DBT-ASSIGNMENT 1

NAME: SAHANA RAO	SRN: PES1UG20CS588	SECTION: J

RELATIONAL SCHEMA

AIRPORT

AID	Name	City

FLIGHT

FID	Company	Source	Destination	ArrivalTime	DeptTime	Capacity	TimeOfFly

Passenger

SSN	Name	DOB	Age	Gender	Phone_no

Ticket

TID	SSN	Fid	Class	SeatNo

ER DIAGRAM:

AIRPORT MANAGEMENT SYSTEM
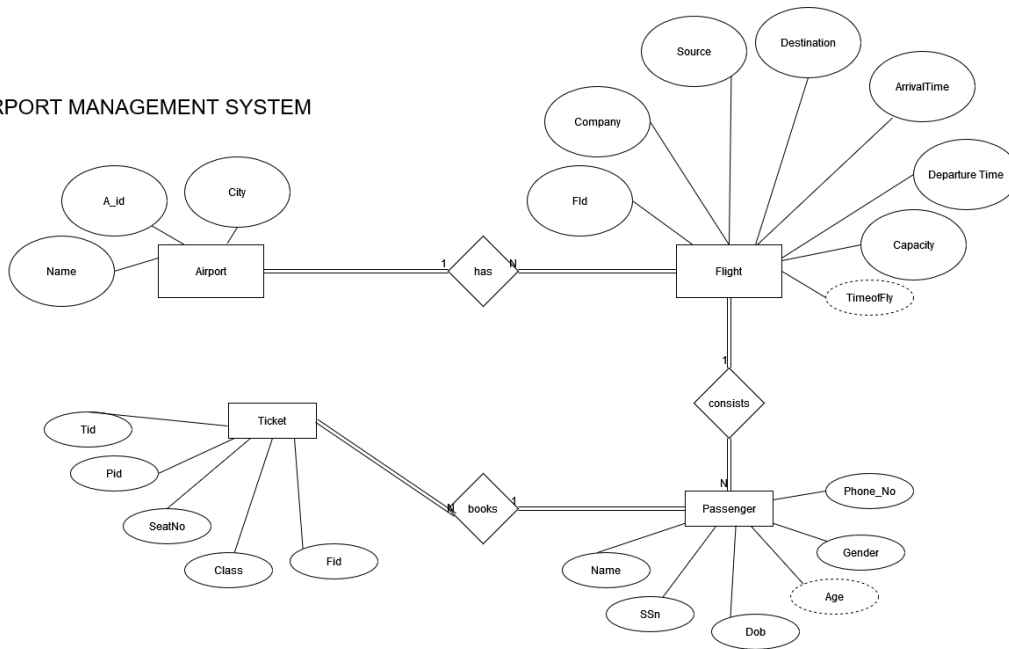
PES1UG20CS588

CREATION AND INSERTION OF VALUES:


```
CREATE TABLE airp ( airport_id INT PRIMARY KEY, airport_name VARCHAR(255) NOT NULL, city VARCHAR(255) NOT NULL);
```

[Edit inline] [Edit] [Create PHP code]


```
CREATE TABLE flights ( flight_id INT PRIMARY KEY, company varchar(50) NOT NULL, source varchar(50) NOT NULL, destination varchar(50) NOT NULL, departure_time DATETIME NOT NULL, arrival_time DATETIME NOT NULL, capacity int, TimeOfFly int );
```

[Edit inline] [Edit] [Create PHP code]

```
CREATE TABLE passengers ( SSN INT PRIMARY KEY, first_name VARCHAR(255) NOT NULL, last_name VARCHAR(255) NOT NULL, dob date NOT NULL, age int, gender varchar(50), phone_number VARCHAR(255) NOT NULL );
```

[Edit inline] [Edit] [Create PHP code]

```
CREATE TABLE Ticket ( tid INT PRIMARY KEY, SSN INT NOT NULL, flight_id INT NOT NULL, class varchar(50), seat_no int not null, FOREIGN KEY (SSN) REFERENCES passengers (SSN), FOREIGN KEY (flight_id) REFERENCES flights (flight_id) );
```

[Edit inline] [Edit] [Create PHP code]

QUERIES:

Airport table:

```
MariaDB [(none)]> use airport_588
Database changed
MariaDB [airport_588]> select * from airp;
+------------+----------------------------------------------+------------+
| airport_id | airport_name                                 | city       |
+------------+----------------------------------------------+------------+
|          1 | Mangaluru Int Port                           | Mangaluru  |
|          2 | Kempegowda Int Airport                        | Bangalore  |
|          3 | Indira Gandhi Int Airport                     | Delhi      |
|          4 | Meenambakkam Int Airport                      | Chennai    |
|          5 | Chatrapati Shivaji Int Airport                | Mumbai     |
|          6 | Rajiv Gandhi Int Airport                      | Hyderabad  |
|          7 | Dabolim Int Airport                           | Panaji     |
|          8 | Netaji Subhash Chandra Bose Int Airport       | Kolakata   |
|          9 | Lokpriya Gopinath Bordoloi Int Airport        | Guwahati   |
|         10 | Veer Savarkar Int Airport                     | Port Blair |
+------------+----------------------------------------------+------------+
10 rows in set (0.001 sec)

MariaDB [airport_588]>
```

```
MariaDB [airport_588]> select count(*) from airp;
+----------+
| count(*) |
+----------+
|       10 |
+----------+
1 row in set (0.001 sec)

MariaDB [airport_588]>
```

Ticket Table

```
MariaDB [airport_588]> select * from flights;
+-----------+----------+----------+-------------+---------------------+---------------------+----------+----------+
| flight_id | company  | source   | destination | departure_time      | arrival_time        | capacity | TimeOfFly |
+-----------+----------+----------+-------------+---------------------+---------------------+----------+----------+
|        10 | Qatar    | Mangaluru | Chennai     | 2023-03-14 09:05:02 | 2023-03-14 10:05:02 |      150 |        1 |
|        15 | AirIndia | Chennai  | Bengaluru   | 2023-03-15 12:05:02 | 2023-03-15 14:05:02 |       90 |        2 |
|        25 | IndiGo   | Mangaluru | Chennai     | 2023-03-14 13:09:26 | 2023-03-14 15:09:26 |      110 |        2 |
|        30 | SpiceJet | Chennai  | Mangaluru   | 2023-03-30 21:09:26 | 2023-03-30 22:09:26 |       86 |        1 |
|        35 | IndiGo   | Kolkata  | Bangalore   | 2023-04-01 12:13:23 | 2023-04-01 14:13:23 |      125 |        2 |
|        40 | AirIndia | Guwahati | Delhi       | 2023-03-18 12:13:23 | 2023-03-18 13:13:23 |       45 |        2 |
|        45 | SpiceJet | Mumbai   | Delhi       | 2023-03-22 05:13:23 | 2023-03-22 07:13:23 |      150 |        2 |
|        60 | Qatar    | Chennai  | Mumbai      | 2023-03-26 10:30:00 | 2023-03-26 11:30:00 |       79 |        1 |
|        65 | AirIndia | Delhi    | Bengaluru   | 2023-03-29 21:13:23 | 2023-03-30 00:13:23 |      115 |        3 |
|        70 | AirIndia | Delhi    | Bengaluru   | 2023-03-29 13:13:23 | 2023-03-29 15:13:23 |      115 |        2 |
+-----------+----------+----------+-------------+---------------------+---------------------+----------+----------+
10 rows in set (0.001 sec)

MariaDB [airport_588]> select count(*) from flights;
+----------+
| count(*) |
+----------+
|       10 |
+----------+
1 row in set (0.000 sec)
```

Passengers Table

```
MariaDB [airport_588]> select * from passengers;
+-----+------------+-----------+------------+------+--------+--------------+
| SSN | first_name | last_name | dob        | age  | gender | phone_number |
+-----+------------+-----------+------------+------+--------+--------------+
| 123 | Sahana     | Rao       | 2002-10-29 |   20 | F      | 9141789654   |
| 159 | Disha      | Rai       | 1995-05-13 |   28 | F      | 7989879879   |
| 357 | Krishna    | Bharadwaj | 1994-06-15 |   29 | F      | 9786541203   |
| 546 | Adi        | Sharma    | 1980-03-28 |   42 | M      | 9765231832   |
| 741 | Reshma     | Bhat      | 1960-03-23 |   63 | F      | 76666999952  |
| 762 | Sanjana    | Hegde     | 2010-03-09 |   13 | F      | 9463152897   |
| 789 | Yash       | J         | 1999-09-24 |   24 | M      | 7631963189   |
| 842 | Rahul      | Deshpande | 1988-02-01 |   35 | M      | 7332211445   |
| 852 | Des        | Shetty    | 1995-03-08 |   28 | M      | 8648946586   |
| 963 | Priya      | V         | 2010-03-14 |   13 | F      | 9377763444   |
+-----+------------+-----------+------------+------+--------+--------------+
10 rows in set (0.000 sec)

MariaDB [airport_588]> select count(*) from passengers;
+----------+
| count(*) |
+----------+
|       10 |
+----------+
1 row in set (0.001 sec)

MariaDB [airport_588]>
```

Flights Table

```
MariaDB [airport_588]> select * from ticket;
+-----+-----+-----------+----------+---------+
| tid | SSN | flight_id | class    | seat_no |
+-----+-----+-----------+----------+---------+
|  90 | 546 |        15 | Business |      10 |
|  95 | 123 |        10 | Economy  |      15 |
| 100 | 789 |        15 | Economy  |      77 |
| 101 | 963 |        15 | Business |      45 |
| 102 | 842 |        70 | Business |      11 |
| 103 | 852 |        70 | Economy  |       2 |
| 104 | 357 |        25 | Economy  |      41 |
| 105 | 741 |        45 | Economy  |      12 |
| 106 | 762 |        60 | Business |      41 |
| 107 | 159 |        30 | Business |      12 |
+-----+-----+-----------+----------+---------+
10 rows in set (0.001 sec)

MariaDB [airport_588]> select count(*) from ticket;
+----------+
| count(*) |
+----------+
|       10 |
+----------+
1 row in set (0.001 sec)

MariaDB [airport_588]>
```

Explain without indexing

Table : passengers:

Display all passengers with first letter of first_name : 'S'

```
MariaDB [airport_588]> select * from passengers where first_name like 'S%';
+-----+------------+-----------+------------+------+--------+--------------+
| SSN | first_name | last_name | dob        | age  | gender | phone_number |
+-----+------------+-----------+------------+------+--------+--------------+
| 123 | Sahana     | Rao       | 2002-10-29 |  20  | F      | 9141789654   |
| 762 | Sanjana    | Hegde     | 2010-03-09 |  13  | F      | 9463152897   |
+-----+------------+-----------+------------+------+--------+--------------+
2 rows in set (0.001 sec)
```

Using Explain keyword:

```
MariaDB [airport_588]> explain format=Json select * from passengers where first_name like 'S%';
+-------------------------------------------------------------------------------------------------------
-------------------------------------------------------------------------+
| EXPLAIN

+-------------------------------------------------------------------------------------------------------
-------------------------------------------------------------------------+
| {
  "query_block": {
    "select_id": 1,
    "table": {
      "table_name": "passengers",
      "access_type": "ALL",
      "rows": 10,
      "filtered": 100,
      "attached_condition": "passengers.first_name like 'S%'"
    }
  }
} |
+-------------------------------------------------------------------------------------------------------
-------------------------------------------------------------------------+
1 row in set (0.002 sec)

MariaDB [airport_588]> z
```

In the above query, all 10 rows are searched to obtain names starting from letter : S

Creating index on first name :

```
MariaDB [airport_588]> create index fname_index on passengers(first_name);
Query OK, 0 rows affected (0.027 sec)
Records: 0  Duplicates: 0  Warnings: 0

MariaDB [airport_588]>
```

Running the query again:

```
MariaDB [airport_588]> select * from passengers where first_name like 'S%';
+------+------------+-----------+------------+------+--------+--------------+
| SSN  | first_name | last_name | dob        | age  | gender | phone_number |
+------+------------+-----------+------------+------+--------+--------------+
| 123  | Sahana     | Rao       | 2002-10-29 |   20 | F      | 9141789654   |
| 762  | Sanjana    | Hegde     | 2010-03-09 |   13 | F      | 9463152897   |
+------+------------+-----------+------------+------+--------+--------------+
2 rows in set (0.027 sec)

MariaDB [airport_588]>
```

The output remains the same.

Analysing the same with 'explain':

```
MariaDB [airport_588]> explain format=Json select * from passengers where first_name like 'S%';
+---------------------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------------
----------------------------------------------------+
| EXPLAIN

                                                  |
+---------------------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------------
----------------------------------------------------+
| {
  "query_block": {
    "select_id": 1,
    "table": {
      "table_name": "passengers",
      "access_type": "range",
      "possible_keys": ["fname_index"],
      "key": "fname_index",
      "key_length": "1022",
      "used_key_parts": ["first_name"],
      "rows": 2,
      "filtered": 100,
      "index_condition": "passengers.first_name like 'S%'"
    }
  }
} |
+---------------------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------------
----------------------------------------------------+
1 row in set (0.001 sec)
```

Note: the number of rows queried now reduces to 2.Thereby proving that indexing reduces time to query.

Table :

Display all the airport id's and corresponding source name.

<<Joining two tables airp and flights>>

```
MariaDB [airport_588]> select distinct airport_id,source from flights,airp where source=city;
+------------+-----------+
| airport_id | source    |
+------------+-----------+
|          1 | Mangaluru |
|          3 | Delhi     |
|          4 | Chennai   |
|          5 | Mumbai    |
|          9 | Guwahati  |
+------------+-----------+
5 rows in set (0.001 sec)

MariaDB [airport_588]>
```

Using explain keyword:

```
MariaDB [airport_588]> explain format=json select airport_id,source from flights,airp where source=city;
+-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------+
| EXPLAIN

  |
+-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------+
| {
  "query_block": {
    "select_id": 1,
    "table": {
      "table_name": "flights",
      "access_type": "ALL",
      "rows": 10,
      "filtered": 100
    },
    "block-nl-join": {
      "table": {
        "table_name": "airp",
        "access_type": "ALL",
        "rows": 10,
        "filtered": 100
      },
      "buffer_type": "flat",
      "buffer_size": "2Kb",
      "join_type": "BNL",
      "attached_condition": "flights.`source` = airp.city"
    }
  }
} |
+-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------+
1 row in set (0.001 sec)

MariaDB [airport_588]>
```

Note : total of 20 rows are observed

Creating index on city of airp table source of flights table:

```
MariaDB [airport_588]> create index city_index on airp(city);
Query OK, 0 rows affected (0.020 sec)
Records: 0  Duplicates: 0  Warnings: 0

MariaDB [airport_588]> create index source_index on flights(source);
Query OK, 0 rows affected (0.051 sec)
Records: 0  Duplicates: 0  Warnings: 0

MariaDB [airport_588]>
```

Running the query again:

```
Records: 0  Duplicates: 0  Warnings: 0

MariaDB [airport_588]> select distinct airport_id,source from flights,airp where source=city;
+------------+-----------+
| airport_id | source    |
+------------+-----------+
|          4 | Chennai   |
|          3 | Delhi     |
|          9 | Guwahati  |
|          1 | Mangaluru |
|          5 | Mumbai    |
+------------+-----------+
5 rows in set (0.001 sec)

MariaDB [airport_588]>
```

Output remains the same.

Checking with explain:

```
MariaDB [airport_588]> explain format=json select distinct airport_id,source from flights,airp where source=city;
+---------------------------------------------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------------------------------------
-------------------------------
| EXPLAIN



                        |
+---------------------------------------------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------------------------------------
---------------------------------------------------------------------------------------------------------------------------
-------------------------------
| {
  "query_block": {
    "select_id": 1,
    "temporary_table": {
      "table": {
        "table_name": "airp",
        "access_type": "index",
        "possible_keys": ["city_index"],
        "key": "city_index",
        "key_length": "1022",
        "used_key_parts": ["city"],
        "rows": 10,
        "filtered": 100,
        "using_index": true
      },
      "table": {
        "table_name": "flights",
        "access_type": "ref",
        "possible_keys": ["source_index"],
        "key": "source_index",
        "key_length": "202",
        "used_key_parts": ["source"],
        "ref": ["airport_588.airp.city"],
        "rows": 1,
        "filtered": 100,
        "attached_condition": "flights.`source` = airp.city",
        "using_index": true
      }
    }
  }
} |
+---------------------------------------------------------------------------------------------------------------------------
```

Do note that only one row is read from flights table rather than reading all 10 rows.

Hence, in the presence of index on the attribute, the search happens based on the index which proves to be faster over full table scan. It is more effective in the presence of large number of tuples.