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

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, guild 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 Nonequijoins 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

To search and register for events scheduled in your area, visit the Academy events calendar.