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Advanced DataBase For Finance - Tutorial 2

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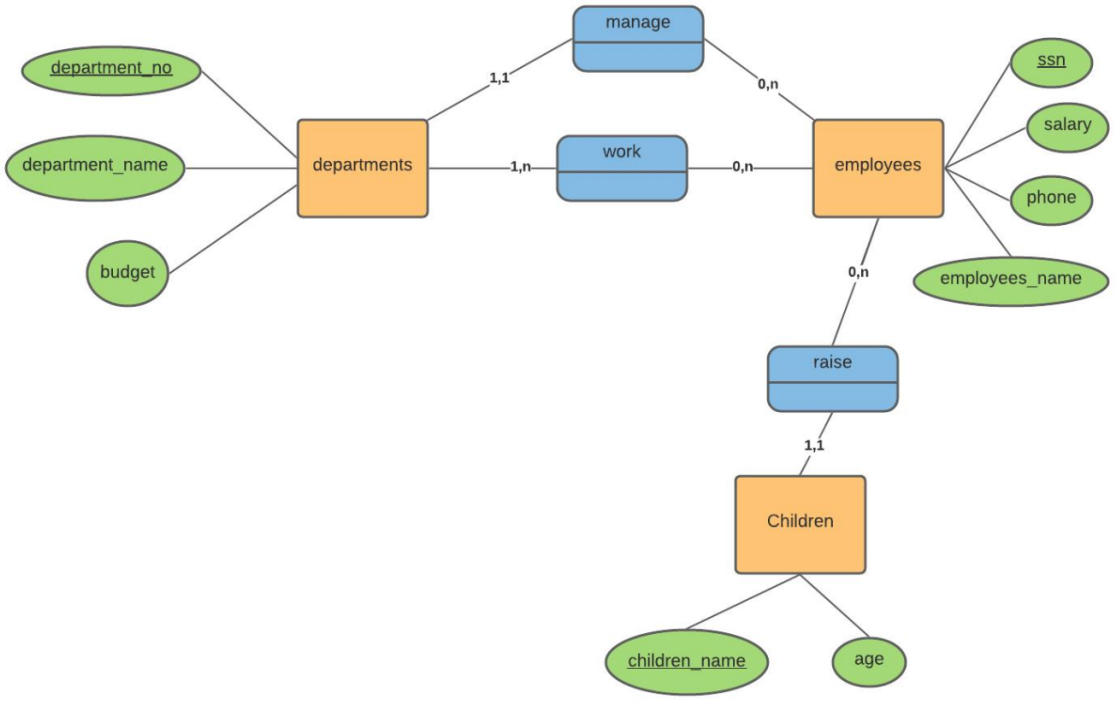
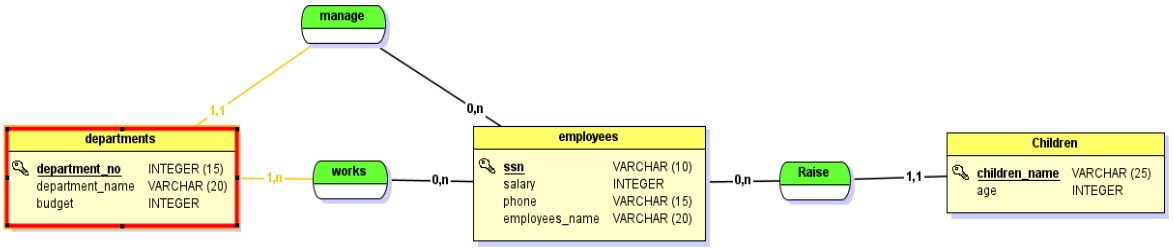


MCD :



MLD :

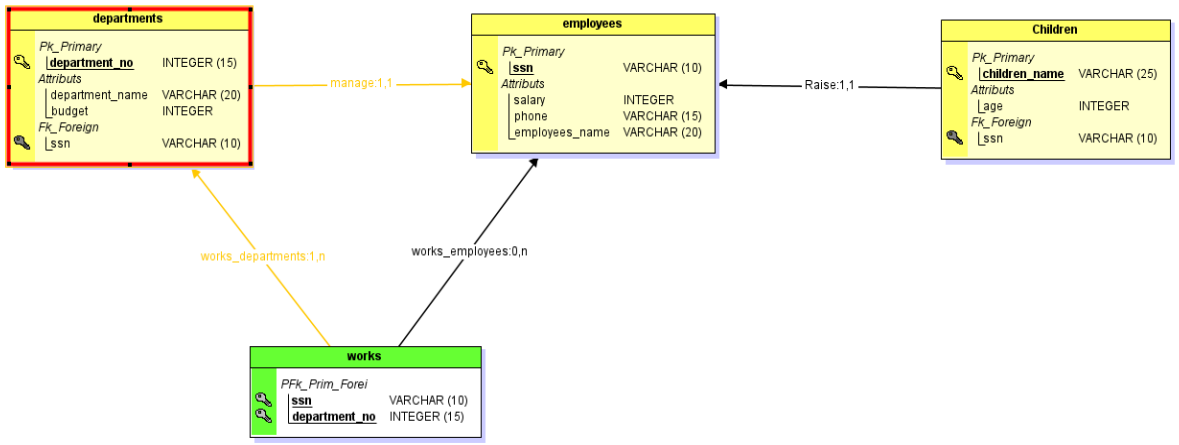


Table Creation :

```
-----------------------------------------------------------
-- Table: employees
-----------------------------------------------------------
CREATE TABLE employees(
        ssn Varchar (10) NOT NULL,
        employees_name Varchar (25) NOT NULL,
        salary Integer,
        phone  Varchar (15),
    CONSTRAINT employees_PK PRIMARY KEY (ssn));
-----------------------------------------------------------
-- Table: departments
-----------------------------------------------------------
CREATE TABLE departments(
        department_no Integer NOT NULL,
        department_name Varchar (20),
        budget    Integer NOT NULL,
        ssn_manager Varchar (10) NOT NULL,
     CONSTRAINT departments_PK PRIMARY KEY (department_no),
     CONSTRAINT departments_employees_FK FOREIGN KEY (ssn_manager)
REFERENCES employees(ssn));
```

```
-------------------------------------------------------
-- Table: Children
-------------------------------------------------------
CREATE TABLE Children(
        children_name Varchar (25) NOT NULL ,
        age  Integer,
        ssn Varchar (10) NOT NULL
    ,CONSTRAINT Children_PK PRIMARY KEY (children_name)
    ,CONSTRAINT Children_employees_FK FOREIGN KEY (ssn) REFERENCES
employees(ssn));
-------------------------------------------------------
-- Table: works
-------------------------------------------------------
CREATE TABLE works(
        ssn Varchar (10) NOT NULL,
        department_no Integer NOT NULL,
    CONSTRAINT works_PK PRIMARY KEY (ssn,department_no),
    CONSTRAINT works_employees_FK FOREIGN KEY (ssn) REFERENCES
employees(ssn),
    CONSTRAINT works_departments0_FK FOREIGN KEY (department_no) REFERENCES
departments(department_no));
```

Data Insertion :

```
-------------------------------------------------------
-- Insertion of lines of data for each table
-------------------------------------------------------
INSERT INTO employees(ssn, employees_name, salary, phone)
VALUES('123456', 'Stowe', 2500, '0645126678'),
      ('789101','Drew', 4500,'0689754122'),
      ('121314','Popeye', 3000,'0689754122'),
      ('134714','Clock', 40000,'0689754122'),
      ('196714','Chibadi', 6000,'0693689412');

INSERT INTO departments(department_no, department_name, budget, ssn_manager)
VALUES('123', 'Marketing', 500000,'123456'),
      ('456', 'Trading', 2000000,'121314'),
      ('789', 'DSI', 350000,'789101');

INSERT INTO Children(children_name, age, ssn)
VALUES('Kevin', 25, '123456'),
      ('Momo', 8, '121314'),
      ('Couhande', 21, '789101'),
      ('Nicolas', 22, '789101'),
      ('Oussama', 7, '789101');

INSERT INTO works(ssn, department_no)
VALUES('123456', '123'),
```

('789101', '789'),
('121314', '456'),
('134714', '456'),
('196714', '123');

SQL Queries :

Query A : Give the DSI department employees names.

```
SELECT employees_name FROM employees
INNER JOIN  works ON works.ssn = employees.ssn
INNER JOIN  departments ON works.department_no = departments.department_no
WHERE department_name = 'DSI';
```

	employees_name character varying (25)
1	Drew

Query B : Which department employs the maximum number of employees.

```
SELECT departments.* FROM departments
INNER JOIN works ON works.department_no = departments.department_no
GROUP BY departments.department_no
ORDER BY COUNT(works.ssn) DESC LIMIT 1;
```

	department_no [PK] integer	department_name character varying (20)	budget integer	ssn_manager character varying (10)
1	456	Trading	2000000	121314

Query C : List all department with the number of employees that each department employs.

```
SELECT COUNT(works.ssn) as numberofemployees, departments.* FROM departments
INNER JOIN works ON works.department_no = departments.department_no
GROUP BY departments.department_no;
```

	numberofemployees bigint	department_no [PK] integer	department_name character varying (20)	budget integer	ssn_manager character varying (10)
1	2	456	Trading	2000000	121314
2	1	789	DSI	350000	789101
3	2	123	Marketing	500000	123456

Query D : What is the name of STOWE's children.

```
SELECT Children.children_name FROM Children
INNER JOIN employees on employees.ssn = Children.ssn
WHERE employees_name = 'Stowe';
```

	children_name [PK] character varying (25)
1	Kevin

Query E : List all departments that have a budget greater than 100k.

```
SELECT * FROM departments
WHERE budget > 100000;
```

	department_no [PK] integer	department_name character varying (20)	budget integer	ssn_manager character varying (1
1	123	Marketing	500000	123456
2	456	Trading	2000000	121314
3	789	DSI	350000	789101

Query F : Give the ssn, salary and department name of all employees that have more than 2 children.

```
SELECT employees.ssn, salary, department_name FROM employees
INNER JOIN works on works.ssn = employees.ssn
INNER JOIN departments on departments.department_no = works.department_no
INNER JOIN Children on employees.ssn = Children.ssn
GROUP BY (employees.ssn,departments.department_no)
HAVING COUNT(Children.ssn)>2;
```

	ssn character varying (10)	salary integer	department_name character varying (20)
1	789101	4500	DSI

Query G : What is the average salary of each department.

```
SELECT AVG(salary) FROM employees
INNER JOIN works on works.ssn = employees.ssn
GROUP BY works.department_no;
```

	avg numeric
1	4500.0000000000000000
2	21500.000000000000
3	4250.0000000000000000

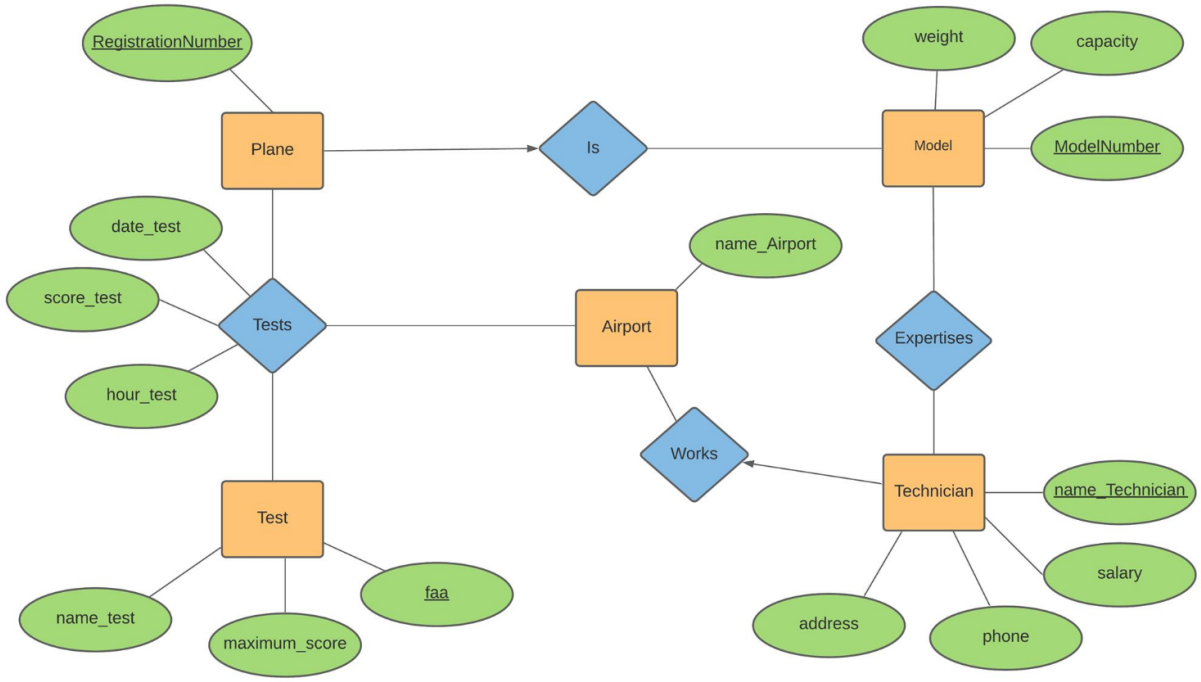
Query H : Give the name of each department manager, the manager salary, the number of children and the number of employees that this department contains.

```
SELECT (employees_name) as manager_name, salary,COUNT(employees.ssn) as numberofemployees, COUNT(Children.ssn)
INNER JOIN works on works.ssn = employees.ssn
INNER JOIN departments ON works.ssn = departments.ssn_manager
INNER JOIN Children on employees.ssn = Children.ssn
GROUP BY (departments.department_no,employees.ssn);
```

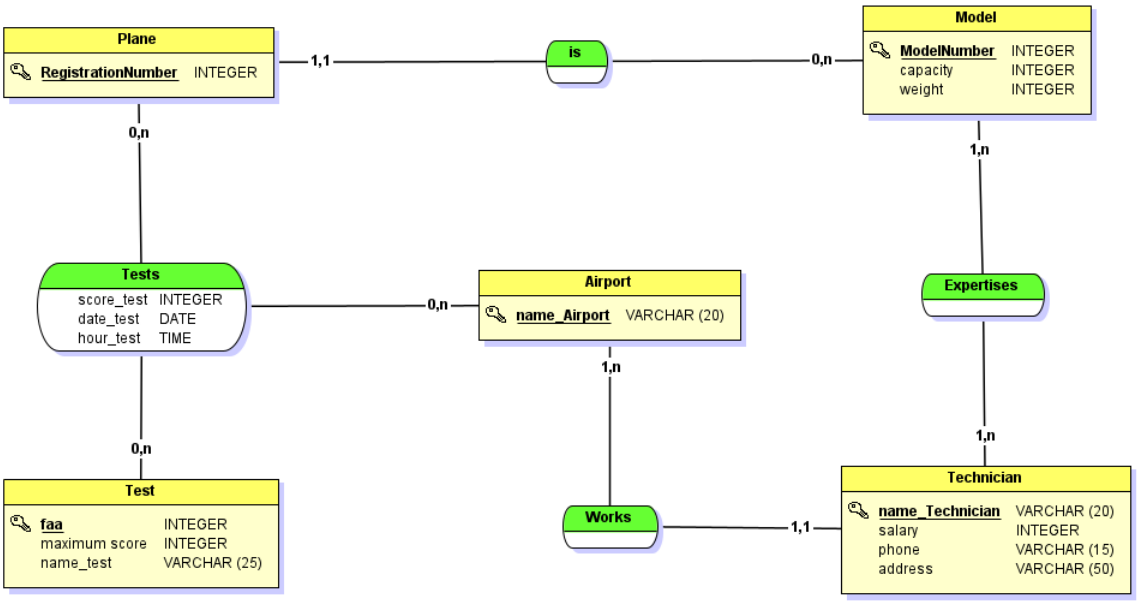
	manager_name character varying (25)	salary integer	numberofemployees bigint	numberofchildren bigint
1	Popeye	3000	1	1
2	Stowe	2500	1	1
3	Drew	4500	3	3

Part II. Database Design for an Airport Domain

E/R Diagram :



MCD :



MLD :

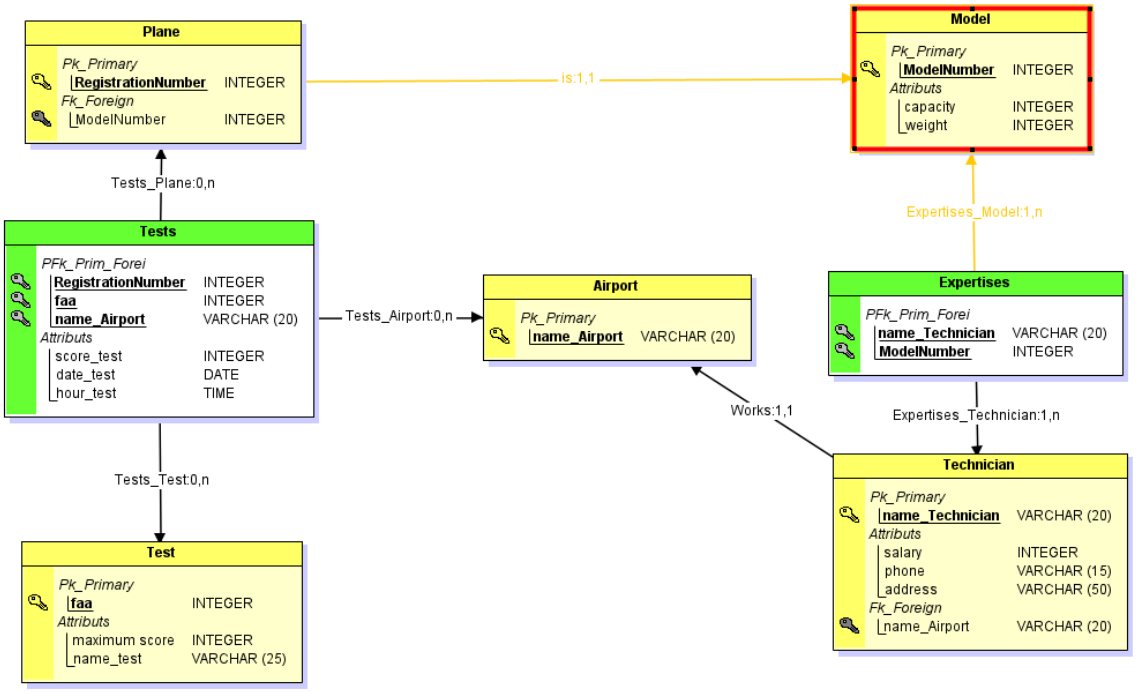


Table Creation :

```
-----------------------------------------------------------
-- Table: Airport
-----------------------------------------------------------
CREATE TABLE public.Airport(
        name_Airport   VARCHAR (20) NOT NULL,
        CONSTRAINT Airport_PK PRIMARY KEY (name_Airport));

-----------------------------------------------------------
-- Table: Technician
-----------------------------------------------------------
CREATE TABLE public.Technician(
        name_Technician   VARCHAR (20) NOT NULL,
        salary          INTEGER,
        phone           VARCHAR (15),
        address         VARCHAR (50) NOT NULL,
        name_Airport     VARCHAR (20) NOT NULL,
        CONSTRAINT Technician_PK PRIMARY KEY (name_Technician),
        CONSTRAINT Technician_Airport_FK FOREIGN KEY (name_Airport)
REFERENCES public.Airport(name_Airport));
```

```
-------------------------------------------------------------
-- Table: Test
-------------------------------------------------------------
CREATE TABLE public.Test(
        faa             INTEGER  NOT NULL,
        maximum_score   INTEGER,
        name_test       VARCHAR (25),
        CONSTRAINT Test_PK PRIMARY KEY (faa));

-------------------------------------------------------------
-- Table: Model
-------------------------------------------------------------
CREATE TABLE public.Model(
        ModelNumber   INTEGER  NOT NULL,
        capacity      INTEGER,
        weight        INTEGER,
        CONSTRAINT Model_PK PRIMARY KEY (ModelNumber));


-------------------------------------------------------------
-- Table: Plane
-------------------------------------------------------------
CREATE TABLE public.Plane(
        RegistrationNumber   INTEGER  NOT NULL,
        ModelNumber          INTEGER  NOT NULL,
        CONSTRAINT Plane_PK PRIMARY KEY (RegistrationNumber),
        CONSTRAINT Plane_Model_FK FOREIGN KEY (ModelNumber) REFERENCES
public.Model(ModelNumber));


-------------------------------------------------------------
-- Table: Expertises
-------------------------------------------------------------
CREATE TABLE public.Expertises(
        name_Technician   VARCHAR (20) NOT NULL,
        ModelNumber       INTEGER  NOT NULL,
        CONSTRAINT Expertises_PK PRIMARY KEY (name_Technician,ModelNumber),
        CONSTRAINT Expertises_Technician_FK FOREIGN KEY (name_Technician)
REFERENCES public.Technician(name_Technician),
        CONSTRAINT Expertises_Model0_FK FOREIGN KEY (ModelNumber)
REFERENCES public.Model(ModelNumber));


-------------------------------------------------------------
-- Table: Tests
-------------------------------------------------------------
CREATE TABLE public.Tests(
        RegistrationNumber   INTEGER  NOT NULL,
```

```
        faa                INTEGER  NOT NULL,
        name_Airport        VARCHAR (20) NOT NULL,
        score_test          INTEGER  NOT NULL,
        date_test           DATE  NOT NULL,
        hour_test           TIMETZ  NOT NULL,
        CONSTRAINT Tests_PK PRIMARY KEY (RegistrationNumber,faa,name_Airport),
        CONSTRAINT Tests_Plane_FK FOREIGN KEY (RegistrationNumber)
REFERENCES public.Plane(RegistrationNumber),
        CONSTRAINT Tests_Test0_FK FOREIGN KEY (faa) REFERENCES
public.Test(faa),
        CONSTRAINT Tests_Airport1_FK FOREIGN KEY (name_Airport) REFERENCES
public.Airport(name_Airport));
```

Data Insertion :

```
INSERT INTO Airport(name_Airport)
VALUES('CDG'),
    ('Orly'),
    ('JFK');

INSERT INTO Technician(name_Technician, salary, phone, address, name_Airport)
VALUES('Sophia', 500000, '0645126678', '71 rue pasteur', 'JFK'),
    ('Adrien', 2000000, '0689754122', '45 rue pila',  'CDG'),
    ('Loic', 350000, '0693689412', '22 rue de la caille',  'Orly');

INSERT INTO Test(faa, maximum_score, name_test)
VALUES(123456, 250, 'Airplane test 1'),
    (456789, 990, 'Airplane test 2'),
    (789123, 500, 'Airplane test 3'),
    (532693, 750, 'Airplane test 4');

INSERT INTO Model(ModelNumber, capacity, weight)
VALUES(753159, 1200, 6000),
    (489621, 360, 4200),
    (487322, 240, 1200),
    (625987, 980, 3000);

INSERT INTO Plane(RegistrationNumber, ModelNumber)
VALUES('46', 753159),
    ('24', 489621),
    ('350', 625987),
    ('65', 487322);

INSERT INTO Expertises(name_Technician, ModelNumber)
VALUES('Sophia', 625987),
    ('Adrien', 489621),
    ('Loic', 753159);
```

```
INSERT INTO Tests(RegistrationNumber, faa, name_Airport, date_test, score_test,
hour_test)
VALUES('46', 123456, 'CDG','2020-08-13', 45, '06:52:23'),
    ('24', 456789, 'Orly', '2020-07-14', 26, '14:28:49'),
    ('350', 789123, 'Orly', '2020-07-05', 78, '19:17:12'),
    ('65', 532693, 'JFK', '2020-01-26', 102, '12:37:49');
```

Query A : What is the salary of each technician?

```
SELECT salary FROM Technician;
```

	salary integer
1	500000
2	2000000
3	350000

Query B : Give the registration number of each plane that obtain a test lower than 75 points the last year.

```
SELECT Plane.RegistrationNumber FROM Plane
INNER JOIN Tests ON Tests.RegistrationNumber = Plane.RegistrationNumber
INNER JOIN Test ON Test.faa = Tests.faa
WHERE EXTRACT (YEAR FROM Tests.date_test) = 2020 AND Tests.score_test < 75;
```

	registrationnumber [PK] integer
1	46
2	24

Query C : How many test are conducted each month the last year.

```
SELECT EXTRACT (MONTH FROM date_test) AS test_month, COUNT(*) FROM Tests
WHERE EXTRACT (YEAR FROM date_test) = 2020
GROUP BY EXTRACT (MONTH FROM date_test);
```

	test_month double precision	count bigint
1	1	1
2	7	2
3	8	1

Query D : Give the number of airplanes in each airport.

```
SELECT COUNT(*), Airport.name_Airport FROM Plane
INNER JOIN Tests ON Tests.RegistrationNumber = Plane.RegistrationNumber
INNER JOIN Airport ON Airport.name_Airport = Tests.name_Airport
GROUP BY Airport.name_Airport;
```

	count bigint	name_airport [PK] character varying (20)
1	1	CDG
2	1	JFK
3	2	Orly

Query E : What are the technicians expertise that each airport has?

```
SELECT Expertises.ModelNumber,Expertises.name_Technician,Airport.name_Airport FROM Technician
INNER JOIN Expertises ON Expertises.name_Technician = Technician.name_Technician
INNER JOIN Airport ON Airport.name_Airport = Technician.name_Airport
INNER JOIN Model ON Expertises.ModelNumber = Model.ModelNumber;
```

	modelnumber integer	name_technician character varying (20)	name_airport character varying (20)
1	625987	Sophia	JFK
2	489621	Adrien	CDG
3	753159	Loic	Orly

Query F : What are the airplane models in all the airport sorted by their weight.

```
SELECT Model.* FROM Model
ORDER BY weight;
```

	modelnumber [PK] integer	capacity integer	weight integer
1	487322	240	1200
2	625987	980	3000
3	489621	360	4200
4	753159	1200	6000

Query G : Give the name of airplane model that have the maximum capacity.

```
SELECT modelnumber, capacity FROM Model
WHERE capacity = (SELECT max (capacity) FROM Model);
```

	modelnumber [PK] integer	capacity integer
1	753159	1200