

Introduction to SQL

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Outline

- 1 What is Database?
- 2 Database Management System (DBMS)
- 3 Data Manipulation Language (DML)

What is Database?

- Database is a organising collection of data
- For example a database of a college would be having a collection of data such as
 - Personal records of Students
 - Students performance history
 - Teachers data
 - Financial department data etc

Types of Databases

- **Basically there are two types of databases**
 - Relational Database
 - Non-relational Database
- **Non-relational databases**
 - Data is not organized in form of tables. Data is stored in form of key and value pairs.
 - The examples of non-relational databases are: JSON and XML.
 - **N.B. We cannot interact with non-relational databases using SQL**
- **Relational Databases**
 - In relational database, data is organized in form of tables. A table contains rows and columns of data.
 - Table has a unique key to identify each row of the table.

Database Management System (DBMS)

- A database management system is a software application which is used for managing different databases.
- It helps us to create and manage database.
- With the help of DBMS we take care following tasks.
 - Data Security.
 - Data Backup.
 - Manages huge amount of data.
 - Data export and import.
 - Serving multiple concurrent database requests.
 - Gives us a way to manage the data using programming languages.

What is SQL ?

- SQL stands for Structured Query Language, which is a standardised language for interacting with RDBMS (Relational Database Management System). Some of the popular relational database example are: MySQL, Oracle etc.
- SQL is used to perform C.R.U.D (Create, Retrieve, Update and Delete) operations on relational databases.
- SQL can also perform administrative tasks on database such as database security, backup, user management etc.

Types of SQL

SQL is a combination of the following different types of languages.

- Data Definition Language (DDL)
- Data Manipulate Language (DML)
- Data Control Language (DCL)
- Data Query Language (DQL)
- Transaction Control Language (TCL)

Data Definition Language (DDL)

- DDL is used to define the table schemas.
- All DDL commands are auto-committed, which means it saves all the changes permanently in the database.
- Following are the DDL commands being used to define database table.

<u>Command</u>	Description
create	to create new table or database
alter	for alteration
truncate	delete data from table
drop	to drop a table
rename	to rename a table

Data Manipulation Language (DML)

- DML commands are used for manipulating the data stored in the table and not the table itself.
- DML commands are not auto-committed. It means changes are not permanent to database, they can be rolled back.
- The DML commands used are:

<u>Command</u>	Description
insert	to insert a new row
update	to update existing row
delete	to delete a row
drop	to drop a table
merge	merging two rows or two tables

Data Control Language (DCL)

- Data control language are the commands to grant and take back authority from any database user.
- DCL commands in SQL are as follows:

<u>Command</u>	Description
grant	grant permission of right
revoke	take back permission.

Data Query Language (DQL)

- DQL is used to fetch the information from the database which is already stored there..
- Select is the only one DQL commands used in SQL.

<u>Command</u>	Description
select	retrieve records from one or more table

Transaction Control Language (TCL)

- These commands are to keep a check on other commands and their affect on the database.
- These commands can annul changes made by other commands by rolling the data back to its original state.
- It can also make any temporary change permanent.
- TCL commands used in SQL are.

<u>Command</u>	Description
commit	to permanently save
rollback	to undo change
savepoint	to save temporarily

Datatypes used in SQL

- In SQL, data types define what type of data a column can contain.
- Following are the few widely used datatypes in SQL.
 - Char.
 - Varchar
 - Boolean
 - Int
 - Real
 - Float
 - Double
 - Text
 - Date

SQL Syntax

- As data need be stored in database in organized manner, there is a requirement of SQL queries or statements to perform different operations in the database.
- SQL Statement:
 - SQL statement tells the database that what information you would like to retrieve or what operation you want to perform on the data.
- SQL statements are NOT case sensitive, but it can be made case sensitive.
- Semicolon at the end of the statement.

Create Command

- **create** is a DDL SQL command used to create a table or a database in relational database management system.
- **Syntax: create database ;database_name;: for creating database**
create table ;table_name;
(
column_name data_type1,
column_name data_type2,
);
- **create** table command will tell the database system to create a new table with the given table name and column information.

Create Command

- Example :
- ```
CREATE TABLE Student
(
 student_id INT,
 name VARCHAR(100),
 age INT
);
```
- The above command will create a table named Student in the current database with 3 columns, namely student\_id, name, age of datatypes integer, varchar that can hold upto 100 characters and integer respectively.



# Alter Command

**alter** command is used for altering the table structure, such as

- To add a column to existing table.
- To rename any existing column or table name.
- To change datatype of any column or to modify its size.
- To drop a column from the table.

## Alter Command: Add new column

**alter** command is used for altering the table structure, such as

- Using **ALTER** command we can add a column to any existing table
- Syntax: **ALTER TABLE table\_name ADD(column\_name datatype);**
- Example: **ALTER TABLE student ADD(address VARCHAR(200));**

# ALTER Command: Add multiple new Columns

**alter** command is used for altering the table structure, such as

- ALTER TABLE table\_name ADDD(  
column\_name1 datatype1,  
column\_name2 datatype2,  
column\_name3 datatype3  
);
- Example: ALTER TABLE student ADD(  
father\_name VARCHAR(60),  
mother\_name VARCHAR(60),  
dob DATE);
- The above command will add three new columns to the student table.

## ALTER Command: Add multiple new Columns

- ALTER command can add a new column to an existing table with a default value too. The default value is used when no value is inserted in the column.
- Syntax: ALTER TABLE table\_name ADD(column-name1 datatype1 DEFAULT some\_value);
- Example: ALTER TABLE student ADD(dob DATE DEFAULT '01-Jan-99');
- The above command will add a new column with a preset default value to the table student.

# ALTER Command: Modify an existing Column

- ALTER command can also be used to modify data type of any existing column.
- Syntax: **ALTER TABLE table\_name modify column\_name datatype;**
- Example: **ALTER TABLE student MODIFY address varchar(300);**
- The above command will modify the address column of the student table, to now hold up to 300 characters.

# ALTER Command: Rename a Column

- Syntax: **ALTER TABLE TABLE\_NAME RENAME COLUMN NAME1 TO COLUMN\_NAME2;**

| <u>ROLL_NO</u> | NAME | AGE |
|----------------|------|-----|
| 1              | Ram  | 20  |
| 2              | Abhi | 21  |

**ALTER TABLE Student RENAME COLUMN NAME TO FIRST\_NAME;**

| <u>ROLL_NO</u> | FIRST_NAME | AGE |
|----------------|------------|-----|
| 1              | Ram        | 20  |
| 2              | Abhi       | 21  |

## AlterCommand: Drop and Modify Usage

- Drop command : DROP COLUMN is used to drop column in a table;
- Syntax: ALTER TABLE table\_name DROP COLUMN column\_name;
- Modify command : It is used to modify the existing columns in a table.
- Syntax: ALTER TABLE table\_name MODIFY column\_name column\_type;

# DROP, TRUNCATE

- DROP : delete a whole database or just a table.
- Syntax: DROP object object\_name
- where, an object can be a table or a database
- TRUNCATE : is used to mark the extents of a table for deallocation (empty for reuse).
- Syntax: TRUNCATE TABLE table\_name;



# DML: Insert Into command

- The INSERT INTO statement of SQL is used to insert a new row in a table.
- Syntax:
- INSERT INTO table\_name VALUES (value1, value2, value3,...);  
table\_name: name of the table.
- Syntax: TRUNCATE TABLE table\_name;value1, value2,... :  
value of first column, second column,... for the new record.

# DML: update

- The UPDATE statement in SQL is used to update the data of an existing table in database.
- Syntax: UPDATE table\_name SET column1 = value1, column2 = value2, WHERE condition;
- table\_name: name of the table column1: name of first , second, third column.
- value1: new value for first, second, third column.
- condition: condition to select the rows for which the values of columns needs to be updated.
- WHERE clause is used to select the rows for which the columns are.

# DML: update (continues...)

- Student

| <u>ROLL_NO</u> | FIRST_NAME | AGE |
|----------------|------------|-----|
| 1              | Ram        | 20  |
| 2              | Abhi       | 21  |

- Example: UPDATE Student SET NAME = 'PRATIK' WHERE Age = 20;

| <u>ROLL_NO</u> | FIRST_NAME | AGE |
|----------------|------------|-----|
| 1              | Pratik     | 20  |
| 2              | Abhi       | 21  |

# References

- <https://beginnersbook.com/2018/11/introduction-to-sql/>
- <https://www.studytonight.com/dbms/alter-query.php>
- <https://unacademy.com/lesson/introduction-to-sql-and-its-syntaxinhindi/AHO6REIJ>