

## Oracle Database 12c R2: Program with PL/SQL Ed 2

**Duration:** 5 Days

### What you will learn

This Oracle Database: Program with PL/SQL training starts with an introduction to PL/SQL and then explores the benefits of this powerful programming language. Through hands-on instruction from expert Oracle instructors, you'll learn to develop stored procedures, functions, packages and more.

### Learn To:

Conditionally control code flow (loops, control structures).

Create stored procedures and functions.

Use PL/SQL packages to group and contain related constructs.

Create triggers to solve business challenges. Use some of the Oracle supplied PL/SQL packages to generate screen output and file output.

Create custom packages for applications.

Write Dynamic SQL code for applications.

### Benefits to You

Ensure fast, reliable, secure and easy to manage performance. Optimize database workloads, lower IT costs and deliver a higher quality of service by enabling consolidation onto database clouds.

### Use Oracle SQL Developer

You will use Oracle SQL Developer to develop these program units. SQL\*Plus is introduced in this course as optional tools.

**Course Bundle Note:** This course is a combination of Oracle Database: PL/SQL Fundamentals and Oracle Database: Develop PL/SQL Program Units courses.

### Related Training

#### *Required Prerequisites*

Oracle Database: Introduction to SQL

Oracle Database 12c R2: SQL Workshop

Oracle Database 12c R2: SQL Workshop II Ed 2

#### *Suggested Prerequisites*

Previous programming experience

## Course Objectives

Use conditional compilation to customize the functionality in a PL/SQL application without removing any source code

Design PL/SQL packages to group related constructs

Create overloaded package subprograms for more flexibility

Design PL/SQL anonymous blocks that execute efficiently

Use the Oracle supplied PL/SQL packages to generate screen output

file output and mail output

Write dynamic SQL for more coding flexibility

Describe the features and syntax of PL/SQL

Create and debug stored procedures and functions

Use PL/SQL programming constructs and conditionally control code flow (loops

control structures

and explicit cursors)

Manage dependencies between PL/SQL subprograms

Handle runtime errors

Create triggers to solve business challenges

## Course Topics

### Introduction

Course Objectives  
Course Agenda  
Describe the Human Resources (HR) Schema  
PL/SQL development environments available in this course  
Introduction to SQL Developer

### Working with Oracle Cloud Exadata Express Cloud Service

Introduction to Oracle Database Exadata Express Cloud Service  
Accessing Cloud Database using SQL Workshop  
Connecting to Exadata Express using Database Clients

### Introduction to PL/SQL

Overview of PL/SQL  
Identify the benefits of PL/SQL Subprograms  
Overview of the types of PL/SQL blocks  
Create a Simple Anonymous Block  
How to generate output from a PL/SQL Block?

### Declare PL/SQL Variables

List the different Types of Identifiers in a PL/SQL subprogram  
Usage of the Declarative Section to Define Identifiers  
Use variables to store data  
Identify Scalar Data Types  
The %TYPE Attribute  
What are Bind Variables?  
Sequences in PL/SQL Expressions

### Write Anonymous PL/SQL Blocks

Describe Basic PL/SQL Block Syntax Guidelines  
Learn to Comment the Code  
Deployment of SQL Functions in PL/SQL  
How to convert Data Types?  
Describe Nested Blocks  
Identify the Operators in PL/SQL

### SQL Statements in a PL/SQL block

Invoke SELECT Statements in PL/SQL  
Retrieve Data in PL/SQL  
SQL Cursor concept  
Avoid Errors by using Naming Conventions when using Retrieval and DML Statements  
Data Manipulation in the Server using PL/SQL  
Understand the SQL Cursor concept  
Use SQL Cursor Attributes to Obtain Feedback on DML  
Save and Discard Transactions

### Control Structures

Conditional processing using IF Statements  
Conditional processing using CASE Statements  
Describe simple Loop Statement

Describe While Loop Statement  
Describe For Loop Statement  
Use the Continue Statement

### **Composite Data Types**

Use PL/SQL Records  
The %ROWTYPE Attribute  
Insert and Update with PL/SQL Records  
INDEX BY Tables  
Examine INDEX BY Table Methods  
Use INDEX BY Table of Records

### **Explicit Cursors**

What are Explicit Cursors?  
Declare the Cursor  
Open the Cursor  
Fetch data from the Cursor  
Close the Cursor  
Cursor FOR loop  
The %NOTFOUND and %ROWCOUNT Attributes  
Describe the FOR UPDATE Clause and WHERE CURRENT Clause

### **Exception Handling**

Understand Exceptions  
Handle Exceptions with PL/SQL  
Trap Predefined Oracle Server Errors  
Trap Non-Predefined Oracle Server Errors  
Trap User-Defined Exceptions  
Propagate Exceptions  
RAISE\_APPLICATION\_ERROR Procedure

### **Stored Procedures**

Create a Modularized and Layered Subprogram Design  
Modularize Development With PL/SQL Blocks  
Understand the PL/SQL Execution Environment  
List the benefits of using PL/SQL Subprograms  
List the differences between Anonymous Blocks and Subprograms  
Create, Call, and Remove Stored Procedures  
Implement Procedures Parameters and Parameters Modes  
View Procedure Information

### **Stored Functions**

Create, Call, and Remove a Stored Function  
Identify the advantages of using Stored Functions  
Identify the steps to create a stored function  
Invoke User-Defined Functions in SQL Statements  
Restrictions when calling Functions  
Control side effects when calling Functions  
View Functions Information

### **Debugging Subprograms**

How to debug Functions and Procedures?

## **Packages**

Listing the advantages of Packages

Describe Packages

What are the components of a Package?

Develop a Package

How to enable visibility of a Packages Components?

Create the Package Specification and Body using the SQL CREATE Statement and SQL Developer

Invoke the Package Constructs

View the PL/SQL Source Code using the Data Dictionary

## **Deploying Packages**

Overloading Subprograms in PL/SQL

Use the STANDARD Package

Use Forward Declarations to solve Illegal Procedure Reference

Implement Package Functions in SQL and Restrictions

Persistent State of Packages

Persistent State of a Package Cursor

Control side effects of PL/SQL Subprograms

Invoke PL/SQL Tables of Records in Packages

## **Implement Oracle-Supplied Packages in Application Development**

What are Oracle-Supplied Packages?

Examples of some of the Oracle-Supplied Packages

How does the DBMS\_OUTPUT Package work?

Use the UTL\_FILE Package to Interact with Operating System Files

Invoke the UTL\_MAIL Package

Write UTL\_MAIL Subprograms

## **Dynamic SQL**

The Execution Flow of SQL

What is Dynamic SQL?

Declare Cursor Variables

Dynamically Executing a PL/SQL Block

Configure Native Dynamic SQL to Compile PL/SQL Code

How to invoke DBMS\_SQL Package?

Implement DBMS\_SQL with a Parameterized DML Statement

Dynamic SQL Functional Completeness

## **Design Considerations for PL/SQL Code**

Standardize Constants and Exceptions

Understand Local Subprograms

Write Autonomous Transactions

Implement the NOCOPY Compiler Hint

Invoke the PARALLEL\_ENABLE Hint

The Cross-Session PL/SQL Function Result Cache

The DETERMINISTIC Clause with Functions

Usage of Bulk Binding to Improve Performance

## **Triggers**

Describe Triggers

Identify the Trigger Event Types and Body  
Business Application Scenarios for Implementing Triggers  
Create DML Triggers using the CREATE TRIGGER Statement and SQL Developer  
Identify the Trigger Event Types, Body, and Firing (Timing)  
Differences between Statement Level Triggers and Row Level Triggers  
Create Instead of and Disabled Triggers  
How to Manage, Test and Remove Triggers?

### **Creating Compound, DDL, and Event Database Triggers**

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

### **PL/SQL Compiler**

What is the PL/SQL Compiler?  
Describe the Initialization Parameters for PL/SQL Compilation  
List the new PL/SQL Compile Time Warnings  
Overview of PL/SQL Compile Time Warnings for Subprograms  
List the benefits of Compiler Warnings  
List the PL/SQL Compile Time Warning Messages Categories  
Setting the Warning Messages Levels: Using SQL Developer, PLSQL\_WARNINGS Initialization Parameter, and the DBM  
View Compiler Warnings: Using SQL Developer, SQL\*Plus, or the Data Dictionary Views

### **Manage Dependencies**

Overview of Schema Object Dependencies  
Query Direct Object Dependencies using the USER\_DEPENDENCIES View  
Query an Objects Status  
Invalidation of Dependent Objects  
Display the Direct and Indirect Dependencies  
Fine-Grained Dependency Management in Oracle Database 12c  
Understand Remote Dependencies  
Recompile a PL/SQL Program Unit