RwandAir Flight Booking and Ticket Management System

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Phase III: Logical Model Design - RwandAir Booking System

1. Entity-Relationship (ER) Model

Entities and Attributes:

Passenger (PK: Passenger_ID): Name, Passport_No (UNIQUE), Contact, Email

Flight (PK: Flight_ID): Departure, Arrival, Date, Time, Aircraft_ID

Booking (PK: Booking_ID): Passenger_ID (FK), Flight_ID (FK), Seat_No, Ticket_Status

Payment (PK: Payment_ID): Booking_ID (FK), Amount, Payment_Status, Date_Paid

Crew (PK: Crew_ID): Name, Role, Assigned_Flight_ID (FK)

2. Relationships & Constraints

Relationships:

- One Passenger can have multiple Bookings (1:M)

- One Flight can have multiple Bookings (1:M)

- Each Booking has one Payment (1:1)

- One Flight is operated by multiple Crew (1:M)

Constraints:

- Passport_No: UNIQUE, NOT NULL

- Payment_Status: CHECK (Paid, Pending, Refunded)

- Ticket_Status: CHECK (Confirmed, Pending, Cancelled)

- Amount: CHECK (>= 0)

- Date_Paid: DEFAULT CURRENT_DATE

3. Normalization

All tables follow 3NF principles:

- 1NF: Atomic attributes only.

- 2NF: Non-key attributes are fully functionally dependent on PK.

- 3NF: No transitive dependencies.

Redundancy is minimized and data is efficiently structured.

4. Handling Data Scenarios

The model can handle:

- Many passengers per flight.

- Passengers making multiple bookings.

- Dynamic updates to flight schedules.

- Real-time payment and seat allocation.

- Accurate tracking of crew assignments and financial reports.

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5. ER Diagram