVOKE Statement Examples</i>	96
Row and Column Access Control (RCAC)	97

---

<i>Row Permissions</i>	98
<i>Column Masks</i>	100
<i>Activating Row and Column Access Control</i>	102
Label-Based Access Control (LBAC)	102
<i>Security Label Components</i>	103
<i>Security Policies</i>	104
<i>Security Labels</i>	105
<i>Granting Security Labels to Users</i>	107
<i>Implementing Row-Level LBAC Protection</i>	108
<i>Implementing Column-Level LBAC Protection</i>	108
A Word About Trusted Contexts	109
<i>Creating Trusted Contexts</i>	111
A Word About DB2 Native Encryption	112
<b>4: Working with Databases and Database Objects</b>	<b>115</b>
Servers, Instances, and Databases	116
Other DB2 Objects	117
<i>Data Objects</i>	117
<i>System Objects</i>	131
Creating a DB2 Database	136
DB2'S Directory Files	140
<i>The System Database Directory</i>	140
<i>The Local Database Directory</i>	141
<i>The Node Directory</i>	141
<i>The Database Connection Services (DCS) Directory</i>	142
Cataloging and Uncataloging a DB2 Database	142
Cataloging and Uncataloging a Node	145
Cataloging and Uncataloging a DCS Database	147
Establishing a Database Connection	148
<i>Type 1 and Type 2 Connections</i>	150
Tables Revisited	151
<i>Base Tables</i>	152
<i>Synopsis Tables</i>	152
<i>Partitioned Tables</i>	152
<i>Range-Clustered Tables (RCTs)</i>	154
<i>Multidimensional Clustering (MDC) Tables</i>	154

<i>Insert Time Clustering (ITC) Tables</i>	158
<i>Materialized Query Tables (MQTs)</i>	158
<i>Shadow Tables</i>	159
<i>Temporal (Time-Travel) Tables</i>	159
<i>History Tables</i>	161
<i>Temporary Tables</i>	161
<i>Typed Tables</i>	162
A Word About Compression	162
<b>5: Working with DB2 Data Using SQL and XQuery</b>	<b>165</b>
Structured Query Language (SQL)	166
SQL Data Manipulation Language (DML) Statements	167
<i>The INSERT Statement</i>	167
<i>The UPDATE Statement</i>	170
<i>The DELETE Statement</i>	174
<i>The SELECT Statement</i>	177
A Closer Look at the SELECT Statement and Its Clauses	178
<i>Other SELECT Statement Clauses</i>	183
<i>The Where Clause</i>	183
<i>The GROUP BY Clause</i>	194
<i>The GROUP BY ROLLUP Clause</i>	196
<i>The GROUP BY CUBE Clause</i>	197
<i>The HAVING Clause</i>	199
<i>The ORDER BY Clause</i>	200
<i>The FETCH FIRST Clause</i>	202
<i>The Isolation Clause</i>	204
<i>A Word About Common Table Expressions</i>	205
<i>A Word About CASE Expressions</i>	207
<i>Joining Tables</i>	211
<i>Using a Set Operator to Combine the Results of Two or More Queries</i>	223
Using a Cursor to Obtain Results from a Result Data Set	231
A Word About Working with Temporal (Time-Travel) Tables	232
<i>Querying System-Period Temporal Tables</i>	234
<i>Querying Application-Period Temporal Tables</i>	236
<i>Querying Bitemporal Temporal Tables</i>	237
Working with XML Data	237

---

Working with User-Defined Functions (UDFs)	243
<i>Creating SQL Scalar and SQL Table User-Defined Functions</i>	244
<i>Invoking SQL Scalar and SQL Table User-Defined Functions</i>	248
Working with Stored Procedures	249
<i>Developing and Registering SQL Stored Procedures</i>	250
<i>Calling a Stored Procedure</i>	253
Transactions and Transaction Boundaries	256
<i>Transaction Management with Savepoints</i>	260
A Word about DB2 10.5's SQL Compatibility Enhancements	263
<i>Extended Row Size Support</i>	264
<i>Ability to Exclude NULL Index Keys</i>	265
<i>String Unit Attributes Improve Handling of Multibyte Characters</i>	265
<b>6: Working with DB2 Tables, Views, and Indexes</b>	<b>267</b>
DB2's Data Types	268
<i>Numeric Data Types</i>	268
<i>Character String Data Types</i>	270
<i>Date and Time Data Types</i>	272
<i>Large Object Data Types</i>	274
<i>The Extensible Markup Language (XML) Data Type</i>	275
<i>A Word About the Oracle Compatibility Data Types</i>	276
<i>User-Defined Data Types</i>	277
Understanding Data Constraints	277
<b>NOT NULL Constraints</b>	278
<i>Default Constraints</i>	278
<i>UNIQUE Constraints</i>	280
<i>Check Constraints</i>	282
<i>Referential Integrity Constraints</i>	283
<i>Informational Constraints</i>	301
Creating Tables	303
<i>Creating Tables with Identity Columns</i>	310
<i>Creating Tables That Are Similar to Existing Tables</i>	313
<i>A Quick Reminder About Schemas</i>	314
<i>Examples of the CREATE TABLE Statement</i>	315
Altering Tables	321
A Closer Look at Temporary Tables	324

A Closer Look at Views	327
A Closer Look at Indexes	332
Altering Indexes	336
A Closer Look at Triggers	337
<b>7: Data Concurrency</b>	<b>345</b>
Understanding Data Consistency	346
Transactions, Isolation Levels, and Locks	347
<i>Isolation Levels</i>	348
<i>Choosing the Proper Isolation Level</i>	358
<i>Specifying the Isolation Level to Use</i>	358
<i>Locks</i>	360
<i>Lock Attributes and Lock States</i>	361
<i>How Locks Are Acquired</i>	364
<i>Which Locks Are Acquired?</i>	366
<i>Lock Avoidance</i>	367
<i>Currently Committed Semantics</i>	368
<i>Enabling Currently Committed Semantics Behavior</i>	372
<i>Overriding Currently Committed Semantics Behavior</i>	372
<i>Locks and Performance</i>	373
<b>Appendix A: DB2 10.5 Fundamentals for LUW Exam (Exam 615) Objectives</b>	<b>381</b>
<b>Appendix B: Practice Questions</b>	<b>384</b>
<b>Appendix C: Answers to Practice Questions</b>	<b>436</b>
<b>Index</b>	<b>482</b>