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I. <u>Storyline</u>

Airport Management System is a large scale project which includes database of more than a single Airport. This airline management system contains the details about: Airplane_Type, Route, Flight, Airfare, Passengers, Employees, Transactions, Countries and Airport.

1.The Airline database Management System keeps a record of its passengers:
    1.1   Every passenger has a unique ID, name, address, age, sex and contacts.
    1.2   The database keeps track of transactions made by the passengers.
    1.3   It keeps track of the booking date, and charge amount of bookings.
    1.4   The transaction details are also noted with transaction id and payment details.
    1.5   Each passenger can make the payment with many transactions.

2. The Airline database Management System keeps a track of the employees and stores their information in the database.
    2.1   The name, employee id, address, age, email id and contact are stored in the database.
    2.2   Each employee has a unique id.
    2.3   Since this is a rapidly growing establishment, the airline database continually keeps employing more employees to keep up with the workload.
    2.4   An airport can employ various employees.

3. It also stores the information of airfare with unique fare if to book a ticket, modify or cancel a reservation also the details of the charge amount.
    3.1   Depending on the travel time each airline assigns different airfare.

4. Each country has an airport with a unique air code and a name.
    4.1   This database systems contains details about all the passenger travelling and it also contains details of all employees associated to respective airports.
    4.2   Each country may have more than one airport.

5. Each airport has various airplanes belonging to various airlines.
    5.1   Each airport has a unique airplane id.
    5.2   It also shows the passenger capacity and airplane weight.

6. The route of the each airplane has been provided by each airlines:
    6.1   Each flight has a unique route ID and a distinct path to follow.
    6.2   It also shows the information of take off and destination point of respective flights.
    6.3   More than one flight can travel on the same path simultaneously.

7. Many flight can land on a particular airport and more than one passenger belongs to particular flight.

7.1 This system provides options for viewing different flights available with different timings for a particular date and also shows information of arrival and departure schedule of flights.

- The project has been planned to be having the view of distributed architecture, with centralized storage of the database.

- The entire project has been developed keeping in view of the distributed client server computing technology, in mind. The specification has been normalized up to 2NF to eliminate all the anomalies that may arise due to the database transaction that are executed by the general users and the organizational administration. The user interfaces are browser specific to give distributed accessibility for the overall system.

II. Components of Database Design

These definitions will help you in better understand of the project.

An **Entity** is anything in the enterprise that is to be represented in our database. An entity can be place, person, object, event or a concept, which stores data in the database. The characteristics of entities are must have an attribute, and a unique key. Every entity is made up of some 'attributes' which represent that entity.

An **Attribute** is a single-valued property of either an entity-type or a relationship type.

Primary Key - is a column or group of columns in a table that uniquely identify every row in that table. These are represented in underlined form.

Foreign Key - is a column that creates a relationship between two tables. The purpose of Foreign keys is to maintain data integrity and allow navigation between two different instances of an entity. It is represented by an '*' mark at the end of attribute.

Here we represent the database management system for an Airline.

The entities and their respective attributes required are as follows:

1. **Airplane_type**
   Attributes:
   - <u>A_ID</u> (Number)
   - Capacity (Number)
   - A_weight (Number)
   - Company (Varchar)

2. **Route**
   Attributes:
   - <u>Route_ID</u> (Number)
   - Destination (Varchar)
   - Take_Off_point (Varchar)
   - R_type

3. **Flight**
   Attributes:
   - <u>Flight_ID</u> (Number)
   - Departure
   - Arrival
   - Flight_date (Date)

4. **AirFare**
   Attributes:
   - <u>Fare_ID</u> (Number)
   - Charge_Amount (Number)
   - Description (Varchar)

5. **Passengers**
   Attributes:
   - <u>Ps_ID</u> (Number)
   - Name (Varchar)
   - Address (Varchar)
   - Age (Number)
   - Sex (Varchar)
   - Contacts (Number)

6. Employees
Attributes:
- ❖ <u>Emp_ID</u> (Number)
- ❖ Name (Varchar)
- ❖ Address (Varchar)
- ❖ Age (Varchar)
- ❖ Email_ID (Varchar)
- ❖ Contacts (Number)

7. Transactions
Attributes:
- ❖ <u>TS_ID</u> (Number)
- ❖ Booking_Date (Date)
- ❖ Departure_Date (Date)
- ❖ Type (Varchar)
- ❖ Emp_ID* (Number)
- ❖ Ps_ID* (Number)
- ❖ Flight_ID* (Number)
- ❖ Charge_Amount* (Number)

8. Countries
Attributes:
- ❖ <u>Country_code</u> (Number)
- ❖ Country_Name (Varchar)

9. Airport
Attributes003A
- ❖ <u>Air_Code</u> (Number)
- ❖ Air_Name (Varchar)
- ❖ City (Varchar)
- ❖ State (Varchar)

Entities & Attributes

- **Airplane_type** (<u>A_ID</u>, Capacity, A_weight, Company)
- **Route** (<u>Route_ID</u>, Destination,Take_Off_point,R_type)
- **Flight** (<u>Flight_ID</u>, Departure, Arrival, Flight_date)
- **AirFare** (<u>Fare_ID</u>, Charge_Amount, Description)
- **Passengers** (<u>Ps_ID</u>, Name, Address, Age, Sex, Contacts)
- **Employees** (<u>Emp_ID</u>, Name, Address ,Age, Email_ID, Contacts)
- **Transactions** (<u>TS_ID</u>, Booking_Date, Departure_Date,Type,Emp_ID*,Ps_ID*, Flight_ID*, Charge_Amount*)
- **Countries** (<u>Country_code,</u> Country_Name)
- **Airport** (<u>Air_Code,</u> Air_Name, City, State)

Relationships and Cardinality

Relationship is nothing but an association among two or more entities.
Entities take part in relationships. We can often identify relationships with verbs or verb phrases.

Cardinality defines the numerical attributes of the relationship between two entities or entity sets. These are most useful in describing binary relation sets.

Different types of cardinal relationships are:
- **One-to-One Relationships (1 : 1)**
  One entity from entity set X can be associated with at most one entity of entity set Y and vice versa.
- **One-to-Many Relationships (1 : M)**
  One entity from entity set X can be associated with multiple entities of entity set Y, but an entity from entity set Y can be associated with at least one entity.
- **Many to One Relationships (M : 1)**
  More than one entity from entity set X can be associated with at most one entity of entity set Y. However, an entity from entity set Y may or may not be associated with more than one entity from entity set X.
- **Many-to-Many Relationships (M : N)**
  One entity from X can be associated with more than one entity from Y and vice versa.

1. The entities **Airplane_type** and **Flight** are connected by a relation called **Type**.
   It is a **One To Many Relationship**.
   And they **Both Have Total Participation**.

2. The entities **Passengers** and **Transactions** are connected by a relation called **Payment**.
   It is a **One To Many Relationship**.
   And they **Both Have Total Participation**.

3. The entities **Flight** and **Airport** are connected by a relation called **Can land**.
   It is a **Many To Many Relationship**.
   And they **Both Have Total Participation**.

4. The entities **Flight** and **Route** are connected by a relation called **Travels on**.
   It is a **Many To Many Relationship**.
   And here **Flight** has **Total Participation** and the **Route** has **Partial Participation**.

5. The entities **Air-Fare** and **Flight** are connected by a relation called **Assigned**.
   It is a **Many To One Relationship**.
   And they **Both Have Total Participation**.

6. The entities **Airport** and **Countries** are connected by a relation called **Part of**.
   It is a **Many To One Relationship**.
   And they **Both Have Total Participation**.

7. The entities **Employee** and **Airport** are connected by a relation called **Works for**.
   It is a **Many To One Relationship**.
   And they **Both Have Total Participation**.

8. The entities **Passenger** and **Flight** are connected by a relation called **Belongs to**.
   It is a **Many To One Relationship**.
   And they **Both Have Total Participation**.

Highlights Relationships: How entities interact with each other

- ❖ **Type**   : (1:M) Airplane_type with Flight ,
                                      Both total
- ❖ **Payment**   : (1:M) Passengers with Transactions,
                                      Both total
- ❖ **Can land**   : (M:N) Flight with Airport,
                                      Both total
- ❖ **Travels on**   : (M:N) Flight with Route
                                      Flight: total Route: partial
- ❖ **Assigned**   : (N:1) Air-Fare with Flight,
                                      Both Total
- ❖ **Part of**   : (N:1)   Airport with Countries,
                                      Both Total
- ❖ **Works for**   : (N:1) Employee with Airport,
                                      Both Total
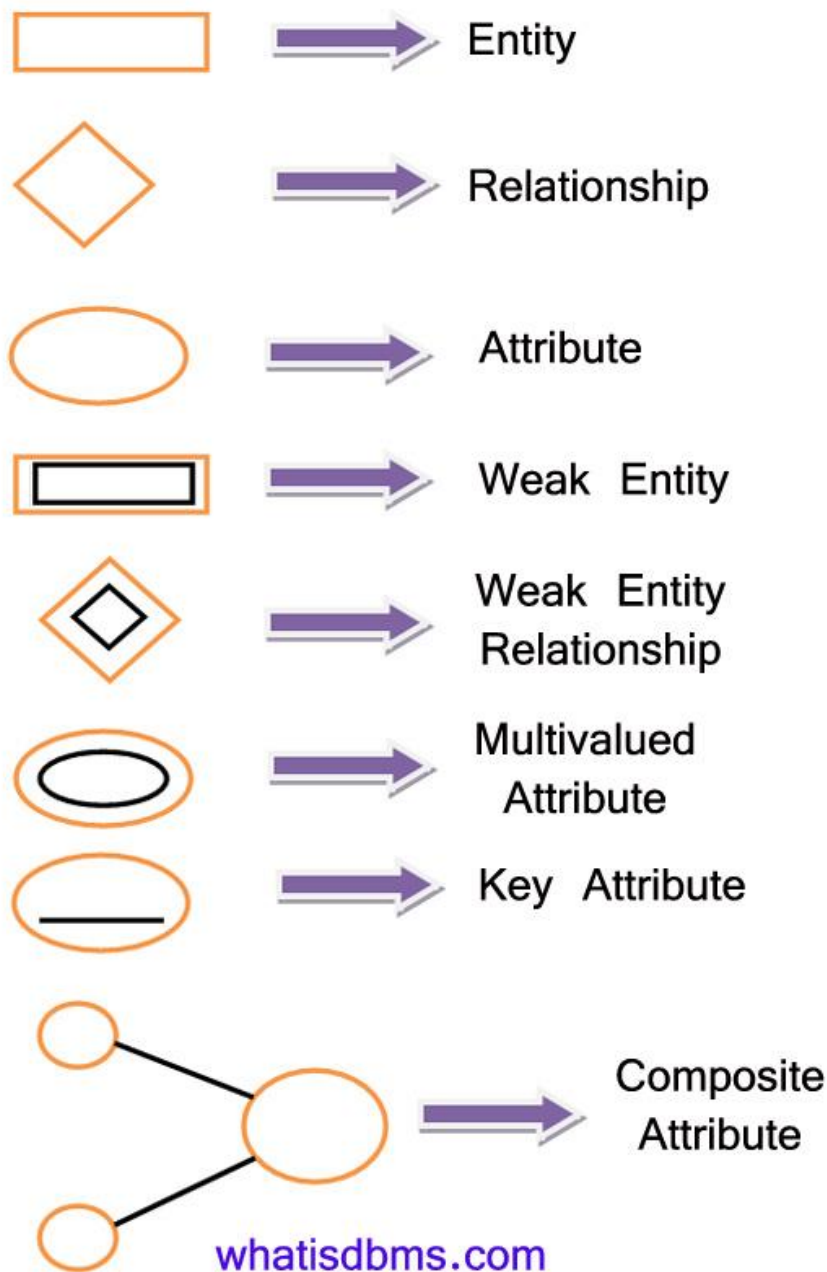- ❖ **Belongs to**   : (N:1) Passenger with Flight,
                                      Both Total
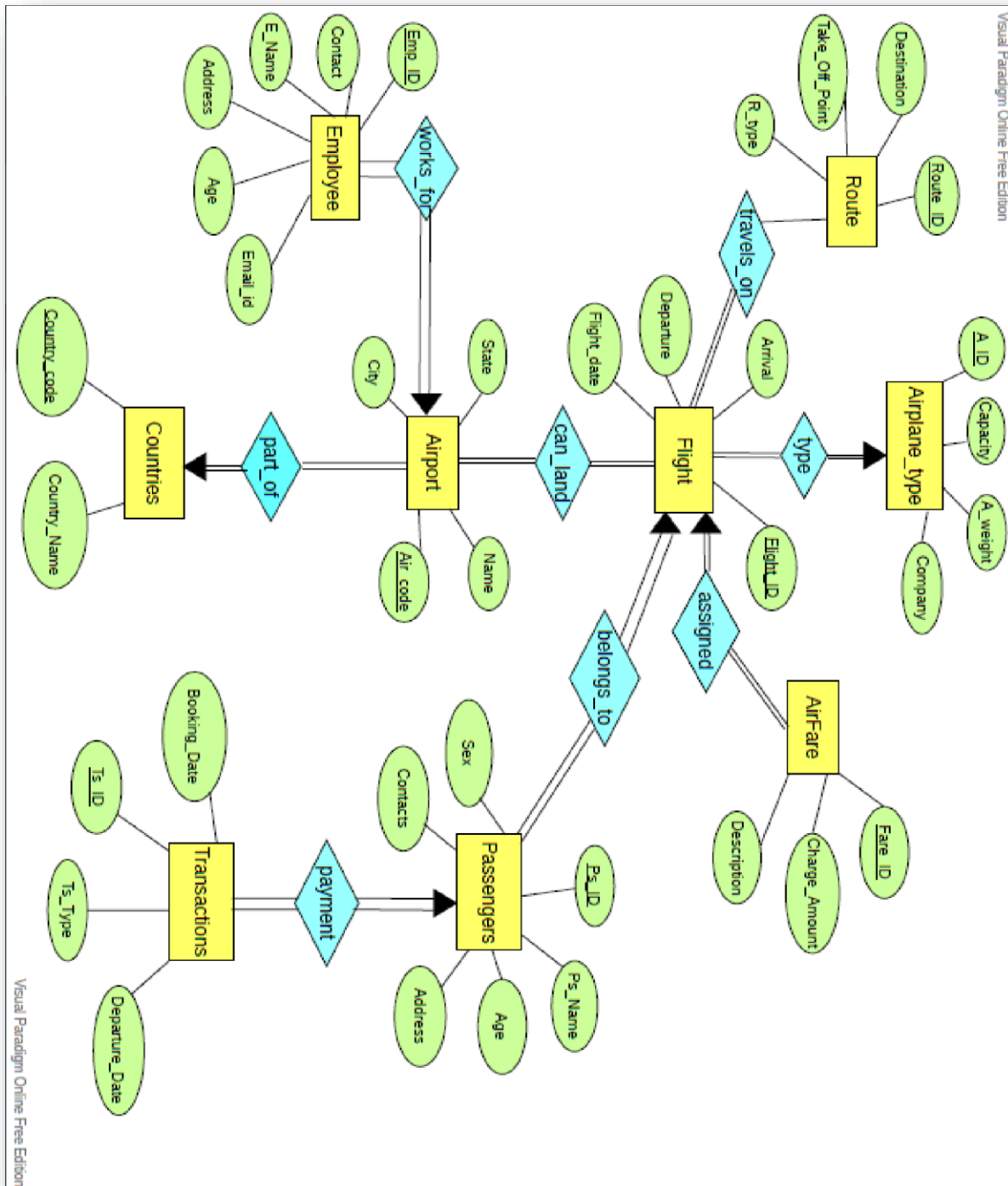
III. Entity Relationship Diagram

Draw the ER diagram here. An example is shown:

ER diagrams help to explain the logical structure of databases. ER diagrams are created based on three basic concepts: entities, attributes and relationships.

ER Diagrams contain different symbols, here's how they are represented.

Entity Relationship Diagram for our project.

IV. Relational Model

- **Airplane_type** (<u>A_ID</u>, Capacity, A_weight, Company)

- **Route** (<u>Route_ID</u>, Destination,Take_Off_point,R_type)

- **Flight** (<u>Flight_ID</u>, Departure, Arrival, Flight_date, A_ID*)

- **AirFare** (<u>Fare_ID</u>, Charge_Amount, Description, Flight_ID*)

- **Passengers** (<u>Ps_ID</u>, Name, Address, Age, Sex, Contacts, Flight_ID*)

- **Employees** (<u>Emp_ID</u>, Name, Address ,Age, Email_ID, Contacts, Air_Code*)

- **Transactions** (<u>TS_ID</u>, Booking_Date, Departure_Date, Type, Emp_ID*, Ps_ID*, Flight_ID*, Charge_Amount*)

- **Countries** (<u>Country_code</u>, Country_Name)

- **Airport** (<u>Air_Code</u>, Air_Name, City, State, Country_code*)

- **Can_Land** (<u>Air_Code*, Flight_ID*</u>)

- **Travels_on** (<u>Route_ID*, Flight_ID*</u>)
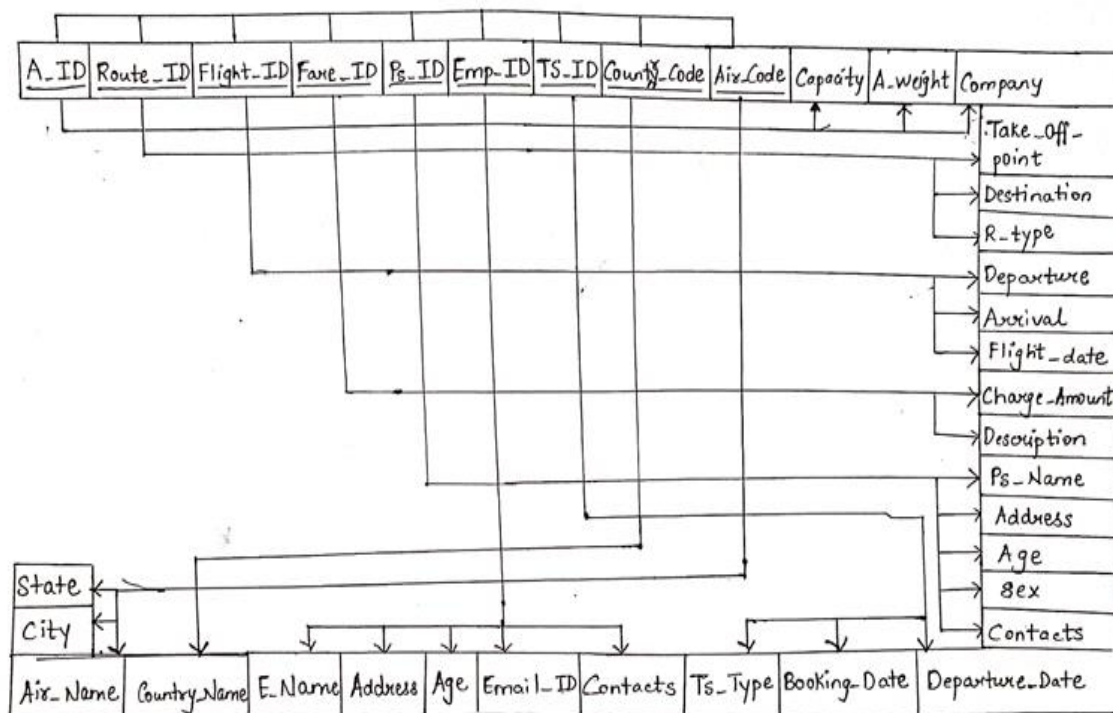
V. Normalization

First Normal Form (1NF) :

For a table to be in the First Normal Form, it should follow the following 4 rules:

1. It should only have single(atomic) valued attributes/columns.

2. Values stored in a column should be of the same domain

3. All the columns in a table should have unique names.

4. And the order in which data is stored, does not matter.

First Normal Form (1NF) :

1NF (A-ID, Route-ID, Flight-ID, Fare-ID, Ps-ID, Emp-ID, TS-ID, Country-Code, Air-Code, Capacity, A-weight, Company, Destination, Take-off-point, R-type, Departure, Arrival, Flight-date, Charge-Amount, Description, Name, Address Age, Sex, Contacts, E-Name, Address, Age, Email-ID, Contacts, Booking-date, Departure-date, TS-type, Country-Name, Air-Name, City, State).

PARTIAL DEPENDENCIES :-
A-ID → Capacity, A-weight, Company
Route-ID → Destination, Take-off-point, R-type
Flight-ID → Departure, Arrival, Flight-date,
Fare-ID → Charge-Amount, Description
Ps-ID → Ps-Name, Address, Age, Sex, Contacts
Emp-ID → E-Name, Address, Age, Email-ID, Contacts
TS-ID → Booking-date, Departure Date, Ts-Type
Country Code → Country-Name
Air-Code → Air-Name, City, State.

Second Normal Form (2NF) :

For a table to be in the Second Normal Form,

    1. It should be in the First Normal form.

    2. And, it should not have Partial Dependency.

2NF :-

- Table name :- Airplane_type

A_ID	Capacity	A-weight	Company

- Table name :- Route

Route_ID	Destination	Take-off-point	R-type

- Table name :- AirFare

Fare_ID	Charge-Amount	Description

- Table name :- Passengers

Ps_ID	Ps-Name	Address	Age	Sex	Contacts

- Table name :- Flight

Flight_ID	Departure	Arrival	Flight_date

- Table name :- Employees.

Emp_ID	E_Name	Address	Age	Email_ID	Contacts

- Table name :- Transactions.

Ts_ID	Booking_Date	Departure_Date	Ts_Type

- Table name:- Countries

Country_Code	Country_Name

- Table name:- Airport

Air_Code	Air_Name	City	State
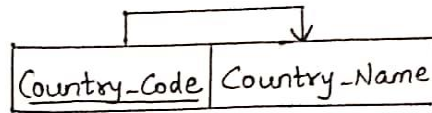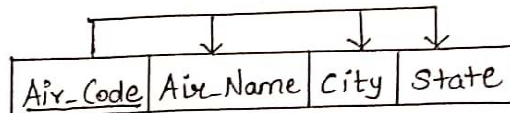
Third Normal Form (3NF) :

A table is said to be in the Third Normal Form when,

1. It is in the Second Normal form.

2. And, it doesn't have Transitive Dependency.

Boyce and Codd Normal Form (BCNF) :

Boyce and Codd Normal Form is a higher version of the Third Normal form. This form deals with certain type of anomaly that is not handled by 3NF. A 3NF table which does not have multiple overlapping candidate keys is said to be in BCNF. For a table to be in BCNF, following conditions must be satisfied:

- R must be in 3rd Normal Form

- and, for each functional dependency ($X \rightarrow Y$), X should be a super Key.

VI. SQL Queries

CREATE TABLE

1. Airplane type

```
CREATE TABLE Airplane_type(
    A_ID INT,
    Capacity INT,
    A_weight INT,
    Company VARCHAR(15),
    PRIMARY KEY(A_ID)
);

INSERT INTO Airplane_type VALUES (738,853,394,'Indigo');
INSERT INTO Airplane_type VALUES (777,800,380,'Vistara');
INSERT INTO Airplane_type VALUES (750,790,364,'AirIndia');
INSERT INTO Airplane_type VALUES (790,850,390,'SpiceJet');
INSERT INTO Airplane_type VALUES (745,770,405,'GoAir');
INSERT INTO Airplane_type VALUES (768,867,387,'AirAsia');
INSERT INTO Airplane_type VALUES (821,790,355,'TruJet');
INSERT INTO Airplane_type VALUES (785,835,410,'Alliance Air');

SELECT * FROM Airplane_type;
```

A_ID	Capacity	A_weight	Company
738	853	394	Indigo
745	770	405	GoAir
750	790	364	AirIndia
768	867	387	AirAsia
777	800	380	Vistara
785	835	410	Alliance Air
790	850	390	SpiceJet
821	790	355	TruJet

2. Route

```
CREATE TABLE Route(
    Route_ID INT,
    Take_Off_point VARCHAR(15),
    Destination VARCHAR(15),
    R_type VARCHAR(15),
    PRIMARY KEY(Route_ID)
);

INSERT INTO Route VALUES(168806,'London','Delhi','Direct');
INSERT INTO Route VALUES(157306,'NewJersey','Mumbai','2Hr Break');
INSERT INTO Route VALUES(178916,'Washington','Jodhpur','3Hr Break');
INSERT INTO Route VALUES(324567,'Chennai','Denmark','Direct');
INSERT INTO Route VALUES(452368,'Chandigard','NewYork','3Hr Break');
INSERT INTO Route VALUES(894521,'Daman','Delhi','Direct');
INSERT INTO Route VALUES(578425,'Beijing','Punjab','Direct');
INSERT INTO Route VALUES(421523,'Hyderabad','Jammu & Kashmir','Direct')

SELECT * FROM Route;
```

Route_ID	Take_Off_point	Destination	R_type
157306	NewJersey	Mumbai	2Hr Break
168806	London	Delhi	Direct
178916	Washington	Jodhpur	3Hr Break
324567	Chennai	Denmark	Direct
421523	Hyderabad	Jammu & Kashmir	Direct
452368	Chandigard	NewYork	3Hr Break
578425	Beijing	Punjab	Direct
894521	Daman	Delhi	Direct

3. FLIGHT

```
CREATE TABLE Flight(
    Flight_ID VARCHAR(15),
    Departure VARCHAR(30),
    Arrival VARCHAR(30),
    Flight_date DATE,
    A_ID INT,
    PRIMARY KEY(Flight_ID),
    FOREIGN KEY (A_ID) REFERENCES Airplane_type(A_ID)
);

INSERT INTO Flight VALUES('AI2014','2021-01-12 08:45am','2021-01-12 10:25pm','2021-01-12',738);
INSERT INTO Flight VALUES('QR2305','2020-12-26 12:05pm','2020-12-27 12:25pm','2020-12-26',777);
INSERT INTO Flight VALUES('EY1234','2021-02-10 05:00am','2021-02-10 10;30pm','2021-02-10',750);
INSERT INTO Flight VALUES('LH9876','2021-02-25 10:15am','2021-02-25 11:00pm','2021-02-25',790);
INSERT INTO Flight VALUES('BA1689','2021-03-02 2:15am','2021-03-02 10:00pm','2021-03-02',745);
INSERT INTO Flight VALUES('AA4367','2021-03-25 12:05am','2021-03-25 02:15am','2021-03-25',768);
INSERT INTO Flight VALUES('CT7812','2021-04-04 2:15pm','2021-04-04 8:00pm','2021-04-04',821);
INSERT INTO Flight VALUES('PF4521','2020-12-25 5:00pm','2020-12-25 10:30pm','2020-12-25',785);

SELECT * FROM Flight;
```

Flight_ID	Departure	Arrival	Flight_date	A_ID
AA4367	2021-03-25 12:05am	2021-03-25 02:15am	2021-03-25	768
AI2014	2021-01-12 08:45am	2021-01-12 10:25pm	2021-01-12	738
BA1689	2021-03-02 2:15am	2021-03-02 10:00pm	2021-03-02	745
CT7812	2021-04-04 2:15pm	2021-04-04 8:00pm	2021-04-04	821
EY1234	2021-02-10 05:00am	2021-02-10 10:30pm	2021-02-10	750
LH9876	2021-02-25 10:15am	2021-02-25 11:00pm	2021-02-25	790
PF4521	2020-12-25 5:00pm	2020-12-25 10:30pm	2020-12-25	785
QR2305	2020-12-26 12:05pm	2020-12-27 12:25pm	2020-12-26	777

4. AIRFARE

```
CREATE TABLE AirFare(
    Fare_ID INT,
    Charge_Amount INT,
    Description VARCHAR(25),
    Flight_ID VARCHAR(15),
    PRIMARY KEY(Fare_ID),
    FOREIGN KEY (Flight_ID) REFERENCES Flight(Flight_ID)
);
```

```
INSERT INTO AirFare VALUES(1,27341,'Standard Single','AI2014');
INSERT INTO AirFare VALUES(4,34837,'Standard Return','QR2305');
INSERT INTO AirFare VALUES(2,42176,'Key Fare Single','EY1234');
INSERT INTO AirFare VALUES(3,27373,'Business Return','LH9876');
INSERT INTO AirFare VALUES(6,44592,'Advanced Purchase','BA1689');
INSERT INTO AirFare VALUES(5,8777,'Superpex Return','AA4367');
INSERT INTO AirFare VALUES(7,9578,'Standard Return','CT7812');
INSERT INTO AirFare VALUES(8,4459,'Superpex Return','PF4521');
```

SELECT * FROM AirFare;

Fare_ID	Charge_Amount	Description	Flight_ID
1	27341	Standard Single	AI2014
2	42176	Key Fare Single	EY1234
3	27373	Business Return	LH9876
4	34837	Standard Return	QR2305
5	8777	Superpex Return	AA4367
6	44592	Advanced Purchase	BA1689
7	9578	Standard Return	CT7812
8	4459	Superpex Return	PF4521

5. Passengers

```
CREATE TABLE Passengers(
    Ps_ID INT,
    Ps_Name VARCHAR(20),
    Address VARCHAR(50),
    Age INT,
    Sex VARCHAR(1),
    Contacts VARCHAR(10),
    Flight_ID VARCHAR(15),
    PRIMARY KEY(Ps_ID),
    FOREIGN KEY (Flight_ID) REFERENCES Flight(Flight_ID)
);
```

INSERT INTO Passengers VALUES(1,'Steve Smith','2230 Northside,Apt 11,London',30,'M','8080367290','AI2014');
INSERT INTO Passengers VALUES(2,'Ankita Ahir','3456 Vikas Apts,Apt 102,New Jersey',26,'F','8080367280','QR2305');
INSERT INTO Passengers VALUES(4,'Akhilesh Joshi','345 Chatam courts,Apt 678, Chennai',29,'M','9080369290','EY1234');
INSERT INTO Passengers VALUES(3,'Khyati Mishra','7820 Mccallum courts,Apt 234,Washington',30,'F','8082267280','LH9876');
INSERT INTO Passengers VALUES(5,'Rom Solanki','1234 Baker Apts,Apt 208,Chandigard',60,'M','9004568903','EY1234’);
INSERT INTO Passengers VALUES(6,'Lakshmi Sharma','1110 Fir hills,Apt 90,Daman',30,'F','7666190505','AA4367');

INSERT INTO Passengers VALUES(8,'Manan Lakhani','7720 Mccallum Blvd,Apt 7 7,Beijing',45,'M','8124579635','CT7812');
INSERT INTO Passengers VALUES(7,'Ria Gupta','B-402,Aditya Apt,Hyderabad',34,'F','9819414036','EY1234');

SELECT * FROM Passengers;

Ps_ID	Ps_Name	Address	Age	Sex	Contacts	Flight_ID
1	Steve Smith	2230 Northside,Apt 11,London	30	M	8080367290	AI2014
2	Ankita Ahir	3456 Vikas Apts,Apt 102,New Jersey	26	F	8080367280	QR2305
3	Khyati Mishra	7820 Mccallum courts,Apt 234,Washington	30	F	8082267280	LH9876
4	Akhilesh Joshi	345 Chatam courts,Apt 678,Chennai	29	M	9080369290	EY1234
5	Rom Solanki	1234 Baker Apts,Apt 208,Chandigard	60	M	9004568903	EY1234
6	Lakshmi Sharma	1110 Fir hills,Apt 90,Daman	30	F	7666190505	AA4367
7	Ria Gupta	B-402,Aditya Apt,Hyderabad	34	F	9819414036	EY1234
8	Manan Lakhani	7720 Mccallum Blvd,Apt 77,Beijing	45	M	8124579635	CT7812

6. Countries

```
CREATE TABLE Countries(
    Country_code INT,
    Country_Name VARCHAR(20),
    PRIMARY KEY(Country_code)
);

INSERT INTO Countries VALUES (+44,'England');
INSERT INTO Countries VALUES (+1,'USA');
INSERT INTO Countries VALUES (+91,'India');
INSERT INTO Countries VALUES (+45,'Kingdom of Denmark');
INSERT INTO Countries VALUES (+64,'New Zealand');
INSERT INTO Countries VALUES (+971,'UAE');
INSERT INTO Countries VALUES (+213,'Algeria');
INSERT INTO Countries VALUES (+55,'Brazil');


SELECT * FROM Countries;
```

Country_code	Country_Name
1	USA
44	England
45	Kingdom of Denmark
55	Brazil
64	New Zealand
91	India
213	Algeria
971	UAE

7. Airport

```
CREATE TABLE Airport(
    Air_code VARCHAR(10),
    Air_Name VARCHAR(50),
    City VARCHAR(20),
    State VARCHAR(20),
    Country_code INT,
    PRIMARY KEY(Air_code),
    FOREIGN KEY (Country_code) REFERENCES Countries(Country_code)
);
```

```
INSERT INTO Airport VALUES('DEL','Indira Gandhi International Airport','Delhi','UP',+91);
INSERT INTO Airport VALUES('BOM','Chhatrapati Shivaji Maharaj International Airport','Mumbai','Maharashtra',+91);
INSERT INTO Airport VALUES('LCY','London City Airport','Newham','London',+44);
INSERT INTO Airport VALUES('EWR','Newark Liberty International Airport','Newark','New Jersey',+1);
INSERT INTO Airport VALUES('JFK','John F.Kennnedy International Airport','New York City','New York',+1);
```

INSERT INTO Airport VALUES('CPH','Copenhagen Airport','Copenhagen','Denmark',+45);
INSERT INTO Airport VALUES('AIP','Adampur Airport','Jalandhar','Punjab',+91);
INSERT INTO Airport VALUES('IXJ','Satwari Airport','Jammu','Jammu & Kashmir',+91);

SELECT * FROM Airport;

Air_code	Air_Name	City	State	Country_code
AIP	Adampur Airport	Jalandhar	Punjab	91
BOM	Chhatrapati Shivaji Maharaj International Airport	Mumbai	Maharashtra	91
CPH	Copenhagen Airport	Copenhagen	Denmark	45
DEL	Indira Gandhi International Airport	Delhi	UP	91
EWR	Newark Liberty International Airport	Newark	New Jersey	1
IXJ	Satwari Airport	Jammu	Jammu & Kashmir	91
JFK	John F.Kennnedy International Airport	New York City	New York	1
LCY	London City Airport	Newham	London	44

8. Employees

```
CREATE TABLE Employees(
    Emp_ID INT,
    E_Name VARCHAR(20),
    Address VARCHAR(50),
    Age INT,
    Email_ID VARCHAR(20),
    Contact VARCHAR(20),
    Air_code VARCHAR(10),
    PRIMARY KEY(Emp_ID),
    FOREIGN KEY (Air_code) REFERENCES Airport(Air_code)
);
```

INSERT INTO Employees VALUES(1234,'Rekha Tiwary','202-Meeta Apt,Yogi Nagar,Mumbai',30,'rekha1234@gmail.com','+918530324018','DEL');
INSERT INTO Employees VALUES(3246,'John Dsouza','302-Fountain Apt,ElizaBeth Street, Newham',26,'john2346@gmail.com','+447911123456','BOM');

INSERT INTO Employees VALUES(9321,'Sanjay Rathod','62-Patwa Apt,Pradeep Nagar,
Delhi',36,'sanjay78@gmail.com','+917504681201','LCY');
INSERT INTO Employees VALUES(8512,'Hafsa Iqmar','1023-
Prajwal Apt,Newark',41,
 'hafsa964@gmail.com','6465554468','EWR');
INSERT INTO Employees VALUES(7512,'Akshay Sharma','Akshay Villa,Queens St
reet,Copenhagen',20,'akshay27@gmail.com','+45886443210','JFK');
INSERT INTO Employees VALUES(5123,'Lara Jen','28-
Mark road,Victoria street,New York
City',31,'jenlara4@gmail.com','+448000751234','CPH');
INSERT INTO Employees VALUES(2458,'Johny Paul','45-
Balaji Apt,Ajit Nagar,Jalandar',32,
 'johnypaul8@gmail.com','+919785425154','AIP');
INSERT INTO Employees VALUES(4521,'Nidhi Maroliya','6-
Matruchaya Apt,Park Road,
Jammu',31,'nidhi785@gmail.com','+918211954901','IXJ');

SELECT * FROM Employees;

Emp_ID	E_Name	Address	Age	Email_ID	Contact	Air_code
1234	Rekha Tiwary	202-Meeta Apt,Yogi Nagar,Mumbai	30	rekha1234@gmail.com	+918530324018	DEL
2458	Johny Paul	45-Balaji Apt,Ajit Nagar,Jalandar	32	johnypaul8@gmail.com	+919785425154	AIP
3246	John Dsouza	302-Fountain Apt,ElizaBeth Street,Newham	26	john2346@gmail.com	+447911123456	BOM
4521	Nidhi Maroliya	6-Matruchaya Apt,Park Road,Jammu	31	nidhi785@gmail.com	+918211954901	IXJ
5123	Lara Jen	28-Mark road,Victoria street,New York City	31	jenlara4@gmail.com	+448000751234	CPH
7512	Akshay Sharma	Akshay Villa,Queens Street,Copenhagen	20	akshay27@gmail.com	+45886443210	JFK
8512	Hafsa Iqmar	1023-Prajwal Apt,Newark	41	hafsa964@gmail.com	6465554468	EWR
9321	Sanjay Rathod	62-Patwa Apt,Pradeep Nagar,Delhi	36	sanjay78@gmail.com	+917504681201	LCY

9. Can_Land

```
CREATE TABLE Can_Land(
    Air_code VARCHAR(10),
    Flight_ID VARCHAR(15),
    PRIMARY KEY(Air_code,Flight_ID),
    FOREIGN KEY(Air_code) REFERENCES Airport(Air_code),
    FOREIGN KEY(Flight_ID) REFERENCES Flight(Flight_ID)
);
```

INSERT INTO Can_Land VALUES('DEL','AI2014');
INSERT INTO Can_Land VALUES('BOM','QR2305');
INSERT INTO Can_Land VALUES('LCY','EY1234');

```
INSERT INTO Can_Land VALUES('EWR','LH9876');
INSERT INTO Can_Land VALUES('JFK','BA1689');
INSERT INTO Can_Land VALUES('CPH','AA4367');
INSERT INTO Can_Land VALUES('AIP','CT7812');
INSERT INTO Can_Land VALUES('IXJ','PF4521');

SELECT * FROM Can_Land;
```

Air_code	Flight_ID
CPH	AA4367
DEL	AI2014
JFK	BA1689
AIP	CT7812
LCY	EY1234
EWR	LH9876
IXJ	PF4521
BOM	QR2305

10. Transactions

```
CREATE TABLE Transactions(
    TS_ID INT,
    Booking_Date DATE,
    Departure_Date DATE,
    TS_Type VARCHAR(20),
    Emp_ID INT,
    Ps_ID INT,
    Flight_ID VARCHAR(15),
    Charge_Amount INT,
    PRIMARY KEY(TS_ID),
    FOREIGN KEY (Emp_ID) REFERENCES Employees(Emp_ID) ,
    FOREIGN KEY (Ps_ID) REFERENCES Passengers(Ps_ID),
    FOREIGN KEY (Flight_ID) REFERENCES Flight(Flight_ID),
    FOREIGN KEY (Charge_Amount) REFERENCES AirFare(Fare_ID)
);

INSERT INTO Transactions VALUES(12345678,'2021-02-21','2021-02-
22','Google Pay',1234,1,'AI2014',27341);
INSERT INTO Transactions VALUES(45612789,'2021-01-12','2021-01-
14','Credit Card',3246,2,'QR2305',34837);
INSERT INTO Transactions VALUES(56987123,'2020-12-05','2020-12-
02','Paytm',9321,4,'EY1234',42176);
INSERT INTO Transactions VALUES(45321879,'2021-03-15','2021-03-
16','PhonePe',8512,3,'LH9876',27373);
INSERT INTO Transactions VALUES(75145863,'2021-04-22','2021-04-
25','Paytm',7512,5,'EY1234',44592);
```

INSERT INTO Transactions VALUES(17892455,'2021-02-05','2021-02-08','Paytm',5123,6,'AA4367',8777);
INSERT INTO Transactions VALUES(24517852,'2021-03-06','2021-03-08','PhonePe',2458,8,'CT7812',9578);
INSERT INTO Transactions VALUES(32548525,'2021-01-20','2021-01-25','Credit Card',4521,7,'EY1234',4459);

SELECT * FROM Transactions;

TS_ID	Booking_Date	Departure_Date	TS_Type	Emp_ID	Ps_ID	Flight_ID	Charge_Amount
12345678	2021-02-21	2021-02-22	Google Pay	1234	1	AI2014	27341
17892455	2021-02-05	2021-02-08	Paytm	5123	6	AA4367	8777
24517852	2021-03-06	2021-03-08	PhonePe	2458	8	CT7812	9578
32548525	2021-01-20	2021-01-25	Credit Card	4521	7	EY1234	4459
45321879	2021-03-15	2021-03-16	PhonePe	8512	3	LH9876	27373
45612789	2021-01-12	2021-01-14	Credit Card	3246	2	QR2305	34837
56987123	2020-12-05	2020-12-02	Paytm	9321	4	EY1234	42176
75145863	2021-04-22	2021-04-25	Paytm	7512	5	EY1234	44592

10.Travels_on

CREATE TABLE Travels_on(
    Route_ID INT,
    Flight_ID VARCHAR(15),
    PRIMARY KEY(Route_ID,Flight_ID),
    FOREIGN KEY(Route_ID) REFERENCES Route(Route_ID),
    FOREIGN KEY(Flight_ID) REFERENCES Flight(Flight_ID)
);

INSERT INTO Travels_on VALUES(168806,'AI2014');
INSERT INTO Travels_on VALUES(157306,'QR2305');
INSERT INTO Travels_on VALUES(178916,'EY1234');
INSERT INTO Travels_on VALUES(324567,'LH9876');
INSERT INTO Travels_on VALUES(452368,'BA1689');
INSERT INTO Travels_on VALUES(894521,'AA4367');
INSERT INTO Travels_on VALUES(578425,'CT7812');
INSERT INTO Travels_on VALUES(421523,'PF4521');

SELECT * FROM Travels_on;

Route_ID	Flight_ID
894521	AA4367
168806	AI2014
452368	BA1689
578425	CT7812
178916	EY1234
324567	LH9876
421523	PF4521
157306	QR2305

SQL QUERIES

1. Display the flight id and Passenger name travelling by Indigo Company.

```
SELECT F.Flight_ID, P.Ps_Name
FROM Airplane_type as A, Flight as F, Passengers as P
WHERE A.A_ID = F.A_ID AND
        F.Flight_ID = P.Flight_ID AND
        A.Company = 'Indigo';
```


Flight_ID	Ps_Name
AI2014	Steve Smith

2. Display the route information for all flights.

```
SELECT A.Company, R.Take_Off_point, R.Destination
FROM Airplane_type as A, Flight as F ,Travels_on as T, Route as R
WHERE F.Flight_ID = T.Flight_ID
        AND A.A_ID = F.A_ID
        AND T.Route_ID = R.Route_ID;
```

Company	≡	Take_Off_point		Destination
Indigo		London		Delhi
GoAir		Chandigard		NewYork
AirIndia		Washington		Jodhpur
AirAsia		Daman		Delhi
Vistara		NewJersey		Mumbai
Alliance Air		Hyderabad		Jammu & Kashmir
SpiceJet		Chennai		Denmark
TruJet		Beijing		Punjab

3. Find the Employee-id of all employees whose name includes the substring John.

```
SELECT Emp_ID, E_Name
FROM Employees
WHERE E_Name LIKE '%John%';
```

Emp_ID		E_Name
2458		Johny Paul
3246		John Dsouza

3. Find the sum of transaction charge amount travelled by flight -id= EY1234 for each transaction type.

```
SELECT SUM(Charge_Amount) as total_charge, TS_Type
FROM Transactions
WHERE Flight_ID = 'EY1234'
GROUP BY TS_Type;
```

total_charge	TS_Type
4459	Credit Card
86768	Paytm

5.
List in alphabetical order the names of all passengers travelling by flight-id EY1234.

```
SELECT P.*
  FROM Passengers as P, Flight as F
  WHERE P.Flight_ID = F.Flight_ID AND
        F.Flight_ID = 'EY1234'
  ORDER BY Ps_Name;
```

Ps_ID	Ps_Name	Address	Age	Sex	Contacts	Flight_ID
4	Akhilesh Joshi	345 Chatam courts,Apt 678,Chennai	29	M	9080369290	EY1234
7	Ria Gupta	B-402,Aditya Apt,Hyderabad	34	F	9819414036	EY1234
5	Rom Solanki	1234 Baker Apts,Apt 208,Chandigard	60	M	9004568903	EY1234

6.Display the companyname whose flight will be landed in mumba i airport.

```
SELECT Company, A_ID
FROM Airplane_type
WHERE A_ID in (SELECT A_ID
               FROM Flight
               WHERE Flight_ID in (SELECT Flight_ID
                                   FROM Can_Land
                                   WHERE Air_code in (SELECT Air_code
                                                      FROM Airport
                                                      WHERE City = 'Mumbai')));
```

Company	A_ID
Vistara	777

7. Find the Transaction-type whose transaction amount is greater than Google Pay transaction-type.

```
SELECT Charge_Amount, TS_Type
FROM Transactions
WHERE Charge_Amount > some (SELECT Charge_Amount
                           FROM Transactions
                           WHERE TS_Type = 'Google Pay');
```

Charge_Amount	TS_Type
27373	PhonePe
34837	Credit Card
42176	Paytm
44592	Paytm

8. Find all country name with more than one airport.

```
SELECT Country_Name, count(*) as Airport_count
FROM Airport as A,Countries as C
WHERE A.Country_code = C.Country_code
GROUP BY C.Country_name
HAVING count(*) > 1;
```

Country_Name	Airport_count
India	4
USA	2

9. Find the largest charge-amount of any transaction-type.

```
SELECT max(total_bal) as largest_transaction
FROM (SELECT  TS_Type, sum(Charge_Amount) as total_bal
        FROM Transactions
        GROUP BY  TS_Type) as result;
```

largest_transaction

95545

10. Find the Fare-id of those with Charge-amount between 20000 and 35000.

```
SELECT Fare_ID, Charge_Amount
FROM AirFare
WHERE Charge_Amount BETWEEN 20000 AND 35000 ;
```

Fare_ID ≡	Charge_Amount
1	27341
3	27373
4	34837

11. Find the average charge-amount of those Transaction_type whose Average charge amount is greater than 20,000.

```
SELECT TS_Type, avg_bal
FROM (SELECT TS_Type, avg(Charge_Amount) as avg_bal
        FROM Transactions
GROUP BY TS_Type) as result
WHERE avg_bal > 20000;
```

TS_Type	avg_bal
Google Pay	27341.0000
Paytm	31848.3333

12. Increase the charge-amount by 5% whose class is Superex Return.

```
UPDATE AirFare
SET Charge_Amount = Charge_Amount * 1.05
WHERE Description = 'Superpex Return';
```

Initial AirFare Table

Fare_ID	Charge_Amount	Description	Flight_ID
1	27341	Standard Single	AI2014
2	42176	Key Fare Single	EY1234
3	27373	Business Return	LH9876
4	34837	Standard Return	QR2305
5	8777	Superpex Return	AA4367
6	44592	Advanced Purchase	BA1689
7	9578	Standard Return	CT7812
8	4459	Superpex Return	PF4521

AirFare Table after 5% increase

Fare_ID	Charge_Amount	Description	Flight_ID
1	27341	Standard Single	AI2014
2	42176	Key Fare Single	EY1234
3	27373	Business Return	LH9876
4	34837	Standard Return	QR2305
5	9216	Superpex Return	AA4367
6	44592	Advanced Purchase	BA1689
7	9578	Standard Return	CT7812
8	4682	Superpex Return	PF4521

13. Display the country-name that does not have an airport.

SELECT Country_code, Country_Name
FROM Countries
WHERE Country_code NOT IN (SELECT Country_code
                                            FROM Airport);

Country_code	Country_Name
55	Brazil
64	New Zealand
213	Algeria
971	UAE

14. Display All the counties that may have or may not have the Airport.

SELECT *
FROM Countries NATURAL LEFT OUTER JOIN Airport;

Country_code	Country_Name	Air_code	Air_Name	City	State
1	USA	EWR	Newark Liberty International Airport	Newark	New Jersey
1	USA	JFK	John F.Kennnedy International Airport	New York City	New York
44	England	LCY	London City Airport	Newham	London
45	Kingdom of Denmark	CPH	Copenhagen Airport	Copenhagen	Denmark
55	Brazil	NULL	NULL	NULL	NULL
64	New Zealand	NULL	NULL	NULL	NULL
91	India	AIP	Adampur Airport	Jalandhar	Punjab
91	India	BOM	Chhatrapati Shivaji Maharaj International Airport	Mumbai	Maharashtra
91	India	DEL	Indira Gandhi International Airport	Delhi	UP
91	India	IXJ	Satwari Airport	Jammu	Jammu & Kashmir