CIS 4349 Advanced Database Management Systems
Fall 2019

Due Date: Beginning of class on Monday, 12/02/2019

Submission Requirements: For submission requirements, go through very carefully the *Submission Requirements* section in this document.

Note: Similar to Assignment #1, #2, and #3, replace all "xxx" whenever it appears with both of the team members' NetID without hyphens or underscores.

Total Points: 100

Introduction:

You are now ready to take your Tax Service BI Solution to the next step of the BI Solution Life Cycle. So far, you have created a data warehouse for the Taxi Service (DWTaxiService_xxx) and executed an ETL process to populate DWTaxiService_xxx with data from the serviceDB_xxx OLTP database. Now, you will create OLAP/SSAS cube that will help answer many questions for the Taxi Service.

(**Note**. Check if your data warehouse DWTaxiService_xxx is correctly populated with data from previous assignments. This is very important to complete this Assignment. If not, go to "Assignment #2 solution files" folder in tracs and run 3 scripts there to create serviceDB_xxx OLTP database, data warehouse DWTaxiService_xxx and finally to populate the datawarehouse with data (use serviceETL.sql script to populate data warehouse with data). As usual do not forget to change any 'xxx' with team members netids without hyphens or underscores)

You are responsible for designing a cube that will help provide information to help the company streamline its operations and develop strategies to help improve its many KPIs. Among other things, the company is seeking information on the following:

a. Total number of trips made and total charge for these trips.
b. Number of trips and associated charge by year, by month, and by date.
c. Number of trips and associated charge by type of car.
d. Number of trips and associated charge by Trip number.
e. Number of Trips and associated charge by street and by city. The managers may need to query this information for a particular city and for a particular street within that city.
f. In addition, the company will request development of several KPIs as well as reports at a later stage.

Now perform the following:

1. Create a visual studio solution and save it as Assignment4_xxx.

2. Add a SSAS project to the solution Assignment4_xxx and name it as TaxiServiceBISolution_xxx.

3. Go to data source view and create a new named calculation for DimCity table. The new column should concatenate CityName and State. Name the new column CitybyState. The values in the resultant column should look like (example for one city (Austin) is shown here):

City: Austin,State: TX (Use this format when creating the new column)
Now, check the data of the DimCity table by using 'Explore Data' option and verify if the new column and its values are showing properly. Now take a screenshot of this page "Explore DimCity Table", label it as DimCity_newcolumn and save in a word document. Name the word document as "Assignment4_Part1".

4. Now, you will design all dimensions that are required to help explain trip mileage and trip charge based on questions posed above (a to f). (Don't create unnecessary dimensions. Create only the ones that are needed). For each dimension, you will need to determine:

   a. The dimension's name,
   b. List of dimension attributes that should be included in the dimension (don't include unnecessary attributes that are not useful here),
   c. Determine user hierarchies that may need to be defined to help answer some of the questions posed above.
   d. For each dimension attribute, you will need to determine the three major properties we discussed in class. These are Key Column, Name Column and type.

5. As development of each dimension is completed, you will build, deploy, and process the dimensions. Finally, go to browser of each dimension and capture a screenshot that shows values of each dimension attribute as well as any user-defined hierarchy (fully expanded). The number of screenshots will depend on the number of dimensions you have included in your SSAS project. Save the screenshots with their corresponding dimension names. For example, the screenshot for DimDates should be labeled as DimDates. Now save all your dimension screenshots with proper labels discussed above in the word "Assignment4_Part1" that you created as part of question 2.

6. Next, develop a SSAS cube based on dimensions you designed above. Make sure that all appropriate measures are included in the cube to answer questions (a. to f.). Name the cube as "TaxiServiceBICube_xxx."

7. After completing the design of the cube, please build and deploy the cube. DO NOT Process it yet.

8. Open the cube in the designer and make the following changes. You may want to build and deploy after each change to ensure no errors are encountered.

   a. Rename the measure Trip Mileage to Mileage.

b. Create a new measure named "AvgRevenuePerTrip." This is calculated as Total Trip Charge divided by the Total Number of Trips (Note: Total number of trips will be created automatically when you are creating the cube with appropriate measures).

c. Create two KPI's as follows:

   i. RevenuePerMile: Revenue per mile must meet a target of $7.00. Anything below $7 is unacceptable, anything between $7 and $10 is acceptable but it has to be over $10/mile to be exceptionally good.

   ii. TotalTripMileage: total number of trip miles must exceed 120 miles. Anything below 120 is unacceptable. Anything between 120 to 140 is acceptable. Anything above 140 is obviously better. You will use this KPI to check total number of trip miles per city later.

9. Build, Deploy and Process the cube. Then, use the Cube Browser to verify that the Total number of Trips is 51, total mileage is 375.14, total trip charge is $3,682.82, and Total trip Mileage in Austin is 145.25 miles. Capture screenshots showing these information and name them appropriately and save them in a new word document called "Assignment4_Part2".

10. Use the cube browser to show the Average revenue per trip by city. Capture screenshot and name it AverageRevenuePerCity and save it in the word document "Assignment4_Part2".

11. Use the cube browser to show the RevenuePerMile KPI by Trip number. Capture screenshot and name it RevenuePerMilebyTripNumber and save it in word document "Assignment4_Part2".

12. Now, go KPIs browser. For each KPI, display, KPI values/dashboard for each of the following in the browser. Capture a screenshot labeled it as KPIscreenshot and save it in word document "Assignment4_Part2".

   a. City of Austin

   b. Year 2012.

13. Finally, access the cube from MS-Excel and generate a pivot table to show total trip mileage, trip charge and number of trips by city, street and car type. (Hint: Drag city, street under Rows and car type under Columns when generating the pivot table). Save the Excel spreadsheet as "PivotTable".

Submission Requirements for Assignment # 4:

1. Submit the following to the instructor provided USB drive beginning of class on Monday, 12/02/2019:

   a. Visual Studio solution Assignment4_xxx with the complete SSAS project.

   b. "Assignment4_Part1" word document with all the screenshots from questions 1-5 properly labeled as directed.

    c. "Assignment4_Part2" word document with all the screenshots from questions 7-12 properly labeled as directed.

    d. "PivotTable" excel file for question 13.

2. Submit the following printouts arranged in the order mentioned below on the instructor's desk before the start of class on the due date (one submission for each team).

    a. A cover page with team members names and Assignment number.
    b. Printout of the "Assignment4_Part1" word document that has all the screenshots from questions 1-5.
    c. Printout of the "Assignment4_Part2" word document that has all the screenshots form questions 7-12.
    d. Printout of the "PivotTable" excel file showing the information requested.