

Introduction

Introduction to Oracle: SQL and PL/SQL

Objectives

After completing this lesson, you should be able to do the following:

- Discuss the theoretical and physical aspects of a relational database
- Describe the Oracle implementation of the RDBMS and ORDBMS
- Describe how SQL and PL/SQL are used in the Oracle product set
- Describe the use and benefits of PL/SQL

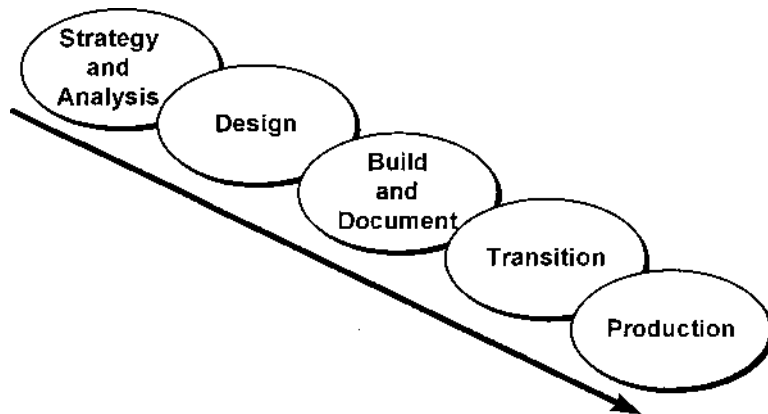
Lesson Aim

In this lesson, you will gain an understanding of the relational database management system (RDBMS) and the object relational database management system (ORDBMS). You will also be introduced to the following:

SQL statements that are specific to Oracle

SQL*Plus, which is used for executing SQL and PL/SQL code and for formatting and reporting purposes • PL/SQL, which is Oracle's procedural language

System Development Life Cycle



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System Development Life Cycle

From concept to production, you can develop a database by using the system development life cycle, which contains multiple stages of development. This top-down, systematic approach to database development transforms business information requirements into an operational database.

Strategy and Analysis

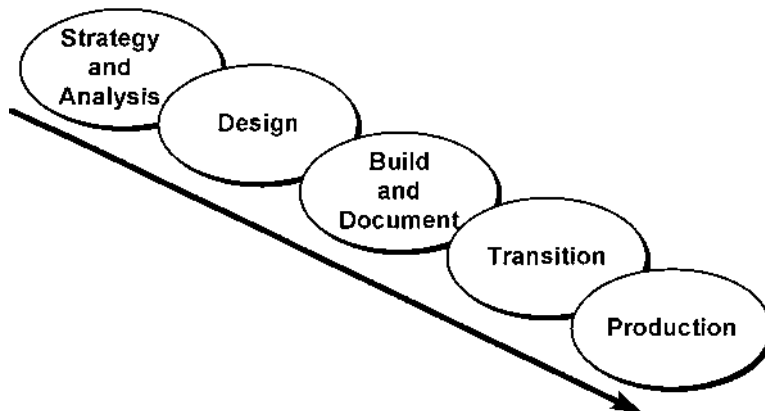
Study and analyze the business requirements. Interview users and managers to identify the information requirements. Incorporate the enterprise and application mission statements as well as any future system specifications.

- Build models of the system. Transfer the business narrative into a graphical representation of business information needs and rules. Confirm and refine the model with the analysts and experts.

Design

Design the database based on the model developed in the strategy and analysis phase.

System Development Life Cycle



System Development Life Cycle (continued)

Transition

Refine the prototype. Move an application into production with user acceptance testing, conversion of existing data, and parallel operations. Make any modifications required.

Production

Roll out the system to the users. Operate the production system. Monitor its performance, and enhance and refine the system.

Note: The various phases of system development life cycle can be carried out iteratively. This course focuses on the build phase of the system development life cycle.

Relational Database Concept

- Dr. E. F. Codd proposed the relational model for database systems in 1970.**
- It is the basis for the relational database management system (RDBMS).**
- The relational model consists of the following:**
 - Collection of objects or relations**
 - Set of operators to act on the relations**
 - Data integrity for accuracy and consistency**

Relational Model

The principles of the relational model were first outlined by Dr. E. F. Codd in a June 1970 paper called "A Relational Model of Data for Large Shared Data Banks." In this paper, Dr. Codd proposed the relational model for database systems.

The more popular models used at that time were hierarchical and network, or even simple flat file data structures. Relational database management systems (RDBMS) soon became very popular, especially for their ease of use and flexibility in structure. In addition, a number of innovative vendors, such as Oracle, supplemented the RDBMS with a suite of powerful application development and user products, providing a total solution.

Components of the Relational Model

Collections of objects or relations that store the data

- A set of operators that can act on the relations to produce other relations
- Data integrity for accuracy and consistency

SQL Statements

SELECT	Data retrieval
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INSERT UPDATE DELETE	Data manipulation language (DML)
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CREATE ALTER DROP RENAME TRUNCATE	Data definition language (DDL)
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COMMIT ROLLBACK SAVEPOINT	Transaction control
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GRANT REVOKE	Data control language (DCL)
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SQL Statements

Oracle SQL complies with industry-accepted standards. Oracle Corporation ensures future compliance with evolving standards by actively involving key personnel in SQL standards committees. Industry-accepted committees are the American National Standards Institute (ANSI) and the International Standards Organization (ISO). Both ANSI and ISO have accepted SQL as the standard language for relational databases.

Statement Description

SELECT	Retrieves data from the database
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INSERT	
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UPDATE	
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DELETE	Enters new rows, changes existing rows, and removes unwanted rows from tables in the database, respectively. Collectively known as <i>data manipulation language</i> (DML),
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CREATE	
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ALTER	
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DROP	
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RENAME	
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TRUNCATE	Sets up, changes, and removes data structures from tables. Collectively known as <i>data definition language</i> (DDL).
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COMMIT	
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ROLLBACK	
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SAVEPOINT	Manages the changes made by DML statements. Changes to the data can be grouped together into logical transactions.
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GRANT	
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REVOKE	Gives or removes access rights to both the oracle database and the structure within it. . Collectively known as <i>data control language</i> (DCL).
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About PL/SQL

PL/SQL is an extension to SQL with design features of programming languages.

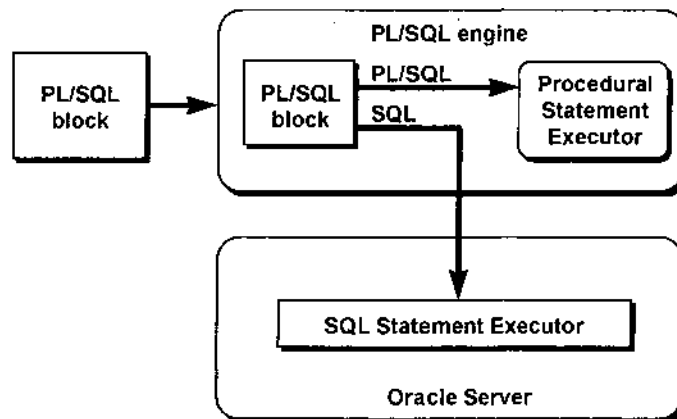
Data manipulation and query statements of SQL are included within procedural units of code.

About PL/SQL

Procedural Language/SQL (PL/SQL) is Oracle Corporation's procedural language extension to SQL, the standard data access language for object-relational databases. PL/SQL offers modern software engineering features such as data encapsulation, exception handling, information hiding, and object orientation, and so brings state-of-the-art programming to the Oracle Server and Toolset.

PL/SQL incorporates many of the advanced features made in programming languages designed during the 1970s and 1980s. It allows the data manipulation and query statements of SQL to be included in block-structured and procedural units of code, making PL/SQL a powerful transaction processing language. With PL/SQL, you can use SQL statements to finesse Oracle data and PL/SQL control statements to process the data.

PL/SQL Environment



PL/SQL Engine and the Oracle Server

PL/SQL is not an Oracle product in its own right; it is a technology employed *by* the Oracle Server and by certain Oracle tools. Blocks of PL/SQL are passed to and processed *by* a PL/SQL engine, which may reside within the tool or within the Oracle Server. The engine used depends on where the PL/SQL block is being invoked.

When you submit PL/SQL blocks from a Pro* program, user-exit, SQL*Plus, or Server Manager, the PL/SQL engine in the Oracle Server processes them. It divides the SQL within the block into separate statements and sends them to the SQL Statement Executor. This means that a single transfer is required to send the block from the application to the Oracle Server, thus improving performance, especially in a client-server network. Stored subprograms can be referenced *by* any number of applications connected to the database.

Tables Used in the Course

EMP

EMPNO	ENAME	JOB	MGR	HIREDATE	SAL	COMM	DEPTNO
7839	KING	PRESIDENT	7698	17-NOV-81	5000		10
7839	BLAKE	MANAGER	7782	MAY-81	2450	1400	30
7839	MARTIN	SALESMAN	7499	JUN-81	1250		30
7839	TURNER	SALESMAN	7844	APR-81	1600	300	30
7839	JAMES	SALESMAN	7900	SEP-81	950		30
7839	CLERK			FEB-81	1250	500	30
7839				SEP-81	1250		30
7839				DEC-81	1250		30

DEPTNO	DNAME	LOG
10	ACCOUNTING	NEW YORK
20	RESEARCH	DALLAS
30	OPERATIONS	CHICAGO
40	SALES	BOSTON

GRADE	LOSAL	HISAL
1	700	1200
1201	1400	1401
2000	2001	3000
3001	9999	

Tables Used in the Course

The following three tables will be used in this course:

EMP table, which gives details of all the employees •

DEPT table, which gives details of all the departments

SALGRADE table, which gives details of salaries for various grades

Summary

- Relational databases are composed of relations, managed by relational operations, and governed by data integrity constraints.**
- The Oracle Server allows you to store and manage information by using the SQL language and PL/SQL engine.**
- PL/SQL is an extension to SQL with design features of programming languages.**

Summary

Relational database management systems are composed of objects or relations. They are managed by operations and governed by data integrity constraints.

Oracle Corporation produces products and services to meet your relational database management system needs. The main product is the Oracle Server, which enables you to store and manage information by using SQL and the PL/SQL engine for procedural constructs.

SQL

The Oracle Server supports ANSI standard SQL and contains extensions. SQL is the language used to communicate with the server to access, manipulate, and control data.

PL/SQL

The PL/SQL language extends the SQL language by offering block-structured procedural