SQL-Nested Queries & Aggregate functions

Lecture By
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Student

rollNo	name	dept	CGPA
123	Alice	CSE	8.2
201	Bob	EEE	5.6
399	Cherry	CSE	8.2

Course

rollNo	cName	dept	marks
123	DBMS	CSE	48
123	OS	CSE	36
399	DBMS	CSE	25
201	DBMS	CSE	40
123	Statistics	Maths	39
201	Control	EEE	35.5

Q12. Find all students such that there is another student from the same department?

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```
select name, dept from Student S1
where exists (select * from Student S2
  where S1.dept = S2.dept
  and S1.rollNo <> S2.rollNo);
```

Correlated Reference!

Q12. Find all students such that there is another student from the same department?

`Exercise:`

1. Rewrite the query using nested select and IN operator?
2. Rewrite the query using JOIN only?
3. Can you refer S2 which is declared in the inner select from the outside select?

Q12. Find all students such that there is another student from the same department?

Exercise 1. Ans

```
select name, dept from Student S1
where dept in (select dept
from Student S2 where
S2.rollNo<>S1.rollNo);
```

Q13. Find the student with the highest mark?
(without using the *max operator*)

Course

rollNo	cName	dept	marks
123	DBMS	CSE	48
123	OS	CSE	36
399	DBMS	CSE	25
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201	Control	EEE	35.5

Q13. Find the student with the highest mark?
(without using the *max operator*)

```
select rollNo, cName from Course C1
where not exists
(select * from Course C2
  where C2.marks > C1.marks);
```

Q14. Find the student with the highest CGPA?
(without using the *max operator*)

Student

rollNo	name	dept	CGPA
123	Alice	CSE	8.2
201	Bob	EEE	5.6
399	Cherry	CSE	8.2

Q14. Find the student with the highest CGPA?
(without using the *max operator*)

```
select rollNo, name, CGPA
from Student S1
where not exists
   (select * from Student S2
    where S2.CGPA > S1.CGPA);
```

rollNo	name	CGPA
123	Alice	8.2
399	Cherry	8.2

Q14. Find the student with the highest CGPA? (with the *all keyword*)

```
select name, CGPA
from Student
where CGPA >= all (select CGPA from
Student);
```

Q14. Find the student with the highest CGPA? (*with the any operator*)

```
select name, CGPA
from Student
where not CGPA < any (select CGPA
                      from Student);
```

all and *any* are not supported in sqlite.

We can always write equivalent queries with *exists*

Exercise: Is the following query same as the previous one?

```
select name, CGPA
from Student
where CGPA <> any (select CGPA
                   from Student);
```

Nested SELECT in the FROM Clause

Q15. What is this query for?

```
select T.rollNo from
(select * from Course
 where dept<>"CSE") T, Course C
    where T.rollNo=C.rollNo
    and C.dept="CSE";
```

Equivalent query - it finds all students who have taken a CSE as well as a non-CSE course

```
select rollNo from
 (select * from Course where dept<>"CSE")
where rollNo in
   (select rollNo from Course
              where dept="CSE");
```

Q16. If the CGPA to percentage conversion factor is 9.21, find all students who have above 50%

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```
select name, Percentage from
 (select name, CGPA*9.21 as Percentage
  from Student)
where Percentage > 50;
```

Subquery in the SELECT Clause

Q17. Find the top marks in each subject along with the subject name

Course

rollNo	cName	dept	marks
123	DBMS	CSE	48
123	OS	CSE	36
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Q17. Find the top marks in each subject along with the subject name?

What does the following query do?

```
select cName, marks
from Course
where marks >=  all(select marks from
Course)
```

```
select cName , marks from Course C1
where not exists
  (select distinct C2.marks from Course C2
  where C2.marks > C1.marks);
```

cName	marks
Networks	49

Not done yet!

```
select cName , marks from Course C1
where not exists
  (select distinct C2.marks from Course C2
  where C2.marks > C1.marks
    and C2.cName=C1.cName);
```

cName	marks
DBMS	48
OS	36
Statistics	39
Control	35.5
Networks	49

Q17. Find the top marks in each subject along with the subject name?

```
select distinct cName,

(select distinct marks from Course C2
  where C2.cName=C1.cName and
  not exists (select marks from Course C3
  where C3.marks > C2.marks
  and  C3.cName = C2.cName))

from Course C1;
```

Aggregation Functions

- Max
- Avg
- Min
- Count
- Count distinct

Aggregation functions

```
select max(CGPA)
from Student;
```

Q18. Find average CGPA of students enrolled in the DBMS course?

```
select avg(CGPA)
from Student, Course
where Student.rollNo = Course.rollNo
and Course.cName = "DBMS";
```

Q19. Find average CGPA of students who have taken a course in the CSE department?

Course

rollNo	cName	dept	marks
123	DBMS	CSE	48
123	OS	CSE	36
399	DBMS	CSE	25
201	DBMS	CSE	40
123	Statistics	Maths	39
201	Control	EEE	35.5

Q19. Find average CGPA of students who have taken a course in the CSE department?

```
select avg(CGPA)
from Student S, Course C
where S.rollNo = C.rollNo
and C.dept = "CSE";
```

```
select avg(CGPA) from Student
where rollNo in
(select rollNo from Course
  where dept="CSE");
```