

# Computer Science & IT

## Database Management System



Query Languages

Lecture No. 07



By- Vishal Sir



# Recap of Previous Lecture

✓ Topic

SQL commands

✓ Topic

SQL clauses





# Topics to be Covered



Topic

SQL clauses



Topic

Introduction to nested query



Topic

IN, ANY, ALL and EXISTS operators







# 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.

Select Branch

g/p =

Branch
CS
EC

From Student

Group by (Branch)

Having (Avg(Marks)  $\geq$  40)

Groups for which having condition is true will be selected

## 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

✓ 50

x30

✓ 60

(discarded)





## Topic : SQL clauses



### NOTE:-

1. WHERE condition is applied on each tuple whereas HAVING condition is applied on each group, *Provided Group by clause is present*
2. We can use HAVING condition without GROUP BY clause, but *as well* 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.

Otherwise  $\left\{ \begin{array}{l} \text{for ascending order we use "Asc"} \\ \text{for descending order we use "Desc"} \end{array} \right.$

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 Sid, Sname  
From Student  
Where (Marks = 60)

O/p =

Sid	Sname
S3	B
S4	A

Select Sid, Sname  
From Student  
Where (Marks = 60)  
Order By (Sname)

O/p =

Sid	Sname
S4	A
S3	B

By default  
Ascending

Select Sid, Sname  
From Student  
Where (Marks = 60)  
Order By (Sname) Desc

O/p =

Sid	Sname
S3	B
S4	A



## Topic : Order of execution

### Order of Execution:-

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



Query:- Retrieve Sids of all the Students  
Who scored maximum marks.



Select Sid From Student Where (Max(Marks))

it is not a Condition

Select Sid From Student Where (Marks = Max(Marks))

Select Sid From Student Having (Max(Marks))

Not a Cond<sup>n</sup>

Select Sid From Student Having (Marks = Max(Marks))

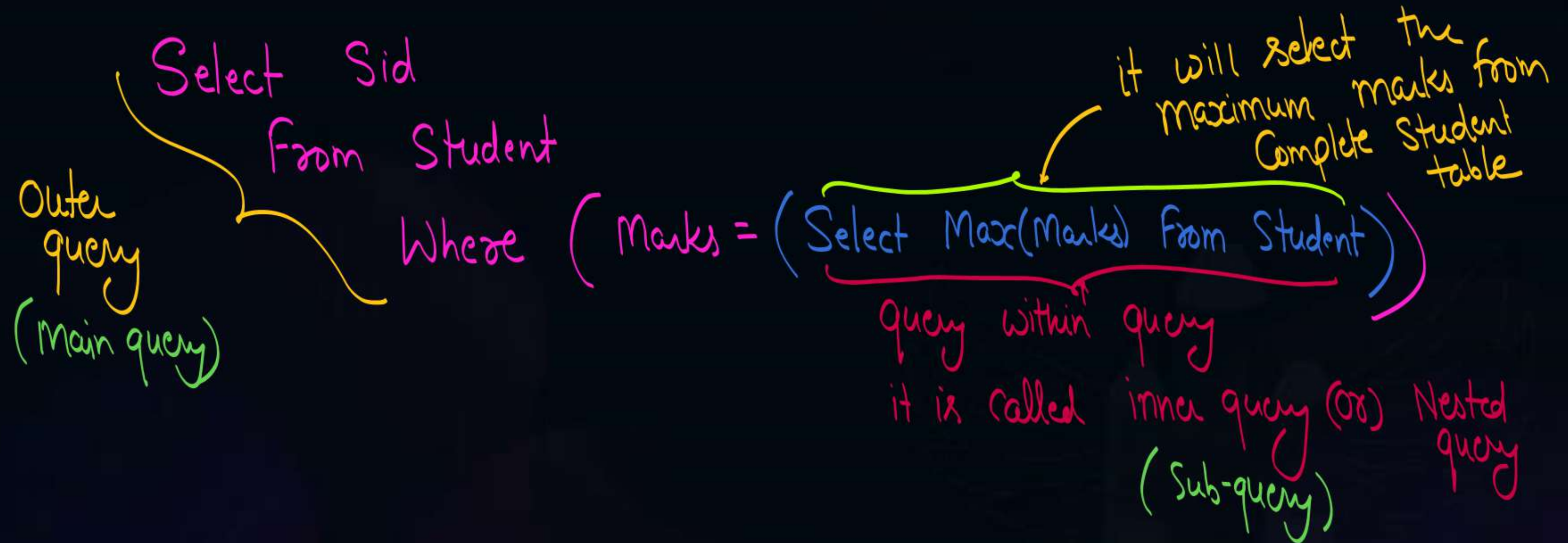
invalid: We are not allowed to use Aggregate function directly within where clause

Having w/o group by is same as where clause

All are Wrong.



Query:- Retrieve Sids of all the Students  
Who scored maximum marks.







## Topic : Nested queries



### Nested Queries (Sub-query)

#### Independent Nested Query

When inner query can be executed independently, then it is called independent Nested query.

When execution of inner query does not depend on the attribute of the relation specified in outer query, then it is called independent Nested query.

#### Correlated Nested Query

When Execution of inner query requires the attribute of relation specified in the outer query, then it is called Correlated nested query.



# Topic : Nested queries



## Nested Queries (Sub-query)

Independent Nested Query

Select Sid  
From Student

Where (Marks = Select Max(Marks)  
From Student)

inner query  
it can be executed  
independently, ∴ Independent  
nested query

Correlated Nested Query

Select \*  
From R

Where operator (

Select \*  
From S

Where (R.A = S.B)

∴ Correlated Nested query. We require the attribute from Rel<sup>n</sup> in outer query





## Topic : Independent nested query

Outer query

o/p =

Sid
S3
S4

inner query

Select Sid  
From Student  
Where (Marks = 60)

Select Max (Marks)  
From Student

Execution of outer query depends on o/p produced by inner query

We can observe that inner query is independent query.

o/p = 60

Inner query will be executed first and based on the o/p of inner query outer query will be executed.

Order of Execution w.r.t Independent Nested Query:

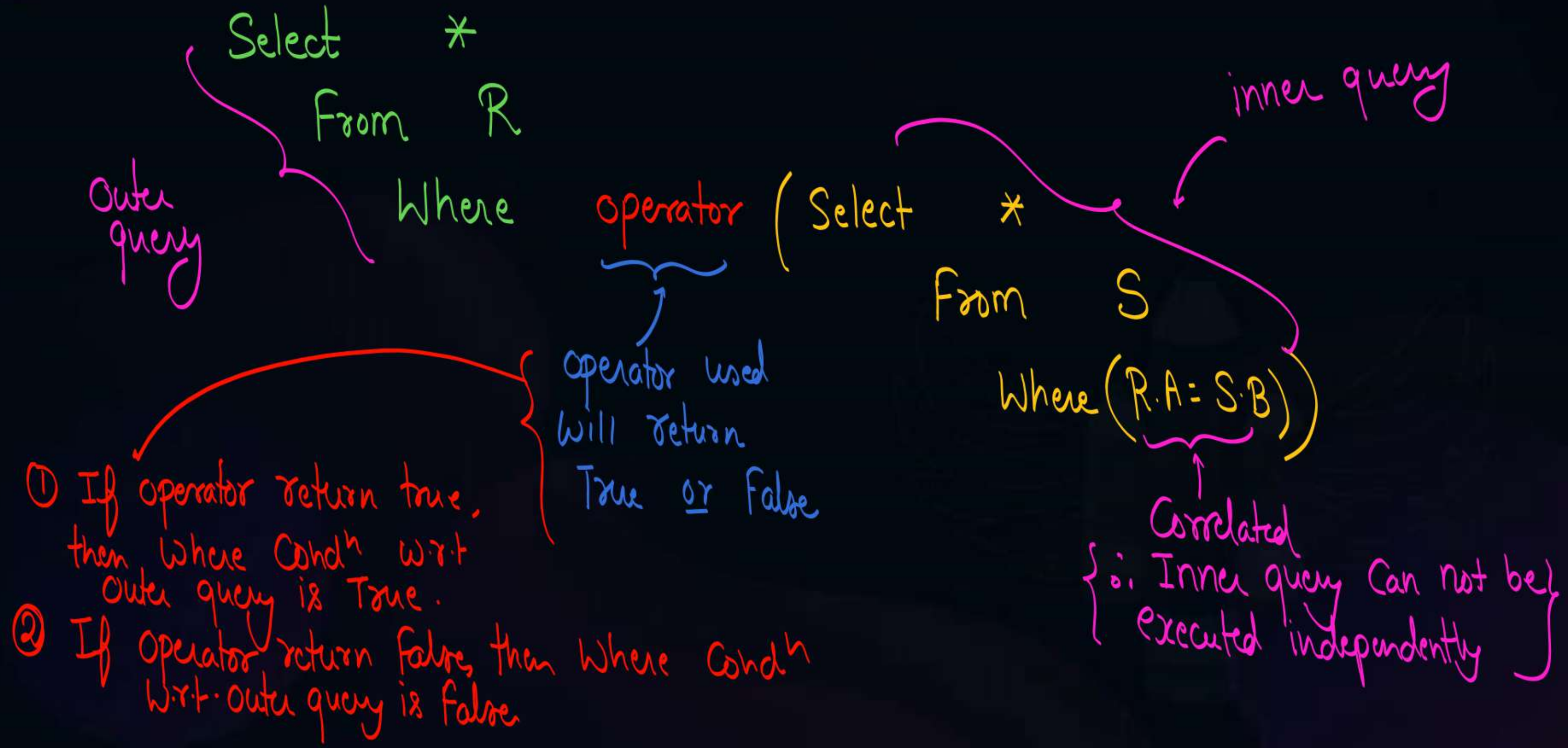
- ① Inner query
- ② Outer query.





## Topic : Correlated nested query

V.V.V. IMP







Order of Execution W.r.t.

## Topic : Correlated nested query

V.V.V. IMP



⑥ ← Select \*

① ← From R

⑤ ← Where operator

For every tuple of outer relation, this steps will be performed w.r.t each tuple of inner relation

tuple →  
1  
2  
3  
4

S

A	B	C	D
	✓		
	✓		
	✓		

④  
From S

Where (R.A = S.B) ③

R

	A	X	Y	Z
tuple 1 →	✓			
2 →				
3 →				
4 →				
5 →				

W.r.t. each tuple of outer relation, o/p of inner query will be a set of tuples

W.r.t. each tuple of outer relation this query will be executed corresponding to all tuples of inner relation





## Topic : Operators



- ① Best used operators with Independent Nested query are 'IN', 'ANY' and 'ALL'
- ② Best used operator with Correlated Nested query is 'EXISTS'.



## Topic : IN operator

'IN' operator is used to check whether the concerned tuple is present in the given set of tuples or not

eg:-  $X \text{ IN } \{4, 5, 8, 10\}$

it is actually  
Output of inner query

if  $X=8$ , then 'IN' will return true w.r.t. above set of tuples  
given set of tuples / i.e. o/p of inner query

if  $X=6$ , then 'IN' will return false

Note: Complement of 'IN' is 'NOT IN'



{ }

let given set of tuples is Empty

{ i.e, o/p produced by inner query is Empty }

- ① If inner query result is Empty, then 'IN' operator will always return false  
{ and 'NOT IN' will always return true }

Q. Supplier (Sid, Sname, Rating)  
 Parts (Pid, Pname, Color)  
 Catalog (Sid, Pid, Cost)

} Retrieve Sid of the supplier  
 who supplied at least one  
 red color part.

Relational Algebra:-  $\pi_{C.Sid} \left( \sigma_{\substack{C.Pid = P.Pid \\ P.Color = 'Red'}} (C \times P) \right)$

SQL {without Nested query} =

```

Select Catalog.Sid
  From Catalog, Parts
        =x
    Where (Catalog.Pid = Parts.Pid AND Parts.Color = 'Red')

```

||| Catalog renamed as C

```

Select C.Sid
  From Catalog As C, Parts As P
    Where (C.Pid = P.Pid AND P.Color = 'Red')

```

Nested  
 H.W. Write SQL query  
 Using IN operator

Parts renamed as P

```

Select C.Sid
  From Catalog C, Parts P
    Where (C.Pid = P.Pid AND
          P.Color = 'Red')

```





## 2 mins Summary



**Topic**

SQL clauses

**Topic**

Introduction to nested query

**Topic**

IN, ANY, ALL and EXISTS operators

**THANK - YOU**