

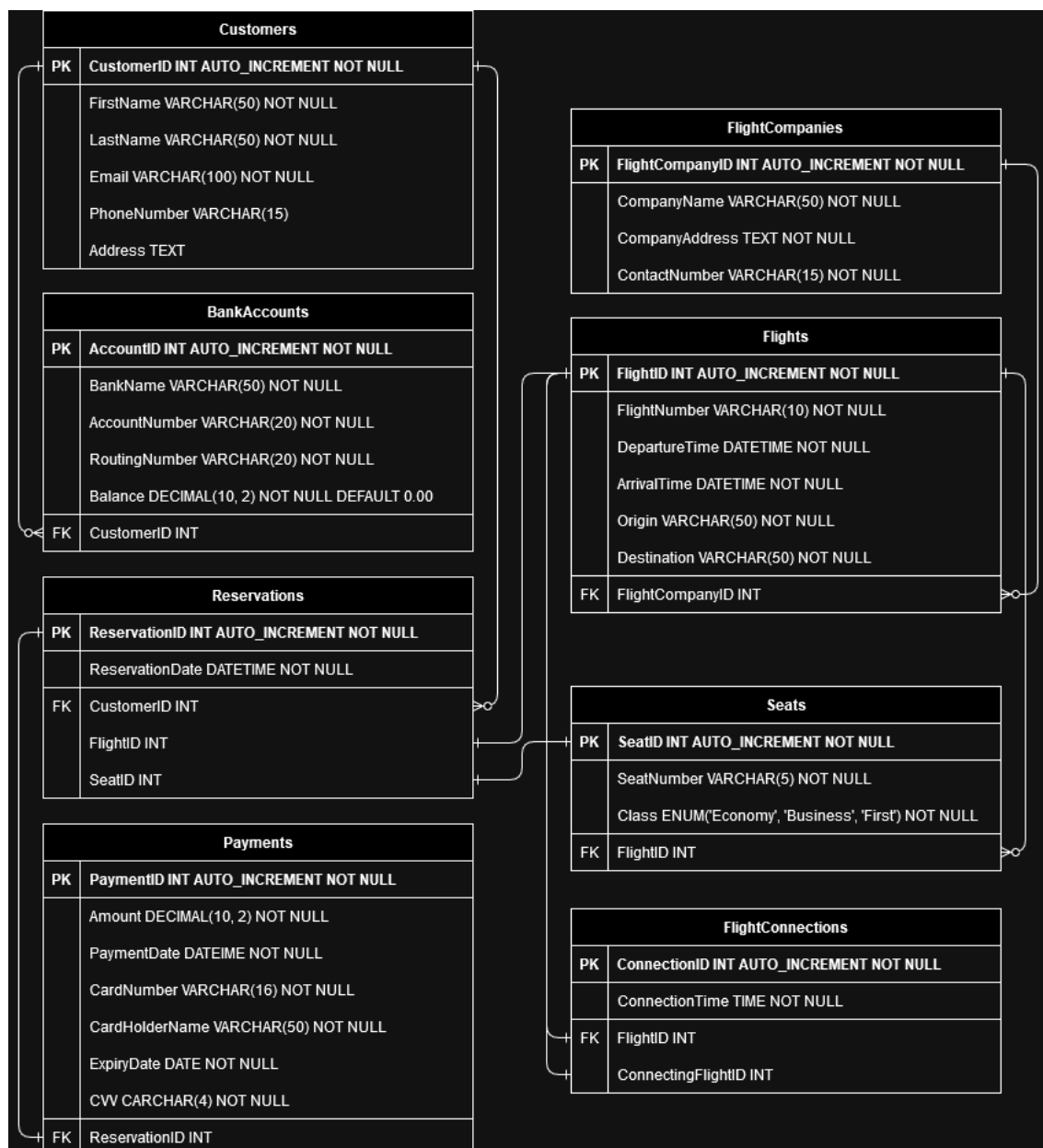
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CD431: Mapping ER to Schema

This document maps the Entity-Relationship (ER) database design document to a relational schema.

1. Reference ER Diagram



2. Changes to Original ER Design

The Flights and Seats entities needed to be modified in order to be able to track the number of seats available for each flight and whether the flight is booked.

The Flights entity will include two additional attributes:

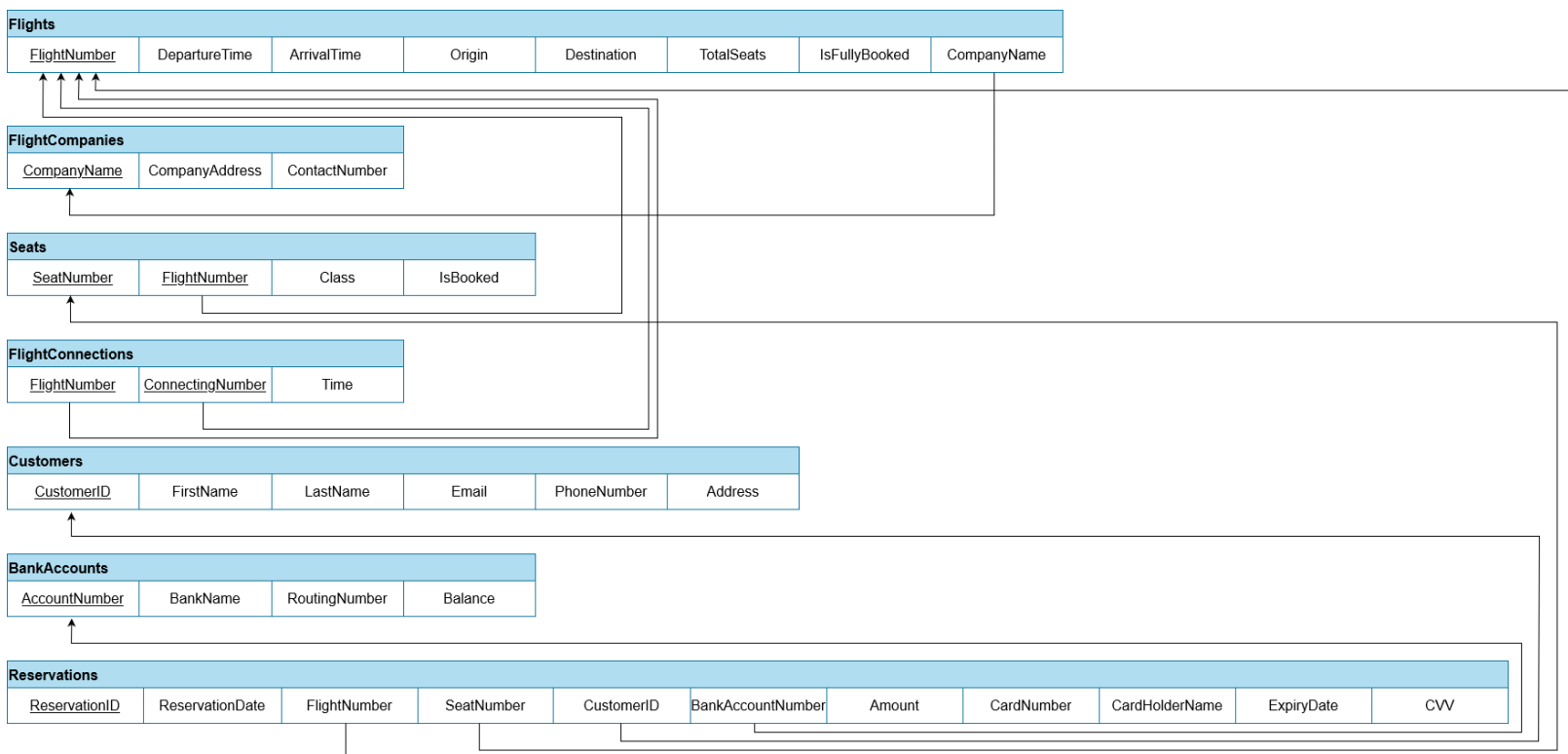
- TotalSeats - INT: The total number of seats available on the flight.
- IsFullyBooked - BOOLEAN: Indicates whether the flight is fully booked.

The Seats entity will include one additional attribute:

- IsBooked - BOOLEAN: Indicates whether the seat is booked.

Some primary keys were changed to other attributes to remove redundant attributes. Such as FlightID from Flights was removed and the new primary key is FlightNumber.

3. Schema Diagram (made with draw.io)



The Payments entity was merged into the Reservations table in order to remove the 1 to 1 relations.

When a customer books a flight:

- Reservation is added
- The amount paid is subtracted from the bank account balance.
- The Seat is marked as booked in the Seats table
- The flight's seats are checked to set IsFullyBooked to true or false.

When a new flight is added:

- A new row is added to Flights table with flight information.
- If there are any connections, a new row is added to the FlightConnections table for each connection.

4. Table Queries

- List All Flights with Available Seats

```
SELECT f.FlightNumber, f.DepartureTime, f.ArrivalTime,
f.Origin, f.Destination, COUNT(s.SeatNumber) AS
AvailableSeats
FROM Flights f
JOIN Seats s ON f.FlightNumber = s.FlightNumber
WHERE s.IsBooked = FALSE
GROUP BY f.FlightNumber, f.DepartureTime, f.ArrivalTime,
f.Origin, f.Destination
ORDER BY f.DepartureTime;
```

- Get Flight Details for a Specific Flight Number

```
SELECT f.FlightNumber, f.DepartureTime, f.ArrivalTime,
f.Origin, f.Destination, fc.CompanyName
FROM Flights f
JOIN FlightCompanies fc ON f.CompanyName =
fc.FlightCompanyID
WHERE f.FlightNumber = 'FL123';
```

- Show Reservations for a Specific Customer

```
SELECT r.ReservationID, r.ReservationDate,
f.FlightNumber, s.SeatNumber, r.Amount
FROM Reservations r
JOIN Flights f ON r.FlightNumber = f.FlightNumber
JOIN Seats s ON r.SeatNumber = s.SeatNumber AND
r.FlightNumber = s.FlightNumber
WHERE r.CustomerID = 1
ORDER BY r.ReservationDate DESC;
```

- List All Flights by a Specific Flight Company

```
SELECT f.FlightNumber, f.FlightNumber, f.DepartureTime,
f.ArrivalTime, f.Origin, f.Destination
FROM Flights f
JOIN FlightCompanies fc ON f.CompanyName =
fc.CompanyName
WHERE fc.CompanyName = 'Delta Airlines'
ORDER BY f.DepartureTime;
```

- Get Details of All Connections for a Specific Flight

```
SELECT f1.FlightNumber AS MainFlight, f2.FlightNumber AS
ConnectingFlight, fc.ConnectionTime
FROM FlightConnections fc
JOIN Flights f1 ON fc.FlightNumber = f1.FlightNumber
JOIN Flights f2 ON fc.ConnectingNumber = f2.FlightNumber
WHERE f1.FlightNumber = 'FL123';
```

- Check If a Specific Seat is Booked

```
SELECT s.SeatNumber, f.FlightNumber, s.Class, s.IsBooked
FROM Seats s
JOIN Flights f ON s.FlightNumber = f.FlightNumber
WHERE f.FlightNumber = 'FL123' AND s.SeatNumber = '12A';
```

- Find All Reservations for a Specific Flight

```
SELECT r.ReservationID, r.ReservationDate, c.FirstName,
c.LastName, s.SeatNumber, r.Amount
FROM Reservations r
JOIN Customers c ON r.CustomerID = c.CustomerID
JOIN Seats s ON r.SeatNumber = s.SeatNumber
WHERE r.FlightNumber = 1
ORDER BY r.ReservationDate;
```