AIRLINE DATA WAREHOUSE CASESTUDY

Analyze And Model Data Warehouse for Airline System Project

The project's purpose is to analyze the flight activities of some airline companies and their frequent flyers and model its data warehouse schema.

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Dimensional Modeling Process

1- Business Process

- Reservation
- Flights Activity
- Frequent Flyers
- Customer Care

2- Grain Level

- Reservation Fact: One row per reservation.
- Segment Flight Activity Fact: Per Segment Level
- Trip Flight Activity Fact: Per Trip Level
- Frequent Flyer Fact:
- Customer Care Fact: Per Customer Interaction Level

3- Dimensions Tables

- Passenger Dimension
- Passenger Profile Dimension
- Flight Dimension
- Airport Dimension
- Aircraft Dimension
- Booking Channel Dimension
- Fare Basis Dimension
- Class Upgrade Dimension
- Payment Method Dimension
- Interaction Type Dimension
- Problem Severity Dimension
- Redeem Dimension
- Customer Experience Dimension
- Date Dimension
- Time Dimension

4- Fact Tables

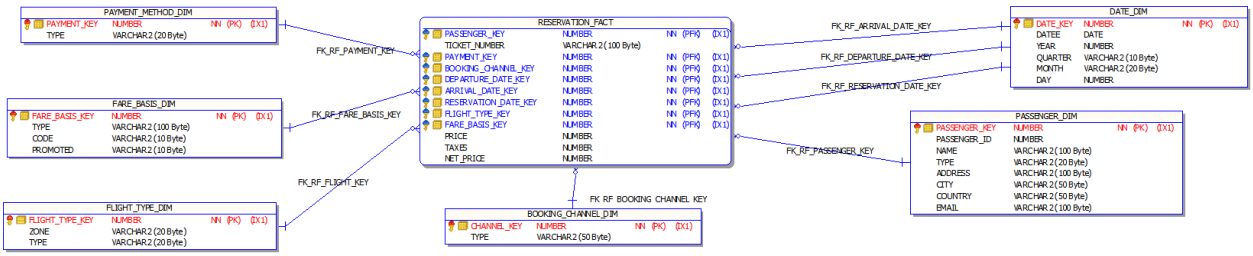
- Reservation Fact
- Segment Flight Activity Fact
- Trip Flight Activity Fact
- Frequent Flyer Fact
- Customer Care Fact

Business Processes:

1. **Passenger Registration and Profile Creation:**
    - Passengers register and provide personal information.
    - Passenger profiles are created with details such as status, club membership type, milage tier, and membership status.
    - Membership status includes categories like Active or Inactive, and Club Membership which can be Gold, Silver, or Bronze.
    - Mileage tier is also recorded, ranging from Under 100,000 miles to 100,000-499,999 miles and 500,000-1,999,999 miles.
2. **Flight Reservation:**
    - Passengers make flight reservations through various booking channels.
    - Each reservation includes details like confirmation number, ticket number, departure airport, arrival airport, scheduled departure date, and flight type.
3. **Flight Activity Tracking:**
    - Tracking of flight activities involves recording data related to each flight segment.
    - This includes information such as aircraft details, departure, and arrival airport keys, scheduled and actual departure and arrival dates and times, fare price, taxes, luggage, and any upgrades.
4. **Customer Care Interaction:**
    - Customers interact with customer service agents for problem resolution and feedback.
    - Interactions are logged with details like interaction type, problem severity, flight type, date, time, and customer information.
5. **Frequent Flyer Program:**
    - Members earn and redeem frequent flyer miles based on flight activities.
    - Frequent flyer facts capture member details, flight information, miles earned and redeemed, and any upgrades.
6. **Fare Basis and Payment:**
    - Fare basis details are recorded, including fare type, code, and promotional status.

Logical Model

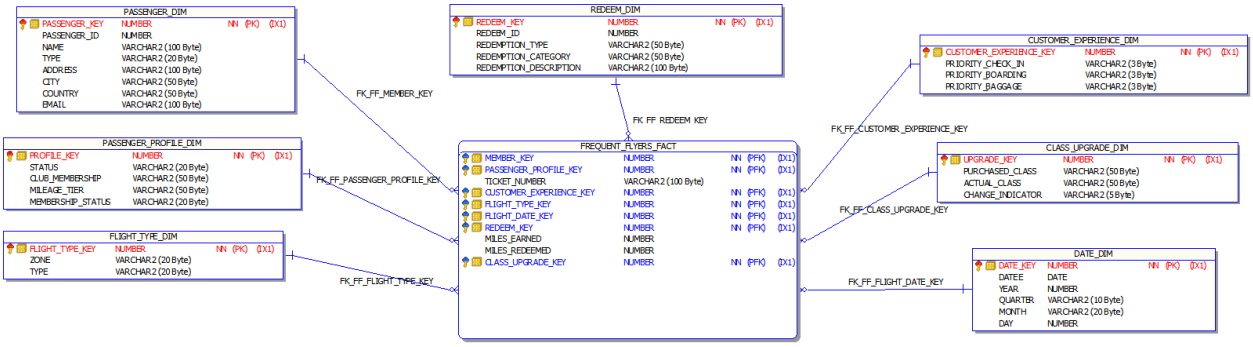
Reservation



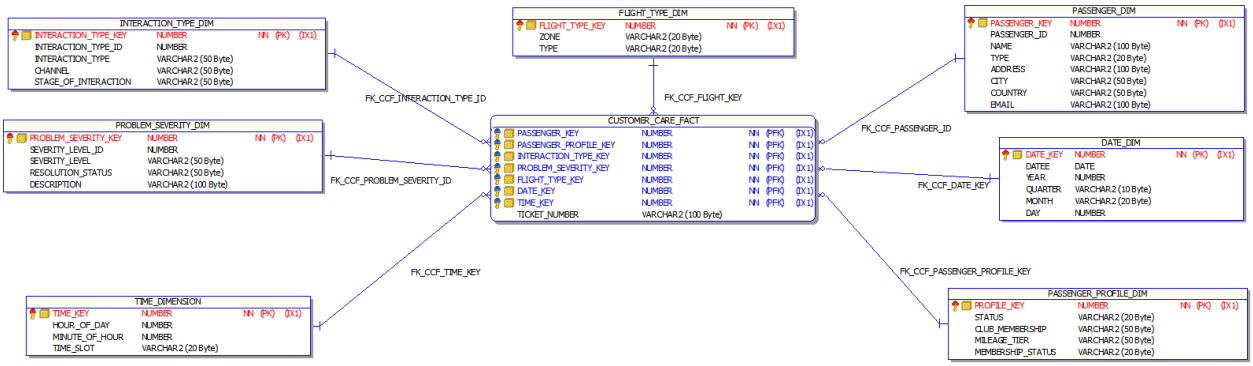
Flight Activity

Logical Model Continued

Frequent Flyer



Customer Care



Tables Identifications

1- Passenger Dimension

- Includes passenger details (e.g., frequent flyer status, age group, gender).

PASSENGER_KEY	PASSENGER_ID	NAME	TYPE	ADDRESS	CITY	COUNTRY	EMAIL
1	1001	John Smith	Regular	123 Main St	New York	USA	john@example.com
2	1002	Alice Johnson	Frequent	456 Elm St	Los Angeles	USA	alice@example.com
3	1003	Michael Brown	Regular	789 Oak St	Chicago	USA	michael@example.com
4	1004	Jennifer Lee	Frequent	321 Pine St	San Francisco	USA	jennifer@example.com
5	1005	David Wilson	Regular	654 Cedar St	Seattle	USA	david@example.com
6	1006	Emily Martinez	Frequent	987 Walnut St	Houston	USA	emily@example.com
7	1007	Daniel Taylor	Regular	741 Maple St	Boston	USA	daniel@example.com
8	1008	Sophia Garcia	Frequent	852 Birch St	Philadelphia	USA	sophia@example.com
9	1009	Matthew Rodriguez	Regular	963 Spruce St	Phoenix	USA	matthew@example.com
10	1010	Olivia Hernandez	Frequent	159 Ash St	San Antonio	USA	olivia@example.com
11	1011	Jacob Martinez	Regular	357 Pine St	Dallas	USA	jacob@example.com
12	1012	Isabella Lopez	Frequent	852 Elm St	Austin	USA	isabella@example.com
13	1013	William Gonzalez	Regular	741 Maple St	Jacksonville	USA	william@example.com
14	1014	Emma Perez	Frequent	963 Oak St	San Jose	USA	emma@example.com
15	1015	Ethan Wilson	Regular	159 Cedar St	Indianapolis	USA	ethan@example.com
16	1016	Ava Scott	Frequent	357 Pine St	San Diego	USA	ava@example.com
17	1017	Michael Lee	Regular	852 Elm St	San Francisco	USA	michael@example.com
18	1018	Mia Taylor	Frequent	741 Maple St	Charlotte	USA	mia@example.com
19	1019	Alexander Hernandez	Regular	963 Oak St	Seattle	USA	alexander@example.com
20	1020	Charlotte Martinez	Frequent	159 Cedar St	Detroit	USA	charlotte@example.com

2- Passenger Profile Dimension

- A status, club membership, and mileage tier.

PROFILE_KEY	STATUS	CLUB_MEMBERSHIP	MILEAGE_TIER	MEMBERSHIP_STATUS
1	Active	Gold Club	Under 100,000 miles	Active
2	Active	Silver Club	100,000-499,999 miles	Active
3	Inactive	Bronze Club	Under 100,000 miles	Inactive
4	Active	Gold Club	500,000-1,999,999 miles	Active
5	Active	Silver Club	Under 100,000 miles	Active
6	Active	Platinum Club	100,000-499,999 miles	Active
7	Active	Gold Club	Under 100,000 miles	Active
8	Inactive	Bronze Club	Under 100,000 miles	Inactive
9	Active	Gold Club	500,000-1,999,999 miles	Active
10	Active	Silver Club	Under 100,000 miles	Active
11	Active	Platinum Club	100,000-499,999 miles	Active
12	Active	Gold Club	Under 100,000 miles	Active
13	Inactive	Bronze Club	Under 100,000 miles	Inactive
14	Active	Gold Club	500,000-1,999,999 miles	Active
15	Active	Silver Club	Under 100,000 miles	Active
16	Active	Platinum Club	100,000-499,999 miles	Active
17	Active	Gold Club	Under 100,000 miles	Active
18	Inactive	Bronze Club	Under 100,000 miles	Inactive
19	Active	Gold Club	500,000-1,999,999 miles	Active
20	Active	Silver Club	Under 100,000 miles	Active

3- Flight Type Dimension

- Describes Flight Zone and Type

FLIGHT_TYPE_KEY	ZONE	TYPE
1	Domestic	Economy
2	Domestic	Business
3	Domestic	Premium Economy
4	Domestic	First Class
5	International	Economy
6	International	Business
7	International	Premium Economy
8	International	First Class

4- Airport Dimension

- Describes airports.

AIRPORT_KEY	AIRPORT_ID	NAME	CITY	COUNTRY
1	1001	John F. Kennedy International Airport	New York City	USA
2	1002	Los Angeles International Airport	Los Angeles	USA
3	1003	Chicago O'Hare International Airport	Chicago	USA
4	1004	Miami International Airport	Miami	USA
5	1005	San Francisco International Airport	San Francisco	USA
6	1006	Denver International Airport	Denver	USA
7	1007	Orlando International Airport	Orlando	USA
8	1008	Seattle-Tacoma International Airport	Seattle	USA
9	1009	McCarran International Airport	Las Vegas	USA
10	1010	Dallas/Fort Worth International Airport	Dallas	USA
11	1011	Hartsfield-Jackson Atlanta International Airport	Atlanta	USA
12	1012	Toronto Pearson International Airport	Toronto	Canada
13	1013	Vancouver International Airport	Vancouver	Canada
14	1014	Montreal-Pierre Elliott Trudeau International Airport	Montreal	Canada
15	1015	Calgary International Airport	Calgary	Canada
16	1016	Edmonton International Airport	Edmonton	Canada
17	1017	Halifax Stanfield International Airport	Halifax	Canada
18	1018	Ottawa Macdonald-Cartier International Airport	Ottawa	Canada
19	1019	Québec City Jean Lesage International Airport	Québec City	Canada
20	1020	London Heathrow Airport	London	UK

5- Aircraft Dimension

- Describes the model, capacity, and manufacturer of each Aircraft.

AIRCRAFT_KEY	AIRCRAFT_ID	MODEL	CAPACITY	MANUFACTURER
1	1001	Boeing 737	189	Boeing
2	1002	Airbus A320	180	Airbus
3	1003	Boeing 777	396	Boeing
4	1004	Airbus A330	300	Airbus
5	1005	Embraer E190	114	Embraer
6	1006	Boeing 787 Dreamliner	242	Boeing
7	1007	Airbus A380	555	Airbus
8	1008	Boeing 747	524	Boeing
9	1009	Airbus A350	440	Airbus
10	1010	Boeing 737 MAX	230	Boeing
11	1011	Airbus A321	240	Airbus
12	1012	Embraer E195	124	Embraer
13	1013	Boeing 767	375	Boeing
14	1014	Airbus A319	160	Airbus
15	1015	Boeing 757	200	Boeing
16	1016	Embraer E175	88	Embraer
17	1017	Airbus A330neo	260	Airbus
18	1018	Boeing 777X	426	Boeing
19	1019	Embraer E170	76	Embraer
20	1020	Boeing 787-10	330	Boeing

6- Booking Channel Dimension

- Represents reservation channels (e.g., online, phone, travel agents).

CHANNEL_KEY	TYPE
1	Online
2	Travel Agency
3	Mobile App
4	Call Center
5	Corporate Portal
6	Airport Counter
7	Third-party Website
8	Kiosk
9	Travel Management Company
10	Direct Sales

7- Fare Basis Dimension

- Holds fare basis codes and related information.

FARE_BASIS_KEY	TYPE	CODE	PROMOTED
1	Full Fare First Class	FFFC	No
2	Discount Fare Economy Class	DFEC	Yes
3	Business Class Flex Fare	BCFF	No
4	Premium Economy Restricted Fare	PERF	No
5	Special Promotion Fare	SPF	Yes
6	Last Minute Fare	LMF	No
7	Advance Purchase Economy Fare	APEF	Yes
8	Refundable Business Class Fare	RBCF	No
9	Group Discount Fare	GDF	Yes
10	Companion Fare	CF	No

8- Class Upgrade Dimension

- Represents class upgrades
  including purchased class, actual class, and change indicator.

UPGRADE_KEY	PURCHASED_CLASS	ACTUAL_CLASS	CHANGE_INDICATOR
1	Economy	Economy	Same
2	Economy	Premium Economy	Up
3	Economy	Business	Up
4	Economy	First Class	Up
5	Premium Economy	Premium Economy	Same
6	Premium Economy	Business	Up
7	Premium Economy	First Class	Up
8	Business	Business	Same
9	Business	First Class	Up
10	First Class	First Class	Same
11	Premium Economy	Economy	Down
12	Business	Premium Economy	Down
13	First Class	Premium Economy	Down
14	Business	Economy	Down
15	First Class	Economy	Down
16	First Class	Premium Economy	Down

9- Payment Method Dimension

- Describes The Payment Method Used for Reserving a Flight

PAYMENT_KEY	TYPE
1	Cash
2	Credit Card
3	Debit Card
4	Mobile Payment
5	Bank Transfer

10- Interaction Type Dimension

- Contains data about different types of interactions, like channel and stage.

INTERACTION_TYPE_KEY	INTERACTION_TYPE_ID	INTERACTION_TYPE	CHANNEL	STAGE_OF_INTERACTION
1		Inquiry	Phone Call	Before Trip
2		Inquiry	Email	During Trip
3		Inquiry	Chat	After Trip
4		Complaint	Phone Call	Before Trip
5		Complaint	Email	During Trip
6		Complaint	Chat	After Trip
7		Feedback	Phone Call	Before Trip
8		Feedback	Email	During Trip
9		Feedback	Chat	After Trip

11- Problem Severity Dimension

- Stores severity levels for problems encountered, along with resolution status and description.

PROBLEM_SEVERITY_KEY	SEVERITY_LEVEL_ID	SEVERITY_LEVEL	RESOLUTION_STATUS	DESCRIPTION
1		Minor	Resolved	Small issue, quickly resolved.
2		Minor	Pending	Small issue, awaiting resolution.
3		Moderate	Resolved	Moderate issue, resolved effectively.
4		Moderate	Pending	Moderate issue, currently under investigation.
5		Major	Resolved	Significant issue, resolved with some difficulty.
6		Major	Pending	Significant issue, awaiting action for resolution.
7		Critical	Resolved	Critical issue, required immediate attention and resolved.
8		Critical	Escalated	Critical issue, escalated for urgent resolution.

12- Redeem Dimension

- Stores information about redemption, including redemption type, category, and description.

REDEEM_KEY	REDEEM_ID	REDEMPTION_TYPE	REDEMPTION_CATEGORY	REDEMPTION_DESCRIPTION
1	101	Miles	Flight	Redeem miles for a free flight
2	102	Cashback	Shopping	Redeem cashback rewards for purchases
3	103	Upgrade	Travel	Redeem points for a seat upgrade
4	104	Gift Card	Retail	Redeem points for a gift card
5	105	Hotel Stay	Accommodation	Redeem points for a free hotel stay

13- Customer Experience Dimension

- Contains data related to customer experience, such as priority check-in, boarding, and baggage.

CUSTOMER_EXPERIENCE_KEY	PRIORITY_CHECK_IN	PRIORITY_BOARDING	PRIORITY_BAGGAGE
1	Yes	Yes	Yes
2	No	Yes	No
3	Yes	No	Yes
4	Yes	Yes	No

14- Date Dimension

- Contains Date and related attributes (e.g. Year, Quarter, Month, Day).
- Role-playing dimension: We used the same date dimension for different purposes (e.g., flight departure time, flight arrival time).

DATE_KEY	DATEE	YEAR	QUARTER	MONTH	DAY
20220101	01-Jan-22	2022	Q1	January	1
20220102	02-Jan-22	2022	Q1	January	2
20220103	03-Jan-22	2022	Q1	January	3
20220104	04-Jan-22	2022	Q1	January	4
20220105	05-Jan-22	2022	Q1	January	5
20220106	06-Jan-22	2022	Q1	January	6
20220107	07-Jan-22	2022	Q1	January	7
20220108	08-Jan-22	2022	Q1	January	8
20220109	09-Jan-22	2022	Q1	January	9
20220110	10-Jan-22	2022	Q1	January	10
20220111	11-Jan-22	2022	Q1	January	11
20220112	12-Jan-22	2022	Q1	January	12
20220113	13-Jan-22	2022	Q1	January	13
20220114	14-Jan-22	2022	Q1	January	14
20220115	15-Jan-22	2022	Q1	January	15
20220116	16-Jan-22	2022	Q1	January	16
20220117	17-Jan-22	2022	Q1	January	17
20220118	18-Jan-22	2022	Q1	January	18

15- Time Dimension

- Contains time and related attributes (e.g. Hour of Day, Time Slot).
- Role-playing dimension: We used the same time dimension for different purposes (e.g., flight departure time, flight arrival time).

TIME_KEY	HOUR_OF_DAY	MINUTE_OF_HOUR	TIME_SLOT
0	0	0	Night
1	0	1	Night
2	0	2	Night
3	0	3	Night
4	0	4	Night
5	0	5	Night
6	0	6	Night
7	0	7	Night
8	0	8	Night
9	0	9	Night
10	0	10	Night
11	0	11	Night
12	0	12	Night
13	0	13	Night
14	0	14	Night
15	0	15	Night
16	0	16	Night
17	0	17	Night
18	0	18	Night

16- Reservation Fact

- Stores reservation-related information like passenger details, booking channel, price, etc.

Column Name	ID	Pk	Null?	Data Type
PASSENGER_KEY	1	1	N	NUMBER
TICKET_NUMBER	2		Y	VARCHAR2 (100 Byte)
PAYMENT_KEY	3	2	N	NUMBER
BOOKING_CHANNEL_KEY	4	3	N	NUMBER
DEPARTURE_DATE_KEY	5	4	N	NUMBER
ARRIVAL_DATE_KEY	6	5	N	NUMBER
RESERVATION_DATE_KEY	7	6	N	NUMBER
FLIGHT_TYPE_KEY	8	7	N	NUMBER
FARE_BASIS_KEY	9	8	N	NUMBER
PRICE	10		Y	NUMBER
TAXES	11		Y	NUMBER
NET_PRICE	12		Y	NUMBER

17- Segment Flight Activity Fact

- Records details about flight segments, including passenger details, flight information, prices, etc.

Column Name	ID	Pk	Null?	Data Type
CONFIRMATION_NUMBER	1		Y	VARCHAR2 (100 Byte)
TICKET_NUMBER	2		Y	VARCHAR2 (100 Byte)
SEGMENT_SEQUENCE_NUMBER	3		Y	NUMBER
PASSENGER_KEY	4	1	N	NUMBER
PASSENGER_PROFILE_KEY	5	2	N	NUMBER
AIRCRAFT_KEY	6	3	N	NUMBER
DEPARTURE_AIRPORT_KEY	7	4	N	NUMBER
ARRIVAL_AIRPORT_KEY	8	5	N	NUMBER
BOOKING_CHANNEL_KEY	9	6	N	NUMBER
FLIGHT_TYPE_KEY	10	7	N	NUMBER
FARE_BASIS_KEY	11	8	N	NUMBER
PAYMENT_METHOD_KEY	12	9	N	NUMBER
CLASS_UPGRADE_KEY	13	10	N	NUMBER
SCHEDULED_DEPARTURE_DATE_KEY	14	11	N	NUMBER
ACTUAL_DEPARTURE_DATE_KEY	15	12	N	NUMBER
SCHEDULED_DEPARTURE_TIME_KEY	16	13	N	NUMBER
ACTUAL_DEPARTURE_TIME_KEY	17	14	N	NUMBER
SCHEDULED_ARRIVAL_DATE_KEY	18	15	N	NUMBER
ACTUAL_ARRIVAL_DATE_KEY	19	16	N	NUMBER
SCHEDULED_ARRIVAL_TIME_KEY	20	17	N	NUMBER
ACTUAL_ARRIVAL_TIME_KEY	21	18	N	NUMBER
FARE_PRICE	22		Y	NUMBER
TAXES	23		Y	NUMBER
OVERWEIGHT_LUGGAGE	24		Y	NUMBER
UPGRADE_FEES	25		Y	NUMBER
NET_PRICE	26		Y	NUMBER
COST	27		Y	NUMBER
PROFIT	28		Y	NUMBER

18- Trip Flight Activity Fact

- Stores reservation-related information like passenger details, booking channel, price, etc.

Column Name	ID	Pk	Null?	Data Type
TICKET_NUMBER	1		Y	VARCHAR2 (100 Byte)
PASSENGER_KEY	2	1	N	NUMBER
PASSENGER_PROFILE_KEY	3	2	N	NUMBER
DEPARTURE_AIRPORT_KEY	4	3	N	NUMBER
ARRIVAL_AIRPORT_KEY	5	4	N	NUMBER
BOOKING_CHANNEL_KEY	6	5	N	NUMBER
FLIGHT_TYPE_KEY	7	6	N	NUMBER
SCHEDULED_DEPARTURE_DATE_KEY	8	7	N	NUMBER
ACTUAL_DEPARTURE_DATE_KEY	9	8	N	NUMBER
SCHEDULED_ARRIVAL_DATE_KEY	10	9	N	NUMBER
ACTUAL_ARRIVAL_DATE_KEY	11	10	N	NUMBER
TOTAL_SEGMENTS	12		Y	NUMBER
TOTAL_FARE_PRICE	13		Y	NUMBER
TOTAL_TAXES	14		Y	NUMBER
TOTAL_OVERWEIGHT_LUGGAGE	15		Y	NUMBER
TOTAL_UPGRADE_FEES	16		Y	NUMBER
TOTAL_NET_PRICE	17		Y	NUMBER
TOTAL_COST	18		Y	NUMBER
TOTAL_PROFIT	19		Y	NUMBER
TOTAL_OVERNIGHT_STAYS	20		Y	NUMBER

19- Frequent Flyers Fact

- Records data about frequent flyers, including member details, flight information, miles earned, etc.

Column Name	ID	Pk	Null?	Data Type
MEMBER_KEY	1	1	N	NUMBER
PASSENGER_PROFILE_KEY	2	2	N	NUMBER
TICKET_NUMBER	3		Y	VARCHAR2 (100 Byte)
CUSTOMER_EXPERIENCE_KEY	4	3	N	NUMBER
FLIGHT_TYPE_KEY	5	4	N	NUMBER
FLIGHT_DATE_KEY	6	5	N	NUMBER
REDEEM_KEY	7	6	N	NUMBER
MILES_EARNED	8		Y	NUMBER
MILES_REDEEMED	9		Y	NUMBER
CLASS_UPGRADE_KEY	10	7	N	NUMBER

20- Customer Care Fact

- Stores information about interactions between customers and customer care, including problem severity, interaction type, etc.

Column Name	ID	Pk	Null?	Data Type
PASSENGER_KEY	1	1	N	NUMBER
PASSENGER_PROFILE_KEY	2	2	N	NUMBER
INTERACTION_TYPE_KEY	3	3	N	NUMBER
PROBLEM_SEVERITY_KEY	4	4	N	NUMBER
FLIGHT_TYPE_KEY	5	5	N	NUMBER
DATE_KEY	6	6	N	NUMBER
TIME_KEY	7	7	N	NUMBER
TICKET_NUMBER	8		Y	VARCHAR2 (100 Byte)

Why we Choose This Model

We chose this data model design because it aligns with the Kimball method, which emphasizes simplicity, flexibility, and usability in data warehousing projects. Our approach involved breaking down the data into separate tables, each focusing on a specific aspect of the business processes involved in airline operations.

1. **Simplicity**: By breaking down the data into separate tables for each business process, we ensure simplicity in data management and querying. Each table represents a distinct entity or aspect of the business, making it easier to understand and work with the data.
2. **Flexibility**: The modular design of our data model allows for easy modification and expansion as business requirements evolve. New tables can be added to accommodate additional business processes or data sources without disrupting existing structures.
3. **Focus on Business Processes**: Each table in our data model represents a specific business process or entity relevant to airline operations. For example, we have tables for passenger information, flight details, reservations, customer care interactions, and frequent flyer programs.

Physical Model

Attached All The SQL Files To Generate The Physical Model: Physical Model

Note: adjust the schema name if you'll use the fact tables data insertion files

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Business Questions

```
-- what flights the company's frequent flyers mostly take
SELECT count(p.name) as count , a.name AS arrival_airport , aa.name as departure_airport
FROM Segment_Flight_Activity_Fact sfaf
JOIN Passenger_dim p ON sfaf.passenger_key = p.passenger_key
JOIN Passenger_Profile_dim pp ON sfaf.passenger_profile_key = pp.profile_key
JOIN Airport_dim a ON sfaf.arrival_airport_key = a.airport_key
JOIN Airport_dim aa ON sfaf.departure_airport_key = aa.airport_key
where pp.status = 'Active'
group by  a.name , aa.name
    order by count desc;
```

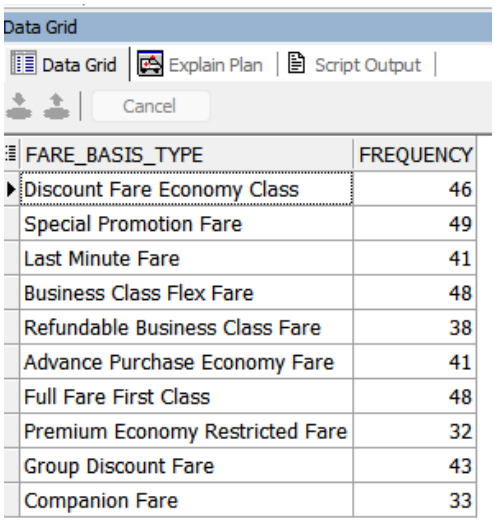
Data Grid

Data Grid | Explain Plan | Script Output

Cancel

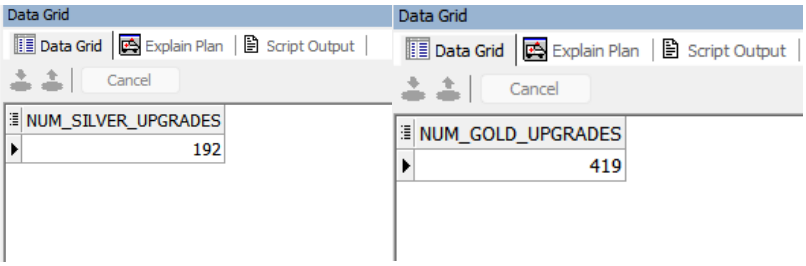
COUNT	ARRIVAL_AIRPORT	DEPARTURE_AIRPORT
4	Oslo Gardermoen Airport	Rome Leonardo da Vinci-Fiumicino Airport
3	Seattle-Tacoma International Airport	John F. Kennedy International Airport
3	Frankfurt Airport	Zurich Airport
3	London Heathrow Airport	Calgary International Airport
3	Cork Airport	Tokyo Haneda Airport
3	Helsinki-Vantaa Airport	Singapore Changi Airport
3	Miami International Airport	London Gatwick Airport
3	San Francisco International Airport	San Francisco International Airport
2	Vancouver International Airport	London Heathrow Airport
2	Belfast International Airport	Singapore Changi Airport
2	McCarran International Airport	Los Angeles International Airport
2	John F. Kennedy International Airport	Chicago O'Hare International Airport
2	Hartsfield-Jackson Atlanta International Airport	Vienna International Airport
2	Montreal-Pierre Elliott Trudeau International Airport	Oslo Gardermoen Airport
2	Dallas/Fort Worth International Airport	Frankfurt Airport
2	Shannon Airport	Vancouver International Airport
2	Orlando International Airport	Orlando International Airport
2	Madrid Barajas Airport	Edinburgh Airport

```
--Analyze fare basis paid by frequent flyers
SELECT DISTINCT fb.type AS fare_basis_type, COUNT(*) AS frequency
FROM Segment_Flight_Activity_Fact sfaf
JOIN Fare_Basis_dim fb ON sfaf.fare_basis_key = fb.fare_basis_key
JOIN Passenger_Profile_dim pp ON sfaf.passenger_profile_key = pp.profile_key
WHERE pp.club_membership =  'Gold Club'
    GROUP BY fb.type;
```



FARE_BASIS_TYPE	FREQUENCY
Discount Fare Economy Class	46
Special Promotion Fare	49
Last Minute Fare	41
Business Class Flex Fare	48
Refundable Business Class Fare	38
Advance Purchase Economy Fare	41
Full Fare First Class	48
Premium Economy Restricted Fare	32
Group Discount Fare	43
Companion Fare	33

```
-- Calculate frequency of upgrades by frequent flyers' Silver Club'
SELECT COUNT(*) AS num_silver_upgrades
FROM Segment_Flight_Activity_Fact sfaf
JOIN Passenger_Profile_dim pp ON sfaf.passenger_profile_key = pp.profile_key
WHERE pp.club_membership = 'Silver Club'
AND sfaf.CLASS_UPGRADE_KEY in (select CLASS_UPGRADE_KEY from class_upgrade_dim where
change_indicator  = 'Up'  ) ;
```




```
-- Calculate frequency of upgrades by frequent flyers 'Gold Club'
SELECT COUNT(*) AS num_gold_upgrades
FROM Segment_Flight_Activity_Fact sfaf
JOIN Passenger_Profile_dim pp ON sfaf.passenger_profile_key = pp.profile_key
WHERE pp.club_membership = 'Gold Club'
AND sfaf.CLASS_UPGRADE_KEY in (select CLASS_UPGRADE_KEY    from class_upgrade_dim where
change_indicator  = 'Up'  ) ;
```

```
-- responses to special fare promotions by frequent flyers
SELECT DISTINCT p.name AS passenger_name , count( sfaf.ticket_number) as Promoted_Tickets
FROM Segment_Flight_Activity_Fact sfaf
JOIN Passenger_dim p ON sfaf.passenger_key = p.passenger_key
JOIN Passenger_Profile_dim pp ON sfaf.passenger_profile_key = pp.profile_key
join Fare_Basis_dim fb on sfaf.fare_basis_key = fb.fare_basis_key
WHERE pp.club_membership ='Gold Club' AND fb.promoted = 'Yes'
group by  p.name;
```

Data Grid

Data Grid | Explain Plan | Script Output

Cancel

PASSENGER_NAME	PROMOTED_TICKETS
David Smith	7
Aria Johnson	6
Ava Scott	1
Charlotte Martinez	7
Penelope Perez	2
Jackson Wilson	2
Lucas Taylor	4
Elena Garcia	3
Santiago Wilson	2
Victoria Brown	3
Emma Perez	6
Alice Johnson	9
John Smith	2
Noah Gonzalez	4
Jacob Martinez	2
Mia Taylor	4

```
--the portion of passengers in the different club memberships
SELECT
    pp.club_membership,
    COUNT(p.passenger_key) AS passenger_count
FROM Passenger_Profile_dim pp
join Segment_Flight_Activity_Fact sfaf ON sfaf.passenger_profile_key = pp.profile_key
JOIN Passenger_dim p ON sfaf.passenger_key = p.passenger_key
where pp.status = 'Active'
GROUP BY pp.club_membership;
```

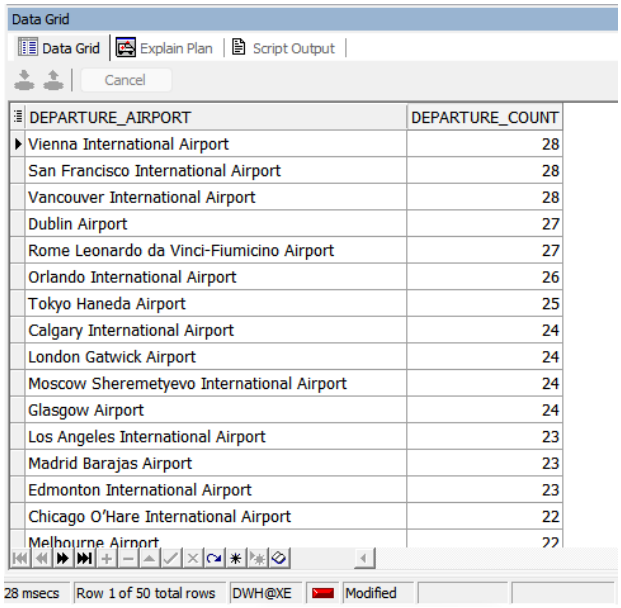
Data Grid

Data Grid | Explain Plan | Script Output

Cancel

CLUB_MEMBERSHIP	PASSENGER_COUNT
Platinum Club	178
Silver Club	192
Gold Club	419

```
-- most departured from
SELECT
    a.name AS departure_airport,
    COUNT(*) AS departure_count
FROM Segment_Flight_Activity_Fact sfaf
JOIN Airport_dim a ON sfaf.departure_airport_key = a.airport_key
GROUP BY a.name
ORDER BY departure_count DESC;
```



Data Grid

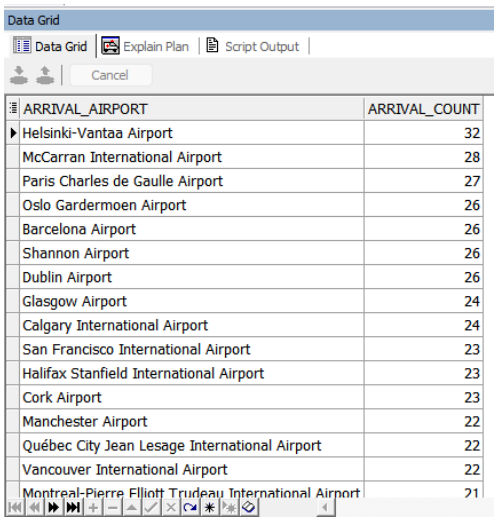
Data Grid | Explain Plan | Script Output

Cancel

DEPARTURE_AIRPORT	DEPARTURE_COUNT
Vienna International Airport	28
San Francisco International Airport	28
Vancouver International Airport	28
Dublin Airport	27
Rome Leonardo da Vinci-Fiumicino Airport	27
Orlando International Airport	26
Tokyo Haneda Airport	25
Calgary International Airport	24
London Gatwick Airport	24
Moscow Sheremetyevo International Airport	24
Glasgow Airport	24
Los Angeles International Airport	23
Madrid Barajas Airport	23
Edmonton International Airport	23
Chicago O'Hare International Airport	22
Melbourne Airport	22

28 msecs | Row 1 of 50 total rows | DWH@XE | Modified

```
-- most arrived airport
SELECT
    a.name AS arrival_airport,
    COUNT(*) AS arrival_count
FROM Segment_Flight_Activity_Fact sfaf
JOIN Airport_dim a ON sfaf.arrival_airport_key = a.airport_key
GROUP BY a.name
ORDER BY arrival_count DESC;
```



Data Grid

Data Grid | Explain Plan | Script Output

Cancel

ARRIVAL_AIRPORT	ARRIVAL_COUNT
Helsinki-Vantaa Airport	32
McCarran International Airport	28
Paris Charles de Gaulle Airport	27
Oslo Gardermoen Airport	26
Barcelona Airport	26
Shannon Airport	26
Dublin Airport	26
Glasgow Airport	24
Calgary International Airport	24
San Francisco International Airport	23
Halifax Stanfield International Airport	23
Cork Airport	23
Manchester Airport	22
Québec City Jean Lesage International Airport	22
Vancouver International Airport	22
Montreal-Pierre Elliott Trudeau International Airport	21

```
--Number of Resolved Complaints
SELECT COUNT(*) AS Resolved_Complaints
FROM Customer_Care_Fact c
JOIN Problem_Severity_dim ps ON c.problem_severity_key = ps.problem_severity_key
JOIN Interaction_Type_dim it ON c.interaction_type_key = it.interaction_type_key
WHERE ps.resolution_status = 'Resolved'
AND it.interaction_type = 'Complaint';
```

Data Grid | Data Grid | Explain Plan | Script Output | Cancel

RESOLVED_COMPLAINTS
165

```
--Total number of interactions per severity level:
SELECT ps.severity_level, COUNT(*) AS Total_Interactions
FROM Customer_Care_Fact c
JOIN Problem_Severity_dim ps ON c.problem_severity_key = ps.problem_severity_key
GROUP BY ps.severity_level;
```

Data Grid | Data Grid | Explain Plan | Script Output | Cancel

SEVERITY_LEVEL	TOTAL_INTERACTIONS
Moderate	246
Major	257
Critical	240
Minor	257

```
--Number of interactions by interaction type and channel:
SELECT it.interaction_type, it.channel, COUNT(*) AS Total_Interactions
FROM Customer_Care_Fact c
JOIN Interaction_Type_dim it ON c.interaction_type_key = it.interaction_type_key
GROUP BY it.interaction_type, it.channel;
```

Data Grid | Data Grid | Explain Plan | Script Output | Cancel

INTERACTION_TYPE	CHANNEL	TOTAL_INTERACTIONS
Complaint	Email	95
Feedback	Chat	105
Inquiry	Chat	129
Complaint	Chat	126
Inquiry	Email	90
Feedback	Phone Call	124
Inquiry	Phone Call	115
Complaint	Phone Call	106
Feedback	Email	110

```
--What are the preferred booking channels for reservations?
SELECT bc.type,
    COUNT(*) AS frequency
FROM  Booking_Channel_dim bc
JOIN   Reservation_Fact rf ON bc.channel_key = rf.booking_channel_key
GROUP BY
    bc.type
ORDER BY
    frequency DESC;
```

Data Grid

Data Grid | Explain Plan | Script Output

Cancel

TYPE	FREQUENCY
Online	114
Travel Agency	109
Mobile App	109
Third-party Website	107
Direct Sales	100
Airport Counter	100
Call Center	98
Travel Management Company	96
Corporate Portal	92
Kiosk	75

```
--Which flights are preferred by frequent flyers?
  SELECT ft.TYPE AS flight_type, COUNT (ff.ticket_number) AS ticket_count
    FROM     Frequent_Flyers_Fact ff
         JOIN
           Flight_Type_dim ft
         ON ff.flight_type_key = ft.flight_type_key
GROUP BY ft.TYPE
ORDER BY COUNT (ff.ticket_number) DESC;
```

Data Grid

Data Grid | Auto Trace | DBMS Output (disabled)

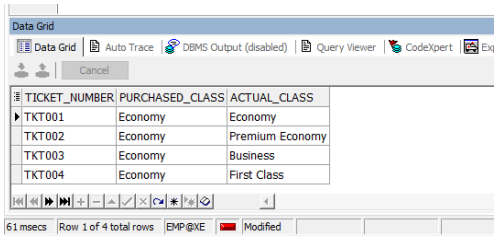
Cancel

FLIGHT_TYPE	TICKET_COUNT
Economy	5
Business	4
First Class	2
Premium E...	1

47 msecs | Row 1 of 4 total rows | EMP@XE | Modified

--How often do frequent flyers upgrade their class?

```
SELECT ff.ticket_number, cu.purchased_class, cu.actual_class
FROM Frequent_Flyers_Fact ff
JOIN Class_Upgrade_dim cu ON ff.upgrade_key = cu.upgrade_key;
```



Data Grid

Data Grid | Auto Trace | DBMS Output (disabled) | Query Viewer | CodeXpert

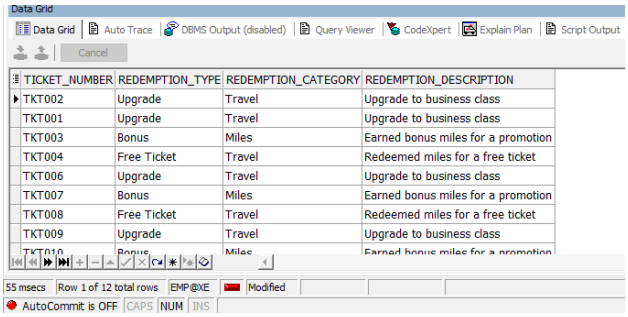
Cancel

TICKET_NUMBER	PURCHASED_CLASS	ACTUAL_CLASS
TKT001	Economy	Economy
TKT002	Economy	Premium Economy
TKT003	Economy	Business
TKT004	Economy	First Class

61 msecs | Row 1 of 4 total rows | EMP@XE | Modified

--How do frequent flyers earn and redeem their miles?

```
SELECT ff.ticket_number, rd.redemption_type, rd.redemption_category, rd.redemption_description
FROM Frequent_Flyers_Fact ff
JOIN Redeem_dim rd ON ff.redeem_key = rd.redeem_key;
```



Data Grid

Data Grid | Auto Trace | DBMS Output (disabled) | Query Viewer | CodeXpert | Explain Plan | Script Output

Cancel

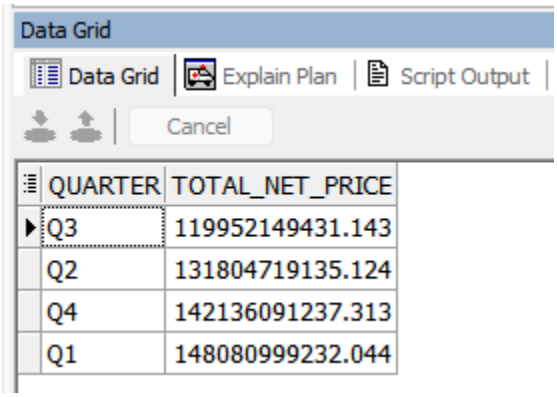
TICKET_NUMBER	REDEMPTION_TYPE	REDEMPTION_CATEGORY	REDEMPTION_DESCRIPTION
TKT002	Upgrade	Travel	Upgrade to business class
TKT001	Upgrade	Travel	Upgrade to business class
TKT003	Bonus	Miles	Earned bonus miles for a promotion
TKT004	Free Ticket	Travel	Redeemed miles for a free ticket
TKT006	Upgrade	Travel	Upgrade to business class
TKT007	Bonus	Miles	Earned bonus miles for a promotion
TKT008	Free Ticket	Travel	Redeemed miles for a free ticket
TKT009	Upgrade	Travel	Upgrade to business class
TKT010	Bonus	Miles	Earned bonus miles for a promotion

55 msecs | Row 1 of 12 total rows | EMP@XE | Modified

AutoCommit is OFF | CAPS | NUM | INS

--What is the total net price earned from reservations for each quarter of a specific year?

```
SELECT dd.quarter, SUM(rf.net_price) AS total_net_price
FROM Reservation_Fact rf
JOIN Date_dim dd ON rf.reservation_date_key = dd.date_key
WHERE dd.year = 2022
GROUP BY dd.quarter;
```



Data Grid

Data Grid | Explain Plan | Script Output

Cancel

QUARTER	TOTAL_NET_PRICE
Q3	119952149431.143
Q2	131804719135.124
Q4	142136091237.313
Q1	148080999232.044

Assumptions

1) To be a frequent flyer you must exceed 100,000 miles and travel 5 times per year.
2) When we get feedback from a customer, we divide it into 2 categories (inquiry or complaint) which may happen before, within or after trip and we keep track the status which may be resolved, pending, or escalated.
3) Passengers can upgrade their class.
4) We also assume that the passenger can redeem its points in
    - Free flight → when you reach to 100,000 miles and 2 flights per month.
    - Cash back reward for porches → 80,000 miles.
    - Seat upgrade → 50,000 miles.
    - Gift card → 30,000 miles.
    - Free hotel status → 50,000 miles