Crash Airlines Oracle DB Project

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CIS 330 Final Report

Overview

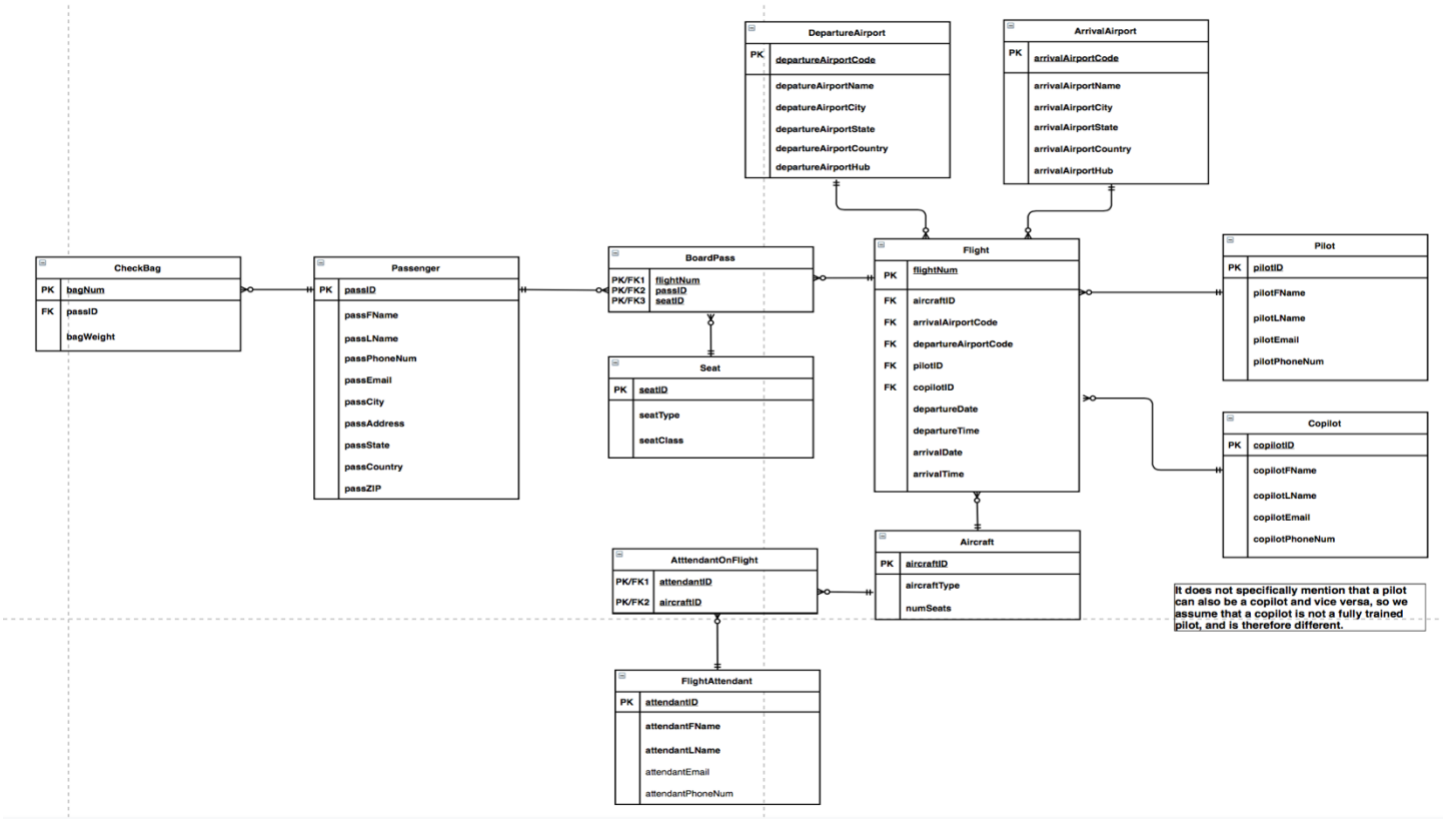
The purpose of this report is to develop a relational database and set of queries to track Crash Airline's staff, flights, and aircrafts as well as provide Crash Airlines with meaningful, useful data they can utilize to make important business decisions moving forward. Through the use of the database in which we have created, Crash Airlines will be able to more accurately allocate their budget towards items that are of high demand, analyze the traffic of passengers at different times of the year as well as to and from specific parts of the world, and simply have all information regarding their staff, flights, and aircrafts at their fingertips.

Crash Airlines is an airline that provides transportation nationwide as well as internationally for passengers all over the world. Crash Airlines operates through the use of four different types of aircrafts: McDonnell Douglas DC-10, Boeing 757, Boeing 777, and Airbus A350, with the McDonnell Douglas DC-10 aircraft being the largest of the four. Each aircraft is identified by a unique aircraftID so that they can be assigned to different flight numbers and easily be distinguished from other aircrafts of the same type. Crash Airlines has a relatively large staff consisting of pilots, copilots, and flight attendants that assist in providing passengers with a safe and comfortable experience. Each staff member is also uniquely identified by their own ID (pilotID, copilotID, and attendantID) so that there is no confusion in regard to their flight assignments.

Crash Airlines was in need of some assistance with tracking flights, aircrafts, staff assignments, and overall just monitoring and tracking all information regarding the airline's assets to ensure they are operating smoothly and efficiently. We have come up with ten sample queries to present how Crash Airlines might benefit from our database. As you make your way through this report, you will not only get a glimpse into what our database can do for Crash Airlines, but

we have also provided Crash Airlines with an in-depth explanation into our entity relationship model, how we created our model, and where the data that populated our database came from.

Conceptual ERD Model



In our conceptual ERD Model for Crash Airlines, we developed a relational database consisting of twelve tables. Each table represents an entity that we consider important for the company's everyday operations. Our model integrates the company's various business rules to create relationships among each of the company's entities to enforce integrity throughout the database.

Database construction and population

Our Entity Relationship Diagram uses the Flight table as a crucial component to our model, the Flight table has a specific relationship with six other tables. The Flight table holds all the information regarding each particular flight including the flight number, five foreign keys that give further information about a flight, and information in regard to the departure and arrival dates and times for each specific flight. We use the flight number as the primary key to differentiate between the many flights that Crash Airlines provides to its customers. This table also makes use of foreign keys from the Pilot, Copilot, Aircraft, DepatureAiport, and the ArrivalAirport tables. Each specific flight, represented by it's unique flight number, is assigned to exactly one pilot, one copilot, one departure airport, one arrival airport, and one aircraft, hence why these relationships are all represented by many optional to one mandatory cardinalities.

Our model includes two associative tables, the first of which is the BoardPass table. The combination of the seatID, flightNum, and passID creates a composite primary key that provides Crash Airlines with the ability to see which passengers are assigned to which seat on a particular flight. The second associative table that we created also integrates a composite primary key between attendantID and aircraftID which allows Crash Airlines to efficiently find which flight attendants are on a specific aircraft. From the limited information we were given about Crash Airlines, we assumed that copilots are not as equally experienced as pilots, therefore they can not be the main pilot on a given flight. We represented this by splitting pilots and copilots into two different entities. Since a flight must have both a departure airport and an arrival airport, we decided to break up the Airport table into two separate entities, one being the DepartureAirport table and the other being the ArrivalAirport table. This requires that every flight must have one departure airport code as well as one arrival airport code.

The data we used to populate the tables in our model represents data that is accurate to data that Crash Airlines would be using on a daily basis. All passenger information is specific and accurate to the location in which we indicated they resided, in order to keep our data consistent and realistic. For the Aircraft table, we researched each type of Aircraft that Crash Airlines uses to operate and assigned the actual number of seats to their respective aircraft. Further, we used real airports that exist throughout the United States in both the DepartureAirport and ArrivalAirport tables.

Queries

Query 1: Aggregation/Grouping

This query is helpful to Crash Airlines because keeping track of baggage is an important aspect of successfully completing a flight and maximizing customer satisfaction. By keeping track of how many bags each passenger checks, Crash Airlines will be able to efficiently handle lost or found luggage and track it back to the appropriate passenger. This will also aid in the pricing of checking bags, and tracking the revenue brought in by certain volumes of passengers.

```
SELECT P.passFName, P.passLName, COUNT(bagNum) Num_Of_Bags
FROM Passenger P, CheckBag CB
WHERE P.passID = CB.passID
GROUP BY P.passFName, P.passLName
ORDER BY COUNT(bagNum) DESC;
```

```
PASSFNAME    PASSLNAME    NUM_OF_BAGS
------------ ------------ -----------
Jessica      Williams               3
Devon        Brown                  2
Chance       Wheeler                2
Nicholas     Chaki                  1
Vincent      Donefield              1
Daniel       Tucci                  1
Mark         Sloan                  1
Carl         Rodriguez              1
Aaron        Davis                  1
Sarah        Clark                  1
Bryan        Miller                 1

11 rows selected.
```

Query 2: Aggregation/Grouping

This query would be beneficial for Crash Airlines when assigning pilots to certain flights, it is useful to know how many pilots are being assigned to what number of flights to ensure that scheduling is being done fairly for all Crash Airline staff. By keeping track of the number of flights each pilot is being assigned, Crash Airlines will be able to better manage scheduling as well as better keep track of payroll.

```
SELECT P.pilotFName, P.pilotLName, COUNT(F.flightNum) Total_Assigned_Flights
FROM Pilot P, Flight F
WHERE P.pilotID = F.pilotID
GROUP BY P.pilotFName, P.pilotLName
ORDER BY COUNT(F.flightNum) DESC;
```

```
PILOTFNAME   PILOTLNAME   TOTAL_ASSIGNED_FLIGHTS
------------ ------------ ----------------------
William      Wortman                         2
Robert       Lixem                           2
Scarlette    Lee                             2
Sarah        Thomas                          2
Damian       Short                           2
Claire       Tilly                           1
Noah         Brian                           1
Ryan         Hampton                         1
Rachel       Stein                           1
Atlee        Wood                            1
Austin       Augusto                         1
Greg         Harley                          1
Blake        Darren                          1
Jake         Batron                          1

14 rows selected.
```

Query 3: Joining with 2 tables

As pricing for baggage is based on the weight of the passenger's baggage, this query allows Crash Airlines to be able to analyze the number of customers that are willing to pay extra dollars to pack luggage weighing over 50 pounds, as well as determine what the minimum and maximum price passengers are willing to pay for that extra weight. Over time as Crash Airlines plays around with these prices, they will be able to track the fluctuation in volume of passengers that are willing to check heavier bags and forecast their baggage pricing accordingly.

```
SELECT DISTINCT P.passFName First_Name, P.passLName Last_Name, CB.bagNum
```

```
Bag_#, CB.bagWeight Weight
FROM CheckBag CB, Passenger P
WHERE CB.passID = P.passID AND bagWeight > 50;
```

FIRST_NAME	LAST_NAME	BAG_#	WEIGHT
Jessica	Williams	B106	52
Mark	Sloan	B102	61
Daniel	Tucci	B114	51

Query 4: Joining with 2 tables

This query is helpful as Crash Airlines has many flights flying in and out of various airports at a time, it is important for Crash Airlines to ensure that no two aircrafts are being assigned to more than one flight at a time. This is crucial for Crash Airlines efficiency and success. This query allows Crash Airlines to see each aircraft as well as the flight it is assigned to and the departure and arrival information for that specific flight.

```
SELECT A.aircraftID, F.flightNum, F.departureDate, F.departureTime, F.arrivalDate,
F.arrivalTime
FROM Aircraft A, Flight F
WHERE A.aircraftID = F.aircraftID
ORDER BY A.aircraftID;
```

AIRCRAFTID	FLIGHTNUM	DEPARTURED	DEPARTURETIME	ARRIVALDAT	ARRIVALTIME
1	FL22	10/09/2020	6:36:00 AM	10/09/2020	7:54:00 AM
1	FL40	04/27/2021	3:16:00 PM	04/27/2021	7:04:00 PM
2	FL82	05/21/2020	5:59:00 PM	05/21/2020	7:38:00 PM
3	FL09	03/24/2020	9:25:00 AM	03/24/2020	2:27:00 PM
4	FL03	01/10/2021	9:50:00 AM	01/10/2021	12:37:00 PM
4	FL33	07/01/2020	10:10:00 PM	07/01/2020	11:59:00 PM
5	FL92	01/26/2020	10:50:00 AM	01/26/2020	1:41:00 PM
6	FL97	03/18/2021	4:22:00 PM	03/18/2021	7:12:00 PM
7	FL26	02/07/2021	6:35:00 AM	02/07/2021	11:55:00 AM
8	FL38	08/02/2020	6:12:00 PM	08/02/2020	8:55:00 PM
8	FL11	12/01/2020	3:15:00 PM	12/01/2020	5:25:00 PM
9	FL87	09/15/2020	12:34:00 PM	09/15/2020	2:30:00 PM
10	FL45	06/09/2021	6:00:00 AM	06/09/2021	7:37:00 AM
11	FL54	09/12/2020	4:30:00 PM	09/12/2020	6:39:00 PM
12	FL13	10/30/2020	11:20:00 AM	10/30/2020	3:27:00 PM
12	FL63	02/03/2021	8:44:00 AM	02/03/2021	11:12:00 AM
13	FL56	12/14/2020	7:40:00 AM	12/14/2020	8:45:00 AM
14	FL19	10/11/2020	11:25:00 AM	10/11/2020	2:12:00 PM
15	FL67	04/06/2021	4:35:00 PM	04/06/2021	5:53:00 PM

19 rows selected.

Query 5: Joining with 2 tables

This query is useful for Crash Airlines as it informs them of the flight number, aircraft, and departure and arrival dates for flights that are to take place in 2021. There is a lot of preparation that goes into getting an aircraft ready for flight and by knowing this information ahead of time, Crash Airlines will be able to better prepare for the flights to come in regard to staffing, fueling, and more.

```
SELECT F.flightNum Flight_#, F.departureDate Dep_Date, F.arrivalDate Arr_Date,
A.aircraftID Aircraft_ID
FROM Flight F, Aircraft A
WHERE F.departureDate LIKE '%21' AND F.arrivalDate LIKE '%21' AND F.aircraftID
= A.aircraftID
ORDER BY F.flightNum;
```

```
FLIGHT_#   DEP_DATE   ARR_DATE   AIRCRAFT_ID
---------- ---------- ---------- -----------
FL03       01/10/2021 01/10/2021           4
FL26       02/07/2021 02/07/2021           7
FL40       04/27/2021 04/27/2021           1
FL45       06/09/2021 06/09/2021          10
FL63       02/03/2021 02/03/2021          12
FL67       04/06/2021 04/06/2021          15
FL97       03/18/2021 03/18/2021           6

7 rows selected.
```

Query 6: Joining with 3 or more tables

This query is useful to Crash Airlines as keeping track of and monitoring all flights is extremely important. This query allows Crash Airlines to see where all aircrafts will be at what date and time, the flight number associated with that specific flight, as well as the airports in which each flight scheduled will be departing from and arriving to.

```
SELECT F.flightNum Flight_#, DA.departureAirportCode Departure, F.departureDate Dep_Date, F.departureTime Dep_Time, AA.arrivalAirportCode Arrival, F.arrivalDate Arr_Date, F.arrivalTime Arr_Time
FROM DepartureAirport DA, ArrivalAirport AA, Flight F
WHERE DA.departureAirportCode = F.departureAirportCode AND AA.arrivalAirportCode = F.arrivalAirportCode
ORDER BY F.flightNum;
```

FLIGHT_#	DEPARTURE	DEP_DATE	DEP_TIME	ARRIVAL	ARR_DATE	ARR_TIME
FL03	ORD	01/10/2021	9:50:00 AM	MSP	01/10/2021	12:37:00 PM
FL09	MSP	03/24/2020	9:25:00 AM	SEA	03/24/2020	2:27:00 PM
FL11	PHL	12/01/2020	3:15:00 PM	MCO	12/01/2020	5:25:00 PM
FL13	DTW	10/30/2020	11:20:00 AM	BOS	10/30/2020	3:27:00 PM
FL19	MCO	10/11/2020	11:25:00 AM	JFK	10/11/2020	2:12:00 PM
FL22	CLT	10/09/2020	6:36:00 AM	ATL	10/09/2020	7:54:00 AM
FL26	BWI	02/07/2021	6:35:00 AM	BOS	02/07/2021	11:55:00 AM
FL33	PHX	07/01/2020	10:10:00 PM	LAS	07/01/2020	11:59:00 PM
FL38	FLL	08/02/2020	6:12:00 PM	DTW	08/02/2020	8:55:00 PM
FL40	JFK	04/27/2021	3:16:00 PM	ORD	04/27/2021	7:04:00 PM
FL45	DFW	06/09/2021	6:00:00 AM	PHL	06/09/2021	7:37:00 AM
FL54	ATL	09/12/2020	4:30:00 PM	SFO	09/12/2020	6:39:00 PM
FL56	LAX	12/14/2020	7:40:00 AM	SLC	12/14/2020	8:45:00 AM
FL63	BOS	02/03/2021	8:44:00 AM	SFO	02/03/2021	11:12:00 AM
FL67	IAH	04/06/2021	4:35:00 PM	DFW	04/06/2021	5:53:00 PM
FL82	ATL	05/21/2020	5:59:00 PM	BWI	05/21/2020	7:38:00 PM
FL87	EWR	09/15/2020	12:34:00 PM	LAX	09/15/2020	2:30:00 PM
FL92	PHL	01/26/2020	10:50:00 AM	MIA	01/26/2020	1:41:00 PM
FL97	EWR	03/18/2021	4:22:00 PM	FLL	03/18/2021	7:12:00 PM

19 rows selected.

Query 7: Joining with 3 or more tables

When a flight is en route, there is a lot of communication happening between the pilots and the ground to ensure the flight is completed successfully. In the case of problems coming up while in the air, taking off, or landing, this query allows Crash Airlines to be aware of the pilots and copilots that are in charge of each specific flight number and the aircraft in which they are operating just in case there was something to go wrong with the aircraft.

```
SELECT F.flightNum, A.aircraftID, P.pilotFName, P.pilotLName, C.copilotFName, C.copilotLName
FROM Aircraft A, Pilot P, Flight F, Copilot C
WHERE A.aircraftID = F.aircraftID AND P.pilotID = F.pilotID AND C.copilotID = F.copilotID
ORDER BY F.flightNum;
```

FLIGHTNUM	AIRCRAFTID	PILOTFNAME	PILOTLNAME	COPILOTFNAME	COPILOTLNAME
FL03	4	Sarah	Thomas	Peter	Pan
FL09	3	Scarlette	Lee	Garrett	Moore
FL11	8	William	Wortman	Veronica	Hues
FL13	12	Atlee	Wood	Diana	Haul
FL19	14	Damian	Short	Rachel	Carolston
FL22	1	Blake	Darren	Jane	Mchugh
FL26	7	Rachel	Stein	John	Snow
FL33	4	Greg	Harley	John	Snow
FL38	8	Robert	Lixem	Koby	Ayasi
FL40	1	William	Wortman	Kevin	Dragonstone
FL45	10	Noah	Brian	Gavin	Lewis
FL54	11	Damian	Short	Aaron	Hulliot
FL56	13	Scarlette	Lee	Kevin	Dragonstone
FL63	12	Austin	Augusto	Veronica	Hues
FL67	15	Jake	Batron	Koby	Ayasi
FL82	2	Ryan	Hampton	Avery	Greene
FL87	9	Sarah	Thomas	Cameron	Gravy
FL92	5	Robert	Lixem	William	Jones
FL97	6	Claire	Tilly	Cameron	Gravy

19 rows selected.

Query 8: Subquery

The McDonnell Douglas DC-10 is Crash Airlines largest aircraft, and therefore holds the most passengers and travels the furthest distances. With McDonnell Douglas DC-10 being Crash Airlines largest asset, it is useful to Crash Airlines to be aware of its location as well as the flight number assigned to it. Larger aircrafts take more time to prepare for flight, and it is useful to Crash Airlines to be aware of the time prior to and following flights to prep the McDonnell Douglas DC-10 aircraft for its next assigned flight.

```
SELECT F.flightNum  Flight_#, A.aircraftType Aircraft_Type, F.departureAirportCode
Dep_From, F.arrivalAirportCode Arr_To
FROM Flight F, Aircraft A
WHERE A.aircraftID = F.aircraftID AND A.aircraftType IN
        (SELECT A.aircraftType
        FROM Aircraft A
        WHERE A.aircraftType LIKE 'McDonnell Douglas DC-10')
GROUP BY F.flightNum, F.departureAirportCode, F.arrivalAirportCode, A.aircraftType
ORDER BY F.flightNum;
```

```
FLIGHT_#   AIRCRAFT_TYPE             DEP_FROM   ARR_TO
---------- ------------------------- ---------- ----------
FL19       McDonnell Douglas DC-10   MCO        JFK
FL22       McDonnell Douglas DC-10   CLT        ATL
FL40       McDonnell Douglas DC-10   JFK        ORD
FL92       McDonnell Douglas DC-10   PHL        MIA
FL97       McDonnell Douglas DC-10   EWR        FLL
```

Query 9: Subquery

This query provides Crash Airlines with all of the flights that are landing at airports that are hubs for Crash Airlines. This is important because there will be more required communication than with other airports, and it will be important to know this as a pilot prior to boarding his/her assigned flight.

```
SELECT F.flightNum Flight_#, AA.arrivalAirportCode Airport_Code,
AA.arrivalAirportName Airport_Name
FROM Flight F, ArrivalAirport AA
WHERE F.arrivalAirportCode = AA.arrivalAirportCode AND AA.arrivalAirportHub IN
    (SELECT AA.arrivalAirportHub
    FROM ArrivalAirport AA
    WHERE AA.arrivalAirportHub LIKE 'Hub')
ORDER BY F.flightNum;
```

```
FLIGHT_#   AIRPORT_CODE    AIRPORT_NAME
---------- --------------- ------------------------------------------------------------
FL03       MSP             Minneapolis-Saint Paul International Airport
FL09       SEA             Seattle-Tacoma International Airport
FL11       MCO             Orlando International Airport
FL19       JFK             John F. Kennedy International Airport
FL22       ATL             Hartsfield-Jackson Atlanta International Airport
FL40       ORD             OHare International Airport
FL45       PHL             Philadelphia International Airport
FL67       DFW             Dallas/Fort Worth International Airport
FL82       BWI             Baltimore-Washington International Airport
FL92       MIA             Miami International Airport
FL97       FLL             Fort Lauderdale-Hollywood International Airport

11 rows selected.
```

Query 10: Nested subquery

This query shows Crash Airlines all of the passenger information for passengers that are flying first class. This will make it easy for Crash Airlines to reach out to these passengers and promote rewards, deals, and other marketing information to Crash's highest paying customers.

```
SELECT P.passFNAME, P.passLName, P.passEmail, P.passPhoneNum
FROM Passenger P
WHERE P.passID IN
        (SELECT BP.passID
        FROM BoardPass BP
        WHERE BP.seatID IN
                (SELECT S.seatID
                FROM Seat S
                WHERE seatClass LIKE 'FirstClass'))
ORDER BY P.passFName;
```

```
PASSFNAME    PASSLNAME    PASSEMAIL                 PASSPHONENUM
------------ ------------ ------------------------- --------------
Bryan        Miller       maneesh@outlook.com       551-298-5474
Chance       Wheeler      chance@verizon.net        860-092-5469
Devon        Brown        mahbub@verizon.net        951-134-5473
Mark         Sloan        msloan@gmail.com          585-294-5468
Matthew      Wilson       mattw@gmail.com           254-267-5477
Vincent      Donefield    donev@yahoo.com           352-543-5471

6 rows selected.
```