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## **AIRLINE FLIGHT DATABASE MANAGEMENT SYSTEM**

### **Description of the Database System:**

The Airline Management Database System is designed to store and efficiently manage the information of an airline system to operate the flights, planes, staff and customer choices. The system ensures that several information is kept for each entity and it is organized to show the complex relationships between the entities. The constraints are enforced to make sure each plane belongs to a specific airline, operated by qualified staff, and is assigned to appropriate plate type. System also shows different flight types such as domestic and international flight categories as well as different seat types to provide detailed information and option range. With this database system, airlines can effectively track the flights, planes and staff while making sure the required operational standards and constraints are performed accordingly.

### **Entities and Their Descriptions:**

#### **1- Planes:**

- Stores the base information, manufacturing date and 3-letter IATA code, about the planes.
- 3-letter IATA code is represented as p\_id in ER diagram.
- Every plane must have a plane type, so that there is a participation constraint.
- Every plane should belong to an airline, meaning that there is a participation constraint.
- Each staff member can only work in a certain plane, which is a key constraint, but a plane can have multiple staff member in it.
- A plane should have only one plane type, meaning there is both participant and key constraint.
- A plane can operate multiple flights.

#### **2- Airline:**

- Stores the name, id, establishment date, founder and the ratings of the airline.
- Highlights the carbon dioxide emissions of the airline.
- Each airline must own a plane, meaning that there is a key constraint.

#### **3- Plane Type:**

- Stores the capacity, model name, manufacturer and fuel usage of the plane types.
- A plane type can have multiple planes.

#### **4- Staff:**

- Stores the salary, job title, identification number, name and experience year of each staff member.
- A staff member can only work in a certain plane, meaning that there is a key constraint.

#### **5- Flights:**

- Stores the departure and arrival airport, duration, date and gate number of the flight.
- Each flight should be operated by a plane, meaning that there is a participation constraint.
- Flights are divided into two subgroups:
  - Domestic Flights:
    - Stores the departure and arrival city
  - International Flights:
    - Stores departure and arrival country

#### **6- Seats:**

- Stores the booking status, price, seat number, closeness to emergency door of the seats.
- The seats are divided into two subgroups:
  - Economy:
  - Business:
    - Stores the possible advantages of the business seat option.

### **Relations and Their Descriptions:**

#### **1- Belongs\_to:**

- Relationship set between seats and flights entities.

#### **2- Own:**

- Relationship set between airlines and planes.

#### **3- Operate:**

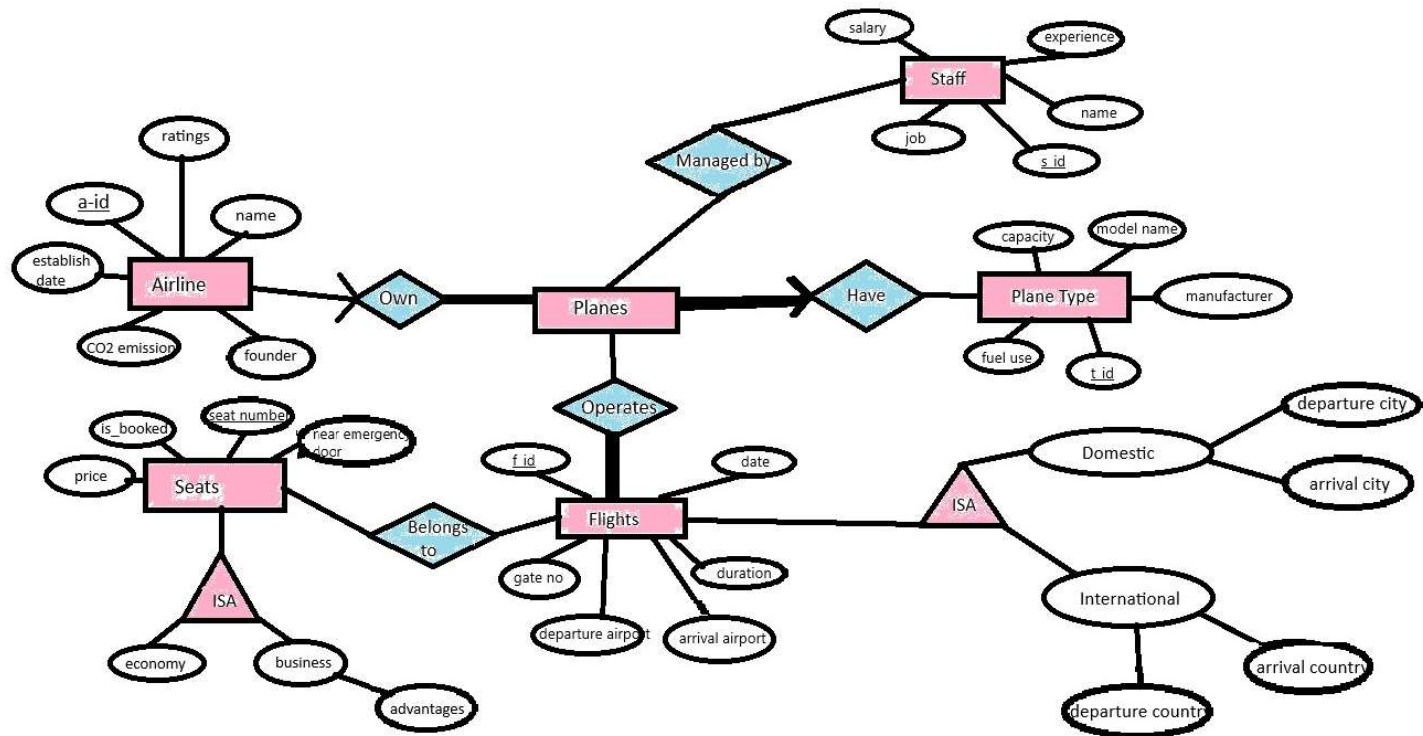
- Relationship set between flights and planes.

#### **4- Managed\_by:**

- Relationship set between planes and staff.

#### **5- Have:**

- Relationship set between planes and plane type.



```

1 • use project;
2 • create table Airlines(
3     a_id varchar(2) primary key,
4     a_name varchar(100) not null,
5     co2_emmission decimal(3,1),
6     establishment_date int,
7     founder varchar(100)
8 );
9
10 • insert into Airlines( a_id, a_name, co2_emmission, establishment_date, founder)
11 values ("AA", "American Airlines", 48.7, 1934, "C. R. Smith"),
12        ("AF", "Air France", 20.0, 1933, "Pierre Cot"),
13        ("CC", "Continental Airlines", 1.0, 1921, "Walter T. Varney" ),
14        ("DL", "Delta Air Lines", 35.9, 1928, "C.E. Woolman"),
15        ("TK", "Turkish Airlines", 25.7, 1933, "Fesa Evrensev"),
16        ("AC", "Air Canada", 13.1, 1937, "Canadian Parliment"),
17        ("UA", "United Airlines Cargo", 44.0, 1926, "Walter Varney"),
18        ("CP", "Canadian Airlines Int'l", 6.3, 1987, "Canadian Airlines Corporation"),
19        ("LH", "Lufthansa Cargo AG", 5.3, 1977, "German National Railway"),
20        ("W4", "Wizz Air Malta", 5.4, 2022, "Diarmuid Ó Conghaile");
21
  
```



```
create table Planes(  
    p_id varchar(20) primary key,  
    manufacture_date int,  
    type_id int,  
    airline_id varchar(2),  
    foreign key(type_id) references Plane_Type(t_id)  
        on delete cascade,  
    foreign key(airline_id) references Airlines(a_id)  
        on delete cascade  
);  
  
select * from Planes;
```

```
insert into Planes(p_id, manufacture_date,type_id, airline_id)
values("AAL708", 2014,6, "AA" ),
      ("AAL1405", 2020, 5, "AA"),
      ("AAL1600", 2010,6, "AA"),
      ("AAL1124",2018, 1, "AA"),
      ("AAL1400",2010, 6, "AA"),
      ("AAL2933",2018, 3, "AA"),
      ("AAL661",2009, 6, "AA"),
      ("AAL2726",2018, 9, "AA"),
      ("AAL1815",2019, 9, "AA"),
      ("AAL1546",2021, 10, "AA");
```

```
create table Belongs_to (  
    seat_number varchar(10),  
    f_id int,  
    primary key (seat_number, f_id),  
    foreign key (seat_number) references seats(seat_number) on delete cascade,  
    foreign key (f_id) references flights(f_id) on delete cascade  
);
```

```
insert into Belongs_to (seat_number, f_id)  
values  
    ('12A', 1),  
    ('12B', 1),  
    ('13A', 2),  
    ('13B', 2),  
    ('14A', 3),  
    ('14B', 3),  
    ('15A', 4),  
    ('15B', 4);
```

```
create table Staff (  
    s_id int primary key,  
    name varchar(100),  
    job varchar(50),  
    salary float,  
    experience int  
);
```

```
create table Flights (  
    f_id int primary key,  
    flight_date date,  
    gate_no varchar(10),  
    departure_airport varchar(50),  
    arrival_airport varchar(50),  
    duration time,  
    p_id varchar(3),  
    foreign key (p_id) references planes(p_id) on delete cascade  
);  
  
alter table Flights rename column date to flight_date;  
alter table Flights modify column p_id varchar(20);
```

- ```
create table Seats (  
    seat_number varchar(10),  
    is_booked boolean,  
    price decimal(10, 2),  
    near_emergency_exit boolean,  
    f_id int,  
    primary key (seat_number, f_id),  
    foreign key (f_id) references Flights(f_id) on delete cascade  
);
```
  - ```
create table Business (  
    seat_number varchar(10),  
    f_id int,  
    advantages text,  
    primary key (seat_number, f_id),  
    foreign key (seat_number, f_id) references Seats(seat_number, f_id) on delete cascade  
);
```
  - ```
select * from internationalflights;
```
- 
- ```
create table Economy (  
    seat_number varchar(10),  
    f_id int,  
    primary key (seat_number, f_id),  
    foreign key (seat_number, f_id) references Seats(seat_number, f_id) on delete cascade  
);
```
  - ```
create table Internationalflights (  
    f_id int primary key,  
    departure_country varchar(50),  
    arrival_country varchar(50),  
    foreign key (f_id) references Flights(f_id) on delete cascade  
);
```
  - ```
create table Domesticflights (  
    f_id int primary key,  
    departure_city varchar(50),  
    arrival_city varchar(50),  
    foreign key (f_id) references Flights(f_id) on delete cascade  
);
```

```
insert into Domesticflights (f_id, departure_city, arrival_city)
values
```

```
(3, 'Miami', 'Philadelphia'),
(4, 'Miami', 'San Francisco'),
(6, 'Los Angeles', 'Miami'),
(9, 'Dallas', 'Miami');
```

```
select * from Domesticflights;
```

```
insert into Internationalflights (f_id, departure_country, arrival_country)
values
```

```
(1, 'Curacao', 'USA'),
(2, 'Colombia', 'USA'),
(5, 'Cuba', 'USA'),
(7, 'Costa Rica', 'USA'),
(8, 'USA', 'Grenada'),
(10, 'USA', 'Jamaica');
```

```
insert into Flights (f_id, flight_date, gate_no, departure_airport, arrival_airport, duration, p_id)
VALUES
```

```
(1, '2024-10-17', 'A1', 'CUR', 'MIA', '03:10:00', 'AAL708'),
(2, '2024-10-17', 'D6', 'BAQ', 'MIA', '02:50:00', 'AAL1124'),
(3, '2024-10-16', 'E7', 'MIA', 'PHL', '02:50:00', 'AAL661'),

(4, '2024-10-17', 'D22', 'MIA', 'SFO', '06:15:00', 'AAL2933'),
(5, '2024-10-16', 'A2', 'HOG', 'MIA', '01:45:00', 'AAL2726'),
(6, '2024-10-17', '43', 'LAX', 'MIA', '05:10:00', 'AAL1815'),
(7, '2024-10-16', '11', 'SJO', 'MIA', '03:05:00', 'AAL1600'),
(8, '2024-10-16', 'D43', 'MIA', 'GND', '03:40:00', 'AAL1546'),
(9, '2024-10-17', 'A18', 'DFW', 'MIA', '02:45:00', 'AAL1405'),
(10, '2024-10-18', 'D19', 'MIA', 'KIN', '01:50:00', 'AAL1400');
```

- insert into Economy (seat\_number, f\_id)

```
VALUES
```

```
('12A', 2),
('12B', 2),
('12C', 2),
('13A', 3),
('13B', 3),
('13C', 3),
('14A', 4),
('15A', 5);
```

- insert into Business (seat\_number, f\_id, advantages)

```
values
```

```
('1A', 1, 'Lounge access'),
('1B', 1, 'Priority boarding');
```



```

select * from Business;
insert into Staff (s_id, name, job, salary, experience)
values
    (1, 'Olivia Johnson', 'Pilot', 90000, 5),
    (2, 'Roger Bluebell', 'Co-Pilot', 70000, 4),
    (3, 'Charlie Glass', 'Flight Attendant', 45000, 3),
    (4, 'Azula Banks', 'Flight Engineer', 80000, 6),
    (5, 'Bruce Cruz', 'Ground Staff', 35000, 2),
    (6, 'Joshua Henry', 'Air Traffic Controller', 95000, 7),
    (7, 'Rose Sullivan', 'Operations Manager', 100000, 8),
    (8, 'Hannah Blue', 'Baggage Handler', 30000, 1),
    (9, 'April Jones', 'Customer Service', 40000, 3),
    (10, 'Ian Brock', 'Maintenance Technician', 60000, 5);

```

```

insert into Seats (seat_number, f_id, is_booked, price, near_emergency_exit)
values
    ('12A', 2, TRUE, 220.00, FALSE),
    ('12B', 2, FALSE, 220.00, FALSE),
    ('12C', 2, FALSE, 220.00, FALSE),
    ('13A', 3, FALSE, 180.00, TRUE),
    ('13B', 3, FALSE, 180.00, TRUE),
    ('13C', 3, TRUE, 180.00, TRUE),

```

```

    ('13C', 3, TRUE, 180.00, TRUE),
    ('14A', 4, TRUE, 100.00, FALSE),
    ('15A', 5, FALSE, 300.00, TRUE),
    ('1A', 1, FALSE, 500.00, TRUE),
    ('1B', 1, FALSE, 500.00, TRUE);

```

```

• create table Managed_by(
    s_id int not null ,
    p_id varchar(20) not null,
    primary key(s_id, p_id),
    foreign key(s_id) references Staff(s_id) ,
    foreign key(p_id) references Planes(p_id)
);
• alter table Managed_by modify p_id varchar(20);
• insert into Managed_by(s_id, p_id)
values
    (1, 'AAL1124'),
    (2, "AAL661"),
    (3, "AAL661"),
    (7, "AAL708"),
    (5, "AAL2933"),
    (4, "AAL2933"),
    (4, "AAL661"),

```



```
~ );  
alter table Managed_by modify p_id varchar(20);  
insert into Managed_by(s_id, p_id)  
values  
  (1, 'AAL1124'),  
  (2, "AAL661"),  
  (3, "AAL661"),  
  (7, "AAL708"),  
  (5, "AAL2933"),  
  (4, "AAL2933"),  
  (4, "AAL661"),  
  (9, "AAL708"),  
  (8, "AAL1546");  
L
```