INT306:DATABASE MANAGEMENT SYSTEMS

L:0 T:0 P:5 Credits:4

Course Outcomes: Through this course students should be able to

- Classify SQL statements, as well as the Oracle Relational Database.
- Manipulate data in relational tables and save the data.
- Manage schema objects and data dictionary views.
- Use the in-built functions supporting the usage of regular expressions and time zone.
- Write PL/SQL code to interface with the database.
- Create PL/SQL blocks of application code that can be shared by multiple forms, reports and data management applications

Unit I

Introduction to Manage Database Objects and Data : Course Objectives, Course Agenda and Appendixes Used in this Course, Overview of Oracle Database 12c and Related Products, Overview of relational database management concepts and terminologies, Components of DBMS, DBMS architecture, Data Independence, Introduction to SQL and its development environments, What is Oracle SQL Developer?, Starting SQL*Plus from Oracle SQL Developer, The Human Resource(HR) Schema, Tables used in the Course, Oracle Database documentation and additional resources

Introduction to Data Definition Language and Managing Schema Objects : Data Definition Language, Categorize Database Objects, Create Tables, Describe the data types, Understand and Manage Constraints, Create a table using a subquery, How to alter a table?, How to drop a table?, Creating and using temporary tables, Creating and using external tables

Data Manipulation : Add New Rows to a Table, Change the Data in a Table, Use the DELETE and TRUNCATE Statements, How to save and discard changes with the COMMIT and ROLLBACK statements, Implement Read Consistency

Retrieve Data using the SQL SELECT Statement : List the capabilities of SQL SELECT statements, Generate a report of data from the output of a basic SELECT statement, Use arithmetic expressions and NULL values in the SELECT statement, Invoke Column aliases, Concatenation operator, literal character strings, alternative quote operator, and the DISTINCT keyword, Display the table structure using the DESCRIBE command

Restricted and Sorted Data : Write queries with a WHERE clause to limit the output retrieved, Describe the comparison operators and logical operators, Describe the rules of precedence for comparison and logical operators, Usage of character string literals in the WHERE clause, Write queries with an ORDER BY clause, Sort the output in descending and ascending order, Substitution Variables, Using the define and verify command

Unit II

Database design : Design guidelines, Relational database design, Integrity constraints, Domain Constraints, Referential Integrity Constraints, First normal form, Functional Dependency, Normalization using Functional Depenedencies, Second normal form, Third normal form, Multivalued Dependencies, Boyce Codd Normal Form, Fourth normal form, Join dependencies, Fifth normal Form and pitfalls in relational database design

Unit III

Usage of Single-Row Functions to Customize Output : List the differences between single row and multiple row functions, Manipulate strings using character functions, Manipulate numbers with the ROUND, TRUNC, and MOD functions, Perform arithmetic with date data, Manipulate dates with the DATE functions

Unit III

Conversion Functions and Conditional Expressions : Describe implicit and explicit data type conversion, Describe the TO_CHAR, TO_NUMBER, and TO_DATE conversion functions, Nesting multiple functions, Apply the NVL, NULLIF, and COALESCE functions to data, Usage of conditional IF THEN ELSE logic in a SELECT statement

Aggregated Data Using the Group Functions : Usage of the aggregation functions in SELECT statements to produce meaningful reports, Describe the AVG, SUM, MIN, and MAX function, How to handle Null Values in a group function?, Divide the data in groups by using the GROUP BY clause, Exclude groups of date by using the HAVING clause

Display Data from Multiple Tables : Write SELECT statements to access data from more than one table, Join Tables Using SQL:1999 Syntax, Natural Join, Non equijoins, View data that does not meet a join condition by using outer joins, Join a table to itself by using a self join, Create Cross Joins

Usage of Subqueries to Solve Queries : Use a Subquery to Solve a Problem, Single-Row Subqueries, Group Functions in a Subquery, Multiple-Row Subqueries, Use the ANY and ALL Operator in Multiple-Row Subqueries, Use the EXISTS Operator

SET Operators : Describe the SET operators, Use a SET operator to combine multiple queries into a single query, Describe the UNION, UNION ALL, INTERSECT, and MINUS Operators, Matching the SELECT statements, Use the ORDER BY Clause in Set Operations

Unit IV

Introduction to Data Dictionary Views : Introduction to Data Dictionary, Describe the Data Dictionary Structure, Using the Data Dictionary Views, Querying the Data Dictionary Views

Creating Views : Create, modify, and retrieve data from a view, Perform Data manipulation language (DML) operations on a view, How to drop a view?

Creating Sequences, Synonyms, Indexes : Overview of sequences, Overview of synonyms, Overview of indexes

Retrieving Data by Using Subqueries : Retrieving Data by Using a Subquery as Source, Working with Multiple-Column subqueries, Using Scalar subqueries in SQL, Correlated Subqueries, Working with the WITH clause

Manipulating Data by Using Subqueries : Using Subqueries to Manipulate Data, Inserting by Using a Subquery as a Target, Using the WITH CHECK OPTION Keyword on DML Statements, Using Correlated Subqueries to Update and Delete rows

Controlling Privileges at the Object and System Level : System privileges, Creating a role, Object privileges, Revoking object privileges

Manipulating Data : Overview of the Explicit Default Feature, Using multitable INSERTs, Using the MERGE statement, Performing flashback operations, Tracking Changes in Data

Managing Data in Different Time Zones : Working with CURRENT_DATE, CURRENT_TIMESTAMP,and LOCALTIMESTAMP, Working with INTERVAL data types, Using Datetime functions in queries

Unit V

Introduction to transaction Processing : Transaction and system concepts, Desirable properties of transactions, Schedules: Serializability of Schedules, Concurrency Control, Recoverability

Unit VI

Introduction to PL/SQL : PL/SQL Overview, List the benefits of PL/SQL Subprograms, Overview of the Types of PL/SQL blocks, Create a Simple Anonymous Block, Generate the Output from a PL/SQL Block

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

Write Executable Statements : Basic PL/SQL Block Syntax Guidelines, How to comment code?, SQL Functions in PL/SQL, Data Type Conversion, Nested Blocks, Operators in PL/SQL

Unit VI

Interaction with the Oracle Server : SELECT Statements in PL/SQL to Retrieve data, Data Manipulation in the Server Using PL/SQL, The SQL Cursor concept, Learn to use SQL Cursor Attributes to Obtain Feedback on DML, How to save and discard transactions?

Control Structures : Conditional processing Using IF Statements, Conditional processing Using CASE Statements, Simple Loop Statement, While Loop Statement, For Loop Statement, The Continue Statement

Usage of Composite Data Types : PL/SQL Records, The %ROWTYPE Attribute, Insert and Update with PL/SQL Records, Associative Arrays (INDEX BY Tables), INDEX BY Table Methods, INDEX BY Table of Records

Explicit Cursors : Understand Explicit Cursors, Declare the Cursor, How to open the Cursor?, Fetching data from the Cursor, How to close the Cursor?, Cursor FOR loop, Explicit Cursor Attributes, FOR UPDATE Clause and WHERE CURRENT Clause

Exception Handling : What are 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 and Functions : What are Stored Procedures and Functions?, Differentiate between anonymous blocks and subprograms, Create a Simple Procedure, Create a Simple Procedure with IN parameter, Create a Simple Function, Execute a Simple Procedure, Execute a Simple Function

References:

1. DATABASE SYSTEM CONCEPTS by HENRY F. KORTH, ABRAHAM SILBERSCHATZ, S. SUDARSHAN, MCGRAW HILL EDUCATION

2. DATABASE SYSTEMS: MODELS, LANGUAGES, DESIGN AND APPLICATION PROGRAMMING by RAMEZ ELMASRI, SHAMKANT B. NAVATHE, PEARSON

3. SQL, PL/SQL: THE PROGRAMMING LANGUAGE OF ORACLE by IVAN BAYROSS, BPB PUBLICATIONS

4. SQL AND PL SQL FUNDAMENTALS by ORACLE, ORACLE PRESS