

# 1. ENTITIES IDENTIFICATION (

**10 entities identified:** Airport, Airline, Flight, Passenger, Booking, Boarding\_Pass, Baggage, Baggage\_Checking, Security\_Check, Booking\_Changes.

## 2. ATTRIBUTES DETERMINATION

**Key attributes with data types:**

- **Airport:** airport\_id (PK, BIGINT), airport\_name, country, city, created\_at, updated\_at
- **Flight:** flight\_id (PK), airline\_id (FK), departure\_airport\_id (FK), arrival\_airport\_id (FK), scheduled\_departure\_time, actual\_departure\_time
- **Passenger:** passenger\_id (PK), first\_name, last\_name, passport\_number (UNIQUE), date\_of\_birth
- **Booking:** booking\_id (PK), flight\_id (FK), passenger\_id (FK), status, ticket\_price, booking\_platform
- **All entities include:** Primary keys, Foreign keys where applicable, timestamps (created\_at, updated\_at), NOT NULL constraints for required fields.

## 3. NORMALIZATION

**3NF achieved:** All tables have atomic values (1NF), no partial dependencies due to single-column primary keys (2NF), and no transitive dependencies - each non-key attribute depends directly on primary key (3NF). No table splitting required.

## 4. RELATIONSHIPS IDENTIFICATION

**Main relationships with cardinality:**

- Airport → Flight (1:N) - departure/arrival airports
- Airline → Flight (1:N) - airline operates flights
- Flight → Booking (1:N) - flight has multiple bookings
- Passenger → Booking (1:N) - passenger makes multiple bookings
- Booking → Boarding\_Pass (1:1) - one boarding pass per booking
- Booking → Baggage (1:N) - multiple baggage per booking
- Passenger → Security\_Check (1:N) - multiple security checks per passenger

## 5. ENTITY BOXES

Rectangular boxes represent each entity with clear labels. Color-coded: Blue (flight operations), Green (passenger services), Orange (security/baggage handling).

## 6. ATTRIBUTES LISTING

Each entity box contains: **Bold text** for primary keys, *Italic text* for foreign keys, regular text for normal attributes, with data types (BIGINT) and constraints (NOT NULL, UNIQUE).

## 7. RELATIONSHIP CONNECTIONS

Lines connect related entities with cardinality labels (1:N, 1:1). **Participation constraints:** Total participation for child entities (foreign keys NOT NULL), partial participation for parent entities. **Referential integrity** maintained through proper foreign key relationships.

## 8. DOCUMENTATION

**Legend:** Rectangle = Entity, Lines = Relationships, Bold = Primary keys, Italic = Foreign keys, 1:N = One-to-many, 1:1 = One-to-one.

**System workflow:** Passengers book flights at specific airports operated by airlines. Bookings generate boarding passes, baggage registrations, and security checks, with all changes tracked for audit purposes.

