Name: Gaoxiang Chen, ID: 4295735

INFSCI 2710 Database Management, Fall 2018

Homework 2: Relational Algebra, SQL

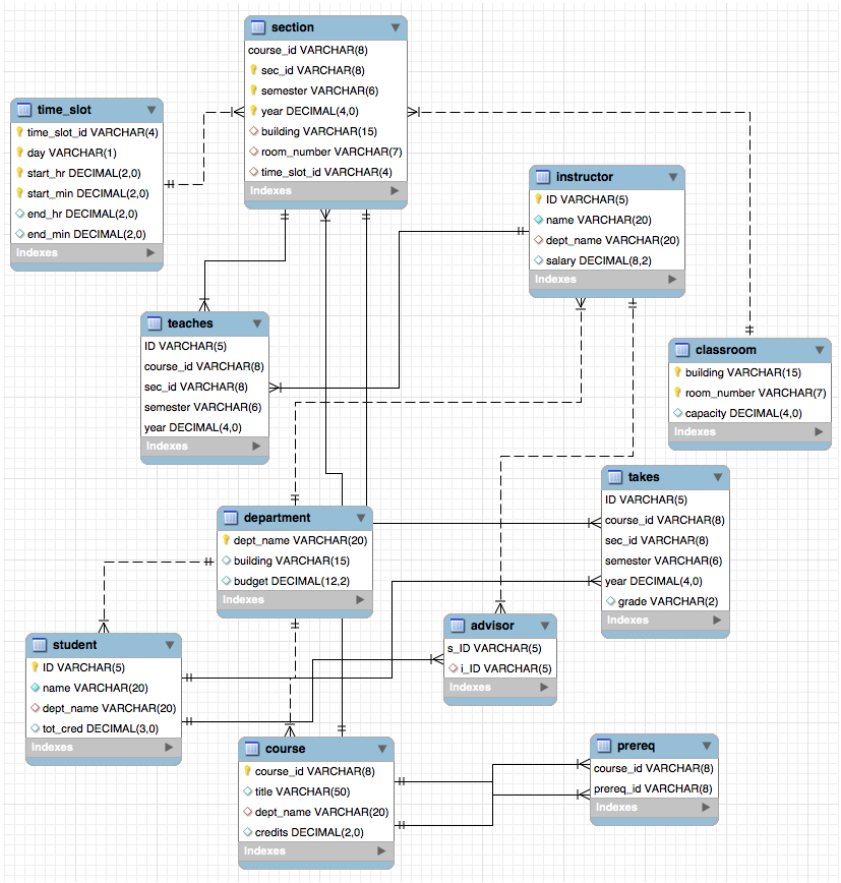
100 pts

Due Date: 2/14, at the beginning of the class. Hard copy, please type and print your answers.

Note: Use MySQL to answer all questions. **For each question you need to provide the SQL query and also the screen shot of the output of that query** from either phpMyAdmin, MySQL Workbench or from the terminal (if from terminal, make sure it is formatted properly).

Preparations: Download code from the class page and load data into MySQL. Running follow by the order create_table.sql -> insert_data.sql

Consider the following schema:



Don't try to write/adjust your SQL queries by looking the provided data too much. When

checking your homework, we will run your queries on a larger dataset.

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

Answer:

SELECT count(*)

FROM instructor

where dept_name = "Physics"

dept_name	count(*)
Physics	2

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

Answer:

SELECT title, dept_name, credits

FROM course

where dept_name = "Comp. Sci."

and credits = 3

title	dept_name	credits
Robotics	Comp. Sci.	3
Image Processing	Comp. Sci.	3
Database System Concepts	Comp. Sci.	3

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

Answer:

SELECT T.ID,C.title

FROM takes T, course C

where T.course_id = C.course_id

and T.ID = 98988

ID	title
98988	Intro. to Biology
98988	Genetics

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

Answer:

```
select avg(I.salary)
from instructor I
where I.ID in (select T1.id
                from teaches T1, takes T2
                where T1.course_id = T2.course_id
                and T2.ID = 98988)
```

avg(I.salary)
72000.000000

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

Answer:

Select()

```
select S.name
from student S
where S.ID in (select distinct S1.ID
from student S1,
(select T1.ID as ID, C1.dept_name as D
                from course C1, takes T1
                where C1.course_id = T1.course_id) as S_T_D
where S_T_D.ID = S1.ID
and S1.dept_name <> S_T_D.D)
```

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(CC.count), min(CC.count)
from (SELECT count(*) as count
FROM takes
group by sec_id, semester, year) as CC
```

max(CC.count)	min(CC.count)
9	1

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

```
SELECT S.ID, T.Count
from student S left join (SELECT T1.ID as ID, count(*) as Count
                          from takes T1
                          group by T1.ID) as T
on S.ID = T.ID
group by S.ID
```

ID	Count
00128	2
12345	4
19991	1
23121	1
44553	1
45678	3
54321	2
55739	1
70557	NULL
76543	2
76653	1
98765	2
98988	2

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

Answer:

```
select T1.ID, count(*)
from takes T1
group by T1.ID
having count(*) >= all((select count(*)
                        from takes T2
                        group by T2.ID))
```

ID	count(*)
12345	4

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)
From takes T, section S, classroom C
Where S.course_id = T.course_id
And S.sec_id = T.sec_id
And S.year = T.year
and S.semester = T.semester
and S.room_number = C.room_number
group by T.ID
```

ID	max(C.capacity)
00128	500
12345	500
45678	500
54321	500
76543	500
98765	500
23121	500
55739	500
98988	10
19991	10
76653	70
44553	30

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 T.ID,  max(C.capacity)
From takes T, section SE, classroom C
Where SE.course_id = T.course_id
And SE.sec_id = T.sec_id
And SE.year = T.year
and SE.semester = T.semester
and SE.room_number = C.room_number
and T.ID in (
                select T1.ID
                from takes T1, student ST
                where T1.ID = ST.ID
                and ST.dept_name = "History")
 group by T.ID
 having max(C.capacity) >= all((select C1.capacity

                                From takes T2, section SE2, classroom C1

                                Where SE2.course_id = T2.course_id

                                And SE2.sec_id = T2.sec_id

                                And SE2.year = T2.year

                                and SE2.semester = T2.semester

                                and SE2.room_number = C1.room_number
```

```
and T2.ID in (
                select T3.ID
                from takes T3, student ST2
                where T3.ID = ST2.ID
                and ST2.dept_name = "History")))
```

ID	max(C.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 DC.D, avg(DC.s_class)
from (Select S.dept_name as D, count(*)as s_class
        From takes T, student S
        Where S.ID= T.ID
        Group by T.ID) as DC
        group by DC.D
        having avg(DC.s_class) = (select max(AVG_DSC.AVG_C)
                                  from (select DC.D as D, avg(DC.s_class) as AVG_C
                                  from (Select S.dept_name as D, (count(*)) as s_class
                                  From takes T, student S
                                  Where S.ID= T.ID
                                  Group by T.ID) as DC

                                  Group by DC.D) as AVG_DSC)
```

D	avg(DC.s_class)
Comp. Sci.	2.5000