



Database System Concepts for Non-Computer Scientist - WiSe 25/26

<http://db.in.tum.de/teaching/ws2526/DBSandere/?lang=en>

Sheet 04

Exercise 1

Formulate the following queries on the known university schema in SQL. Output all results without duplicates.

- (a) Find the *students* who know Sokrates from *lecture(s)*.
- (b) Find the *students* who attend *lectures* that Fichte also attends.
- (c) Find the *assistants* of *professors* who have taught the student Carnap – e.g., as potential supervisors for his bachelor's thesis.
- (d) Give the names of the *professors* whom Theophrastos knows from *lectures*.
- (e) Which *lectures* are attended by *students* in the bachelor's program (1st–6th semester)? Give the titles of these *lectures*.

Solution:

- (a) Find the *students* who know Sokrates from *lecture(s)*.

```
select distinct s.Name, s.StudNr
from Students s, attend a, Lectures l, Professors p
where s.StudNr = a.StudNr
    and a.LectureNr = l.LectureNr
    and l.Given_by = p.PersNr
    and p.Name = 'Sokrates';
```

- (b) Find the *students* who attend *lectures* that Fichte also attends.

```
select distinct s1.Name, s1.StudNr
from Students s1, Students s2, attend a1, attend a2
where s1.StudNr = a1.StudNr
    and s1.StudNr != s2.StudNr
    and s2.StudNr = a2.StudNr
    and a1.LectureNr = a2.LectureNr
    and s2.Name = 'Fichte';
```

- (c) Find the *assistants* of *professors* who have taught the student Carnap.

```
select distinct asst.Name, asst.PersNr
from Assistants asst, Professors p, Lectures l, attend a, Students
s
where asst.Boss = p.PersNr
    and p.PersNr = l.Given_by
    and l.LectureNr = a.LectureNr
    and a.StudNr = s.StudNr
    and s.Name = 'Carnap';
```

(d) Give the names of the *professors* whom Theophrastos knows from *lectures*.

```
select distinct p.PersNr, p.Name
from Professors p, attend a, Lectures l, Students s
where p.PersNr = l.Given_by
    and l.LectureNr = a.LectureNr
    and a.StudNr = s.StudNr
    and s.Name = 'Theophrastos';
```

(e) Which *lectures* are attended by *students* in the bachelor's program (1st–6th semester)?
Give the titles of these *lectures*.

```
select distinct l.Title
from Lectures l, attend a, Students s
where l.LectureNr = a.LectureNr
    and a.StudNr = s.StudNr
    and s.Semester between 1 and 6;
```

Exercise 2

Answer the following questions on our university database using SQL:

- a) Find all foundation lectures (lectures that don't depend on another lecture).
- b) “Lonely Students“ Are there any students that are attending a lecture on their own?
- c) “Industrial Students“ List all students that are attending all lectures. Hint: ¹ ²

Solution:

a) Query:

```
select *
from lectures l
where not exists (
    select *
    from require r
    where l.lecturenr = r.successor)
```

¹The task can be rephrased as: List all students, where there is no lecture with no attend record of the student.

²Alternatively, you could also try counting how many lectures a student is attending.

b) Solution using a sub query:

```
select distinct s.studNr, name
from Students s, attend a
where s.studNr = a.studNr
and not exists(
    select *
    from attend a2
    where a2.lecturenr = a.lecturenr
    and a2.studnr != a.studnr
)
```

Solution using group by and having:

```
select distinct min(s.studNr), min(name)
from Students s, attend a
where s.studNr = a.studNr
group by a.lectureNr
having count(*) = 1
```

- c) Solution using a double negative: “Find all students where there is no lecture that they did not attend.” or “Find all students where there is no lecture, for which there is no entry in attend.”

```
select *
from Students s
where not exists
    (select *
     from lectures l
     where not exists(
         select *
         from attend a
         where l.lecturenr = a.lecturenr
         and a.studnr = s.studnr
     )
    )
```

Alternatively, we can simply count how many lectures there are in one sub query and then use a second sub query to count how many lectures a student is attending. If the two numbers match (e.g., if there are 5 lectures at a university and a student is attending 5 lectures) then the student is attending all lectures.

```
select *
from Students s
where (select count(*)
      from lectures)
      = (select count(*)
        from attend a
        where a.studNr = s.studNr)
```

Alternatively, we can simply count how many lectures there are in one sub query and then use a second sub query to count how many lectures a student is attending. If the two numbers match (e.g., if there are 5 lectures at a university and a student is attending 5 lectures) then the student is attending all lectures.

```
select s.name, s.studNr
from Students s, attend a
where s.studNr = a.studNr
group by s.name, s.studNr
having count(*) = (select count(*) from lectures)
```