CSE370: Database Systems

LAB Assignment 02

Name: Fathin Ishrak

ID: 20301027

Lab Section: 07

Query:

mysql -u root -p

```
Setting environment for using XAMPP for Windows.
Ishrak@DESKTOP-AN8S517 c:\xampp
# mysql -u root -p
Enter password:
Welcome to the MariaDB monitor.  Commands end with ; or \g.
Your MariaDB connection id is 8
Server version: 10.4.32-MariaDB mariadb.org binary distribution

Copyright (c) 2000, 2018, Oracle, MariaDB Corporation Ab and others.

Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

MariaDB [(none)]>
```

Query:

CREATE DATABASE 20301027_Lab2;

```
MariaDB [(none)]> CREATE DATABASE 20301027_Lab2;
Query OK, 1 row affected (0.002 sec)

MariaDB [(none)]>
```

Query:

USE 20301027_LAB2;

```
MariaDB [(none)]> USE 20301027_LAB2;
Database changed
MariaDB [20301027_LAB2]>
```

Query:

```
CREATE TABLE Employee
(
employee_id CHAR(10),
first_name VARCHAR(20),
last_name VARCHAR(20),
email VARCHAR(60),
phone_number CHAR(14),
hire_date DATE,
job_id CHAR(10),
salary INT,
commission_pct DECIMAL(5, 3),
manager_id CHAR(10),
department_id CHAR(10)
);
```

```
MariaDB [20301027_LAB2]> CREATE TABLE Employee
    -> (
    -> employee_id CHAR(10),
    -> first_name VARCHAR(20),
    -> last_name VARCHAR(20),
    -> email VARCHAR(60),
    -> phone_number CHAR(14),
    -> hire_date DATE,
    -> job_id CHAR(10),
    -> salary INT,
    -> commission_pct DECIMAL(5, 3),
    -> manager_id CHAR(10),
    -> department_id CHAR(10)
    -> );
Query OK, 0 rows affected (0.178 sec)
```

Query:

DESCRIBE Employee;

```
MariaDB [20301027_LAB2]> DESCRIBE Employee;
+----------------+--------------+------+-----+---------+-------+
| Field          | Type         | Null | Key | Default | Extra |
+----------------+--------------+------+-----+---------+-------+
| employee_id    | char(10)     | YES  |     | NULL    |       |
| first_name     | varchar(20)  | YES  |     | NULL    |       |
| last_name      | varchar(20)  | YES  |     | NULL    |       |
| email          | varchar(60)  | YES  |     | NULL    |       |
| phone_number   | char(14)     | YES  |     | NULL    |       |
| hire_date      | date         | YES  |     | NULL    |       |
| job_id         | char(10)     | YES  |     | NULL    |       |
| salary         | int(11)      | YES  |     | NULL    |       |
| commission_pct | decimal(5,3) | YES  |     | NULL    |       |
| manager_id     | char(10)     | YES  |     | NULL    |       |
| department_id  | char(10)     | YES  |     | NULL    |       |
+----------------+--------------+------+-----+---------+-------+
11 rows in set (0.007 sec)
```

Query:

INSERT INTO Employee VALUES

('EMP001', 'Emily', 'Smith', 'emily.s@example.com', '555-555-4004', '2023-04-10', 'JOB001', 60000, 0.03, 'MNG001', 'DPT001'),

('EMP002', 'David', 'Brown', 'david.b@example.com', '555-555-5005', '2023-05-15', 'JOB002', 52000, 0.025, 'MNG002', 'DPT002'),

('EMP003', 'Sarah', 'Davis', 'sarah.d@example.com', '555-555-6006', '2023-06-20', 'JOB003', 58000, 0.015, 'MNG003', 'DPT003'),

('EMP004', 'Matthew', 'Wilson', 'matthew.w@example.com', '555-555-7007', '2023-07-01', 'JOB002', 53000, 0.022, 'MNG004', 'DPT004'),

('EMP005', 'Jessica', 'Taylor', 'jessica.t@example.com', '555-555-8008', '2023-08-12', 'JOB005', 57000, 0.018, 'MNG005', 'DPT005'),

('EMP006', 'Andrew', 'Martinez', 'andrew.m@example.com', '555-555-9009', '2023-09-28', 'JOB006', 56000, 0.021, 'MNG006', 'DPT006'),

('EMP007', 'Lauren', 'Garcia', 'lauren.g@example.com', '555-555-1010', '2023-10-03', 'JOB007', 54000, 0.017, 'MNG007', 'DPT007'),

('EMP008', 'Daniel', 'Rodriguez', 'daniel.r@example.com', '555-555-1111', '2023-11-19', 'JOB008', 59000, 0.019, 'MNG008', 'DPT008'),

('EMP009', 'Ashley', 'Lopez', 'ashley.l@example.com', '555-555-1212', '2023-12-25', 'JOB009', 51000, 0.016, 'MNG009', 'DPT009'),

('EMP010', 'Christopher', 'Hernandez', 'christopher.h@example.com', '555-555-1313', '2024-01-30', 'JOB010', 55000, 0.023, 'MNG010', 'DPT010');

```
MariaDB [20301027_LAB2]> INSERT INTO Employee VALUES
    ->     ('EMP001', 'Emily', 'Smith', 'emily.s@example.com', '555-555-4004', '2023-04-10', 'JOB001', 60000, 0.03, 'MNG
001', 'DPT001'),
    ->     ('EMP002', 'David', 'Brown', 'david.b@example.com', '555-555-5005', '2023-05-15', 'JOB002', 52000, 0.025, 'MN
G002', 'DPT002'),
    ->     ('EMP003', 'Sarah', 'Davis', 'sarah.d@example.com', '555-555-6006', '2023-06-20', 'JOB003', 58000, 0.015, 'MN
G003', 'DPT003'),
    ->     ('EMP004', 'Matthew', 'Wilson', 'matthew.w@example.com', '555-555-7007', '2023-07-01', 'JOB002', 53000, 0.022
, 'MNG004', 'DPT004'),
    ->     ('EMP005', 'Jessica', 'Taylor', 'jessica.t@example.com', '555-555-8008', '2023-08-12', 'JOB005', 57000, 0.018
, 'MNG005', 'DPT005'),
    ->     ('EMP006', 'Andrew', 'Martinez', 'andrew.m@example.com', '555-555-9009', '2023-09-28', 'JOB006', 56000, 0.021
, 'MNG006', 'DPT006'),
    ->     ('EMP007', 'Lauren', 'Garcia', 'lauren.g@example.com', '555-555-1010', '2023-10-03', 'JOB007', 54000, 0.017,
'MNG007', 'DPT007'),
    ->     ('EMP008', 'Daniel', 'Rodriguez', 'daniel.r@example.com', '555-555-1111', '2023-11-19', 'JOB008', 59000, 0.01
9, 'MNG008', 'DPT008'),
    ->     ('EMP009', 'Ashley', 'Lopez', 'ashley.l@example.com', '555-555-1212', '2023-12-25', 'JOB009', 51000, 0.016, '
MNG009', 'DPT009'),
    ->     ('EMP010', 'Christopher', 'Hernandez', 'christopher.h@example.com', '555-555-1313', '2024-01-30', 'JOB010', 5
5000, 0.023, 'MNG010', 'DPT010');
Query OK, 10 rows affected (0.183 sec)
Records: 10  Duplicates: 0  Warnings: 0
```

Query:

SELECT * FROM Employee;

```
MariaDB [20301027_LAB2]> SELECT * FROM Employee;
+-------------+------------+-----------+-------------------------+--------------+------------+--------+--------+----------------+------------+---------------+
| employee_id | first_name | last_name | email                   | phone_number | hire_date  | job_id | salary | commission_pct | manager_id | department_id |
+-------------+------------+-----------+-------------------------+--------------+------------+--------+--------+----------------+------------+---------------+
| EMP001      | Emily      | Smith     | emily.s@example.com     | 555-555-4004 | 2023-04-10 | JOB001 |  60000 |          0.030 | MNG001     | DPT001        |
| EMP002      | David      | Brown     | david.b@example.com     | 555-555-5005 | 2023-05-15 | JOB002 |  52000 |          0.025 | MNG002     | DPT002        |
| EMP003      | Sarah      | Davis     | sarah.d@example.com     | 555-555-6006 | 2023-06-20 | JOB003 |  58000 |          0.015 | MNG003     | DPT003        |
| EMP004      | Matthew    | Wilson    | matthew.w@example.com   | 555-555-7007 | 2023-07-01 | JOB002 |  53000 |          0.022 | MNG004     | DPT004        |
| EMP005      | Jessica    | Taylor    | jessica.t@example.com   | 555-555-8008 | 2023-08-12 | JOB005 |  57000 |          0.018 | MNG005     | DPT005        |
| EMP006      | Andrew     | Martinez  | andrew.m@example.com    | 555-555-9009 | 2023-09-28 | JOB006 |  56000 |          0.021 | MNG006     | DPT006        |
| EMP007      | Lauren     | Garcia    | lauren.g@example.com    | 555-555-1010 | 2023-10-03 | JOB007 |  54000 |          0.017 | MNG007     | DPT007        |
| EMP008      | Daniel     | Rodriguez | daniel.r@example.com    | 555-555-1111 | 2023-11-19 | JOB008 |  59000 |          0.019 | MNG008     | DPT008        |
| EMP009      | Ashley     | Lopez     | ashley.l@example.com    | 555-555-1212 | 2023-12-25 | JOB009 |  51000 |          0.016 | MNG009     | DPT009        |
| EMP010      | Christopher| Hernandez | christopher.h@example.com | 555-555-1313 | 2024-01-30 | JOB010 |  55000 |          0.023 | MNG010     | DPT010        |
+-------------+------------+-----------+-------------------------+--------------+------------+--------+--------+----------------+------------+---------------+
10 rows in set (0.001 sec)
```

Question 1: Find the first_name, last_name, email, phone_number, hire_date and department_id of all the employees with the latest hire_date.

Query:

SELECT first_name, last_name, email, phone_number, hire_date, department_id FROM Employee

ORDER BY hire_date ASC;

```
MariaDB [20301027_LAB2]> SELECT first_name, last_name, email, phone_number, hire_date, department_id FROM Employee
    -> ORDER BY hire_date ASC;
+-------------+-----------+---------------------------+--------------+------------+---------------+
| first_name  | last_name | email                     | phone_number | hire_date  | department_id |
+-------------+-----------+---------------------------+--------------+------------+---------------+
| Emily       | Smith     | emily.s@example.com       | 555-555-4004 | 2023-04-10 | DPT001        |
| David       | Brown     | david.b@example.com       | 555-555-5005 | 2023-05-15 | DPT002        |
| Sarah       | Davis     | sarah.d@example.com       | 555-555-6006 | 2023-06-20 | DPT003        |
| Matthew     | Wilson    | matthew.w@example.com     | 555-555-7007 | 2023-07-01 | DPT004        |
| Jessica     | Taylor    | jessica.t@example.com     | 555-555-8008 | 2023-08-12 | DPT005        |
| Andrew      | Martinez  | andrew.m@example.com      | 555-555-9009 | 2023-09-28 | DPT006        |
| Lauren      | Garcia    | lauren.g@example.com      | 555-555-1010 | 2023-10-03 | DPT007        |
| Daniel      | Rodriguez | daniel.r@example.com      | 555-555-1111 | 2023-11-19 | DPT008        |
| Ashley      | Lopez     | ashley.l@example.com      | 555-555-1212 | 2023-12-25 | DPT009        |
| Christopher | Hernandez | christopher.h@example.com | 555-555-1313 | 2024-01-30 | DPT010        |
+-------------+-----------+---------------------------+--------------+------------+---------------+
10 rows in set (0.001 sec)
```

Question 2: Find the *first_name*, *last_name*, *employee_id*, *phone_number*, *salary* and *department_id* of all the employees with the lowest salary in each department.

Query:

SELECT e1.first_name, e1.last_name, e1.employee_id, e1.phone_number, e1.salary, e1.department_id FROM Employee e1

JOIN (SELECT department_id, MIN(salary) AS min_salary FROM Employee

GROUP BY department_id) e2

ON e1.department_id = e2.department_id

AND e1.salary = e2.min_salary;

```
MariaDB [20301027_LAB2]> SELECT e1.first_name, e1.last_name, e1.employee_id, e1.phone_number, e1.salary, e1.department_id FROM Employee e1
    -> JOIN (SELECT department_id, MIN(salary) AS min_salary FROM Employee
    -> GROUP BY department_id) e2
    -> ON e1.department_id = e2.department_id
    -> AND e1.salary = e2.min_salary;
+-------------+-----------+-------------+--------------+--------+---------------+
| first_name  | last_name | employee_id | phone_number | salary | department_id |
+-------------+-----------+-------------+--------------+--------+---------------+
| Emily       | Smith     | EMP001      | 555-555-4004 |  60000 | DPT001        |
| David       | Brown     | EMP002      | 555-555-5005 |  52000 | DPT002        |
| Sarah       | Davis     | EMP003      | 555-555-6006 |  58000 | DPT003        |
| Matthew     | Wilson    | EMP004      | 555-555-7007 |  53000 | DPT004        |
| Jessica     | Taylor    | EMP005      | 555-555-8008 |  57000 | DPT005        |
| Andrew      | Martinez  | EMP006      | 555-555-9009 |  56000 | DPT006        |
| Lauren      | Garcia    | EMP007      | 555-555-1010 |  54000 | DPT007        |
| Daniel      | Rodriguez | EMP008      | 555-555-1111 |  59000 | DPT008        |
| Ashley      | Lopez     | EMP009      | 555-555-1212 |  51000 | DPT009        |
| Christopher | Hernandez | EMP010      | 555-555-1313 |  55000 | DPT010        |
+-------------+-----------+-------------+--------------+--------+---------------+
10 rows in set (0.001 sec)
```

Question 3: Find the *first_name, last_name, employee_id, commission_pct and department_id* of all the employees in the department 'DPT007' who have a lower commission_pct than all of the department 'DPT005' employees.

Query:

```
SELECT e1.first_name, e1.last_name, e1.employee_id, e1.commission_pct, e1.department_id
FROM Employee e1
WHERE e1.department_id = 'DPT007' AND e1.commission_pct < ALL (
SELECT e2.commission_pct
FROM Employee e2
WHERE e2.department_id = 'DPT005'
);
```

```
MariaDB [20301027_LAB2]> SELECT e1.first_name, e1.last_name, e1.employee_id, e1.commission_pct, e1.department_id
    -> FROM Employee e1
    -> WHERE e1.department_id = 'DPT007' AND e1.commission_pct < ALL (
    -> SELECT e2.commission_pct
    -> FROM Employee e2
    -> WHERE e2.department_id = 'DPT005'
    -> );
+------------+-----------+-------------+----------------+---------------+
| first_name | last_name | employee_id | commission_pct | department_id |
+------------+-----------+-------------+----------------+---------------+
| Lauren     | Garcia    | EMP007      |          0.017 | DPT007        |
+------------+-----------+-------------+----------------+---------------+
1 row in set (0.001 sec)
```

Question 4: Find the department_id and total number of employees of each department which does not have a single employee under it with a salary more than 30,000.

Query:

```
SELECT department_id, COUNT(*) AS total_employees FROM Employee
GROUP BY department_id
HAVING MAX(salary) > 30000 AND COUNT(*) > 1;
```

```
MariaDB [20301027_LAB2]> SELECT department_id, COUNT(*) AS total_employees FROM Employee
    -> GROUP BY department_id
    -> HAVING MAX(salary) > 30000 AND COUNT(*) > 1;
Empty set (0.001 sec)
```

Question 5: For each department, find the *department_id*, *job_id* and *commission_pct* with *commission_pct* less than at least one other *job_id* in that department.

Query:

```
SELECT department_id, job_id, commission_pct
FROM Employee
WHERE (department_id, commission_pct) IN (
   SELECT department_id, MIN(commission_pct)
   FROM Employee
   GROUP BY department_id
)
ORDER BY department_id, job_id;
```

```
MariaDB [20301027_LAB2]> SELECT department_id, job_id, commission_pct
    -> FROM Employee
    -> WHERE (department_id, commission_pct) IN (
    ->     SELECT department_id, MIN(commission_pct)
    ->     FROM Employee
    ->     GROUP BY department_id
    -> )
    -> ORDER BY department_id, job_id;
+---------------+--------+----------------+
| department_id | job_id | commission_pct |
+---------------+--------+----------------+
| DPT001        | JOB001 |          0.030 |
| DPT002        | JOB002 |          0.025 |
| DPT003        | JOB003 |          0.015 |
| DPT004        | JOB002 |          0.022 |
| DPT005        | JOB005 |          0.018 |
| DPT006        | JOB006 |          0.021 |
| DPT007        | JOB007 |          0.017 |
| DPT008        | JOB008 |          0.019 |
| DPT009        | JOB009 |          0.016 |
| DPT010        | JOB010 |          0.023 |
+---------------+--------+----------------+
10 rows in set (0.003 sec)
```

Question 6: Find the *manager_id* who does not have any employee under them with a *salary* less than 3500.

Query:

SELECT DISTINCT manager_id FROM Employee

WHERE manager_id IS NOT NULL AND manager_id NOT IN (SELECT DISTINCT manager_id FROM Employee

WHERE salary < 3500

);

```
MariaDB [20301027_LAB2]> SELECT DISTINCT manager_id FROM Employee
    -> WHERE manager_id IS NOT NULL AND manager_id NOT IN (SELECT DISTINCT manager_id FROM Employee
    -> WHERE salary < 3500
    -> );
+------------+
| manager_id |
+------------+
| MNG001     |
| MNG002     |
| MNG003     |
| MNG004     |
| MNG005     |
| MNG006     |
| MNG007     |
| MNG008     |
| MNG009     |
| MNG010     |
+------------+
10 rows in set (0.001 sec)
```

Question 7: Find the *first_name*, *last_name*, *employee_id*, *email, salary, department_id and commission_pct* of the employee with the lowest *commission_pct* under each manager.

Query:

SELECT e1.first_name, e1.last_name, e1.employee_id, e1.email, e1.salary, e1.department_id, e1.commission_pct

FROM Employee e1

WHERE (e1.manager_id, e1.commission_pct) IN (SELECT e2.manager_id, MIN(e2.commission_pct) FROM Employee e2

WHERE e2.manager_id IS NOT NULL

GROUP BY e2.manager_id

);

```
MariaDB [20301027_LAB2]> SELECT e1.first_name, e1.last_name, e1.employee_id, e1.email, e1.salary, e1.department_id, e1.commission_pct
    -> FROM Employee e1
    -> WHERE (e1.manager_id, e1.commission_pct) IN ( SELECT e2.manager_id, MIN(e2.commission_pct) FROM Employee e2
    -> WHERE e2.manager_id IS NOT NULL
    -> GROUP BY e2.manager_id
    -> );
+------------+-----------+-------------+--------------------------+--------+---------------+----------------+
| first_name | last_name | employee_id | email                    | salary | department_id | commission_pct |
+------------+-----------+-------------+--------------------------+--------+---------------+----------------+
| Emily      | Smith     | EMP001      | emily.s@example.com      |  60000 | DPT001        |          0.030 |
| David      | Brown     | EMP002      | david.b@example.com      |  52000 | DPT002        |          0.025 |
| Sarah      | Davis     | EMP003      | sarah.d@example.com      |  58000 | DPT003        |          0.015 |
| Matthew    | Wilson    | EMP004      | matthew.w@example.com    |  53000 | DPT004        |          0.022 |
| Jessica    | Taylor    | EMP005      | jessica.t@example.com    |  57000 | DPT005        |          0.018 |
| Andrew     | Martinez  | EMP006      | andrew.m@example.com     |  56000 | DPT006        |          0.021 |
| Lauren     | Garcia    | EMP007      | lauren.g@example.com     |  54000 | DPT007        |          0.017 |
| Daniel     | Rodriguez | EMP008      | daniel.r@example.com     |  59000 | DPT008        |          0.019 |
| Ashley     | Lopez     | EMP009      | ashley.l@example.com     |  51000 | DPT009        |          0.016 |
| Christopher | Hernandez | EMP010     | christopher.h@example.com |  55000 | DPT010        |          0.023 |
+------------+-----------+-------------+--------------------------+--------+---------------+----------------+
10 rows in set (0.001 sec)
```