Lab 01: Review on SQL

CO527 Advanced Database Systems

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E/16/086

Database created at **company.sql**

Answer queries to the lab tasks at **E16086_Answers.sql**

Lab Task :

Refer to the Company ER diagram shown in Figure 1 and create a database named Company. All the questions listed below are based on this database.

1. Load data to each of the tables from the given .sql files. It should have the following mentioned number of records for each table if the import was successful.

Database Creation

Initially six tables were created. They are,

```
MySQL [company]> show tables
    -> ;
+-------------------+
| Tables_in_company |
+-------------------+
| departments       |
| dept_emp          |
| dept_manager      |
| employees         |
| salaries          |
| titles            |
+-------------------+
6 rows in set (0.096 sec)
```

Related queries,

create database Company;

use company;

CREATE TABLE EMPLOYEES (
  emp_no INT,
  birth_date DATE,
  first_name VARCHAR(14),
  last_name VARCHAR(16),
  sex ENUM('M','F'),
  hire_date DATE,
  PRIMARY KEY(emp_no));

CREATE TABLE DEPARTMENTS(
  dept_no CHAR(4),
  dept_name VARCHAR(40),
  PRIMARY KEY(dept_no));

CREATE TABLE DEPT_MANAGER(
  emp_no INT,
  dept_no CHAR(4),
  from_date DATE,
  to_date DATE,
  PRIMARY KEY(dept_no, emp_no),

```
  FOREIGN KEY(emp_no) REFERENCES EMPLOYEES(emp_no),
  FOREIGN KEY(dept_no) REFERENCES DEPARTMENTS(dept_no));

CREATE TABLE DEPT_EMP(
 emp_no INT,
 dept_no CHAR(4),
 from_date DATE,
 to_date DATE,
 PRIMARY KEY(emp_no,dept_no),
 FOREIGN KEY(emp_no) REFERENCES EMPLOYEES(emp_no),
 FOREIGN KEY(dept_no) REFERENCES DEPARTMENTS(dept_no));

CREATE TABLE SALARIES(
 emp_no INT,
 salary INT,
 from_date DATE,
 to_date DATE,
 PRIMARY KEY(emp_no, from_date, to_date),
 FOREIGN KEY(emp_no) REFERENCES EMPLOYEES(emp_no));

CREATE TABLE TITLES(
 emp_no INT,
 title VARCHAR(50),
 from_date DATE,
 to_date DATE,
 PRIMARY KEY(emp_no, title, from_date, to_date),
 FOREIGN KEY(emp_no) REFERENCES EMPLOYEES(emp_no));
```

Load data to database

My .sql files are in the C:/xampp/mysql/bin directory. Terminal was used to load data.

```
Path  C:/xampp/mysql/bin/load_employees.sql
```

mysql -u root -p company < load_employees.sql

mysql -u root -p company < load_departments.sql

mysql -u root -p company < load_dept_manager.sql
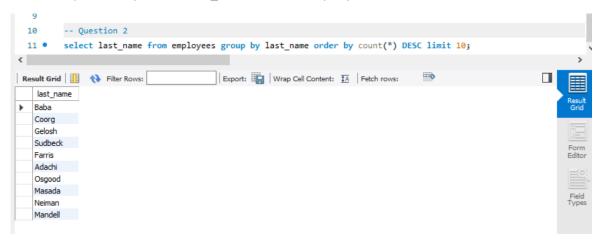
mysql -u root -p company < load_dept_emp.sql

mysql -u root -p company < load_salaries1.sql

mysql -u root -p company < load_salaries2.sql
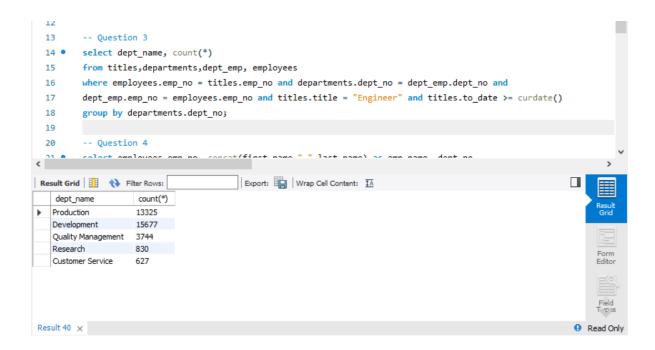
mysql -u root -p company < load_titles.sql

```
MySQL [company]> select count(*) from employees;
+----------+
| count(*) |
+----------+
|   300024 |
+----------+
1 row in set (14.322 sec)

MySQL [company]> select count(*) from dept_manager;
+----------+
| count(*) |
+----------+
|       24 |
+----------+
1 row in set (0.019 sec)

MySQL [company]> select count(*) from dept_emp;
+----------+
| count(*) |
+----------+
|   331603 |
+----------+
1 row in set (11.947 sec)

MySQL [company]> select count(*) from titles;
+----------+
| count(*) |
+----------+
|   443308 |
+----------+
1 row in set (0.782 sec)

MySQL [company]> select count(*) from salaries;
+----------+
| count(*) |
+----------+
|  1876717 |
+----------+
1 row in set (13.296 sec)
```

```
MySQL [company]> select count(*) from salaries;
+----------+
| count(*) |
+----------+
|  1876717 |
+----------+
1 row in set (13.296 sec)

MySQL [company]> select count(*) from departments;
+----------+
| count(*) |
+----------+
|        9 |
+----------+
1 row in set (0.007 sec)
```

2. Find the top 10 family names (last_name) in the company.

```
 9
10      -- Question 2
11 •    select last_name from employees group by last_name order by count(*) DESC limit 10;
```

last_name
Baba
Coorg
Gelosh
Sudbeck
Farris
Adachi
Osgood
Masada
Neiman
Mandell

Result Grid | Filter Rows: | Export: | Wrap Cell Content: | Fetch rows:

Result Grid

Form Editor

Field Types

3. List the number of Engineers each department has.

Here considered only the current number of Engineers.

```
12
13      -- Question 3
14 •    select dept_name, count(*)
15      from titles,departments,dept_emp, employees
16      where employees.emp_no = titles.emp_no and departments.dept_no = dept_emp.dept_no and
17      dept_emp.emp_no = employees.emp_no and titles.title = "Engineer" and titles.to_date >= curdate()
18      group by departments.dept_no;
19
20      -- Question 4
21 •    colort omployoor omn no  concat(firct namo " " lact namo) ac omn namo  dont no
```

dept_name	count(*)
Production	13325
Development	15677
Quality Management	3744
Research	830
Customer Service	627

Result Grid | Filter Rows: | Export: | Wrap Cell Content: 𝄢

Result 40 ✕

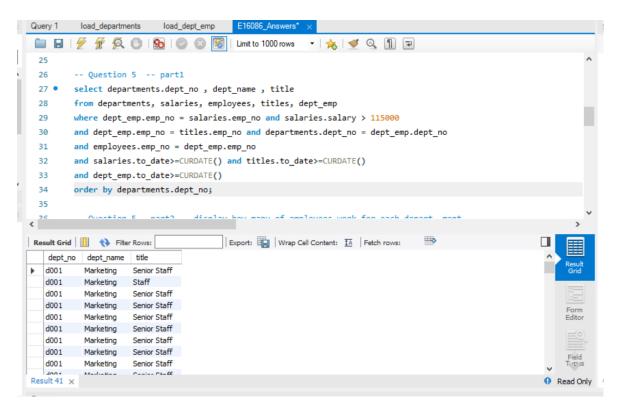Result Grid / Form Editor / Field Types / Read Only

4. List all the female employees who are department managers and have worked as a senior engineer.

All old and current employees are considered here.

```
20      -- Question 4
21 •    select employees.emp_no, concat(first_name," ",last_name) as emp_name, dept_no
22      from employees, dept_manager, titles
23      where employees.sex='F' and employees.emp_no =dept_manager.emp_no
24      and employees.emp_no = titles.emp_no and  titles.title = "Senior Engineer";
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content: 𝄢

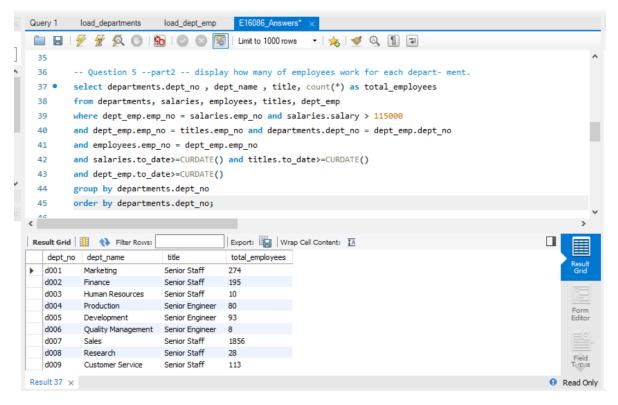| emp_no	emp_name	dept_no
110344	Rosine Cools	d004
110800	Sanjoy Quadeer	d006

Result Grid

5. Display the departments and titles of employees who have a salary greater than 115000. Display how many of such employees work for each department.
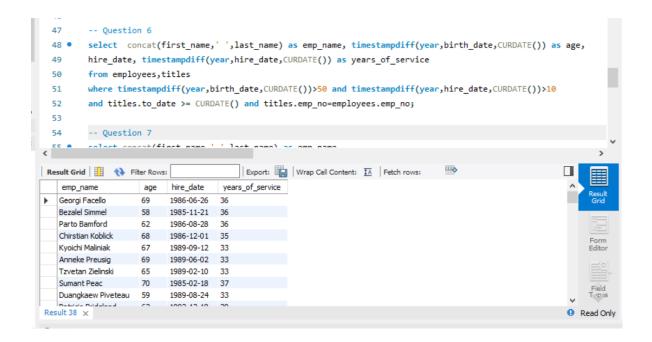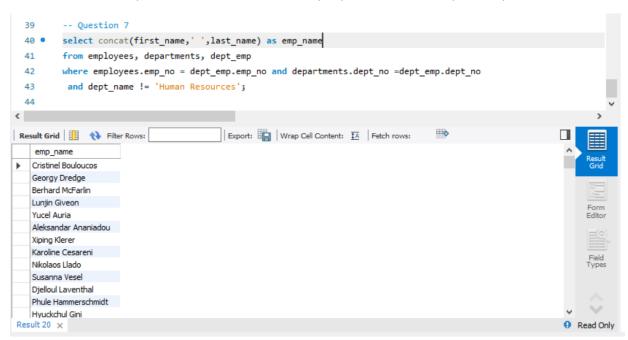
Part1:

```
25
26     -- Question 5  -- part1
27 •   select departments.dept_no , dept_name , title
28     from departments, salaries, employees, titles, dept_emp
29     where dept_emp.emp_no = salaries.emp_no and salaries.salary > 115000
30     and dept_emp.emp_no = titles.emp_no and departments.dept_no = dept_emp.dept_no
31     and employees.emp_no = dept_emp.emp_no
32     and salaries.to_date>=CURDATE() and titles.to_date>=CURDATE()
33     and dept_emp.to_date>=CURDATE()
34     order by departments.dept_no;
35
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content: | Fetch rows:

dept_no	dept_name	title
d001	Marketing	Senior Staff
d001	Marketing	Staff
d001	Marketing	Senior Staff
d001	Marketing	Senior Staff
d001	Marketing	Senior Staff
d001	Marketing	Senior Staff
d001	Marketing	Senior Staff
d001	Marketing	Senior Staff
d001	Marketing	Senior Staff

Result 41 ×   Read Only

Part 2:

```
35
36     -- Question 5 --part2 -- display how many of employees work for each depart- ment.
37 •   select departments.dept_no , dept_name , title, count(*) as total_employees
38     from departments, salaries, employees, titles, dept_emp
39     where dept_emp.emp_no = salaries.emp_no and salaries.salary > 115000
40     and dept_emp.emp_no = titles.emp_no and departments.dept_no = dept_emp.dept_no
41     and employees.emp_no = dept_emp.emp_no
42     and salaries.to_date>=CURDATE() and titles.to_date>=CURDATE()
43     and dept_emp.to_date>=CURDATE()
44     group by departments.dept_no
45     order by departments.dept_no;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

dept_no	dept_name	title	total_employees
d001	Marketing	Senior Staff	274
d002	Finance	Senior Staff	195
d003	Human Resources	Senior Staff	10
d004	Production	Senior Engineer	80
d005	Development	Senior Engineer	93
d006	Quality Management	Senior Engineer	8
d007	Sales	Senior Staff	1856
d008	Research	Senior Staff	28
d009	Customer Service	Senior Staff	113

Result 37 ×   Read Only

6. Assume that the company wants to reward the most senior employees who are more than 50 years of age and have contributed to the company for more than 10 years. Who is on the list? Display employee name, age, years of service in the company and joined date.
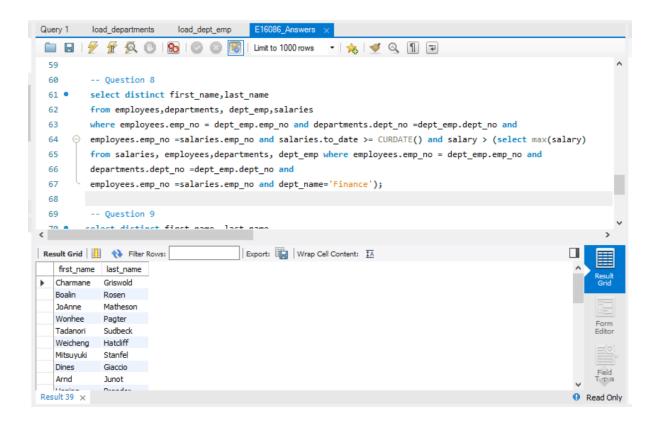
```
47    -- Question 6
48 •  select  concat(first_name,' ',last_name) as emp_name, timestampdiff(year,birth_date,CURDATE()) as age,
49    hire_date, timestampdiff(year,hire_date,CURDATE()) as years_of_service
50    from employees,titles
51    where timestampdiff(year,birth_date,CURDATE())>50 and timestampdiff(year,hire_date,CURDATE())>10
52    and titles.to_date >= CURDATE() and titles.emp_no=employees.emp_no;
53
54    -- Question 7
55 •  select concat(first name ' ' last name) as emp name
```

emp_name	age	hire_date	years_of_service
Georgi Facello	69	1986-06-26	36
Bezalel Simmel	58	1985-11-21	36
Parto Bamford	62	1986-08-28	36
Chirstian Koblick	68	1986-12-01	35
Kyoichi Maliniak	67	1989-09-12	33
Anneke Preusig	69	1989-06-02	33
Tzvetan Zielinski	65	1989-02-10	33
Sumant Peac	70	1985-02-18	37
Duangkaew Piveteau	59	1989-08-24	33

Result 38 ×

07. Find all the names (first name + last name) of employees in the database who do not work in the Human Resources department. Assume that all the people work for exactly one department.

```
39    -- Question 7
40 •  select concat(first_name,' ',last_name) as emp_name
41    from employees, departments, dept_emp
42    where employees.emp_no = dept_emp.emp_no and departments.dept_no =dept_emp.dept_no
43     and dept_name != 'Human Resources';
44
```

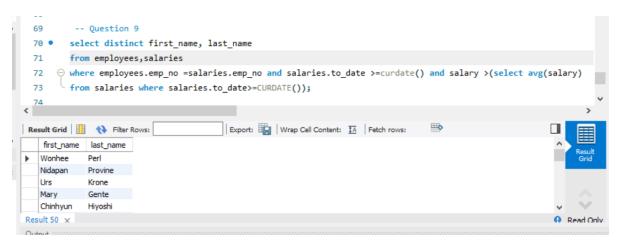| emp_name |
|----------|
| Cristinel Bouloucos |
| Georgy Dredge |
| Berhard McFarlin |
| Lunjin Giveon |
| Yucel Auria |
| Aleksandar Ananiadou |
| Xiping Klerer |
| Karoline Cesareni |
| Nikolaos Llado |
| Susanna Vesel |
| Djelloul Laventhal |
| Phule Hammerschmidt |
| Hyuckchul Gini |

Result 20 ×

08. Find the names of all employees in the database who earn more than every employee in the Finance department. Assume that all people work for at most one company.

Considered the salaries and titles to the current date.

```
59
60      -- Question 8
61 •    select distinct first_name,last_name
62      from employees,departments, dept_emp,salaries
63      where employees.emp_no = dept_emp.emp_no and departments.dept_no =dept_emp.dept_no and
64      employees.emp_no =salaries.emp_no and salaries.to_date >= CURDATE() and salary > (select max(salary)
65      from salaries, employees,departments, dept_emp where employees.emp_no = dept_emp.emp_no and
66      departments.dept_no =dept_emp.dept_no and
67      employees.emp_no =salaries.emp_no and dept_name='Finance');
68
69      -- Question 9
70 •    select distinct first name  last name
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content: IA

first_name	last_name
Charmane	Griswold
Boalin	Rosen
JoAnne	Matheson
Wonhee	Pagter
Tadanori	Sudbeck
Weicheng	Hatcliff
Mitsuyuki	Stanfel
Dines	Giaccio
Arnd	Junot

Result 39 ×

Read Only

09. Find the names of all employees who earn more than the average salary of all employees of their company.

Considered the salaries and titles to the current date.

```
69      -- Question 9
70 •    select distinct first_name, last_name
71      from employees,salaries
72      where employees.emp_no =salaries.emp_no and salaries.to_date >=curdate() and salary >(select avg(salary)
73      from salaries where salaries.to_date>=CURDATE());
74
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content: IA | Fetch rows:

first_name	last_name
Wonhee	Perl
Nidapan	Provine
Urs	Krone
Mary	Gente
Chinhyun	Hiyoshi

Result 50 ×

Read Only

10. Compute the difference between the average salary of a Senior Engineer and the average salary of all employees (including Senior Engineers).

Considered the salaries and titles to the current date.

```
74
75    -- Question 10
76 •  select
77    ⊖ (select avg(salary) from employees, salaries, titles
78      where employees.emp_no=salaries.emp_no and employees.emp_no=titles.emp_no
79      and titles.title='Senior Engineer'and titles.to_date>=curdate() and salaries.to_date>=curdate())-
80    ⊖ (select avg(salary)
81      from salaries where  salaries.to_date>=curdate()) as difference;
```

difference
-1224.5456

Result 52 ✕   ⓘ Read Only

11. Create a view current dept emp (emp no, fromdate, todate) to show only the current department for each employee. You may have to use two views for this.

```
82
83    -- Question 11
84 •  create view current_dept_emp as
85    select employees.emp_no , dept_emp.from_date , dept_emp.to_date
86    from employees
87    inner join dept_emp
88    on employees.emp_no = dept_emp.emp_no
89    where dept_emp.to_date >= curdate() ;
90
```

12. Write a normal SQL query to do the above task in problem 11.

```
 89        where dept_emp.to_date >= curdate() ;
 90
 91        -- Question 12
 92 •      select e.emp_no, de.from_date, de.to_date
 93        from employees e
 94        inner join dept_emp de
 95        on de.emp_no = e.emp_no
 96        where de.to_date >= curdate() ;
 97
```

emp_no	from_date	to_date
10001	1986-06-26	9999-01-01
10002	1996-08-03	9999-01-01
10003	1995-12-03	9999-01-01
10004	1986-12-01	9999-01-01
10005	1989-09-12	9999-01-01
10006	1990-08-05	9999-01-01

13. Create a trigger to print salary changes of employees. For example, if you enter an SQL statement such as UPDATE salaries SET salary = salary + 1000 WHERE emp no = 1500, the trigger should fire once for each row that is updated and it should print the new and old salaries, and the difference.

```
 98        -- Question 13
 99 •      create table emp_salary_change
100        (
101            old_salary int,
102            new_salary int,
103            difference int,
104            action VARCHAR(50) DEFAULT NULL
105        );
106
107        delimiter $
108 •      create trigger after_salaries_update
109        after update on salaries
110        for each row
111        begin
112        insert into emp_salary_change
113        SET action = 'update',
114        old_Salary = old.salary,
115        new_Salary = new.salary,
116        difference = new.salary-old.salary;
117        end $
118        delimiter ;
119
```

14. Create a trigger that will cause an error when an update occurs that would result in a salary increase greater than 10% of the current salary

```sql
120     -- Question 14
121     delimiter $
122
123     create trigger error_salary_update
124     before update on salaries
125     for each row
126     begin
127     declare msg varchar(50);
128     if(new.salary-old.salary)>(old.salary*0.1)then
129         set msg ="Error : Salary increment > 10%";
130         signal sqlstate '45000' set message_text = msg;
131     end if;
132     end $
133     delimiter ;
134
```