Assignment: SQL Tasks for SpecialForce Private Limited - Database Operations (MySQL)

Scenario:

SpecialForce Private Limited is expanding its workforce and needs help with managing its employee records, departments, and ongoing projects. As a fresh database consultant, your task is to create and manipulate the database to manage their growing employee, department, and project data.

Tasks:

Task 1: Create Tables

1. Create three tables: Employees, Departments, and Projects to track employees, departments, and projects, respectively.

o Ensure each table has a Primary Key for uniquely identifying records.

o Set up Foreign Key constraints to link employees to departments and projects.

o Use appropriate constraints (e.g., NOT NULL, UNIQUE, etc.) to maintain data integrity.
Ans:

```
CREATE TABLE DEPARTMENTS (
   -> DEPARTMENT_ID INT PRIMARY KEY,
   -> DEPARTMENT_NAME VARCHAR(20) NOT NULL UNIQUE);

CREATE TABLE EMPLOYEES (
   -> EMPLOYEE_ID INT PRIMARY KEY,
   -> FIRST_NAME VARCHAR(20) NOT NULL,
   -> LAST_NAME VARCHAR(20) NOT NULL,
   -> EMAIL VARCHAR(50) NOT NULL UNIQUE,
   -> HIRE_DATE DATE NOT NULL,
   -> SALARY INT,
```

```
-> DEPARTMENT_ID INT NOT NULL,
-> FOREIGN KEY (DEPARTMENT_ID) REFERENCES DEPARTMENTS(DEPARTMENT_ID));

CREATE TABLE PROJECTS (
->  PROJECT_ID INT PRIMARY KEY,
->  PROJECT_NAME VARCHAR(50) NOT NULL,
->  START_DATE DATE NOT NULL,
->  END_DATE DATE,
->  DEPARTMENT_ID INT NOT NULL,
->  FOREIGN KEY (DEPARTMENT_ID) REFERENCES DEPARTMENTS(DEPARTMENT_ID));
```

Task 2: Insert Data (Given in excel sheet)

Once you have created the tables, insert the provided data into the respective tables. The data contains details about employees, departments, and projects.
Ans:

```
insert into DEPARTMENTS(DEPARTMENT_ID,DEPARTMENT_NAME)
-> values
-> (1,'IT'),
-> (2,'HR'),
-> (3,'Sales'),
-> (4,'Finance'),
-> (5,'Marketing');

INSERT INTO EMPLOYEES (EMPLOYEE_ID, FIRST_NAME, LAST_NAME, EMAIL, HIRE_DATE, SALARY, DEPARTMENT_ID)
-> VALUES
-> (101, 'Ravi', 'Sharma', 'ravi.sharma@specialforce.com', '2017-05-15', 55000, 1),
-> (102, 'Neha', 'Kapoor', 'neha.kapoor@specialforce.com', '2019-03-23', 48000, 2),
-> (103, 'Jyoti', 'Verma', 'jyoti.verma@specialforce.com', '2020-11-02', 60000, 1),
```

-> (104, 'Anil', 'Patil', 'anil.patil@specialforce.com', '2018-09-18', 70000, 3),

-> (105, 'Pooja', 'Singh', 'pooja.singh@specialforce.com', '2021-06-10', 40000, 4),

-> (106, 'Sanjay', 'Iyer', 'sanjay.iyer@specialforce.com', '2018-01-22', 75000, 3),

-> (107, 'Jatin', 'Reddy', 'jatin.reddy@specialforce.com', '2021-12-12', 85000, 2),

-> (108, 'Shreya', 'Mehta', 'shreya.mehta@specialforce.com', '2022-04-19', 30000, 5),

-> (109, 'Rajesh', 'Gupta', 'rajesh.gupta@specialforce.com', '2020-08-11', 90000, 1),

-> (110, 'Kavita', 'Nair', 'kavita.nair@specialforce.com', '2021-02-07', 50000, 2);

INSERT INTO PROJECTS (PROJECT_ID, PROJECT_NAME, START_DATE, END_DATE, DEPARTMENT_ID)

-> VALUES

-> (201,'Project Phoenix','2021-01-15','2022-07-30',1),

-> (202,'Client Onboarding','2020-06-20',NULL,3),

-> (203,'Financial Overhaul','2019-03-10','2021-12-15',4),

-> (204,'Marketing Revamp','2022-03-01',NULL,5),

-> (205,'Internal System Audit','2023-02-15',NULL,2);

- **Queries to Perform:**

Query 1: Write a query to retrieve the first name, last name, and department name of all employees. If an employee does not belong to any department, the department name should be NULL.

Ans: select first_name,last_name,department_name from EMPLOYEES,DEPARTMENTS

-> where DEPARTMENTS.department_id=EMPLOYEES.department_id;

first_name	last_name	department_name
Pooja	Singh	Finance
Neha	Kapoor	HR
Jatin	Reddy	HR
Kavita	Nair	HR
Ravi	Sharma	IT
Jyoti	Verma	IT
Rajesh	Gupta	IT
Shreya	Mehta	Marketing
Anil	Patil	Sales
Sanjay	Iyer	Sales

Query 2: Write a query to find all employees in the IT department who earn more than ₹50,000.

Ans: select first_name,last_name,salary from EMPLOYEES

-> where employee_id=(select employee_id from DEPARTMENTS

-> where department_name='IT')

-> and salary>50000;

first_name	last_name	salary
Ravi	Sharma	55000
Jyoti	Verma	60000
Anil	Patil	70000
Sanjay	Iyer	75000
Jatin	Reddy	85000
Rajesh	Gupta	90000

Query 3: Write a query to list the first name, last name, and email of all employees whose first name starts with 'J' and whose email contains specialforce.com.

Ans: select first_name,last_name,email from EMPLOYEES

-> where first_name like 'J%' and

-> email like '%specialforce.com';

first_name	last_name	email
Jyoti	Verma	jyoti.verma@specialforce.com
Jatin	Reddy	jatin.reddy@specialforce.com

Query 4: Write a query to find all the distinct department names in the Departments table.

Ans: select distinct department_name from DEPARTMENTS;

department_name
Finance
HR
IT
Marketing
Sales

Query 5: Write a query to calculate the total salary expenditure of each department.

Ans: select department_name,sum(salary) from EMPLOYEES,DEPARTMENTS

-> where EMPLOYEES.department_id=DEPARTMENTS.department_id

-> group by department_name;

department_name	sum(salary)
Finance	40000
HR	183000
IT	205000
Marketing	30000
Sales	145000

Query 6: Write a query to find the average salary of employees in the Finance department.

Ans: select department_name as 'Department Name',avg(salary) as 'Average Salary' from EMPLOYEES,DEPARTMENTS

-> where EMPLOYEES.department_id=DEPARTMENTS.department_id

-> and DEPARTMENTS.department_name='Finance'

-> group by department_name;

Department Name	Average Salary
Finance	40000.0000

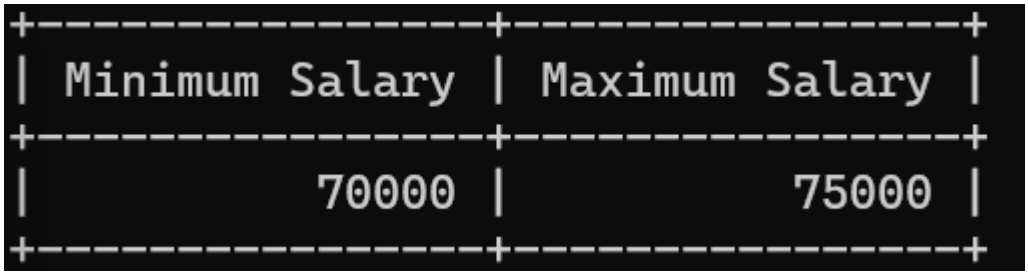
Query 7: Write a query to find the minimum and maximum salaries of employees in the Sales department.

Ans: select min(salary) as 'Minimum Salary' ,max(salary) as 'Maximum Salary' from EMPLOYEES

-> where department_id=(

-> select department_id from DEPARTMENTS

-> where department_name='Sales');



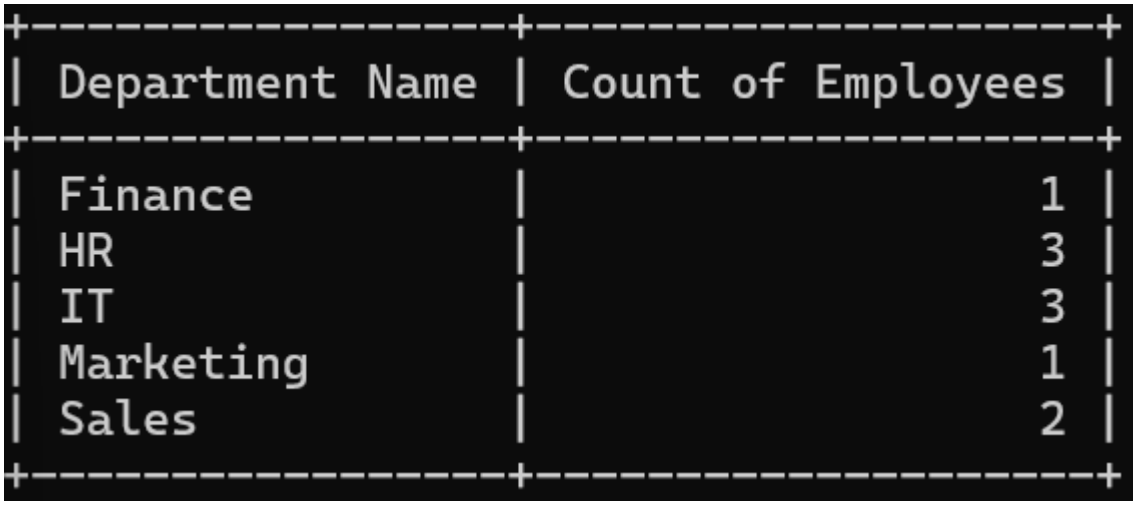
Minimum Salary	Maximum Salary
70000	75000

Query 8: Write a query to count the number of employees in each department.

Ans: select DEPARTMENTS.department_name as 'Department Name',count(EMPLOYEES.department_id) as 'Count of Employees' from EMPLOYEES,DEPARTMENTS

-> where DEPARTMENTS.department_id=EMPLOYEES.department_id

-> group by DEPARTMENTS.department_name;



Department Name	Count of Employees
Finance	1
HR	3
IT	3
Marketing	1
Sales	2

Query 9: Write a query to find all employees who were hired between January 1, 2018, and December 31, 2020. Sort the result by hire date in ascending order.

Ans: select first_name,last_name from EMPLOYEES

-> where hire_date between '2018-01-01' and'2020-12-31';

-> order by hire_date;

first_name	last_name
Sanjay	Iyer
Anil	Patil
Neha	Kapoor
Rajesh	Gupta
Jyoti	Verma

Query 10: Write a query to list all employees who do not have an email address.

Ans: select first_name,last_name from EMPLOYEES

-> where email=null;

```
Empty set (0.01 sec)
```

Query 11: Write a query to find all employees who work in HR, Finance, or IT departments.

Ans: select concat(first_name,' ',last_name) as 'Employee names' from EMPLOYEES

-> where department_id in(

-> select department_id from DEPARTMENTS

-> where department_name in ('Hr','Finance','It'));

Employee names
Pooja Singh
Neha Kapoor
Jatin Reddy
Kavita Nair
Ravi Sharma
Jyoti Verma
Rajesh Gupta

Query 12: Write a query to list the first name, last name, and salary of employees earning between ₹30,000 and ₹70,000. Sort the results by salary in descending order.

Ans: select first_name,last_name,salary from EMPLOYEES

-> where salary between 30000 and 70000

-> order by salary desc;

first_name	last_name	salary
Anil	Patil	70000
Jyoti	Verma	60000
Ravi	Sharma	55000
Kavita	Nair	50000
Neha	Kapoor	48000
Pooja	Singh	40000
Shreya	Mehta	30000

- **Transaction Management Tasks:**

Use transaction control statements to manage the salary updates as follows:

Task 1: Increase HR Salaries:

Write a query to increase the salaries of all employees in the HR department by 5%. Start a transaction before applying the changes.

Ans: start transaction;

update employees

-> set salary=salary*1.05

-> where department_id=(

-> select department_id from departments

```
   -> where department_name='HR');
Query OK, 3 rows affected (0.04 sec)
Rows matched: 3  Changed: 3  Warnings: 0

commit;
```

Task 2: Savepoint Before :

Set a savepoint before increasing the salaries of employees in the Sales department by 3%.

Ans: start transaction;

Query OK, 0 rows affected (0.00 sec)

```
mysql> savepoint SalesIncrease;
Query OK, 0 rows affected (0.00 sec)

update employees
   -> set salary = salary*1.03
   -> where department_id=(
   -> select department_id from departments
   -> where department_name='Sales');
Query OK, 2 rows affected (0.01 sec)
Rows matched: 2  Changed: 2  Warnings: 0
```

Task 3: Rollback Sales Salary Increase:

Rollback to the savepoint created before the Sales salary increase.

Ans: mysql> Rollback to SalesIncrease;

Query OK, 0 rows affected (0.02 sec)

Task 4: Commit the Transaction:

After rolling back the Sales increase, commit the changes made to the HR department salaries.

Ans:

mysql> commit;

Query OK, 0 rows affected (0.00 sec)

Query 13: Write a query to join the Employees and Departments tables to list employees and their department names. Make sure all employees are included, even if they don't belong to any department.

Ans: select concat(Employees.first_name," ",Employees.last_name)as 'Employee Name', departments.department_name from Employees,departments

-> where departments.department_id=Employees.department_id;

Employee Name	department_name
Pooja Singh	Finance
Neha Kapoor	HR
Jatin Reddy	HR
Kavita Nair	HR
Ravi Sharma	IT
Jyoti Verma	IT
Rajesh Gupta	IT
Shreya Mehta	Marketing
Anil Patil	Sales
Sanjay Iyer	Sales

Query 14: Write a query to list employees who are working on projects that started after January 1, 2023.

Ans: select concat(Employees.first_name," ",Employees.last_name)as 'Employee Name', projects.project_name from Employees,projects

-> where projects.department_id=Employees.department_id

-> and projects.start_date>01-01-2023;

Employee Name	project_name
Ravi Sharma	Project Phoenix
Jyoti Verma	Project Phoenix
Rajesh Gupta	Project Phoenix
Anil Patil	Client Onboarding
Sanjay Iyer	Client Onboarding
Pooja Singh	Financial Overhaul
Shreya Mehta	Marketing Revamp
Neha Kapoor	Internal System Audit
Jatin Reddy	Internal System Audit
Kavita Nair	Internal System Audit

Query 15: Write a query to list all departments, even those without any employees assigned.

Ans: select concat(Employees.first_name," ",Employees.last_name)as 'Employee Name', departments.department_name from Employees,departments

-> where departments.department_id=Employees.department_id

-> order by departments.department_id;

Employee Name	department_name
Ravi Sharma	IT
Jyoti Verma	IT
Rajesh Gupta	IT
Neha Kapoor	HR
Jatin Reddy	HR
Kavita Nair	HR
Anil Patil	Sales
Sanjay Iyer	Sales
Pooja Singh	Finance
Shreya Mehta	Marketing

Query 16: Write a query to find the employee with the highest salary in each department.

Ans: select concat(Employees.first_name," ",Employees.last_name)as 'Employee Name',Employees.salary, departments.department_name from Employees,departments

-> where Employees.salary=(

-> select max(salary) from employees

-> where departments.department_id=Employees.department_id)

-> order by Employees.department_id;

Employee Name	salary	department_name
Rajesh Gupta	90000	IT
Jatin Reddy	89250	HR
Sanjay Iyer	75000	Sales
Pooja Singh	40000	Finance
Shreya Mehta	30000	Marketing

Query 17: Write a query to remove all data from the Employees table but keep the structure intact.

Ans: truncate table employees;
select * from Employees;

Empty set (0.01 sec)
desc Employees;

Field	Type	Null	Key	Default	Extra
EMPLOYEE_ID	int	NO	PRI	NULL	
FIRST_NAME	varchar(20)	NO		NULL	
LAST_NAME	varchar(20)	NO		NULL	
EMAIL	varchar(50)	NO	UNI	NULL	
HIRE_DATE	date	NO		NULL	
SALARY	int	YES		NULL	
DEPARTMENT_ID	int	NO	MUL	NULL	
phone_number	varchar(15)	YES		NULL	

Query 18: Write a query to drop the Projects table from the database.

Ans: drop table Projects;

```
mysql> select * from projects;
ERROR 1146 (42S02): Table 'adityasir.projects' doesn't exist
```

Query 19: SpecialForce Private Limited realized they need to store the phone numbers of employees. Write a query to add a new column phone_number (VARCHAR(15)) to the Employees table using the ALTER statement.

Ans: alter table Employees

-> add phone_number VARCHAR(15);

EMPLOYEE_ID	FIRST_NAME	LAST_NAME	EMAIL	HIRE_DATE	SALARY	DEPARTMENT_ID	phone_number
101	Ravi	Sharma	ravi.sharma@specialforce.com	2017-05-15	55000	1	NULL
102	Neha	Kapoor	neha.kapoor@specialforce.com	2019-03-23	50400	2	NULL
103	Jyoti	Verma	jyoti.verma@specialforce.com	2020-11-02	60000	1	NULL
104	Anil	Patil	anil.patil@specialforce.com	2018-09-18	70000	3	NULL
105	Pooja	Singh	pooja.singh@specialforce.com	2021-06-10	40000	4	NULL
106	Sanjay	Iyer	sanjay.iyer@specialforce.com	2018-01-22	75000	3	NULL
107	Jatin	Reddy	jatin.reddy@specialforce.com	2021-12-12	89250	2	NULL
108	Shreya	Mehta	shreya.mehta@specialforce.com	2022-04-19	30000	5	NULL
109	Rajesh	Gupta	rajesh.gupta@specialforce.com	2020-08-11	90000	1	NULL
110	Kavita	Nair	kavita.nair@specialforce.com	2021-02-07	52500	2	NULL

Query 20: The company also decided to track the budget for each project. Write a query to add a column budget (DECIMAL(10,2)) to the Projects table.

Ans: alter table projects

-> add budget DECIMAL(10,2);

PROJECT_ID	PROJECT_NAME	START_DATE	END_DATE	DEPARTMENT_ID	budget
201	Project Phoenix	2021-01-15	2022-07-30	1	NULL
202	Client Onboarding	2020-06-20	NULL	3	NULL
203	Financial Overhaul	2019-03-10	2021-12-15	4	NULL
204	Marketing Revamp	2022-03-01	NULL	5	NULL
205	Internal System Audit	2023-02-15	NULL	2	NULL

Query 21: Write a query to find the 2nd largest salary from the Employees table using:

□ A subquery.

□ The LIMIT clause.

Ans: 1. select max(salary) as '2nd largest salary' from Employees

-> where salary<(

-> select max(salary) from Employees);

2nd largest salary
89250

2. select distinct salary as '2nd largest salary' from Employees

-> order by salary desc

-> limit 1 offset 1;

2nd largest salary
89250

Query 22: Write a query to find the 3rd largest salary from the Employees table using:

□ A subquery.

□ The LIMIT clause.

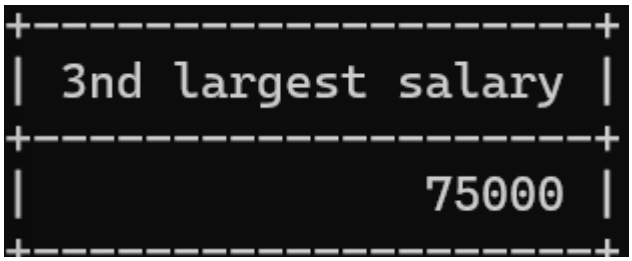
Ans: 1. select max(salary) as '3nd largest salary' from Employees

-> where salary<(

-> select max(salary) from Employees

-> where salary<(

-> select max(salary) from Employees));

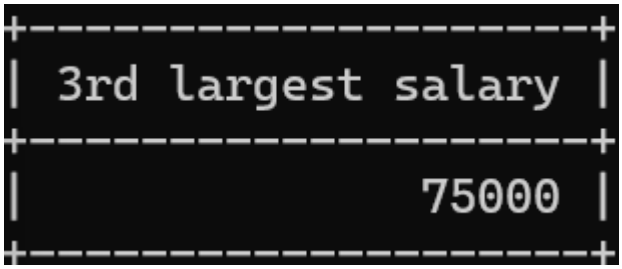


3nd largest salary
75000

2. select distinct salary as '3rd largest salary' from Employees

-> order by salary desc

-> limit 1 offset 2;



3rd largest salary
75000

Query 23: Write a query to drop the Projects table.

Ans: drop table Projects;

Query 24: Write a query to truncate the Employees table.

Ans: truncate table employees;

Field	Type	Null	Key	Default	Extra
EMPLOYEE_ID	int	NO	PRI	NULL	
FIRST_NAME	varchar(20)	NO		NULL	
LAST_NAME	varchar(20)	NO		NULL	
EMAIL	varchar(50)	NO	UNI	NULL	
HIRE_DATE	date	NO		NULL	
SALARY	int	YES		NULL	
DEPARTMENT_ID	int	NO	MUL	NULL	
phone_number	varchar(15)	YES		NULL	