SQL is a standard language for storing, manipulating and retrieving data in databases.

SQL is used in MySQL, SQL Server, MS Access, Oracle, Sybase, Informix, Postgres, and other database systems.

* SQL stands for Structured Query Language
* SQL lets you access and manipulate databases
* 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

RDBMS stands for Relational Database Management System.

RDBMS is the basis for SQL, and for all modern database systems such as MS SQL Server, IBM DB2, Oracle, MySQL, and Microsoft Access.

The data in RDBMS is stored in database objects called tables. A table is a collection of related data entries and it consists of columns and rows.

Some of the important commands

* SELECT - extracts data from a database
* UPDATE - updates data in a database
* DELETE - deletes data from a database
* INSERT INTO - inserts new data into a database
* CREATE DATABASE - creates a new database
* ALTER DATABASE - modifies a database
* CREATE TABLE - creates a new table
* ALTER TABLE - modifies a table
* DROP TABLE - deletes a table
* CREATE INDEX - creates an index (search key)
* DROP INDEX - deletes an index

MYSQL SELECT

The SELECT statement is used to select data from a database.

The data returned is stored in a result table, called the result-set.

SELECT column1, column2, ...FROM table\_name; \* to select all columns

The SELECT DISTINCT statement is used to return only distinct (different) values.

The WHERE clause can be combined with AND, OR, and NOT operators.

MYSQL Where

The WHERE clause is used to filter records.

It is used to extract only those records that fulfill a specified condition.

SQL AND ,OR, NOT

The AND and OR operators are used to filter records based on more than one condition:

* The AND operator displays a record if all the conditions separated by AND are TRUE.
* The OR operator displays a record if any of the conditions separated by OR is TRUE.

The NOT operator displays a record if the condition(s) is NOT TRUE

MYSQL ORDER BY

The ORDER BY keyword is used to sort the result-set in ascending or descending order.

The ORDER BY keyword sorts the records in ascending order by default. To sort the records in descending order, use the DESC keyword.

If given multiple columns it orders it for each column from left to right.

MYSQL INSERT

The INSERT INTO statement is used to insert new records in a table.

1. Specify both the column names and the values to be inserted
2. Enter all the values in order

MYSQL NULL VALUE

A field with a NULL value is a field with no value.

If a field in a table is optional, it is possible to insert a new record or update a record without adding a value to this field. Then, the field will be saved with a NULL value

It is not possible to test for NULL values with comparison operators, such as =, <, or <>.

We will have to use the IS NULL and IS NOT NULL operators instead.

MYSQL UPDATE

The UPDATE statement is used to modify the existing records in a table where clause specifies the condition on a particular column.

MYSQL DELETE

The DELETE statement is used to delete existing records in a table.if not specified it deletes all the rows.

The difference with truncate is it is possible to rollback in truncate.

MYSQL LIMIT

The LIMIT clause is used to specify the number of records to return.

The LIMIT clause is useful on large tables with thousands of records. Returning a large number of records can impact performance.

LIMIT N gives N top N rows.

LIMIT M N gives n rows starting from M.

MYSQL AGGREGATE FUNCTIONS

The MIN() function returns the smallest value of the selected column.

The MAX() function returns the largest value of the selected column.

In case of strings it calculates according to length.

The COUNT() function returns the number of rows that matches a specified criterion.

The AVG() function returns the average value of a numeric column.

The SUM() function returns the total sum of a numeric column.

AVG ,SUM doesn’t work for strings.

MYSQL LIKE

The LIKE operator is used in a WHERE clause to search for a specified pattern in a column.

\_ - single character.

%- any number of characters.

MYSQL WildCards.

MYSQL WildCards

|  |  |  |
| --- | --- | --- |
| % | Represents zero or more characters | bl% finds bl, black, blue, and blob |
| \_ | Represents a single character | h\_t finds hot, hat, and hit |
| [] | Represents any single character within the brackets | h[oa]t finds hot and hat, but not hit |
| ! | Represents any character not in the brackets | h[!oa]t finds hit, but not hot and hat |
| - | Represents a range of characters | c[a-b]t finds cat and cbt |

MYSQL Joins

A JOIN clause is used to combine rows from two or more tables, based on a related column between them.

The INNER JOIN keyword selects records that have matching values in both tables.

The LEFT JOIN keyword returns all records from the left table (table1), and the matching records from the right table (table2).

The RIGHT JOIN keyword returns all records from the right table (table2), and the matching records (if any) from the left table (table1).

Null values to unmatched records in both the joins.

The CROSS JOIN keyword returns all records from both tables (table1 and table2).

A self join is a regular join, but the table is joined with itself.

MYSQL UNION

The UNION operator is used to combine the result-set of two or more SELECT statements.

* Every SELECT statement within UNION must have the same number of columns
* The columns must also have similar data types
* The columns in every SELECT statement must also be in the same order

The UNION operator selects only distinct values by default. To allow duplicate values, use UNION ALL

MYSQL GROUP BY

The GROUP BY statement groups rows that have the same values into summary rows, like "find the number of customers in each country".

The GROUP BY statement is often used with aggregate functions (COUNT(), MAX(), MIN(), SUM(), AVG()) to group the result-set by one or more columns.

The HAVING clause was added to SQL because the WHERE keyword cannot be used with aggregate functions in group by.

MYSQL EXISTS

The EXISTS operator is used to test for the existence of any record in a subquery.

The EXISTS operator returns TRUE if the subquery returns one or more records.

MYSQL ANY ALL:

The ANY and ALL operators allow you to perform a comparison between a single column value and a range of other values.

ANY means that the condition will be true if the operation is true for any of the values in the range.

ALL returns true if all values in given range are true.

MYSQL DDL

The CREATE DATABASE statement is used to create a new SQL database.

The DROP DATABASE statement is used to drop an existing SQL database.

The CREATE TABLE statement is used to create a new table in a database.

The DROP TABLE statement is used to drop an existing table in a database.

Create table using another table

CREATE TABLE new\_table\_name AS  
    SELECT column1, column2,...  
    FROM existing\_table\_name  
    WHERE ....;

The ALTER TABLE statement is used to add, delete, or modify columns in an existing table.

The ALTER TABLE statement is also used to add and drop various constraints on an existing table.

MYSQL Constraints

The following constraints are commonly used in SQL:

* [NOT NULL](https://www.w3schools.com/mysql/mysql_notnull.asp) - Ensures that a column cannot have a NULL value
* [UNIQUE](https://www.w3schools.com/mysql/mysql_unique.asp) - Ensures that all values in a column are different
* [PRIMARY KEY](https://www.w3schools.com/mysql/mysql_primarykey.asp) - A combination of a NOT NULL and UNIQUE. Uniquely identifies each row in a table
* [FOREIGN KEY](https://www.w3schools.com/mysql/mysql_foreignkey.asp) - Prevents actions that would destroy links between tables
* [CHECK](https://www.w3schools.com/mysql/mysql_check.asp) - Ensures that the values in a column satisfies a specific condition
* [DEFAULT](https://www.w3schools.com/mysql/mysql_default.asp) - Sets a default value for a column if no value is specified
* [CREATE INDEX](https://www.w3schools.com/mysql/mysql_create_index.asp) - Used to create and retrieve data from the database very quickly

Alternate syntax  CONSTRAINT identifier CONSTRAINT NAME (column names)

INDEXES

The CREATE INDEX statement is used to create indexes in tables.

Indexes are used to retrieve data from the database more quickly than otherwise. The users cannot see the indexes, they are just used to speed up searches/queries.

Updating a table with indexes takes more time than updating a table without (because the indexes also need an update). So, indexes should be created on columns that will be frequently searched against.

Creating an index

CREATE INDEX index\_name on table\_name (column);

Dropping an index

ALTER TABLE table\_name DROP INDEX index\_name;

MYSQL AUTO\_INCREMENT

MySQL uses the AUTO\_INCREMENT keyword to perform an auto-increment feature.

By default, the starting value for AUTO\_INCREMENT is 1, and it will increment by 1 for each new record.

To set default value of the auto\_increment attribute of the table

ALTER TABLE Persons AUTO\_INCREMENT=100;

MYSQL Dates

MySQL comes with the following data types for storing a date or a date/time value in the database:

* DATE - format YYYY-MM-DD
* DATETIME - format: YYYY-MM-DD HH:MI:SS
* TIMESTAMP - format: YYYY-MM-DD HH:MI:SS
* YEAR - format YYYY or YY

MYSQL VIEWS

In SQL, a view is a virtual table based on the result-set of an SQL statement.

A view contains rows and columns, just like a real table. The fields in a view are fields from one or more real tables in the database.

 A view always shows up-to-date data! The database engine recreates the view, every time a user queries it.

SQL INJECTION

SQL injection is a code injection technique that might destroy your database.

SQL injection is one of the most common web hacking techniques.

The user inserts a sql query in the field of input fields which could corrupt our databases.

The user may also insert batched sql statements as most DBMS support batched sql statements.

To protect a web site from SQL injection, one can use SQL parameters.SQL parameters are values that are added to an SQL query at execution time, in a controlled manner.