

# 1 Introduction to SQL

SQL (Structured Query Language) is a database computer language designed for managing data in relational database management systems (RDBMS).

SQL, is a standardized computer language that was originally developed by IBM for querying, altering and defining relational databases, using declarative statements.

SQL is pronounced */ˌɛs kjuː ˈɛl/* (letter by letter) or */ˈsiːkwəl/* (as a word).

## SQL – Structured Query language

A Database Computer Language designed for Managing Data in Relational Database Management Systems (RDBMS)

### Query Examples:

- `insert into STUDENT (Name , Number, SchoolId)  
values ('John Smith', '100005', 1)`
- `select SchoolId, Name from SCHOOL`
- `select * from SCHOOL where SchoolId > 100`
- `update STUDENT set Name='John Wayne' where StudentId=2`
- `delete from STUDENT where SchoolId=3`

We have 4 different Query Types: **INSERT**, **SELECT**, **UPDATE** and **DELETE**

What can SQL do?

- SQL can execute queries against a database
- SQL can retrieve data from a database
- SQL can insert records in a database
- SQL can update records in a database
- SQL can delete records from a database

- SQL can create new databases
- SQL can create new tables in a database
- SQL can create stored procedures in a database
- SQL can create views in a database
- SQL can set permissions on tables, procedures, and views

Even if SQL is a standard, many of the database systems that exist today implement their own version of the SQL language. In this document, we will use the Microsoft SQL Server as an example.

There are lots of different database systems, or DBMS – Database Management Systems, such as:

- **Microsoft SQL Server**
  - Enterprise, Developer versions, etc.
  - Express version is free of charge
- **Oracle**
- **MySQL** (Oracle, previously Sun Microsystems) - MySQL can be used free of charge (open source license), Web sites that use MySQL: YouTube, Wikipedia, Facebook
- **Microsoft Access**
- **IBM DB2**
- **Sybase**
- ... lots of other systems



In this Tutorial, we will focus on Microsoft SQL Server. SQL Server uses T-SQL (Transact-SQL). T-SQL is Microsoft's proprietary extension to SQL. T-SQL is very similar to standard SQL, but in addition it supports some extra functionality, built-in functions, etc.

Other useful Tutorials about databases:

- Introduction to Database Systems
- Database Communication in LabVIEW

These Tutorials are located at: <https://www.halvorsen.blog>

## 1.1 Data Definition Language (DDL)

The **Data Definition Language (DDL)** manages table and index structure. The most basic items of DDL are the CREATE, ALTER, RENAME and DROP statements:

- **CREATE** creates an object (a table, for example) in the database.
- **DROP** deletes an object in the database, usually irretrievably.
- **ALTER** modifies the structure an existing object in various ways—for example, adding a column to an existing table.

## 1.2 Data Manipulation Language (DML)

The **Data Manipulation Language (DML)** is the subset of SQL used to add, update and delete data.

The acronym **CRUD** refers to all of the major functions that need to be implemented in a relational database application to consider it complete. Each letter in the acronym can be mapped to a standard SQL statement:

Operation	SQL	Description
Create	INSERT INTO	inserts new data into a database
Read (Retrieve)	SELECT	extracts data from a database
Update	UPDATE	updates data in a database
Delete (Destroy)	DELETE	deletes data from a database

# 2 Introduction to SQL Server

Microsoft is the vendor of SQL Server.

We have different editions of SQL Server, where SQL Server Express is free to download and use.

SQL Server uses T-SQL (Transact-SQL). T-SQL is Microsoft's proprietary extension to SQL. T-SQL is very similar to standard SQL, but in addition it supports some extra functionality, built-in functions, etc. T-SQL expands on the SQL standard to include procedural programming, local variables, various support functions for string processing, date processing, mathematics, etc.

SQL Server consists of a **Database Engine** and a **Management Studio** (and lots of other stuff which we will not mention here). The Database engine has no graphical interface - it is just a service running in the background of your computer (preferable on the server). The Management Studio is graphical tool for configuring and viewing the information in the database. It can be installed on the server or on the client (or both).

