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## SQL Programming

**Duration:** 21 hours

**Price:** \$950 (If taken for the 1-course SQL Programmer certificate), \$900 (If taken as a requisite course for any other certificate)

**Prerequisites:** General computer knowledge.

**Description:** This SQL programming course teaches students relational database fundamentals and SQL programming skills. Topics covered include relational database architecture, database design techniques, and simple and complex query skills. This class is intended for analysts, developers, designers, administrators, and managers new to the SQL programming language. Upon completion, participants will understand SQL functions, join techniques, database objects and constraints, and will be able to write useful SELECT, INSERT, UPDATE and DELETE statements. Comprehensive hands on exercises are integrated throughout to reinforce learning and develop real competency.

### Course Overview

#### Relational Database Fundamentals

- Overview of Relational Database Concepts
- Relational Databases and Relational Database Management Systems
- Data Normalization
- DDL Syntax

#### Creating a Database

- Database Development Methodology Overview
- Building a Logical Data Model

#### Writing Basic SQL Queries

- Displaying Table Structures
- Retrieving Column Data From a Table or View
- Selecting Unique Values
- Filtering Rows Using the WHERE Clause
- Sorting Results Using ORDER BY
- Joining Multiple Tables
- Using Column and Table Aliases

#### Manipulating Query Results

- Using Row Functions
  - Character

- Identifying Entities and Attributes
- Isolating Keys
- Relationships Between Entities
- Creating Entity-Relationship Diagrams
- Transforming to Physical Design
  - Migrating Entities to Tables
  - Selecting Primary Keys
  - Defining Columns
  - Enforcing Relationships with Foreign Keys
- Constructing the Database Using DDL
  - Creating Tables, Indexes, Constraints and Views
  - Dropping Tables, Indexes, Constraints and Views
  - Modifying Tables, Indexes, Constraints and Views

- Numeric
  - Date and Time
  - Data Conversion (CAST and CONVERT)
- Using the CASE Function
- Handling Null Values

## Advanced Query Techniques

- Inner Joins
- Outer Joins (Left, Right, Full)
- Performing Self-Joins
- Subqueries
  - Simple
  - Correlated
- Using the EXISTS Operator
- Tips for Developing Complex SQL Queries
- Using Aggregate Functions
  - AVG
  - COUNT
  - SUM
  - MIN
  - MAX
- Performing Set Operations
  - UNION
  - INTERSECT
  - EXCEPT/MINUS
- Aggregating Results Using GROUP BY

## Manipulating Table Data Using SQL's Data Manipulation Language (DML)

- Inserting Data into Tables
- Updating Existing Data
- Deleting Records
- Truncating Tables
- Implementing Data Integrity with Transactions
  - Beginning Explicit Transactions
  - Committing Transactions
  - Rolling Back Transactions

- Restricting Groups with the `HAVING` Clause
- Creating Temporary Tables

## User-Defined Functions

- Definition and Benefits of Use
- `CREATE FUNCTION`
  - Syntax
  - `RETURN` Clause and the `RETURNS` Statement
  - Scalar vs. Table Functions
- Comparison with Stored Procedures
- Returning Scalar Values and Tables
- `ALTER` and `DROP FUNCTION`

## Triggers

- Definition and Benefits of Use
- Alternatives (e.g., Constraints)
- `CREATE TRIGGER`
  - Syntax
  - Trigger Types
- "Inserted" (or "NEW") and "Deleted" (or "OLD") Tables
- Event Handling and Trigger Execution
- `ALTER` and `DROP TRIGGER`

## Stored Procedures

- Definition and Benefits of Use
- `CREATE PROCEDURE`
  - Syntax
  - Variables and Parameters
- Control of Program Flow
- `ALTER` and `DROP PROCEDURE`
- Implementation Differences

## Working with Table Expressions

- Overview of Table Expressions
- Working with Views
- Using Derived Tables
- Common Table Expressions
- Table-Valued Functions

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