

SQL

Structured Query Language

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Introduction to SQL

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What is SQL?

- The growth in relational database systems resulted in the production of a database language – SQL.
- SQL stands for Structured Query Language.
- SQL is a programming language used to communicate with a database.

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SQL was adopted as the standard language for relational database management systems (RDBMS):

- 1986 ANSI (American National Standards Institute)
- 1987 ISO (International Standards Organisation)

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Some RDBMS's that use SQL are:

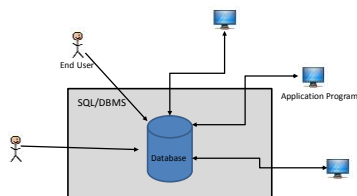
- Oracle (Oracle sqlDeveloper)
- Microsoft SQL Server
- **Microsoft ACCESS**
- Ingres
- And many others others.....

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SQL acts as an interface between the end user / application program and the data in the database.



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SQL allows an end user or an application program to *manipulate* the data stored in a database.

SQL statements are used to:

- Retrieve data from a database table(s)
- Add data to a database table
- Update data in a database table
- Remove data from a database table
- Define / create a database table(s)

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Interactive / Embedded SQL

SQL may be used **interactively**:

- SQL statements are entered by the user at a terminal via a command line interface.
- The results are displayed instantaneously to the user.
- Non-programmers e.g. managers

Examples:

- MS SQL Server
- Oracle SQL*Plus / sqlDeveloper

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An application programmer **embeds** SQL statements in a procedural language

- C#
- Java
- VB.Net

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SQL: Objectives

- Create the database and the relation structures (tables)
- Perform basic data manipulation tasks
 - Insert a row in a table (a single row only)
 - Update a row(s) in a table
 - Delete a row(s) from a table
 - Retrieve a row(s) from one or more tables
- Perform simple/complex queries on the database

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SQL: Characteristics

- Performs tasks with minimal user effort
- Has an easy to learn command structure and syntax
- Can be applied to multiple DBMS platforms ie. Portability.
i.e. the same command set and syntax can apply when we move from one DBMS to another (Oracle/Microsoft/Dbase).

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Although all database management systems use SQL, most of them also have their own additional **proprietary extensions** that are usually only used on their own system.

For example, the **ORACLE SQL*Plus** product provides Oracle users with additional commands for editing, executing and managing script files.

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The SQL Command Set

SQL statements belong to one of two categories:

- **Data Definition Language (DDL) Commands.**
These commands are used to define the database structure eg. CREATE TABLE, DROP TABLE, ALTER TABLE
- **Data Manipulation Language (DML) Commands.**
These commands are used to retrieve and change the data in the database eg. SELECT, INSERT, UPDATE, DELETE

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SQL contains only the defined DDL & DML commands.

It does **not** contain constructs such as:

- IF ... THENELSE
- DO WHILE
- GO TO

SQL Users

SQL can be used by a range of users:

- DBA
- Application Programmers
- End users
- Management

SQL Features

- SQL is a **non-procedural** language.
- You specify **what** information you require and not **how** to access the data.
- SQL is essentially free format – there is no ordering imposed on the order in which rows or columns are retrieved.
- The SQL command set consists of standard English words eg. CREATE TABLE, INSERT, SELECT

Terminology

Informal	Relational Data Model
Table	Relation
Row	Tuple
Column	Attribute

SQL Features

An SQL statement consists of **Reserved Words** and **User Defined Words** and has an exact syntax that must be adhered to.

Reserved words are part of the SQL language and have a fixed meaning. Always in UPPER CASE.

They must be spelt **exactly** as required eg. SELECT, DELETE, DROP.

User defined words are made up by the user

- Table names
- Column names
- Constraint names

Since table names, column names and constraint names are referenced in SQL code, they should be aptly named for easy reference.

Note the following:

- Brackets are used to denote placeholders – do not include in actual SQL statements!
- A single SQL statement contains two or more ***clauses***
- Some clauses are mandatory while others are optional
- SQL statement terminated with a semi-colon