# KBTU

Course: Databases

Laboratory Work 1: ERD Diagram

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## Introduction

The purpose of this laboratory work is to design an Entity-Relationship Diagram (ERD) for an international airport database system. The system manages data related to airports, flights, airlines, bookings, passengers, baggage, and security checks. The ERD helps to visualize the database structure, identify entities, attributes, and relationships, and ensure normalization up to the Third Normal Form (3NF).

## Entities and Attributes

### Airport

- - airport_id (PK)
- - airport_name
- - country
- - state
- - city
- - created_at
- - updated_at

### Airline

- - airline_id (PK)
- - airline_code
- - name
- - country
- - created_at
- - updated_at

### Flight

- - flight_id (PK)
- - airline_id (FK)
- - departure_airport_id (FK)
- - arrival_airport_id (FK)
- - departing_gate
- - arriving_gate
- - scheduled_departure
- - scheduled_arrival
- - actual_departure
- - actual_arrival
- - created_at
- - updated_at

### Passenger

- - passenger_id (PK)
- - first_name
- - last_name
- - gender
- - date_of_birth
- - country_of_citizenship
- - country_of_residence
- - passport_number
- - created_at
- - updated_at

### Booking

- - booking_id (PK)
- - flight_id (FK)
- - passenger_id (FK)
- - status
- - booking_platform
- - ticket_price
- - created_at
- - updated_at

### Booking_Change

- - change_id (PK)
- - booking_id (FK)
- - change_details
- - created_at
- - updated_at

### Boarding_Pass

- - boarding_pass_id (PK)
- - booking_id (FK)
- - seat
- - boarding_time
- - created_at
- - updated_at

### Baggage

- - baggage_id (PK)
- - booking_id (FK)
- - weight_kg
- - created_at

- - updated_at

### Baggage_Check

- - check_id (PK)
- - baggage_id (FK)
- - passenger_id (FK)
- - check_results
- - created_at
- - updated_at

### Security_Check

- - security_check_id (PK)
- - passenger_id (FK)
- - check_results
- - created_at
- - updated_at

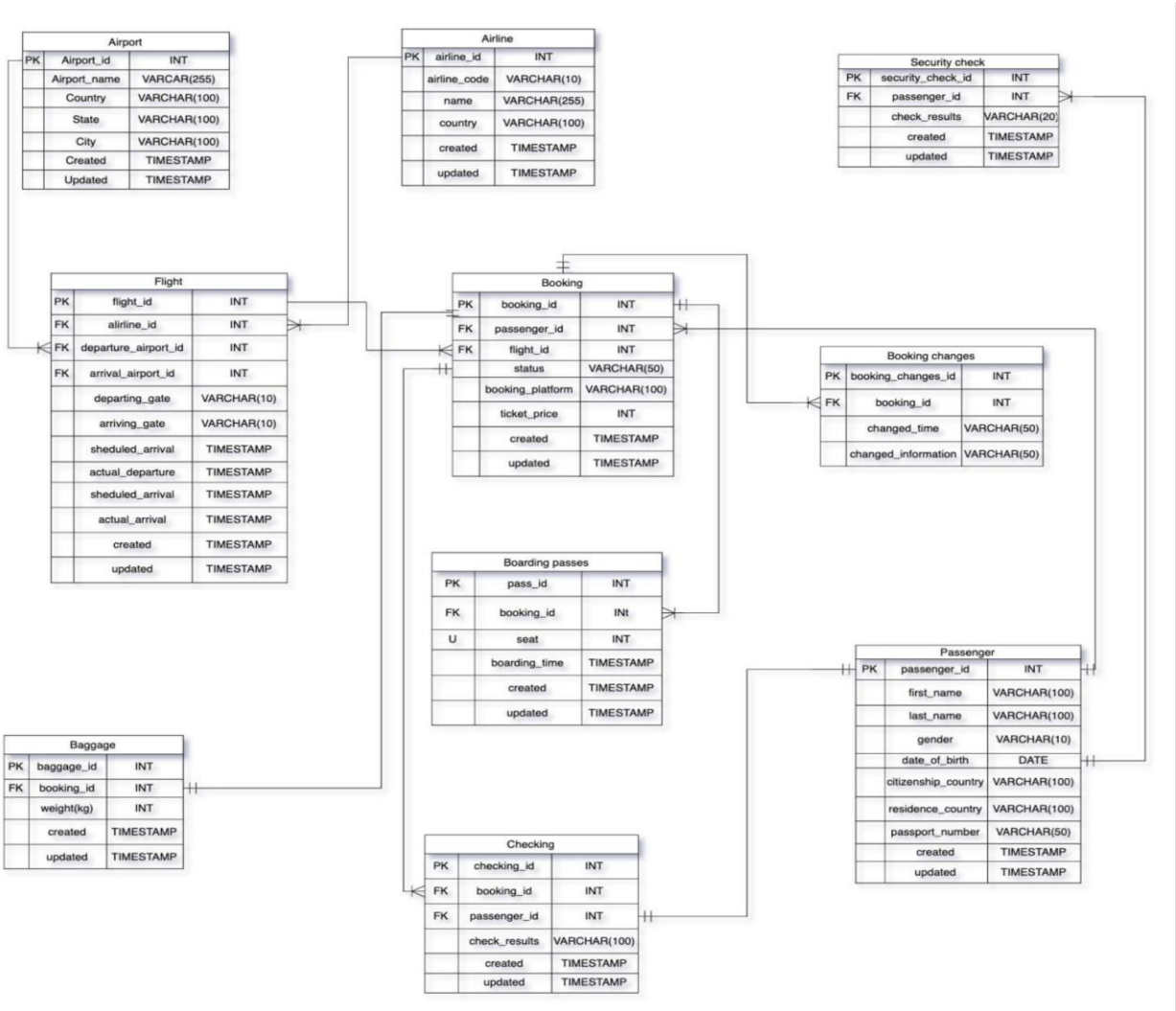
## Normalization

The database schema is normalized to the Third Normal Form (3NF). Each table has a primary key that uniquely identifies records. Attributes are dependent only on the primary key, and there are no transitive dependencies. Foreign keys are used to maintain referential integrity between related entities.

## Relationships

- One Airport can be the departure point for many Flights (1:N).
- One Airport can be the arrival point for many Flights (1:N).
- One Airline operates many Flights (1:N).
- One Flight can have many Bookings (1:N).
- One Passenger can have many Bookings (1:N).
- One Booking may have multiple Boarding Passes and Baggage records (1:N).
- One Baggage item can have one Baggage Check (1:1).
- One Passenger can undergo multiple Security Checks (1:N).

## ER Diagram




## Legend

- PK: Primary Key
- FK: Foreign Key
- 1:N: One-to-Many relationship
- 1:1: One-to-One relationship

## Conclusion

The ERD of the international airport database system provides a structured and normalized representation of data. Entities, attributes, and relationships are clearly defined, ensuring data integrity, minimizing redundancy, and facilitating efficient data management for airport operations.