

INFSCI 2710 Database Management, Fall 2018

Homework 2: Relational Algebra, SQL

By JING PANG, JIP45

Q1[5pt] Count the number of instructors from Physics department.

Answer:

```
SELECT count(DISTINCT ID) FROM instructor WHERE dept_name = 'Physics'
```

Run SQL query/queries on table **testbase.course**: ?

```
1 SELECT count(DISTINCT ID) FROM instructor WHERE dept_name = 'Physics'
```

SELECT * SELECT INSERT UPDATE DELETE Clear Format Get auto-saved query

☐ Bind parameters ?

[Delimiter ;] ☒ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks

[Hide query box](#)

Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.

Showing rows 0 - 0 (1 total, Query took 0.0003 seconds.)

```
SELECT count(DISTINCT ID) FROM instructor WHERE dept_name = 'Physics'
```

☐ Profiling [Edit](#)

☐ Show all | Number of rows: 25 Filter rows: Search this table

[+ Options](#)

count(DISTINCT ID)
2

Q2[5pt]: Find the names of courses in Computer science department which have 3 credits.

Answer:

```
SELECT title FROM course WHERE dept_name = 'Comp. Sci.' AND credits = 3
```

Run SQL query/queries on table **testbase.course**: ?

```

1 SELECT title
2 FROM course
3 WHERE dept_name = 'Comp. Sci.' AND credits = 3

```

SELECT * SELECT INSERT UPDATE DELETE Clear Format Get auto-saved query

☐ Bind parameters ?

[Delimiter ;] ☒ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks

Hide query box

Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.

✓ Showing rows 0 - 2 (3 total, Query took 0.0002 seconds.)

```

SELECT title FROM course WHERE dept_name = 'Comp. Sci.' AND credits = 3
.....

```

☐ Profiling [Edit]

☐ Show all | Number of rows: 25 Filter rows: Search this table Sort by key: None

+ Options

title
Robotics
Image Processing
Database System Concepts

Q3[5pt]: Find all the courses's name taken by student 98988

Answer:

```

SELECT c.title
FROM course c, takes t
WHERE c.course_id = t.course_id AND t.ID = 98988

```

Run SQL query/queries on table **testbase.course**: ?

```

1 SELECT c.title
2 FROM course c, takes t
3 WHERE c.course_id = t.course_id AND t.ID = 98988

```

SELECT * SELECT INSERT UPDATE DELETE Clear Format Get auto-saved query

☐ Bind parameters ?

[Delimiter ;] ☒ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks

Hide query box

Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.

✓ Showing rows 0 - 1 (2 total, Query took 0.0002 seconds.)

```

SELECT c.title FROM course c, takes t WHERE c.course_id = t.course_id AND t.ID = 98988
.....

```

☐ Profiling [Edit]

☐ Show all | Number of rows: 25 Filter rows: Search this table

+ Options

title
Intro. to Biology
Genetics

Q4[10pt]: As above but show the average salary of all the instructor of those courses taken by student 98988.

Answer:

```

SELECT AVG(salary)
FROM takes ta, teaches te, instructor i
WHERE te.course_id = ta.course_id
      AND te.sec_id = ta.sec_id
      AND te.semester = ta.semester
      AND ta.ID = 98988 AND te.ID = i.ID

```

Run SQL query/queries on table **testbase.course**: ?

```

1 SELECT AVG(salary) FROM takes ta, teaches te, instructor i
2 WHERE te.course_id = ta.course_id AND te.sec_id = ta.sec_id AND te.semester = ta.semester
3 AND ta.ID = 98988 AND te.ID = i.ID

```

☐ Bind parameters ?

[Delimiter ;] ☒ Show this query here again
 ☐ Retain query box
 ☐ Rollback when finished
 ☒ Enable foreign key checks

[Hide query box](#)

Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.

Showing rows 0 - 0 (1 total, Query took 0.0003 seconds.)

SELECT AVG(salary) FROM takes ta, teaches te, instructor i WHERE te.course_id = ta.course_id AND te.sec_id = ta.sec_id AND te.sem
 ☐ Profiling [Edit](#)

☐ Show all | Number of rows: 25 Filter rows: Search this table

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AVG(salary)
72000.000000

Q5[10pt]: Find the students' name who take the course in the different department as the student.

Answer:

```

SELECT DISTINCT name
FROM takes t, course c, student s
WHERE t.course_id = c.course_id
      AND t.ID = s.ID
      AND c.dept_name <> s.dept_name

```

Run SQL query/queries on table **testbase.course**: ?

```


1 SELECT DISTINCT name FROM takes t, course c, student s
2 WHERE t.course_id = c.course_id AND t.ID = s.ID
3 AND c.dept_name <> s.dept_name


```

☐ Bind parameters ?

[Delimiter ;] ☒ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks

Hide query box

 Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.


 Showing rows 0 - 1 (2 total, Query took 0.0003 seconds.)

```

SELECT DISTINCT name FROM takes t, course c, student s WHERE t.course_id = c.course_id AND t.ID = s.ID AND c.dept_name <> s.dept_

```

☐ Profiling [Edit]

☐ Show all | Number of rows: 25  Filter rows: Search this table

+ Options

name
Levy
Bourikas

Q6[10pt]: Find the maximum and minimum enrollment across all sections, considering only sections that had some enrollment, don't worry about those that had no students taking that section.

Answer:

```

SELECT
    MAX(t.enrolls) AS max_enrolls, MIN(t.enrolls) AS min_enrolls
FROM
(
    SELECT course_id, sec_id, semester, year, COUNT(DISTINCT ID) AS enrolls
    FROM takes
    GROUP BY course_id, sec_id, semester, year
) t

```

Run SQL query/queries on table **testbase.takes**: ?

```

1 SELECT
2     MAX(t.enrolls) AS max_enrolls,
3     MIN(t.enrolls) AS min_enrolls
4 FROM
5     (
6         SELECT
7             course_id,
8             sec_id,
9             semester,
10            YEAR,
11            COUNT(DISTINCT ID) AS enrolls
12         FROM
13             takes
14         GROUP BY
15             course_id,
16             sec_id,
17             semester,

```

SELECT * SELECT INSERT UPDATE DELETE Clear Format Get auto-saved query

☐ Bind parameters ?

[Delimiter ;] ☒ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks

[Hide query box](#)

Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.

✓ Showing rows 0 - 0 (1 total, Query took 0.0004 seconds.)

```

SELECT MAX(enrolls) AS max_enrolls, MIN(enrolls) AS min_enrolls FROM (SELECT course_id, sec_id, semester, year, COUNT(DISTINCT ID)
sec_id,semester, year ) t

```

☐ Profiling [Edit](#)

☐ Show all | Number of rows: 25 Filter rows: Search this table

+ Options

max_enrolls	min_enrolls
6	1

Q7[5pt]: Find each student ID and the count of courses he/she takes. Display the student ID and course count.

Answer:

```

SELECT
    ID,count(DISTINCT course_id) AS NumberOfCourseTaken
FROM takes
GROUP BY ID

```

SQL Query Editor Interface:

```

1 SELECT ID, count(DISTINCT course_id) AS NumberOfCourseTaken
2 FROM takes
3 GROUP BY ID

```

Buttons: SELECT *, SELECT, INSERT, UPDATE, DELETE, Clear, Format, Get auto-saved query

☐ Bind parameters ?

[Delimiter ;] ☒ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks

Hide query box

Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.

Showing rows 0 - 11 (12 total, Query took 0.0003 seconds.)

```

SELECT ID, count(DISTINCT course_id) AS NumberOfCourseTaken FROM takes GROUP BY ID

```

☐ Profiling [Edit i]

Show all | Number of rows: 25 | Filter rows: Search this table | Sort by key: None

+ Options

ID	NumberOfCourseTaken
00128	2
12345	4
19991	1
23121	1
44553	1
45678	2
54321	2
55739	1
76543	2
76653	1
98765	2
99999	2

Console

Q8[10pt]: Find the student who take more courses than the other students. Display the student ID and course count.

Answer:

```

SELECT
    temp.ID
FROM
    (
        SELECT
            ID, COUNT(DISTINCT course_id) AS NumberOfCourseTaken
        FROM takes
        GROUP BY ID
    ) AS temp
WHERE temp.NumberOfCourseTaken IN (
    SELECT MAX(NumberOfCourseTaken)
    FROM
        (
            SELECT ID, COUNT(DISTINCT course_id) AS NumberOfCourseTaken
            FROM takes
            GROUP BY ID
        ) AS temp
)

```

Run SQL query/queries on table **testbase.takes**: ?

```

5      GROUP BY ID) AS temp
6  WHERE temp.NumberOfCourseTaken IN (
7      SELECT MAX(NumberOfCourseTaken)
8      FROM (
9          SELECT ID, count(DISTINCT course_id) AS NumberOfCourseTaken
10         FROM takes
11         GROUP BY ID) AS temp)

```

SELECT * | SELECT | INSERT | UPDATE | DELETE | Clear | Format | Get auto-saved query

☐ Bind parameters ?

[Delimiter ;] ☒ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks

Hide query box

Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.

Showing rows 0 - 0 (1 total, Query took 0.0004 seconds.)

```

SELECT temp.ID FROM ( SELECT ID, count(DISTINCT course_id) AS NumberOfCourseTaken FROM takes GROUP BY ID) AS temp WHERE temp.NumberOfCourseTaken =
FROM ( SELECT ID, count(DISTINCT course_id) AS NumberOfCourseTaken FROM takes GROUP BY ID) AS temp

```

☐ Profiling [Edit i]

☐ Show all | Number of rows: 25 Filter rows: Search this table

+ Options

ID
12345

Q9[10pt]: Find the student and the largest classroom (biggest room capacity) among all the class he/she has taken. Display the student ID and the room capacity.

Answer:

```

SELECT
    t.ID, MAX(c.capacity) AS max_capacity
FROM takes t, section s, classroom c
WHERE t.course_id = s.course_id
    AND t.sec_id = s.sec_id
    AND t.semester = s.semester
    AND s.room_number = c.room_number
GROUP BY t.ID

```

```

1 SELECT t.ID, MAX(c.capacity) AS max_capacity
2 FROM takes t, section s, classroom c
3 WHERE t.course_id = s.course_id AND t.sec_id = s.sec_id AND t.semester = s.semester
4 AND s.room_number = c.room_number
5 GROUP BY t.ID

```

SELECT * SELECT INSERT UPDATE DELETE Clear Format Get auto-saved query

☐ Bind parameters ?

[Delimiter ;] ☒ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks

Hide query box

Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.

Showing rows 0 - 11 (12 total, Query took 0.0004 seconds.)

```

SELECT t.ID, MAX(c.capacity) AS max_capacity FROM takes t, section s, classroom c WHERE t.course_id = s.course_id AND t.sec_id = s.room_number = c.room_number GROUP BY t.ID

```

☐ Profiling [Edit i](#)

☐ Show all | Number of rows: 25 Filter rows: Search this table

+ Options

ID	max_capacity
00128	500
12345	500
19991	10
23121	500
44553	30
45678	500
54321	500
55739	500
76543	500
76653	70
98765	500
98988	10

Q10[15pt]: Find the student (ID) from history department who has taken classes in the largest classroom (biggest the room capacity) compare with other students in history department. Display the student ID and the corresponding room capacity.

Answer:

```

SELECT
    temp.ID, temp.max_capacity
FROM
    (
        SELECT st.ID, MAX(c.capacity) max_capacity
        FROM student st, takes t, section se, classroom c
        WHERE st.dept_name = 'History'
            AND st.ID = t.ID
            AND t.course_id = se.course_id
            AND t.sec_id = se.sec_id
            AND t.semester = se.semester
            AND se.room_number = c.room_number
        GROUP BY st.ID
    ) temp
WHERE max_capacity IN(
    SELECT
        MAX(temp.max_capacity)
    FROM
        (

```



```

SELECT st.ID, MAX(c.capacity) max_capacity
FROM student st, takes t, section se, classroom c
WHERE st.dept_name = 'History'
      AND st.ID = t.ID
      AND t.course_id = se.course_id
      AND t.sec_id = se.sec_id
      AND t.semester = se.semester
      AND se.room_number = c.room_number
GROUP BY st.ID
) temp
)

```

Run SQL query/queries on table **testbase.temp**: ?

```

6 AND se.room_number = c.room_number
7 GROUP BY st.ID) temp
8 WHERE max_capacity IN (SELECT MAX(temp.max_capacity) FROM (SELECT st.ID, MAX(c.capacity) max_capacity
9 FROM student st, takes t, section se, classroom c
10 WHERE st.dept_name = 'History' AND st.ID = t.ID
11 AND t.course_id = se.course_id AND t.sec_id = se.sec_id AND t.semester = se.semester
12 AND se.room_number = c.room_number GROUP BY st.ID) temp)

```

Clear Format Get auto-saved query

☐ Bind parameters ?

[Delimiter ;] ☒ Show this query here again ☐ Retain query box ☐ Rollback when finished ☒ Enable foreign key checks

Hide query box

⚠ Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.

✓ Showing rows 0 - 0 (1 total, Query took 0.0007 seconds.)

```

SELECT temp.ID, temp.max_capacity FROM (SELECT st.ID, MAX(c.capacity) max_capacity FROM student st, takes t, section se, classroom c WHERE st.
AND t.course_id = se.course_id AND t.sec_id = se.sec_id AND t.semester = se.semester AND se.room_number = c.room_number GROUP BY st.ID) temp W
MAX(temp.max_capacity) FROM (SELECT st.ID, MAX(c.capacity) max_capacity FROM student st, takes t, section se, classroom c WHERE st.dept_name =
t.course_id = se.course_id AND t.sec_id = se.sec_id AND t.semester = se.semester AND se.room_number = c.room_number GROUP BY st.ID) temp)

```

☐ Profiling [Edit inline] [Edit] [E]

☐ Show all | Number of rows: 25 Filter rows: Search this table

+ Options

ID	max_capacity
19991	10

Q11[15pt]: Find the department that its students take more courses on average than other departments. Display the department, and average count of courses that its student take.

Answer:

```

SELECT
    temp.dept_name, AVG(temp.NumberOfCourses) avgcourses
FROM
(
    SELECT s.dept_name, s.ID, COUNT(DISTINCT course_id) NumberOfCourses
    FROM student s, takes t
    WHERE s.ID = t.ID
    GROUP BY s.dept_name, s.ID
) temp
GROUP BY temp.dept_name
HAVING AVG(temp.NumberOfCourses) >= ALL(
    SELECT AVG(temp.NumberOfCourses) avgcourses
    FROM
    (
        SELECT s.dept_name, s.ID,

```

```

        COUNT(DISTINCT course_id) NumberOfCourses
    FROM student s, takes t
    WHERE s.ID = t.ID
    GROUP BY s.dept_name, s.ID
) temp
GROUP BY
temp.dept_name
)

```

28

s.dept_name,

29

s.ID,

30

COUNT(DISTINCT course_id) NumberOfCourses

31

FROM

32

student s,

33

takes t

34

WHERE

35

s.ID = t.ID

36

GROUP BY

37

s.dept_name,

38

s.ID

39

) temp

40

GROUP BY

41

temp.dept_name

42

)

Clear

Format

Get auto-saved query

☐ Bind parameters


[Delimiter ;]


☒ Show this query here again

☐ Retain query box

☐ Rollback when finished

[Hide query box](#)


 Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete are disabled.

 Showing rows 0 - 0 (1 total, Query took 0.0007 seconds.)

```

SELECT temp.dept_name, AVG(temp.NumberOfCourses) avgcourses FROM ( SELECT s.dept_name, s.
BY s.dept_name, s.ID ) temp GROUP BY temp.dept_name HAVING AVG(temp.NumberOfCourses) >= A
course_id) NumberOfCourses FROM student s, takes t WHERE s.ID = t.ID GROUP BY s.dept_name

```

☐ Show all | Number of rows: 25  Filter rows:

+ Options

dept_name	avgcourses
Comp. Sci.	2.5000