Database Systems CS-220

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Lecture 2

What is a database

- **Database** is a organized collection of data. For example a database of a college would be having a collection of data such as –
  1. Personal records of Students
  2. Students performance history
  3. Teachers data
  4. Financial department data etc.

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 –
  1. Data Security
  2. Data Backup
  3. Manages huge amount of data
  4. Data export & import
  5. Serving multiple concurrent database requests
  6. Gives us a way to manage the data using programming languages

What is SQL

- SQL also pronounced as sequel, is a language which is used to interact with relational database management system.
- 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, mariaDB, postgreSQL etc.
- SQL is used to perform **C.R.U.D** (Create, Retrieve, Update & Delete) operations on relational databases.
- SQL can also perform **administrative tasks** on database such as database security, backup, user management etc.
- We can create **databases and tables** using SQL.

Types of Structured Query Language

- SQL is basically combination of different languages, they are –

- **DQL (Data Query Language)** is used to fetch the data from the database that already exists in the database. DQL command is: SELECT.
- **DDL (Data Definition Language)** is used to define table schemas. DDL commands are: CREATE, DROP and ALTER.
- **DCL (Data Control Language)** is used for user & permission management. It controls the access to the database. DCL commands are: GRANT and REVOKE.
- **DML (Data Manipulation Language)** is used for inserting, updating and deleting data from the database. DML commands are: INSERT, DELETE and UPDATE.
- **TCL (Transaction Control Language**) is used for transaction management tasks in the database. TCL commands are: COMMIT and ROLLBACK.

What is a Query

- A Query is a set of instruction given to the database management system, which tells RDBMS what information you would like to get, insert, update or delete from the database.

- For e.g. to fetch the employee name from the database table EMPLOYEE, we write the SQL Query like this:

```
SELECT employee_name from EMPLOYEE;
```

SQL Statements

- SQL statement tells the database that what information you would like to retrieve or what operation you want to perform on the data.

- For example:
- Consider this table: STUDENT

STUDENT_NAME	STU_AGE	STU_ADDRESS
Ajeet	30	Chennai
Chaitanya	31	Noida
Steve	29	Agra
Rahul	30	Gurgaon

SQL statement to fetch STUDENT_NAME from the table STUDENT:

```
SELECT STUDENT_NAME FROM STUDENT;
```

To fetch the complete table:

```
SELECT * FROM STUDENT;
```

SQL is NOT case sensitive

- SQL is not a case sensitive language. For example: Both the following statements would work fine and produce the same output:

```
select * from student;
&
SELECT * FROM STUDENT;
```

Syntax of Most Important SQL Commands

SQL SELECT Statement

To fetch the data from table

```
SELECT column_name1, column_name2....column_nameN
FROM   table_name;
```

SQL WHERE Clause

TO fetch the specific rows from the table that meets the given condition.

```
SELECT column_name1, column_name2....column_nameN
FROM   table_name
WHERE  CONDITION;
```

SQL ORDER BY Clause

To fetch the records in a particular order

```
SELECT column_name1, column_name2....column_nameN
FROM table_name
ORDER BY column_name1, column_name2, ... {ASC|DESC};
```

SQL GROUP BY Clause

```
SELECT COUNT(column_name) FROM   table_name
WHERE  CONDITION
GROUP BY column_name;
```

SQL DISTINCT Clause

To fetch distinct values of column from the table.

```
SELECT DISTINCT column_name1, column_name2....column_nameN
FROM table_name;
```

SQL HAVING Clause

```
SELECT SUM(column_name)
FROM table_name
WHERE CONDITION
GROUP BY column_name
HAVING (arithmetic function condition);
```

SQL HAVING Clause

```
SELECT SUM(column_name)
FROM table_name
WHERE CONDITION
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HAVING (arithmetic function condition);
```

SQL CREATE TABLE Statement

To create the table in the database.

```
CREATE TABLE table_name(
column_name1 data_type,
column_name2 data_type,
.....
.....
column_nameN data_type,
PRIMARY KEY(column(s))
);
```

SQL DESC Statement

```
DESC table_name;
```

SQL INSERT INTO Statement

To insert a record into the table.

```
INSERT INTO table_name( column_name1, column_name2....column_nameN)
VALUES (value_1, value_2.....value_N);
```

SQL UPDATE Statement

To update data in table.

```
UPDATE table_name
SET column_name1 = value_1, column_name2 = value_2....column_nameN=value_N
WHERE  CONDITION;
```

SQL DELETE Statement

To delete rows from table.

```
DELETE FROM table_name
WHERE CONDITION;
```

SQL DROP TABLE Statement

To delete the table completely from database.

```
DROP TABLE table_name;
```

SQL TRUNCATE TABLE Statement

To delete all the records from the table.

```
TRUNCATE TABLE table_name;
```

ADD, DROP or MODIFY column of table

```
ALTER TABLE table_name {ADD|DROP|MODIFY} column_name {data_type};
```

SQL CREATE INDEX Statement

```
CREATE UNIQUE INDEX index_name
ON table_name ( column_name1, column_name2,...column_nameN);
```

Dropping Index of table

```
ALTER TABLE table_name
DROP INDEX index_name;
```

Rename Table name

```
ALTER TABLE table_name RENAME TO new_table_name;
```

SQL AND/OR Clause

```
SELECT column_name1, column_name2....column_nameN
FROM   table_name
WHERE  CONDITION_1 {AND|OR} CONDITION_2;
```

SQL COUNT Clause

```
SELECT COUNT(column_name)
FROM   table_name
WHERE  CONDITION;
```

SQL IN Clause

Selects rows based on the column values in a given set of values.

```
SELECT column_name1, column_name2....column_nameN
FROM   table_name
WHERE  column_name IN (value_1, value_2,...value_N);
```

SQL BETWEEN Clause

Selects rows based on the column values in a given range.

```
SELECT column_name1, column_name2....column_nameN
FROM   table_name
WHERE  column_name BETWEEN value_1 AND value_2;
```

SQL USE Statement

To select a particular database.

```
USE database_name;
```

SQL CREATE DATABASE Statement

To create database.

```
CREATE DATABASE database_name;
```

SQL DROP DATABASE Statement

Delete the entire database.

```
DROP DATABASE database_name;
```

SQL COMMIT Statement

To commit the changes permanently to the database.

```
COMMIT;
```

SQL ROLLBACK Statement

To rollback the changes made to the database to a previous checkpoint.