

ORACLE®

ORACLE PRESS™—EXCLUSIVELY FROM MCGRAW-HILL/OSBORNE

ORACLE DATABASE 10g

A Beginner's Guide

Learn Oracle Database Essentials

IAN ABRAMSON

CTO of Red Sky Data and
International Oracle Users Group
Director of Education

MICHAEL ABBEY

Pythian Group DBA SourceTeam Lead
and Renowned Oracle Press Author

MICHAEL COREY

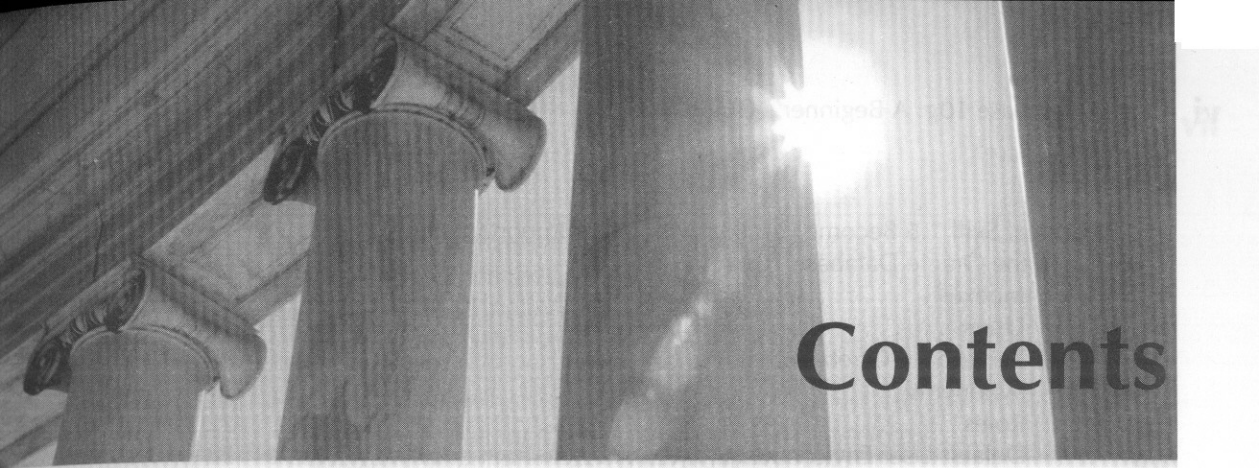
Founder and CEO of Ntirety, LLC



ORIGINAL • AUTHENTIC

Oracle Press

ONLY FROM OSBORNE



Contents

ACKNOWLEDGMENTS	xv
INTRODUCTION	xvi
I Database Fundamentals	I
Critical Skill 1.1 Define a Database	2
Critical Skill 1.2 Learn the Oracle Database 10g Architecture	3
The Control Files	4
The Online Redo Logs	4
The SYSTEM Tablespace	5
The SYSAUX Tablespace	5
Default Temporary Tablespace	5
Undo Tablespace	5
The System Parameter File	6
Background Processes	6
Project 1-1 Reviewing the Oracle Database 10g Architecture	8
The Database Administrator	9
Critical Skill 1.3 Learn the Basic Oracle Database 10g Data Types ...	10
varchar2	10
number	10
date	11
timestamp	11
clob	12
blob	12
Critical Skill 1.4 Work with Tables	12
Tables Related to part_master	13
Critical Skill 1.5 Work with Stored Objects	14
Views	15
Triggers	16
Procedures	16
Functions	16
Packages	17

Critical Skill 1.6 Become Familiar with Other Important Items in the Oracle Database 10g	19
Indexes	19
Users	20
Tablespace Quotas	20
Synonyms	21
Roles	22
Default User Environments	22
Critical Skill 1.7 Work with Object and System Privileges	23
Select	23
Insert	23
Update	24
Delete	24
System Privileges	24
Critical Skill 1.8 Introduce Yourself to the Grid	25
Critical Skill 1.9 Tie It All Together	28
Chapter 1 Mastery Check	30
2 SQL: Structured Query Language	33
Critical Skill 2.1 Learn the SQL Statement Components	34
DDL	34
DML	35
Critical Skill 2.2 Use Basic insert and select Statements	36
insert	36
select	37
Critical Skill 2.3 Use Simple where Clauses	39
The where Clause with NOT	42
The where Clause with a Range Search	42
The where Clause with a Search List	43
The where Clause with a Pattern Search	44
The where Clause: Common Operators	44
Critical Skill 2.4 Use Basic update and delete Statements	46
update	46
delete	48
Critical Skill 2.5 Order Data	50
Critical Skill 2.6 Employ Functions: String, Numeric, Aggregate (No Grouping)	51
String Functions	51
Numeric Functions	52
Aggregate Functions	53
Critical Skill 2.7 Use Dates and Data Functions (Formatting and Chronological)	54
Date Functions	54

Special Formats with the Date Data Type	55
Nested Functions	56
Critical Skill 2.8 Employ Joins (ANSI vs. Oracle):	
Inner, Outer, Self	57
Inner Joins	57
Outer Joins	61
Project 2-1 Joining Data Using Inner and Outer Joins	62
Project 2-2 Joining Data Using ANSI SQL Joins	65
Self-Joins	66
Critical Skill 2.9 Learn the group by and having Clauses	67
group by	67
having	68
Project 2-3 Grouping Data in Your select Statements	69
Critical Skill 2.10 Learn Subqueries: Simple and Correlated	
Comparison with Joins	72
Simple Subquery	72
Correlated Subqueries with Joins	73
Critical Skill 2.11 Use Set Operators: Union, Intersect, Minus	74
union	74
union all	75
intersect	75
minus	76
Project 2-4 Using the union Function in Your SQL	76
Critical Skill 2.12 Use Views	78
Critical Skill 2.13 Learn Sequences: Just Simple Stuff	79
Critical Skill 2.14 Employ Constraints: Linkage to Entity Models,	
Types, Deferred, Enforced, Gathering Exceptions	80
Linkage to Entity Models	81
Types	82
Deferred	83
Critical Skill 2.15 Format Your Output with SQL*Plus	83
Page and Line Size	83
Page Titles	84
Page Footers	84
Formatting Columns	84
Project 2-5 Formatting Your SQL Output	84
Writing SQL*Plus Output to a File	87
Chapter 2 Mastery Check	87
3 The Database Administrator	89
Critical Skill 3.1 Learn the Job of the DBA	90
Critical Skill 3.2 Understand the Oracle Database 10g	
DBA Skill Set	90

Critical Skill 3.3 Perform Day-to-Day Operations	91
Architecture and Design	91
Capacity Planning	91
Backup and Recovery	91
Security	92
Performance and Tuning	92
Managing Database Objects	92
Storage Management	92
Change Management	93
Schedule Jobs	93
Network Management	93
Troubleshooting	93
Critical Skill 3.4 Understand the Oracle Database 10g Infrastructure ..	93
Schemas	94
Storage Structures	97
Critical Skill 3.5 Operate Modes of an Oracle Database 10g	97
Modes of Operation	98
Database and Instance Shutdown	99
Critical Skill 3.6 Get Started with Oracle Enterprise Manager	101
Instance Configuration	102
User Sessions	102
Resource Consumer Groups	102
Schema, Security, and Storage Management	103
Distributed Management	104
Warehouse Features	105
Other Tools	105
Critical Skill 3.7 Manage Database Objects	106
Controlfiles	106
Redo Logs	106
Undo Management	107
Schema Objects	108
Critical Skill 3.8 Manage Space	109
Archive Logs	110
Tablespaces and Datafiles	110
Critical Skill 3.9 Manage Users	112
Create a User	113
Edit Users	114
Critical Skill 3.10 Manage Privileges for Database Users	115
Grant Authority	115
Roles	116
Profiles	117
In Conclusion	118

Project 3-1 Creating Essential Objects	118
Chapter 3 Mastery Check	120
4 Networking	121
Critical Skill 4.1 Use Oracle Net Services	122
Network Protocols	123
Optimize Network Bandwidth	124
Character Sets	125
Connections	125
Maintain Connections	126
Define a Location	127
Critical Skill 4.2 Learn the Difference Between Dedicated and Shared Server Architectures	127
Dedicated Server	128
Shared Server	129
Set Dispatchers	131
Views to Monitor the Shared Server	133
Critical Skill 4.3 Define Connections	134
A Connect Descriptor	134
Define a Connect Descriptor	134
The Oracle Connection Manager	135
Session Multiplexing	136
Firewall Access Control	136
Critical Skill 4.4 Use the Oracle Net Listener	137
Password Authentication	139
Multiple Listeners	140
Connection Pooling	140
Critical Skill 4.5 Learn Naming Methods	140
Directory Naming Method	141
Directory Information Trees	141
Distinguished Names	142
How to Find the Directory Naming Information	142
Net Service Alias Entries	143
The Local Naming Method	143
The Easy Naming Method	143
The External Naming Method	144
Which Naming Method to Use	144
Critical Skill 4.6 Use Oracle Configuration Files	144
Syntax for Configuration Files	144
Critical Skill 4.7 Use Administration Tools	146
The Oracle Enterprise Manager	146
The Oracle Net Manager	147
The OEM Console	148

The OEM Components	148
The Oracle Net Configuration Assistant	148
The Oracle Internet Directory Configuration Assistant	149
Command-Line Utilities	149
The Oracle Advanced Security Option	151
Dispatchers	151
Project 4-1 Testing a Connection	152
Critical Skill 4.8 Use Profiles	154
Control Access	154
Critical Skill 4.9 Network in a Multitiered Environment	155
Chapter 4 Mastery Check	156
5 Backup and Recovery	157
Critical Skill 5.1 Oracle Backup and Recovery Fundamentals	158
Where Do I Start?	158
Backup Architecture	159
Oracle Binaries	160
The Parameter Files	160
Control Files	160
Redo Logs	161
Undo Segments	161
Checkpoints	161
Archive Logs	162
Datafiles, Tablespace, Segments, Extents, and Blocks	162
Trace Files	163
Critical Skill 5.2 Learn about Oracle User-Managed Backup and Recovery	164
Types of User-Managed Backups	164
Cold Backups	164
Hot Backups	165
Recovery from a Cold Backup	167
Recovery from a Hot Backup	168
Seven Steps to Recovery	169
Recovery Using Backup Control Files	169
Critical Skill 5.3 Write a Database Backup	170
Critical Skill 5.4 Back Up Archived Redo Logs	172
Critical Skill 5.5 Get Started with Oracle Data Pump	173
Critical Skill 5.6 Use Oracle Data Pump Export	174
Some Export Examples	177
Critical Skill 5.7 Work with Oracle Data Pump Import	178
A Data Pump Export and Import Example	181
Critical Skill 5.8 Use Traditional Export and Import	183
How to Run the Original Utilities	183
Examples Using Original Export and Import	184

Critical Skill 5.9 Get Started with Recovery Manager	185
RMAN Architecture	186
Set Up a Recovery Catalog and Target Database	188
Key RMAN Features	189
Backups	192
Performing Backups	193
Restore and Recovery	194
Project 5-1 RMAN End-to-End	195
Chapter 5 Mastery Check	197
6 PL/SQL	199
Critical Skill 6.1 Define PL/SQL and Why We Use It	200
Critical Skill 6.2 Describe the Basic PL/SQL Program Structure	202
Critical Skill 6.3 Define PL/SQL Data Types	204
The PL/SQL Character Set	204
Critical Skill 6.4 Write PL/SQL Programs in SQL*Plus	210
Project 6-1 Creating a PL/SQL Program	212
SQL in Your PL/SQL Programs	213
The Cursor FOR Loop	215
Critical Skill 6.5 Handle Error Conditions in PL/SQL	217
Error Handling Oracle-Supplied Variables	220
Critical Skill 6.6 Include Conditions in Your Programs	222
Program Control	223
Project 6-2 Using Conditions and Loops in PL/SQL	231
Critical Skill 6.7 Create Stored Procedures—How and Why	232
Critical Skill 6.8 Create and Use Functions	237
Project 6-3 Creating and Using a Function	237
Critical Skill 6.9 Call PL/SQL Programs	239
Chapter 6 Mastery Check	240
7 Java	241
Java Server Fundamentals	242
Critical Skill 7.1 What Does Java Mean to an Oracle DBA?	242
Critical Skill 7.2 Overview of Java	245
Platform Independence	247
Java in All Three Tiers	247
Java 2 Platform, Standard Edition	248
Java 2 Platform, Enterprise Edition	248
The J2EE Server	249
Different Types of Java Programs	249
Standalone Applications	250
Applets	250
JavaBeans	250
JavaServer Pages and Servlets	250

Enterprise JavaBeans	251
Advantages of N-Tiered Architectures	251
Java, XML, Web Services, and Oracle 10g	252
Opportunities for Oracle DBAs	252
Critical Skill 7.3 Configure Java for Oracle	254
Java Initialization Parameters	254
Environmental Variables	255
Critical Skill 7.4 Java in Oracle	256
Native Compilation	256
Garbage Collection	257
Things to Watch Out For	257
Main Components of the JVM	257
Critical Skill 7.5 JDBC Drivers	258
JDBC Thin Driver	258
JDBC Thick Driver	258
JDBC Server-Side Driver	258
Use the Proper JDBC Driver	258
Critical Skill 7.6 Use JDBC	259
How to Write Database Programs	259
Project 7-1 Accessing the Database with Java	260
Critical Skill 7.7 Use SQLJ	261
SQLJ Translator	261
Sample SQLJ Code	262
SQLJ Directions	262
Critical Skill 7.8 Java-Stored Procedures	262
Java Utilities for DBAs	263
loadjava and dropjava Examples	263
ojvmjava Examples	263
Privileges	264
Resolver Specifications	264
Project 7-2 Creating a Java-Stored Procedure	264
Critical Skill 7.9 Create Java Objects in Oracle	266
create java class	266
create java source	266
create java resource	266
Critical Skill 7.10 Understand Oracle Java Products	267
Oracle Application Server 10g	267
Oracle JDeveloper 10g	267
Chapter 7 Mastery Check	269

8 XML	271
Critical Skill 8.1 Understand XML	272
Critical Skill 8.2 XML DB: Use XML in the Database	273

Critical Skill 8.3 SQLX: Create XML from Data Stored in Oracle	276
The SQL/XML Standard	276
xmlelement()	277
xmlattributes()	277
xmlforest()	277
xmlagg()	279
Project 8-1 Creating an XML Listing	281
Critical Skill 8.4 Store XML in Oracle XML DB	283
The Native XMLType	283
The XML DB Repository	284
Registering an XML Schema	284
Loading XML Data	286
Project 8-2 Storing XML	287
Use the RESOURCE_VIEW	288
Path-Based Access	289
Update the XML Document	290
Critical Skill 8.5 Use Simple Queries	291
Project 8-3 Using Simple Queries	293
Critical Skill 8.6 Create a Relational View from XML	294
Critical Skill 8.7 Learn Programmatic Access Using XSLT	296
Chapter 8 Mastery Check	297
9 Large Database Features	299
Critical Skill 9.1 What Is a Large Database?	300
Critical Skill 9.2 Why and How to Use Data Partitioning	301
Why Use Data Partitioning	301
Implement Data Partitioning	305
Project 9-1 Creating a Range-Partitioned Table and a Local Partitioned Index	320
Critical Skill 9.3 Compress Your Data	323
Data Compression	324
Index Key Compression	326
Critical Skill 9.4 Use Parallel Processing to Improve Performance	327
Parallel Processing Database Components	327
Parallel Processing Configuration	328
Invoke Parallel Execution	330
Critical Skill 9.5 Use Materialized Views	331
Uses for Materialized Views	332
Query Rewrite	333
When to Create Materialized Views	334
Create Materialized Views	335
Critical Skill 9.6 Real Application Clusters: A Primer	336
RAC Architecture	337

xiv Oracle Database 10g: A Beginner's Guide

Critical Skill 9.7 Automatic Storage Management: Another Primer	338
ASM Architecture	338
Critical Skill 9.8 Grid Computing: The “g” in Oracle Database 10g . . .	340
Self-Managing Databases	341
Critical Skill 9.9 Use SQL Aggregate and Analysis Functions	343
Aggregation Functions	344
Analysis Functions	346
Other Functions	354
Critical Skill 9.10 Create SQL Models	355
Project 9-2 Using Analytic SQL Functions and Models	358
Chapter 9 Mastery Check	360
A Mastery Check Answers	363
Index	381