



## **DAMG 6210: 16152 -Data Management & Database Design**

### **Airport Operation and Luggage Management System**

#### **Database Specification: Purpose, Business Problems Addressed, Business Rules and Design decisions**

##### **Members:**

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##### **Database Purpose**

The purpose of the database is to maintain the data which gets generated on a day-to-day basis at an airport. It will be used to keep a track on the status of the claimed/unclaimed luggage bags, how efficiently the runways are being used, where the luggage is exactly and who is the owner of the unclaimed bag. These data will be used by the administrative team to accurately track passenger luggage to avoid missing luggage instances.

##### **Business Problems Addressed:**

- Tracking the luggage throughout its journey from being checked in until it is boarded onto the flight.
- Supply insights to drive the travel industry and its initiatives (e.g., Tracking the most frequent flight route and which is the most popular destination and airline).
- Allow the administrative team to track the person responsible for the piece of luggage that went missing or did not get on the flight for any reason.
- Tracking the runway utilization and the period for which it was the busiest.
- To establish contact with the person whose unclaimed luggage has been identified.

##### **Business Rules:**

- Each passenger has only one fixed address, contact information, and Email Id.
- Each flight has a fixed origin and destination.
- Each flight is a direct flight from origin to destination.
- Each ticket is associated with only one flight.
- Each luggage loading, checking, and sorting events will have only one staff member associated with it at any stage.
- Capacity of a runway is the measure of the maximum amount of flight traffic handled on that runway.
- Cancelling, rescheduling, and ticket transferring operations are not allowed.

- Records reflected in the flight luggage loading entity are necessarily loaded in the flight en route to its destination.
- The luggage reflected in the final luggage loading has passed through the luggage sorting stage.
- The luggage reflected in the luggage sorting has necessarily passed through the luggage check-in stage.

### Design Requirements (Credit to Prof. Simon Wang):

- Use Crow's Foot Notation
- Specify the primary key fields in each table by specifying PK beside the fields.
- Draw a line between the fields of each table to show the relationships between each table. This line should be pointed directly to the areas in each table used to form the relationship.
- Specify which table is on one side of the relationship by placing a one next to the field where the line starts.
- Specify which table is on the many sides of the relationship by placing a crow's feet symbol next to the field where the line ends.

### Design Decisions

Entity Name	Why entity is included	How Entity is related to other entities
<b><i>LuggageCheckIn</i></b>	The most important functionality that we are trying to implement is to track the luggage throughout its lifecycle at the airport. When the passenger checks-in the luggage, every piece of luggage is assigned a unique LuggageID. Also, the time is being recorded as well.	LuggageCheckIn plays a vital role in the tracking of the luggage. TicketID and StaffID are made foreign keys in this entity so that we could track the owner of that bag and the staff member who was responsible for its movement to the next stage.
<b><i>LuggageSorting</i></b>	Once the luggage has been checked in, it is moved to the next stage, where the sorting occurs. The luggage gets placed into different sorting stations. We added this stage because we want to implement and show the tracking of luggage functionality.	LuggageSorting will be having records of only that luggage which has been checked in by the passengers. It is the penultimate stage of the lifecycle of a bag and later it is moved to the FlightLuggageLoading table.
<b><i>FlightLuggageLoading</i></b>	This is the final stage in our luggage tracking process. Once the luggage is received in this area, i.e., a record is present in this table, we assume that the luggage will be loaded onto the correct flight no matter what. During implementation, we will look for records in this table and	We will enforce the integrity that the records present in FlightLuggageLoading will have some or all the records in the LuggageSorting table. Also, a staff member will be associated with a bag at this stage. This way, we could easily track the person

	compare them with those in the above two tables. If a record is not found, that implies the luggage is missing, and we will inform its owner about its whereabouts.	responsible for missing the luggage.
<b>InboundLuggage</b>	This entity will act as a luggage master for all the bags arriving at our airport. We decided to add this entity to demonstrate whether a piece of luggage was claimed or not.	This entity is connected to UnclaimedLuggage and Ticket, so we can fetch the bags' owners and where the bag came from.
<b>UnclaimedLuggage</b>	Once the business day is over, a staff member will scan the tags of all the unclaimed bags. Those records will automatically get populated in this table. It will help us in contacting the owners of that luggage.	We will have some or all the records in the InboundLuggage table present in this table. To ensure that we can demonstrate whether the luggage was claimed, we will intentionally make some records disappear from this table.
<b>Flight</b>	This core entity tracks the flight information and relates it with all other flight related data. It encompasses all the information about and related to flight type, arrival, destination, and timings schedule. This will help track and compute delay time, runway utilization, and the passenger associated with the said flight.	This entity acts as a bridge for direct connection between Airline, Airport, Runway, FlightDelay, and Ticket. Many Airlines, Airports, Runways, and Tickets could be associated with a flight. At the same time, only a single delay could be related to a single flight.
<b>Ticket</b>	This entity here will contain all required information about a passenger in a concise table which is needed to track the lost or unclaimed luggage and its associated passenger.	This entity is directly connected to LuggageCheckIn, UnclaimedLuggage, and InboundLuggage as crucial factors for luggage tracking. Ticket entity's direct connection to the flight and passenger entity helps ensure passenger identification for lost and unclaimed luggage.
<b>Passenger</b>	This vital entity is the interface through which we capture all the essential data associated with the passenger, including the passenger's contact and address information and passport information.	Passenger entity is related to address as well as ticket entity. A passenger can be associated with 0 or many tickets. While an address can be associated with 0 or many passengers.
<b>FlightDelay</b>	The team here is trying to track the delay time associated with a flight, this could further be related to understanding the impact of the same on other factors, such as runway utilization, busiest runways.	FlightDelay entity is directly associated with the Flight entity through the primary key FlightID; this helps in relating the delay-related information with other factors (i.e., runway) to gain

		insights about different fields (i.e., runway utilization).
<b>Staff</b>	One crucial functionality of the database is to identify and track the responsible staff for luggage mishandling. This entity contains all the necessary information about staff, including the manager, department, and the person's contact details.	The staff entity is directly associated with LuggageCheckIn, LuggageSorting, and FlightLuggageLoading entities. Each record in these entities here has a staff associated with it.
<b>Airport</b>	Airport ID and name is a unique identifier. With this entity we will keep record of the destination and arrival flights.	This entity is connected to flight. This will inform us about the origin, destination, scheduled date, time, and status of flights at that airport.
<b>Airline</b>	This entity is included to track airline information for the flight.	This entity is connected to flight through AirlineID as FK. This gives us information about which flight is associated to which airline.
<b>Runway</b>	Runway entity plays a role in terms of airport operations. With this entity, we can track runway utilization compared to the per day capacity of that runway.	Runway entity is related to flight entity, which track outgoing and incoming flights to calculate the utilization of a runway.
<b>Address</b>	Address entity is used in case of luggage tracking this entity will be used to contact the passenger and return the luggage to their address, hassle-free	This entity is connected to Passenger with AddressID as foreign key. Passenger entity will record all the passenger contact information along with their DOB and passport number.

## ER DIAGRAM

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