

Database Design and Programming with SQL – Course Description

Overview

This course engages students to analyze complex business scenarios and create a data model—a conceptual representation of an organization’s information. Participants implement their database design by creating a physical database using SQL. Basic SQL syntax and the rules for constructing valid SQL statements are reviewed. This course culminates with a project that challenges students to design, implement, and demonstrate a database solution for a business or organization.

Available Curriculum Languages:

- English, Simplified Chinese, Brazilian Portuguese, Spanish, Indonesian

Duration

- Recommended total course time: 180 hours*
- Professional education credit hours for educators who complete Oracle Academy training: 60

** Course time includes instruction, self-study/homework, practices, projects, and assessment*

Target Audiences

Educators

- College/university faculty who teach computer programming, information communications technology (ICT), or a related subject
- Secondary school teachers who teach computer programming, ICT, or a related subject

Students

- Students who wish to learn the techniques and tools to design, build and extract information from a database
- Students who possess basic mathematical, logical, and analytical problem-solving skills
- Novice programmers, as well as those at advanced levels, to learning the SQL Programming language to an advanced level

Prerequisites

Required

- Ease with using a computer
- General knowledge of databases and query activity

Suggested

- None

Suggested Next Courses

- Database Programming with PL/SQL

Lesson-by-Lesson Topics

Database Design

Introduction

- Introduction to the Oracle Academy
- Data vs. Information
- History of the Database
- Major Transformations in Computing

Entities and Attributes

- Conceptual and Physical Models
- Entities, Instances, Attributes, and Identifiers
- Entity Relationship Modeling and ERDs

Relationship Basics

- Identifying Relationships
- ER Diagramming Conventions
- Speaking ERDish & Drawing Relationships
- Matrix Diagrams

Super/Sub Types and Business Rules

- Supertypes and Subtypes
- Documenting Business Rules

Relationship Fundamentals

- Relationship Transferability
- Relationship Types
- Resolving Many-to-Many Relationships
- Understanding CRUD Requirements

UIDs and Normalization

- Artificial, Composite, and Secondary UIDs
- Normalization and First Normal Form
- Second Normal Form
- Third Normal Form

Arcs, Hierarchies, and Recursive Modeling

- Arcs
- Hierarchies and Recursive Relationships

Changes and Historical Modeling

- Modeling Historical Data
- Modeling Change: Time
- Modeling Change: Price
- Drawing Conventions for Readability

Mapping

- Introduction to Relational Database Concepts
- Basic Mapping: The Transformation Process
- Relationship Mapping
- Subtype Mapping

Creating Database Projects

- System Development Life Cycle
- Project Overview and Getting Started
- Presentation Project Management
- Final Presentation Components

Presenting Database Projects

- Creating Tables for the Final Presentation
- Preparing Written Documentation
- Preparing Visual Materials
- Final Presentations

Database Programming with SQL

Introduction

- Oracle Application Express
- Relational Database Technology
- Anatomy of a SQL Statement

SELECT and WHERE

- Columns, Characters, and Rows
- Limit Rows Selected
- Comparison Operators

WHERE, ORDER BY, and Intro to Functions

- Logical Comparisons and Precedence Rules
- Sorting Rows
- Introduction to Functions

Single Row Functions Part I

- Case and Character Manipulation
- Number Functions
- Date Functions

Single Row Functions Part II

- Conversion Functions
- NULL Functions
- Conditional Expressions

JOINS

- Cross Joins and Natural Joins
- Join Clauses
- Inner versus Outer Joins
- Self-Joins and Hierarchical Queries
- Oracle Equijoin and Cartesian Product
- Oracle Nonequijoins and Outer Joins

Group Functions

- Group Functions
- Oracle Nonequi Joins and Outer Joins
- Using Group By and Having Clauses
- Using Rollup and Cube Operations, and Grouping Sets
- Using Set Operators

Subqueries

- Fundamentals of Subqueries
- Single-Row Subqueries
- Multiple-Row Subqueries
- Correlated Subqueries

Ensuring Quality Queries Part I

- Ensuring Quality Query Results

DML

- INSERT Statements
- Updating Column Values and Deleting Rows
- DEFAULT Values, MERGE, and Multi-Table Inserts

DDL

- Creating Tables
- Using Data Types
- Modifying a Table

Constraints

- Intro to Constraints; NOT NULL and UNIQUE Constraints
- PRIMARY KEY, FOREIGN KEY, and CHECK Constraints
- Managing Constraints

Views

- Creating Views
- DML Operations and Views
- Managing Views

Sequences and Synonyms

- Working With Sequences
- Indexes and Synonyms

Privileges and Regular Expressions

- Controlling User Access
- Creating and Revoking Object Privileges
- Regular Expressions

TCL

- Database Transactions

Final Project and Exam Review

- Testing
- Final Project Database Creation
- Final Exam Review

Ensuring Quality Queries Part II

- Ensuring Quality Query Results - Advanced Techniques