Lesson 1: Introduction to SQL Server and SSMS

Notes before doing the tasks:

• Tasks should be solved using SQL Server.

• Case insensitivity applies.

• Alias names do not affect the score.

• Scoring is based on the correct output.

• One correct solution is sufficient.

**Task 1. Define the following terms: data, database, relational database, and table.**

**Answer:**

Data: These are the raw, unorganized facts and figures. Think of them as individual pieces of information, like a name ('John Doe'), a number (34), or a date ('2025-10-08').

Database: A database is an organized and structured collection of data, stored electronically. It allows for efficient management, access, and updating of that data. It's like a digital filing cabinet for all your information.

Relational Database: This is a specific type of database that organizes data into one or more tables of columns and rows, with a unique key identifying each row. These tables can be linked—or related—to each other based on common data fields. For example, a Customers table could be related to an Orders table through a CustomerID.

Table: A table is the fundamental structure within a relational database. It organizes data into a grid of vertical columns (attributes like 'FirstName', 'LastName') and horizontal rows (records for each individual entry).

**Task 2. List five key features of SQL Server.**

**Answer:**

SQL Server, Microsoft's relational database management system, has many powerful features. Here are five key ones:

**High Performance**: It's engineered for speed, capable of handling large volumes of transactions and complex queries quickly and efficiently.

**Robust Security**: SQL Server provides strong security features, including data encryption, access control through user roles, and threat detection to protect sensitive information.

**High Availability**: It ensures that data is accessible with minimal downtime through features like Always On availability groups and failover clustering, which provide redundant copies of the database that can take over if the primary server fails.

**Scalability**: It can scale to meet the demands of applications of any size, from small departmental databases to massive enterprise-level systems handling millions of users.

**Business Intelligence (BI) Integration**: It includes a powerful suite of tools for data analysis and reporting, such as SQL Server Analysis Services (SSAS), SQL Server Reporting Services (SSRS), and SQL Server Integration Services (SSIS).

Task 3. What are the different authentication modes available when connecting to SQL Server? (Give at least 2)

**Answer:**

SQL Server offers two primary modes for authenticating users who are trying to connect to the database.

**Windows Authentication Mode**: This is the default and most secure mode. It leverages the Windows operating system's security system to validate users. When a user connects, SQL Server uses their logged-in Windows account credentials to grant access, so no separate password is required for the database. It's often called "integrated security."

**Mixed Mode (SQL Server and Windows Authentication Mode)**: This mode provides flexibility by allowing connections using either Windows Authentication or SQL Server Authentication. With SQL Server Authentication, you create specific login names and passwords that are stored within SQL Server itself. This method is useful when users need to connect from non-Windows systems or over the internet.

Task 4. Create a new database in SSMS named SchoolDB.

**Answer:**

create database SchoolDB

Task 5. Write and execute a query to create a table called Students with columns:

StudentID (INT, PRIMARY KEY), Name (VARCHAR(50)), Age (INT).

**Answer:**

create table Students (StudentID int, Name varchar(50), Age int)

Task 6. Describe the differences between SQL Server, SSMS, and SQL.

**Answer:**

SQL (Structured Query Language)

This is the language. SQL is the standard programming language used to communicate with and manage data in a relational database. You use it to perform tasks like:

Querying: Asking the database to retrieve specific data (SELECT).

Manipulating: Adding, updating, or deleting data (INSERT, UPDATE, DELETE).

Defining: Creating new databases, tables, and other structures (CREATE).

Controlling: Setting permissions and managing access (GRANT, REVOKE).

In short: SQL is the set of commands you write.

SQL Server

This is the database engine. SQL Server is a specific brand of a Relational Database Management System (RDBMS) developed by Microsoft.6 Its primary job is to:

Store data efficiently and securely.

Process the SQL commands you send it.

Manage users, security, backups, and the overall health of the database.7

Other popular RDBMS brands include Oracle, MySQL, and PostgreSQL. They all use the SQL language, but the engine itself is a different product.

In short: SQL Server is the software that holds and manages your data.

SSMS (SQL Server Management Studio)

This is the application interface. SSMS is a software tool with a graphical user interface (GUI) that you install on your computer.9 It provides an environment to:

Connect to a SQL Server instance.

Write, edit, and run SQL queries in a code editor.10

Visually manage databases, view tables, design structures, and configure settings without writing code.

Access administrative tools for performance tuning, security management, and backups

In short: SSMS is the program you use to interact with your SQL Server database.

Task 7. Research and explain the different SQL commands: DQL, DML, DDL, DCL, TCL with examples.

**Answer**

**1. DQL (Data Query Language)**

DQL is used to **query** or fetch data from the database. It's the most commonly used category for data analysis and reporting. The primary command is **SELECT**.

**2. DML (Data Manipulation Language)**

DML commands are used to **manipulate**—that is, add, modify, or remove—the actual data within the tables.

**INSERT**: Adds new rows of data into a table.

**UPDATE**: Modifies existing data within a table.

**DELETE**: Removes existing rows from a table.

**3. DDL (Data Definition Language)**

DDL commands are used to **define** and manage the entire structure of your database and its objects (like tables, indexes, and users). These commands change the schema, not the data itself.

**CREATE**: Builds a new database object (e.g., CREATE TABLE, CREATE DATABASE).

**ALTER**: Modifies the structure of an existing object (e.g., adds or removes a column).

**DROP**: Permanently deletes an entire database object.

**TRUNCATE**: Quickly removes all rows from a table, but the table structure remains. It's faster than DELETE.

**4. DCL (Data Control Language)**

DCL commands are all about security and **controlling** who has access to do what within the database.

**GRANT**: Gives specific permissions to a database user (e.g., permission to SELECT or INSERT data).

**REVOKE**: Takes away permissions that were previously granted.

**5. TCL (Transaction Control Language)**

TCL commands are used to manage **transactions**. A transaction is a sequence of operations performed as a single logical unit of work. All changes in a transaction are temporary until they are either permanently saved or undone.

**COMMIT**: Saves all the work done in the current transaction.

**ROLLBACK**: Undoes all the work done since the last COMMIT or ROLLBACK.

**SAVEPOINT**: Sets a temporary marker within a transaction that you can later roll back to.

Task 8. Write a query to insert three records into the Students table.

insert into Students (StudentID, Name, Age)

values

(1, 'Anvar', 21),

(2, 'Sarvar', 20),

(3, 'Zarina', 22);