

P3 Final ERD (Logical Model)

Group Number 8

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GitHub URL for P3 - <https://github.com/arnavvaryani/Airhub>

CHANGES MADE TO INITIAL ER DIAGRAM:

1. Addition of the "Loyalty Program" entity, which is associated with the "UserAccount" entity via a foreign key.
2. Addition of the "FlightCrew" entity, which is associated with the "Aircraft" entity via a foreign key.
3. Addition of the "AircraftModel" entity, which is associated with the "Aircraft" entity via a foreign key.
4. Addition of the "Payment" entity, which is associated with the "Flight" entity via a foreign key.
5. Addition of the "Booking" entity, which is associated with the "Passenger" entity via a foreign key.
6. The "Passenger" entity now has a foreign key to the "UserAccount" entity.
7. The "Passenger" entity now has a foreign key to the "Baggage" entity.
8. The "Flight" entity now has a foreign key to the "Aircraft" entity.
9. The "Flight" entity now has a foreign key to the "Airport" entity.
10. The "FlightSchedule" entity is associated with the "Flight" entity via a foreign key.
11. The "Ticket" entity is associated with the "Passenger" entity via a foreign key.
12. The "Ticket" entity is associated with the "Flight" entity via a foreign key.
13. The "Ticket" entity is associated with the "Booking" entity via a foreign key.
14. The "Aircraft" entity now has a foreign key to the "AircraftModel" entity.
15. The "Aircraft" entity now has a foreign key to the "FlightCrew" entity.
16. The "Airport" entity now has attributes such as "Name", "Location", "Capacity", and "Runways".
17. The "FlightCrew" entity now has attributes such as "Name" and "Role".
18. The "Baggage" entity now has attributes such as "Size", "Status", and "FixedDiscount".
19. The "AircraftModel" entity now has an attribute such as "ModelName".
20. The "Payment" entity now has an attribute such as "Payment Method".
21. The "Booking" entity now has attributes such as "BookingStatus" and "Class".

Entities and Attributes:

1. UserAccount

- **UserID**: A unique identifier for each user, which serves as the primary key.
- **Name**: The full name of the user. This is a direct attribute of the user and is functionally dependent on the UserID.
- **Email**: A unique email address for user identification and communication. It's also a candidate key due to its uniqueness constraint.
- **Password**: A secured attribute used for authenticating the user's identity. It's sensitive and should be stored securely (hashed and salted).

2. Passenger

- **PassengerID**: A unique identifier for each passenger, serving as the primary key.
- **UserID**: Links the passenger to a user account, indicating that passengers are also users of the system.
- **Name**: The passenger's name. Although similar to the Name in UserAccount, it's kept here to ensure that passenger details are encapsulated within this entity.
- **Email**: The passenger's email address, which must be unique and is thus a candidate key.
- **PassportNumber**: A globally unique identifier for the passenger for international travel purposes.

3. Loyalty Program

- **LoyaltyID**: A unique identifier for each loyalty program membership.
- **UserID**: Associates the loyalty program with a specific user account.
- **FixedDiscount**: Represents the discount value that members of the loyalty program receive. This is a simple attribute with no dependencies on other non-key attributes.

4. FlightSchedule

- **FlightScheduleID**: A unique identifier for each flight schedule entry.
- **PassengerID** and **FlightID**: Foreign keys that link the schedule to a specific passenger and flight. This enforces a relationship where a schedule is specific to a flight and a passenger.
- **DepartureTime** and **ArrivalTime**: Specific times for the flight's departure and arrival, respectively.
- **Price**: The cost associated with this specific flight schedule.
- **Date**: The specific date of the flight.

5. Flight

- **FlightID**: A unique identifier for each flight.
- **AirportID**: Connects the flight to its originating airport.
- **AirlineName**, **OriginAirport**, and **DestinationAirport**: Define the airline operating the flight and the airports of departure and arrival.
- **Status**: Current status of the flight (e.g., on-time, delayed, canceled).
- **Route**: The planned trajectory or path the flight will take.

6. Airport

- **AirportID**: A unique identifier for each airport.
- **Name**: The official name of the airport.
- **Location**: The geographical location of the airport.
- **Capacity**: The maximum number of passengers the airport can handle.
- **Runways**: The number of runways available at the airport.

7. AircraftModel

- **ModelID**: A unique identifier for each aircraft model.
- **AircraftID**: Links the model to a specific aircraft.

- **ModelName**: The name of the aircraft model, which could be shared among multiple aircraft.
8. **Aircraft**
- **AircraftID**: A unique identifier for each aircraft.
 - **ModelID**: Associates the aircraft with its model.
 - **FuelCapacity**, **Range**, and **Length**: Define the physical and operational characteristics of the aircraft.
9. **Payment**
- **PaymentID**: A unique identifier for each payment transaction.
 - **FlightID**: Associates the payment with a specific flight.
 - **PaymentMethod**: The method by which the payment was made (e.g., credit card, bank transfer).
10. **Booking**
- **BookingID**: A unique identifier for each booking.
 - **PaymentID** and **PassengerID**: Foreign keys that associate the booking with a payment and a passenger.
 - **Date**: The date when the booking was made.
 - **BookingStatus**: The current status of the booking (e.g., confirmed, pending, canceled).
 - **Class**: The travel class booked by the passenger (e.g., economy, business).
11. **Ticket**
- **TicketID**: A unique identifier for each issued ticket.
 - **FlightID** and **BookingID**: Foreign keys linking the ticket to a specific flight and booking.
 - **SeatNumber**: The assigned seat for the passenger.
 - **Price**: The cost of the ticket.
 - **PassengerID**: A unique identifier associated with the passenger who has booked the ticket.
12. **Baggage**
- **BaggageID**: A unique identifier for each piece of baggage.
 - **PassengerID** and **FlightID**: Foreign keys that link the baggage to a passenger and a flight.
 - **Size**: The dimensions or category of the baggage.
 - **Status**: The current handling status of the baggage (e.g., checked-in, loading, in transit).
13. **FlightCrew**
- **CrewID**: A unique identifier for each crew member associated with the flight.
 - **AircraftID**: A unique identifier for each aircraft.
 - **Name**: Name of each crew member.
 - **Role**: Role assigned for each flight crew member.

All these entities, as described, maintain the attributes' atomicity, ensuring 1NF. Relationships are properly enforced with foreign keys to avoid partial dependencies, thus adhering to 2NF. Finally, there are no transitive dependencies present, as each non-key attribute is fully functionally dependent on the primary key, which is the requirement for 3NF. This design supports data integrity and avoids common anomalies in database operations.