

Introduction to Microsoft SQL Server

Database Design and Implementation: Level 1

Nature of the course: Theory + Practical

Total hours per day: 2 hours

Course duration: 4 weeks

Course Summary

The DTC - Database Design and Implementation – Level 1 course is designed for beginners who want to learn how to develop meaningful pieces of codes in Database design and implementation, as well as how to read other people's Database design and implementation codes. The course is 40 hours long and includes both lecture and lab work. Laboratory exercises are required, have a set date, and are graded. Because software programming can only be learned effectively by explicitly putting the principles that have been taught into practice, the course places a strong emphasis on lab exercises. Exercises that are submitted after the deadline are penalized in terms of overall points. Instructors may supply students with pertinent lecture/lab notes as (and when) needed, either in the form of printed handouts or by email. Students may be required to take an optional exam at the end of the course to assess their knowledge of the material covered. This exam, which may be practical or theoretical, is required for every student desiring to advance to the next level. In order of significance, students are graded on their attendance, lab activities, and final test.

Prerequisites

- Fundamental understanding of programming, bits/bytes, procedures, classes, and computer architecture. It's absolutely acceptable if you only have a theoretical understanding of programming, but you should be certain about what programming is and what you intend to gain from this session.
- Willing and enthusiastic to spend at least 10-20 hours each week outside of the training class reading/writing database design and implementation codes (this could vary from student to student).
- This course does not require any prior educational experience. This course is open to anyone from a 10+2 student to someone pursuing a Ph.D. in Genetic Engineering.
- If you're simply interested in theory and don't have the time or patience to put in at least 10 hours each week for the duration of the course, this might not be the course for you.
- If you have no prior experience with programming and do not anticipate doing so in the next six months, this session may not be for you.

Completion Criteria

After fulfilling all of the following criteria, the student will be deemed to have finished the Module:

1. Has attended 90% of all classes held
2. Has received an average grade of 80% on all assignments
3. Has received an average of 60% in assessments

4. The tutor believes the student has grasped all of the concepts and is ready to go on to the second module.

Required Text Books

1. SQL QuickStart Guide: The Simplified Beginner's Guide to Managing, Analyzing, and Manipulating Data With SQL
2. SQL All-in-One For Dummies

Course Details

WEEK 1

Relational Database Fundamentals

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

Conceptual Data Modeling

- Problems with File-based System
- Concept of Data Model
- 3-Tier Architecture
- Data Mapping
- Data Model and its Types
- The Relational Data Model
- Data Modeling Using ERD
- Problems of Using ERDs and Solutions

EERD and Chen Notation

- Relational Database Model Terminologies and their Implementation
- Database Relations and their Characteristics
- Relational Keys and Integrity Constraints

WEEK 2

Relational Database Design

- Database Design Methodologies,
- Conceptual, Logical and Physical Database Designs,
- Mapping ERD into Relational Schema

Creating a Database

- Database Development Methodology Overview
- Building a Logical Data Model
- 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

WEEK 3

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
- Numeric
- Date and Time
- Data Conversion

Using the case function

- Handling Null Values

WEEK 4

Labs

Lab assignments will focus on the practice and mastery of contents covered in the lectures; and introduce critical and fundamental problem-solving techniques to the students.

Database Design and Implementation: Level 2

Course Summary

The DTC - Database Design and Implementation – Level 2 course is designed for students who have some prior hands-on programming experience with the Database Design and Implementation programming language at a beginning level. The level 2 course is also for people who wish to learn Database design and implementation but have prior programming expertise (e.g., Database design and implementation, Obj-C, PHP, C, C++, etc.). This course was built with high school and university students in mind who want to undertake coursework in Database Design and Implementation, as well as professionals who are now working as VB.NET developers and want to transfer to ANDROID. This course is also appropriate for those who have completed an undergraduate degree in Economics, have worked in the media sector or as a professional freelance PHP developer, or are in their third semester of Electrical/Electronic undergraduate studies.

Prerequisites

- Complete the entrance examination with a score of at least 40%. (For trainees directly applying to this level).
- Complete the DWIT Training – Database Design and Implementation – Level 1 course with passing marks (Not applicable to trainees directly applying to this level).
- Complete the interview successfully.
- Willing and eager to spend at least 10-20 hours each week reading/writing database design and implementation codes outside of the training session (this may vary from student to student).

Required Text Books

1. SQL QuickStart Guide: The Simplified Beginner's Guide to Managing, Analyzing, and Manipulating Data With SQL
2. SQL All-in-One For Dummies

Course Details

WEEK 1

Advanced Query Techniques

- Inner Joins
- Outer Joins (Left, Right, Full)
- Joining a Table to Itself
- Subqueries
- Tips for Developing Complex SQL Queries
- Using Aggregate Functions
 - AVG
 - COUNT
 - SUM
 - MIN
 - MAX
- Aggregating Results Using GROUP BY

- Restricting Groups with the HAVING Clause

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

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

WEEK 2

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 Views

- Benefits of Using Views
- Creating Views
 - Alter and Drop View

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

WEEK 3

Data Warehousing

- Database Warehouse Architecture
- RAID
- Parallelism and Partitioning
- ETL
- Data Mining

Database Recovery and Security

- Logical and Physical Database Security
- SQL Injections
- Database Recovery Mechanism
- Deferred and Immediate Update

WEEK 4

Labs

Lab assignments will focus on the practice and mastery of contents covered in the lectures; and introduce critical and fundamental problem-solving techniques to the students.

Learning Outcomes

- Ability to understand the concept of Data Modeling
- Increased familiarity with SQL
- How to write basic SQL Queries
- How to manipulate data and working with views