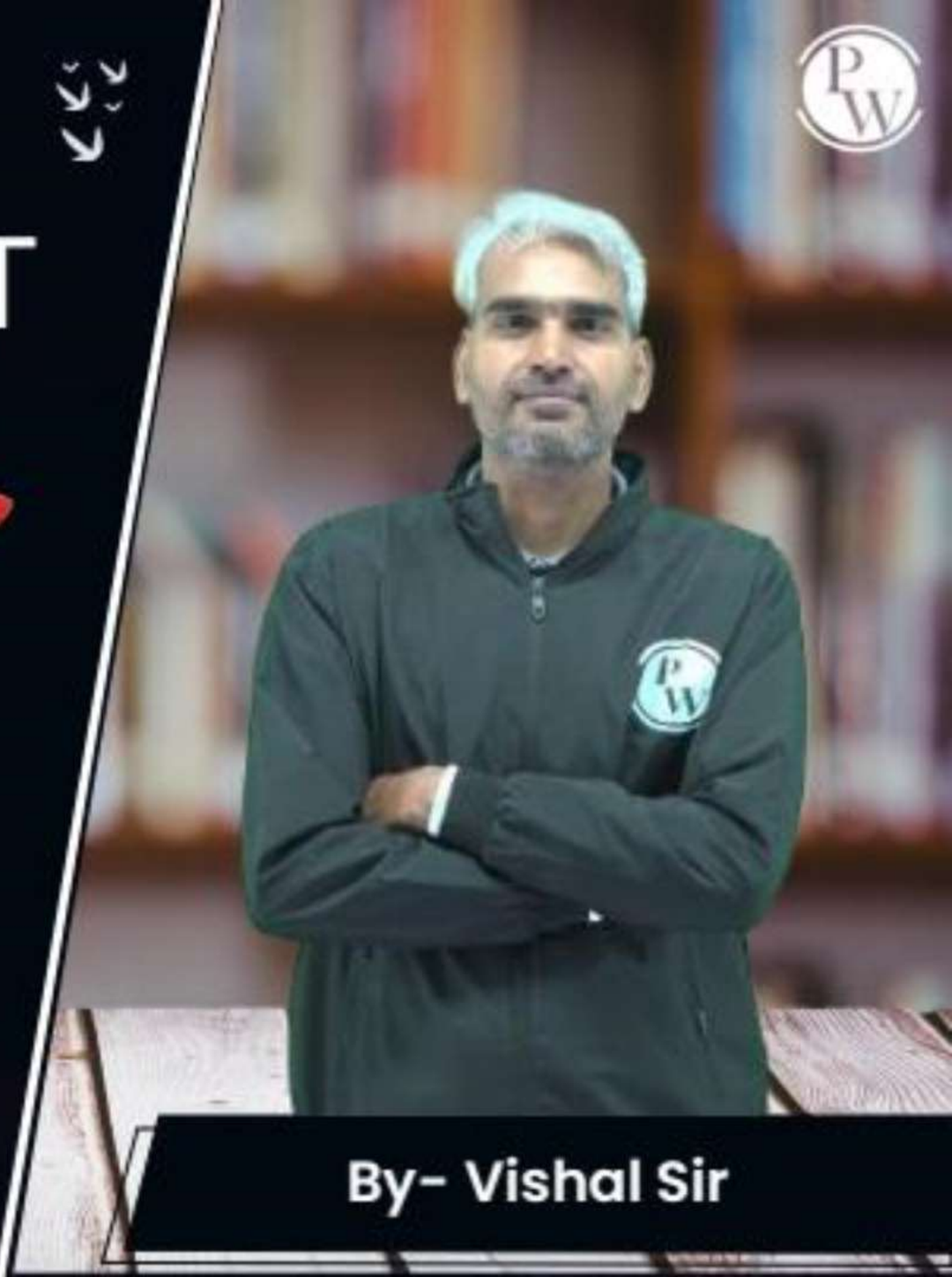
Computer Science & IT

Database Management System

Query Languages

Lecture No. 06



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Recap of Previous Lecture

- **Topic** SQL { Non-procedural Query language }
- **Topic** SQL commands
- **Topic** SQL clauses { From, Where, Group by, having, Order by }
- **Topic** Aggregate functions { Count, SUM, AVG, Min, Max }

Slide

Topics to be Covered

Topic — SQL clauses

Topic — Introduction to nested query

Slide

Topic : Commands in SQL

- CREATE TABLE - creates a new table
- ALTER TABLE - modifies a table
- DROP TABLE - deletes a table

Add or Remove Column
ADD DROP
Data definition Language

Complete table along with its structure will be deleted

- INSERT - inserts new data into a database
- DELETE - deletes data from a database
- UPDATE - updates data in a database

- SELECT - extracts data from a database

Topic : Commands in SQL

- CREATE TABLE - creates a new table

```
CREATE TABLE Student (
        Sid varchar(25),
        Sname varchar(25),
        Marks int
                );
```

```
Create table
        table_name
            (Attr1  data_type  Constraint,
             Attr2  data_type  Constraint,
             . . . . . .
            );
```

Topic : Commands in SQL

SQL is CASE sensitive

- CREATE TABLE - creates a new table

```
CREATE TABLE Student (
        Sid varchar(25),
        Sname varchar(25),
        Marks int
        );
```

Student

Sid	Sname	Marks

Branch ?

Student ≠ STUDENT

Sid ≠ SID

Topic : Commands in SQL

- ALTER TABLE - modifies a table

```
ALTER TABLE Student
ADD Branch varchar(25);
```

We can also define Constraint

Name of new attribute

data type of new attribute

Student

Sid	Sname	Marks	Branch

Topic : Commands in SQL

- ALTER TABLE - modifies a table

Add Column

```
ALTER TABLE Student
ADD Branch varchar(25);
```

Student

Sid	Sname	Marks	Branch

Delete Column

```
Alter table Student
Drop Sname
```

Column Sname will be deleted

Topic : Commands in SQL

- DROP TABLE - deletes a table

DROP TABLE *Student*;

→ Complete table is deleted

- TRUNCATE TABLE - deletes complete data from the table without deleting the structure of the table

TRUNCATE TABLE Student;

Topic : Commands in SQL

- INSERT - inserts new data into a database table

row/rows

- INSERT INTO *Student* VALUES (*S1*, *A*, *35*, CS);

Student

Sid	Sname	Marks	Branch

- Insert into table_name
  (values (Att_1, Att_2, . . .),
    values (Att_1, Att_2, . . .),
    ⋮
)

Topic : Commands in SQL

- INSERT - inserts new data into a database

- INSERT INTO *Student* VALUES (*S1*, *A*, *35*, CS);

Student

Sid	Sname	Marks	Branch
S1	A	35	CS

Topic : Commands in SQL

- DELETE - deletes data from a database

  ↳ Deletion will be performed based on Condition

```
delete from Student
where (Marks = 35)
```

Topic : Commands in SQL

- UPDATE - updates data in a database

UPDATE *Student*
SET *Marks = Marks + 5;*

Update table_name
Set (_____)
updation required.

Student

Sid	Sname	Marks	Branch
S1	A	35	CS

Topic : Commands in SQL

- UPDATE - updates data in a database

UPDATE *Student*
SET *Marks = Marks + 5;*

Student

Sid	Sname	Marks	Branch
S1	A	35+5=40	CS

Topic : SQL clauses

I·M·P·

- FROM - The FROM clause in SQL is used to select the database tables specified with from Clause.
- WHERE - The WHERE clause in SQL is used to retrieve the data from the database (table) based on conditions specified with WHERE (tuple) clause.
- GROUP BY - GROUP BY clause is used to group the result of WHERE clause. based on attributes specified with Group by Clause
  Note: If where Condn is not present, then Group by Clause will be applied on all tuples of relation
- HAVING - HAVING clause can be used with or Without GROUP BY clause. If Group by Clause is present then Having Condition will be used select the group which satisfy the specified Condition. {Having Condn is applied on each group}
- ORDER BY - The ORDER BY clause in SQL is used for sorting the records of the database based on attribute specified with order by Clause.

Topic : Order of execution

Order of Execution:-

1. From
2. Where
3. Group By
4. Having
5. Select
6. Order BY

Topic : SQL clauses

FROM:- From clause is used to select the tables from the database.

Select * ← Every thing

From Student

o/p of this query will be complete Student table

Student

Sid	Sname	Marks	Branch
S1	A	40	CS
S2	A	20	IT
S3	B	60	CS
S4	A	60	EC
S5	C	40	IT
S6	C	NULL	EC

Topic : SQL clauses

FROM:- From clause is used to select the tables from the database.

list of attributes

```
Select Sid
From Student
```

=

Sid
S1
S2
S3
S4
S5
S6

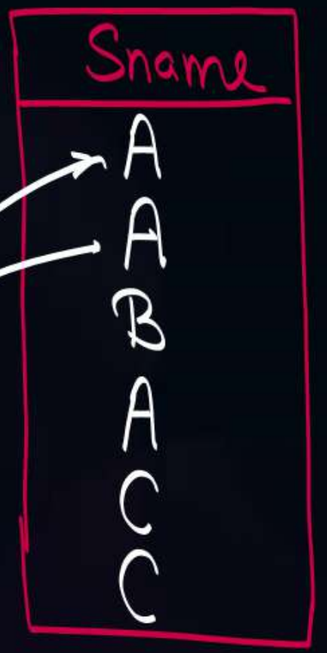
Student

Sid	Sname	Marks	Branch
S1	A	40	CS
S2	A	20	IT
S3	B	60	CS
S4	A	60	EC
S5	C	40	IT
S6	C	NULL	EC

Topic : SQL clauses

FROM:- From clause is used to select the tables from the database.

Select Sname
From Student =



duplicate tuples may be present

{distinct is not used}

Student

Sid	Sname	Marks	Branch
S1	A	40	CS
S2	A	20	IT
S3	B	60	CS
S4	A	60	EC
S5	C	40	IT
S6	C	NULL	EC

Topic : SQL clauses

FROM:- From clause is used to select the tables from the database.

Select distinct Sname
From Student =

Sname
A
B
C

Student

Sid	Sname	Marks	Branch
S1	A	40	CS
S2	A	20	IT
S3	B	60	CS
S4	A	60	EC
S5	C	40	IT
S6	C	NULL	EC

Select $\not\equiv$ Projection (π)

Select distinct $\equiv$ Projection (π)

Topic : SQL clauses

WHERE:- Used to retrieve the data from the database based on conditions specified with WHERE clause.

(tuple) (table)

* Retrieve Sids of all students Who scored more than 40 Marks.

③ – Select Sid

① — From Student

② —— Where (Marks > 40)

=

Sid
S3
S4

Student

Sid	Sname	Marks	Branch
S1	A	40	CS
S2	A	20	IT
S3	B	60	CS
S4	A	60	EC
S5	C	40	IT
S6	C	NULL	EC

Topic : SQL clauses

WHERE:- Used to retrieve the data from the database based on conditions specified with WHERE clause.

(tuple) (table)

* Retrieve Sids of all students who scored marks in the range 10 to 40 (both inclusive)

```
Select Sid
From Student
Where (Marks ≥ 10 AND Marks ≤ 40)
```

=

Sid
S1
S2
S5

Student

Sid	Sname	Marks	Branch
S1	A	40	CS
S2	A	20	IT
S3	B	60	CS
S4	A	60	EC
S5	C	40	IT
S6	C	NULL	EC

Topic : SQL clauses

WHERE:- Used to retrieve the data from the database based on conditions specified with WHERE clause.

(tuple) (table)

* Retrieve Sids of all students who scored marks in the range 10 to 40 (both inclusive)
* Select Sid
  From Student
  Where Marks between 10 AND 40 ;

Both included

q/p :-

Sid
S1
S2
S3
S4
S5

Student

Sid	Sname	Marks	Branch
S1	A	40	CS
S2	A	20	IT
S3	B	60	CS
S4	A	60	EC
S5	C	40	IT
S6	C	NULL	EC

Topic : SQL clauses

GROUP BY:- GROUP BY clause is used to group the result of WHERE clause.

If Where Condition is not present then Group by Clause will be applied on all tuples.

Query: Retrieve names of all branches along with maximum marks in that branch.

?

STUDENT

Sid	Sname	Marks	Branch
S1	A	40	CS
S2	A	20	IT
S3	B	60	CS
S4	A	60	EC
S5	C	40	IT
S6	C	NULL	EC

Q: Retrieve maximum marks from Student table

```
Select Max(Marks)
From Student
```

⇒ O/P

Max(Marks)
60

We can use aggregate function with Select

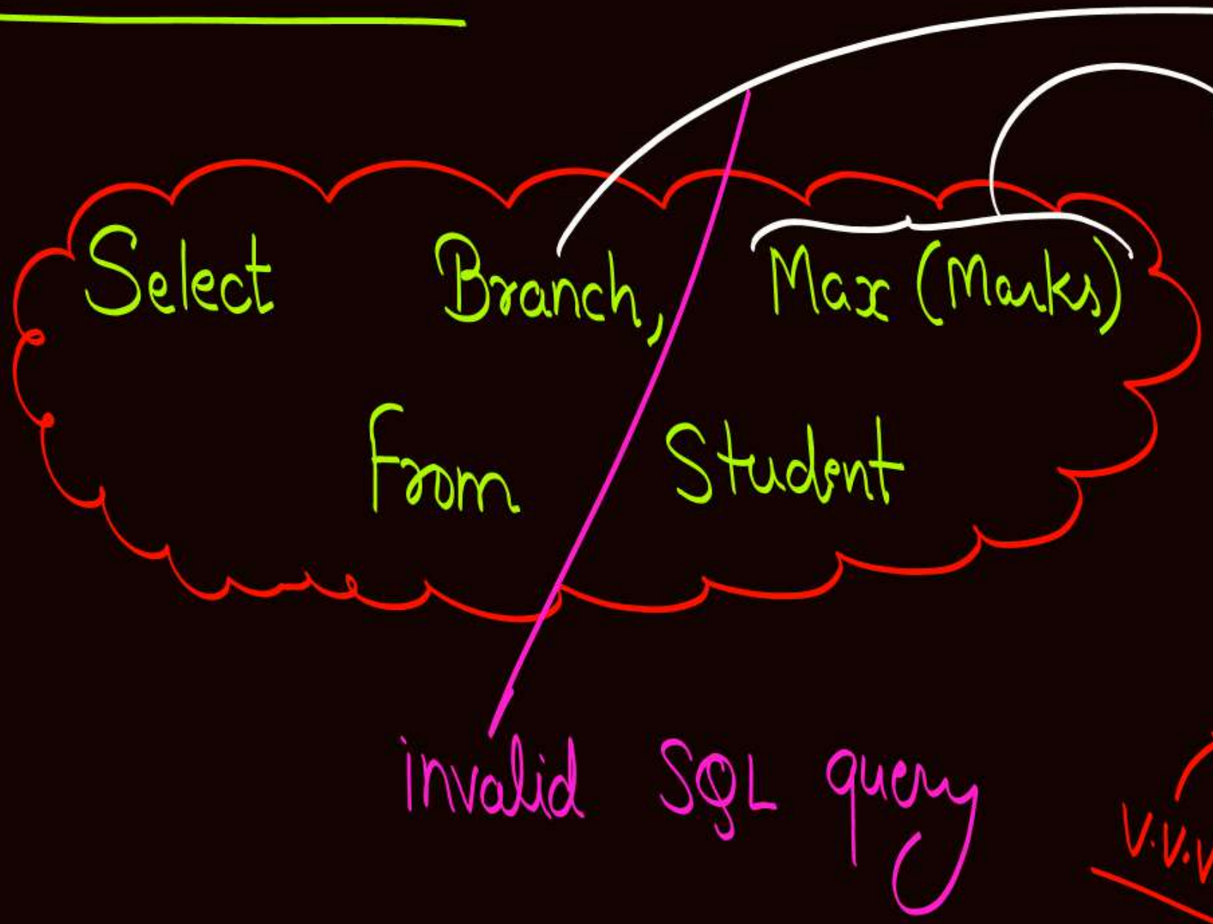
Aggregate function is applied on all tuples

Q: Retrieve Branch from Student table

```
Select Branch
From Student.
```

We can specify any attribute with Select.

Q:- Retriere names of all branches along with Maximum marks in that Branch.



Aggregate function + Attribute Branch of table

Note: We can not specify any attribute in the Select Clause along with an aggregate function. Until that attribute/es is present in Group by Clause

V.V.V.IMP

Topic : SQL clauses

NOTE:-

1. We can not select any attribute in SELECT clause along with aggregate function until those attributes are present in GROUP BY clause.

2. If aggregate function is used along with GROUP BY clause, then aggregate function is applied on each group.

Topic : SQL clauses

GROUP BY:- GROUP BY clause is used to group the result of WHERE clause.

Query: Retrieve names of all branches along with maximum marks in that branch.

③ — Select Branch, Max(Marks)
① — From Student
② —— Group By (Branch)

Student

Sid	Sname	Marks	Branch
S1	A	40	CS
S2	A	20	IT
S3	B	60	CS
S4	A	60	EC
S5	C	40	IT
S6	C	NULL	EC

Branch	Max(Marks)
CS	60
IT	40
EC	60

Topic : SQL clauses

HAVING:- HAVING condition is applied on each group. (Provided Group By Clause is present)

Query: Retrieve branch names with average marks more than or equal to 40.

Student

Sid	Sname	Marks	Branch
S1	A	40	CS
S2	A	20	IT
S3	B	60	CS
S4	A	60	EC
S5	C	40	IT
S6	C	NULL	EC

Topic : SQL clauses

NOTE:-

1. WHERE condition is applied on each tuple whereas HAVING condition is applied on each group.
2. We can use HAVING condition without GROUP BY clause, but in that case HAVING condition will be applied on each tuple. i.e., without GROUP BY clause HAVING clause will degenerate into WHERE clause.

Topic : SQL clauses

ORDER BY:- This clause is used to sort the result in ascending or descending order based on values of attribute specified with ORDER BY clause.

By default order is ascending order.

Student

Sid	Sname	Marks	Branch
S1	A	40	CS
S2	A	20	IT
S3	B	60	CS
S4	A	60	EC
S5	C	40	IT
S6	C	NULL	EC

Topic : Order of execution

Order of Execution:-

1. From
2. Where
3. Group By
4. Having
5. Select
6. Order BY

2 mins Summary

Topic SQL clauses

Topic Introduction to nested query

Slide

THANK - YOU