1 Writing Basic SQL SELECT Statements

Objectives 1-2 Capabilities of SQL SELECT Statements 1-3 Basic SELECT Statement 1-4 Selecting All Columns 1-5 Selecting Specific Columns 1-6 Writing SQL Statements 1-7 Column Heading Defaults 1-8 Arithmetic Expressions 1-9 Using Arithmetic Operators 1-10 **Operator Precedence 1-11** Using Parentheses 1-13 Defining a Null Value 1-14 Null Values in Arithmetic Expressions 1-15 Defining a Column Alias 1-16 Using Column Aliases 1-17 **Concatenation Operator 1-18** Using the Concatenation Operator 1-19 Literal Character Strings 1-20 Using Literal Character Strings 1-21 **Duplicate Rows 1-22** Eliminating Duplicate Rows 1-23 SQL and iSQL*Plus Interaction 1-24 SQL Statements versus iSQL*Plus Commands 1-25 Overview of iSQL*Plus 1-26 Logging In to iSQL*Plus 1-27 The iSQL*Plus Environment 1-28 Displaying Table Structure 1-29 Interacting with Script Files 1-31 Summary 1-34 Practice 1 Overview 1-35

2 Restricting and Sorting Data

Objectives 2-2 Limiting Rows Using a Selection 2-3 Limiting the Rows Selected 2-4 Using the WHERE Clause 2-5 Character Strings and Dates 2-6 **Comparison Conditions 2-7** Using Comparison Conditions 2-8 Other Comparison Conditions 2-9 Using the BETWEEN Condition 2-10 Using the IN Condition 2-11 Using the LIKE Condition 2-12 Using the NULL Conditions 2-14 Logical Conditions 2-15 Using the AND Operator 2-16 Using the OR Operator 2-17 Using the NOT Operator 2-18 Rules of Precedence 2-19

ORDER BY Clause 2-22 Sorting in Descending Order 2-23 Sorting by Column Alias 2-24 Sorting by Multiple Columns 2-25 Summary 2-26 Practice 2 Overview 2-27

3 Single-Row Functions

Objectives 3-2 SQL Functions 3-3 Two Types of SQL Functions 3-4 Single-Row Functions 3-5 **Character Functions 3-7 Case Manipulation Functions 3-9** Using Case Manipulation Functions 3-10 Character-Manipulation Functions 3-11 Using the Character-Manipulation Functions 3-12 Number Functions 3-13 Using the ROUND Function 3-14 Using the TRUNC Function 3-15 Using the MOD Function 3-16 Working with Dates 3-17 Arithmetic with Dates 3-19 Using Arithmetic Operators with Dates 3-20 Date Functions 3-21 Using Date Functions 3-22 Practice 3, Part 1 Overview 3-24 **Conversion Functions 3-25** Implicit Data-Type Conversion 3-26 Explicit Data-Type Conversion 3-28 Using the TO CHAR Function with Dates 3-31 Elements of the Date Format Model 3-32 Using the TO_CHAR Function with Dates 3-36 Using the TO CHAR Function with Numbers 3-37 Using the TO NUMBER and TO DATE Functions 3-39 RR Date Format 3-40 Example of RR Date Format 3-41 Nesting Functions 3-42 **General Functions 3-44** NVL Function 3-45 Using the NVL Function 3-46 Using the NVL2 Function 3-47 Using the NULLIF Function 3-48 Using the COALESCE Function 3-49 **Conditional Expressions 3-51** The CASE Expression 3-52 Using the CASE Expression 3-53 The DECODE Function 3-54 Using the DECODE Function 3-55 Summary 3-57 Practice 3, Part 2 Overview 3-58

4 Displaying Data from Multiple Tables

Objectives 4-2 Obtaining Data from Multiple Tables 4-3 Cartesian Products 4-4 Generating a Cartesian Product 4-5 Types of Joins 4-6 Joining Tables Using Oracle Syntax 4-7 What Is an Equijoin? 4-8 Retrieving Records with Equijoins 4-9 Additional Search Conditions Using the AND Operator 4-10 Qualifying Ambiguous Column Names 4-11 Using Table Aliases 4-12 Joining More than Two Tables 4-13 Nonequijoins 4-14 **Retrieving Records with Nonequijoins 4-15** Outer Joins 4-16 Outer Joins Syntax 4-17 Using Outer Joins 4-18 Self Joins 4-19 Joining a Table to Itself 4-20 Practice 4, Part 1 Overview 4-21 Joining Tables Using SQL: 1999 Syntax 4-22 Creating Cross Joins 4-23 **Creating Natural Joins 4-24** Retrieving Records with Natural Joins 4-25 Creating Joins with the USING Clause 4-26 Retrieving Records with the USING Clause 4-27 Creating Joins with the ON Clause 4-28 Retrieving Records with the ON Clause 4-29 Creating Three-Way Joins with the ON Clause 4-30 **INNER versus OUTER Joins 4-31 LEFT OUTER JOIN 4-32 RIGHT OUTER JOIN 4-33** viii FULL OUTER JOIN 4-34 Additional Conditions 4-35 Summary 4-36 Practice 4, Part 2 Overview 4-37

5 Aggregating Data Using Group Functions

Objectives 5-2 What Are Group Functions? 5-3 Types of Group Functions 5-4 Group Functions Syntax 5-5 Using the AVG and SUM Functions 5-6 Using the MIN and MAX Functions 5-7 Using the COUNT Function 5-8 Using the DISTINCT Keyword 5-10 Group Functions and Null Values 5-11 Using the NVL Function with Group Functions 5-12 Creating Groups of Data 5-13 Creating Groups of Data: GROUP BY Clause Syntax 5-14 Using the GROUP BY Clause 5-15 Grouping by More Than One Column 5-17 Using the GROUP BY Clause on Multiple Columns 5-18 Illegal Queries Using Group Functions 5-19 Excluding Group Results 5-21 Excluding Group Results: The HAVING Clause 5-22 Using the HAVING Clause 5-23 Nesting Group Functions 5-25 Summary 5-26 Practice 5 Overview 5-27

6 Subqueries

Objectives 6-2 Using a Subquery to Solve a Problem 6-3 Subquery Syntax 6-4 Using a Subquery 6-5 Guidelines for Using Subgueries 6-6 Types of Subqueries 6-7 Single-Row Subqueries 6-8 **Executing Single-Row Subqueries 6-9** Using Group Functions in a Subguery 6-10 The HAVING Clause with Subqueries 6-11 What Is Wrong with This Statement? 6-12 Will This Statement Return Rows? 6-13 Multiple-Row Subqueries 6-14 Using the ANY Operator in Multiple-Row Subqueries 6-15 Using the ALL Operator in Multiple-Row Subgueries 6-16 Null Values in a Subguery 6-17 Summary 6-18 Practice 6 Overview 6-19

7 Producing Readable Output with iSQL*Plus

Objectives 7-2 Substitution Variables 7-3 Using the & Substitution Variable 7-5 Character and Date Values with Substitution Variables 7-7 Specifying Column Names, Expressions, and Text 7-8 **Defining Substitution Variables 7-10 DEFINE and UNDEFINE Commands 7-11** Using the DEFINE Command with & Substitution Variable 7-12 Using the VERIFY Command 7-14 Customizing the iSQL*Plus Environment 7-15 SET Command Variables 7-16 iSQL*Plus Format Commands 7-17 The COLUMN Command 7-18 Using the COLUMN Command 7-19 **COLUMN Format Models 7-20** Using the BREAK Command 7-21 Using the TTITLE and BTITLE Commands 7-22 Creating a Script File to Run a Report 7-23

Sample Report 7-25 Summary 7-26 Practice 7 Overview 7-27

8 Manipulating Data

Objectives 8-2 Data Manipulation Language 8-3 Adding a New Row to a Table 8-4 The INSERT Statement Syntax 8-5 Inserting New Rows 8-6 Inserting Rows with Null Values 8-7 Inserting Special Values 8-8 **Inserting Specific Date Values 8-9** Creating a Script 8-10 Copying Rows from Another Table 8-11 Changing Data in a Table 8-12 The UPDATE Statement Syntax 8-13 Updating Rows in a Table 8-14 Updating Two Columns with a Subguery 8-15 Updating Rows Based on Another Table 8-16 Updating Rows: Integrity Constraint Error 8-17 Removing a Row from a Table 8-18 The DELETE Statement 8-19 Deleting Rows from a Table 8-20 Deleting Rows Based on Another Table 8-21 Deleting Rows: Integrity Constraint Error 8-22 Using a Subquery in an INSERT Statement 8-23 Using the WITH CHECK OPTION Keyword on DML Statements 8-25 Overview of the Explict Default Feature 8-26 Using Explicit Default Values 8-27 The MERGE Statement 8-28 MERGE Statement Syntax 8-29 Merging Rows 8-30 Database Transactions 8-32 Advantages of COMMIT and ROLLBACK Statements 8-34 Controlling Transactions 8-35 Rolling Back Changes to a Marker 8-36 Implicit Transaction Processing 8-37 State of the Data Before COMMIT or ROLLBACK 8-38 State of the Data After COMMIT 8-39 Committing Data 8-40 State of the Data After ROLLBACK 8-41 Statement-Level Rollback 8-42 Read Consistency 8-43 Implementation of Read Consistency 8-44 Locking 8-45 Implicit Locking 8-46 Summary 8-47 Practice 8 Overview 8-48

9 Creating and Managing Tables

Objectives 9-2 Database Objects 9-3 Naming Rules 9-4 The CREATE TABLE Statement 9-5 Referencing Another User's Tables 9-6 The DEFAULT Option 9-7 **Creating Tables 9-8** Tables in the Oracle Database 9-9 Querying the Data Dictionary 9-10 Data Types 9-11 Datetime Data Types 9-13 TIMESTAMP WITH TIME ZONE Data Type 9-15 TIMESTAMP WITH LOCAL TIME Data Type 9-16 INTERVAL YEAR TO MONTH Data Type 9-17 Creating a Table by Using a Subguery Syntax 9 -18 Creating a Table by Using a Subquery 9-19 The ALTER TABLE Statement 9-20 Adding a Column 9-22 Modifying a Column 9-24 Dropping a Column 9-25 The SET UNUSED Option 9-26 Dropping a Table 9-27 Changing the Name of an Object 9-28 Truncating a Table 9-29 Adding Comments to a Table 9-30 Summary 9-31 Practice 9 Overview 9-32

10 Including Constraints

Objectives 10-2 What Are Constraints? 10-3 **Constraint Guidelines 10-4 Defining Constraints 10-5** The NOT NULL Constraint 10-7 The UNIQUE Constraint 10-9 The PRIMARY KEY Constraint 10-11 The FOREIGN KEY Constraint 10-13 FOREIGN KEY Constraint Keywords 10-15 The CHECK Constraint 10-16 Adding a Constraint Syntax 10-17 Adding a Constraint 10-18 Dropping a Constraint 10-19 **Disabling Constraints 10-20** Enabling Constraints 10-21 Cascading Constraints 10-22 Viewing Constraints 10-24 Viewing the Columns Associated with Constraints 10-25 Summary 10-26 Practice 10 Overview 10-27

11 Creating Views

Objectives 11-2 Database Objects 11-3 What Is a View? 11-4 Why Use Views? 11-5 Simple Views and Complex Views 11-6 Creating a View 11-7 Retrieving Data from a View 11-10 Querying a View 11-11 Modifying a View 11-12 Creating a Complex View 11-13 Rules for Performing DML Operations on a View 11-14 Using the WITH CHECK OPTION Clause 11-17 Denying DML Operations 11-18 Removing a View 11-20 Inline Views 11-21 Top-n Analysis 11-22 Performing Top-n Analysis 11-23 Example of Top-n Analysis 11-24 Summary 11-25 Practice 11 Overview 11-26

12 Other Database Objects

Objectives 12-2 Database Objects 12-3 What Is a Sequence? 12-4 The CREATE SEQUENCE Statement Syntax 12-5 Creating a Sequence 12-6 Confirming Sequences 12-7 NEXTVAL and CURRVAL Pseudocolumns 12-8 Using a Sequence 12-10 Modifying a Sequence 12-12 Guidelines for Modifying a Sequence 12-13 Removing a Sequence 12-14 What Is an Index? 12-15 How Are Indexes Created? 12-16 Creating an Index 12-17 When to Create an Index 12-18 When Not to Create an Index 12-19 Confirming Indexes 12-20 Function-Based Indexes 12-21 Removing an Index 12-22 Synonyms 12-23 Creating and Removing Synonyms 12-24 Summary 12-25 Practice 12 Overview 12-26

13 Controlling User Access

Objectives 13-2 Controlling User Access 13-3 Privileges 13-4 System Privileges 13-5 Creating Users 13-6 User System Privileges 13-7 Granting System Privileges 13-8 What Is a Role? 13-9 Creating and Granting Privileges to a Role 13-10 Changing Your Password 13-11 Object Privileges 13-12 Granting Object Privileges 13-14 Using the WITH GRANT OPTION and PUBLIC Keywords 13-15 Confirming Privileges Granted 13-16 How to Revoke Object Privileges 13-17 Revoking Object Privileges 13-18 Database Links 13-19 Summary 13-21 Practice 13 Overview 13-22

14 SQL Workshop Workshop Overview

Workshop Overview 14-2

15 Using SET Operators

Objectives 15-2 The SET Operators 15-3 Tables Used in This Lesson 15-4 The UNION SET Operator 15-7 Using the UNION Operator 15-8 The UNION ALL Operator 15-10 Using the UNION ALL Operator 15-11 The INTERSECT Operator 15-12 Using the INTERSECT Operator 15-13 The MINUS Operator 15-14 SET Operator Guidelines 15-16 The Oracle Server and SET Operators 15-17 Matching the SELECT Statements 15-18 Controlling the Order of Rows 15-20 Summary 15-21 Practice 15 Overview 15-22

16 Oracle Datetime Functions

Objectives 16-2 TIME ZONES 16-3 Oracle Datetime Support 16-4 CURRENT_DATE 16-6 CURRENT_TIMESTAMP 16-7 LOCALTIMESTAMP 16-8 DBTIMEZONE and SESSIONTIMEZONE 16-9 EXTRACT 16-10 FROM_TZ 16-11 TO_TIMESTAMP and TO_TIMESTAMP_TZ 16-12 TO_YMINTERVAL 16-13 TZ_OFFSET 16-14 Summary 16-16 Practice 16 Overview 16-17

17 Enhancements to the GROUP BY Clause

Objectives 17-2 Review of Group Functions 17-3 Review of the GROUP BY Clause 17-4 Review of the HAVING Clause 17-5 GROUP BY with ROLLUP and CUBE Operators 17-6 **ROLLUP Operator 17-7 ROLLUP Operator Example 17-8** CUBE Operator 17-9 CUBE Operator: Example 17-10 **GROUPING Function 17-11 GROUPING Function: Example 17-12 GROUPING SETS 17-13 GROUPING SETS: Example 17-15** Composite Columns 17-17 Composite Columns: Example 17-19 Concatenated Groupings 17-21 Concatenated Groupings Example 17-22 Summary 17-23 Practice 17 Overview 17-24

18 Advanced Subqueries

Objectives 18-2 What Is a Subquery? 18-3 Subqueries 18-4 Using a Subguery 18-5 Multiple-Column Subqueries 18-6 Column Comparisons 18-7 Pairwise Comparison Subguery 18-8 Nonpairwise Comparison Subquery 18-9 Using a Subquery in the FROM Clause 18-10 Scalar Subquery Expressions 18-11 **Correlated Subqueries 18-14** Using Correlated Subgueries 18-16 Using the EXISTS Operator 18-18 Using the NOT EXISTS Operator 18-20 Correlated UPDATE 18-21 Correlated DELETE 18-24 The WITH Clause 18-26 WITH Clause: Example 18-27 Summary 18-29 Practice 18 Overview 18-31

19 Hierarchical Retrieval

Objectives 19-2 Sample Data from the EMPLOYEES Table 19-3 Natural Tree Structure 19-4 Hierarchical Queries 19-5 Walking the Tree 19-6 Walking the Tree: From the Bottom Up 19-8 Walking the Tree: From the Top Down 19-9 Ranking Rows with the LEVEL Pseudocolumn 19-10 Formatting Hierarchical Reports Using LEVEL and LPAD 19-11 Pruning Branches 19-13 Summary 19-14 Practice 19 Overview 19-15

20 Oracle Extensions to DML and DDL Statements

Objectives 20-2 Review of the INSERT Statement 20-3 Review of the UPDATE Statement 20-4 **Overview of Multitable INSERT Statements 20-5** Types of Multitable INSERT Statements 20-7 Multitable INSERT Statements 20-8 Unconditional INSERT ALL 20-10 Conditional INSERT ALL 20-11 Conditional FIRST INSERT 20-13 **Pivoting INSERT 20-15** External Tables 20-18 Creating an External Table 20-19 Example of Creating an External Table 20-20 Querying External Tables 20-23 CREATE INDEX with CREATE TABLE Statement 20-24 Summary 20-25 Practice 20 Overview 20-26