Data Warehousing and Business Intelligence

Assignment – 1

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1. Data Set Selection and Scenario

The selected data source is a collection of restaurants data. The link to the source data set is mentioned below:
https://www.kaggle.com/datasets/mikhailpustovalov/scraped-data-from-ta

Modifications were done accordingly to the data set derived from the source. This data set reflects combinations between restaurants details and their ranking on the countries. Restaurant specific details involved in restaurants, Food types customers are keen to order, Reviews and ratings that customers are given to each restaurant are some of the key details included in the data set.

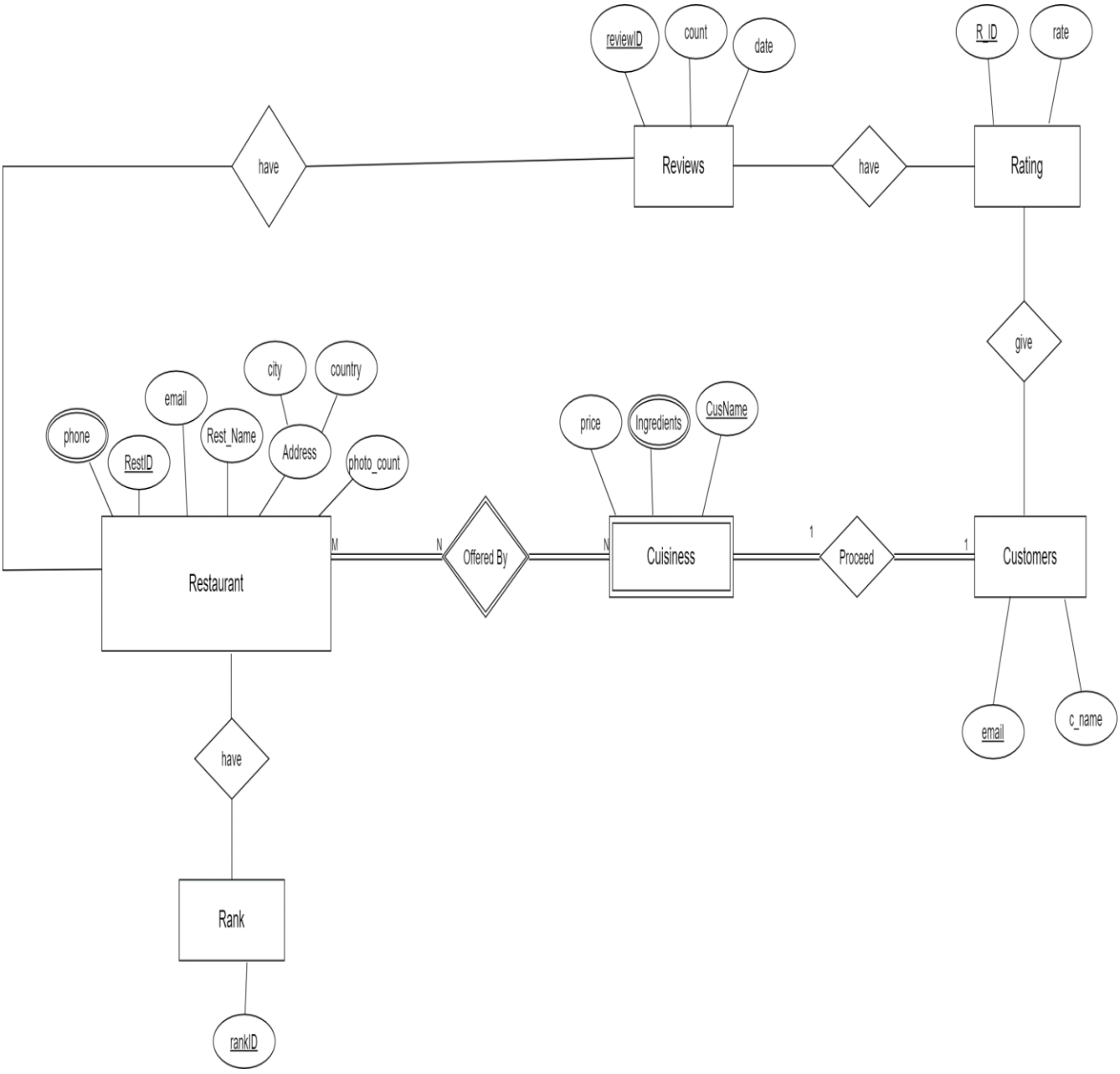
The two main sources are listed below:

SQL Database
One text file(.txt) – Location Data

Also, the below mentioned CSV files were imported to the SQL source database.

- accm_txn_complete_time CSV File
- Restaurants CSV File
- Reviews CSV File
- Meal CSV File
- Cusiness Price CSV File

ER Diagram


reviewID
count
date
R_ID
rate
have
Reviews
have
Rating
give
city
country
email
phone
RestID
Rest_Name
Address
photo_count
price
Ingredients
CusName
Restaurant
M
N
Offered By
N
Cuisiness
1
Proceed
1
Customers
email
c_name
have
Rank
rankID

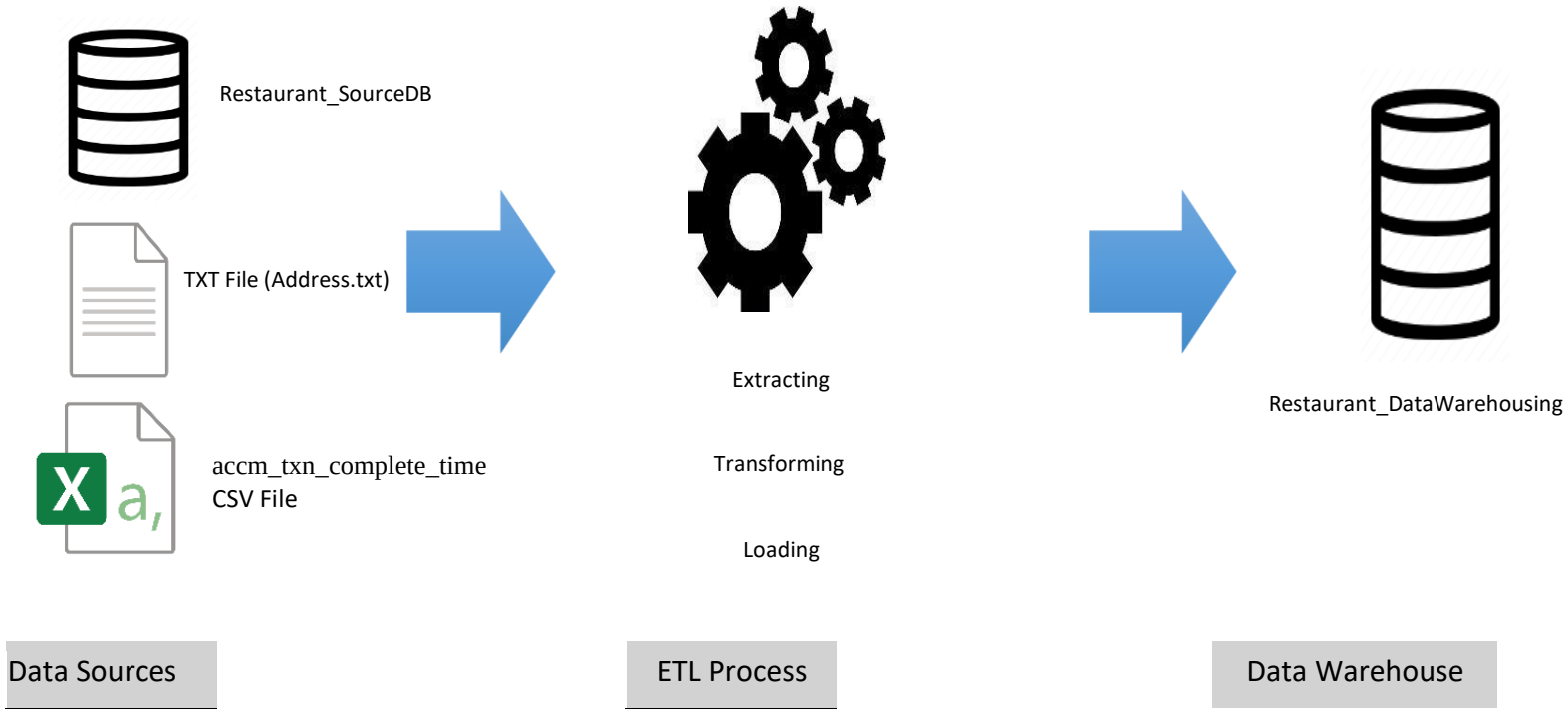
2. Preparation of Data Sources

The original tables taken from the dataset were in the .csv format. Therefore, 2 tables were converted into excel files (.xlsx) and one table to a text file (.txt).

Source Type	Table Name	Column Names	Data Type	Description
Microsoft Excel Comma Separated Values File (.csv)	Restaurants	res_id	smallint	This table holds the details of the Restaurants in the countries.
		name	Varchar(100)	
		tel	Varchar(50)	
		rank	smallint	
Microsoft Excel Comma Separated Values File (.csv)	Meal	cuisiness_ID	smallint	This table includes the Meal details of each restaurant.
		primary_cuisiness	Varchar(50)	
		cuisines	Varchar(100)	
		special_diets	Varchar(100)	
		cus_rest_rank	smallint	
Microsoft Excel Comma Separated Values File (.csv)	Reviews	Review_ID	smallint	This table contains the details of the reviews made by customers for each restaurant .
		review_number	smallint	
		review_date	Varchar(50)	
		review_ratings	Varchar(50)	
		reviews.title	Varchar(150)	
Text Document (.txt)	Address	location_ID	smallint	This table holds the information about the address of each restaurant.
		address	Varchar(50)	
		postalCode	Varchar(50)	
		city	Varchar(50)	
		province	Varchar(50)	
		country	Varchar(50)	
Microsoft Excel Comma Separated Values File (.csv)	cus_price	Date	datetime	This table stores the meal prices in each restaurant.
		res_id	smallint	
		meal_id	int	
		Price ($)	Float	
		discount	tinyint	
		KSymbol	Varchar(50)	

Table 1-1

3. Solution Architecture



Architure Components.

- Data Sources.
  - Operational System(**Accumulating**).
  - External Sources.

- Extract ,Transform and Load.
  - Extract – reading data from source systems.
  - Transform – Combine data from multiple sources, De-duplicating.

- Data Warehouse
  - EDW and Data Mart.
  - Dimensional Modeling- Facts and Dimensions.
  - Many schemas – In here I use star schema.

✓ As explained First step is staging the source data set.
✓ Next staged tables are profiled and aggregations are performed when necessary. As the next step data is transformed and loaded.

- ✓ After completing the described stages, data is tested and validated and the Datawarehouse is created.
- ✓ After the warehouse is created BI results such as OLAP analysis, Reports, Data visualization, Data mining can be obtained as results after further modifications.

3.1. Data Sources

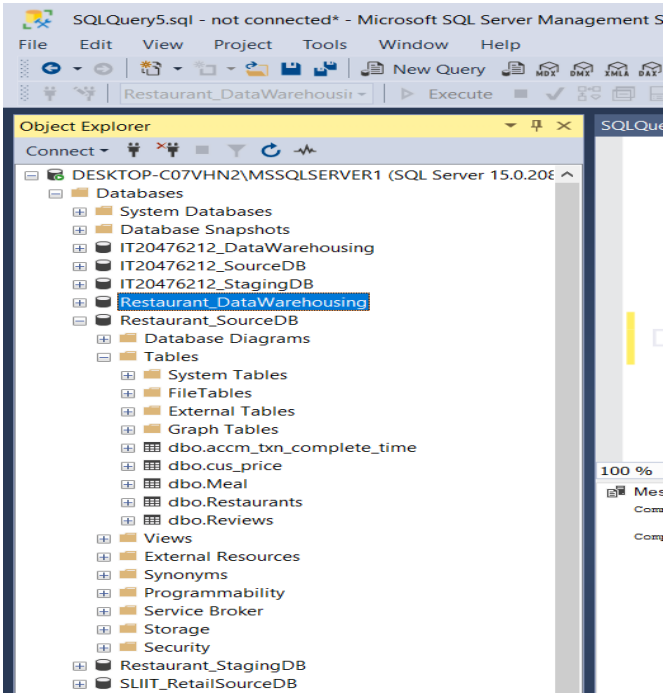
There were five tables in the data set and one as Text (txt) file and the rest of the tables as csv files.

I have created three databases on Microsoft Server Management Studio.

1) Restaurant_SourceDB
2) Restaurant_StagingDB
3) Restaurant_DataWarehousing

Restaurant_SourceDB

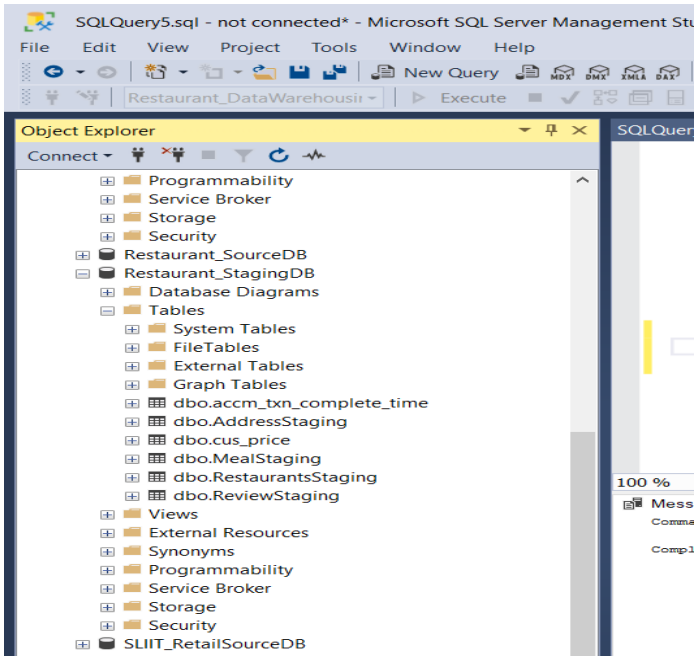
This database is the main source to the Data Warehouse. I imported all the csv files to this database. This database includes the Restaurants, Meal, Reviews and cus_price tables. Address(txt) file was loaded extracted directly through Visual Studio Data Tool.



Restaurant_Staging_

The first step of solution architecture is staging the source data set. After the staging layer the below mentioned staging tables are created:

1. Restaurants Staging
2. Meal Staging
3. Reviews Staging
4. cus_price Staging
5. Address Staging



Restaurant_DataWarehousing

This is the destination of database and this contains all the staging tables and the dimension and fact tables.

1.DimAddress

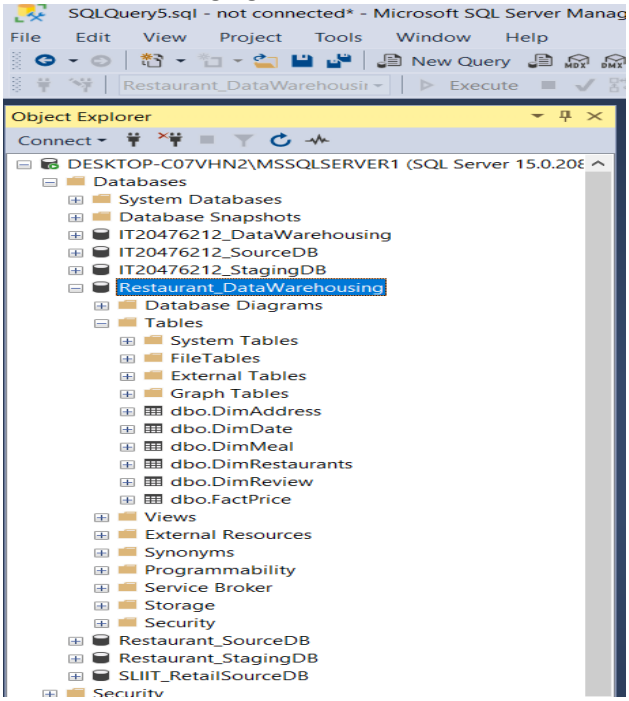
2.DimDate

3.DimMeal

4.DimRestaurants

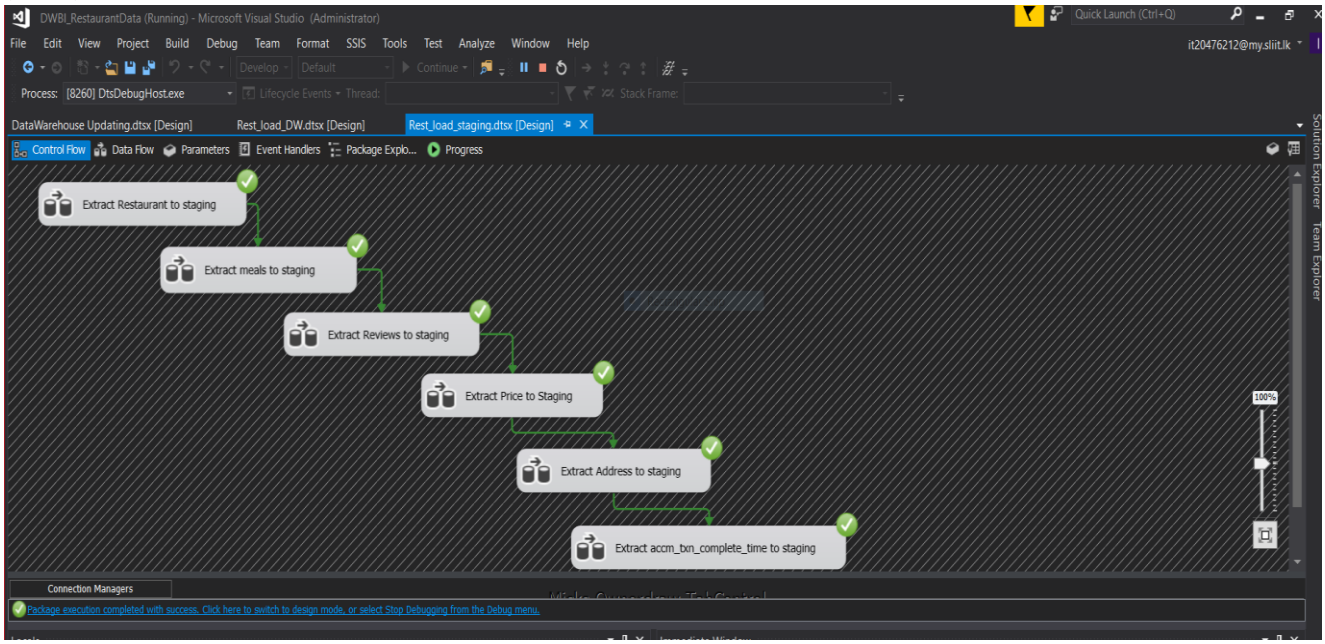
5.DimReview

6.FactPrice

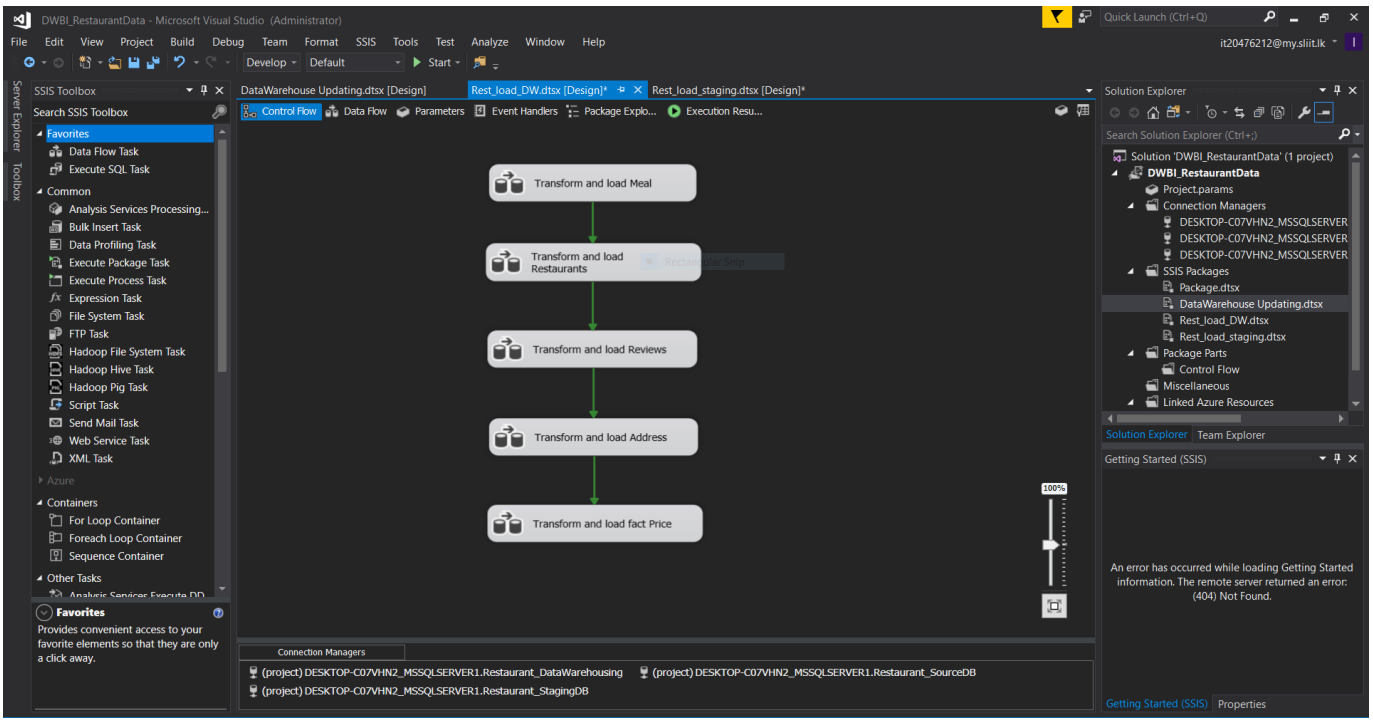


3.2. Extract, Transform and Loading

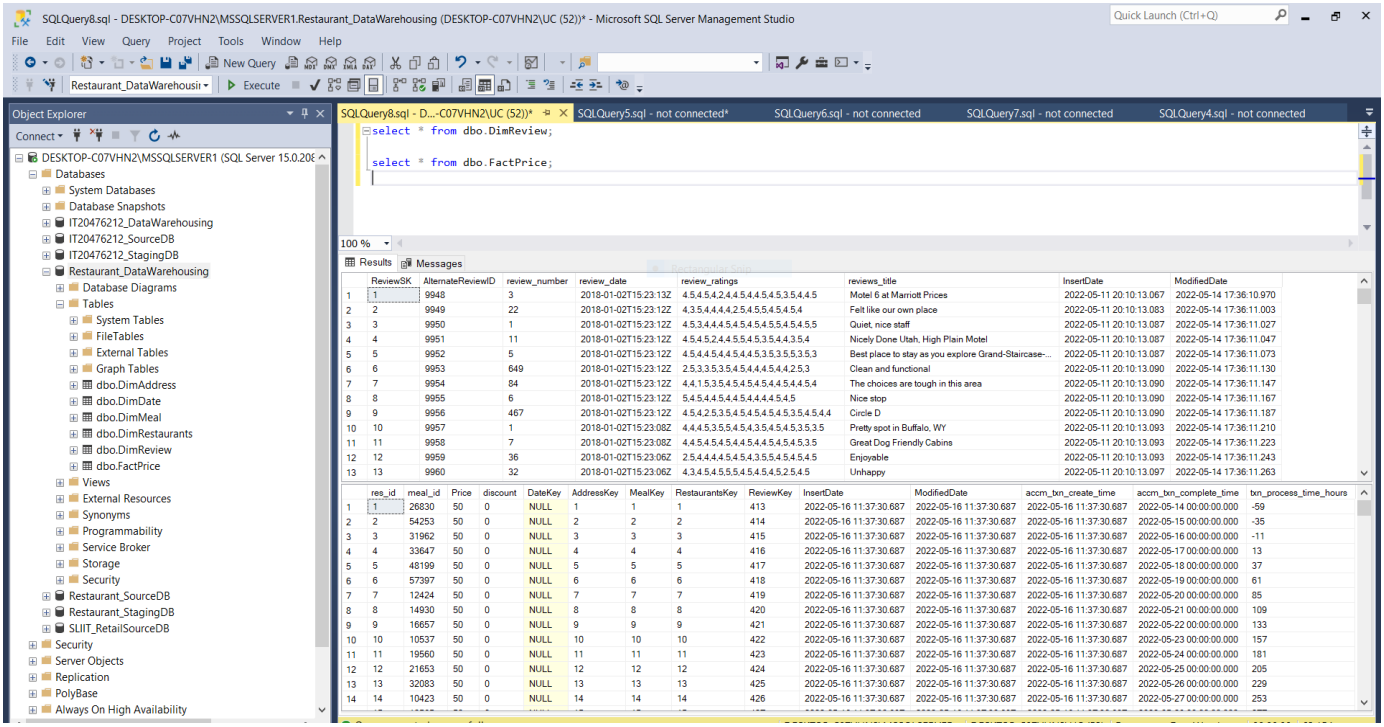
After creating the source database, I have extracted the data to the staging tables through Visual Studio (SSDT).



After extracting the data were transformed.

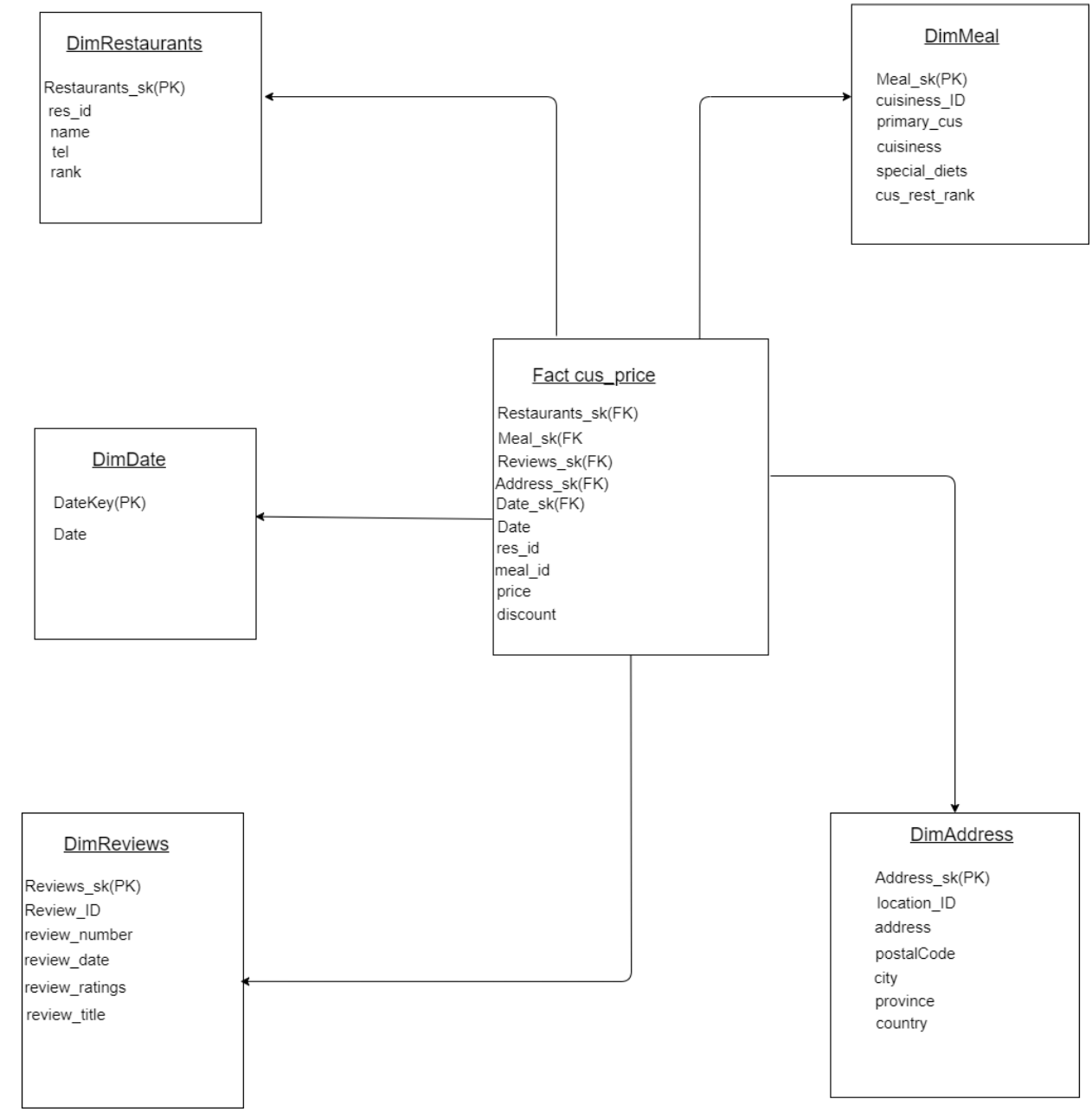


After the extracting and transforming data were loaded to the dimension tables and to fact table.



4. Data Warehouse Design & Development

Relational Diagram (Star Schema)



DimAddress is **slowly changing dimention**. Address and city may be changed in future.Therefore, I get it as slowly changing attribute.

Address -> PostalCode -> City -> Province ->Country This is the Hierachies (Address table.)

5. Test Planning and Design Test Cases

Test Case No.	Scenario	Assumptions	Schedules	Environment	Tools	Risk and Risk Management
1	Check the number of res_ID in RestaurantsStaging table and DimRestaurants table	All the transaction data were loaded into the table	Load data to tables and setup a SQL environment (SSMS)	SQL based environment	SQL Server Management Studio Visual Studio Data Tool	No risk
2	Check the data length of a specific in RestaurantsStaging table and DimRestaurants table	All the restaurants data were loaded into the table	Load data to tables and setup a SQL environment (SSMS)	SQL based environment	SQL Server Management Studio Visual Studio Data Tool	No risk
3	Check the number of duplicate values in RestaurantsStaging table and DimRestaurant table	All the restaurant data were loaded into the table	Load data to tables and setup a SQL environment (SSMS)	SQL based environment	SQL Server Management Studio Visual Studio Data Tool	No risk

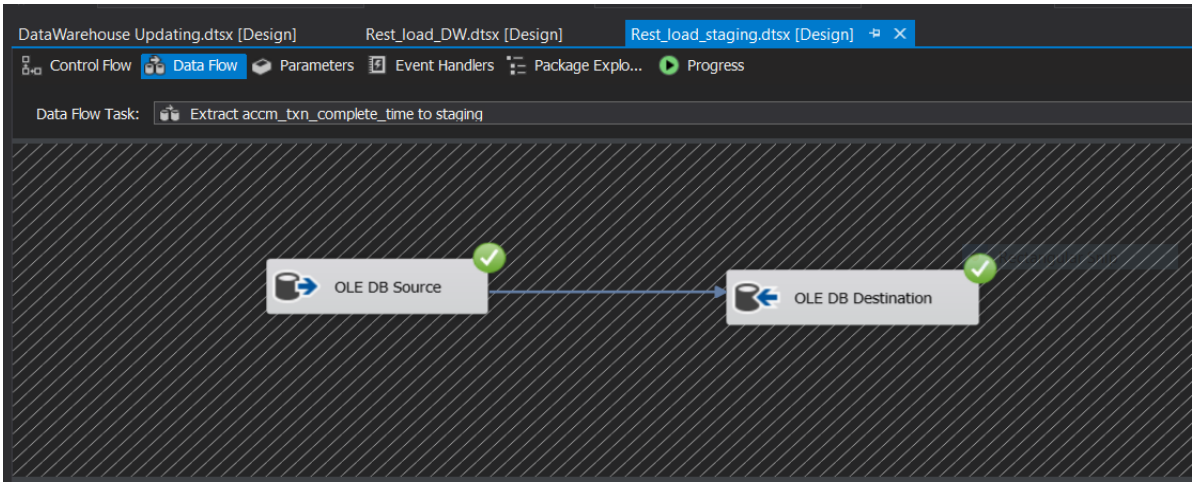
6. ETL Development

Extraction

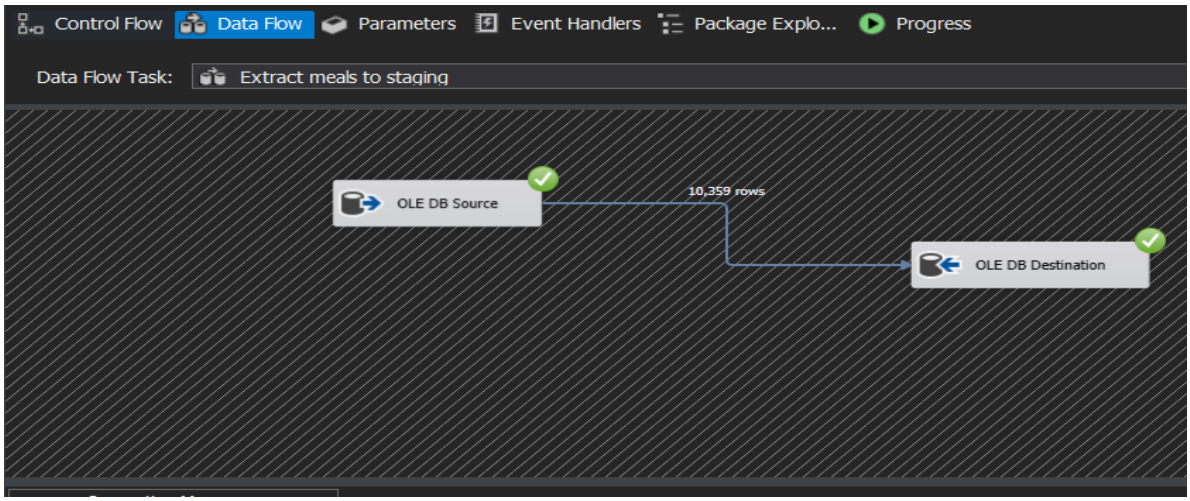
In the extraction all the tables were taken to a staging table in the Restaurant_DataWarehousing. All the csv files were taken through the Restaurant_SourceDB and the Text (txt) files were taken directly to the staging.

Data taken from Restaurant_SourceDB.

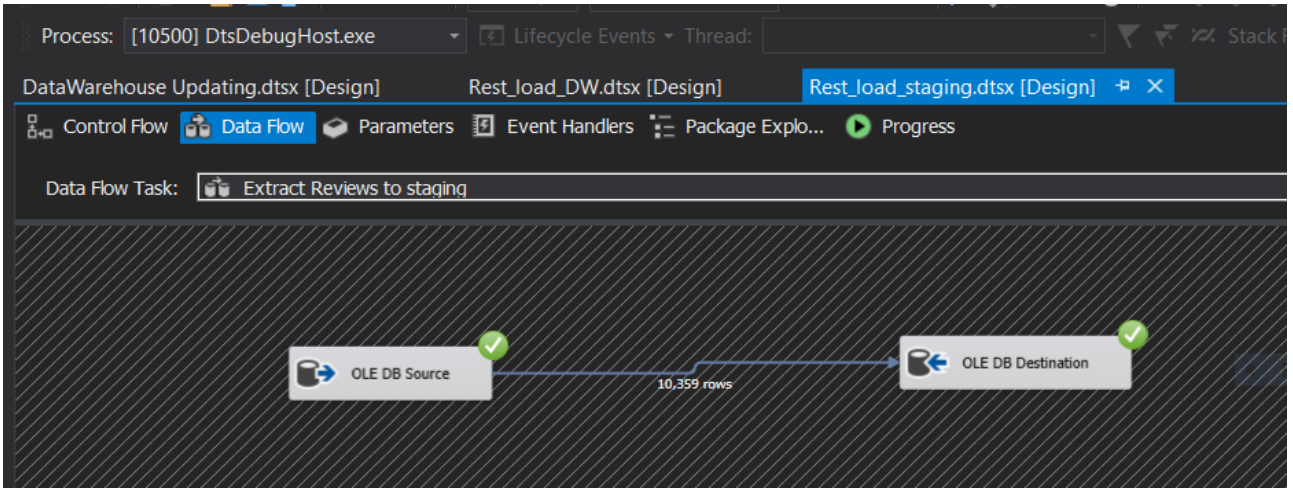
❖ Load data Restaurants to staging



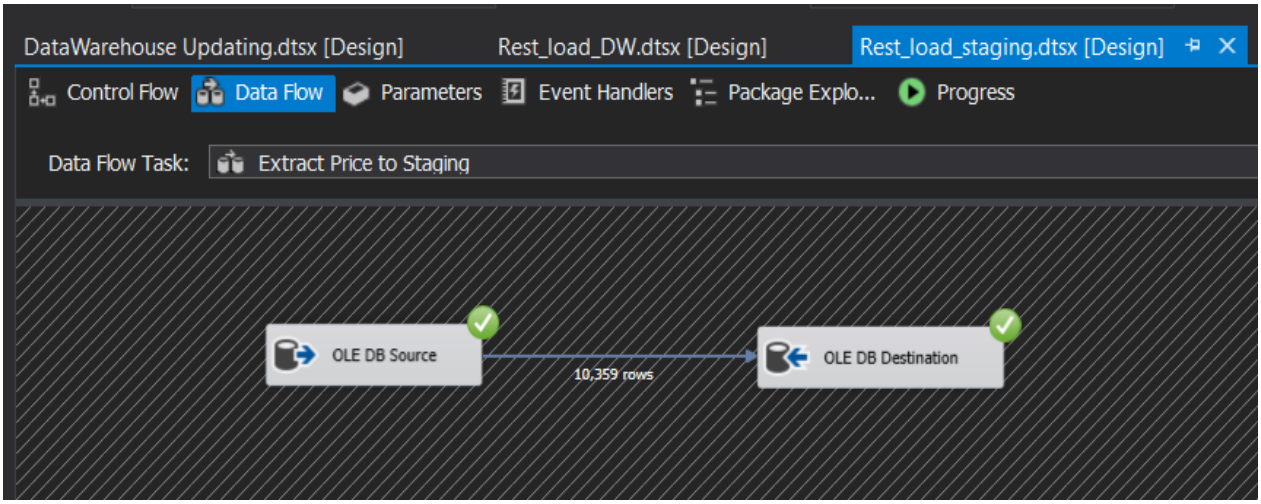
❖ Load data Meal to staging



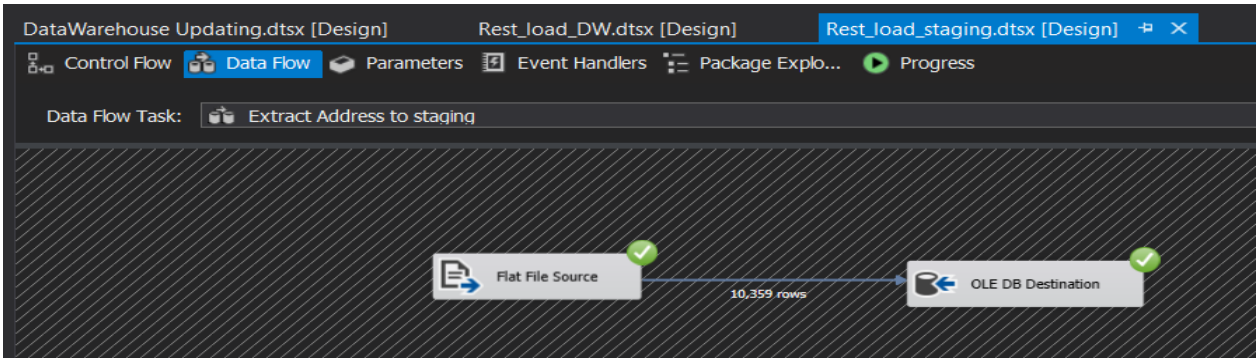
❖ **Load data Reviews to staging**



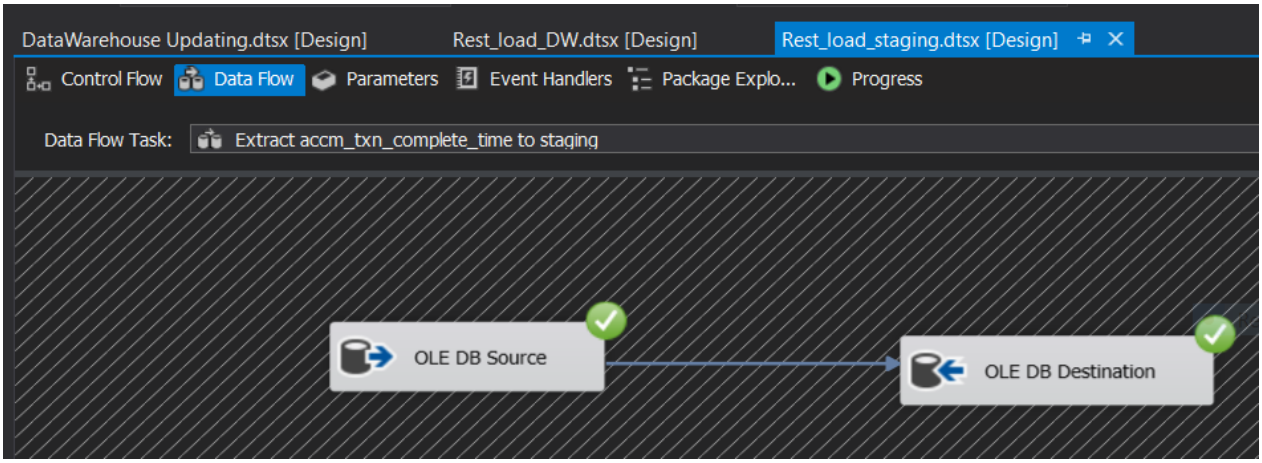
❖ **Load data Price to staging**



❖ **Load data Address to staging(.txt file)**



❖ Load data accm_txn_complete_time to staging



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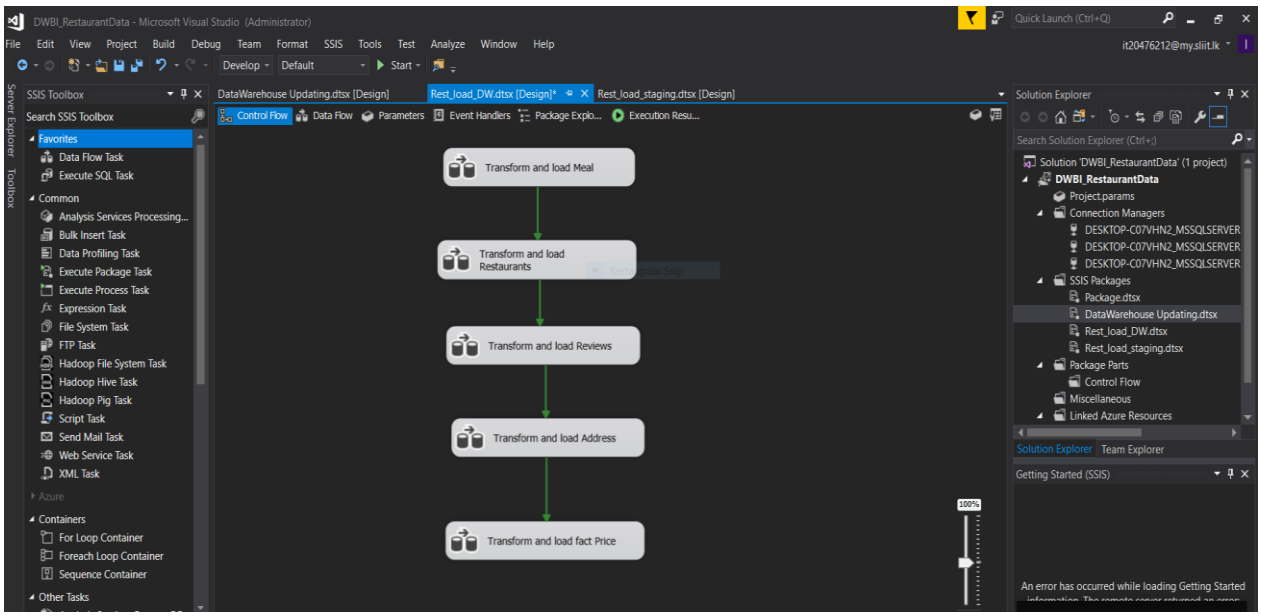
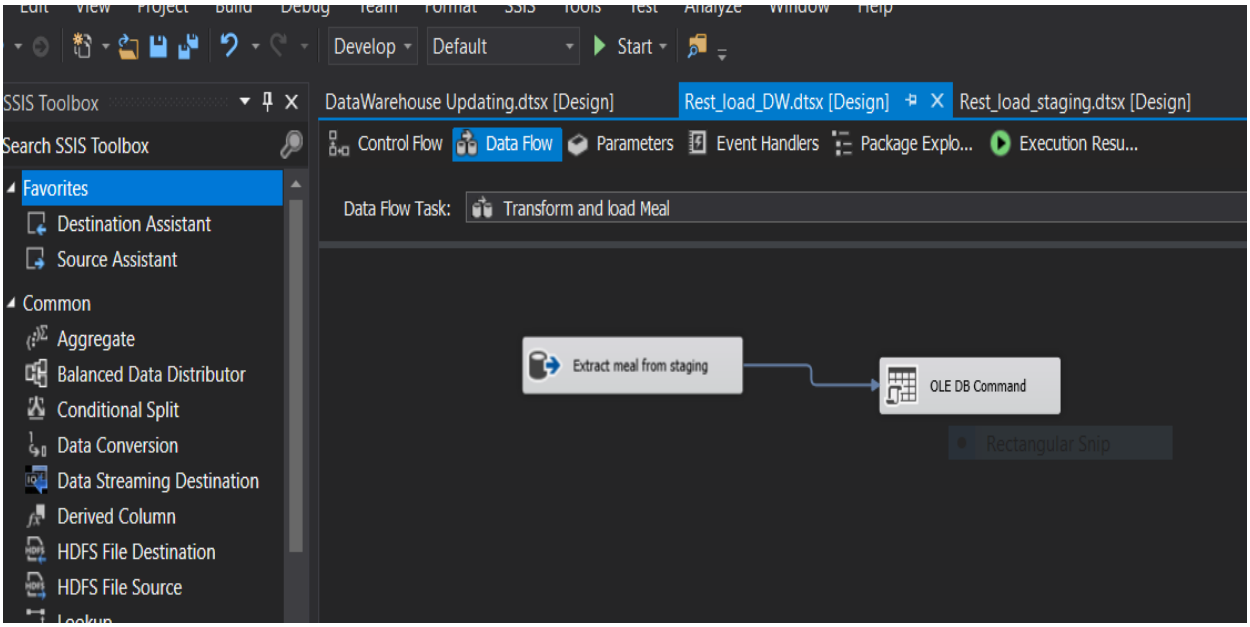
Transforming and Loading

After staging all the tables from the dataset they were transformed and loaded into the dimension tables and to the fact table.

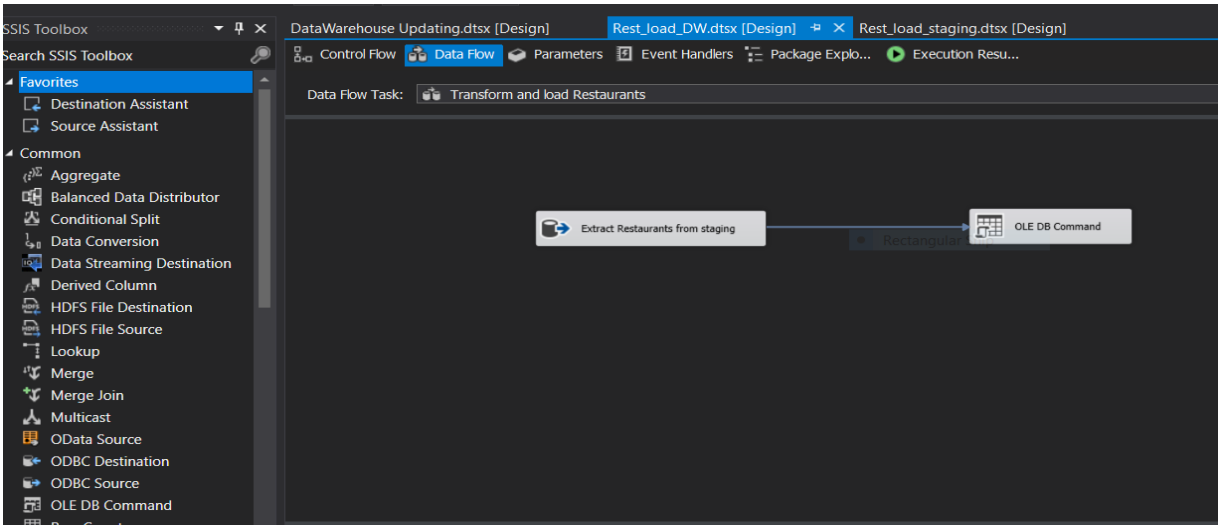
❖ ETL System to Datawarehouse



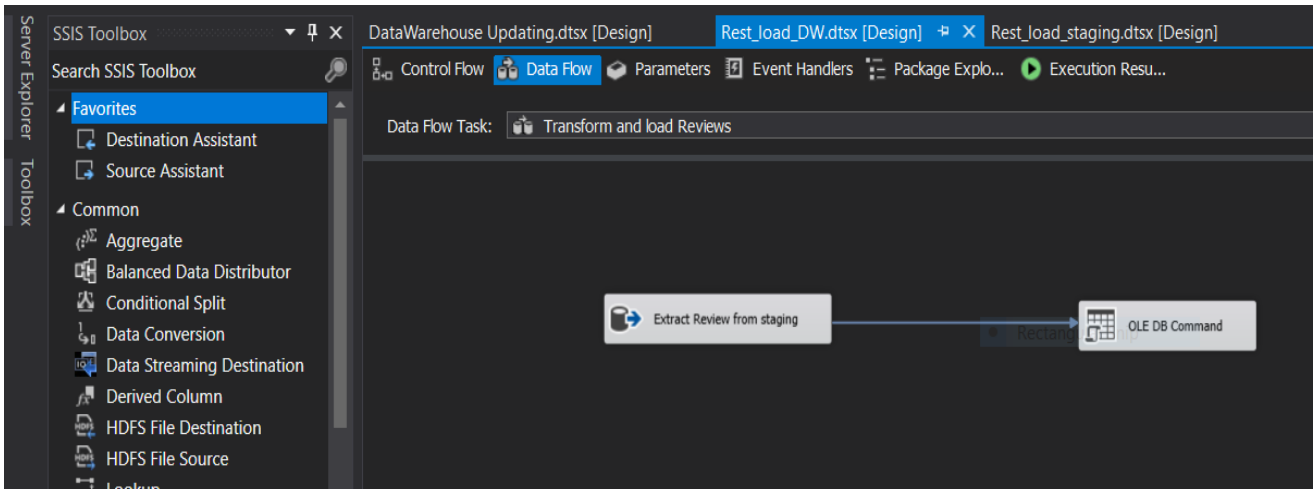
❖ Transform Meal data and load them into DimMeal.



❖ Transform Restaurants data and load them into Restaurants.



❖ Transform Reviews data and load them into DimReviews



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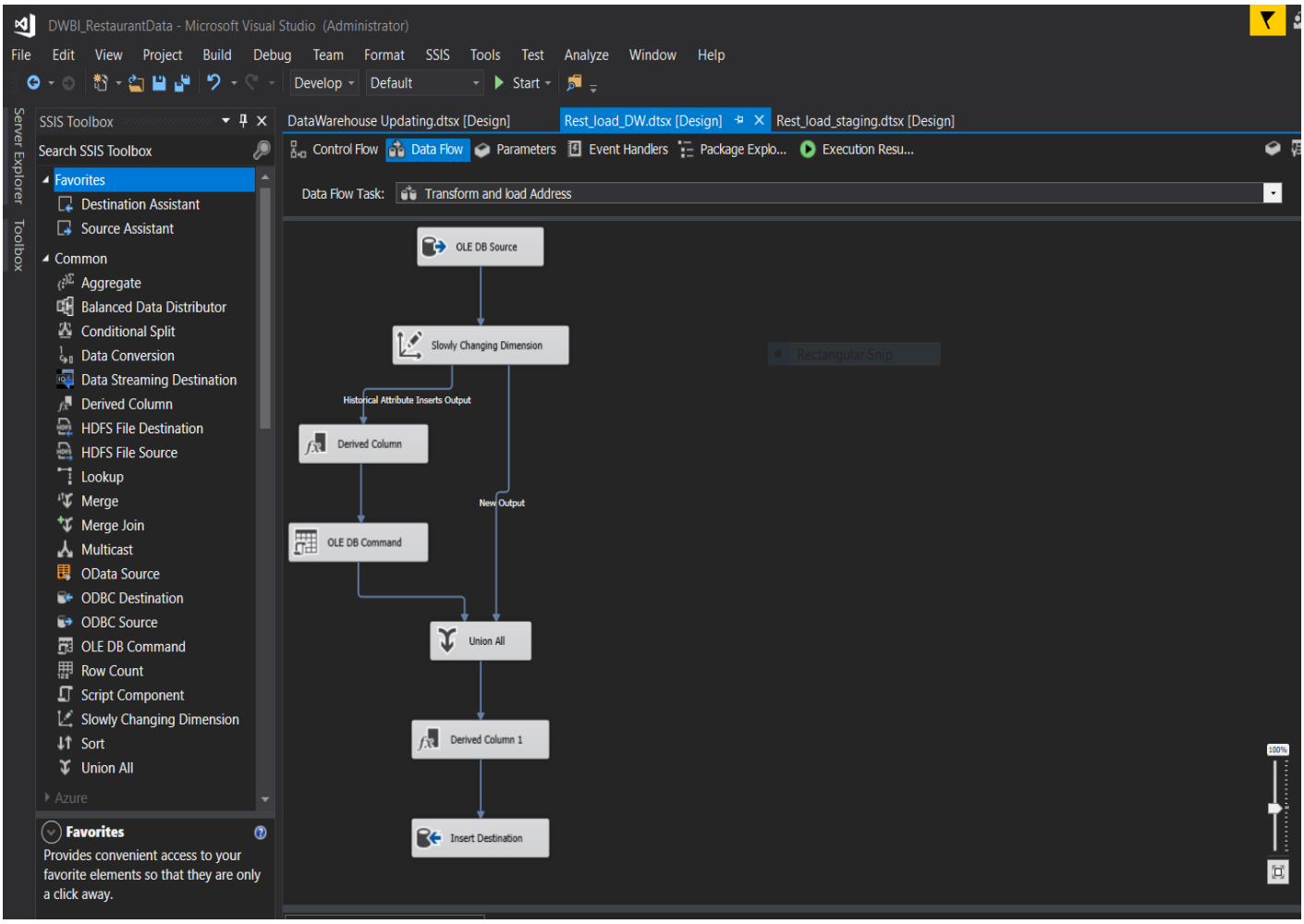
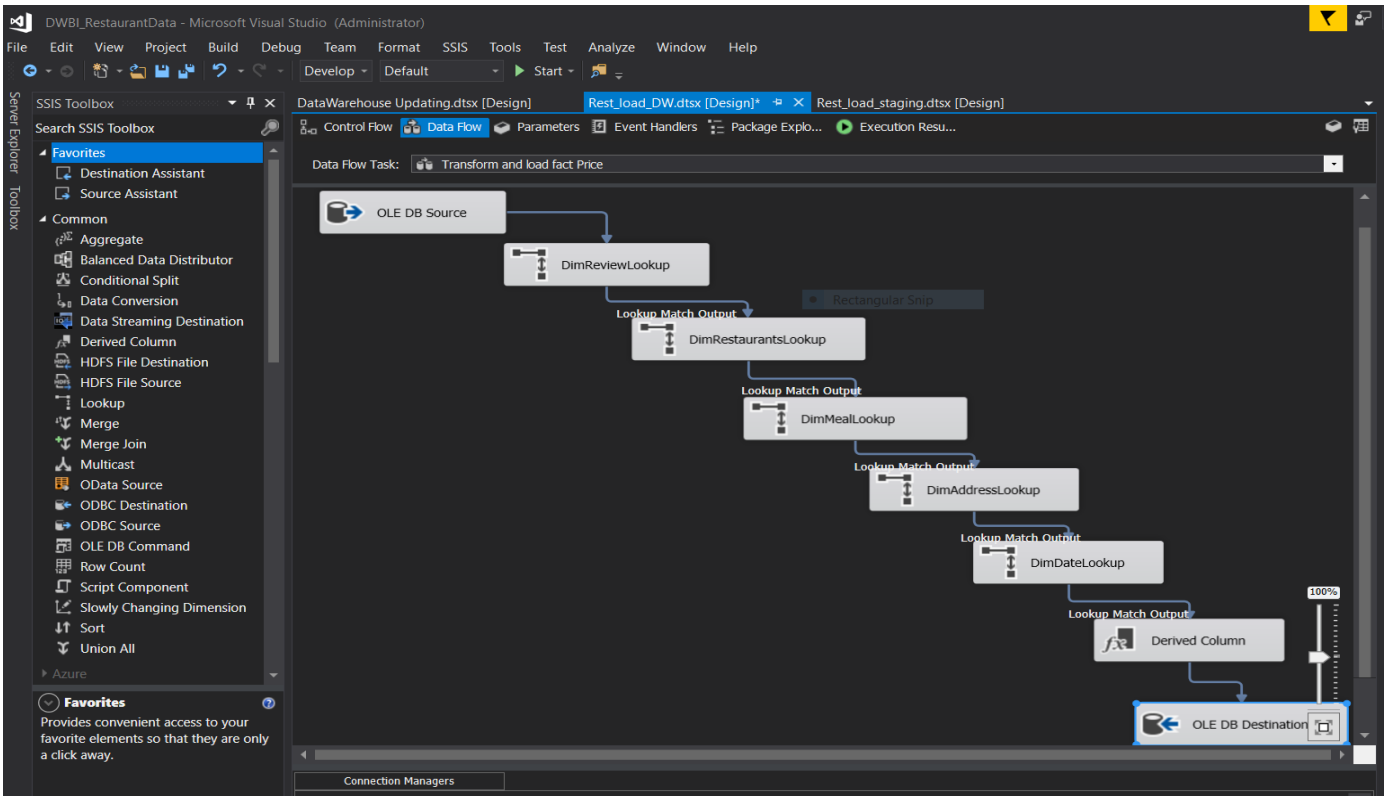
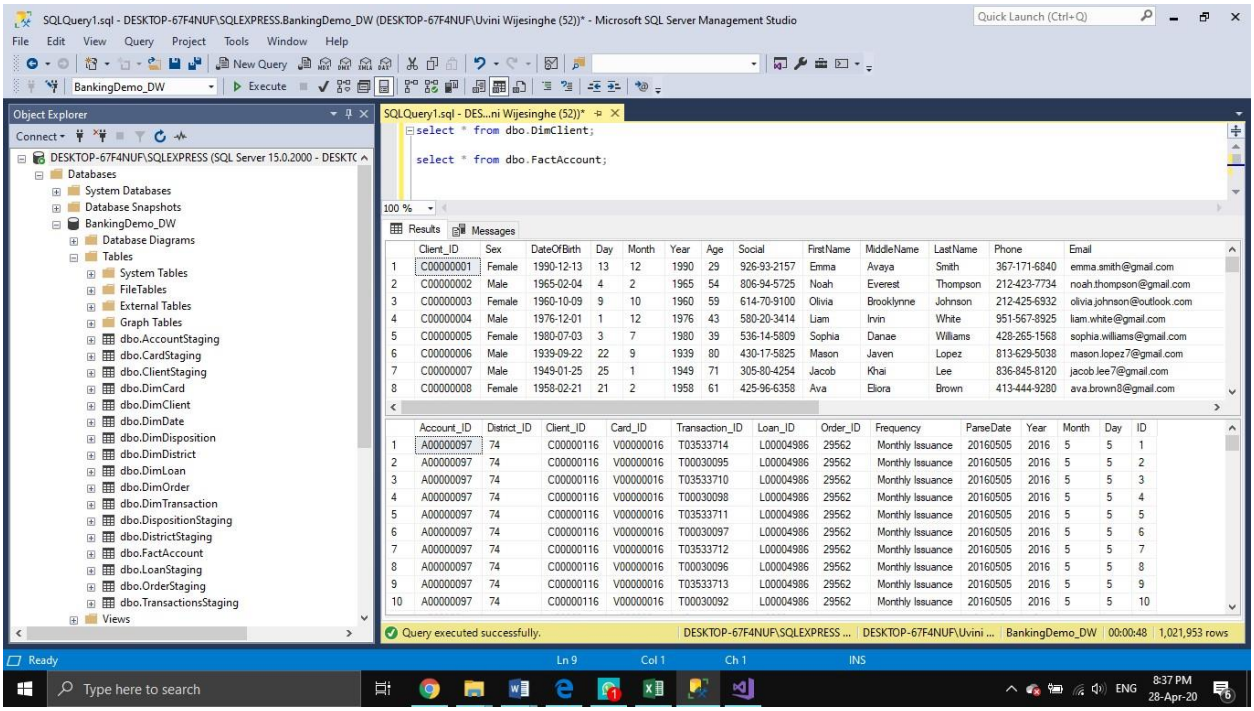
❖ Transform Address data and load them into Dim Address **(Slowly changing dimension)**



❖ Load FactPrice Data from staging



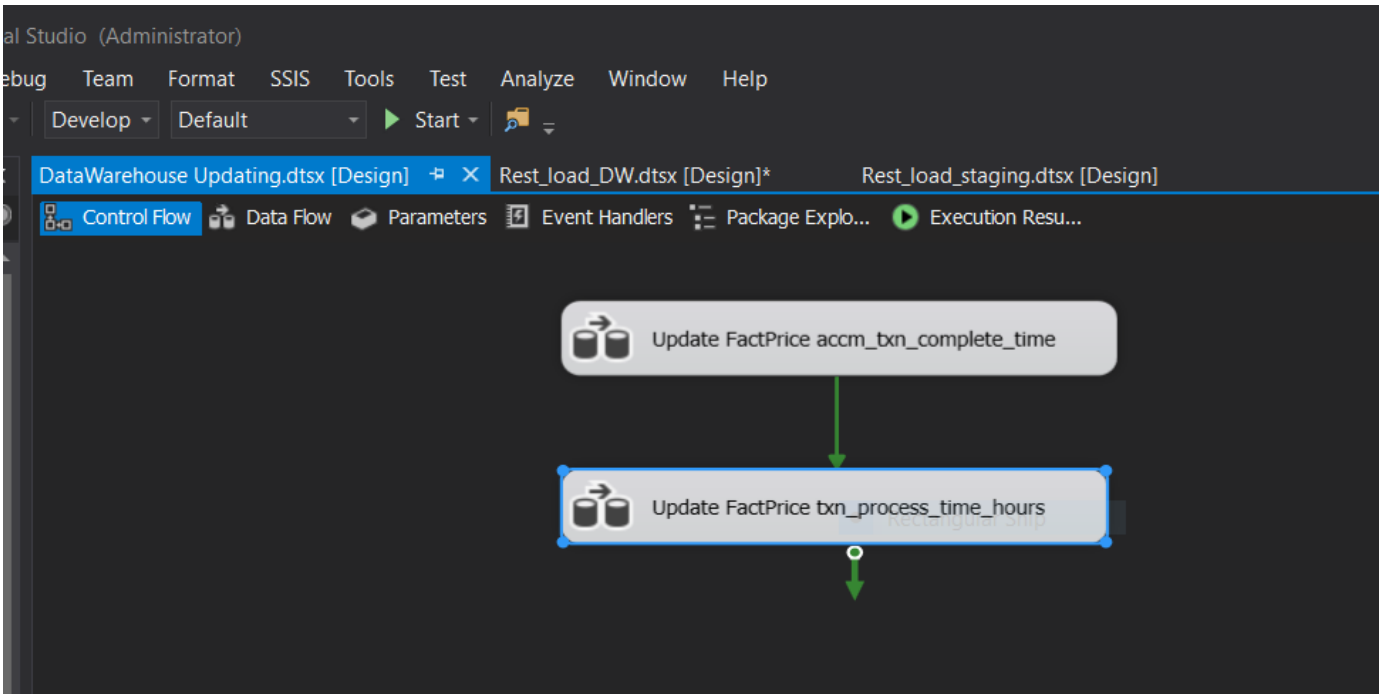
Loaded Data


SQLQuery1.sql - DESKTOP-67F4NUF\SQLEXPRESS.BankingDemo_DW (DESKTOP-67F4NUF\Uvini Wijesinghe (52))* - Microsoft SQL Server Management Studio
Object Explorer
select * from dbo.DimClient;
select * from dbo.FactAccount;
Query executed successfully.

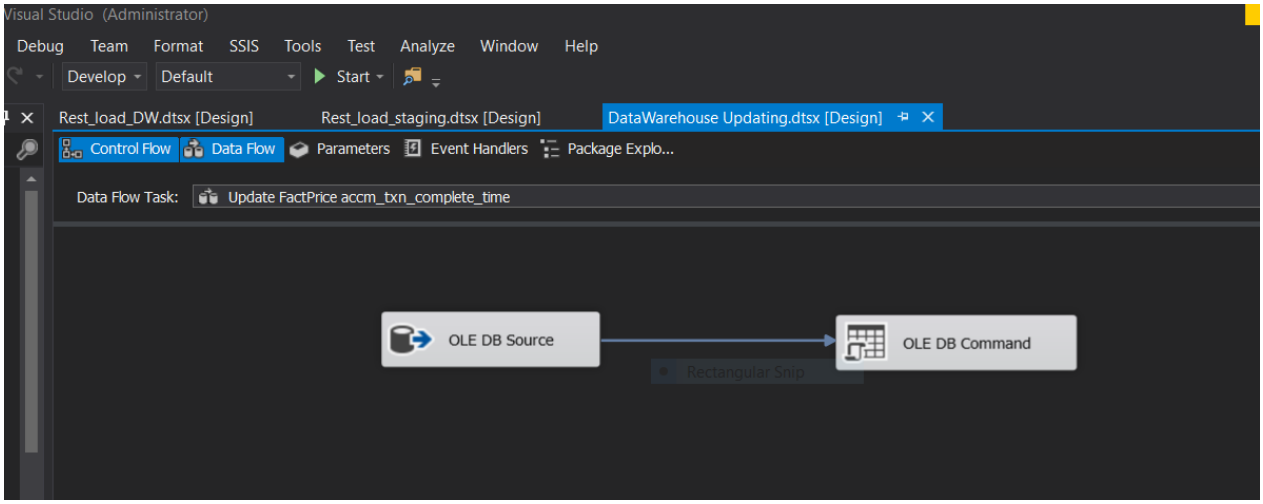
7. DataWarehouse Updating

In order to creating Accumulated fact table I created a new SSIS package and updated accm_txn_complete_time and txn_process_time_hours.

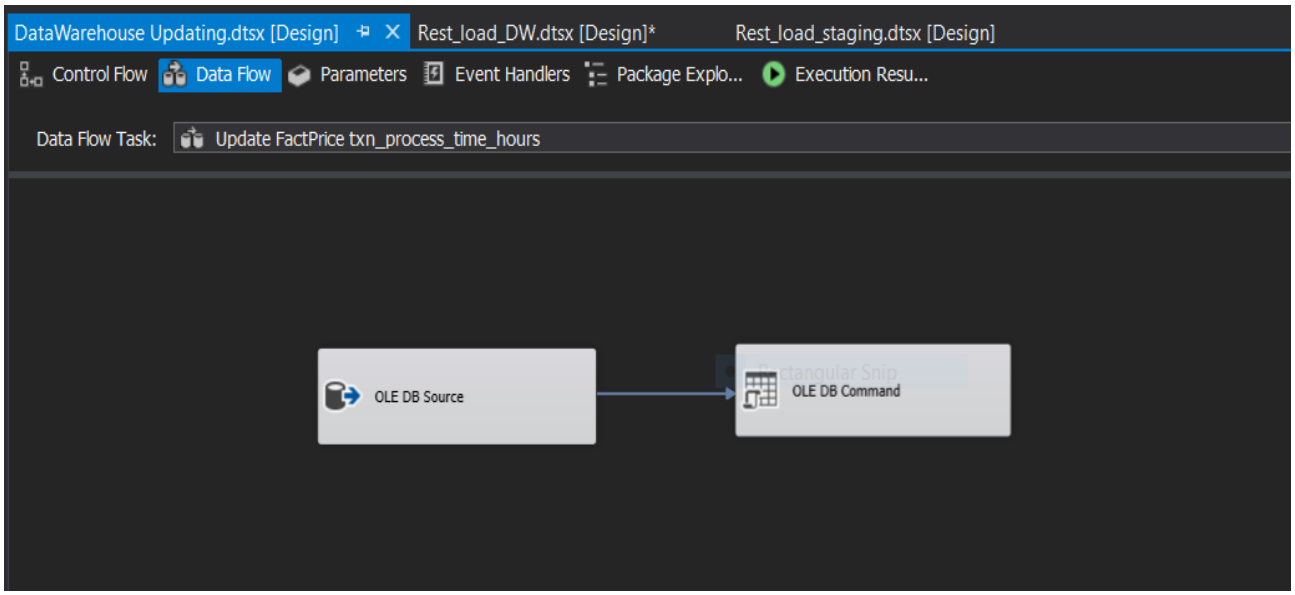
- **Datawarehouse updating**



➢ Update factPrice accm_txn_complete_time



➢ Update factPrice txn_process_time_hours



7.2 Accumulated Fact Table (FactPrice)

100 %

Results | Messages

	res_id	meal_id	Price	discount	DateKey	AddressKey	MealKey	RestaurantsKey	ReviewKey	InsertDate	ModifiedDate
1	1	26830	50	0	NULL	1	1	1	413	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
2	2	54253	50	0	NULL	2	2	2	414	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
3	3	31962	50	0	NULL	3	3	3	415	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
4	4	33647	50	0	NULL	4	4	4	416	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
5	5	48199	50	0	NULL	5	5	5	417	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
6	6	57397	50	0	NULL	6	6	6	418	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
7	7	12424	50	0	NULL	7	7	7	419	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
8	8	14930	50	0	NULL	8	8	8	420	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
9	9	16657	50	0	NULL	9	9	9	421	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
10	10	10537	50	0	NULL	10	10	10	422	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
11	11	19560	50	0	NULL	11	11	11	423	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
12	12	21653	50	0	NULL	12	12	12	424	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
13	13	32083	50	0	NULL	13	13	13	425	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
14	14	10423	50	0	NULL	14	14	14	426	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
15	15	10565	50	0	NULL	15	15	15	427	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
16	16	17035	50	0	NULL	16	16	16	428	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
17	17	27801	50	0	NULL	17	17	17	429	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
18	18	30645	50	0	NULL	18	18	18	430	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
19	19	30832	50	0	NULL	19	19	19	431	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
20	20	34047	56....	0	NULL	20	20	20	432	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
21	21	34139	65....	0	NULL	21	21	21	433	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687
22	22	45502	55.5	0	NULL	22	22	22	434	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687

Query executed successfully. DESKTOP-C07VHN2\MSSQLSERVER... DESKTOP

y	InsertDate	ModifiedDate	accm_txn_create_time	accm_txn_complete_time	txn_process_time_hours
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-14 00:00:00.000	-59
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-15 00:00:00.000	-35
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 00:00:00.000	-11
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-17 00:00:00.000	13
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-18 00:00:00.000	37
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-19 00:00:00.000	61
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-20 00:00:00.000	85
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-21 00:00:00.000	109
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-22 00:00:00.000	133
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-23 00:00:00.000	157
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-24 00:00:00.000	181
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-25 00:00:00.000	205
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-26 00:00:00.000	229
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-27 00:00:00.000	253
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-28 00:00:00.000	277
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-29 00:00:00.000	301
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-30 00:00:00.000	325
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-31 00:00:00.000	349
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-06-01 00:00:00.000	373
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-06-02 00:00:00.000	397
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-06-03 00:00:00.000	421
	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-05-16 11:37:30.687	2022-06-04 00:00:00.000	445