

CCT College Dublin

Assessment Cover Page

Programme Title	Higher Diploma in Science in Computing
Module Titles	Databases and Web Development
Assignment Title	Data Manipulation and Validation
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Declaration

By submitting this assessment, I confirm that I have read the CCT policy on Academic Misconduct and understand the implications of submitting work that is not my own or does not appropriately reference material taken from a third party or other source. I declare it to be my own work and that all material from third parties has been appropriately referenced. I further confirm that this work has not previously been submitted for assessment by myself or someone else in CCT College Dublin or any other higher education institution.

https://github.com/MariaFerreiraCCT/webdev_ca2

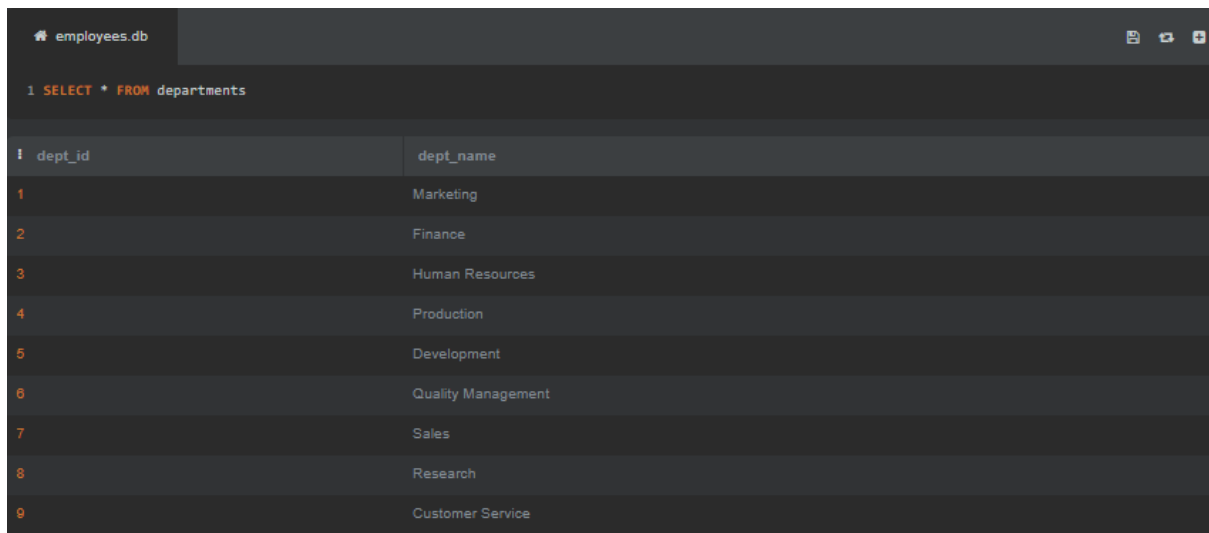
1.1 Databases CA Part 1

1. List all attributes present in the department's relation.

Query:

```
Select * From departments
```

Screenshot:



The screenshot shows a database interface with a query editor and a results table. The query is `SELECT * FROM departments`. The results table has two columns: `dept_id` and `dept_name`. The data is as follows:

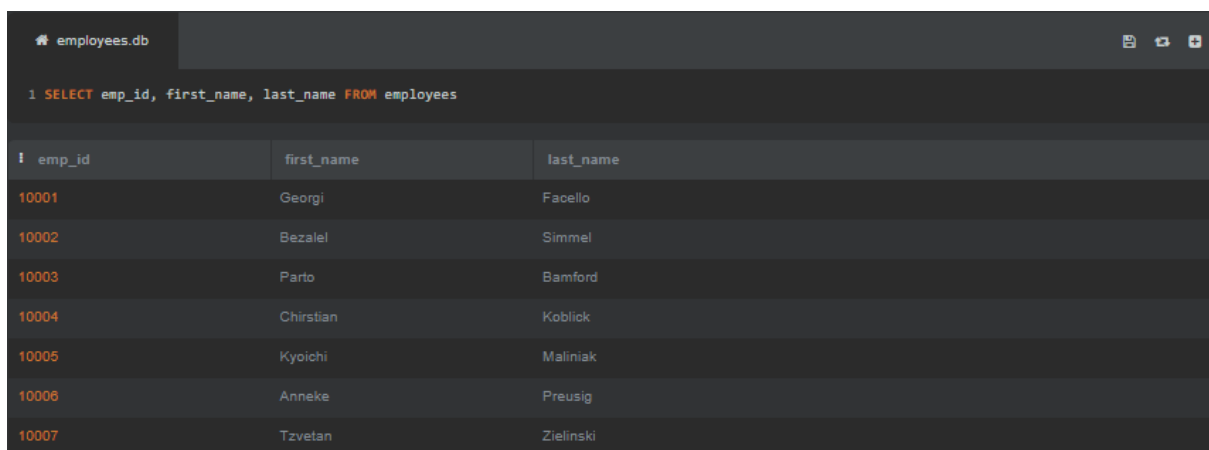
dept_id	dept_name
1	Marketing
2	Finance
3	Human Resources
4	Production
5	Development
6	Quality Management
7	Sales
8	Research
9	Customer Service

2. List all employee IDs of all past/current employees, their first and last names.

Query:

```
SELECT emp_id, first_name, last_name from employees
```

Screenshot:



The screenshot shows a database interface with a query editor and a results table. The query is `SELECT emp_id, first_name, last_name FROM employees`. The results table has three columns: `emp_id`, `first_name`, and `last_name`. The data is as follows:

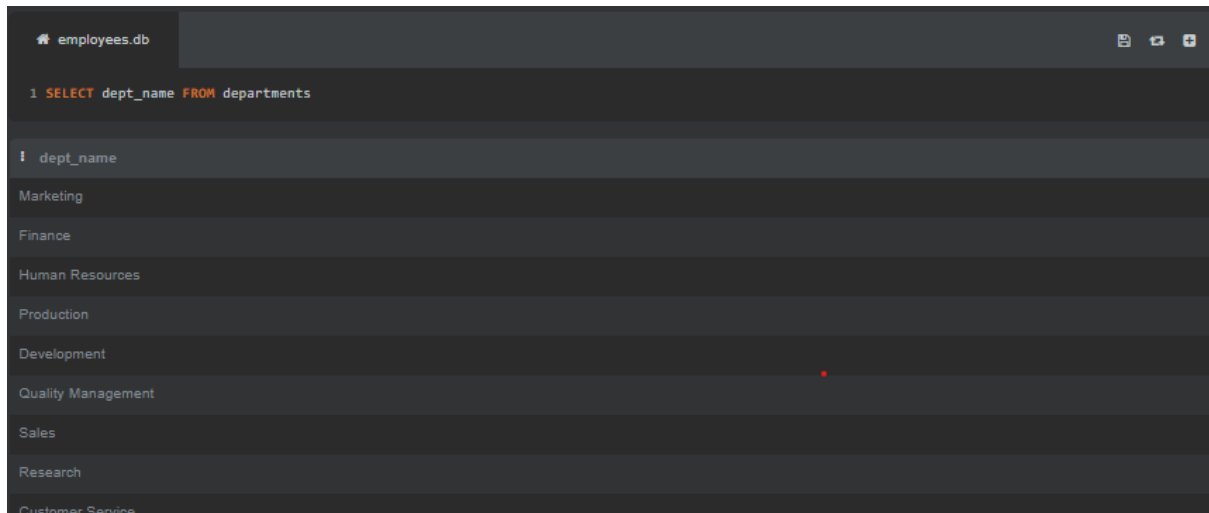
emp_id	first_name	last_name
10001	Georgi	Facello
10002	Bezalel	Simmel
10003	Parto	Bamford
10004	Chirstian	Koblick
10005	Kyoichi	Maliniak
10006	Anneke	Preusig
10007	Tzvetan	Zielinski

3. List all department titles present in the database.

Query:

```
SELECT dept_name FROM departments
```

Screenshot:



The screenshot shows a database interface with a query editor and a results table. The query editor contains the SQL statement: `1 SELECT dept_name FROM departments`. The results table has a single column labeled `dept_name` and lists the following department names: Marketing, Finance, Human Resources, Production, Development, Quality Management, Sales, Research, and Customer Service.

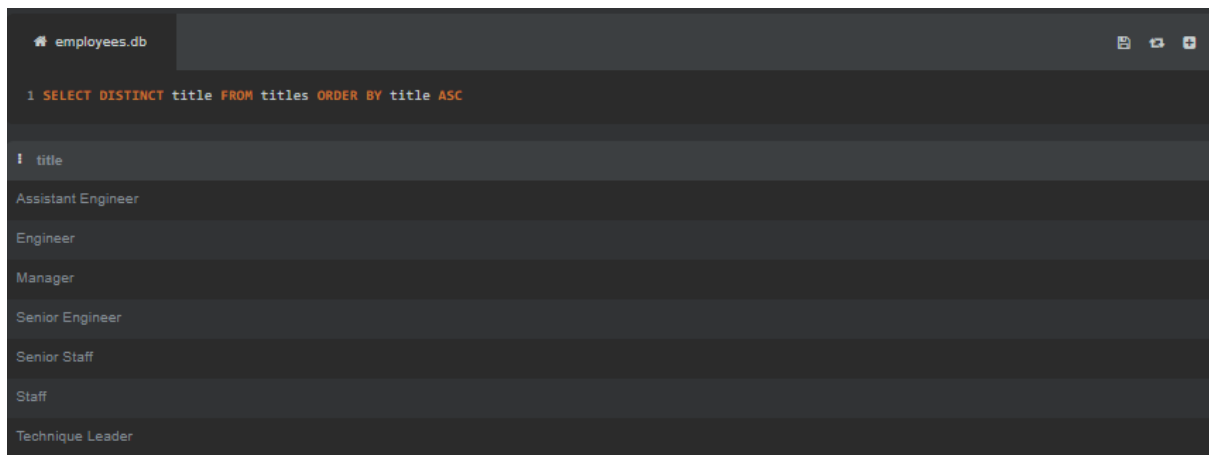
dept_name
Marketing
Finance
Human Resources
Production
Development
Quality Management
Sales
Research
Customer Service

4. List all unique job titles found in the database, and order them alphabetically.

Query:

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

Screenshot:



The screenshot shows a database interface with a query editor and a results table. The query editor contains the SQL statement: `1 SELECT DISTINCT title FROM titles ORDER BY title ASC`. The results table has a single column labeled `title` and lists the following job titles in alphabetical order: Assistant Engineer, Engineer, Manager, Senior Engineer, Senior Staff, Staff, and Technique Leader.

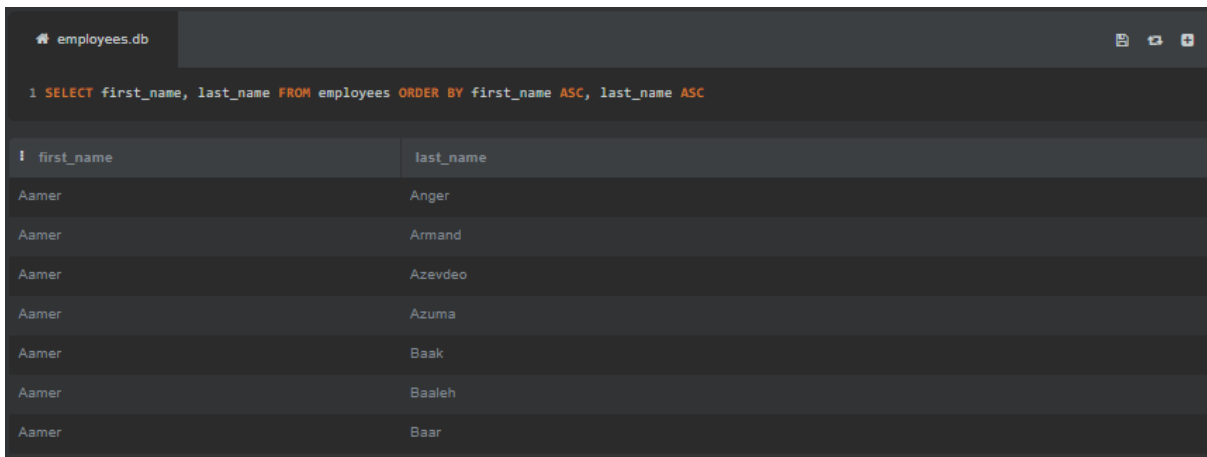
title
Assistant Engineer
Engineer
Manager
Senior Engineer
Senior Staff
Staff
Technique Leader

5. List all past/current employees' names ordered alphabetically in ascending order, i.e. first name and last name in alphabetical order.

Query:

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

Screenshot:



The screenshot shows a database interface with a query editor and a results table. The query is: `1 SELECT first_name, last_name FROM employees ORDER BY first_name ASC, last_name ASC`. The results table has two columns: `first_name` and `last_name`. The data is as follows:

first_name	last_name
Aamer	Anger
Aamer	Armand
Aamer	Azevedo
Aamer	Azuma
Aamer	Baak
Aamer	Baaleh
Aamer	Baer

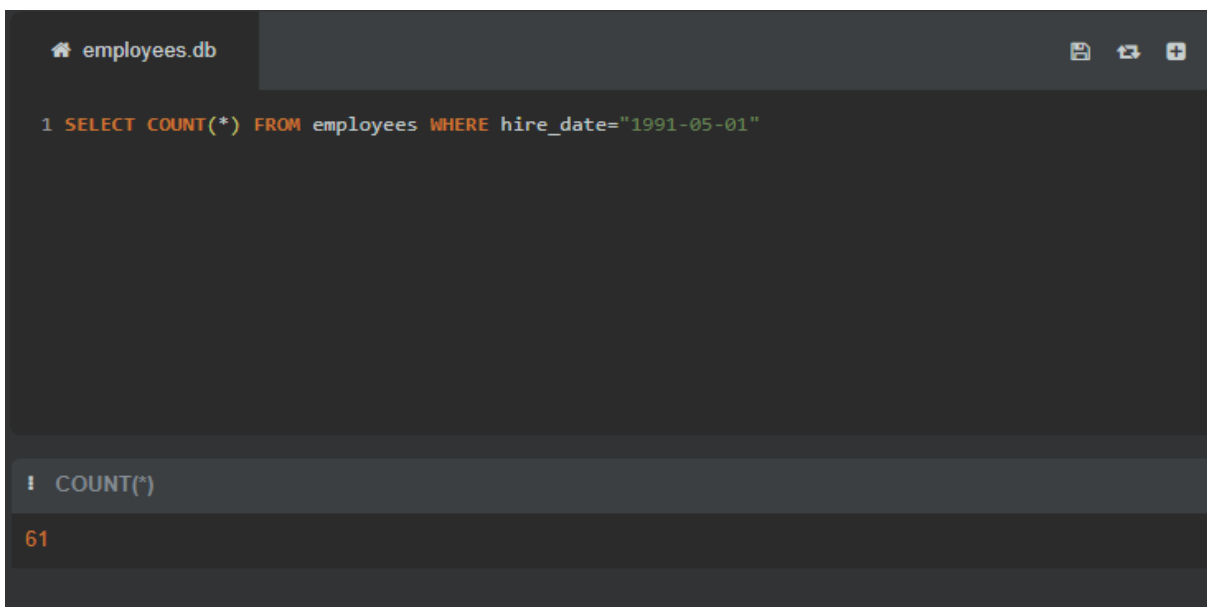
1.2 Database CA Part 2

1. The number of all employees that started on 1991-05-01.

Query:

```
SELECT COUNT(*) FROM employees WHERE hire_date="1991-05-01"
```

Screenshot:



The screenshot shows a database interface with a query editor and a results table. The query is: `1 SELECT COUNT(*) FROM employees WHERE hire_date="1991-05-01"`. The results table has one column: `COUNT(*)`. The result is:

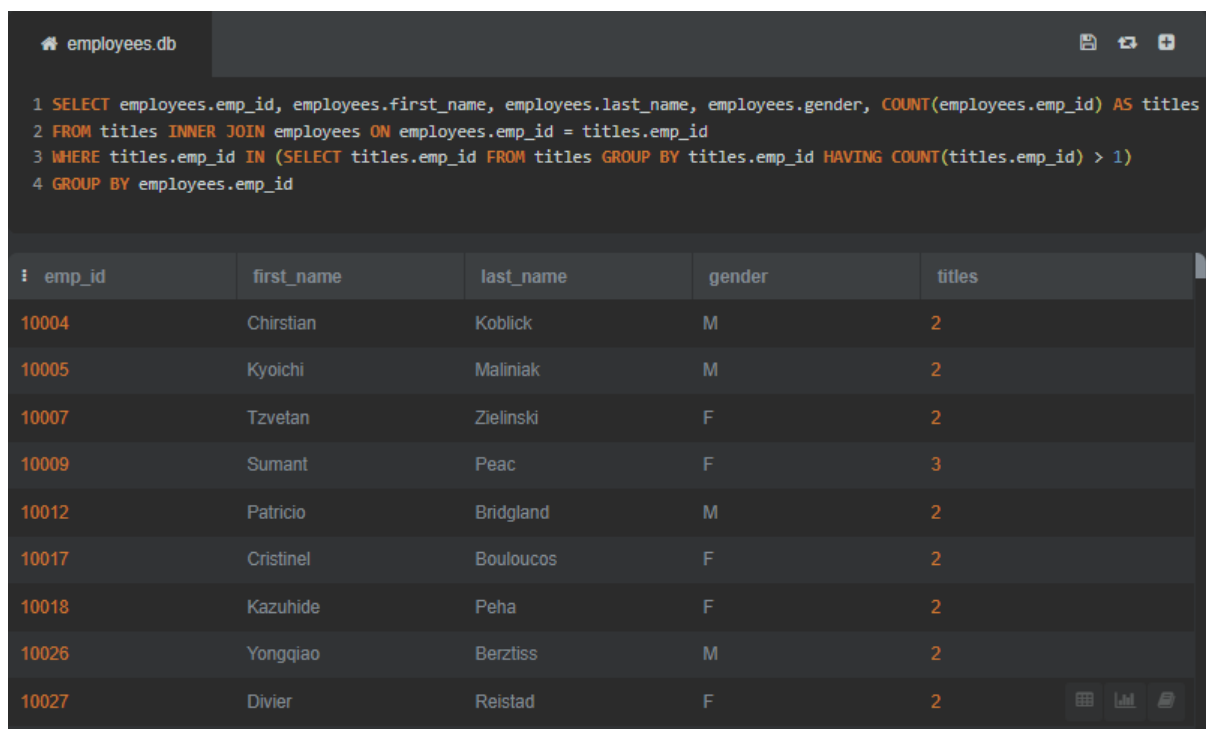
COUNT(*)
61

2. List all emp_no who have had strictly more than 2 titles and display the total number of the titles they have had.

Query:

```
SELECT employees.emp_id, employees.first_name, employees.last_name, employees.gender, COUNT(employees.emp_id) AS titles FROM titles INNER JOIN employees ON employees.emp_id = titles.emp_id WHERE titles.emp_id in (SELECT titles.emp_id FROM titles GROUP BY titles.emp_id HAVING COUNT(titles.emp_id) > 1) GROUP BY employees.emp_id
```

Screenshot:



The screenshot shows a SQL query execution in a database client. The query is as follows:

```
1 SELECT employees.emp_id, employees.first_name, employees.last_name, employees.gender, COUNT(employees.emp_id) AS titles
2 FROM titles INNER JOIN employees ON employees.emp_id = titles.emp_id
3 WHERE titles.emp_id IN (SELECT titles.emp_id FROM titles GROUP BY titles.emp_id HAVING COUNT(titles.emp_id) > 1)
4 GROUP BY employees.emp_id
```

The results are displayed in a table with the following columns: emp_id, first_name, last_name, gender, and titles. The table contains 10 rows of data, where the 'titles' column represents the count of titles for each employee.

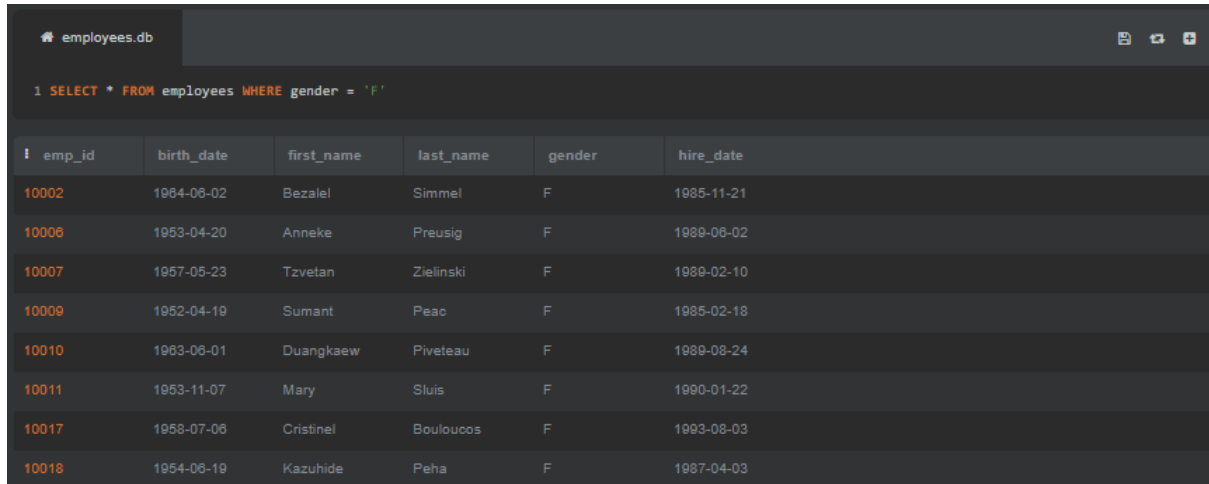
emp_id	first_name	last_name	gender	titles
10004	Chirstian	Koblick	M	2
10005	Kyoichi	Maliniak	M	2
10007	Tzvetan	Zielinski	F	2
10009	Sumant	Peac	F	3
10012	Patricio	Bridgland	M	2
10017	Cristinel	Bouloucos	F	2
10018	Kazuhide	Peha	F	2
10026	Yongqiao	Bertziss	M	2
10027	Divier	Reistad	F	2

3. List female employees (past/current) together with all other relation attributes.

Query:

```
SELECT * FROM employees WHERE gender = 'F'
```

Screenshot:



The screenshot shows a database interface with a query editor and a results table. The query is `SELECT * FROM employees WHERE gender = 'F'`. The results table contains 8 rows of employee data.

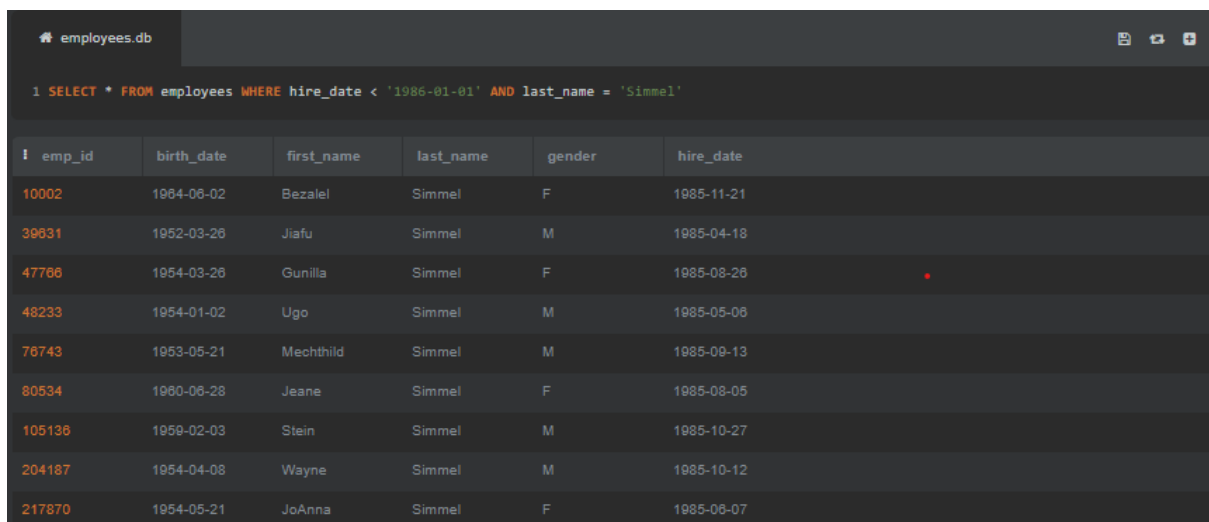
emp_id	birth_date	first_name	last_name	gender	hire_date
10002	1964-06-02	Bezalel	Simmel	F	1985-11-21
10006	1953-04-20	Anneke	Preusig	F	1989-06-02
10007	1957-05-23	Tzvetan	Zielinski	F	1989-02-10
10009	1952-04-19	Sumant	Peac	F	1985-02-18
10010	1963-06-01	Duangkaew	Piveteau	F	1989-08-24
10011	1953-11-07	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

4. List past/current employees hired prior to 1986-01-01 with the surname Simmel.

Query:

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

Screenshot:



The screenshot shows a database interface with a query editor and a results table. The query is `SELECT * FROM employees WHERE hire_date < '1986-01-01' AND last_name = 'Simmel'`. The results table contains 10 rows of employee data.

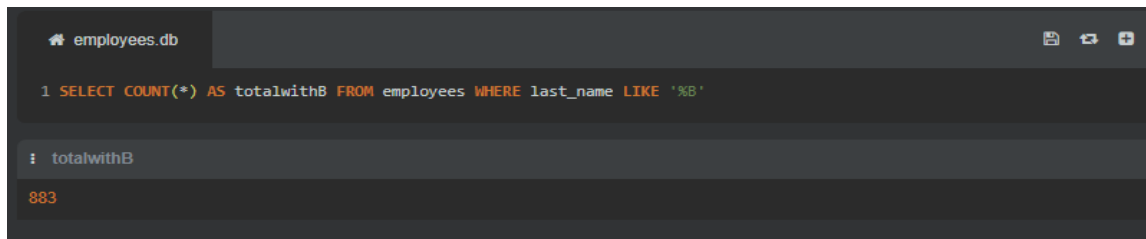
emp_id	birth_date	first_name	last_name	gender	hire_date
10002	1964-06-02	Bezalel	Simmel	F	1985-11-21
39031	1952-03-26	Jiafu	Simmel	M	1985-04-18
47766	1954-03-26	Gunilla	Simmel	F	1985-08-26
48233	1954-01-02	Ugo	Simmel	M	1985-05-06
76743	1953-05-21	Mechthild	Simmel	M	1985-09-13
80534	1960-06-28	Jeane	Simmel	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

**5. How many past/current employees' last name begins with the capital letter B?
Use a column alias total with B to output your results.**

Query:

```
SELECT COUNT(*) AS totalwithB FROM employees WHERE last_name LIKE '%B'
```

Screenshot:

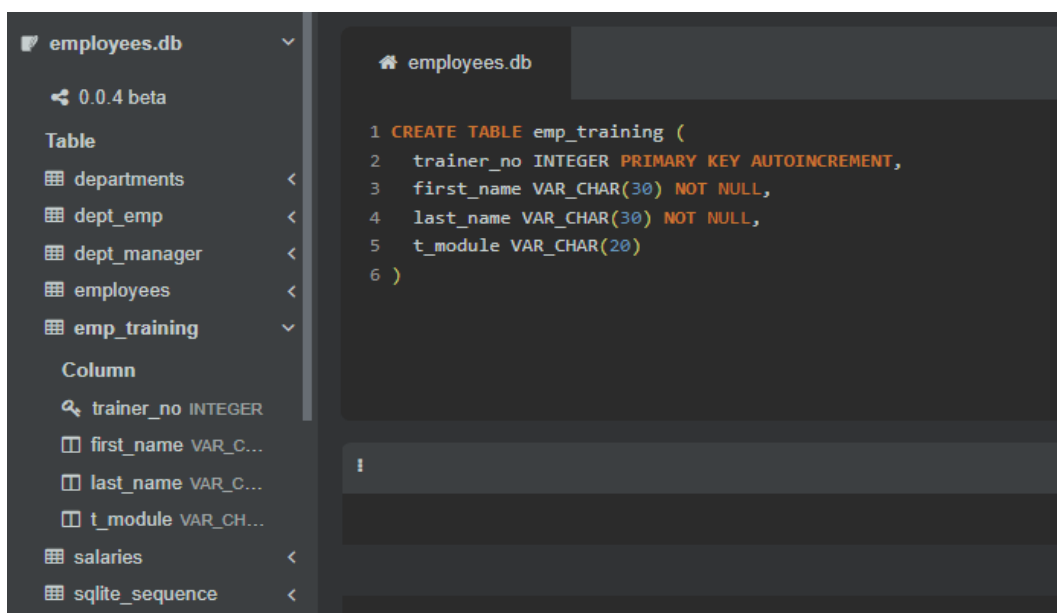


6. Create a new table called emp_training with 3 columns.

Query:

```
CREATE TABLE emp_training (  
    trainer_no INTEGER PRIMARY KEY AUTOINCREMENT,  
    first_name VARCHAR(30) NOT NULL,  
    last_name VARCHAR(30) NOT NULL,  
    t_module VARCHAR(30) NOT NULL  
)
```

Screenshot:

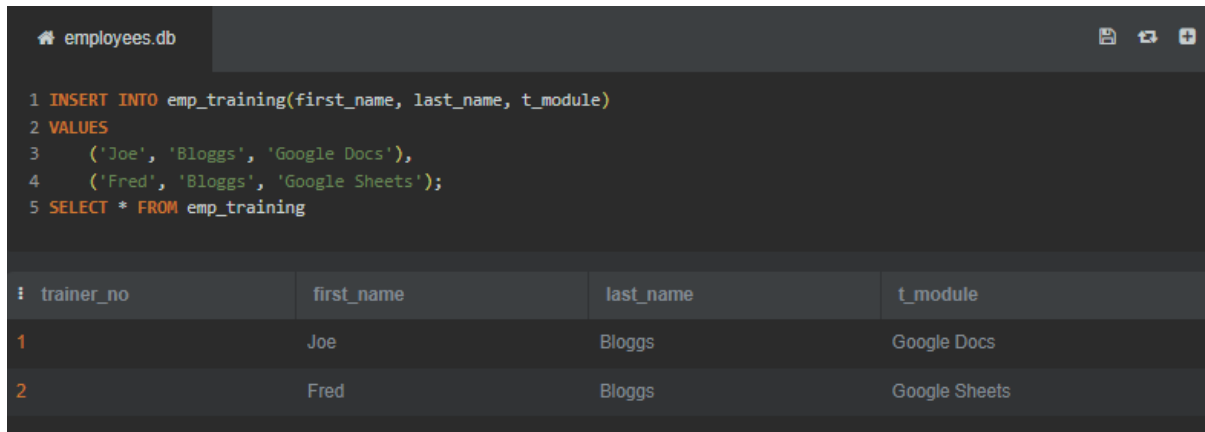


7. Insert 2 new rows into the emp_training table.

Query:

```
INSERT INTO emp_training(first_name, last_name, t_module) VALUES  
( 'Joe', 'Bloggs', 'Google Docs'),  
( 'Fred', 'Bloggs', 'Google Sheets')
```

Screenshot:



The screenshot shows a database client interface with a dark theme. The top bar indicates the database is 'employees.db'. The main area displays an SQL query with five lines: an INSERT statement with two rows of values, followed by a SELECT statement. Below the query, the results are shown in a table with four columns: 'trainer_no', 'first_name', 'last_name', and 't_module'. The results table contains two rows of data.

```
1 INSERT INTO emp_training(first_name, last_name, t_module)  
2 VALUES  
3   ('Joe', 'Bloggs', 'Google Docs'),  
4   ('Fred', 'Bloggs', 'Google Sheets');  
5 SELECT * FROM emp_training
```

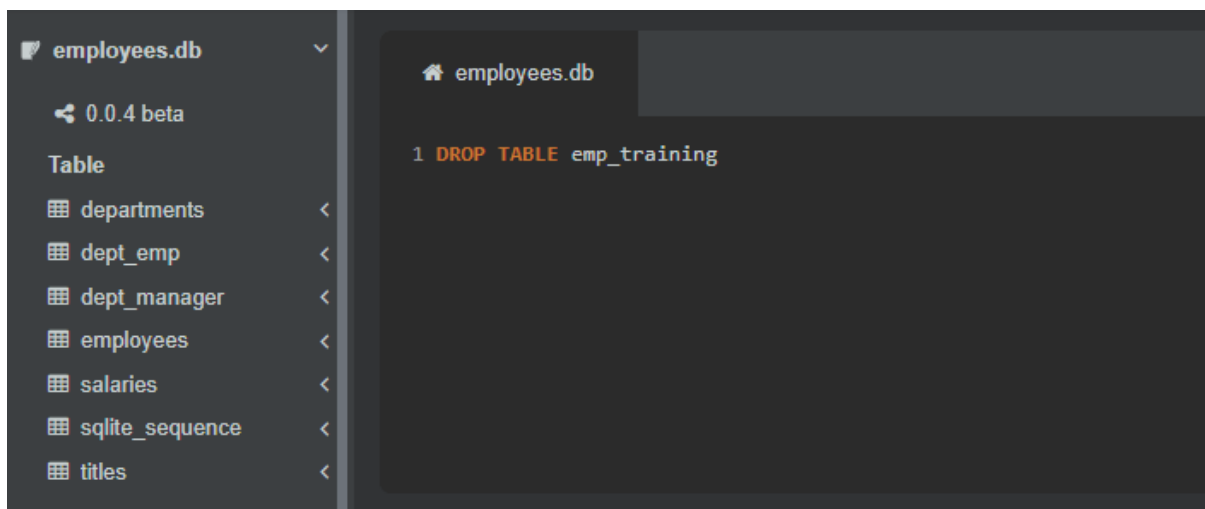
trainer_no	first_name	last_name	t_module
1	Joe	Bloggs	Google Docs
2	Fred	Bloggs	Google Sheets

8. The organisation no longer wishes to record the employees training within the database. Therefore, delete the newly created emp_training table.

Query:

```
DROP TABLE emp_training
```

Screenshot:



The screenshot shows a database client interface with a dark theme. On the left, a sidebar lists the tables in the 'employees.db' database: departments, dept_emp, dept_manager, employees, salaries, sqlite_sequence, and titles. The main area displays a single SQL query: 'DROP TABLE emp_training'.

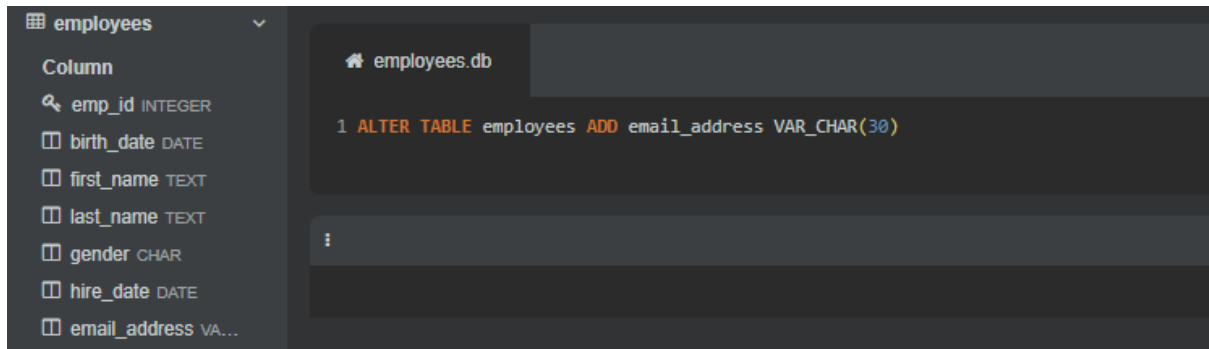
```
1 DROP TABLE emp_training
```


9. Alter the employees table to include an email_address field of type varchar(20).

Query:

```
ALTER TABLE employees ADD email_address VARCHAR(30)
```

Screenshot:

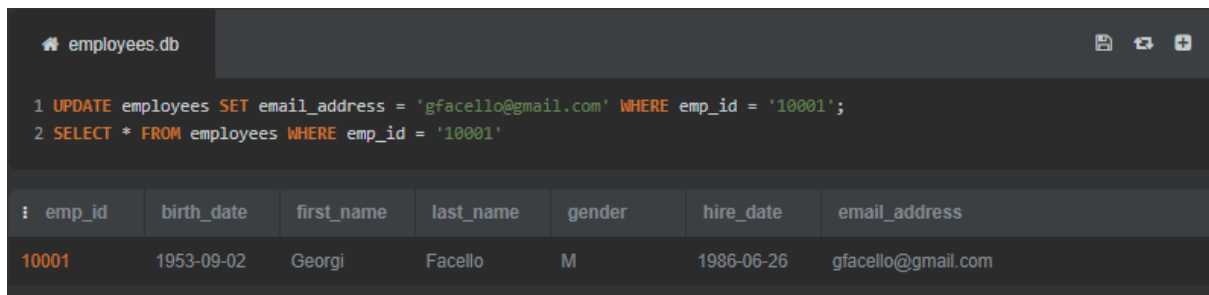


10. Update the email address of Georgi Facello to gfacello@gmail.com, where emp_no equals to 10001.

Query:

```
UPDATE employees SET email_address = 'gfacello@gmail.com' WHERE emp_id = '10001'
```

Screenshot:



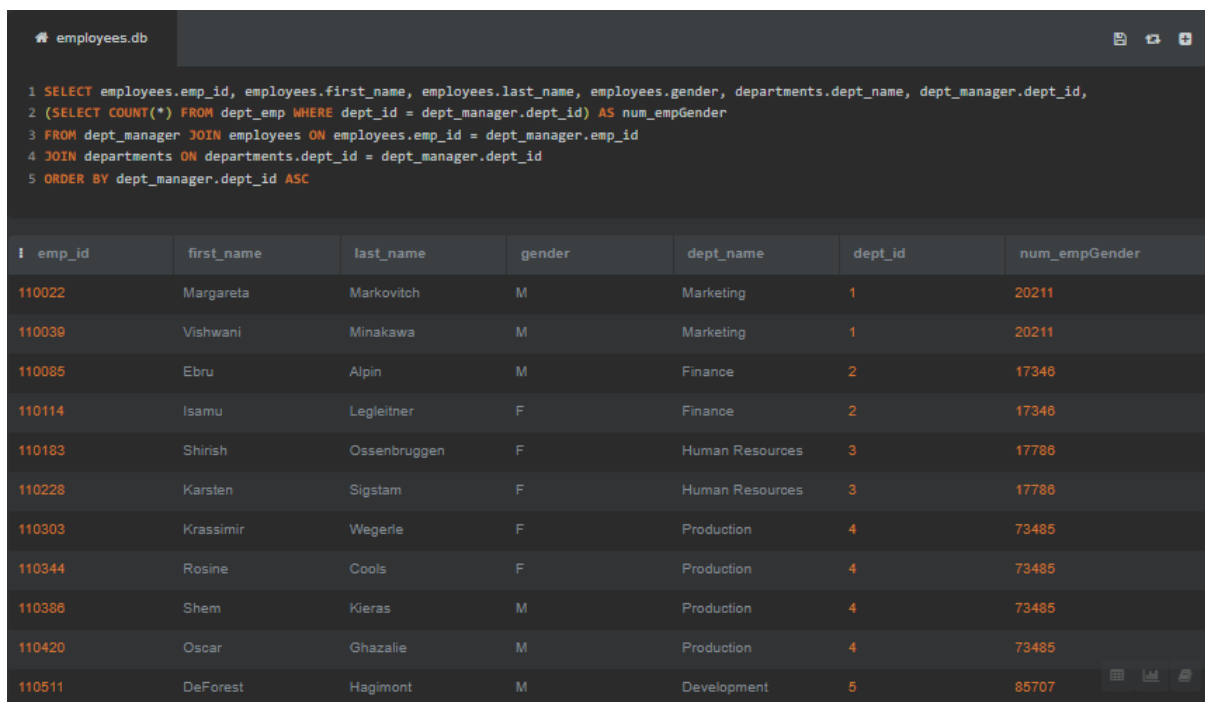
1.3 Database CA Part 3

1. List the number of male managers and female managers who work for each department. Make sure to display the gender, the number of employees (renamed as num_empGender) and dept_no, ordered by department number in an ascendant order.

Query:

```
SELECT employees.emp_id, employees.first_name, employees.last_name,
employees.gender, departments.dept_name, dept_manager.dept_id,
(SELECT COUNT(*) FROM dept_emp WHERE dept_id = dept_manager.dept_id)
AS num_empGender
FROM dept_manager JOIN employees ON employees.emp_id =
dept_manager.emp_id
JOIN departments ON departments.dept_id = dept_manager.dept_id
ORDER by dept_manager.dept_id ASC
```

Screenshot:



The screenshot shows a SQL query execution in a database client. The query is as follows:

```
1 SELECT employees.emp_id, employees.first_name, employees.last_name, employees.gender, departments.dept_name, dept_manager.dept_id,
2 (SELECT COUNT(*) FROM dept_emp WHERE dept_id = dept_manager.dept_id) AS num_empGender
3 FROM dept_manager JOIN employees ON employees.emp_id = dept_manager.emp_id
4 JOIN departments ON departments.dept_id = dept_manager.dept_id
5 ORDER BY dept_manager.dept_id ASC
```

The results are displayed in a table with the following columns: emp_id, first_name, last_name, gender, dept_name, dept_id, and num_empGender. The data is ordered by dept_id in ascending order.

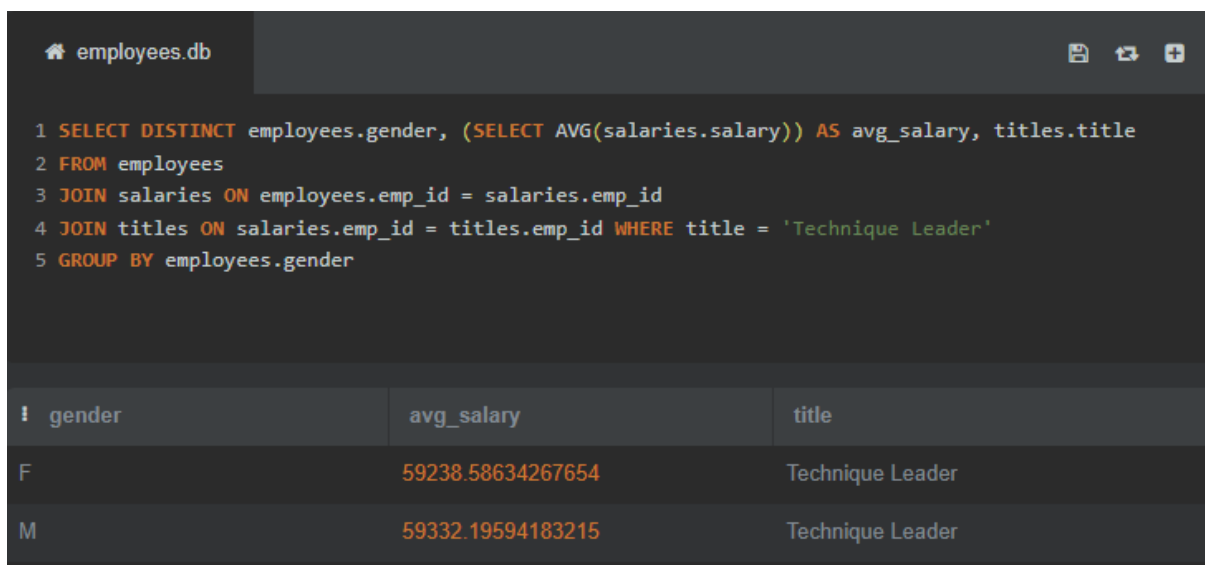
emp_id	first_name	last_name	gender	dept_name	dept_id	num_empGender
110022	Margareta	Markovitch	M	Marketing	1	20211
110039	Vishwani	Minakawa	M	Marketing	1	20211
110085	Ebru	Alpin	M	Finance	2	17346
110114	Isamu	Legleitner	F	Finance	2	17346
110183	Shirish	Ossenbruggen	F	Human Resources	3	17786
110228	Karsten	Sigstam	F	Human Resources	3	17786
110303	Krassimir	Wegerle	F	Production	4	73485
110344	Rosine	Cools	F	Production	4	73485
110386	Shem	Kieras	M	Production	4	73485
110420	Oscar	Ghazalie	M	Production	4	73485
110511	DeForest	Hagimont	M	Development	5	85707

2. List the average salary of male and female employees whose title is "Technique Leader". In your result table should appear, gender, average salary named as avg_salary and title.

Query:

```
SELECT DISTINCT employees.gender, (SELECT AVG(salaries.salary)) as  
avg_salary, titles.title  
FROM employees  
JOIN salaries ON employees.emp_id = salaries.emp_id  
JOIN titles ON salaries.emp_id = titles.emp_id WHERE title =  
'Technique Leader'  
GROUP BY employees.gender
```

Screenshot:



The screenshot shows a SQL query execution in a database client. The query is as follows:

```
1 SELECT DISTINCT employees.gender, (SELECT AVG(salaries.salary)) AS avg_salary, titles.title  
2 FROM employees  
3 JOIN salaries ON employees.emp_id = salaries.emp_id  
4 JOIN titles ON salaries.emp_id = titles.emp_id WHERE title = 'Technique Leader'  
5 GROUP BY employees.gender
```

The results are displayed in a table with three columns: gender, avg_salary, and title. The results are as follows:

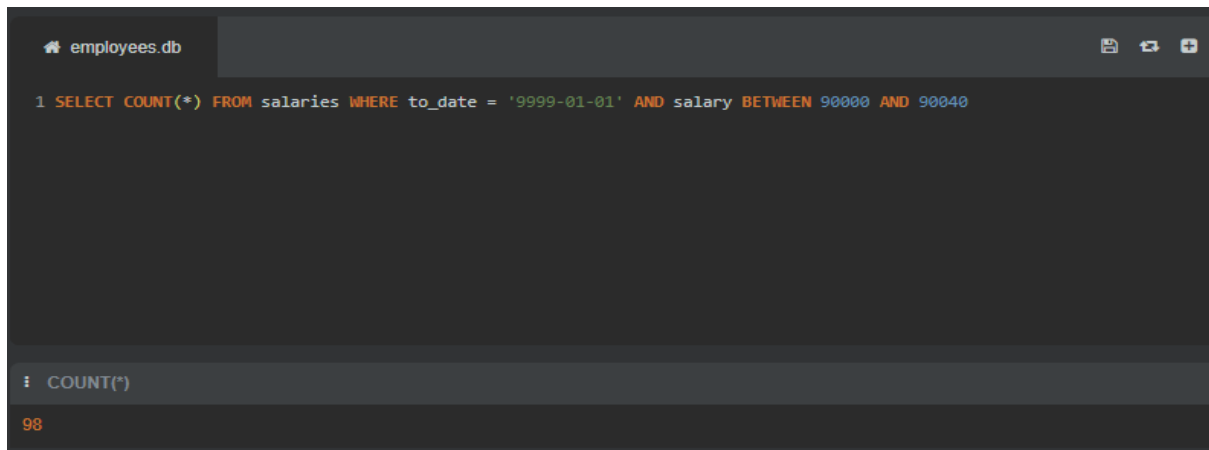
gender	avg_salary	title
F	59238.58634267654	Technique Leader
M	59332.19594183215	Technique Leader

3. The number of employees that have a current salary (i.e., to_date equals to 9999-01-01) between 90000 and 90040.

Query:

```
SELECT COUNT(*) FROM salaries WHERE to_date = '9999-01-01' AND salary BETWEEN 90000 AND 90040
```

Screenshot:



The screenshot shows a database client window titled 'employees.db'. The SQL query entered is: `1 SELECT COUNT(*) FROM salaries WHERE to_date = '9999-01-01' AND salary BETWEEN 90000 AND 90040`. The result of the query is displayed in a table with one row:

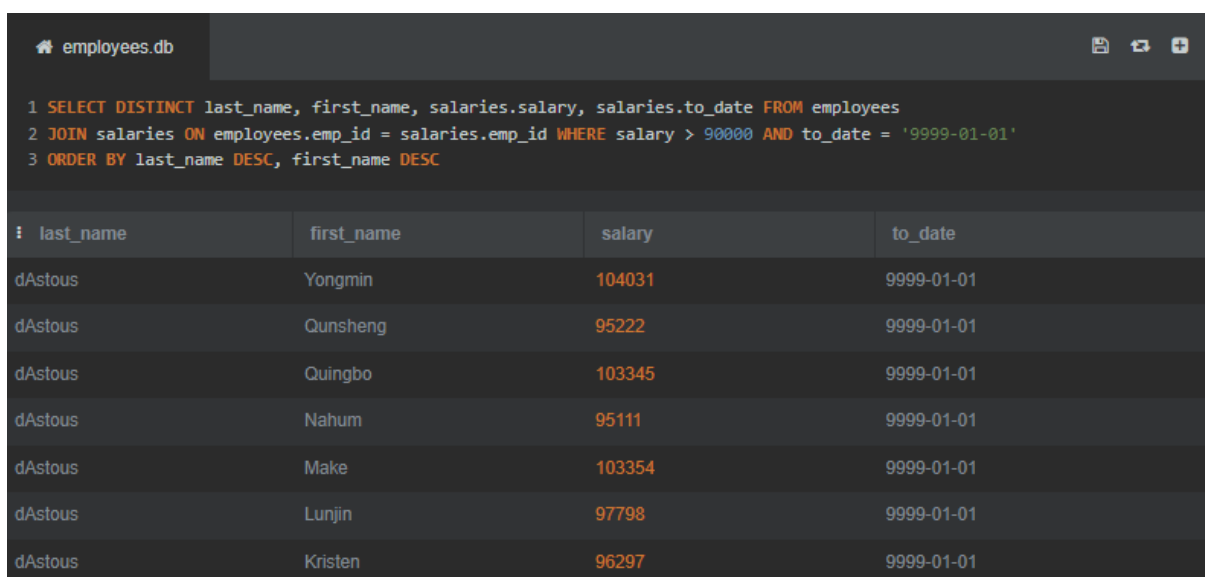
COUNT(*)
98

4. List all unique employees' last and first names (using GROUP BY method) that have a current salary (i.e., to_date equals to 9999-01-01) greater than 90000, outputting both names in descending order (sort by the last name first and then the first name) and also displaying their current salaries (using the INNER JOIN method).

Query:

```
SELECT DISTINCT last_name, first_name, salaries.salary,
salaries.to_date FROM employees JOIN salaries ON employees.emp_id =
salaries.emp_id WHERE salary > 90000 AND to_date = '9999-01-01'
ORDER BY last_name DESC, first_name DESC
```

Screenshot:



The screenshot shows a SQL query execution in a database client. The query is as follows:

```
1 SELECT DISTINCT last_name, first_name, salaries.salary, salaries.to_date FROM employees
2 JOIN salaries ON employees.emp_id = salaries.emp_id WHERE salary > 90000 AND to_date = '9999-01-01'
3 ORDER BY last_name DESC, first_name DESC
```

The results are displayed in a table with the following columns: last_name, first_name, salary, and to_date. The data is sorted by last_name in descending order, and then by first_name in descending order.

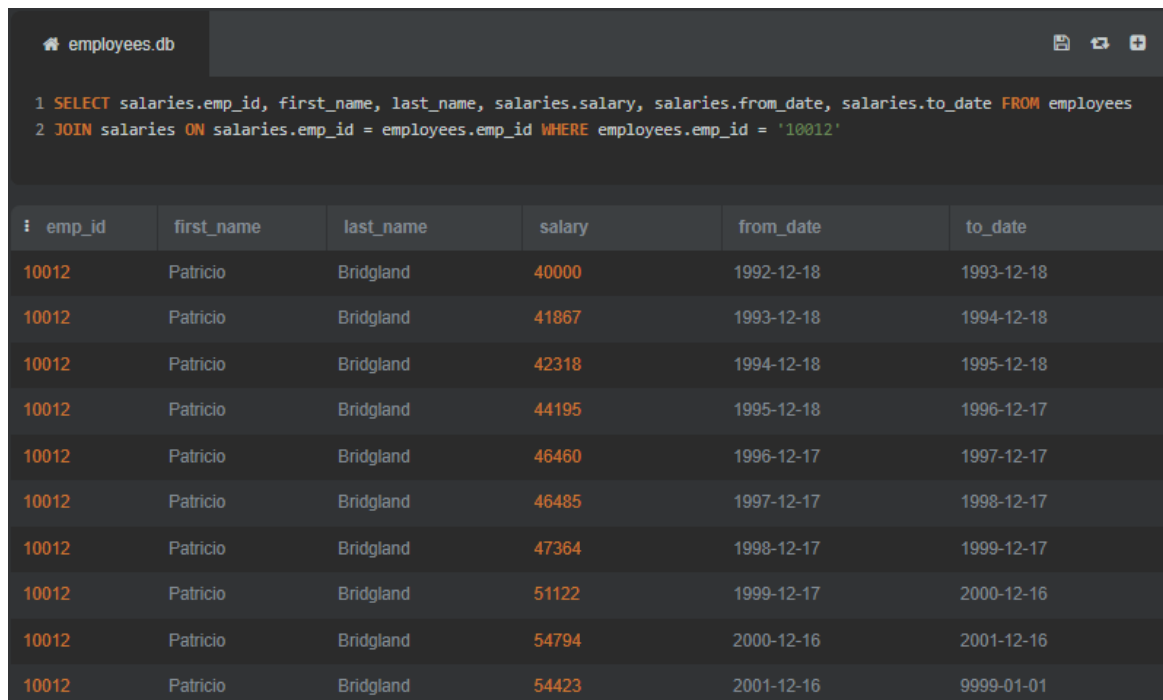
i	last_name	first_name	salary	to_date
	dAstous	Yongmin	104031	9999-01-01
	dAstous	Qunsheng	95222	9999-01-01
	dAstous	Quingbo	103345	9999-01-01
	dAstous	Nahum	95111	9999-01-01
	dAstous	Make	103354	9999-01-01
	dAstous	Lunjin	97798	9999-01-01
	dAstous	Kristen	96297	9999-01-01

5. First name, last name, all salary dates and related amounts for the employee with employee number 10012.

Query:

```
SELECT salaries.emp_id, first_name, last_name, salaries.salary, salaries.from_date, salaries.to_date FROM employees JOIN salaries ON salaries.emp_id = employees.emp_id WHERE employees.emp_id = '10012'
```

Screenshot:



The screenshot shows a database interface with a query window and a results table. The query window contains the following SQL query:

```
1 SELECT salaries.emp_id, first_name, last_name, salaries.salary, salaries.from_date, salaries.to_date FROM employees
2 JOIN salaries ON salaries.emp_id = employees.emp_id WHERE employees.emp_id = '10012'
```

The results table displays the following data:

emp_id	first_name	last_name	salary	from_date	to_date
10012	Patricio	Bridgland	40000	1992-12-18	1993-12-18
10012	Patricio	Bridgland	41867	1993-12-18	1994-12-18
10012	Patricio	Bridgland	42318	1994-12-18	1995-12-18
10012	Patricio	Bridgland	44195	1995-12-18	1996-12-17
10012	Patricio	Bridgland	46460	1996-12-17	1997-12-17
10012	Patricio	Bridgland	46485	1997-12-17	1998-12-17
10012	Patricio	Bridgland	47364	1998-12-17	1999-12-17
10012	Patricio	Bridgland	51122	1999-12-17	2000-12-16
10012	Patricio	Bridgland	54794	2000-12-16	2001-12-16
10012	Patricio	Bridgland	54423	2001-12-16	9999-01-01

6. In relation to the table named salaries in Figure 1 above. Answer in text:

a) What is the degree of this table?

Answer: Since there are four columns in salaries table so its degree is 4.

b) What column(s), if any, make(s) up the primary key?

Answer: The emp_id column makes up the primary key.

c) What column(s), if any, make(s) up the foreign key?

Answer: The from_date column makes up foreign key.

7. In the given schema, the tables dept_emp, dept_manager, salaries, titles have composite keys. Explain for each relation why this is the case? Support your answer with appropriate references.

Answer:

In SQL tables, sometimes we don't have a unique key so we combine two or more columns to use as unique primary key. This is called composite key.

In dept_emp, we have emp_id and dept_id. The emp_id is used to identify employee from employees table while dept_id is used to identify department in the departments table. Same case is with dept_manager table where we have used dept_id and emp_id as composite key. In salaries we have emp_id and from_date as composite key. emp_id is used to identify employee from employees table while from_date is used in relation with titles table.

In titles table, we have used 3 columns as composite key, emp_id, title, from_date. emp_id is used for employee; title is used to identify each role and from_date is used in relation to salaries to identify employee's starting date.