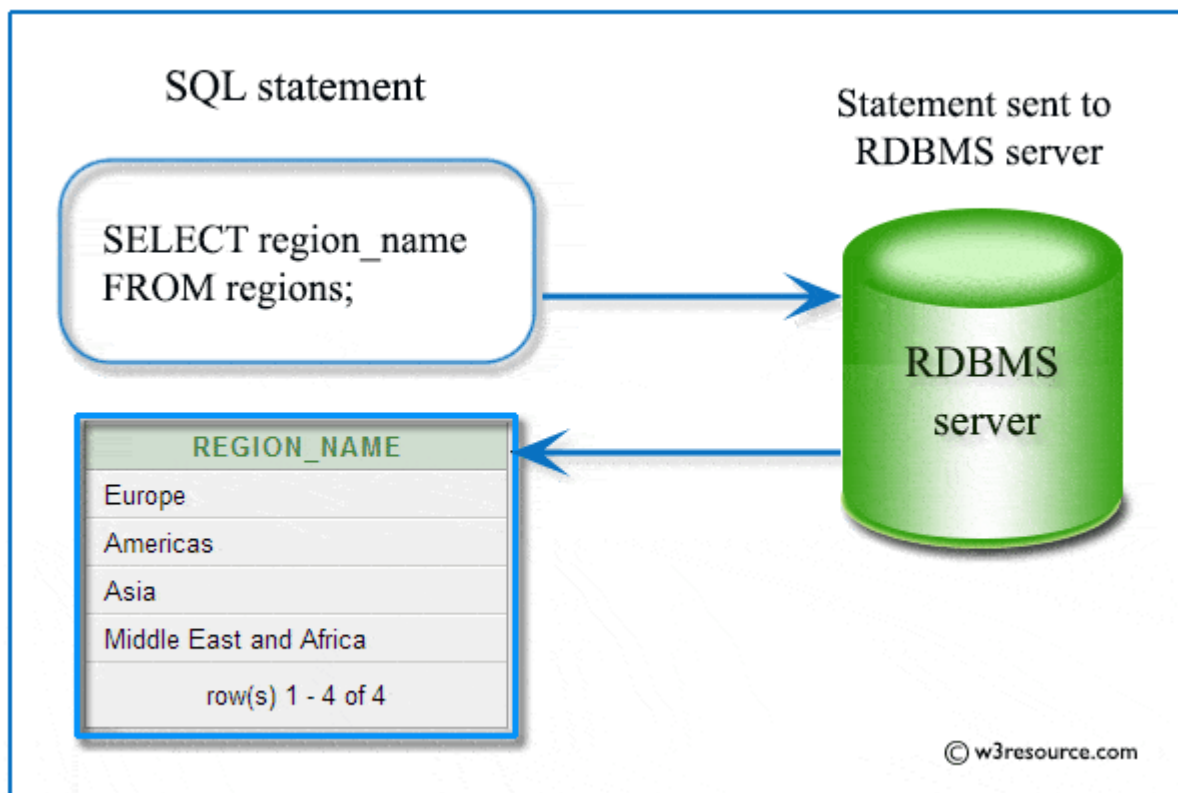


What is SQL?

SQL stands for Structured Query Language and it is an ANSI (American National Standards Institute) standard computer language for accessing and manipulating database systems. It is used for managing data in relational database management system which stores data in the form of tables and relationship between data is also stored in the form of tables. SQL statements are used to retrieve and update data in a database.

SQL works with database programs like DB2, [MySQL](#), [PostgreSQL](#), [Oracle](#), [SQLite](#), SQL Server, Sybase, MS Access and much more. There are many different versions of the SQL language, but to be in compliance with the ANSI standard, they support the major keyword such as SELECT, UPDATE, DELETE, INSERT, WHERE, and others. The following picture shows the communicating with an RDBMS using SQL.



History of SQL

Here is the year wise development history :

- 1970 E.F. Codd publishes [Definition of Relational Model](#)
- 1975 Initial version of SQL Implemented (D. Chamberlin)
- IBM experimental version: System R (1977) w/ revised SQL
- IBM commercial versions: SQL/DS and DB2 (the early 1980s)
- Oracle introduces commercial version before IBM's SQL/DS
- INGRES 1981 & 85
- ShareBase 1982 & 86
- Data General (1984)
- Sybase (1986)
- by 1992 over 100 SQL products

SQL Standard Revisions

- SEQUEL/Original SQL - 1974
- SQL/86 - Ratification and acceptance of a formal SQL standard by ANSI (American National Standards Institute) and ISO (International Standards Organization).
- SQL/92 - Major revision (ISO 9075), Entry Level SQL-92 adopted as FIPS 127-2.
- SQL/99 - Added regular expression matching, recursive queries (e.g. transitive closure), triggers, support for procedural and control-of-flow statements, non-scalar types, and some object-oriented features (e.g. structured types).
- SQL/2003 - Introduced XML-related features (SQL/XML), Window functions, Auto generation.
- SQL/2006 - Lots of XML Support for XQuery, an XML-SQL interface standard.
- SQL/2008 - Adds INSTEAD OF triggers, TRUNCATE statement.

Constructs of SQL

Here is list of the key elements of SQL along with a brief description:

- **Queries** : Retrieves data against some criteria.
- **Statements** : Controls transactions, program flow, connections, sessions, or diagnostics.
- **Clauses** : Components of Queries and Statements.
- **Expressions** : Combination of symbols and operators and a key part of the SQL statements.
- **Predicates** : Specifies conditions.

Some Key terms of SQL

To know the key terms of SQL 2003, you should know the statement classes of both SQL 92 AND SQL 2003, since both are used to refer SQL features and statements.

In SQL 92, SQL statements are grouped into following categories:

- **Data manipulation** : The Data Manipulation Language (DML) is the subset of SQL which is used to add, update and delete data.
- **Data definition** : The Data Definition Language (DDL) is used to manage table and index structure. CREATE, ALTER, RENAME, DROP and TRUNCATE statements are to name a few data definition elements.
- **Data control** : The Data Control Language (DCL) is used to set permissions to users and groups of users whether they can access and manipulate data.
- **Transaction** : A transaction contains a number of SQL statements. After the transaction begins, all of the SQL statements are executed and at the end of the transaction, permanent changes are made in the associated tables.
- **Procedure** : Using a stored procedure, a method is created which contains source code for performing repetitive tasks.

In SQL 2003 statements are grouped into seven categories which are called classes. See the following table :

Class	Example
SQL data statements	SELECT, INSERT, UPDATE, DELETE

SQL connection statements CONNECT, DISCONNECT

SQL schema statements ALTER, CREATE, DROP

SQL control statements CALL, RETURN

SQL diagnostic statements GET DIAGNOSTICS

SQL session statements SET CONSTRAINT

SQL transaction statements COMMIT, ROLLBACK

PL-SQL, TSQL and PL/pgSQL

- PL/SQL - Procedural Language/Structured Query Language (PL/SQL) is Oracle Corporation's procedural extension language for SQL and the Oracle relational database.
- TSQL - Transact-SQL (T-SQL) is Microsoft's and Sybase's proprietary extension to SQL.
- PL/pgSQL - Procedural Language/PostgreSQL(PL/pgSQL) is a procedural programming language supported by the PostgreSQL.

Database and Table Manipulation

Command	Description
CREATE DATABASE database_name	Create a database
DROP DATABASE database_name	Delete a database
CREATE TABLE "table_name" ("column_1" "column_1_data_type", "column_2" "column_2_data_type", ...)	Create a table in a database.
ALTER TABLE table_name ADD column_name column_datatype	Add columns in an existing table.
ALTER TABLE table_name DDROP column_name column_datatype	Delete columns in an existing table.
DROP TABLE table_name	Delete a table.

Data Types:

Data Type	Description
CHARACTER(n)	Character string, fixed length n.
CHARACTER VARYING(n) or VARCHAR(n)	Variable length character string, maximum length n.
BINARY(n)	Fixed-length binary string, maximum length n.
BOOLEAN	Stores truth values - either TRUE or FALSE.
BINARY VARYING(n) or VARBINARY(n)	Variable length binary string, maximum length n.
INTEGER(p)	Integer numerical, precision p.
SMALLINT	Integer numerical precision 5.
INTEGER	Integer numerical, precision 10.
BIGINT	Integer numerical, precision 19.
DECIMAL(p, s)	Exact numerical, precision p, scale s.
NUMERIC(p, s)	Exact numerical, precision p, scale s. (Same as DECIMAL).
FLOAT(p)	Approximate numerical, mantissa precision p.
REAL	Approximate numerical mantissa precision 7.
FLOAT	Approximate numerical mantissa precision 16.
DOUBLE PRECISION	Approximate numerical mantissa precision 16.
DATE TIME TIMESTAMP	Composed of a number of integer fields, representing an absolute point in time, depending on sub-type.

INTERVAL	Composed of a number of integer fields, representing a period of time, depending on the type of interval.
COLLECTION (ARRAY, MULTISSET)	ARRAY(offered in SQL99) is a set-length and ordered the collection of elements.
XML	Stores XML data. It can be used wherever a SQL data type is allowed, such as a column of a table.

SQL Operators:

Operators	Description
SQL Arithmetic Operator	Arithmetic operators are addition(+), subtraction(-), multiplication(*) and division(/). The + and - operators can also be used in date arithmetic.
SQL Comparison Operator	A comparison (or relational) operator is a mathematical symbol which is used to compare two values.
SQL Assignment operator	In SQL the assignment operator (=) assigns a value to a variable or of a column or field of a table.
SQL Bitwise Operator	The bitwise operators are & (Bitwise AND), (Bitwise OR) and ^ (Bitwise Exclusive OR or XOR). The valid datatypes for bitwise operators are BINARY, BIT, INT, SMALLINT, TINYINT, and VARBINARY.
SQL Logical Operator	The Logical operators are those that are true or false. The logical operators are AND , OR, NOT, IN, BETWEEN, ANY, ALL, SOME, EXISTS, and LIKE.
SQL Unary Operator	The SQL Unary operators perform such an operation which contain only one expression of any of the datatypes in the numeric datatype category.

Insert, Update and Delete:

Command	Description
INSERT INTO table_name VALUES (value_1, value_2,...) INSERT INTO table_name (column1, column2,...) VALUES (value_1, value_2,...)	Insert new rows into a table.
UPDATE table_name SET column_name_1 = new_value_1, column_name_2 = new_value_2 WHERE column_name = some_value	Update one or several columns in rows.
DELETE FROM table_name WHERE column_name = some_value	Delete rows in a table.

Select:

Command	Description
SELECT column_name(s) FROM table_name	Select data from a table.
SELECT * FROM table_name	Select all data from a table.
SELECT DISTINCT column_name(s) FROM table_name	Select only distinct (different) data from a table.
SELECT column_name(s) FROM table_name WHERE column operator value AND column operator value OR column operator value AND (... OR ...) ...	Select only certain data from a table.
SELECT column_name(s) FROM table_name WHERE column_name IN (value1, value2, ...)	The IN operator may be used if you know the exact value you want to return for at least one of the columns.

SELECT column_name(s) FROM
table_name ORDER BY row_1, row_2
DESC, row_3 ASC, ...

Select data from a table with sort the rows.

SELECT column_1, ...,
SUM(group_column_name) FROM
table_name GROUP BY
group_column_name

The GROUP BY clause is used with the SELECT statement to make a group of rows based on the values of a specific column or expression. The SQL AGGREGATE function can be used to get summary information for every group and these are applied to individual group.

SELECT column_name(s) INTO
new_table_name FROM source_table_name
WHERE query

Select data from table(S) and insert it into another table.

SELECT column_name(s) IN
external_database_name FROM
source_table_name WHERE query

Select data from table(S) and insert it in another database.

Functions:

SQL functions	Description
	This function can produce a single value for an entire group or table. Some Aggregate functions are -
Aggregate Function	<ul style="list-style-type: none"> • SQL Count function • SQL Sum function • SQL Avg function • SQL Max function • SQL Min function
Arithmetic Function	A mathematical function executes a mathematical operation usually based on input values that are provided as arguments, and return a numeric value as the result of the operation.

Some Arithmetic functions are -

- abs()
- ceil()
- floor()
- exp()
- ln()
- mod()
- power()
- sqrt()

A character or string function is a function which takes one or more characters or numbers as parameters and returns a character value. Some Character functions are -

Character
Function

- lower()
- upper()
- trim()
- translate()

Joins:

Name	Description
SQL EQUI JOIN	The SQL EQUI JOIN is a simple SQL join uses the equal sign(=) as the comparison operator for the condition. It has two types - SQL Outer join and SQL Inner join.

SQL INNER JOIN returns all rows from tables where the key record of one table is equal to the key records of another table.

SQL OUTER JOIN returns all rows from one table and only those rows from the secondary table where the joined condition is satisfying i.e. the columns are equal in both tables.

SQL NON EQUI JOIN The SQL NON EQUI JOIN is a join uses comparison operator other than the equal sign like >, <, >=, <= with the condition.

Union:

Command	Description
SQL_Statement_1 UNION SQL_Statement_2	Select all different values from SQL_Statement_1 and SQL_Statement_2
SQL_Statement_1 UNION ALL SQL_Statement_2	Select all values from SQL_Statement_1 and SQL_Statement_2

View:

Command	Description
CREATE VIEW view_name AS SELECT column_name(s) FROM table_name WHERE condition	Create a virtual table based on the result-set of a SELECT statement.

Summary

- SQL stands for Structured Query Language.
- SQL is easy to learn.
- SQL is an ANSI standard computer language.
- SQL allows us to access a database.

- SQL use to access and manipulate data in various databases like Oracle, Sybase, Microsoft SQL Server, DB2, Access, MySQL, PostgreSQL and other database systems.
- SQL execute queries against a database.
- SQL can insert new records into a database.
- SQL can update records in a database.
- SQL can delete records from a database.