



Information Technology Institute Data  
Management Track  
Data Warehouse Project (Intake 42/2021)

# DWH Project, Airline Case Study

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## **Airline Company Case Study**

- **Which model did we choose ?**

Ralph Kimball data model, ERD- Dimensional Modeling (snowflake).

- **Why Ralph Kimbal model ?**

- As we started by understanding and documenting the most important business processes, business needs, and business questions data warehouse needs to answer.
- This Architecture is much simpler to design and setup, also easy to be understood by anyone.
- It takes a relatively lesser amount of time to implement the Kimball data warehouse architecture.

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- **The Business Process:**

Analyzing flight activities, reservation process and customer care interaction by discovering new opportunities for an airline company.

- **The Grain:**

**Flights per segment (Transit).**

**Segment is the stop point for each flight if it's not a one way flight.**

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- **Dimensions:**

**(Details about each data components is explained in next pages )**

Passenger, Flight, Promotion, Flight\_Status, Resv\_Channel, Feedback, Feedback type, Class\_type, FareBasis, Airport

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- **The Facts:**

**(Details about each data components is explained in next pages )**

- **Flight\_activity:** Total\_miles, Segment\_Duration, ticket fees.
- **Promotions\_response:** Factless table(Passenger\_key, Promotion\_key, Flight\_key)
- **Class Upgrades:** Factless table(Class\_key, Passenger\_key, Flight\_key)
- **Passenger\_Interactions:** Total complaint, Total feedbacks, total inquires

## • Model Components: (Dimensions And Facts)

### ○ Passenger Dimension:

Passenger dimension carries all the data about passenger,

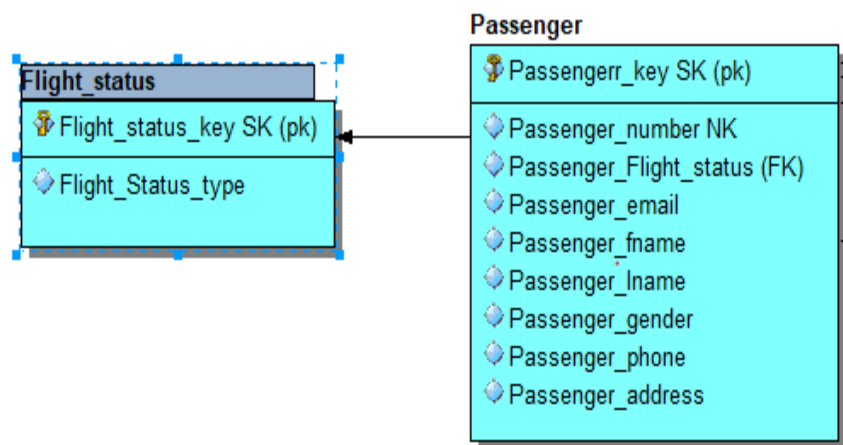
Their key number, their Natural key number, Their personal data and contacts, And

Passenger\_Flight\_status key, which is a foreign key from

Flights status dimension which have 3 values of the passenger

status either he has a Gold,

Platinum or Titanium status .



### ○ Flight Dimension:

Flight Dimension will carry all the data about available flights,

The flight number. Flight description or any notes related to the flight,

The flight source and destination, Flight miles which denotes to

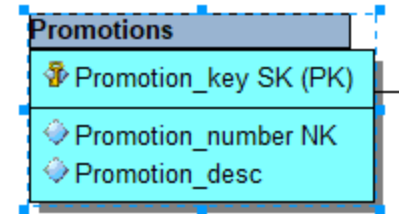
how many miles the flight will take from its source to the destination,

And the flight duration.



- **Promotion Dimension:**

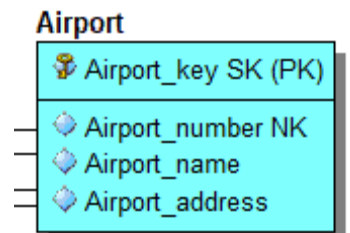
Promotion Dimension will carry the data about the promotions which the company provides, it has its own promotion key, and the description of the promotion.



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- **Airport Dimension:**

Airport Dimension will carry all the available airports details, their names and location, which will be associated then to the flight\_activity fact table as the source and destinations to the flights and segments



- **Fare basis Dimension:**




Fare basis Dimension will carry data about the fare basis which is the fare basis code assigned to your ticket and seat.

This is because the plane cabin is divided up into categories of airfares, each with its own price and rules or features. These fare basis codes are given a one-letter fare code, the most common being Y, J and F.

Although each airline can set their own rules for each fare basis, generally, the letter of your fare basis will contain information around the price of your ticket, how much flexibility your ticket has (changeable or refundable, for example).

Here is a sample of the fare basis data:

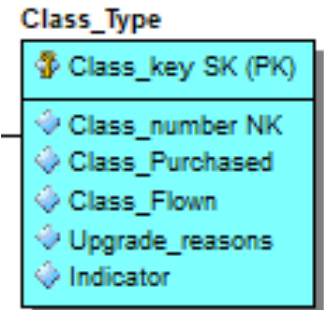
#### Fare\_Basis

 Fare_basis_key SK (PK)
 Fare_basis_Number NK
 Fare_basis_desc

Fare Basis Code Letter	Fare Basis Code meaning
K	Often refer to discounted economy class ticket
L	Often refer to discounted economy class ticket
Q	Often refer to discounted economy class ticket
V	Often refer to discounted economy class ticket
W	Often refer to discounted economy class ticket
U	Often refer to discounted economy class ticket
T	Often refer to discounted economy class ticket
X	Often refer to discounted economy class ticket
N	Often refer to discounted economy class ticket
O	Often refer to discounted economy class ticket
S	Often refer to discounted economy class ticket
Y	Often refers to full-fare economy tickets
B	Often refers to full-fare economy tickets
M	Often refers to full-fare economy tickets
H	Often refers to full-fare economy tickets
W	This ticket often refers to premium economy fares
E	This ticket often refers to premium economy fares
D	This fare will often indicate a discounted business class ticket
I	This fare will often indicate a discounted business class ticket
Z	This fare will often indicate a discounted business class ticket
J	This letter will often mean that it is a full-fare business ticket
C	This letter will often mean that it is a full-fare business ticket
D	This letter will often mean that it is a full-fare business ticket
A	This letter often means that the passenger is a full-fare paying first-class passenger

### ○ Class Type Dimension:

Class Type dimension, will be a **Junk dimension**, which carries all the Possible combinations for the flight class upgrades, with an indicator column carrying the values if it was upgrading, downgrading or non-change,

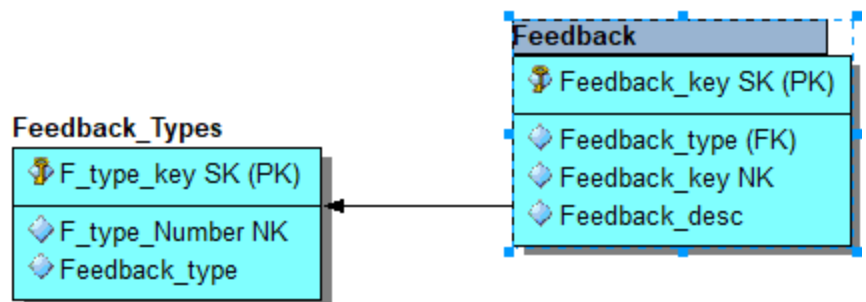


We chose to use a junk dimension(cross join for the classes with each other), because the class dimension has

few numbers of row, and it also important to track the changing on the classes for each passenger,

### ○ Feedback and Feedback Types Dimension:

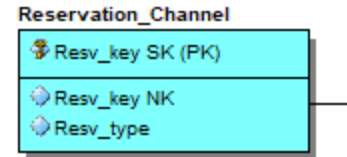
Feedback Dimension will carry all interactions types with customers which are either inquiry, positive feedback or complaint, and the description of that feedback which carries the response of the customer.





### ○ **Reservation Channel Dimension:**

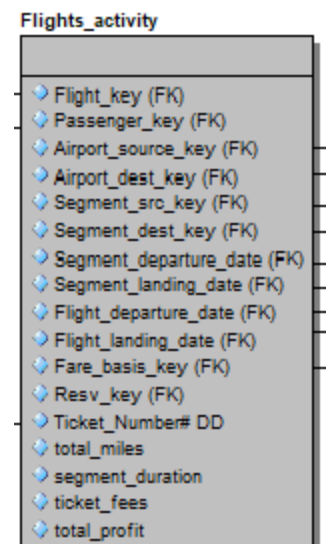
Reservation Channel Dimension will carry the type of the reservation channel, is it preformed online through website or app, or offline from the airport itself or contributed agency



### ○ **Flight\_Activity Fact:**

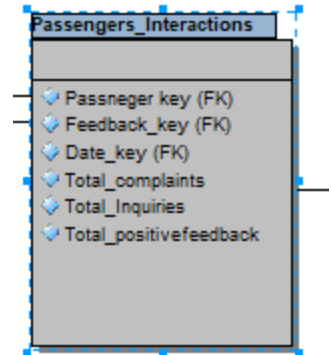
Flight Activity fact which will be used to analyze the flights activity, what flights the company's frequent flyers take, what fare basis they pay, which reservation channel commonly used, how many segments they take, how long their overnight stays,

Beside Calculating the total profits the company earn, and the how much the ticket fees take,



### ○ **Passenger\_Interaction Fact:**

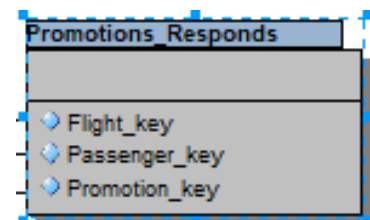
Passenger Interaction fact, will used to measure passengers interactions, either it was a complaint, inquiry or a feedback, that will help the company to know how satisfied is its customers, by knowing the total complaints/ inquiries/ feedback they get, how is the problem severity, in order to ensure good ongoing for the company's flights.



### ○ **Promotion Responds Factless table:**

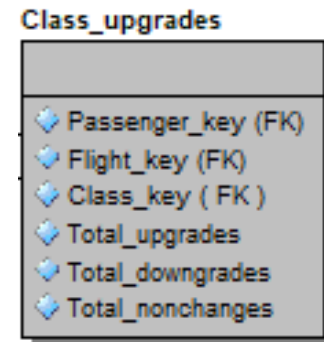
Promotion response is a factless table which have no measures, but used to help the company to gather information about which promotions do the passengers usually engage with, and which flights that often come with a lot of offers, does all the promotions get the same interactions or not,

Generally this table will help the company to analyze the passenger's response with the promotions they offer.



### ○ **Class\_upgrades Factless table:**

Class upgrades factless table which contains the data about the passenger and their class in each flight they take, and how often they upgrade/ downgrade or decide not to change their



The image shows a screenshot of a database table structure for 'Class\_upgrades'. The table has six columns: 'Passenger\_key (FK)', 'Flight\_key (FK)', 'Class\_key (FK)', 'Total\_upgrades', 'Total\_downgrades', and 'Total\_nonchanges'. Each column is preceded by a blue diamond icon, indicating it is a foreign key or a specific data field.

Class_upgrades	
Passenger_key (FK)	
Flight_key (FK)	
Class_key (FK)	
Total_upgrades	
Total_downgrades	
Total_nonchanges	

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## ○ **Assumptions:**

- To be a frequent flier you must exceed 6000 miles, (the total miles for that passenger flight)
- Passengers often Upgrade, Downgrade or don't change their class type for the flight
- Passengers is a (Slowly Changed Dimension) to change the passenger\_flight\_status when they earn a certain total amount of miles.

If total mile **more than 5000 and less than 10000** then he will have **titanium** status

else if total mile **more than 10000 and less than 5000** he will be upgraded to **platinum**,

Else if he **exceeded 10000 miles** he will have a **gold status**.

- When Receiving feedbacks from passengers, it's divided into 3 categories, either it's a problem, inquiry or a feedback, and if it's a problem it will have an indicator problem severity, which have a rate from 1 to 10 to indicate how severe is that problem