Project Report for
Database Management Systems

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DBMS

PROJECT REPORT

ON

AIRPORT MANAGEMENT SYSTEM

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INTRODUCTION:

A Database Management System (DBMS) for an airport involves organizing and storing data related to flights, passengers, staff, and more.

It ensures data integrity, security, and efficient retrieval for tasks like passenger, flight scheduling, baggage handling, and financial transactions.

The system typically includes tables for airlines, flights, passengers, staff, and maintenance, along with queries and reports for various airport operations.

It plays a crucial role in managing airport functions, enhancing customer experience, and ensuring safety and security.

THEORY:

An Airport Management System is a comprehensive software solution that facilitates the management and coordination of various operations and activities within an airport. This system employs a Database Management System (DBMS) as its backbone to store, manage, and retrieve data efficiently. The theory behind designing a DBMS for an Airport Management System involves several key aspects:

1.Entity-Relationship Model (ER Model)

2.Normalization

3.Data Integrity and Constraints

4.Data Security

5.Querying and Reporting

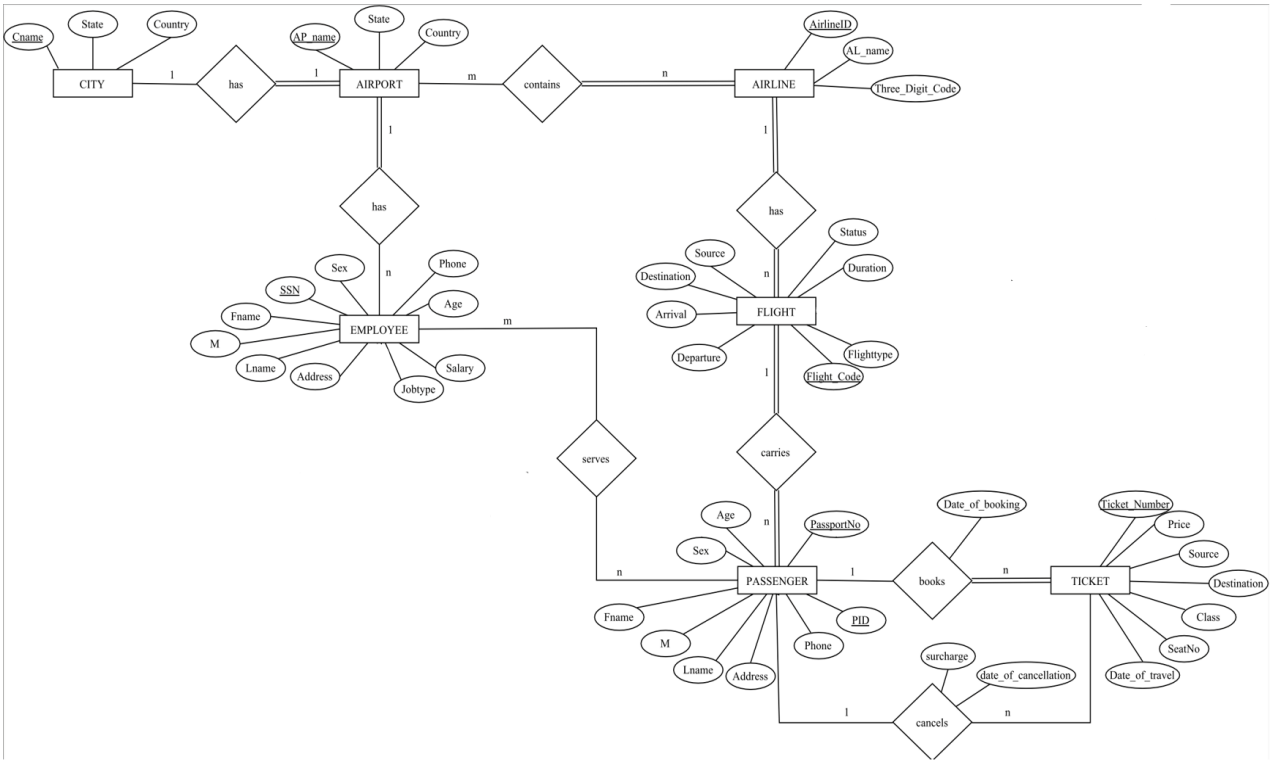
6.Scalability and Performance

7.Backup and Recovery

8.User Interface Integration

9.Data Warehousing and Analytics

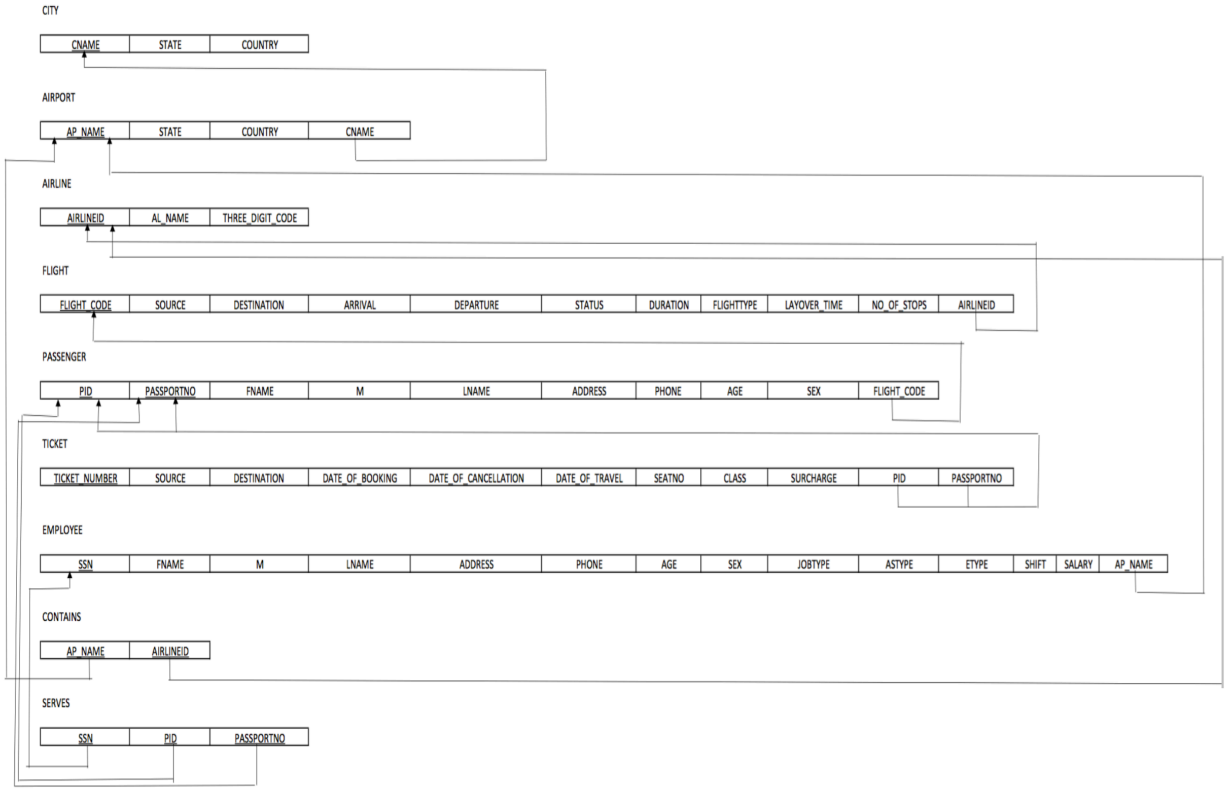
ER DIAGRAM:


Cname
State
Country
CITY
1
has
1
AP_name
State
Country
AIRPORT
m
contains
n
AirlineID
AL_name
Three_Digit_Code
AIRLINE
1
has
n
Sex
Phone
SSN
Age
Fname
M
Lname
Address
Salary
Jobtype
EMPLOYEE
m
serves
1
has
n
Source
Destination
Arrival
Departure
Status
Duration
Flighttype
Flight_Code
FLIGHT
1
carries
n
Age
Sex
PassportNo
Fname
M
Lname
Address
Phone
PID
PASSENGER
n
1
books
n
Date_of_booking
Ticket_Number
Price
Source
Destination
Class
SeatNo
Date_of_travel
TICKET
surcharge
date_of_cancellation
1
cancels
n

ER- RELATIONSHIP:

Entity 1	Name of the Relationship	Entity 2	Cardinality
City	has	Airport	1:1
Airport	contains	Airline	m : n
Airport	has	Employee	1 : n
Airline	has	Flight	1 : n
Flight	carries	Passengers	1 : n
Employee	serves	Passengers	m : n
Passengers	books	Ticket	1 : n

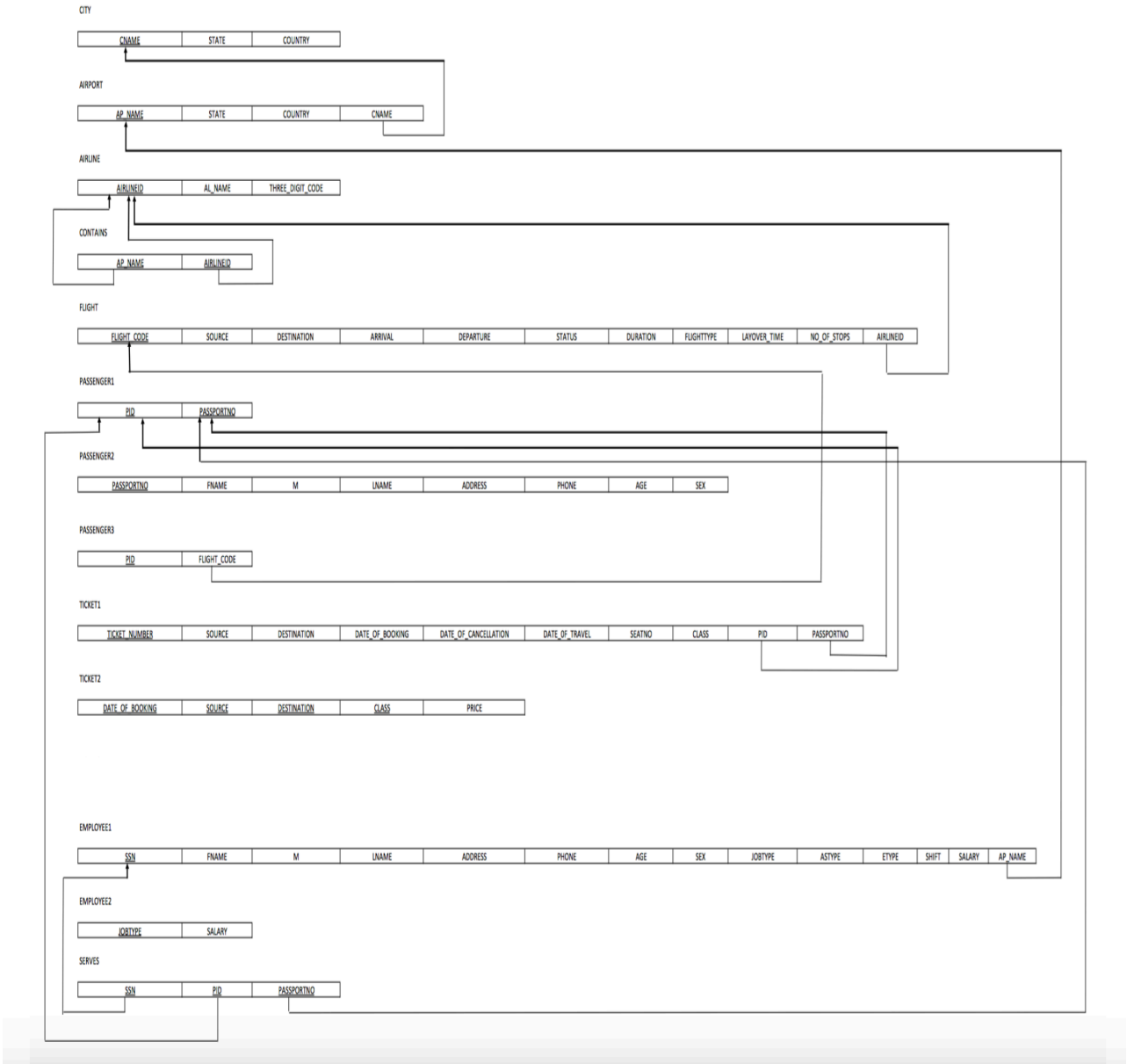
RELATIONAL DIAGRAM:



NORMALIZATION RULE:

FUNCTIONAL DEPENDECIES	
PASSPORTNO -> FNAME, M, LNAME, ADDRESS, PHONE, AGE, SEX	Violates 2NF
PID -> FLIGHT_CODE	Violates 2NF
DATE_OF_BOOKING, SOURCE, DESTINATION, CLASS -> PRICE	Violates 3NF
JOBTYPE -> SALARY	Violates 3NF

RELATIONAL DIAGRAM AFTER NORMALIZATION:



DATABASE :

```
CREATE DATABASE airport_management;
```

CITY TABLE :

```
CREATE TABLE airport_management.CITY(
CNAME VARCHAR(28) NOT NULL,
STATE VARCHAR(28) NOT NULL,
COUNTRY VARCHAR(28) NOT NULL,
PRIMARY KEY(CNAME)
);
```

AIRPORT TABLE :

```
CREATE TABLE airport_management.AIRPORT (
   AP_NAME VARCHAR(100) NOT NULL,
   STATE VARCHAR(28),
   COUNTRY VARCHAR(28),
   CNAME VARCHAR(28),
   PRIMARY KEY (AP_NAME),
   FOREIGN KEY (CNAME) REFERENCES CITY (CNAME) ON DELETE CASCADE
);
```

AIRLINE TABLE :

```
CREATE TABLE airport_management.AIRLINE
(AIRLINEID VARCHAR(3) NOT NULL,
 AL_NAME VARCHAR(50),
 THREE_DIGIT_CODE VARCHAR(3),
 PRIMARY KEY(AIRLINEID)
 );
```

CONTAINS TABLE :

```
CREATE TABLE airport_management.CONTAINS
(AIRLINEID VARCHAR(3) NOT NULL,
AP_NAME VARCHAR(100) NOT NULL,
PRIMARY KEY(AIRLINEID, AP_NAME),
FOREIGN KEY(AIRLINEID) REFERENCES AIRLINE(AIRLINEID) ON DELETE CASCADE,
FOREIGN KEY(AP_NAME) REFERENCES AIRPORT(AP_NAME) ON DELETE CASCADE);
```

FLIGHT TABLE :

```
CREATE TABLE airport_management.FLIGHT
(FLIGHT_CODE VARCHAR(10) NOT NULL,
SOURCE VARCHAR(3),
DESTINATION VARCHAR(3),
ARRIVAL DATETIME,
DEPARTURE DATETIME,
STATUS ENUM('on-time', 'delayed'),
DURATION VARCHAR(30),
FLIGHTTYPE ENUM('connecting', 'non-stop'),
AIRLINEID VARCHAR(3),
PRIMARY KEY(FLIGHT_CODE),
FOREIGN KEY(AIRLINEID) REFERENCES AIRLINE(AIRLINEID) ON DELETE CASCADE);
```

EMPLOYEE1 TABLE :

```
CREATE TABLE airport_management.EMPLOYEE1 (
SSN INT NOT NULL AUTO_INCREMENT,
FNAME VARCHAR(20),
MNAME VARCHAR(20),
LNAME VARCHAR(20),
ADDRESS VARCHAR(100),
PHONE INT,
AGE INT CHECK (AGE < 60),
SEX ENUM('M', 'F'),
JOBTYPE VARCHAR(30),
AP_NAME VARCHAR(100),
PRIMARY KEY(SSN),
FOREIGN KEY(AP_NAME) REFERENCES AIRPORT(AP_NAME) ON DELETE CASCADE);
```

EMPLOYEE2 TABLE :

```
CREATE TABLE airport_management.EMPLOYEE2 (
JOBTYPE VARCHAR(30) NOT NULL,
SALARY INT,
PRIMARY KEY(JOBTYPE));
```

SERVES TABLE :

```
CREATE TABLE airport_management.SERVES
(SSN INT NOT NULL,
```

```
PID INT NOT NULL,

PASSPORTNO VARCHAR(12) NOT NULL,

PRIMARY KEY(SSN, PID, PASSPORTNO),

FOREIGN KEY(SSN) REFERENCES EMPLOYEE1(SSN) ON DELETE CASCADE,

FOREIGN KEY(PID, PASSPORTNO) REFERENCES PASSENGER1(PID, PASSPORTNO) ON DELETE
CASCADE);
```

TICKET1 TABLE:

```
CREATE TABLE airport_management.TICKET1 (

   TICKET_NUMBER VARCHAR(20) NOT NULL,

   SOURCE VARCHAR(3),

   DESTINATION VARCHAR(3),

   DATE_OF_BOOKING DATE,

   DATE_OF_TRAVEL DATE,

   SEATNO VARCHAR(5),

   CLASS ENUM('Economy', 'Business', 'First'),

   DATE_OF_CANCELLATION DATE,

   PID INT AUTO_INCREMENT,

   PASSPORTNO VARCHAR(10),

   FOREIGN KEY (PID, PASSPORTNO) REFERENCES PASSENGER1 (PID, PASSPORTNO) ON DELETE
CASCADE,

   CONSTRAINT TICKET_NO_LENGTH CHECK (LENGTH(TICKET_NUMBER) = 13));
```

TICKET2 TABLE:

```
CREATE TABLE airport_management.TICKET2

(DATE_OF_BOOKING DATE NOT NULL,

SOURCE VARCHAR(3) NOT NULL,
```

DESTINATION VARCHAR(3) NOT NULL,

CLASS ENUM('Economy', 'Business', 'First') NOT NULL,

PRICE INT,

PRIMARY KEY(DATE_OF_BOOKING, SOURCE, DESTINATION, CLASS));

TICKET 3 TABLE:

CREATE TABLE airport_management.TICKET3 (

DATE_OF_CANCELLATION DATE NOT NULL,

SURCHARGE INT,

PRIMARY KEY(DATE_OF_CANCELLATION));

PASSENGER1 TABLE:

CREATE TABLE airport_management.TICKET3 (

DATE_OF_CANCELLATION DATE NOT NULL,

SURCHARGE INT,

PRIMARY KEY(DATE_OF_CANCELLATION));

PASSENGER2 TABLE:

CREATE TABLE airport_management.PASSENGER2 (

PASSPORTNO VARCHAR(10) NOT NULL,

FNAME VARCHAR(20),

Mname VARCHAR(20),

LNAME VARCHAR(20),

ADDRESS VARCHAR(100),

PHONE INT,

AGE INT,

SEX ENUM('M', 'F'),

PRIMARY KEY(PASSPORTNO));

PASSENGER3 TABLE:

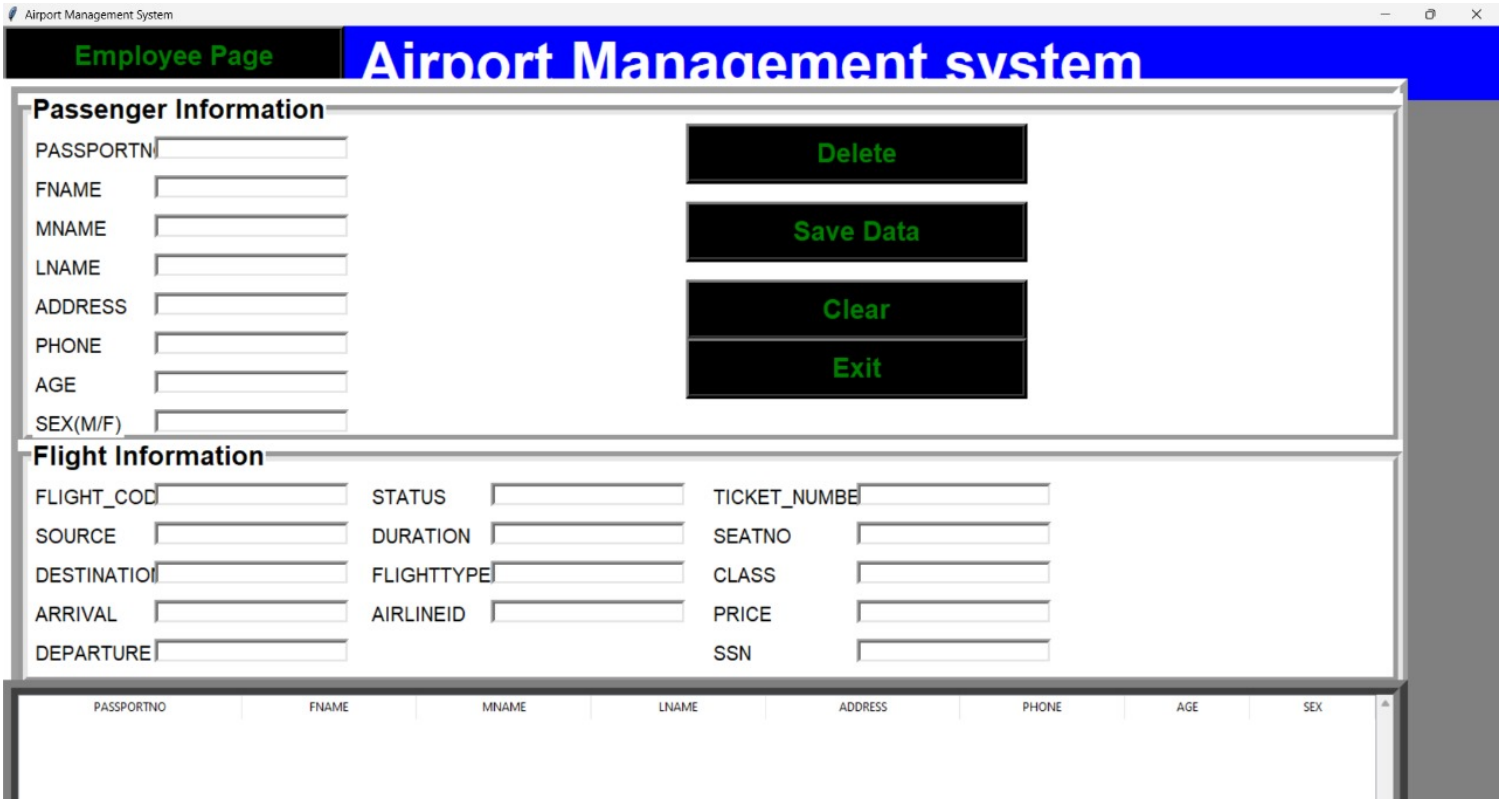
CREATE TABLE airport_management.PASSENGER3 (

PID INT NOT NULL,

FLIGHT_CODE VARCHAR(10),

PRIMARY KEY(PID),

FOREIGN KEY(FLIGHT_CODE) REFERENCES FLIGHT(FLIGHT_CODE) ON DELETE CASCADE);



```
mysql> select * from passenger1;
+-----+------------+
| PID | PASSPORTNO |
+-----+------------+
|   1 | 31195855   |
|   2 | 58423698   |
|   3 | 45684625   |
|   4 | 65482135   |
+-----+------------+
4 rows in set (0.00 sec)

mysql> select * from passenger2;
+------------+----------+-------+---------+-----------------------------+------------+------+------+
| PASSPORTNO | FNAME    | Mname | LNAME   | ADDRESS                     | PHONE      | AGE  | SEX  |
+------------+----------+-------+---------+-----------------------------+------------+------+------+
| 31195855   | Raunak   | --    | Shahi   | A-203, C Hostel, TIET Patiala | 2147483647 |   19 | M    |
| 45684625   | Krishnam | --    | Agarwal | C-206                       | 1245896779 |   20 | M    |
| 58423698   | Dev      | --    | Mehta   | A-203, C Hostel, TIET Patiala | 2147483647 |   19 | M    |
| 65482135   | Keshav   | --    | Singla  | 636, O Hostel, TIET Patiala |  564651313 |   21 | M    |
+------------+----------+-------+---------+-----------------------------+------------+------+------+
4 rows in set (0.00 sec)

mysql> select * from passenger3;
+-----+-------------+
| PID | FLIGHT_CODE |
+-----+-------------+
|   2 | AD4627      |
|   1 | MX3756      |
|   3 | PL2034      |
|   4 | PO2039      |
+-----+-------------+
4 rows in set (0.00 sec)
```

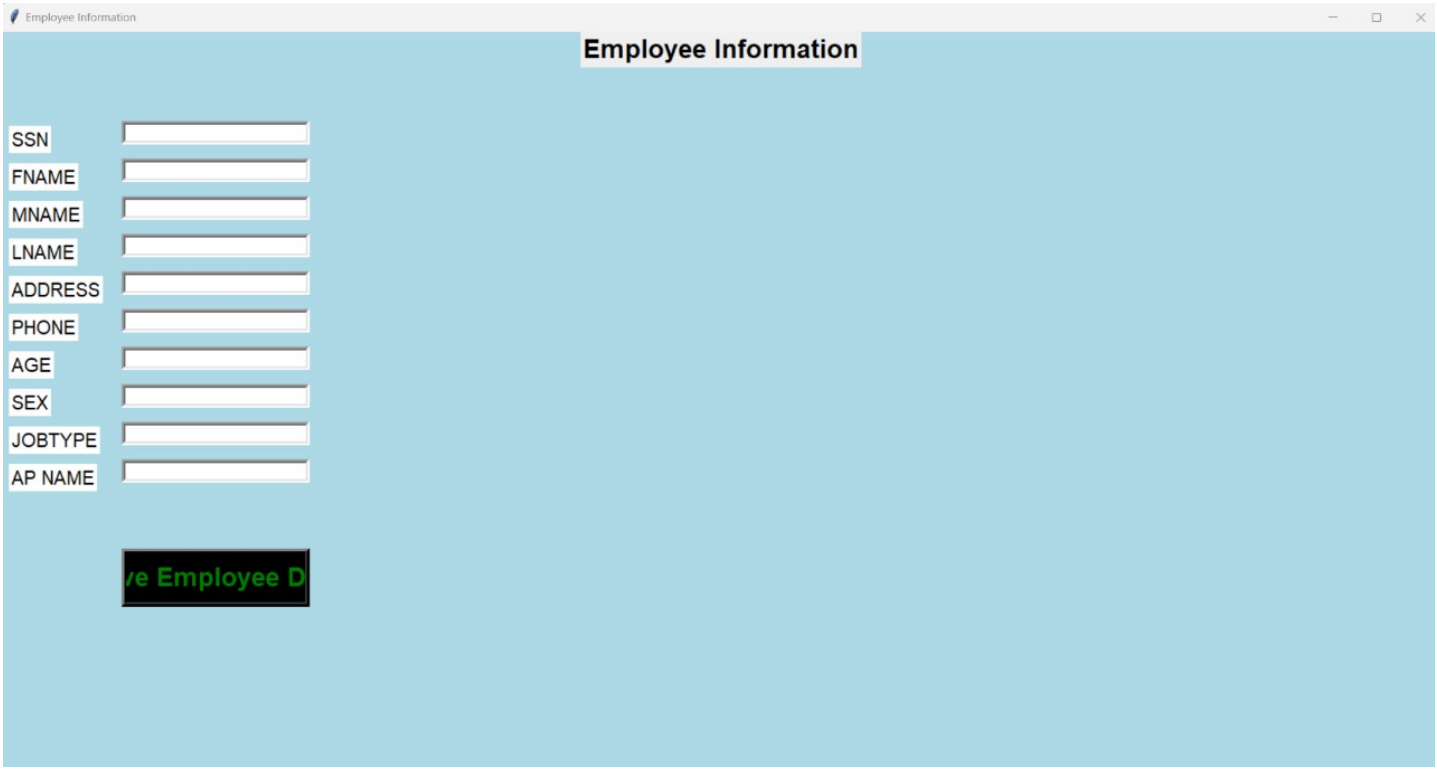
```
mysql> select * from flight;
+-------------+--------+-------------+---------------------+---------------------+---------+----------+------------+------------+
| FLIGHT_CODE | SOURCE | DESTINATION | ARRIVAL             | DEPARTURE           | STATUS  | DURATION | FLIGHTTYPE | AIRLINEID |
+-------------+--------+-------------+---------------------+---------------------+---------+----------+------------+------------+
| AD4627      | PAT    | JAI         | 2024-04-16 18:30:00 | 2024-04-16 19:00:00 | on-time | 3 HOURS  | non-stop   | 101       |
| MX3756      | DEL    | PAT         | 2024-05-10 19:00:00 | 2024-05-11 19:00:00 | on-time | 5 HOURS  | connecting | 101       |
| PL2034      | JAI    | DEL         | 2024-05-20 06:45:00 | 2024-05-20 08:30:00 | delayed | 6 HOURS  | connecting | 103       |
| PL8765      | JAI    | DEL         | 2024-05-20 08:30:00 | 2024-05-20 09:00:00 | on-time | 6 HOURS  | non-stop   | 103       |
| PO2039      | DEL    | PAT         | 2024-05-20 16:00:00 | 2024-05-20 17:30:00 | on-time | 7 HOURS  | connecting | 102       |
+-------------+--------+-------------+---------------------+---------------------+---------+----------+------------+------------+
5 rows in set (0.00 sec)
```

```
mysql> select * from ticket1;
+---------------+--------+-------------+-----------------+----------------+--------+----------+-----------------------+-----+------------+
| TICKET_NUMBER | SOURCE | DESTINATION | DATE_OF_BOOKING | DATE_OF_TRAVEL | SEATNO | CLASS    | DATE_OF_CANCELLATION | PID | PASSPORTNO |
+---------------+--------+-------------+-----------------+----------------+--------+----------+-----------------------+-----+------------+
| 8569412375841 | DEL    | PAT         | 2024-05-10      | 2024-05-11     | 45A    | Economy  | NULL                  |  10 | 31195855   |
| 9685475621354 | PAT    | JAI         | 2024-05-10      | 2024-04-16     | 33B    | Business | NULL                  |  11 | 58423698   |
| 6548465125478 | JAI    | DEL         | 2024-05-10      | 2024-05-20     | 33C    | First    | NULL                  |  13 | 45684625   |
| 1235445698231 | DEL    | PAT         | 2024-05-10      | 2024-05-20     | 12C    | First    | NULL                  |  14 | 65482135   |
+---------------+--------+-------------+-----------------+----------------+--------+----------+-----------------------+-----+------------+
4 rows in set (0.00 sec)

mysql> select * from ticket2;
+-----------------+--------+-------------+----------+-------+
| DATE_OF_BOOKING | SOURCE | DESTINATION | CLASS    | PRICE |
+-----------------+--------+-------------+----------+-------+
| 2024-05-10      | DEL    | PAT         | Economy  |  5000 |
| 2024-05-10      | DEL    | PAT         | First    | 25000 |
| 2024-05-10      | JAI    | DEL         | First    | 25000 |
| 2024-05-10      | PAT    | JAI         | Business | 10000 |
+-----------------+--------+-------------+----------+-------+
4 rows in set (0.00 sec)
```

```
mysql> insert into city values ('New Delhi','Delhi','India');
Query OK, 1 row affected (0.01 sec)

mysql> insert into city values ('Patiala','Punjab','India');
Query OK, 1 row affected (0.01 sec)

mysql> insert into city values ('Jaipur','Rajasthan','India');
Query OK, 1 row affected (0.01 sec)

mysql> select * from city;
+-----------+-----------+---------+
| CNAME     | STATE     | COUNTRY |
+-----------+-----------+---------+
| Jaipur    | Rajasthan | India   |
| New Delhi | Delhi     | India   |
| Patiala   | Punjab    | India   |
+-----------+-----------+---------+
3 rows in set (0.00 sec)
```

```
mysql> insert into airport values('Patiala Airport','Punjab','India','Patiala');
Query OK, 1 row affected (0.01 sec)

mysql> insert into airport values('Indira Gandhi Airport','Delhi','India','New Delhi');
Query OK, 1 row affected (0.01 sec)

mysql> insert into airport values('Jaipur Airport','Rajasthan','India','Jaipur');
Query OK, 1 row affected (0.01 sec)

mysql> select * from airport;
+----------------------+-----------+---------+-----------+
| AP_NAME              | STATE     | COUNTRY | CNAME     |
+----------------------+-----------+---------+-----------+
| Indira Gandhi Airport | Delhi     | India   | New Delhi |
| Jaipur Airport        | Rajasthan | India   | Jaipur    |
| Patiala Airport       | Punjab    | India   | Patiala   |
+----------------------+-----------+---------+-----------+
3 rows in set (0.00 sec)
```

```
mysql> insert into airline values('101','Indigo Airlines','100');
Query OK, 1 row affected (0.01 sec)

mysql> insert into airline values('102','Vistara Airlines','200');
Query OK, 1 row affected (0.01 sec)

mysql> insert into airline values('103','Air India','300');
Query OK, 1 row affected (0.01 sec)

mysql> select * from airline;
+-----------+-----------------+------------------+
| AIRLINEID | AL_NAME         | THREE_DIGIT_CODE |
+-----------+-----------------+------------------+
| 101       | Indigo Airlines | 100              |
| 102       | Vistara Airlines | 200             |
| 103       | Air India       | 300              |
+-----------+-----------------+------------------+
3 rows in set (0.00 sec)
```



CONCLUSION:

A comprehensive Airport Management System (AMS) is pivotal in ensuring smooth operations, efficient services, and enhanced passenger experience within airports. In this DBMS report, the fundamental importance and functionalities of an AMS have been extensively explored and analyzed.

In conclusion, the implementation of a well-designed DBMS in an Airport Management System is indispensable for modern airports to meet the demands of a dynamic aviation industry. The ability to efficiently collect, manage, and utilize data plays a pivotal role in ensuring operational excellence, passenger satisfaction, and the overall success of airport operations. It is crucial for airports to continually adapt and evolve their database management systems to meet the ever-changing needs and advancements in technology within the aviation sector.

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