

PL/SQL is Oracle's embedded procedural database language, allowing developers and administrators to write scripts, stored procedures, functions, packages, and database triggers which run in the optimized environment of the Oracle Database server. This advanced course helps PL/SQL programmers take advantage of language features, advanced techniques, and packages and facilities provided by Oracle to develop and tune efficient and effective PL/SQL subprograms.

**Course Objectives:**

- Use detailed understanding of the PL/SQL execution environment in your application design and tuning.
- Develop programs that make sophisticated and effective use of cursors.
- Use all kinds of dynamic SQL in your PL/SQL code.
- Design and write solutions using Oracle’s object types.
- Use Oracle’s tools and supplied packages to trace, profile, and tune your PL/SQL programs.
- Use a variety of techniques and tools for debugging PL/SQL code.
- Write programs that interface between PL/SQL, and external procedures and programs.
- Use package state to solve application problems.
- Use autonomous transactions in stored subprograms and triggers.
- Choose which user’s application context and rights will apply when a stored subprogram runs.
- Write high-performance code using NOCOPY and pipelined table functions.
- Create functions to implement fine-grained access control.
- Use DBMS\_PIPE to set up inter-session communication between PL/SQL programs.

**Audience:** Oracle application developers and database administrators.

**Prerequisites:** *Introduction to Oracle PL/SQL Programming*

**Number of Days:** 2 days

<p><b>1. Course Introduction</b>          Course Objectives          Overview          Suggested References</p>	<p>Cursor Types          Cursors and Storage          Spanning Commits Across          FETCHes</p>
<p><b>2. The PL/SQL Execution Environment</b>          The Server Process          PL/SQL Execution          The PL/SQL Compiler          Compiler Optimization          SQL — Parse          SQL — Execute and Fetch          Server Memory          Latches          Locks</p>	<p>Dynamic SQL in PL/SQL          Bulk Operations          Bulk Returns          Limiting Results          Cursor Parameters          Cursor Variables          Strong and Weak Cursors          Using Cursor Variables          Cursor Type Errors          Cursor Subqueries</p>
<p><b>3. Advanced Cursors</b></p>	<p><b>4. Dynamic SQL</b></p>

Generating SQL at Runtime  
 Native Dynamic SQL vs. DBMS\_SQL  
 Package  
 The EXECUTE IMMEDIATE  
 Statement  
 Using Bind Variables  
 Multi-row Dynamic Queries  
 Bulk Operations with Dynamic SQL  
 Using DBMS\_SQL for DML and DDL  
 Using DBMS\_SQL for Queries  
 Retrieving Meta Information with  
 DBMS\_SQL

**5. Object-Oriented Oracle**

Introducing Object-Oriented Oracle  
 Defining Object Types and Tables in  
 SQL  
 Querying and Modifying Object Data  
 Object Method  
 Inheritance  
 Type Evolution  
 Object Views  
 Object Types in PL/SQL  
 REF Pointers  
 Object Functions and Operators

**6. Tuning PL/SQL**

PL/SQL vs SQL  
 PL/SQL Performance Tips  
 Tuning Goals  
 Monitoring Wait Events  
 DBMS\_PROFILER  
 DBMS\_TRAC  
 Execution Plans  
 Interpreting Explain Plan Results  
 Execution Plan Details  
 Trace Files  
 TKPROF  
 Using trcess  
 DBMS\_APPLICATION\_INFO

**7. Debugging and Error Handling**

Exception Management  
 Exception Propagation  
 User-Defined Exceptions  
 Exception Error Messages  
 Stack Management  
 Debugging with DBMS\_OUTPUT  
 Debugging with a Table

Using UTL\_FILE  
 Using DBMS\_DEBUG  
 SQL Developer  
 Avoiding Bugs

**8. Advanced Programming Topics**

Autonomous Transactions  
 Invoker's Rights  
 Fine-Grained Access Control  
 with DBMS\_RLS  
 Creating Pipes with  
 DBMS\_PIPE  
 Writing to and Reading from a  
 Pipe

Table Functions  
 Pipelined Table Functions  
 Enabling parallel execution  
 DETERMINISTIC Functions

**9. Interfacing with External Code**

External Programs and  
 Procedures  
 External Procedure Architecture  
 Configure Oracle For External  
 Procedures  
 Creating a java Stored Procedure  
 Security and External Programs  
 The Job Scheduler  
 Manage and Drop External Jobs  
 Native Compilation of PL/SQL  
 Code  
 The Oracle Call Interface (OCI  
 and OCCI)

Pro\*C and Pro\*C++  
 Using Pro\*C and Pro\*C++  
 Perl DBI/DBD Architecture  
 Perl and Stored Procedures  
 ODBC  
 Using ODBC  
 JDBC

**10. Working With XML**

Databases and XML  
 Schema Validation  
 Unstructured and Structured  
 Storage  
 The XMLType Datatype  
 XPath Expressions

Extracting XML Data  
Generating XML  
XMLQuery  
XMLType Views  
Oracle XML DB Repository