

Hello friend, Are you ready to complete our discussing about **Database**. First I will view an important idea in interaction with database.

The two keys of idea are important two concepts **Imperative and Declarative programming**.

Imperative in database means I tell DBMS **how** interacts with database, more clearly the user or developer tells DBMS how to do the operation in database.

Declarative in database means I tell DBMS **what** I want to do and let DBMS interact with database with itself.

**AND the question now which approach is the best?**

The answer is Declarative because DBMS is very effective and has a **query optimizer** that is can rewrite the query that I'm write it and has an optimal execution strategies.

**NOW**, after we know the important of declarative programming in interacting with database through DBMS, Let's talk about the language that I'm used it to interact and write query in DBMS, this language called **SQL**.

SQL is standard for **S**tructured **Q**uery **L**anguage, and has three main forms:

- 1- Data manipulation language (DML).
- 2- Data Definition language (DDL).
- 3- Data control language (DCL).

The Basic syntax for query is:

SELECT **column, column**

FROM **table name**

WHERE **predicates;**

**Note:** SQL is base in bags(duplicated) not sets(no duplicated).

NOW, we will discuss and display some basics and tricks in SQL

1- **Aggregates**: Function that is returns a single value from a bag of tuples.

**EX**: AVG (col), Min (col), Max (col), Sum (col), Count (col).

**Note**: Output of other columns outside of an aggregate is **Undefined**.

**SO**, we can use Grouped BY : project tuples into subsets and calculate aggregates each subset.

**Be aware** non aggregated values in SELECT output clause must appear in Grouped BY clause.

**Having**: filters results based on aggregation computation, like a WHERE clause for a Grouped By.

## 2-String operation:

1-Like: is used for string matching.

2-String matching operators are:

  %: Match any substring (including empty string).

  - : Match any one character.

3-String concatenate:

  Use || or + or CONCAT ().

## 3-Output Redirection:

  Store query results in another table.

## 4-Output Control:

  Order By: order the output tuples by the values in one or more of their

  Limit: limit the number of tuples returned in output. Can set an offset to return a “rang”.

5-**Nested Query**: queries contain other queries.

.Inner query can appear anywhere in query.

6-**Window functions**: perform a sliding calculation across a set of tuples that are related.

.Like an aggregation but tuples are not grouped into single output

Tuples.

**Special window function**:

Row\_ Number (): number of the current row.

RANK (): order position of the current row.

7-**Common Table Expression**:

Provide away to write auxiliary state mints for use in large query.

TO understand this expression, think of it like making a function in natural programming to use it many times in large problems.

