

Object-Oriented Oracle™

Johanna Wenny Rahayu
La Trobe University, Australia

David Taniar
Monash University, Australia

Eric Pardede
La Trobe University, Australia



IRM Press
**Publisher of innovative scholarly and professional
information technology titles in the cyberage**
Hershey • London • Melbourne • Singapore

Object-Oriented Oracle™

Table of Contents

Preface	viii
Chapter I. Object-Relational Approaches	1
<i>Object-Oriented Conceptual Model</i>	<i>1</i>
<i>Static Aspects of OOCM</i>	<i>2</i>
Objects and Classes	3
Inheritance Relationships	4
Association Relationships	6
Aggregation Hierarchies	7
<i>Dynamic Aspects of OOCM</i>	<i>12</i>
Generic Methods	13
User-Defined Methods	14
<i>New Era of Object-Relational Approaches</i>	<i>15</i>
OOCM Implemented on Relational Databases	16
Object Wrappers on Relational Systems	16
Extended Relational Systems	17
Object-Oriented System and RDBMS Coexistence	18
OODBMS and RDBMS Interoperation	19
<i>Object-Relational Database System</i>	<i>20</i>
<i>Case Study</i>	<i>21</i>
<i>Summary</i>	<i>23</i>
<i>References</i>	<i>24</i>
<i>Chapter Problems</i>	<i>25</i>
<i>Chapter Solutions</i>	<i>27</i>

Chapter II. Object-Oriented Features in Oracle™	31
<i>Relational-Model Features</i>	31
<i>Object-Oriented Features</i>	34
Object Types and User-Defined Types	34
Collection Types	35
Object Identifiers	36
Relationships using <i>Ref</i>	38
Cluster	39
Inheritance Relationships using <i>Under</i>	40
Encapsulation	41
<i>Summary</i>	47
<i>References</i>	47
<i>Chapter Problems</i>	48
<i>Chapter Solutions</i>	49
Chapter III. Using Object-Oriented Features	51
<i>Using Inheritance Relationships</i>	51
Union Inheritance Implementation	52
Mutual-Exclusion Inheritance Implementation	54
Partition Inheritance Implementation	56
Multiple Inheritance Implementation	57
<i>Using Association Relationships</i>	59
Creating an Association Relationship by a Primary-Key and Foreign-Key Relationship	60
Creating an Association Relationship by Object References	62
Primary Keys: Foreign Keys vs. Object References in an Association Relationship	65
<i>Using Aggregation Relationships</i>	67
Implementing Existence-Dependent Aggregation using the Clustering Technique	67
Implementing Existence-Dependent Aggregation using the Nesting Technique	70
Implementing Existence-Independent Aggregation	73
<i>Case Study</i>	76
<i>Summary</i>	81
<i>References</i>	81
<i>Chapter Problems</i>	81
<i>Chapter Solutions</i>	83

Chapter IV. Object-Oriented Methods	89
<i>Implementation of Encapsulation Using Stored Procedures</i>	
<i>or Functions and Grant Mechanisms</i>	90
Stored Procedures or Functions	90
Grant	97
<i>Implementation of Encapsulation Using Member Procedures</i>	
<i>or Functions</i>	98
<i>Case Study</i>	102
<i>Summary</i>	107
<i>References</i>	108
<i>Chapter Problems</i>	108
<i>Chapter Solutions</i>	111
Chapter V. Generic Methods	114
<i>Implementation of Methods in Inheritance Hierarchies</i>	115
Implementation of Methods in Union Inheritance	116
Implementation of Methods in Mutual-Exclusion	
Inheritance	126
Implementation of Methods in Partition Inheritance	133
Implementation of Methods in Multiple Inheritance	135
<i>Implementation of Methods in Association Relationships</i>	138
<i>Implementation of Methods in Aggregation Relationships</i>	142
Implementation of Methods in Aggregation Relationships	
Using the Clustering Technique	145
Implementation of Methods in Aggregation Relationships	
Using the Nesting Technique	146
<i>Case Study</i>	151
<i>Summary</i>	159
<i>Chapter Problems</i>	159
<i>Chapter Solutions</i>	163
Chapter VI. User-Defined Queries	170
<i>User-Defined Queries in Inheritance Hierarchies</i>	170
Subclass Query	171
Superclass Query	172
<i>User-Defined Queries in Association Relationships</i>	175
Referencing Query	175
Dereferencing Query	177
<i>User-Defined Queries in Aggregation Hierarchies</i>	178
Part Query	179

Whole Query	181
<i>User-Defined Queries Using Multiple Collection Types</i>	184
Varray Collection Type	184
Nested-Table Collection Type	186
<i>User-Defined Queries with Object References</i>	187
VALUE	188
DEREF	190
IS DANGLING	190
<i>Object Table vs. Object Attribute</i>	191
<i>Clustering Technique vs. Index-Organization Table</i>	193
Case Study	194
Summary	202
Chapter Problems	202
Chapter Solutions	206
Chapter VII. University Case Study	210
<i>Problem Description</i>	210
<i>Problem Solution</i>	217
Campus_T Table	217
Faculty_T Class and Part Classes	218
Building_T Class and Part Classes	221
Degree_T Class	224
Person_T Class, the Subclasses, and the Enrolls_In Table	227
Subject_T Class and Takes Table	240
<i>Sample Database Execution</i>	243
Generic Methods Sample	243
User-Defined Methods Sample	247
<i>Building Case Application</i>	249
Summary	275
Chapter VIII. Retailer Case Study	276
<i>Problem Description</i>	276
<i>Problem Solution</i>	282
Company_T Class and the Subclasses	284
Shareholders_T Class and Own_Shares Table	285
Management_T Class and the Subclasses	288
Store_T Class and the Department_T Part Class	290
Employee_T Class and the Subclasses	294
Maker_T Class	300
Item_T Class and Available_In Table	301

Customer_T Class	303
Transaction_T Class	306
<i>Building Tools Using Oracle™ Developer</i>	307
Creating a Form Using the Data-Block Form	308
Creating a Form Using a Custom Form	315
Summary	323
About the Authors	324
Index	326