

Module 02 – SQL Basics

Module Objectives

Discuss the theoretical and physical aspects of a relational database

Discuss the various types of SQL statements

List the capabilities of an SQL SELECT statement

Execute a basic SELECT statement

List the differences between the three different dialects of SQL

Theoretical and physical aspects of a relational database

A database is an organized collection of information.

Use a database management system (DBMS) to manage a database.

There are four different types of database models:

Hierarchical - is a data model in which the data is organized into a tree-like structure. The data is stored as records, which are connected to one another through links. A record is a collection of fields, with each field containing only one value.

Network - is a database model conceived as a flexible way of representing objects and their relationships. Its distinguishing feature is that the schema, viewed as a graph in which object types are nodes and relationship types are arcs, which allows each record to have multiple parent and child records, forming a generalized graph structure.

Relational - is a database model whose organization is based on the relational model of data, as proposed by E. F. Codd in 1970. This model organizes data into one or more tables of columns and rows, with a unique key identifying each row. Rows are called records or tuples, where columns are called attributes.

Object relational – is a database model similar to a relational database, but with an object-oriented database model: objects, classes and inheritance are directly supported in database schemas and in the query language. The basic goal for the Object-relational database is to bridge the gap between relational databases and the object-oriented modeling techniques used in programming languages.

Terminology used in relational databases

A relational database can contain one or many tables.

A table is a basic storage structure of a Relational DBMS.

A table holds all the necessary data about one entity.

A single row or record represents all the data about a specific instance of an entity.

Each row in a table should be identified by a primary key, which does not allow duplicate rows.

A primary key must contain a value.

The order in which data appears in a row is insignificant, the order is specified when the data is retrieved from the table.

A column or attribute represents one type of data in a table that describes the entity.

A foreign key is a column that defines how tables relate to each other.

A field can be found where a row and a column intersect.

A field may have or not have a value stored in it.

A field without a value is said to be NULL.

To access a database, execute a structured query language (SQL) statement.

The American National Standards Institute (ANSI) standard language for operating upon a relational database is SQL.

SQL allows you to define, retrieve, and manipulate data in tables.

Types of SQL statements

Data retrieval

SELECT

Data manipulation language (DML)

INSERT, UPDATE, DELETE

Data definition language (DDL)

CREATE, ALTER, DROP, RENAME, TRUNCATE

Transaction Control

COMMIT, ROLLBACK, SAVEPOINT

Data control language (DCL)

GRANT, REVOKE

Capabilities of an SQL SELECT statement

A SELECT statement retrieves information from a database. Using a SELECT statement, you can create a SELECTION, PROJECTION, or a JOIN.

Use the SELECTION capability in SQL to choose the rows in a table that you want returned in a query. You can use various selection criteria to restrict the rows that are retrieved by a query.

Use the PROJECTION capability in SQL to choose the columns in a table that you want returned in a query. You can choose as little or as many columns from a table as you need.

Use the JOIN capability in SQL to bring data together that is located in different tables by creating a link between the tables.

Basic SELECT statement

Basic SELECT statement components.

```
SELECT [DISTINCT] { *, column [alias], ... }
```

```
FROM table;
```

SELECT identifies which columns.

FROM identifies which tables.

A functional SELECT statement must contain two clauses, the SELECT clause, and the FROM clause. The syntax of a SELECT statement is as follows:

SELECT - is the list of one or more columns

DISTINCT - suppresses duplicate values

* - selects all columns

column - selects a specifically named column

alias - provides selected columns a different label or title

FROM table - specifies the table containing the columns

Guidelines for writing SQL statements

SQL statements are not case sensitive, unless indicated.

SQL statements can be entered on one or more lines.

Keywords, like SLEECT or FROM cannot be abbreviated or split across multiple lines.

Clauses are often placed on separate lines for readability.

In a SELECT clause, specify the columns you want to see in the order you want them to appear.

When you SELECT multiple columns, place a comma between each column name.

Use arithmetic operators to perform calculations with columns.

Operator precedence is the same as in traditional mathematics.

Override the order of precedence by using parentheses.

If a row lacks a data value for a particular column, that value is said to be NULL.

A NULL value is a value that is unavailable, unassigned, unknown, or inapplicable.

A NULL values is not the same as zero or a space.

Use an alias after a column in a SELECT clause by placing a space between the column name and the alias for that column.

Use two vertical pipes to concatenate two columns together in a SELECT clause.

To place a date or character literal in a SELECT clause the literal must be in single quotes.

Number literals do not need to be in single quotes.

To eliminate duplicate rows, include the DISTINCT keyword in the SELECT clause immediately after the SELECT keyword.

Differences between the three different dialects of SQL

Name	MySQL	Oracle	MS SQL Server
Database model	Relational DBMS	Relational DBMS	Relational DBMS
Developer	Oracle	Oracle	Microsoft
Initial Release	1995	1980	1989
Partitioning methods	Horizontal partitioning	Horizontal partitioning	Horizontal partitioning
Commonly used location	Server side	Server side	Server side
Server operating systems	FreeBSD Linux OS X Solaris Windows	AIX HP-UX Linux OS X Solaris Windows z/OS	Windows