

Module 1 - Introduction to SQL

What is SQL?

SQL stands for Structured Query Language.

It is a standard programming language that is specially designed to manage and work with databases, especially relational databases.

Relational databases store data in the form of tables (like rows and columns in Excel). SQL helps you interact with this data easily.

Key Points About SQL

- **Structured** - The word “structured” means that SQL works with data that is arranged in a specific format, usually in tables with rows and columns.
- **Query** - A “query” means a request or question. In SQL, you ask the database to do something for you, like “show me all students” or “add a new employee.”
- **Language** - It is a language, just like English or Hindi, but used to talk to databases.

Purpose of SQL (Structured Query Language)

The main purpose of SQL is to communicate with a database and manage the data stored in it.

Think of SQL as a language that helps you talk to the database to:

1. Add new data
2. View existing data
3. Change or update data
4. Remove data
5. Create tables and databases
6. Give permissions to users

1. To Store Data in the Database

SQL allows you to insert new data into tables.

This helps when you want to save information like students’ records, customer details, product lists, etc.

Purpose: To add new records (data entries) into the database.



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2. To Retrieve (View) Data from the Database

You can use SQL to ask questions to the database and get the data you need. For example, you can ask:
"Show me all students who scored more than 90."

Purpose: To search, read, or display specific data.

3. To Update Existing Data

SQL lets you change old or incorrect data. For example, if a student's marks were entered wrong, you can correct them using SQL.

Purpose: To modify or edit data in the database.

4. To Delete Unwanted Data

If you no longer need certain records (like a cancelled order or a student who left the school), SQL helps you remove them.

Purpose: To delete or remove data from the database.

5. To Create Tables and Databases

SQL allows you to design and build new databases and tables. You can decide how many columns you want, what type of data each column will hold (like name, date, number), etc.

Purpose: To set up the structure of the database.

6. To Control Access and Security

SQL can also manage who can see or change the data. For example, an admin can have full access, but a user can be given only read access.

Purpose: To protect data by giving correct permissions to users.

7. To Manage Transactions

SQL helps handle multiple steps together like bank transfers, where one account is debited and another is credited. Both actions must happen successfully.



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Purpose: To make sure data is safe and consistent, even during multiple operations.

Important Terminologies in SQL:

SQL has many terms that you need to understand while working with databases.

• Database

A database is a container where all your data is stored in an organized way.

Example: A school database can contain tables like Students, Teachers, Classes, Results.

Think of a database as a folder that stores many Excel sheets (tables) inside it.

• Table

A table is a collection of rows and columns that stores data.

Example: A Students table may have columns like ID, Name, Class, and Marks. Each table stores related data.

• Field or Column

A field or column is a single piece of data in a table. Each column has a name and a data type.

Example: In the Students table, the columns are ID, Name, Class, and Marks.

• Row or Record

A row is a single entry in a table. It holds data for one item or person.

Example: A row like 1, Ravi, 10, 85 represents one student's data.

• Primary Key

A primary key is a unique column that helps to identify each row in a table. It cannot be empty.

Example: In the Students table, the ID column can be a primary key.

• Query

A query is a request or question you ask the database using SQL.

Example: `SELECT * FROM Students;` means "Show me all data from the Students table."

• SQL Statement

An SQL statement is a full command written in SQL to perform a task.

Example: `INSERT INTO Students (ID, Name, Class, Marks) VALUES (3, 'Aman', 10, 90);` is a statement to insert data.

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• **Data Types**

Data types define what kind of data can be stored in a column.
Examples: INT for whole numbers, VARCHAR for text, DATE for dates.

• **Constraint**

A constraint is a rule applied to a column to protect the data.
Examples: PRIMARY KEY, FOREIGN KEY, NOT NULL, UNIQUE.

What is a Table in SQL?

In SQL, a table is the most important part of a database.
It is used to store data in an organized way, using rows and columns, just like a spreadsheet or Excel sheet.

Basic Definition:

A table is a collection of related data arranged in rows and columns.

- Each column stores one type of information (like Name, Age, or Marks).
- Each row stores one record (like one student or one employee).

	ID	Name	Age	Marks
ROWS	1	Ravi	15	88
	2	Sita	14	92
	3	Aman	15	90

ROWS

Columns

What is a Database?

A database is a collection of organized data that is stored and managed electronically. It helps you keep data safe, easy to access, and easy to manage.

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Concepts of SQL

Why Do We Need a Database?

- To store large amounts of data safely.
- To organize data in a way that makes it easy to find and use.
- To manage data efficiently, like adding, updating, or deleting information.
- To share data among many users or applications.
- To avoid data duplication and maintain data accuracy.

How is Data Stored in a Database?

In a database, data is stored in **tables**.
Tables are made of rows and columns (like a spreadsheet).

Example: If you have a database for a school, it might have tables like:

- Students
- Teachers
- Classes
- Results

Types of SQL Commands

There are five main types of SQL Commands.

Type	Description	Examples
DDL (Data Definition Language)	Used to define and structure the database	CREATE, ALTER, DROP
DML (Data Manipulation Language)	Used to manipulate data	INSERT, UPDATE, DELETE
DQL (Data Query Language)	Used to query data	SELECT
DCL (Data Control Language)	Used to control access	GRANT, REVOKE
TCL (Transaction Control Language)	Used to manage transactions	COMMIT, ROLLBACK, SAVEPOINT