Las Positas CurricUNET

LAS POSITAS COLLEGE

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Course Outline for CIS 9003

ORACLE: DATABASE PROGRAMMING WITH PL/SQL

Effective: Fall 2011

I. CATALOG DESCRIPTION:
CIS 9003 — ORACLE: DATABASE PROGRAMMING WITH PL/SQL — 3.00 units

This course introduces students to Procedural Language/Structured Query Language (PL/SQL) through a project-based approach. Learn procedural logic constructs such as variables, constants, conditional statements and iterative controls; then execute, and manage PL\SQL stored program units such as procedures, functions, packages, and database triggers. Learn the basic functionality of how to debug functions and procedures using the SQL Developer Debugger. Manage PL/SQL subprograms, triggers, declaring identifiers and trapping exceptions.

2.50 Units Lecture 0.50 Units Lab

Strongly Recommended
CIS 9002 - ORACLE: Database Design and SQL Programming

Grading Methods:
Letter or P/NP

Discipline:

	MIN
Lecture Hours:	45.00
Lab Hours:	27.00
Total Hours:	72.00

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: 2

III. PREREQUISITE AND/OR ADVISORY SKILLS:

Before entering this course, it is strongly recommended that the student should be able to:

A. CIS9002

IV. MEASURABLE OBJECTIVES:

Upon completion of this course, the student should be able to:

A. Describe the features and syntax of PL/SQL
B. Declare PL/SQL Variables
C. Use PL/SQL programming constructs and conditionally control code flow (loops, control structures, and explicit cursors)
D. Create and debug stored procedures and functions
E. Use conditional compilation to customize the functionality in a PL/SQL application without removing any source code
F. Design PL/SQL packages to group and contain related constructs
G. Design PL/SQL anonymous blocks that execute efficiently
H. Use the Oracle supplied PL/SQL packages to generate screen output, file output and mail output
I. Manage dependencies between PL/SQL subprograms
J. Handle runtime errors
K. Create triggers to solve business challenges

V. CONTENT:
A. Introduction to PL/SQL
   1. Overview of PL/SQL
   2. Identify the benefits of PL/SQL Subprograms
   3. Overview of the types of PL/SQL blocks
   4. Create a Simple Anonymous Block
   5. How to generate output from a PL/SQL Block?
B. Declare PL/SQL Identifiers
   1. List the different Types of Identifiers in a PL/SQL subprogram
   2. Usage of the Declarative Section to Define Identifiers
   3. Use variables to store data
   4. Identify Scalar Data Types
   5. The %TYPE Attribute
   6. What are Bind Variables?

    7. Sequences in PL/SQL Expressions

C. Write Executable Statements
    1. Describe Basic PL/SQL Block Syntax Guidelines
    2. Learn to Comment the Code
    3. Deployment of SQL Functions in PL/SQL
    4. How to convert Data Types?
    5. Describe Nested Blocks
    6. Identify the Operators in PL/SQL

D. Interaction with the Oracle Server
    1. Invoke SELECT Statements in PL/SQL
    2. Retrieve Data in PL/SQL
    3. SQL Cursor concept
    4. Avoid Errors by using Naming Conventions when using Retrieval and DML Statements
    5. Data Manipulation in the Server using PL/SQL
    6. Understand the SQL Cursor concept
    7. Use SQL Cursor Attributes to Obtain Feedback on DML
    8. Save and Discard Transactions

E. Control Structures
    1. Conditional processing using IF Statements
    2. Conditional processing using CASE Statements
    3. Describe simple Loop Statement
    4. Describe While Loop Statement
    5. Describe For Loop Statement
    6. Use the Continue Statement

F. Composite Data Types
    1. Use PL/SQL Records
    2. The %ROWTYPE Attribute
    3. Insert and Update with PL/SQL Records
    4. INDEX BY Tables
    5. Examine INDEX BY Table Methods
    6. Use INDEX BY Table of Records

G. Explicit Cursors
    1. What are Explicit Cursors?
    2. Declare the Cursor
    3. Open the Cursor
    4. Fetch data from the Cursor
    5. Close the Cursor
    6. Cursor FOR loop
    7. The %NOTFOUND and %ROWCOUNT Attributes
    8. Describe the FOR UPDATE Clause and WHERE CURRENT Clause

H. Exception Handling
    1. Understand Exceptions
    2. Handle Exceptions with PL/SQL
    3. Trap Predefined Oracle Server Errors
    4. Trap Non-Predefined Oracle Server Errors
    5. Trap User-Defined Exceptions
    6. Propagate Exceptions
    7. RAISE_APPLICATION_ERROR Procedure

I. Stored Procedures
    1. Create a Modularized and Layered Subprogram Design
    2. Modularize Development With PL/SQL Blocks
    3. Understand the PL/SQL Execution Environment
    4. List the benefits of using PL/SQL Subprograms
    5. List the differences between Anonymous Blocks and Subprograms
    6. Create, Call, and Remove Stored Procedures
    7. Implement Procedures Parameters and Parameters Modes
    8. View Procedure Information

J. Stored Functions and Debugging Subprograms
    1. Create, Call, and Remove a Stored Function
    2. Identify the advantages of using Stored Functions
    3. Identify the steps to create a stored function
    4. Invoke User-Defined Functions in SQL Statements
    5. Restrictions when calling Functions
    6. Control side effects when calling Functions
    7. View Functions Information
    8. How to debug Functions and Procedures?

K. Packages
    1. Listing the advantages of Packages
    2. Describe Packages
    3. What are the components of a Package?
    4. Develop a Package
    5. How to enable visibility of a Package's Components?
    6. Create the Package Specification and Body using the SQL CREATE Statement and SQL Developer
    7. Invoke the Package Constructs
    8. View the PL/SQL Source Code using the Data Dictionary

L. Deploying Packages
    1. Overloading Subprograms in PL/SQL
    2. Use the STANDARD Package
    3. Use Forward Declarations to solve Illegal Procedure Reference
    4. Implement Package Functions in SQL and Restrictions
    5. Persistent State of Packages
    6. Persistent State of a Package Cursor
    7. Control side effects of PL/SQL Subprograms
    8. Invoke PL/SQL Tables of Records in Packages

M. Implement Oracle-Supplied Packages in Application Development
    1. What are Oracle-Supplied Packages?
    2. Examples of some of the Oracle-Supplied Packages
    3. How does the DBMS_OUTPUT Package work?
    4. Use the UTL_FILE Package to Interact with Operating System Files
    5. Invoke the UTL_MAIL Package

6. Write UTL_MAIL Subprograms

N. Dynamic SQL

1. The Execution Flow of SQL
2. What is Dynamic SQL?
3. Declare Cursor Variables
4. Dynamically Executing a PL/SQL Block
5. Configure Native Dynamic SQL to Compile PL/SQL Code
6. How to invoke DBMS_SQL Package?
7. Implement DBMS_SQL with a Parameterized DML Statement
8. Dynamic SQL Functional Completeness

O. Design Considerations for PL/SQL Code

1. Standardize Constants and Exceptions
2. Understand Local Subprograms
3. Write Autonomous Transactions
4. Implement the NOCOPY Compiler Hint
5. Invoke the PARALLEL_ENABLE Hint
6. The Cross-Session PL/SQL Function Result Cache
7. The DETERMINISTIC Clause with Functions
8. Usage of Bulk Binding to Improve Performance

P. Triggers

1. Describe Triggers
2. Identify the Trigger Event Types and Body
3. Business Application Scenarios for Implementing Triggers
4. Create DML Triggers using the CREATE TRIGGER Statement and SQL Developer
5. Identify the Trigger Event Types, Body, and Firing (Timing)
6. Differences between Statement Level Triggers and Row Level Triggers
7. Create Instead of and Disabled Triggers
8. How to Manage, Test and Remove Triggers?

Q. Creating Compound, DDL, and Event Database Triggers

1. What are Compound Triggers?
2. Identify the Timing-Point Sections of a Table Compound Trigger
3. Understand the Compound Trigger Structure for Tables and Views
4. Implement a Compound Trigger to Resolve the Mutating Table Error
5. Comparison of Database Triggers to Stored Procedures
6. Create Triggers on DDL Statements
7. Create Database-Event and System-Events Triggers
8. System Privileges Required to Manage Triggers

R. PL/SQL Compiler

1. What is the PL/SQL Compiler?
2. Describe the Initialization Parameters for PL/SQL Compilation
3. List the new PL/SQL Compile Time Warnings
4. Overview of PL/SQL Compile Time Warnings for Subprograms
5. List the benefits of Compiler Warnings
6. List the PL/SQL Compile Time Warning Messages Categories
7. Setting the Warning Messages Levels: Using SQL Developer, PLSQL_WARNINGS Initialization Parameter, and the DBMS_WARNING Package Subprograms
8. View Compiler Warnings: Using SQL Developer, SQL*Plus, or the Data Dictionary Views

S. Manage PL/SQL Code

1. What Is Conditional Compilation?
2. Implement Selection Directives
3. Invoke Predefined and User-Defined Inquiry Directives
4. The PLSQL_CCFLAGS Parameter and the Inquiry Directive
5. Conditional Compilation Error Directives to Raise User-Defined Errors
6. The DBMS_DB_VERSION Package
7. Write DBMS_PREPROCESSOR Procedures to Print or Retrieve Source Text
8. Obfuscation and Wrapping PL/SQL Code

T. Manage Dependencies

1. Overview of Schema Object Dependencies
2. Query Direct Object Dependencies using the USER_DEPENDENCIES View
3. Query an Object's Status
4. Invalidation of Dependent Objects
5. Display the Direct and Indirect Dependencies
6. Fine-Grained Dependency Management in Oracle Database 11g
7. Understand Remote Dependencies
8. Recompile a PL/SQL Program Unit

VI. METHODS OF INSTRUCTION:

A. **Lecture** -
B. Classroom discussion
C. Computer demonstrations with overhead display panel
D. Discussion boards
E. Lab experience: hands-on lab assignments and database creation and manipulation
F. PowerPoint presentations
G. Chat rooms
H. Read text and other supplemental sources (example, Internet sites)

VII. TYPICAL ASSIGNMENTS:

A. Lecture 1. Interests, Aptitudes, and Career Exploration 2. GROUP BY and HAVING clauses B. Reading 1. Read the chapter on Joins and Subqueries 2. Read the U.S. Department of Labor Bureau of Labor Statistics Occupational Outlook Handbook SQL jobs C. Hands-on lab assignment, write the PL/SQL program to: 1. Display for each employee the employee number, last name, salary, and salary increased by 15% and expressed as a whole number. Label the column New Salary 2. Write a query that produces the following for each employee: earns monthly but wants . Label the column Dream Salaries. Format the salary to look like $10,000.00 3. Write a query that will return the names and past job Ids for those employees that have previously held roles in their company

VIII. EVALUATION:

A. **Methods**

1. Exams/Tests
2. Quizzes
3. Class Participation
4. Lab Activities
5. Other:
    a. Methods
        1. Quizzes, chapter, midterm and final examination
        2. Graded hands-on lab assignments
        3. Relevant active participation

B. **Frequency**

1. Frequency
    a. Chapter quizzes, examinations (mid-term, final)
    b. Weekly hands-on lab assignments to reinforce and demonstrate mastery of the various tools

IX. TYPICAL TEXTS:

1. Dawes, Chip *OCA/OCP Introduction to Oracle11g SQL Study Guide.*, Sybex, 2009.
2. Oracle *Oracle iLearning.*, Oracle Corporation Curriculum, 2011.

X. OTHER MATERIALS REQUIRED OF STUDENTS:

A. Access to the World Wide Web with any major Web browser