# Final Project
Spring 2018
CPSC 6127 Contemporary Issues in DBMS (Business Intelligence)
Due Wednesday, May 9, 2018

Background

AviaCo is an aircraft charter company that supplies on-demand charter flight services using a mix of different aircrafts and aircraft types (currently a fleet of four aircrafts). The company already has an OLTP charter database in place to help manage all of its operations. The company's OLTP database is a MS Access database AviaCo.mdb (available at http://csc.columbusstate.edu/carroll/6127/projects/AviaCo.mdb.zip) developed by an outside consulting team. The database contains the company charter information for years 2008 - 2012. The OLTP AviaCo.mdb will be used as a data source for the SQL Server data mart AviaCoDM-<yourInitials> (which you will create for this project). The AviaCo CEO wants to be able to analyze charter data such as charter cost in terms of hours flown, hours waited, fuel used, oil used and revenue as well. She would also like to be able to drill down by pilot, aircraft, and time periods. Below are the relationships in the MS Access database:
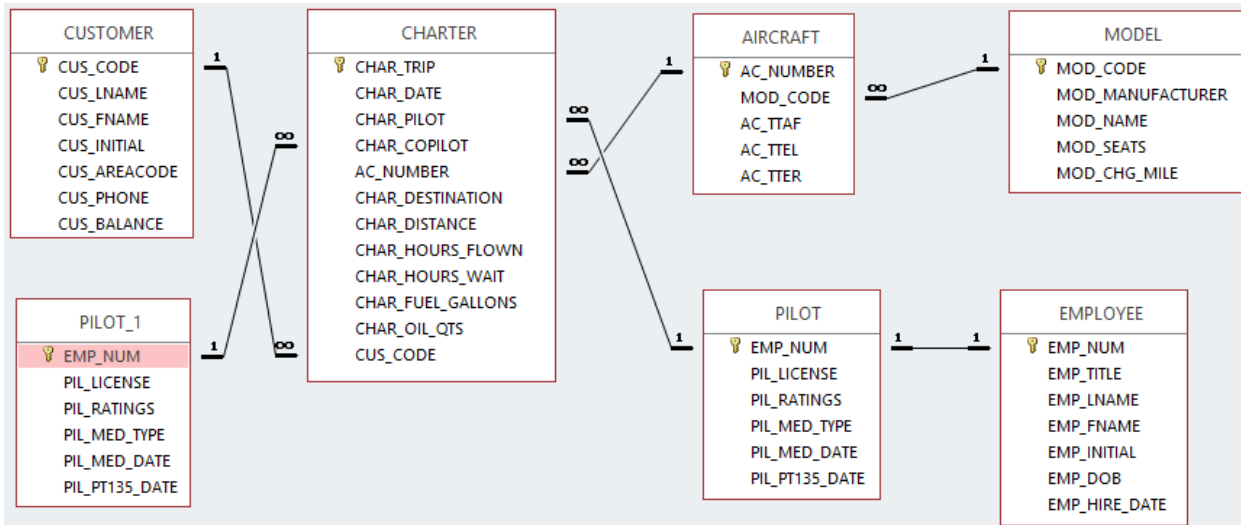
A. Data Mart Design
1. Hierarchies and Dimensions
    - DimPILOT ← DimEMPLOYEE
    - DimAIRCRAFT ← DimMODEL
    - DimCHARTER ← DimCUSTOMER
    - DimTIME
2. Fact Table
    - CHARTER_FACT

B. Data Mart Implementation

1. Create new database AviaCoDM-<yourInitials>. Create dimensions.

   1.1. Using the Import/Export Wizard, copy the AviaCo database tables to AviaCoDM-<yourInitials> database tables as follows:

   AIRCRAFT to DimAIRCRAFT,
   CHARTER to DimCHARTER,
   CUSTOMER to DimCUSTOMER,
   EMPLOYEE to DimEMPLOYEE,
   MODEL to DimMODEL,
   PILOT to DimPILOT
   (You can use the Import/Export Wizard in SSMS to pull the tables into SQL Server, then design the tables (with Primary Keys), then load them with an Integration Services project.)

   1.2. Create DimTIME table with the following columns and data types:

	Column Name	Data Type	Allow Nulls
🔑	TIME_ID	nvarchar(10)	☐
	TIME_DATE	datetime	☐
	TIME_YEAR	nvarchar(4)	☑
	TIME_MONTH	nvarchar(2)	☑
	TIME_DAY	nvarchar(2)	☑

   Using Integration Services, create a project Load DimTIME-<yourInitials> that populates the DimTIME table with values derived from the CHAR_DATE column of the DimCHARTER table. The column values are date values when the AviaCo company had charter flights. The TIME_DATE values are the charter datetime values from the CHAR_DATE column. The TIME_YEAR is the year of charter, TIME_MONTH is the month of the date, and TIME_DAY is the day of the charter date. All these values are character (nvarchar) format. TIME_ID is the concatenation of the TIME_YEAR, TIME_MONTH, and TIME_DAY and has unique values because it is the PK of the table. Below you can see what the DimTIME table values will be after executing the project.

   Hint: To implement the IS project you can use Derived Column transformation and Sort transformation with option "Remove rows with duplicate sort values".

	TIME_ID	TIME_DATE	TIME_YEAR	TIME_MONTH	TIME_DAY
1	2006210	2006-02-10 00:00:00.000	2006	2	10
2	200625	2006-02-05 00:00:00.000	2006	2	5
3	200626	2006-02-06 00:00:00.000	2006	2	6
4	200627	2006-02-07 00:00:00.000	2006	2	7
5	200628	2006-02-08 00:00:00.000	2006	2	8
6	200629	2006-02-09 00:00:00.000	2006	2	9

2. Create and populate with data the fact CHARTER_FACT table.

Create CHARTER_FACT table with the following columns and data types:

	Column Name	Data Type	Allow Nulls
🔑	TIME_ID	nvarchar(10)	☐
🔑	CHAR_TRIP	int	☐
🔑	CHAR_PILOT_NUM	int	☐
🔑	CHAR_AC_NUM	nvarchar(5)	☐
	TOT_HRS_FLOWN	float	☑
	TOT_HRS_WAITED	float	☑
	TOT_CHAT_HRS	float	☑
	TOT_CHAT_FUEL_GAL	float	☑
	TOT_CHAT_OIL_QTS	float	☑
	TOT_CHAR_DISTANCE	float	☑
	REVENUE	money	☑

Using Integration Services, create a project Load CHARTER_FACT-<yourInitials> that populates the CHARTER_FACT table with values derived from DimCHARTER and DimMODEL tables:

- TIME_ID is derived from DimCHARTER.CHAR_DATE, it has the same format as DimTIME.TIME_ID
- CHAR_TRIP is DimCHARTER.CHAR_TRIP
- CHAR_PILOT_NUM is DimCHARTER.CHAR_PILOT
- CHAR_AC_NUM is DimCHARTER.AC_NUMBER
- TOT_HRS_FLOWN is DimCHARTER.CHAR_HOURS_FLOWN
- TOT_HRS_WAITED is DimCHARTER.CHAR_HOURS_WAIT
- TOT_CHAR_HRS is TOT_HRS_FLOWN + TOT_HRS_WAITED
- TOT_CHAR_FUEL_GAL is DimCHARTER.CHAR_FUEL_GALLONS
- TOT_CHAR_OIL_QTS is DimCHARTER.CHAR_OIL_QTS
- TOT_CHAR_DISTNACE is DimCHARTER.CHAR_DISTANCE
- REVENUE is DimCHARTER.CHAR_DISTANCE * DimMODEL.MOD_CHG_MILE

Hint. Use LookUp and Derived Column transformations.

3. Create AviaCoDM-<yourInitials> database diagram using Management Studio and set the table relationships (see the picture below) (by clicking and dragging, and order matters)

The AviaCoDM-<yourInitials> has the following PK and FK constraints:

- DimMODEL: PK MOD_CODE
- DimAIRCRAFT: PK AC_NUMBER, FK MOD_CODE
- DimCUSTOMER: PK CUS_CODE
- DimCHARTER: PK CHAR_TRIP, FK CUS_CODE
- DimEMPLOYEE: PK EMP_NUM
- Dim_PILOT: PK EMP_NUM, FK EMP_NUM

- DimTIME: PK TIME_ID
- CHARTER_FACT:
PKs: TIME_ID, CHAR_TRIP, CHAR_PILOT_NUM, CHAR_AC_NUM
FKs: TIME_ID, CHAR_TRIP, CHAR_PILOT_NUM, CHAR_AC_NUM
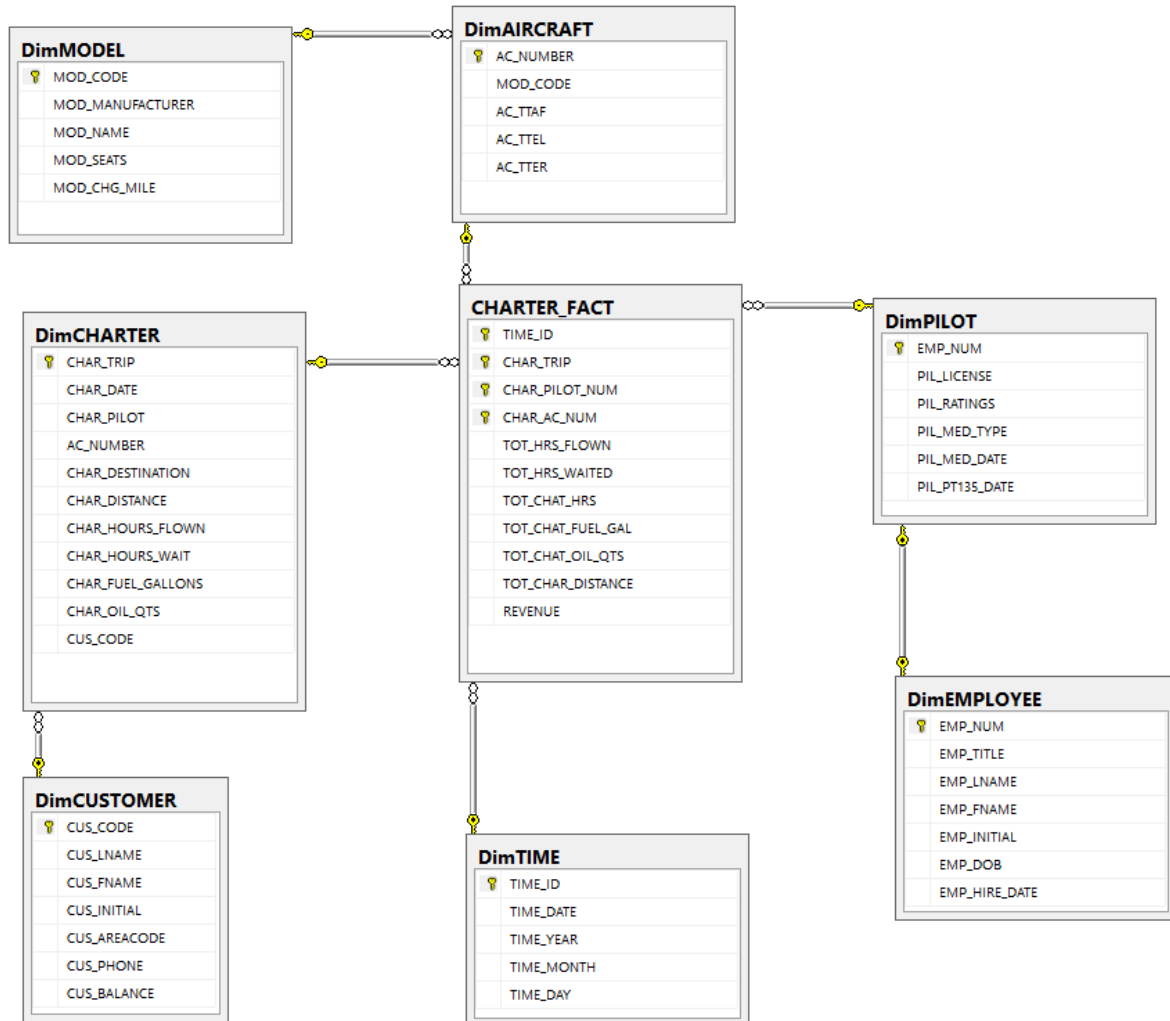
Grading

This project will be graded on your VM server. Your AviaCoDM-<yourInitials> database, all database objects, and IS projects have to be created before the deadline stated above.

Rubric:

AviaCoDM- <yourInitials> database and dimensions	10 pts
IS project Load DimTime-<yourInitials> and populating the DimTIME table	30 pts
CHARTER_FACT table, IS project Load CHARTER_FACT-<yourInitials> and populating the CHARTER_FACT table	40 pts
AviaCoDM-<yourInitials> database diagram and table relationships	20 pts