COURSE INFORMATION

MODULE NAME: DATABASE
YEAR: 22 SEP 2022

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1 Table of Contents

2 DATABASE CA2 FIRST PART

2.1 All Attributes of Departments Table

In order to list all attributes of the “departments” entity below SQL must be run “see figure 1”:

- **SELECT** * **FROM** departments;

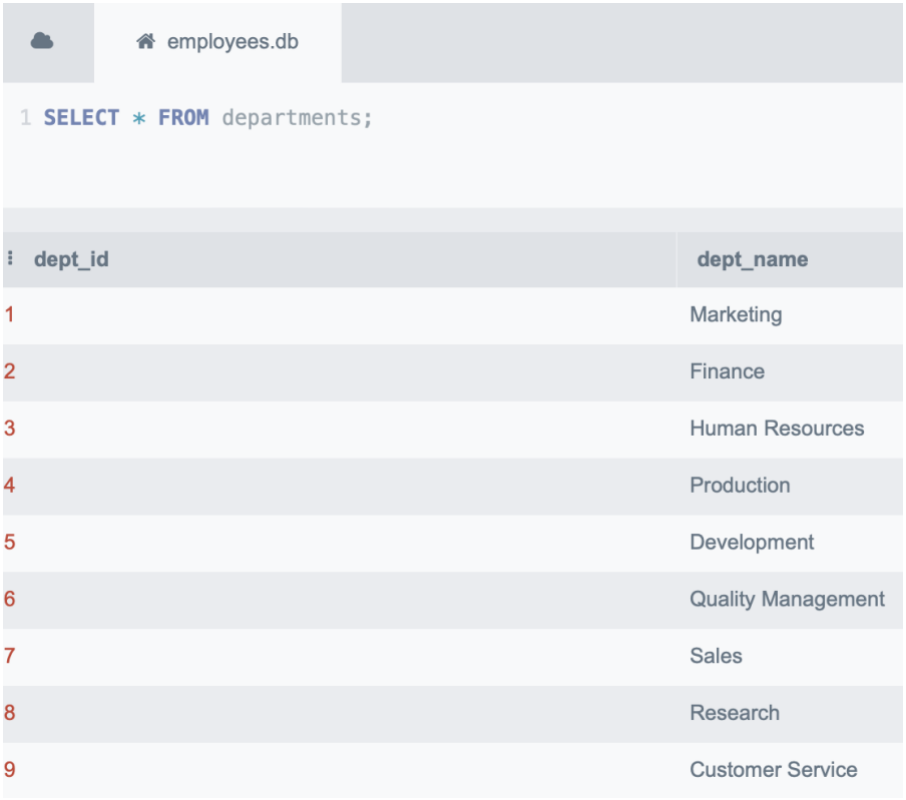

Figure 1: List of departments attributes and the SQL command.

2.2 List of All Employee IDs

All Employee IDs, their first names, and last names are listed as requested through the below command “see figure 2”:

- **SELECT** emp_id, first_name, last_name **FROM** employees;

employees.db

```
1 SELECT emp_id, first_name, last_name FROM employees;
```

emp_id	first_name	last_name
10001	Georgi	Facello
10002	Bezalel	Simmel
10003	Parto	Bamford
10004	Chirstian	Koblick
10005	Kyoichi	Maliniak
10006	Anneke	Preusig
10007	Tzvetan	Zielinski
10008	Saniya	Kalloufi
10009	Sumant	Peac
10010	Duangkaew	Piveteau
10011	Mary	Sluis
10012	Patricio	Bridgland
10013	Eberhardt	Terkki
10014	Berni	Genin
10015	Guoxiang	Nooteboom
10016	Kazuhito	Cappelletti
10017	Cristinel	Bouloucos

Figure 2: List of employee IDs, first name and last name.

2.3 List of Department Titles

Department “titles” can be listed through below SQL code “see figure 3”;

- **SELECT** title **FROM** titles;

employees.db

```
1 SELECT title FROM titles;
```

title
Senior Engineer
Staff
Senior Engineer
Engineer
Senior Engineer
Senior Staff
Staff
Senior Engineer
Senior Staff
Staff
Assistant Engineer
Assistant Engineer
Engineer
Senior Engineer
Engineer
Staff
Engineer

Figure 3: List of all department titles present in the database.

2.4 List of All Unique Job Titles in Order by Alphabetically

To achieve a list of unique job titles ordered alphabetically below SQL code should be run "see figure 4":

- **SELECT DISTINCT** title **FROM** titles **ORDER BY** title **ASC**;

```
1 SELECT DISTINCT title FROM titles ORDER BY title ASC;
```

title
Assistant Engineer
Engineer
Manager
Senior Engineer
Senior Staff
Staff
Technique Leader

Figure 4: List of unique job titles ordered alphabetically.

2.5 List of Employee Names Ordered Alphabetically

All employees listed queried in alphabetical order by below SQL command “see figure 5”;

- **SELECT** first_name, last_name **FROM** employees **ORDER BY** first_name **ASC**;

employees.db

```
1 SELECT first_name, last_name FROM employees ORDER BY first_name ASC;
```

first_name	last_name
Aamer	Fraisse
Aamer	Jayawardene
Aamer	Garrabrants
Aamer	Glowinski
Aamer	Slutz
Aamer	Parveen
Aamer	Kornyak
Aamer	Szmurlo
Aamer	Tsukuda
Aamer	Kroll
Aamer	Parhami
Aamer	Bridgland
Aamer	Gyorkos
Aamer	Basawa
Aamer	Crabtree
Aamer	Matzel
Aamer	Unni

Figure 5: All employee names are listed alphabetically.

3 DATABASE CA2 SECOND PART

3.1 Count of Employees Who Hired on 1991-05-01

The count of employees who were hired on 1991-05-01 has been queried by the below command;

- **SELECT COUNT** (*) **FROM** employees **WHERE** hire_date = '1991-05-01';

Figure 6: Count of employees who started to work on 1991-05-01.

3.2 List of Employee Number Who Has More Than Two Titles

A list of emp_id who have had more than two titles and the quantity of their title can be achieved with below SQL command;

- **SELECT** emp_id, **COUNT**(emp_id) **AS** countOfTitle **FROM** titles **GROUP BY** emp_id **HAVING COUNT**(emp_id) > 1;

employees.db

```
1 SELECT emp_id, COUNT(emp_id) AS countOfTitle FROM titles GROUP BY emp_id HAVING COUNT(emp_id) > 1;
```

emp_id	countOfTitle
10004	2
10005	2
10007	2
10009	3
10012	2
10017	2
10018	2
10026	2
10027	2
10029	2
10030	2
10031	2
10032	2
10035	2
10037	2
10038	2
10039	2

Figure 7: List of emp_no who has more than two titles and the count of their titles.

3.3 List of All Female Employees

In order to list all female employees with their relational attributes below query code can be run “see figure 8”:

- **SELECT** * **FROM** employees **WHERE** gender = "F";

employees.db

```
1 SELECT * FROM employees WHERE gender = "F";
```

emp_id	birth_date	first_name	last_name	gender	hire_date
10002	1964-06-02	Bezalel	Simmel	F	1985-11-21
10006	1953-04-20	Anneke	Preusig	F	1989-06-02
10007	1957-05-23	Tzvetan	Zielinski	F	1989-02-10
10009	1952-04-19	Sumant	Peac	F	1985-02-18
10010	1963-06-01	Duangkaew	Piveteau	F	1989-08-24
10011	1953-11-07	Mary	Sluis	F	1990-01-22
10017	1958-07-06	Cristinel	Bouloucos	F	1993-08-03
10018	1954-06-19	Kazuhide	Peha	F	1987-04-03
10023	1953-09-29	Bojan	Montemayor	F	1989-12-17
10024	1958-09-05	Suzette	Pettey	F	1997-05-19
10027	1962-07-10	Divier	Reistad	F	1989-07-07
10032	1960-08-09	Jeong	Reistad	F	1990-06-20
10040	1959-09-13	Weiyi	Meriste	F	1993-02-14
10041	1959-08-27	Uri	Lenart	F	1989-11-12
10042	1956-02-26	Magy	Stamatiou	F	1993-03-21
10044	1961-09-21	Mingsen	Casley	F	1994-05-21
10049	1961-04-24	Basil	Tramer	F	1992-05-04

Figure 8: All female employees and their attributes.

3.4 List of Employees Who Hired Before 1986-01-01 and The Surname is Simmel

The list of employees who were hired before 1986-01-01 and whose surname is “Simmel” has been queried through below SQL command “see figure 9”:

- **SELECT** * **FROM** employees **WHERE** hire_date < '1986-01-01' **AND** last_name = "Simmel";

employees.db

```
1 SELECT * FROM employees WHERE hire_date < '1986-01-01' AND last_name = "Simmel";
```

emp_id	birth_date	first_name	last_name	gender	hire_date
10002	1964-06-02	Bezalel	Simmel	F	1985-11-21
39631	1952-03-26	Jiafu	Simmel	M	1985-04-18
47766	1954-03-26	Gunilla	Simmel	F	1985-08-26
48233	1954-01-02	Ugo	Simmel	M	1985-05-06
76743	1953-05-21	Mechthild	Simmel	M	1985-09-13
80534	1960-06-28	Jeane	Simmel	F	1985-08-05
105136	1959-02-03	Stein	Simmel	M	1985-10-27
204187	1954-04-08	Wayne	Simmel	M	1985-10-12
217870	1954-05-21	JoAnna	Simmel	F	1985-06-07
237922	1959-04-12	Etsuo	Simmel	M	1985-03-16
246815	1964-08-08	Conrado	Simmel	F	1985-06-20
247973	1952-11-26	Xuejun	Simmel	F	1985-02-02
252312	1955-07-07	Gonzalo	Simmel	M	1985-09-23
252318	1965-01-30	Keung	Simmel	M	1985-11-24
265855	1952-02-04	Mandell	Simmel	F	1985-06-28
287561	1961-02-25	Honesty	Simmel	M	1985-11-24
293263	1957-08-19	Theron	Simmel	M	1985-03-23

Figure 9: List of employees whos' surname is Simmel and hired before 1986-01-01.

3.5 Capital Letter

By the below SQL command case sensitive query can be done;

- **PRAGMA** case_sensitive_like = 1;

Once the above command is typed in the console next query with 'LIKE' commend will be case sensitive. Hence, requested query can be done by below commend "see figure 10";

- **SELECT COUNT**(*) as total_with_B **FROM** employees **WHERE** last_name **LIKE** 'B%';

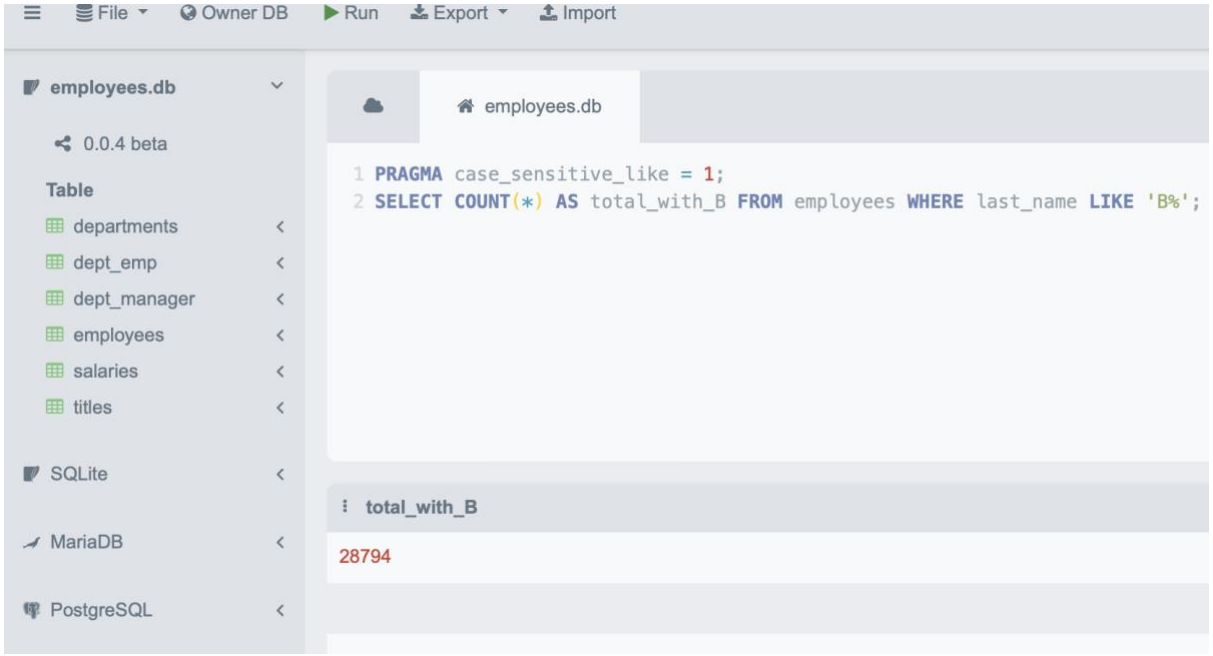

Figure 10: Count of employees whos' last name begins with capital 'B'.

As seen below in figure 11 query result of “b%” is “0”. Thus, we can say case-sensitive query works.

Figure 11: Evidence of case sensitive query works.

3.6 Create a New Table “emp_training”

How to create a new table.

- **DROP TABLE IF EXISTS** emp_training; **CREATE TABLE** emp_training (
  `trainer_no` **INTEGER PRIMARY KEY AUTOINCREMENT**,
  `first_name` **VARCHAR**(30) **NOT NULL**,
  `last_name` **VARCHAR**(30) **NOT NULL**,
  `t_modul` **VARCHAR**(20) **NULL**)

DROP TABLE IF EXIST -> Just in case there is already a table with an existing specified name.
CREATE TABLE - Creates a new table with the name 'emp_training'.
Inside the brackets creates new attributes with specified properties.

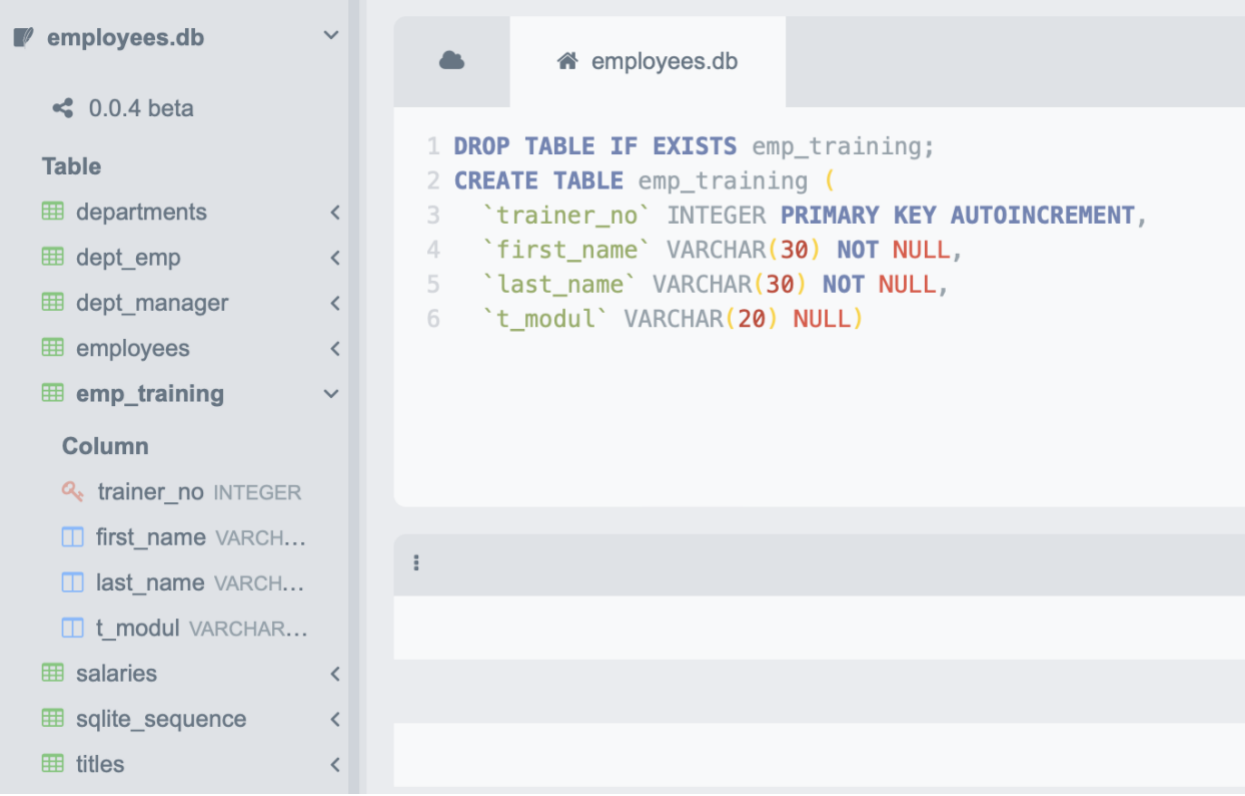

Figure 12: Creating a new table with requested attributes.

3.7 Inserting New Rows

New records can be added by the below command "see figure 13";

- **INSERT INTO** emp_training (first_name, last_name, t_modul)
  VALUES
  ('Joe', 'Bloggs', 'Google Docs'),
  ('Fred', 'Bloggs', 'Google Sheets')

Figure 13: Inserting new rows to the new table with requested information.

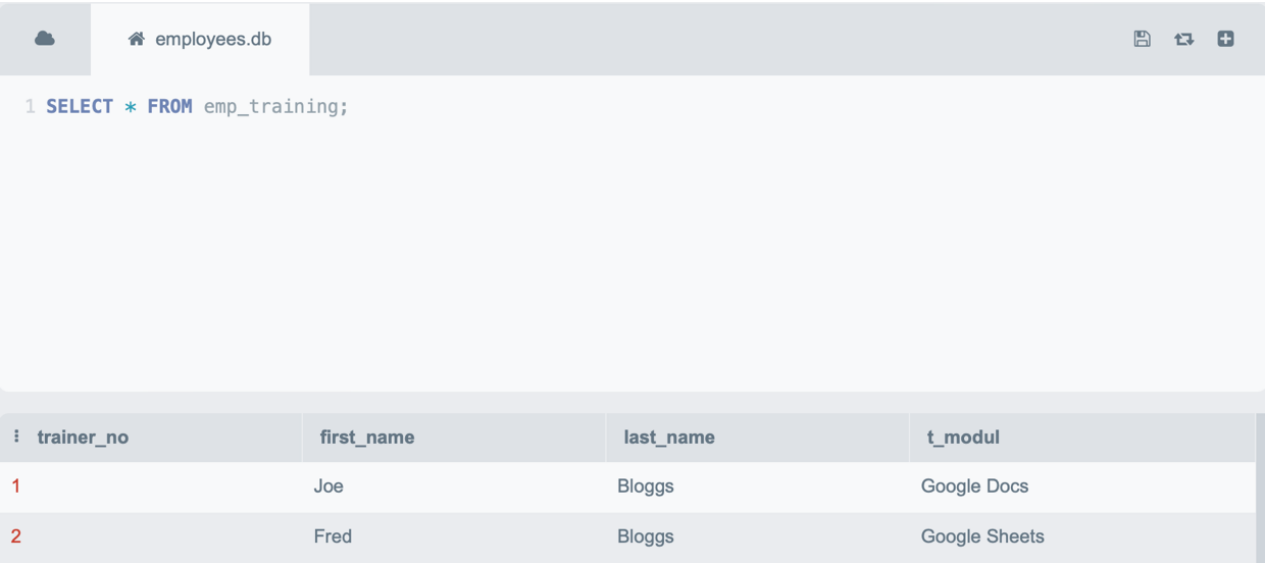

Figure 14: Querying the inserted new rows as evidence.

3.8 Delete 'emp_training' Table.

Below SQL command used to delete 'emp_traning' table "see figure 15":

- **DROP TABLE** emp_training;

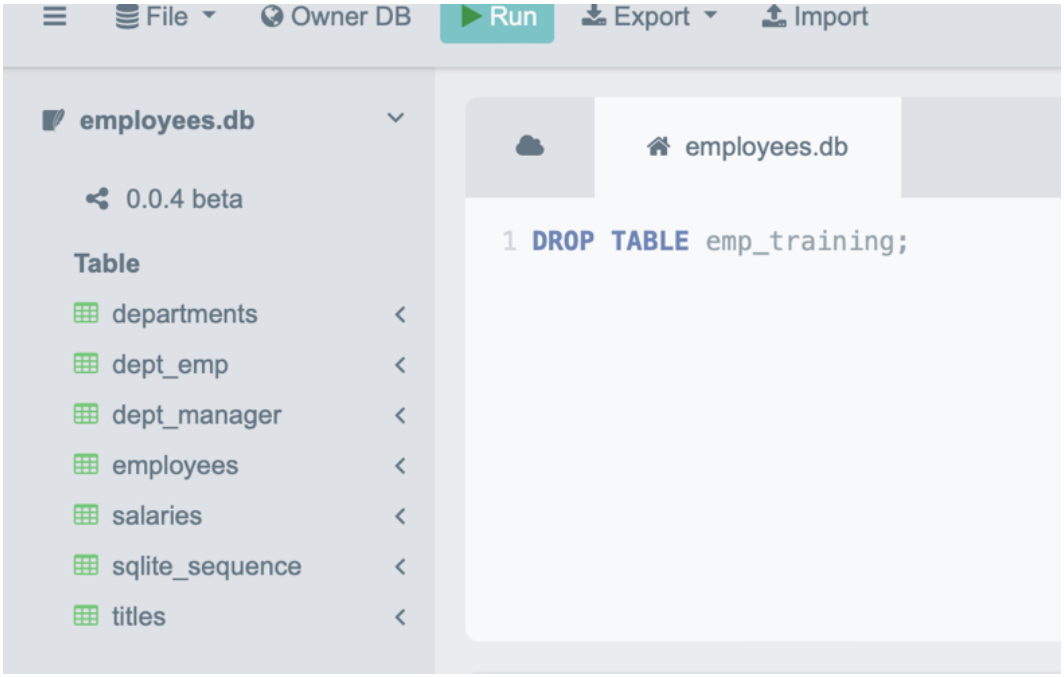

Figure 15: 'emp_training' table is dropped.

3.9 Alter Employee Table and Insert a New Row

In order to add a new attribute to an existing table, a new table should be created the same as the existing table attributes. In addition to that, the requested additional attributes should be added as well. Then all existing information from the existing original table should be INSERTED to the new table. The next old table must be DROPPED. Finally, the new table can be changed to the old table name. Thus, a new attribute will be added to the table. See the below command and figure 16.

- **CREATE TABLE** test (emp_id INTEGER PRIMARY KEY,
  birth_date DATE,
  first_name TEXT,
  last_name TEXT,
  gender CHAR,
  hire_date DATE,
  email_address VARCHAR(20)
  );
- **INSERT INTO** test(emp_id, birth_date, first_name, last_name, gender, hire_date) **SELECT** * **FROM** employees;
- **DROP TABLE** employees;
- **ALTER TABLE** test **RENAME TO** employees;

Figure 16: Implementation of adding new row to an existing table.

3.10 Update the Email Address of Georgi Facello

Please find below the SQL command to update the 'Georgi Facello' email address "see figure 17".

- **UPDATE** employees **SET** email_address = "gfacello@gmail.com" **WHERE** emp_id = 10001;

Figure 17: How to update an existing record.

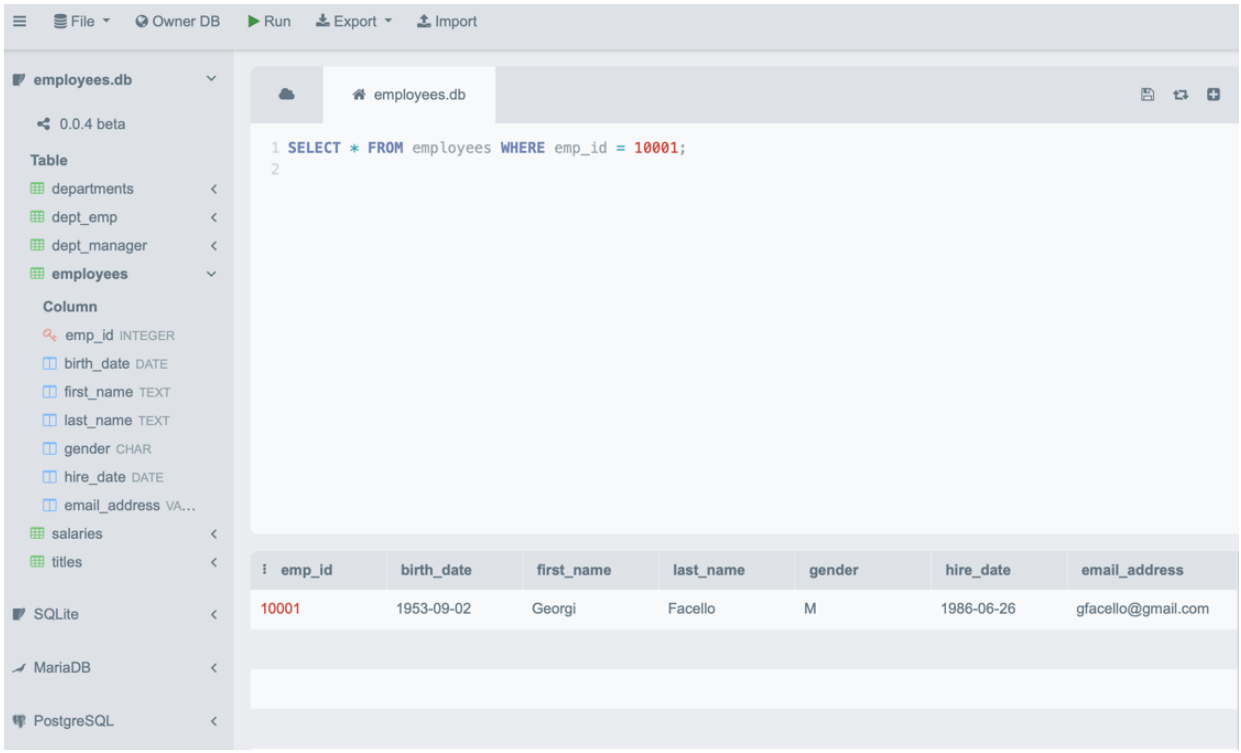

Figure 18: Evidence of updated record.

4 DATABASE CA2 THIRD PART

4.1 List The Number of Male and Female Managers

The requested query can be done through below SQL command:

SELECT COUNT(employees.gender) **AS** num_empGender, employees.gender, dept_manager.dept_id **FROM** employees **INNER JOIN** dept_manager **ON** employees.emp_id = dept_manager.emp_id **GROUP BY** dept_manager.dept_id **ORDER BY** dept_manager.dept_id **ASC**;

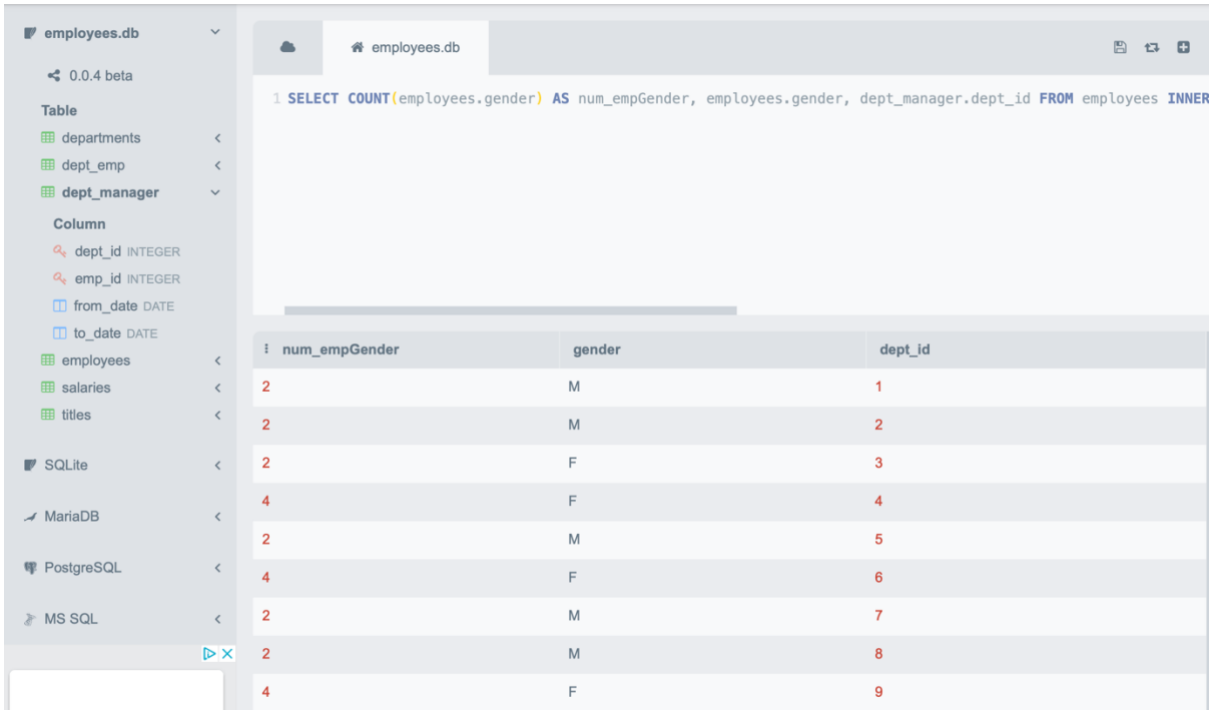

Figure 19: Managers has listed with count of genders and grouped by departments.

4.2 Female and Male Technique Leaders' Average Salaries

The below SQL command has been used for the requested query:

SELECT gender, AVG(salary) **AS** avg_salary, title **FROM** employees **INNER JOIN** titles **ON** employees.emp_id = titles.emp_id **INNER JOIN** salaries **ON** titles.emp_id = salaries.emp_id **WHERE** titles.title = 'Technique Leader' **GROUP BY** gender;

Figure 20: Average salaries of 'Technique Leaders' grouped by genders.

4.3 The Number of Employees Current Salary Between 90000 and 90040

The below SQL command has been used for the requested query:

SELECT COUNT(*) **AS** numOfEmployees, salaries.salary **FROM** employees **INNER JOIN** salaries **ON** employees.emp_id= salaries.emp_id **WHERE** salaries.to_date = '9999-01-01' **AND** salaries.salary **BETWEEN** 90000 and 90040;

Figure 21: Count of employees whos' salaries are between 90000 and 90040.

4.4 List of Unique Employees' Salaries

Below SQL command can be used for the requested querry;

SELECT COUNT(*) **AS** emp_count, employees.last_name, employees.first_name, salaries.salary, salaries.to_date **FROM** employees **INNER JOIN** salaries **ON** employees.emp_id = salaries.emp_id **WHERE** salaries.to_date = '9999-01-01' **AND** salaries.salary > 90000 **GROUP BY** first_name, last_name **HAVING** emp_count = 1 **ORDER BY** last_name **DESC**, first_name **DESC**;

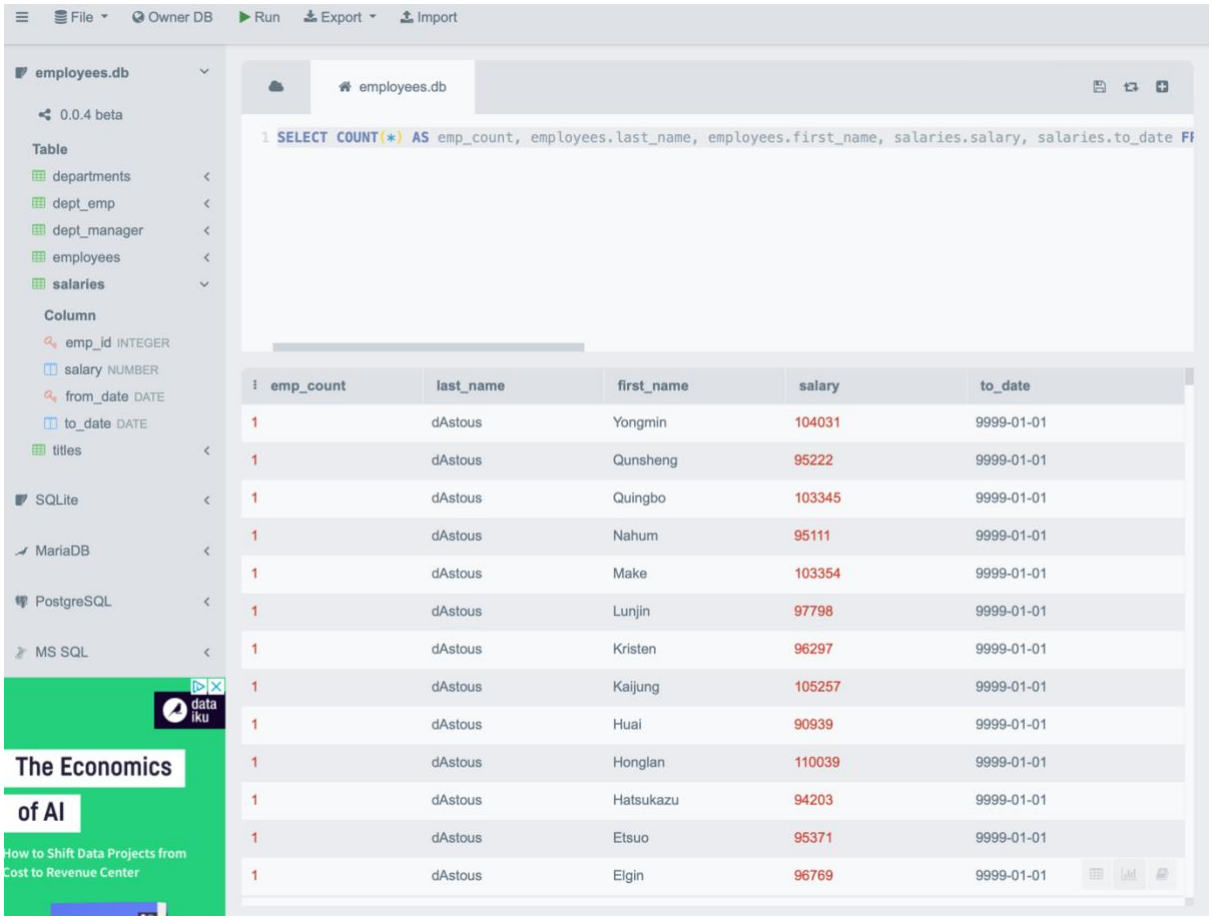

Figure 22: List of unique employees whose current salary higher than 90000.

4.5 Employee 10012 Details

The below command has been used for the related query:

SELECT employees.first_name, employees.last_name, salaries.from_date, salaries.to_date, salaries.salary **FROM** employees **INNER JOIN** salaries **ON** employees.emp_id = salaries.emp_id **WHERE** employees.emp_id = 10012;

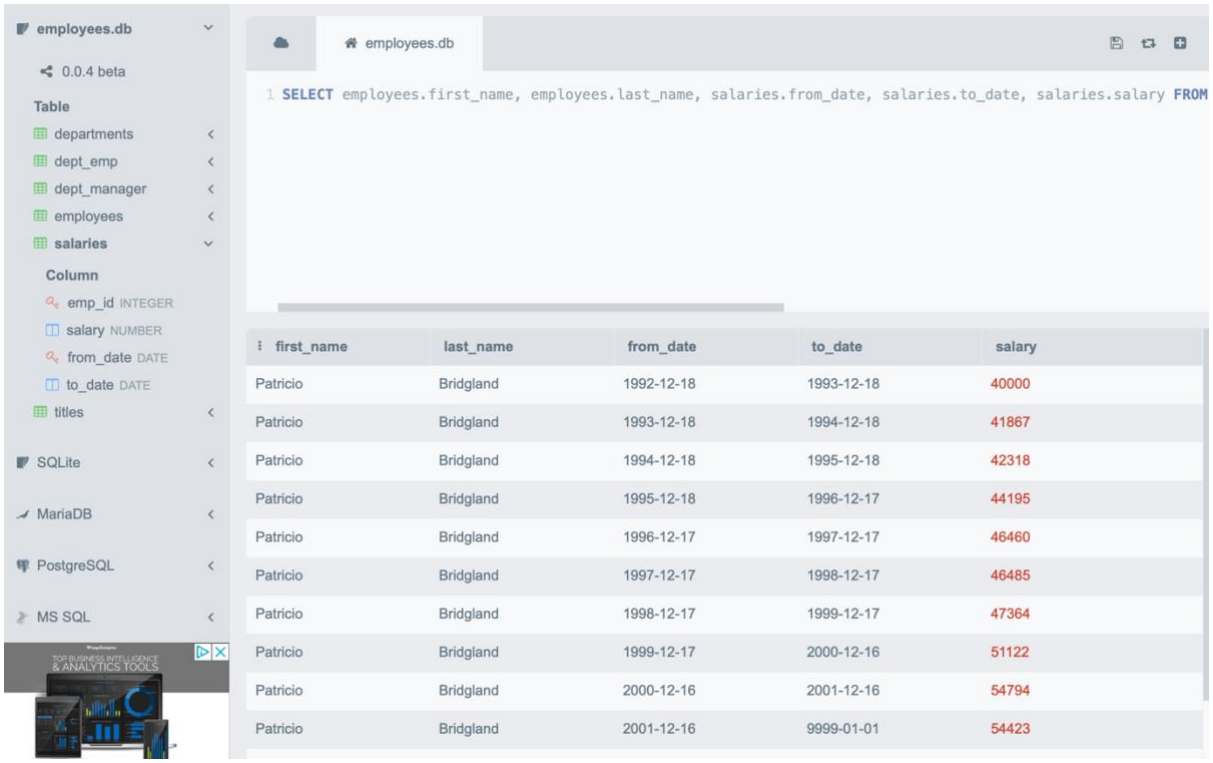

Figure 23: Requested information for employee id 10012.

4.6 Related Answers For The Salaries Table

a) Degree of the table of a table attributes “column” quantity of a table for the salaries table is four.
b) “emp_id” is a foreign key. “from_date” is highlighted as a primary key. However, the primary key can be repeated only once unless it’s not a foreign key. There might be repeated “from_date” individually. Because some employees might be hired on the same date or their salary might be modified on the same date. But both can be used as a primary key or “composite key”. Although, if “from_date” is a primary key it will be a “compound key”. Because each salary record for each employee is unique.
c) “Emp_id” is a foreign key. Because it’s primary key of employees entity.

4.7 Composite Key Explanation

It consists of more than one attribute to uniquely identify an entity. This differs from a compound key because they are not simple keys on their own. However, partly it might be foreign keys or keys. “For more details, ref 8 and ref 9 can be seen.”

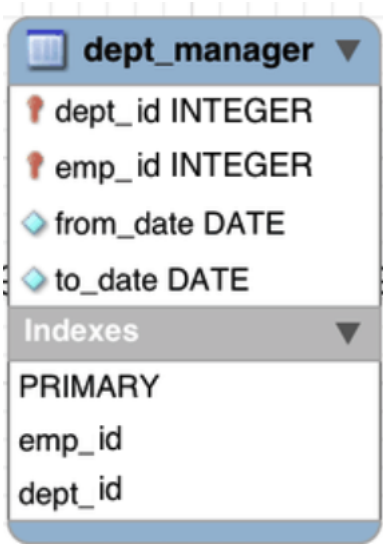

Figure 24: dept_manager table.

For example, we can check the “dept_manager” table. The degree of the table is four. It has two foreign keys “emp_id” and “dept_id”. Two attributes “from_date” and “to_date”. Both foreign keys can be repeated individually and together. Since an employee can work in different departments which will cause to repeat “emp_id” or other employees can work in the same department in this case “dept_id” should be repeated. Also, both can be repeated together in a scenario of an employee working in a department then he moved to another department and he get back to his first department. In this case, “dept_id” and “emp_id” will be duplicated. “If it would not be repeated, foreign keys can have been considered as compound keys.” However, “emp_id”, “dept_id” and “from_date” cannot be repeated, since an employee can start to work in a department only on one specific date. Thus, three of these attributes can be used as a composite key.

Let’s deep dive into “titles” table with provided descriptions about the compound and composite keys above.

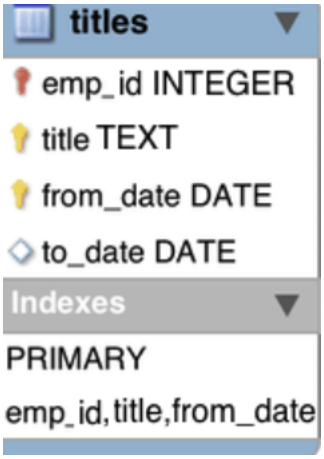

Figure 25: titles table.

If we consider the real world an employee would have the same title twice such as temporary assignments for a position. Therefore, “emp_id” and “title” cannot be unique. Also, a person can have two titles on the same date. For example, Senior DBA Dr. Aybatu KERKUKLUOGLU has become a Professor and on the same day because of his academic progress he was promoted to “Area Manager” and his title is now Area Manager Senior DBA Prof. Dr. Aybatu KERKUKLUOGLU. “some companies consider academical progress for the salary improvements.” Therefore, only “emp_id”, “title” and “from_date” together can be unique, and they are together a composite key.

Next salaries table will be investigated. “see figure 26.”

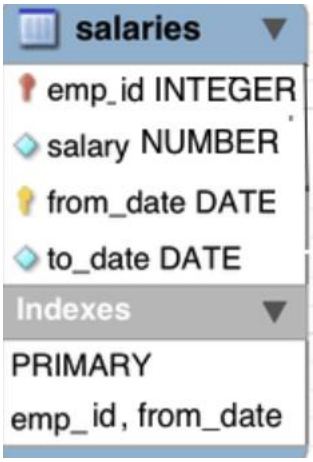

Figure 26: Salaries table.

One employee cannot have two salaries at the same time. Therefore, “from_date” and “emp_id” are composite keys together.

Finally, “dept_emp” table is analysed. See below figure 27.

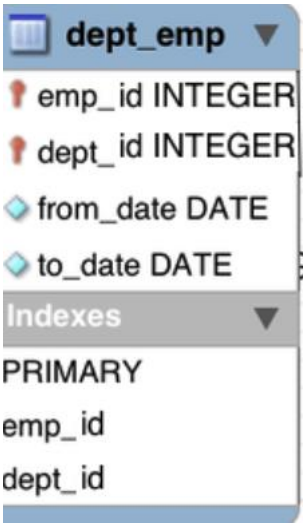

Figure 27: Dept_emp table.

The table is quite similar to “dept_manager” table consideration. An employee can work in the same department more than once. But the person cannot for in the same department on the same date. Therefore, “emp_id”, “dept_id”, and “from_date” are together a composite key.

5 REFERENCE LIST

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3. https://sqliteonline.com/syntax/insert

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4. https://www.w3schools.com/sql/sql_join.asp

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