

Introduction to SQL Databases

About this course

This course examines the services and features of Microsoft SQL from 2012 to 2022, including lessons and lab exercises on key attributes you'll need on the job. It's designed for novices and professionals who are interested in interacting with databases using Structured Query Language (SQL) and seek foundational knowledge and skills. This audience typically includes people who are moving into a database role or expect their role to require interacting with a database server that uses SQL.

By completing this course, you will achieve the knowledge and skills to:

- Conceptualize data organization in a database.
- Identify various types of databases.
- Retrieve information from a database using SQL, Transact-SQL (T-SQL), and other languages.
- Normalize and denormalize data stored in a database.

Audience profile

This course is intended for people with varied computer knowledge. As an introductory course, it does not require any previous knowledge of SQL, databases, or information technologies. As an introductory path, this course is ideal for those who haven't previously interacted with databases or those who have previous experience with databases and languages distinct from SQL.

Recommended prerequisite knowledge

Not applicable

Course Outline

Module 1: Introduction to databases

This module introduces databases and tables, methods of using them to track relevant data, and common issues you might experience when working with them. You'll explore the inner workings of relational databases, including how to use primary and foreign keys and write basic yet effective queries for a SQL Server database using SQL.

Lesson 1: Introduction to relational databases

- What is a database?
- What is a table?
- What is a relational database?
- Develop tables with primary and foreign keys

Lesson 2: Retrieve data from a relational database by using SQL

- Interact with a relational database
- What is SQL?
- Compare and contrast types of SQL commands
- Retrieve data with the SELECT statement
- Select individual columns in queries
- Refine a SQL SELECT statement with the WHERE clause
- Demonstration: Retrieve data from the database using a SELECT statement

Lab 1: Use the SELECT statement to retrieve data from a database

Module 2: Database tables

To create databases that are effective, usable, and more secure, it's necessary for you to choose the types of data, properties, and constraints you implement in your database tables. This module covers why it's essential to use schemas and views to improve organization and security as you grow your database.

Lesson 1: Identify and use Microsoft SQL Server data types

- Data types in Microsoft SQL Server
- Choose the correct data type

- NULL values

Lesson 2: Create tables with SQL

- Create a table with SQL
- Demonstration: Create a table in Microsoft SQL Server Management Studio
- Control values allowed in columns using constraints
- Create a surrogate primary key by using the IDENTITY property
- Group tables by using a schema

Lesson 3: Altering and dropping a table

- Add a column to a table using the ALTER TABLE statement
- Change a column using the ALTER TABLE statement
- Drop a column using the ALTER TABLE statement
- Remove a table using the DROP TABLE statement

Lab 2: Create and alter a table in Microsoft SQL Server

Lesson 4: Collect information from multiple tables by using joins and views

- Use JOIN to obtain data from multiple tables
- JOIN statement types
- Create views
- Demonstration: Create a view with SQL

Lab 3: Create and retrieve a view that uses the JOIN statement in Microsoft SQL Server

Module 3: Add and update data

This module covers using statements to add, alter, and remove rows in a table. It also covers creating stored procedures and using input parameters in stored procedures.

Lesson 1: Insert, update, and delete information

- Add information to a table using the INSERT keyword
- Add multiple rows to a table at once
- Update values in a table
- Use DELETE to delete rows in a table

Lab 4: Add and change data in SQL Server

Lesson 2: Stored procedures

- Define a stored procedure
- Use multiple statements in a stored procedure
- Use input parameters in a stored procedure
- Describe the uses of stored procedures
- Demonstration: Create a stored procedure

Lab 5: Create and use stored procedures in Microsoft SQL Server

Module 4: Entity relationships

This module covers entities and the relationships between them. It also discusses using the various types of referential integrity.

Lesson 1: Model entity relationships

- What is an entity?
- Entity keys
- Candidate keys
- Entity relationships and cardinality
- Join tables
- Compare optional and mandatory relationships
- Entity relationship modeling
- Demonstration: Create an entity relationship diagram in Microsoft SQL Server Management Studio

Lesson 2: Design for referential integrity What is referential integrity?

- Ensure declarative referential integrity by using key constraints
- Ensure procedural referential integrity by using triggers
- Cascading referential integrity

Lab 6: Create an entity relationship diagram in Microsoft SQL Server Management Studio

Module 5: Normalization and denormalization

This module covers normalization and denormalization in a database, their benefits, and when each should be used.

Lesson 1: Normalization

- What is normalization?
- First normal form
- Second normal form
- Third normal form

Lesson 2: Denormalization

- Defining denormalization
- Adding redundant columns
- Saving computed data
- Potential issues
- Demonstration: Denormalize a table

Lab 7: Denormalize a table by adding a redundant column of computed data

Module 6: Query performance and safety

This module covers writing effective and performant queries and using clustered and nonclustered indexes. It also discusses concurrency issues and the transactions and isolation levels you can use to address them.

Lesson 1: Indexes

- What are indexes?
- Clustered indexes
- Nonclustered indexes
- Indexes and performance

Lesson 2: Write performant SQL code

- Limit data referenced and returned
- Use indexes
- Use SARGable queries

Lab 8: Create indexes and consult execution plans in Microsoft SQL Server Management Studio

Lesson 3: Concurrency

- What is concurrency?
- Problems caused by concurrency
- Isolating transactions
- Limiting concurrency
- Demonstration: Write an isolated transaction