

410255:LP-VI. BI

Experiment No: 3	Create the cube with suitable dimension and fact tables based on ROLAP, MOLAP and HOLAP model.
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Objective of the Assignment : To introduce the concepts and components of Business Intelligence (BI)

Prerequisite:

1. Basics of OLAP.
2. Concept of Multi Dimensional Cube.

Contents for Theory :

- ◆ What is a Fact Table ?
- ◆ What is a ROLAP, MOLAP and HOLAP model
- ◆ Create the cube with suitable dimension and fact tables based on OLAP

1. What is a Fact Table ?

In Business Intelligence (BI), A Fact Table is a table that stores quantitative data or facts about a business process or activity.

It is a central table in a data warehouse that provides a snapshot of a business at a specific point in time.

For example - A Fact Table in a retail business might contain sales data for each transaction, with dimensions such as date, product, store, and customer. Analysts can use the Fact Table to analyze trends and patterns in sales, such as which products are selling the most, which stores are performing well, and which customers are buying the most.

2. What is a ROLAP, MOLAP and HOLAP model

ROLAP, MOLAP, and HOLAP are three types of models used in Business Intelligence (BI) for organizing and analyzing data:

ROLAP (Relational Online Analytical Processing):

In this model, data is stored in a relational database, and the analysis is performed by joining multiple tables. ROLAP allows for complex queries and is good for handling large amounts of data, but it may be slower due to the need for frequent joins.

MOLAP (Multidimensional Online Analytical Processing):

In this model, data is stored in a multidimensional database, which is optimized for fast query performance. MOLAP is good for analyzing data in multiple dimensions, such as time, geography, and product, but may be limited in its ability to handle large amounts of data.

HOLAP (Hybrid Online Analytical Processing):

This model combines elements of both ROLAP and MOLAP. It stores data in both a relational and multidimensional database, allowing for efficient analysis of both large amounts of data and complex queries. HOLAP is a good compromise between the other two models, offering both speed and flexibility.

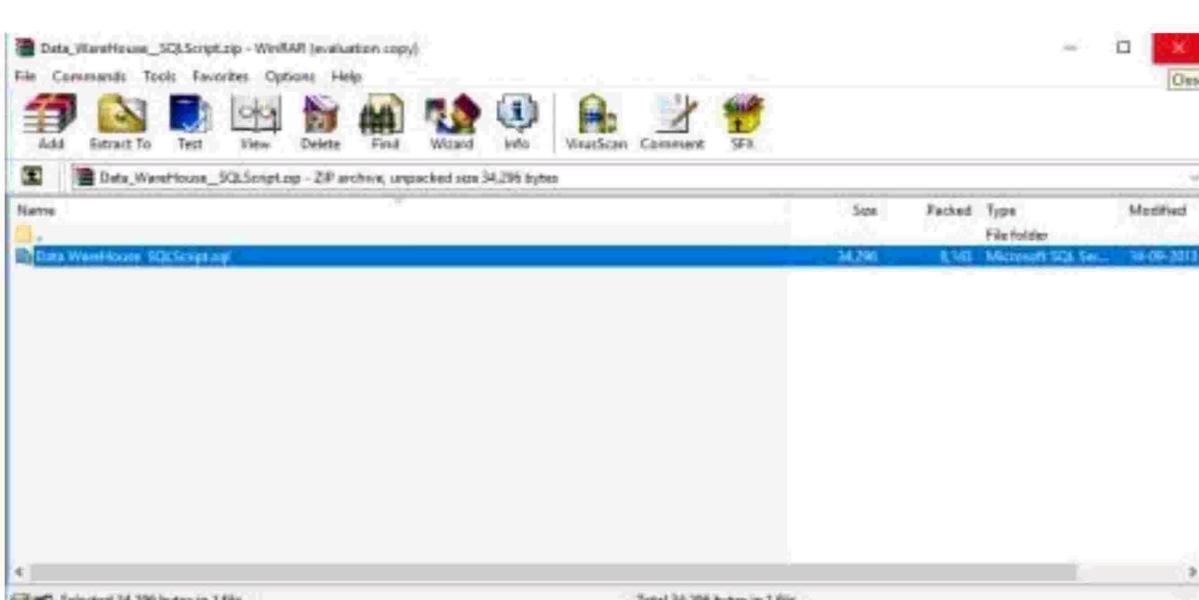
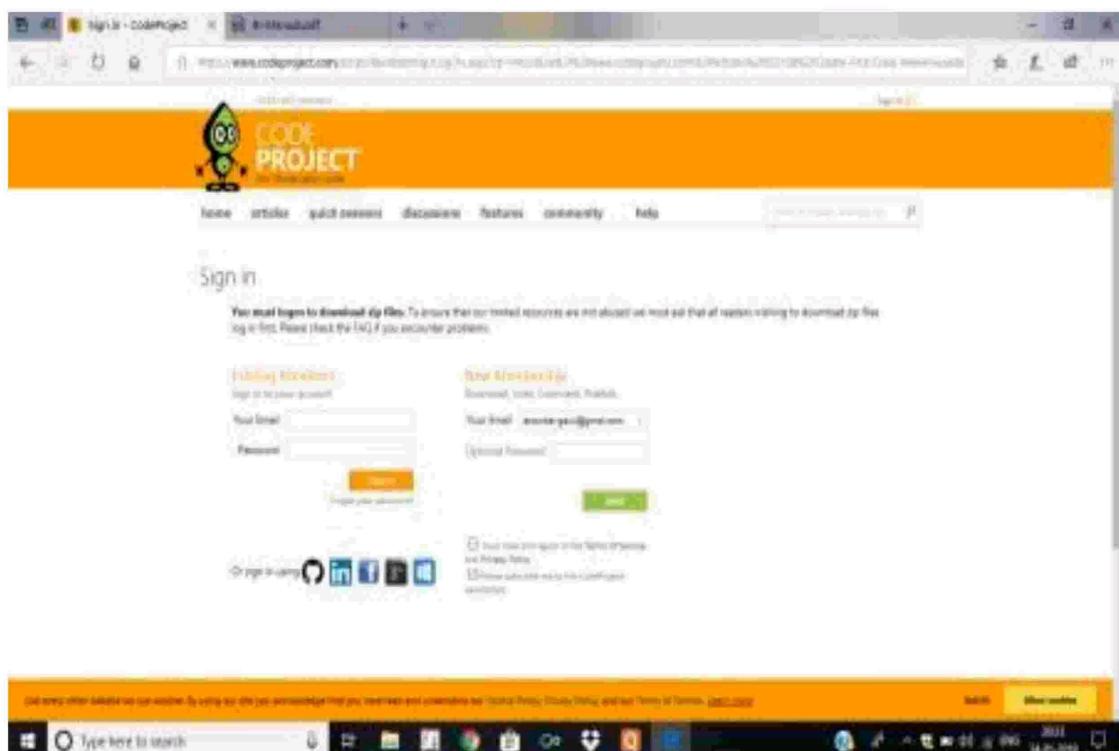
3. Create the cube with a suitable dimension and fact tables based on OLAP ?

Step 1: Creating Data Warehouse

Let us execute our T-SQL Script to create a data warehouse with fact tables, dimensions and populate them with appropriate test values.

Download the T-SQL script attached with this article for creation of Sales Data Warehouse or download from this article “Create First Data Warehouse” and run it in your SQL Server.

Downloading "Data_Warehouse_SQLScript.zip" from the article



After downloading the extract file in the folder.

Follow the given steps to run the query in SSMS (SQL Server Management Studio).

1. Open SQL Server Management Studio 2012
2. Connect Database Engine



Password for sa : admin123 (as given during installation) Click Connect.

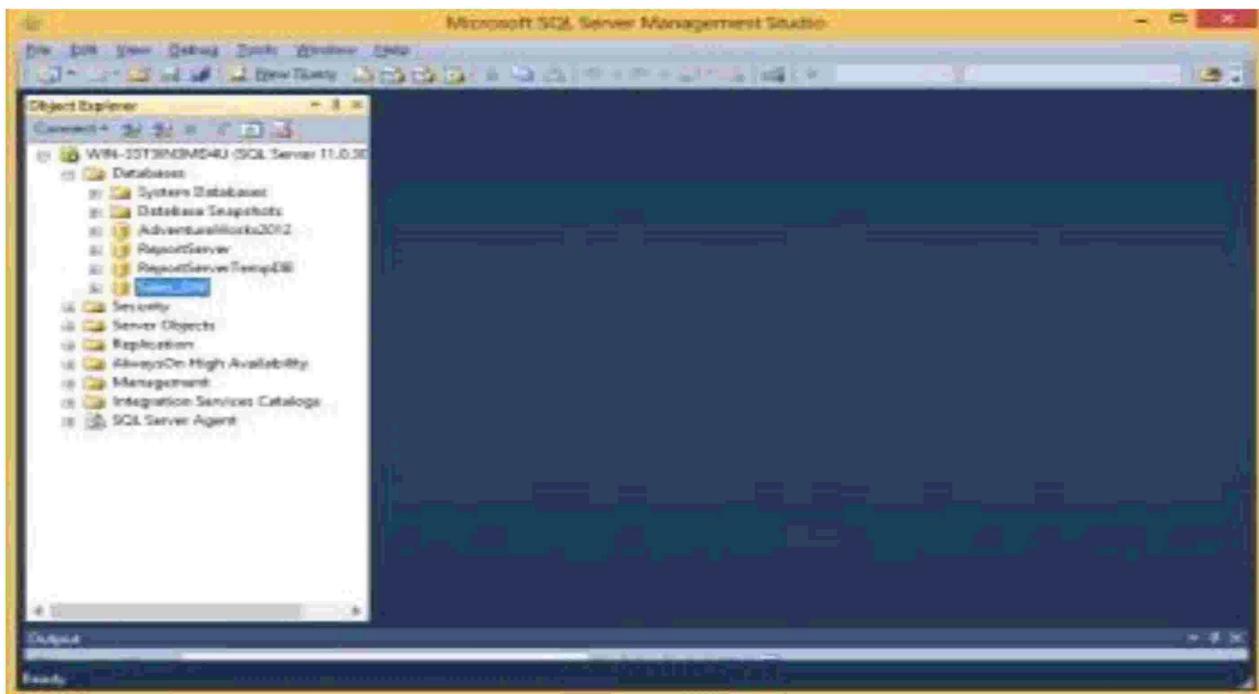
3. Open New Query editor
 4. Copy paste Scripts given below in various steps in new query editor window one by one
 5. To run the given SQL Script, press F5
 6. It will create and populate “Sales_DW” database on your SQL Server OR
- 1** Go to the extracted sql file and double click on it.
2 New Sql Query Editor will be opened containing the Sales_DW Database.

```
USE [master]
GO
CREATE DATABASE [SalesDW]
GO
ALTER DATABASE [SalesDW] SET AUTO_CREATE_STATISTICS ON
GO
ALTER DATABASE [SalesDW] SET AUTO_UPDATE_STATISTICS ON
GO
CREATE TABLE [Customer] (
    [CustomerID] INT PRIMARY KEY IDENTITY(1,1),
    [CustomerName] NVARCHAR(40),
    [CustomerAddress] NVARCHAR(100),
    [CustomerPhone] NVARCHAR(15)
)
GO
--Insert the Customer information with sample values.
INSERT INTO [Customer] ([CustomerName], [CustomerAddress], [CustomerPhone])
VALUES
    ('201-0001', 'Henry Ford', '707-1234'),
    ('201-0002', 'Edsel Ford', '707-1235'),
    ('201-0003', 'Fayet Smith', '707-1236'),
    ('201-0004', 'William Chrysler', '707-1237'),
    ('201-0005', 'Dame Esther', '707-1238')
GO
--Insert some rows of Product dimension table without considering any Category or SubCategory.
CREATE TABLE [Product]

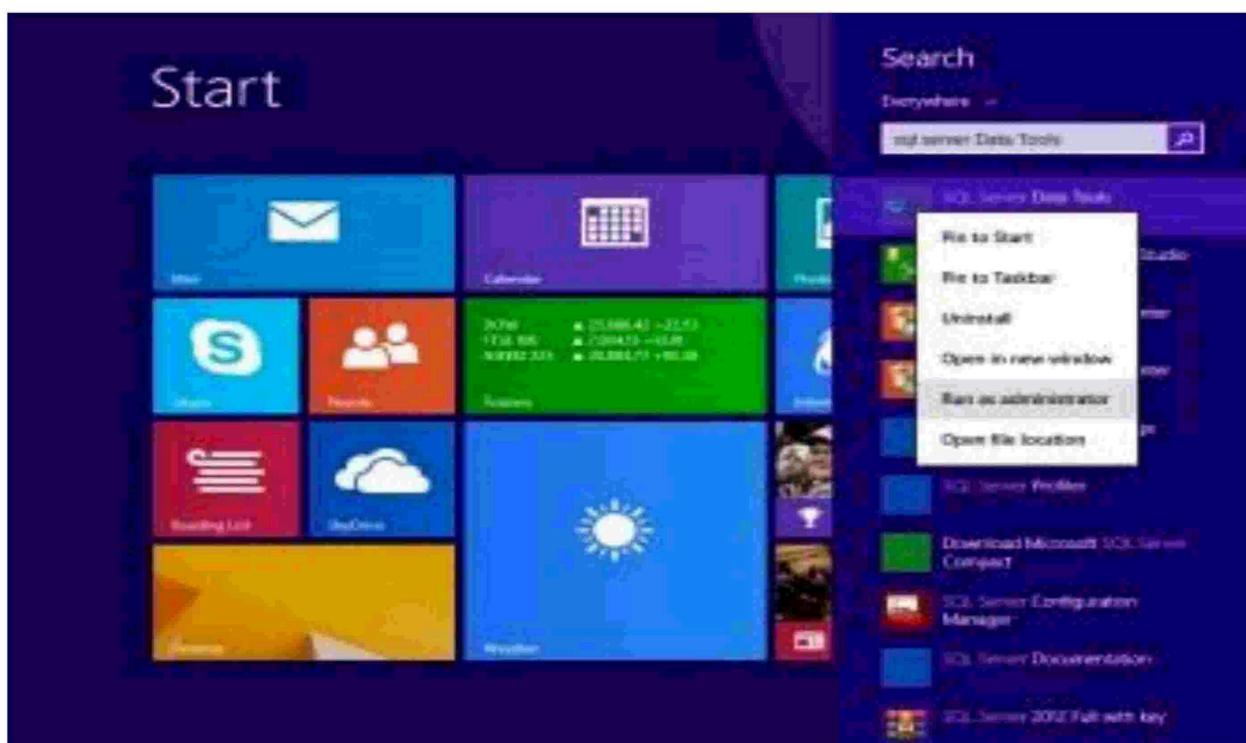
```

- 3** Click on execute or press F5 by selecting the query one by one or directly click on Execute.

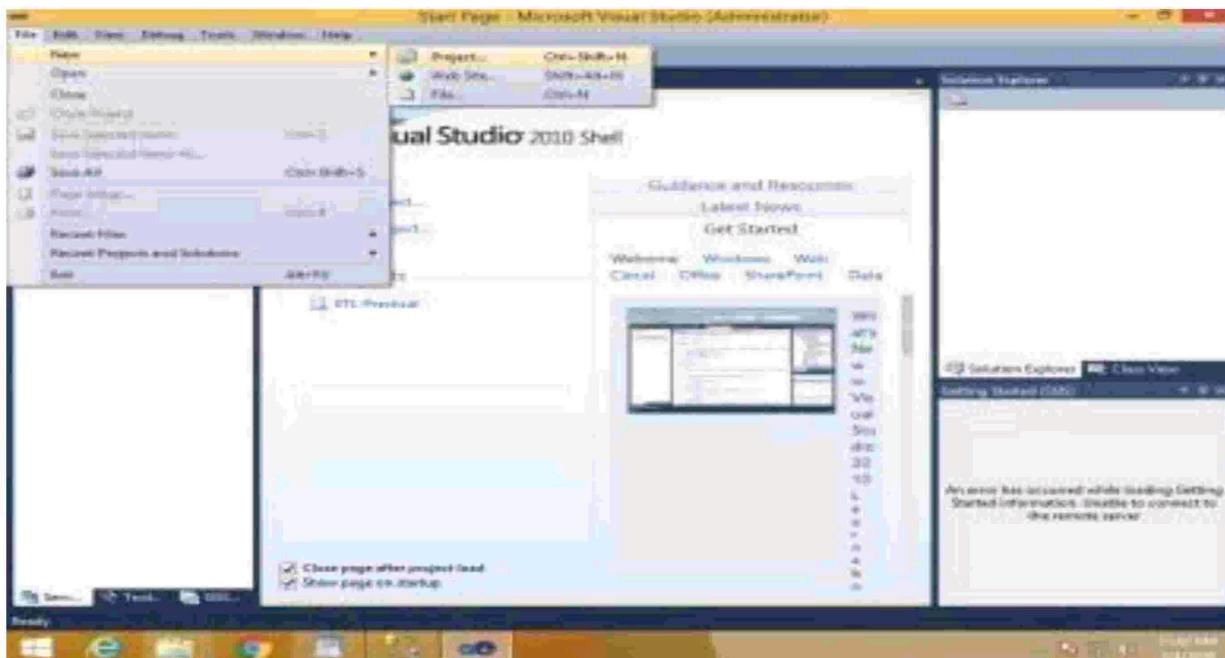
4 After completing execution save and close SQL Server Management studio & Reopento see Sales_DW in Databases Tab.



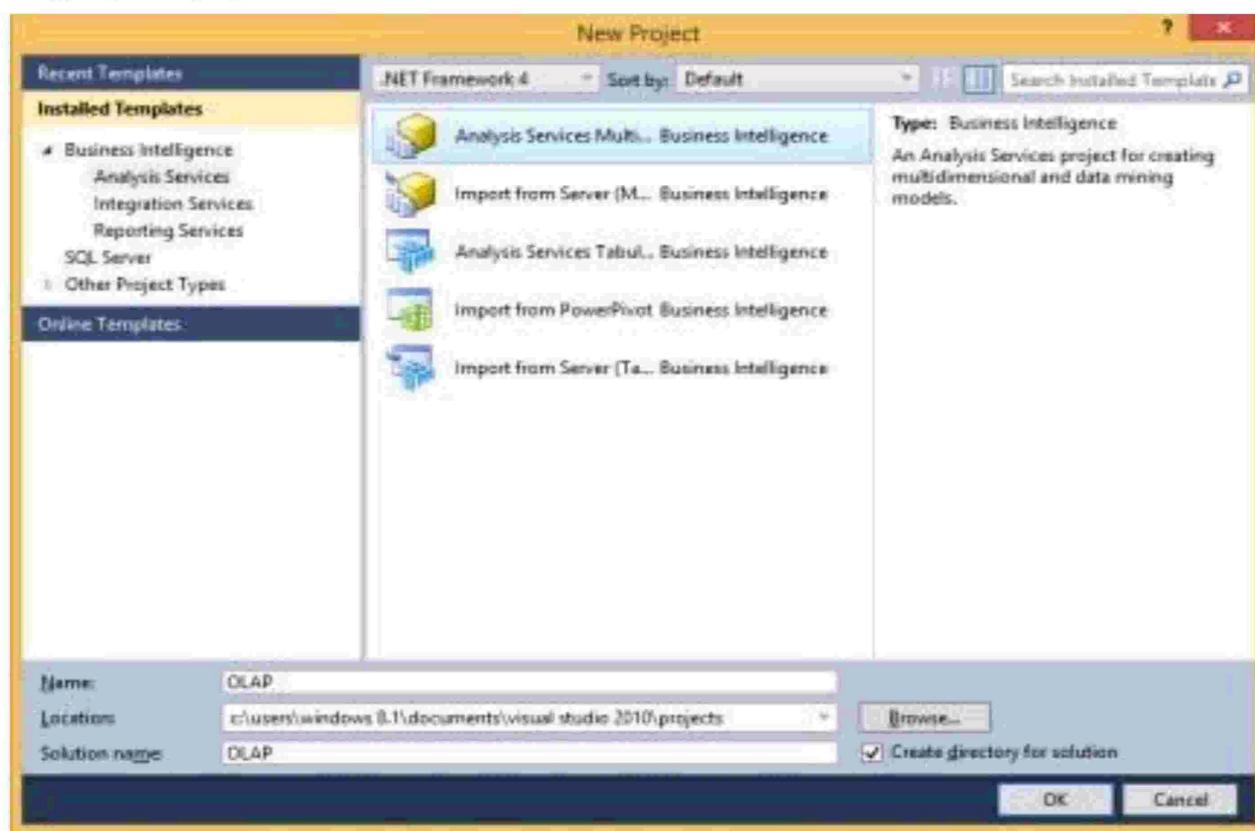
Step 2: Start SSDT environment and create New Data Source Go to Sql Server DataTools --> Right click and run as administrator



Click on File → New → Project

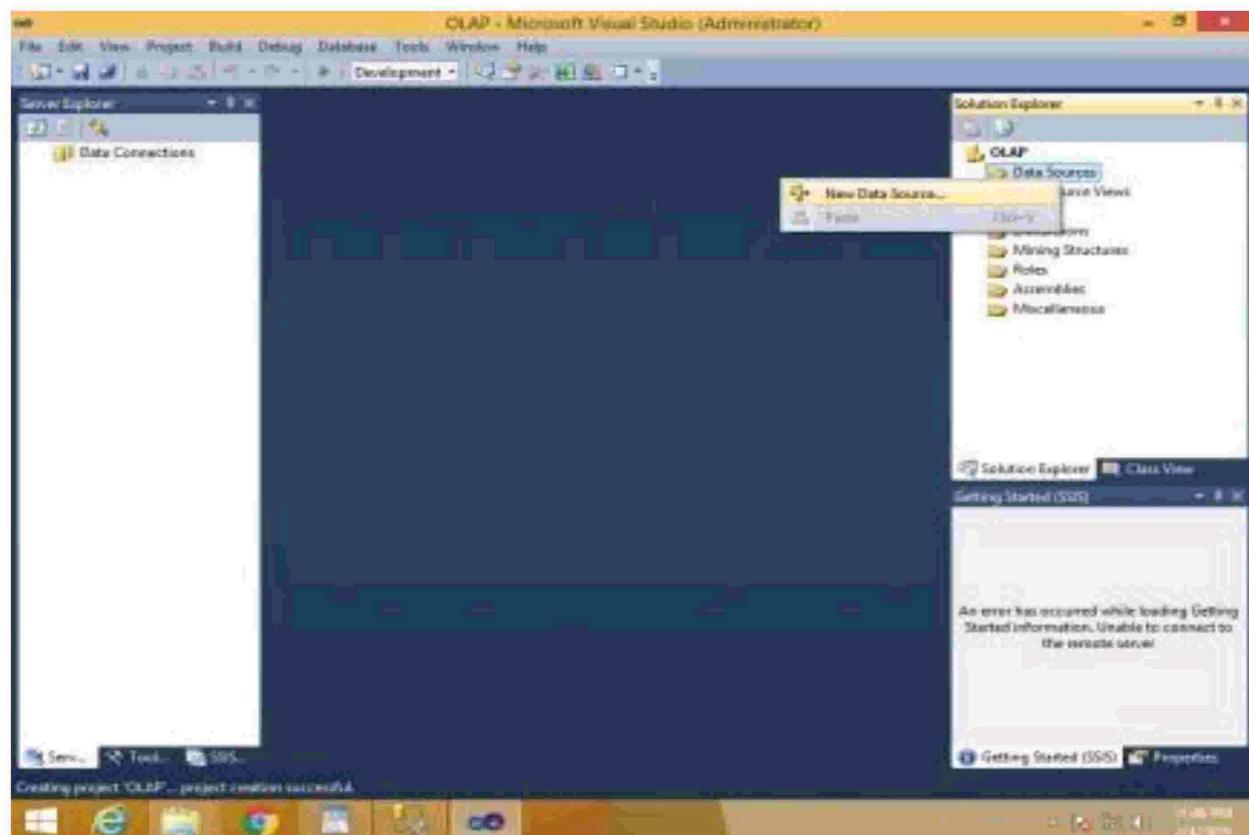


In Business Intelligence → Analysis Services Multidimensional and Data Miningmodels → appropriate project name → click OK

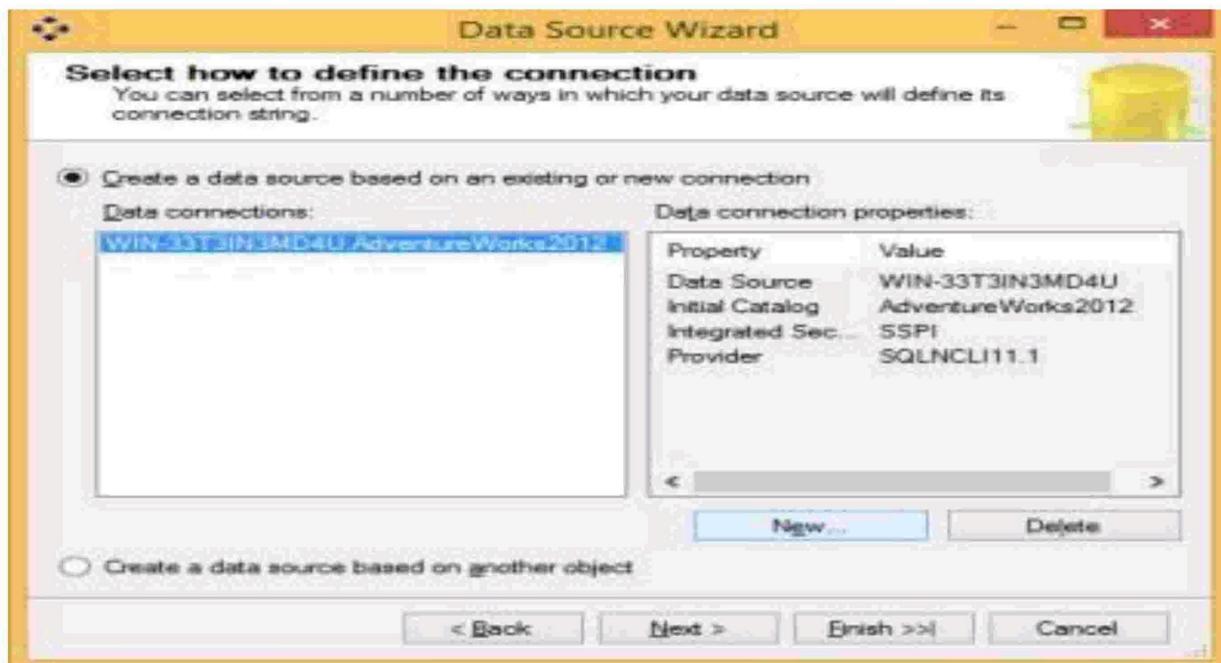


Right click on Data Sources in solution explorer → New Data Source

Data Source Wizard appears

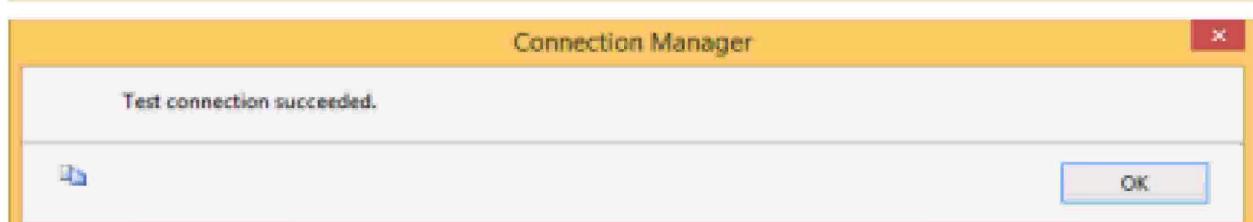
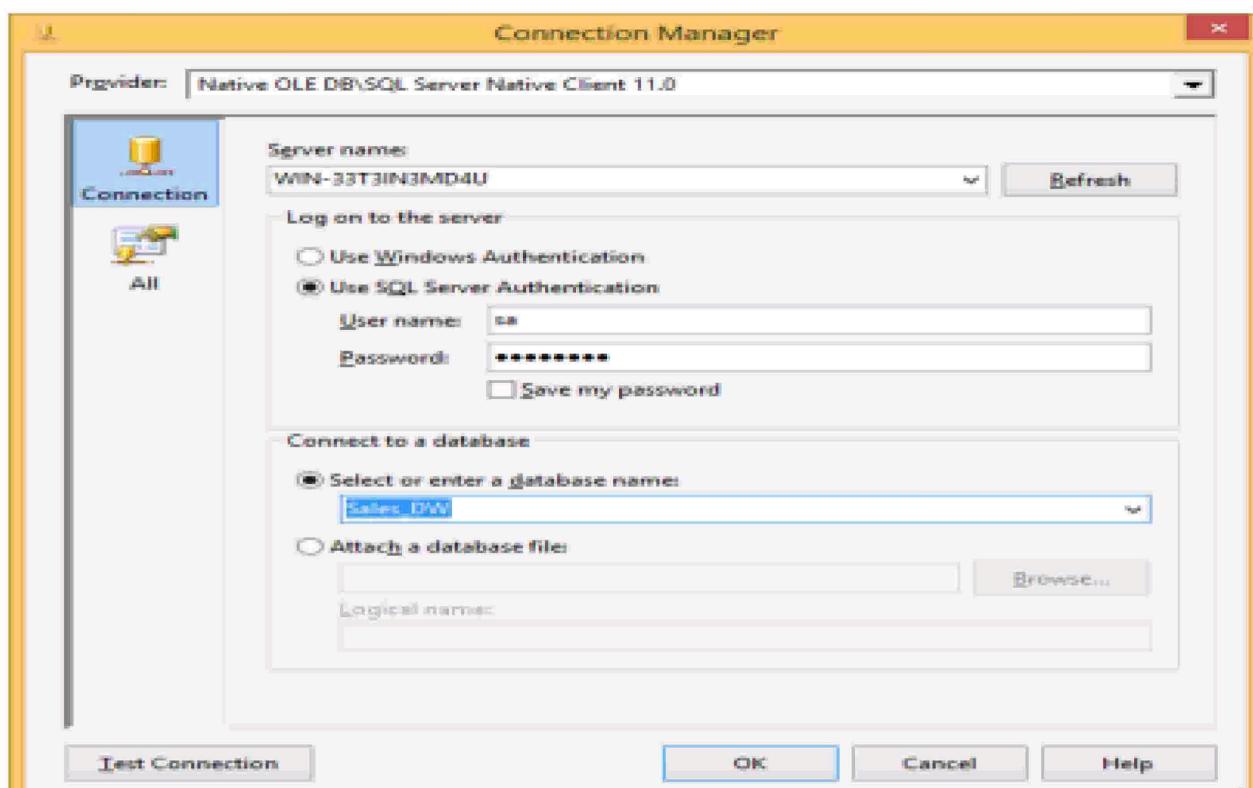


Click on New

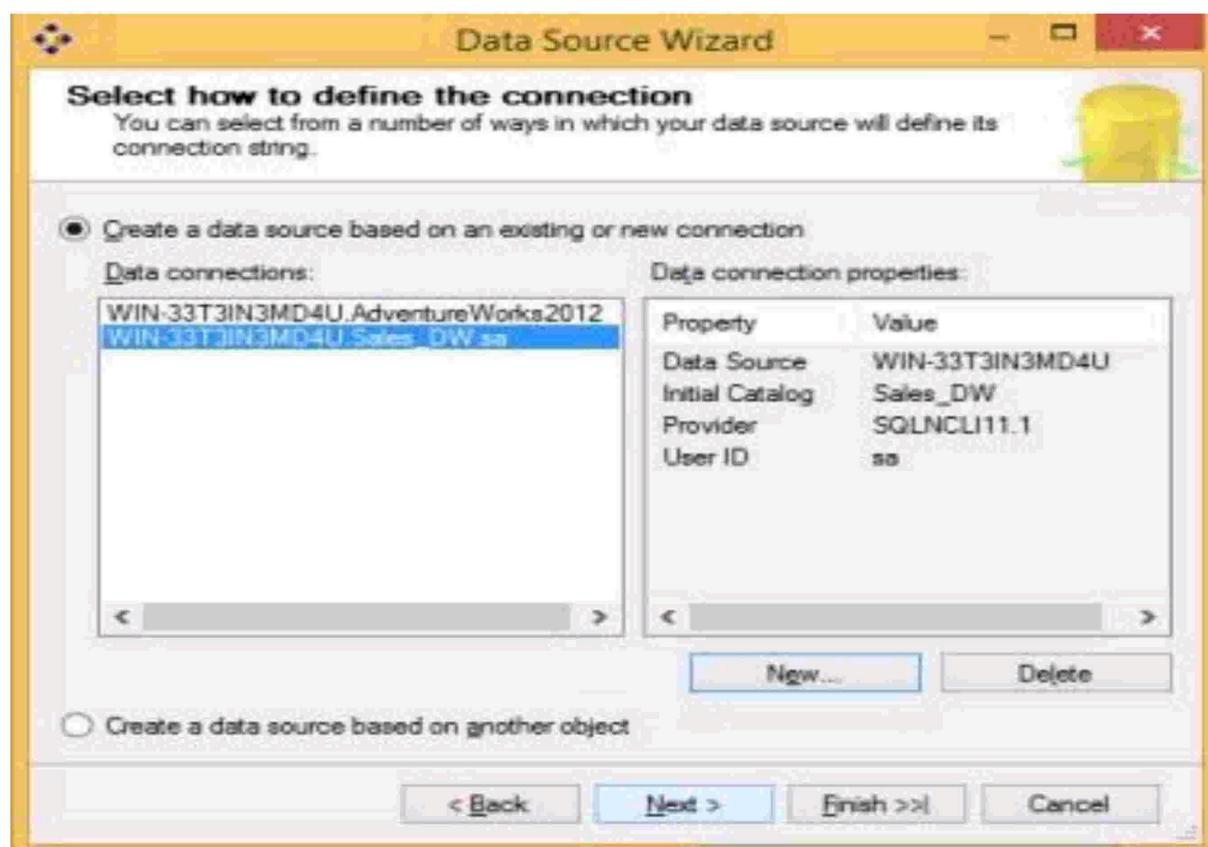


Select Server Name → select Use SQL Server Authentication → Select or enter database name (Sales_DW)

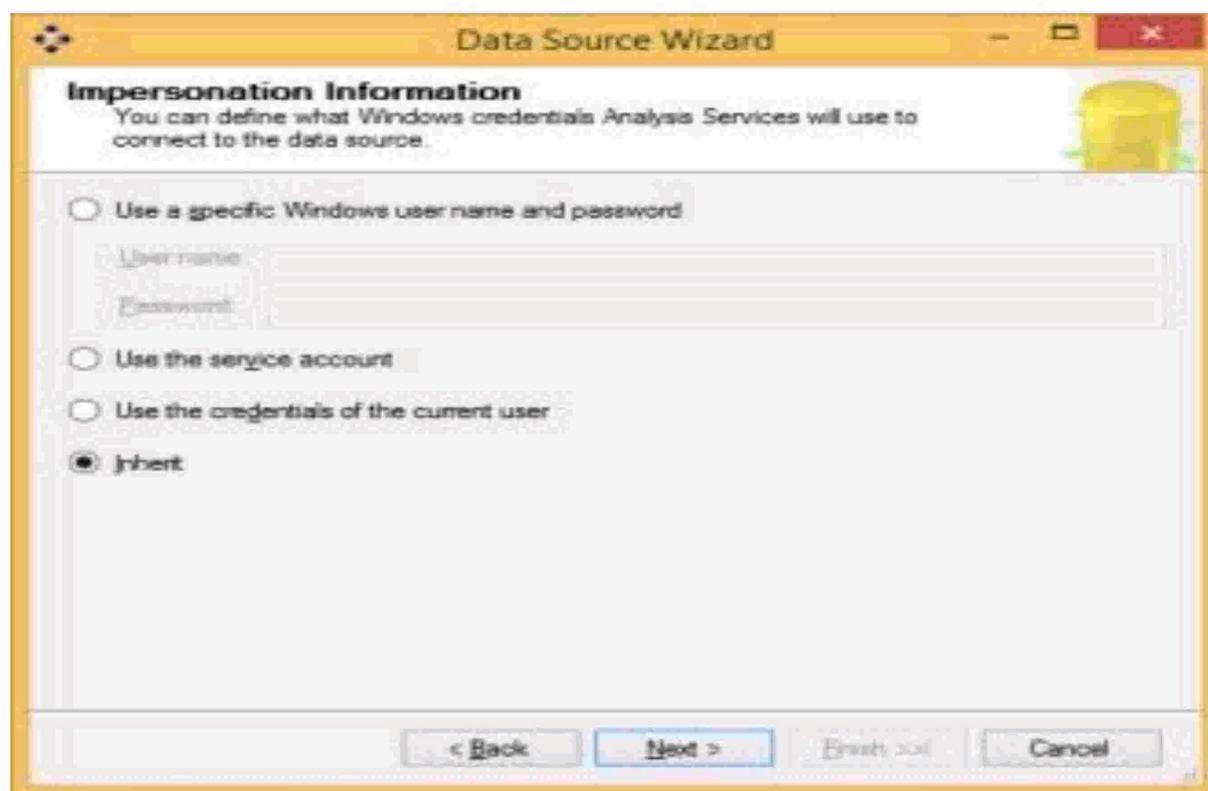
Note : Password for sa : admin123 (as given during installation of SQL 2012 fullversion)



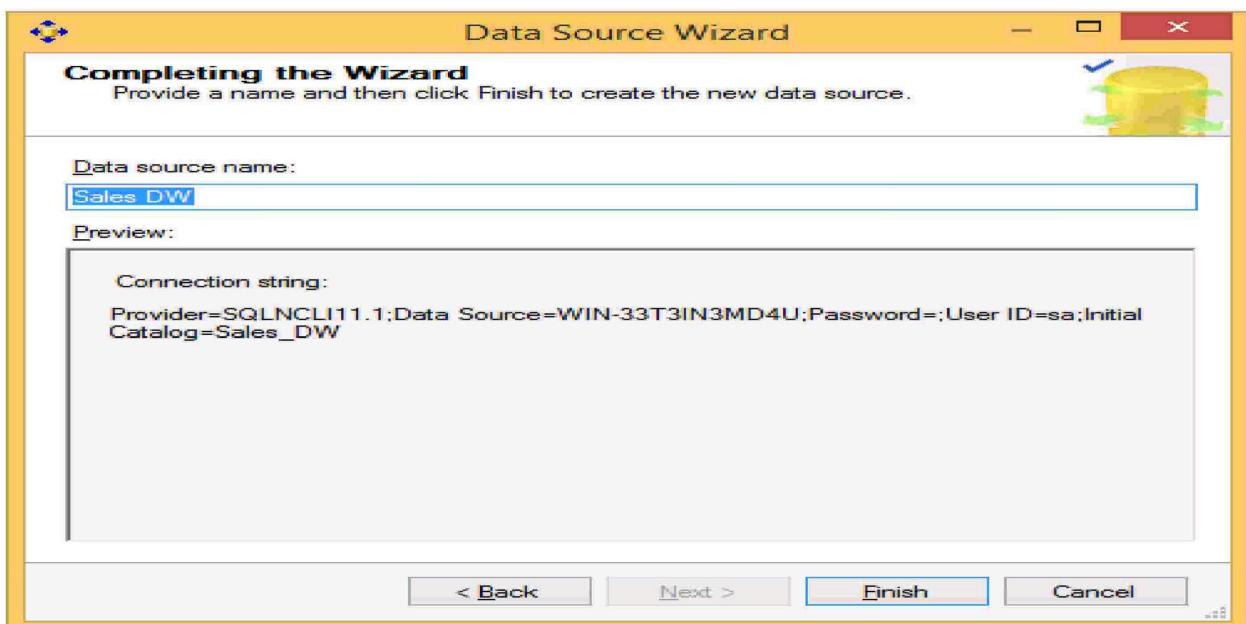
Click Next



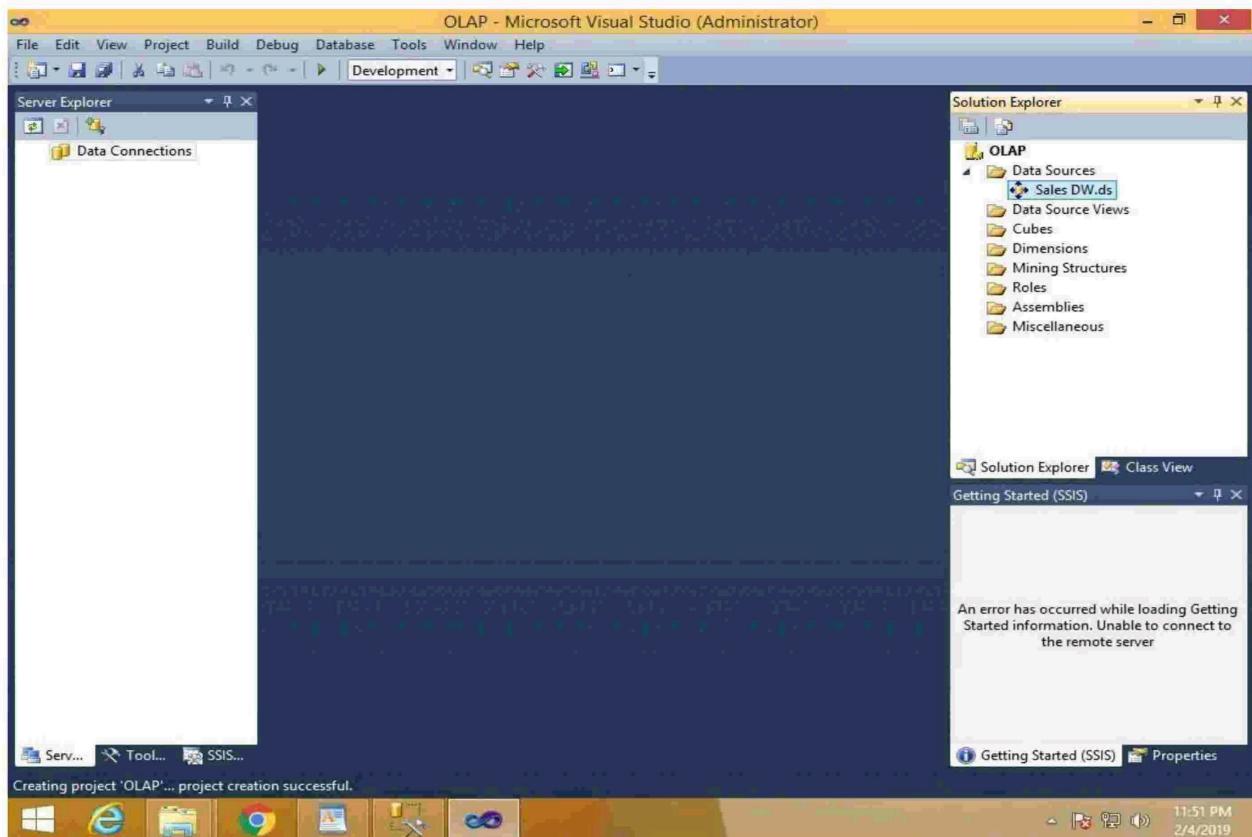
Select Inherit → Next



Click Finish

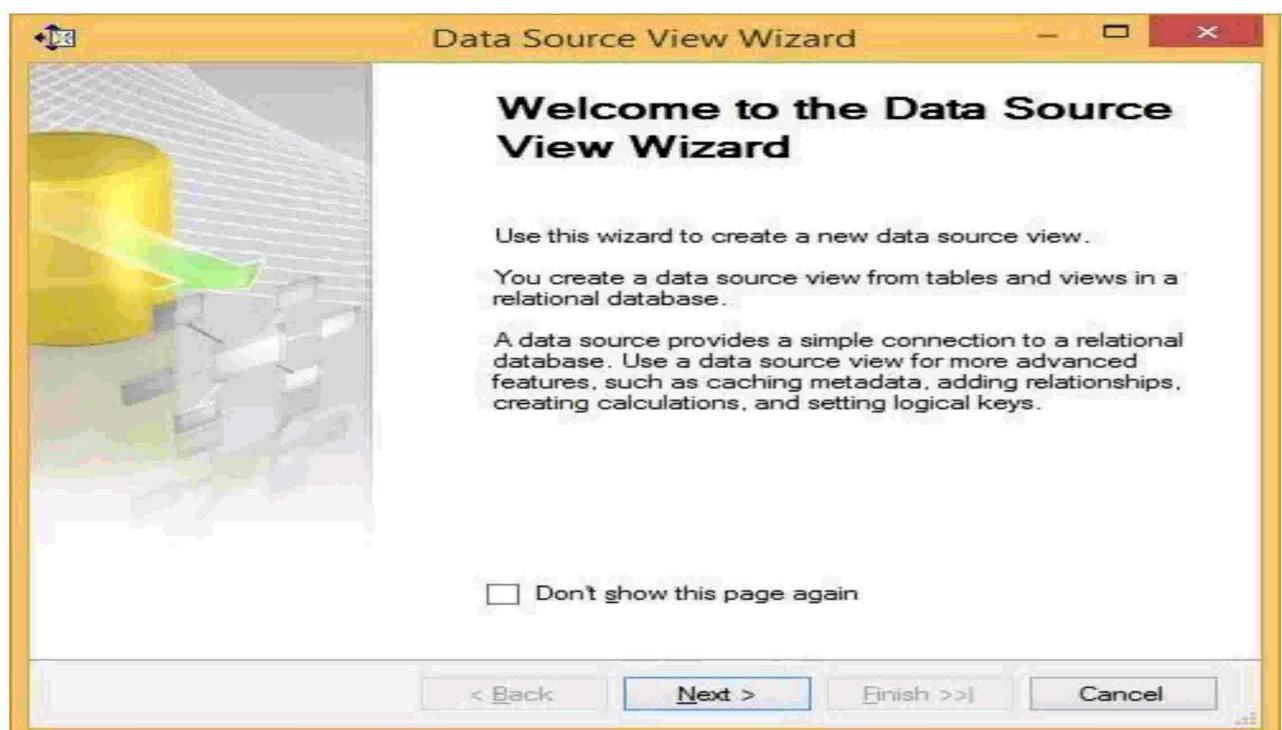
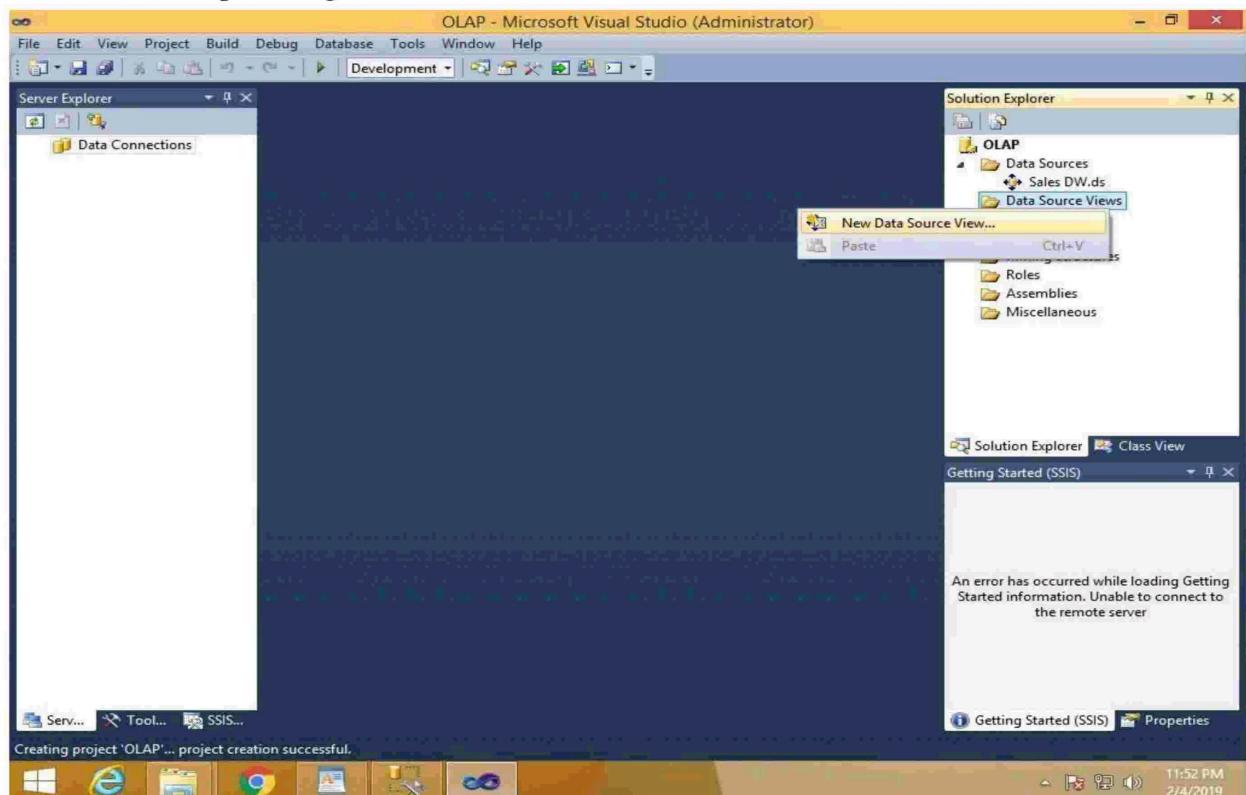


Sales_DW.ds gets created under Data Sources in Solution Explorer

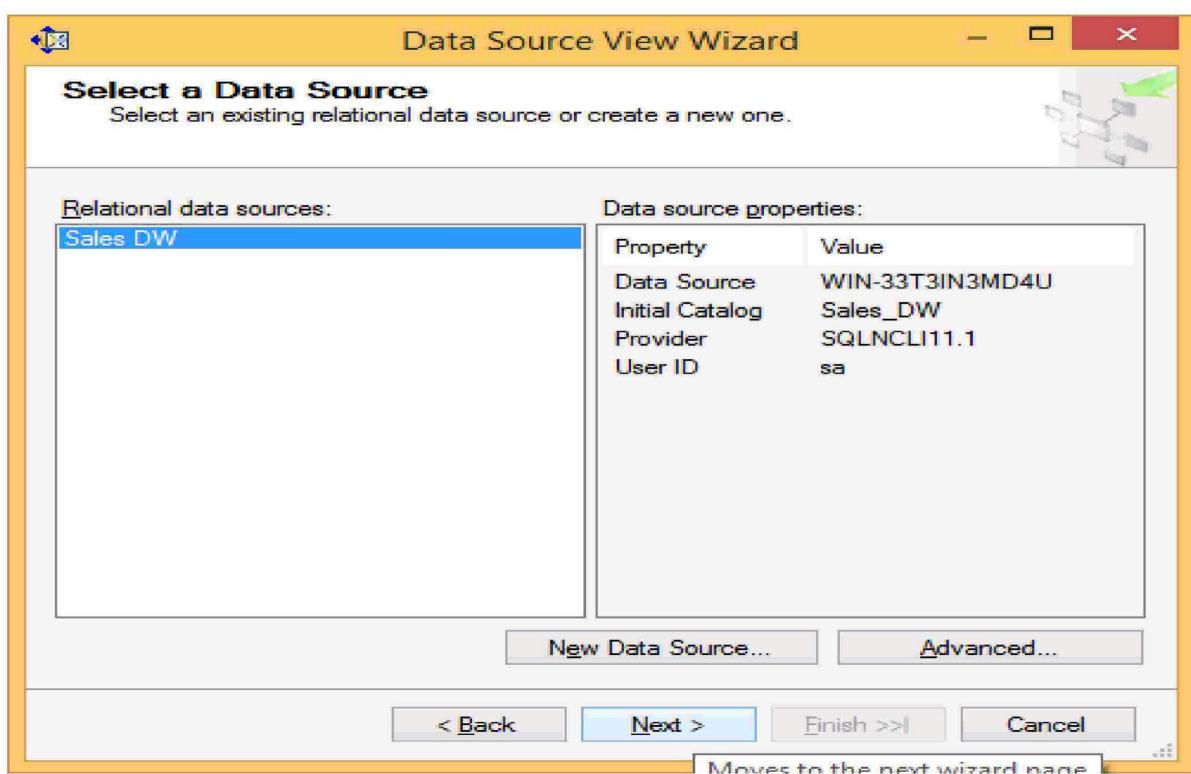


Step 3: Creating New Data Source View

In Solution explorer right click on Data Source View → Select New Data Source View

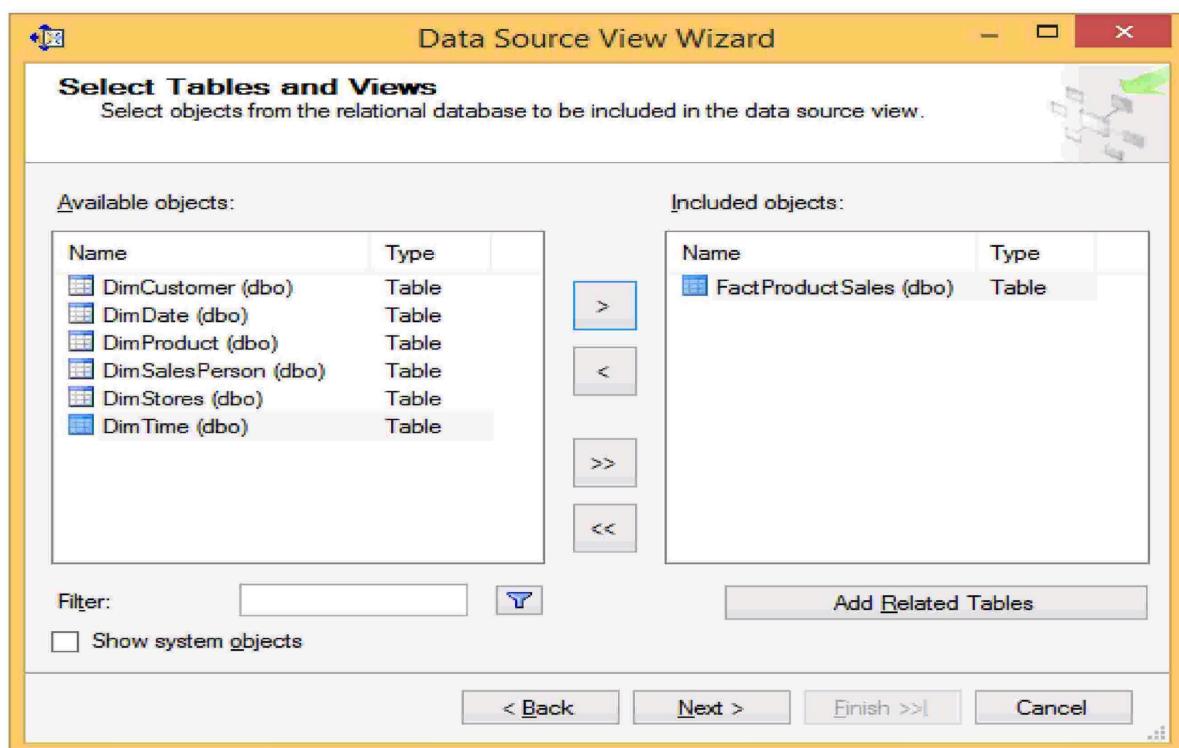


Click Next

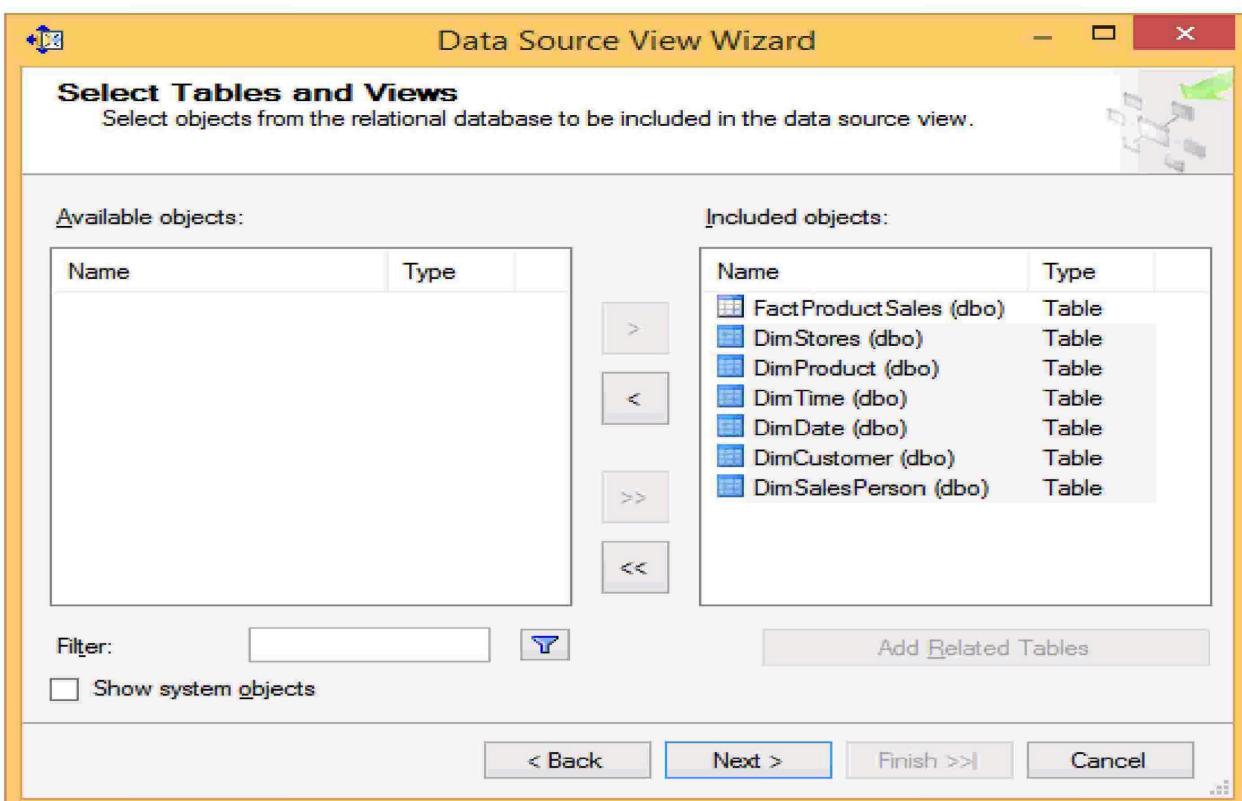
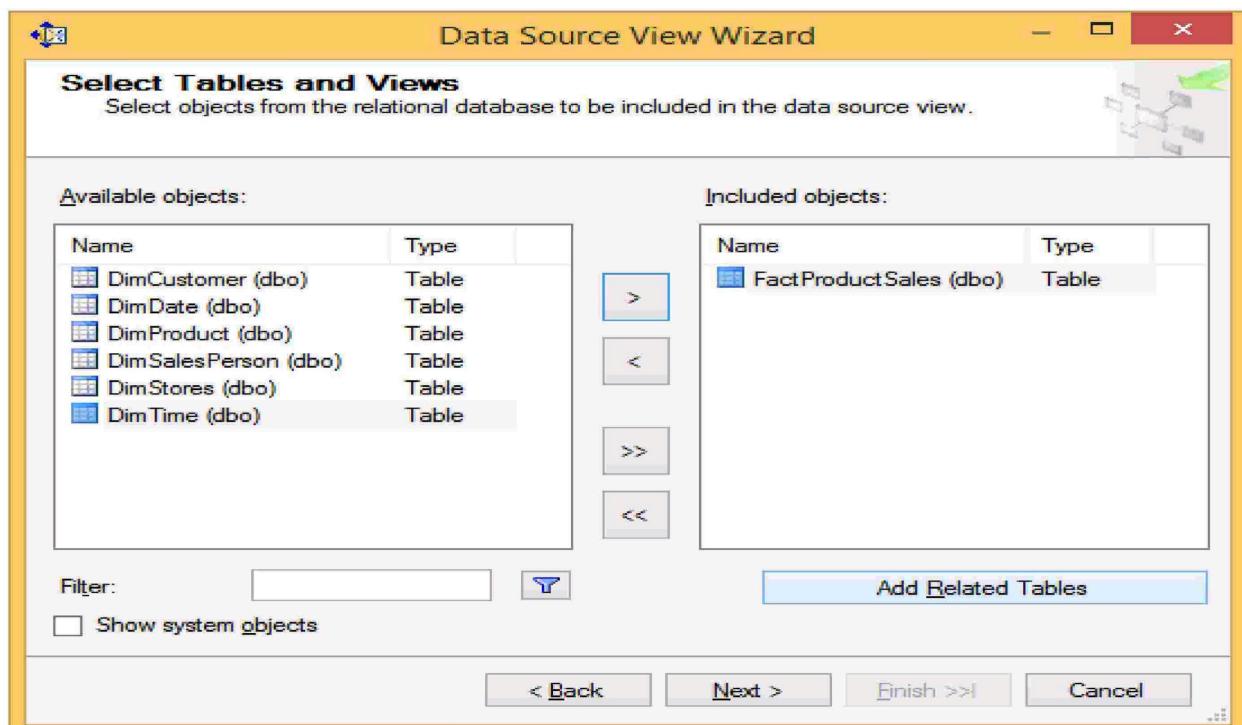


Click Next

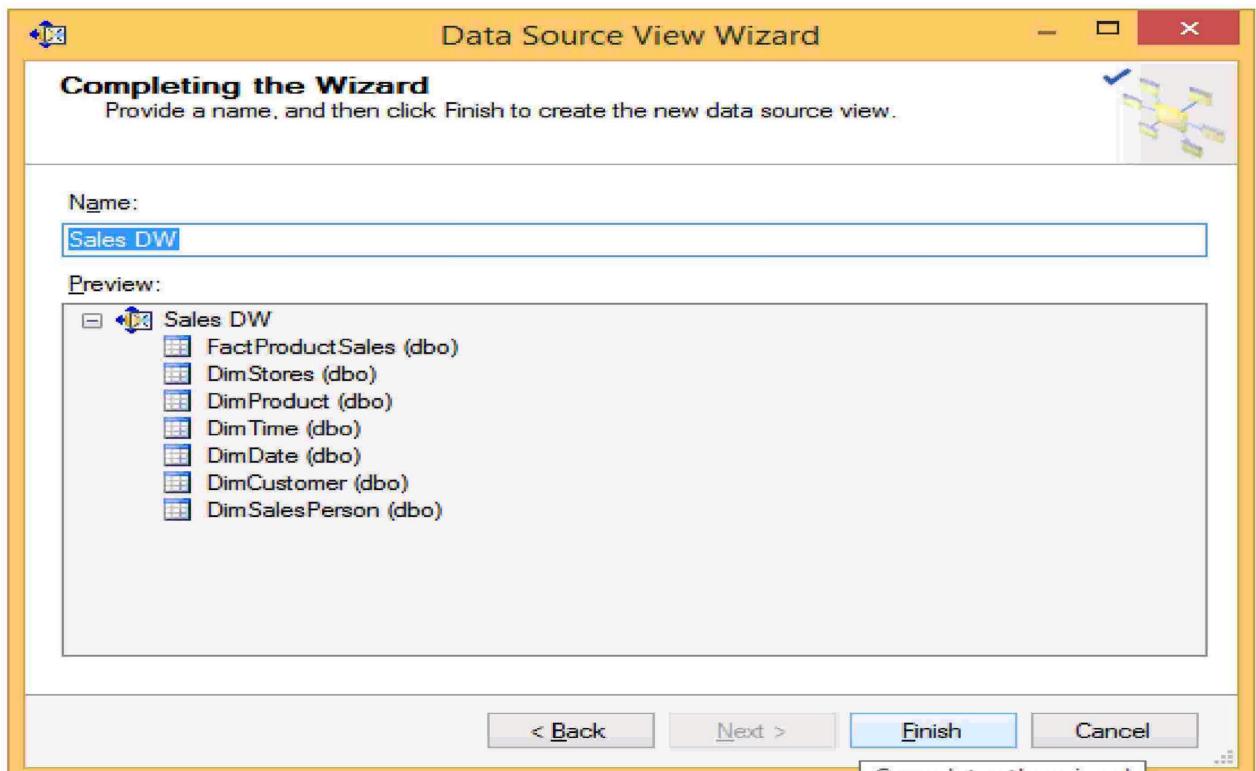
Select FactProductSales(dbo) from Available objects and put in Includes Objects by clicking on



Click on Add Related Tables

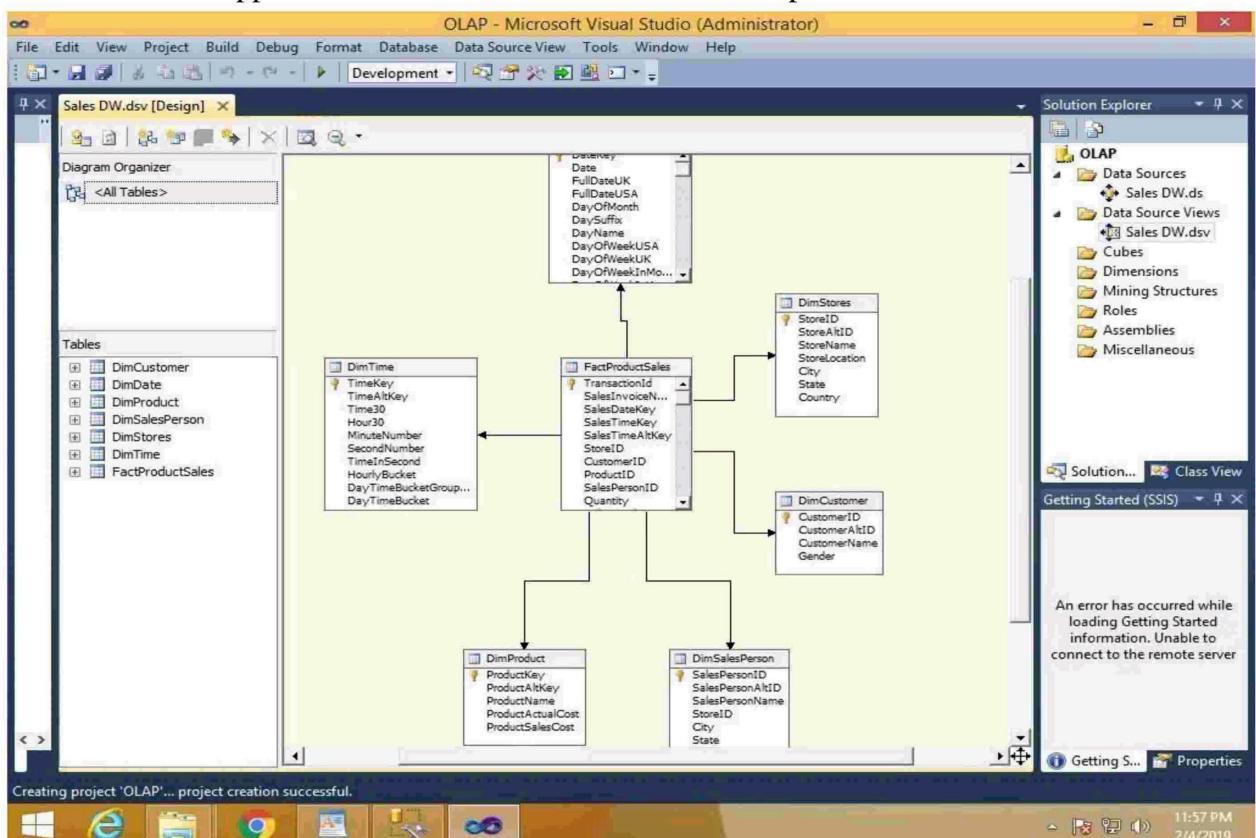


Click Next



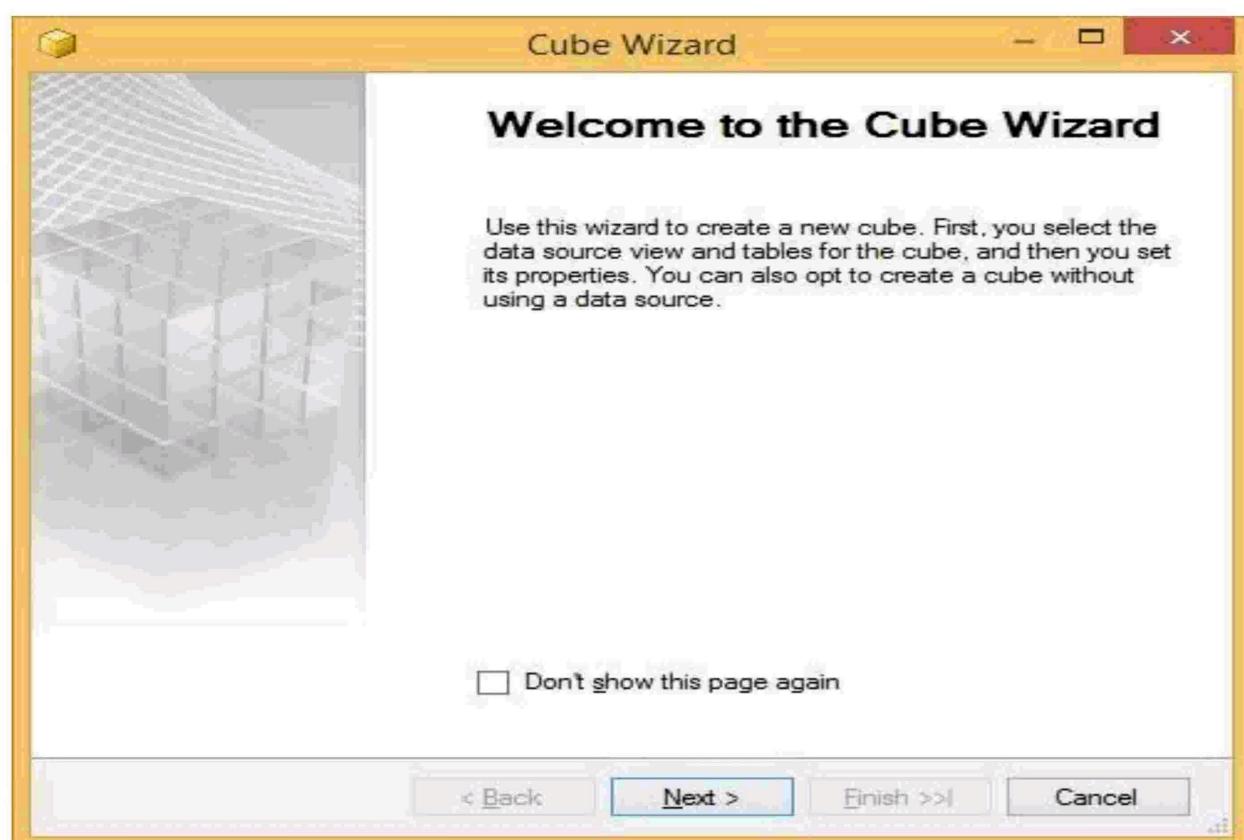
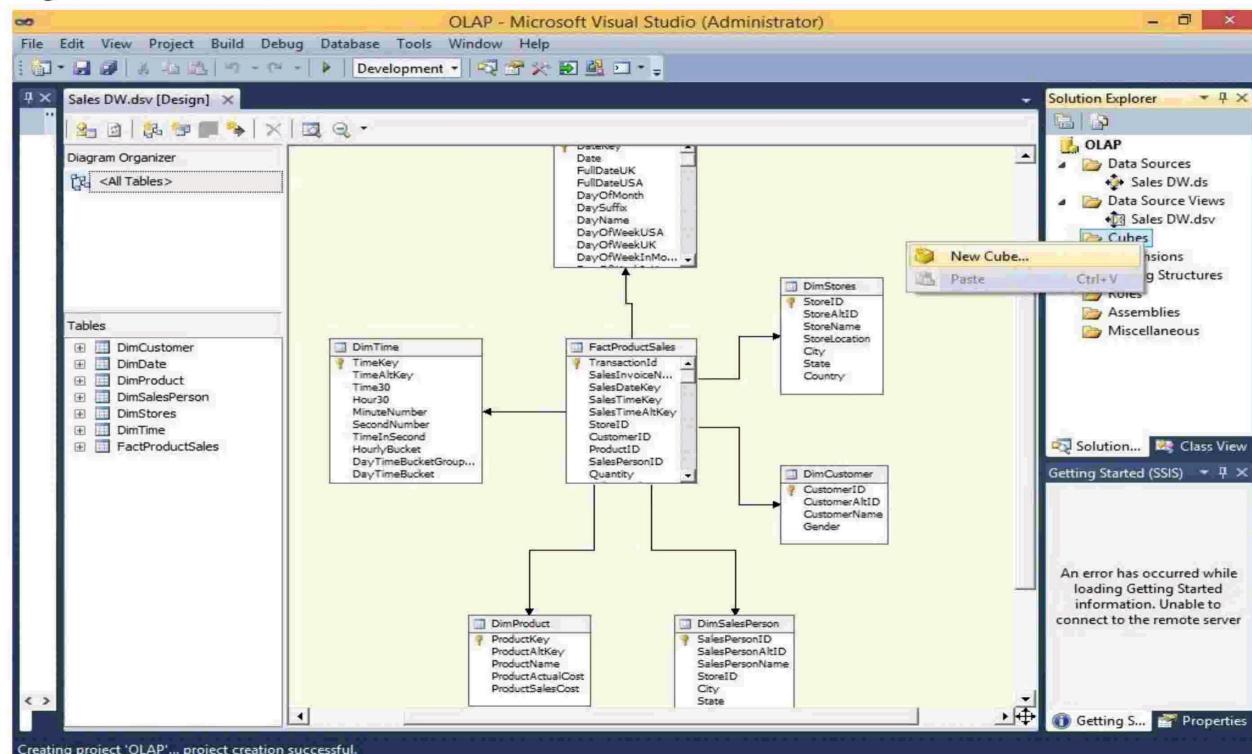
Click Finish

Sales DW.dsv appears in Data Source Views in Solution Explorer.

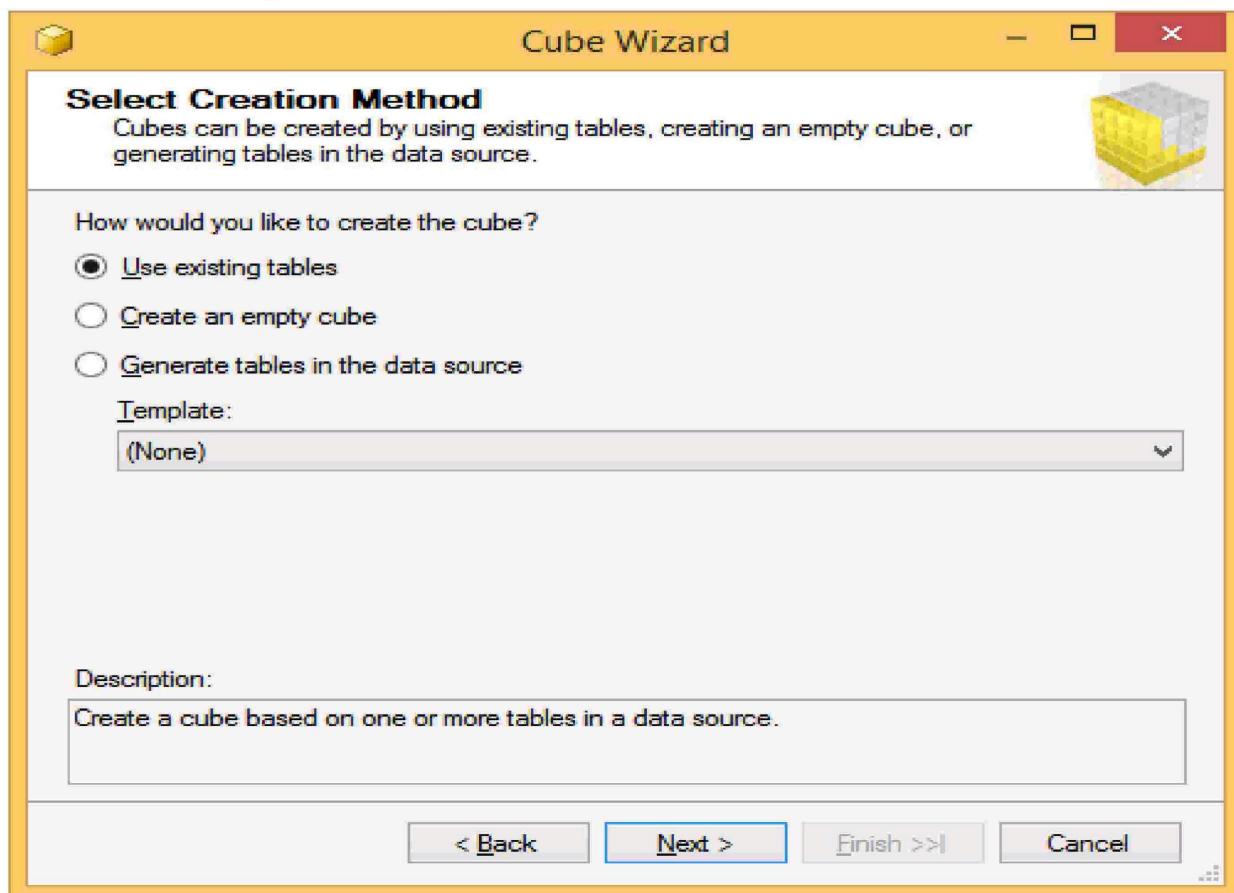


Step 4: Creating new cube

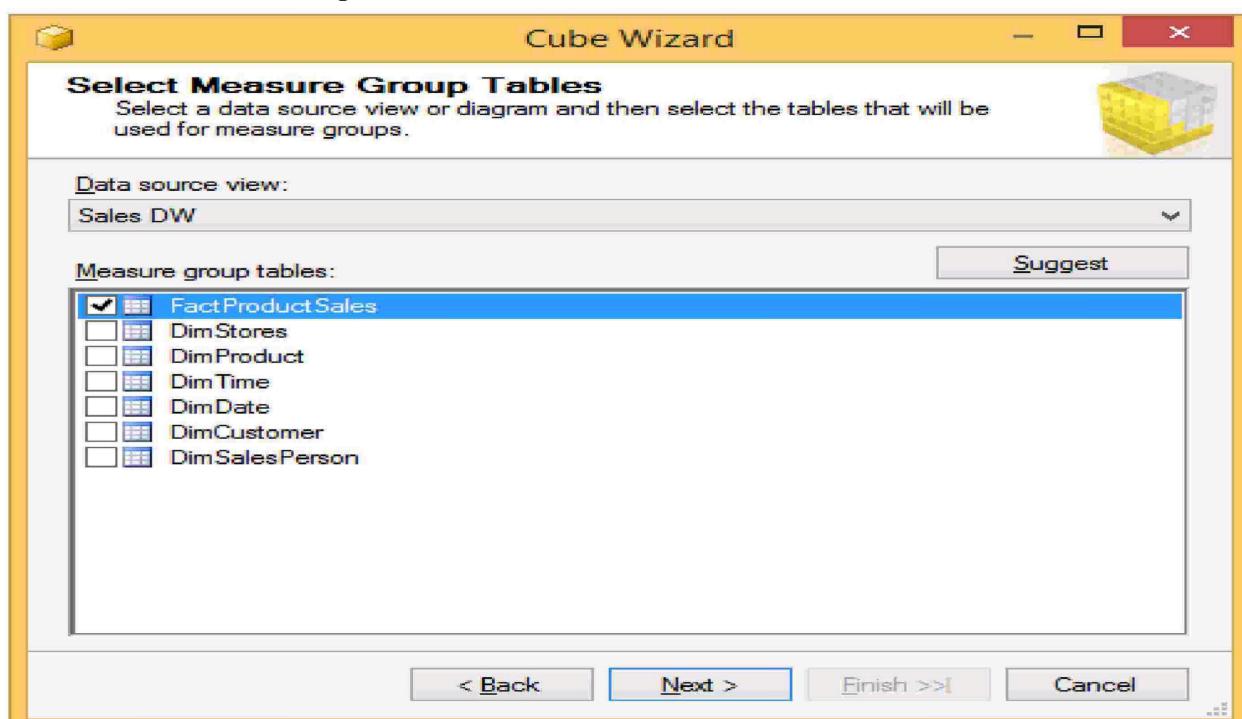
Right click on Cubes → New Cube



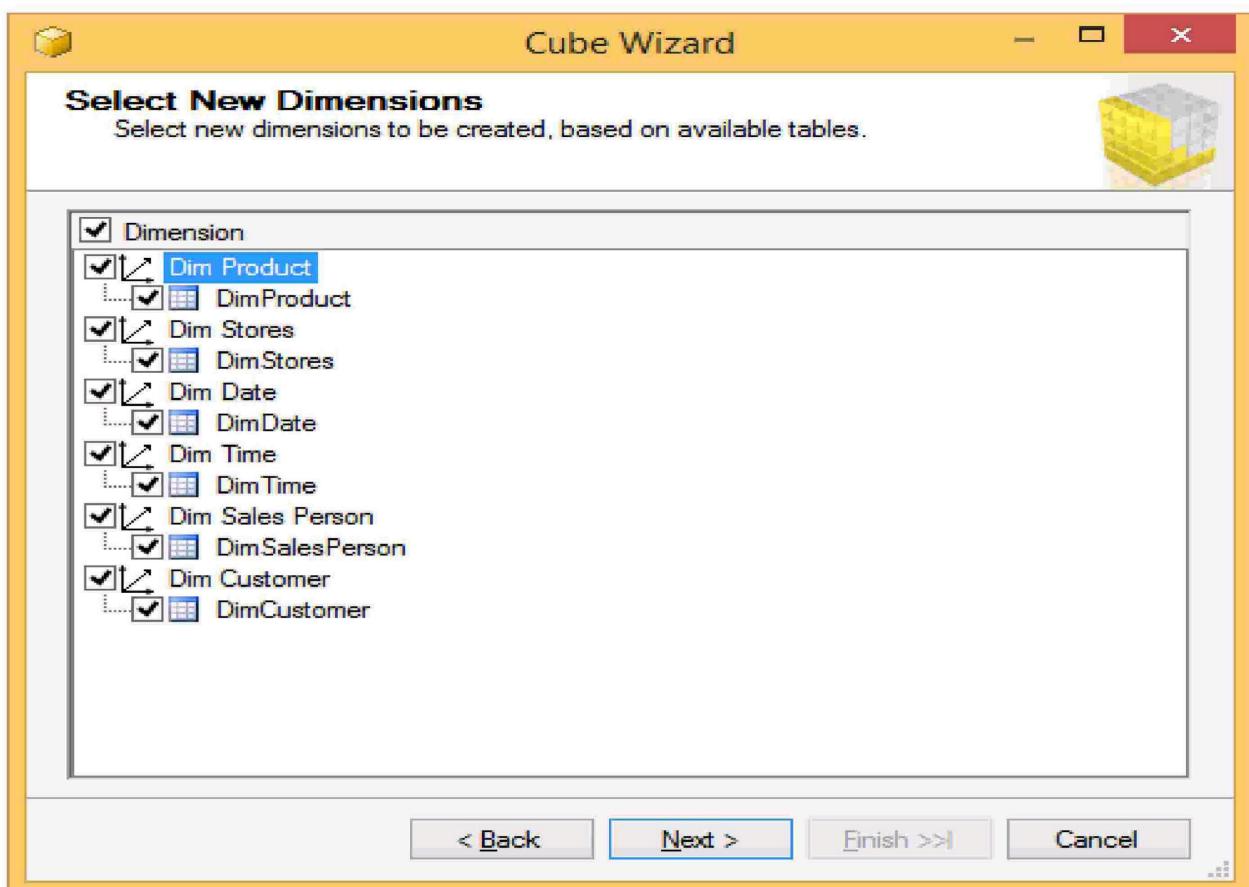
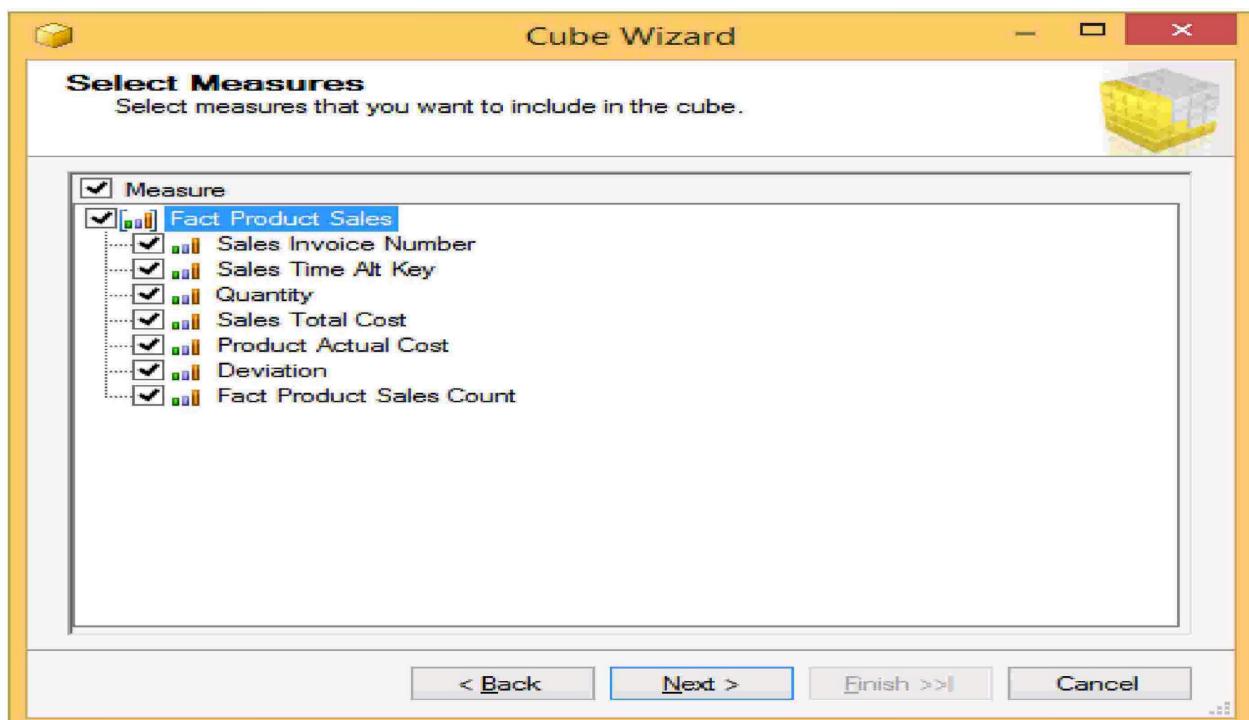
Select Use existing tables in Select Creation Method → Next



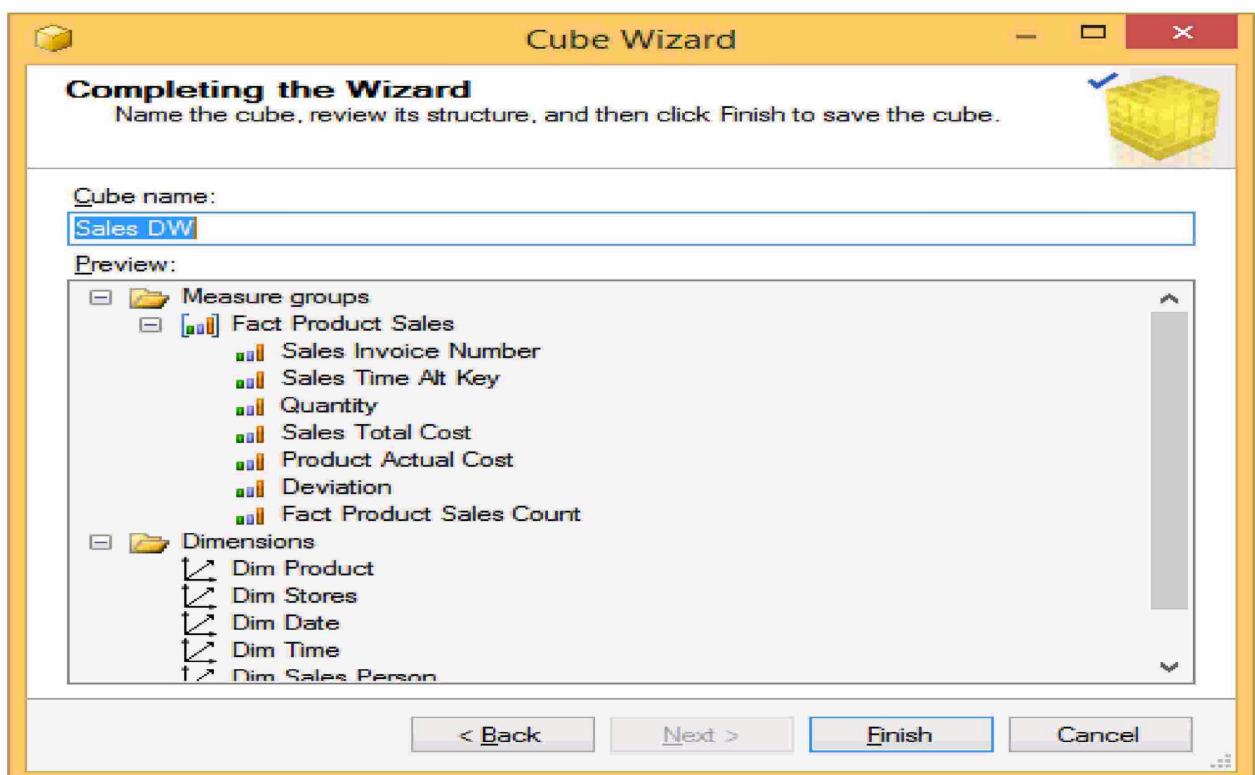
In Select Measure Group Tables → Select FactProductSales → Click Next



In Select Measures → check all measures → Next

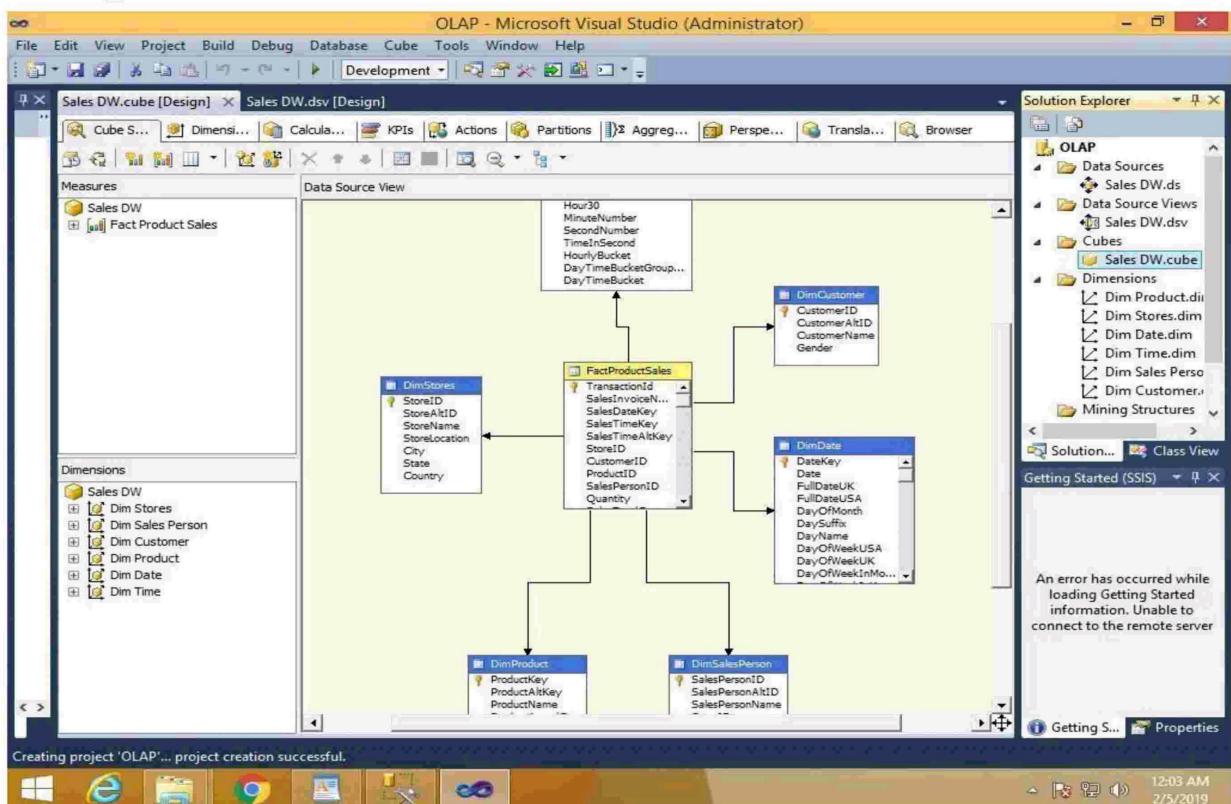


In Select New Dimensions → Check all Dimensions → Next



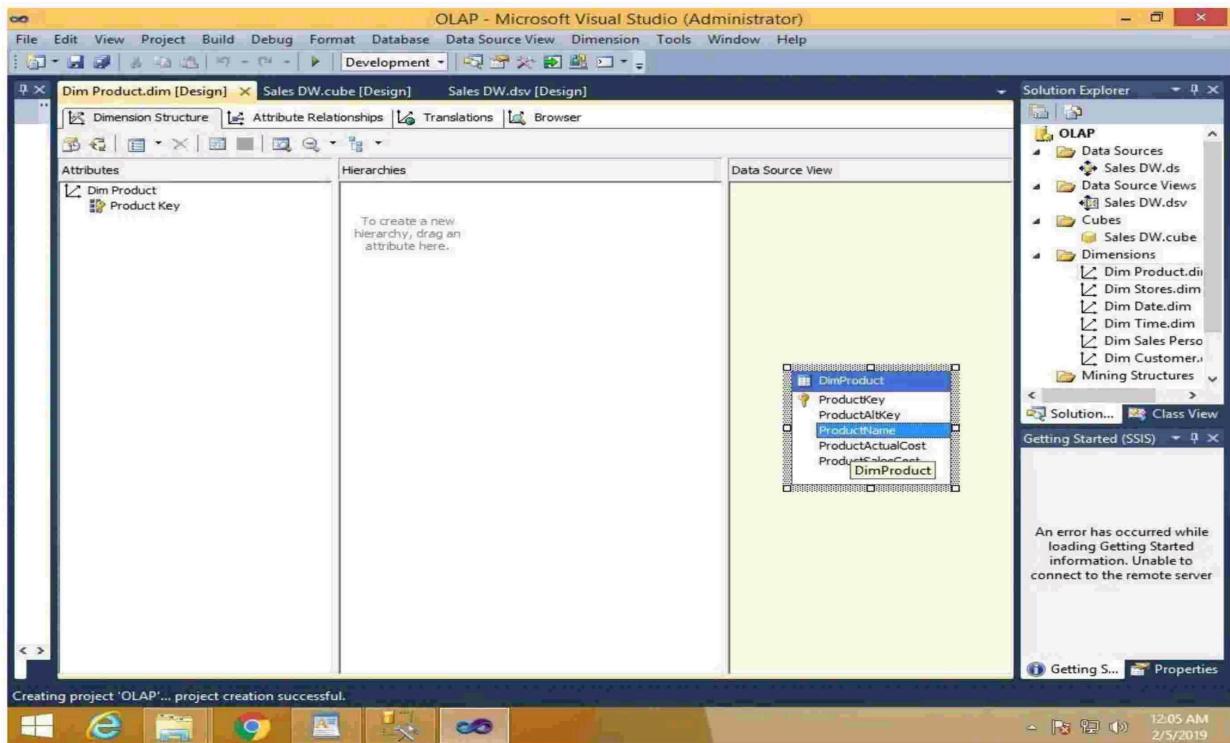
Click on Finish

Sales_DW.cube is created

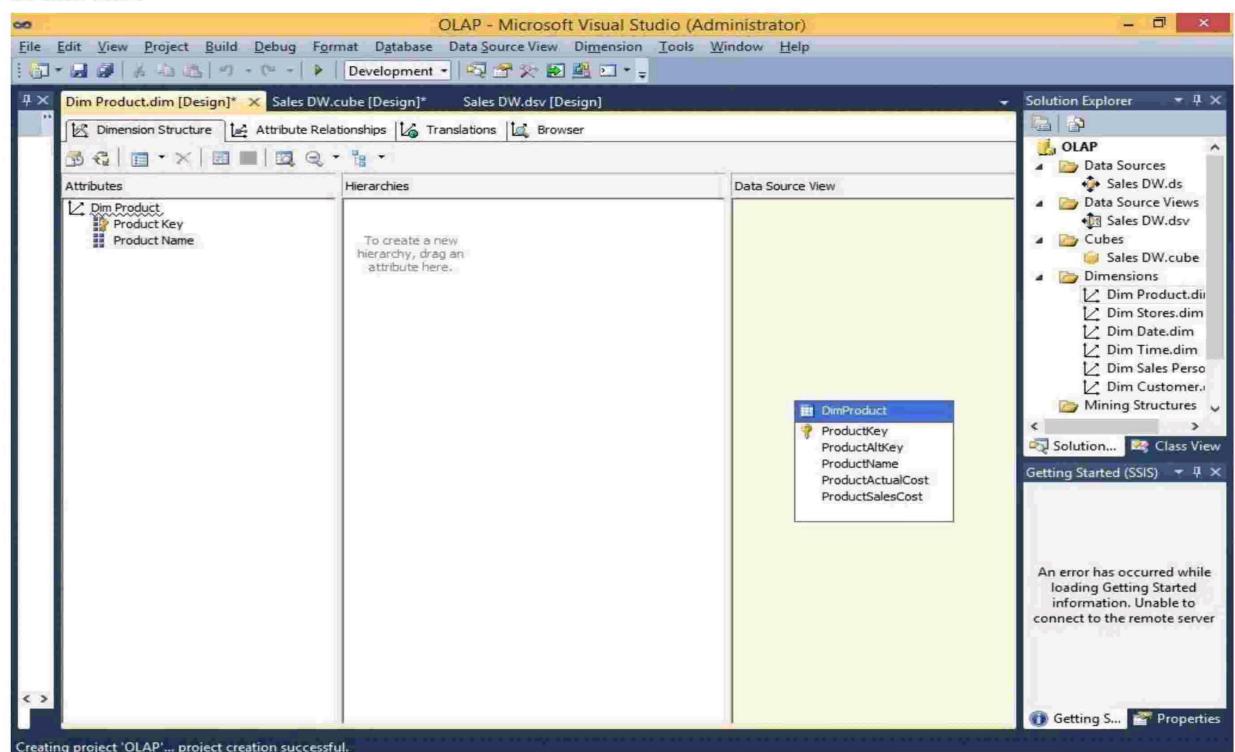


Step 5: Dimension Modification

In dimension tab → Double Click Dim Product.dim



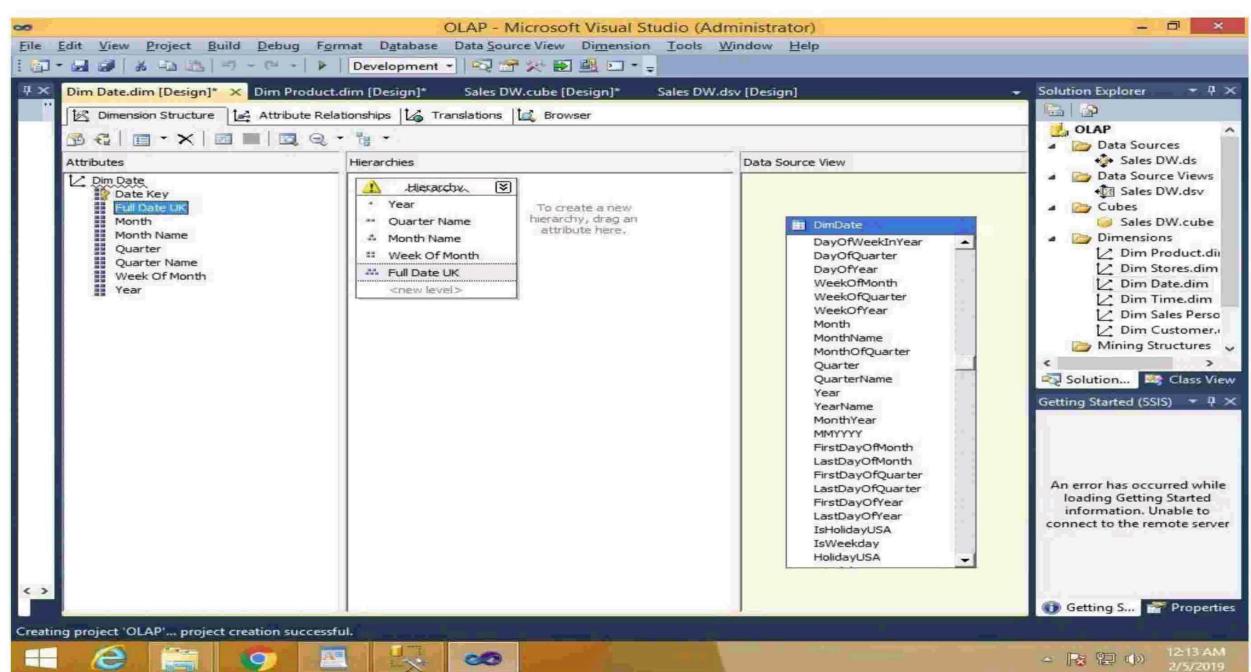
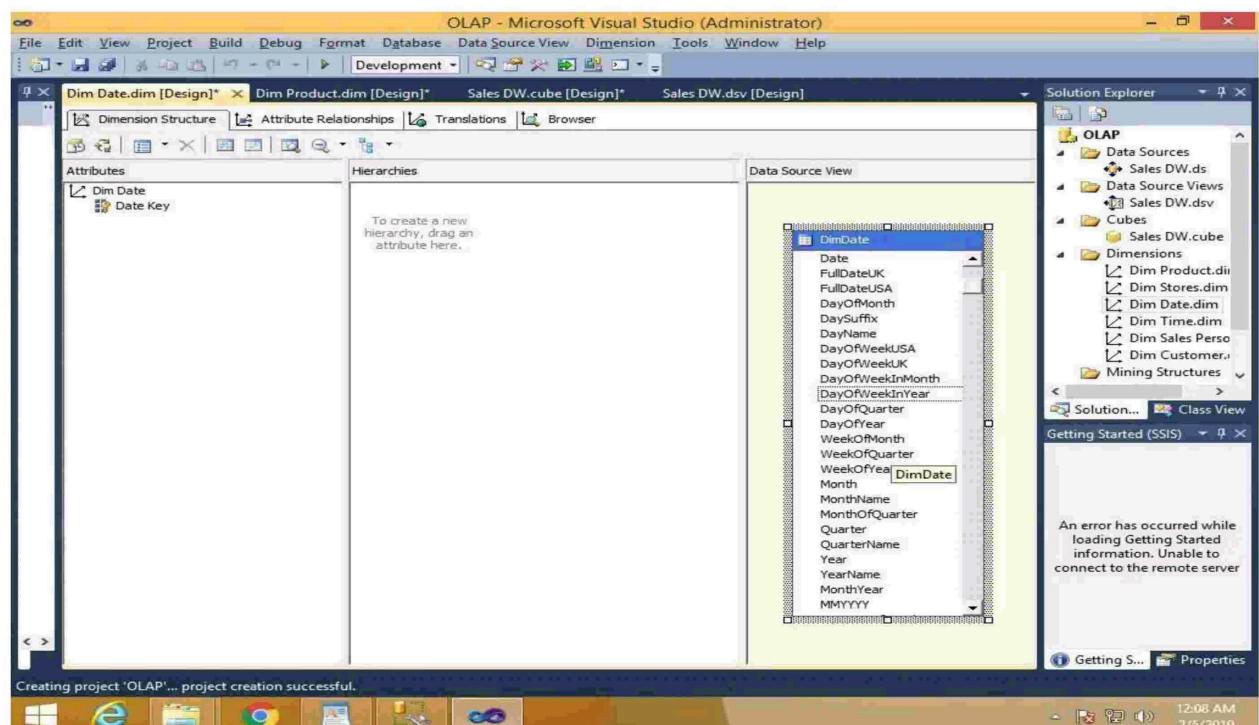
Drag and Drop Product Name from Table in Data Source View and Add in AttributePane at left side



Step 6: Creating Attribute Hierarchy in Date Dimension

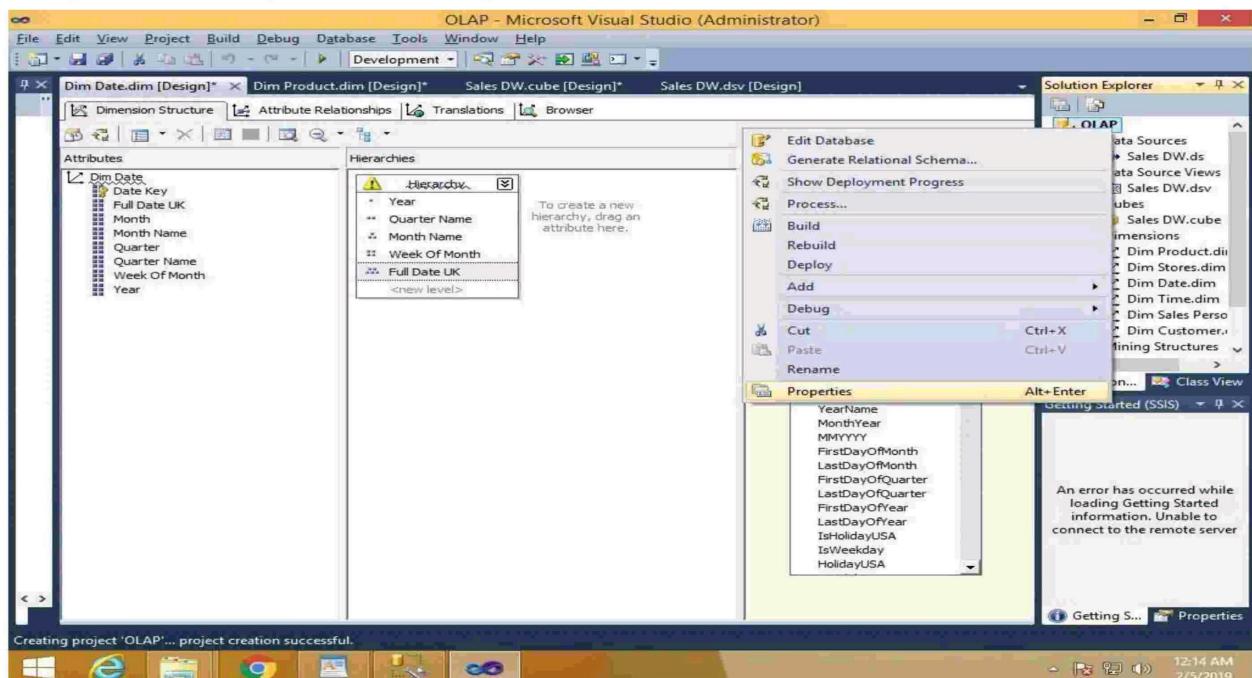
Double click On Dim Date dimension -> Drag and Drop Fields from Table shown in Data Source View to Attributes-> Drag and Drop attributes from leftmost pane of attributes to middle pane of Hierarchy.

Drag fields in sequence from Attributes to Hierarchy window (Year, Quarter Name, Month Name, Week of the Month, Full Date UK).

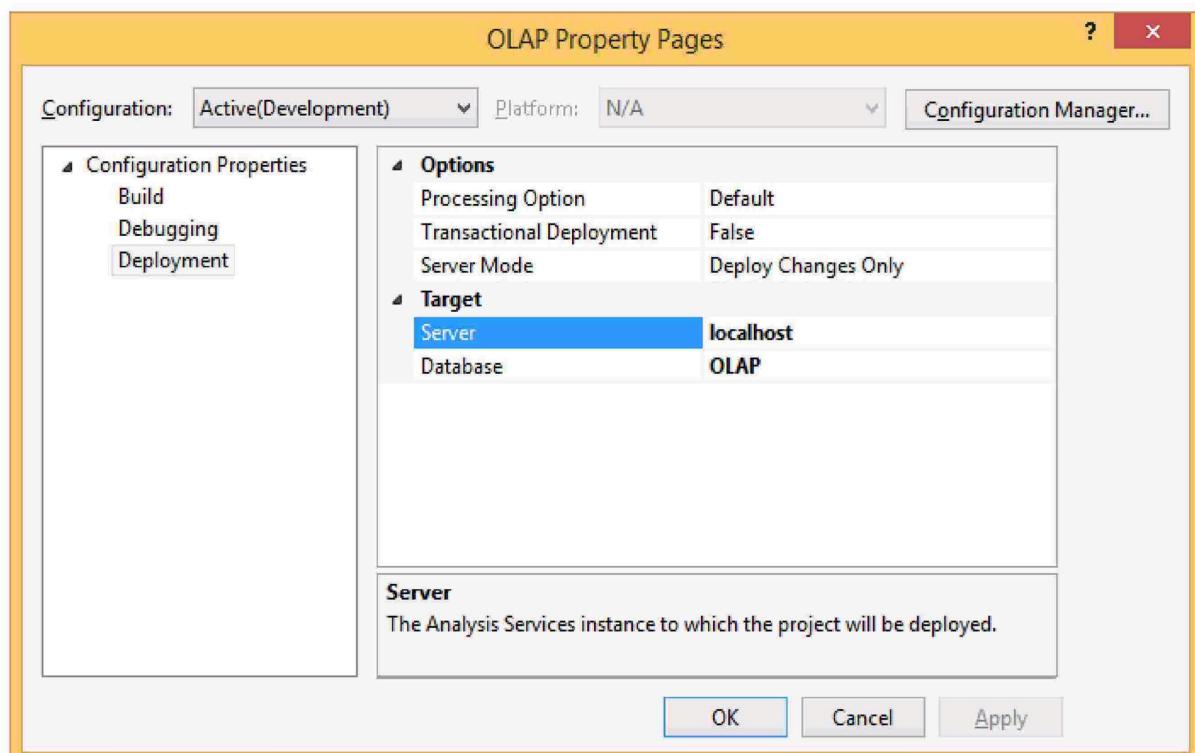


Step 7: Deploy Cube

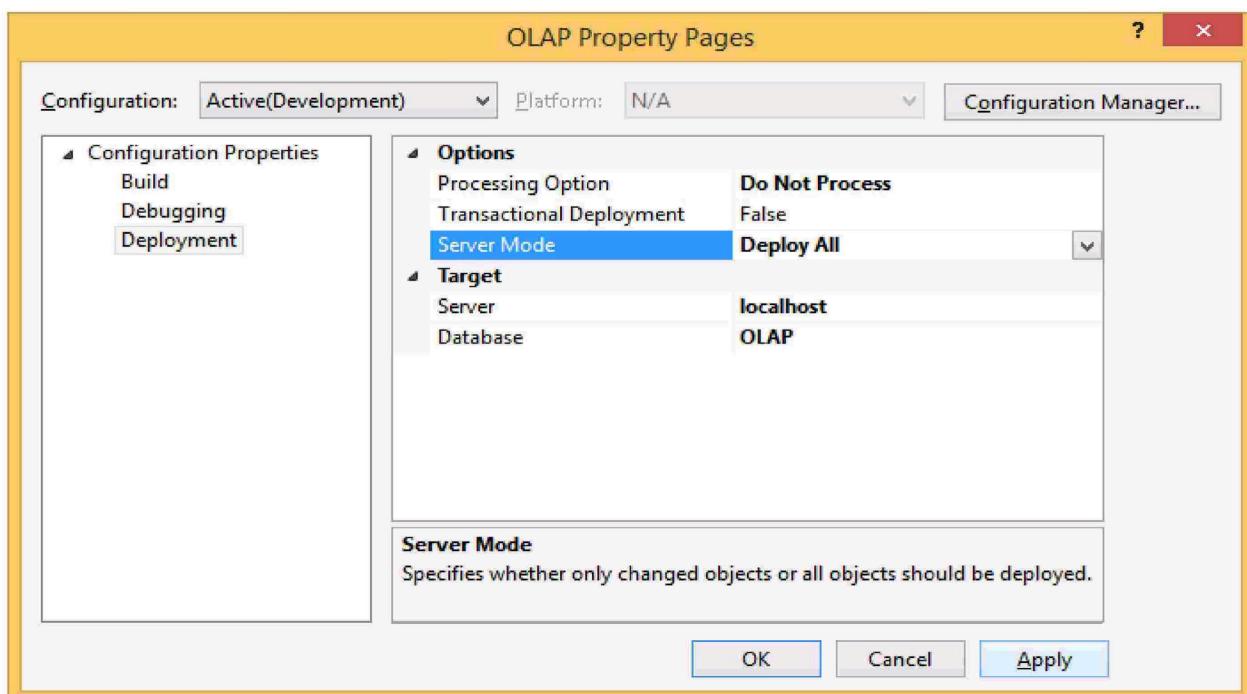
Right click on Project name → Properties



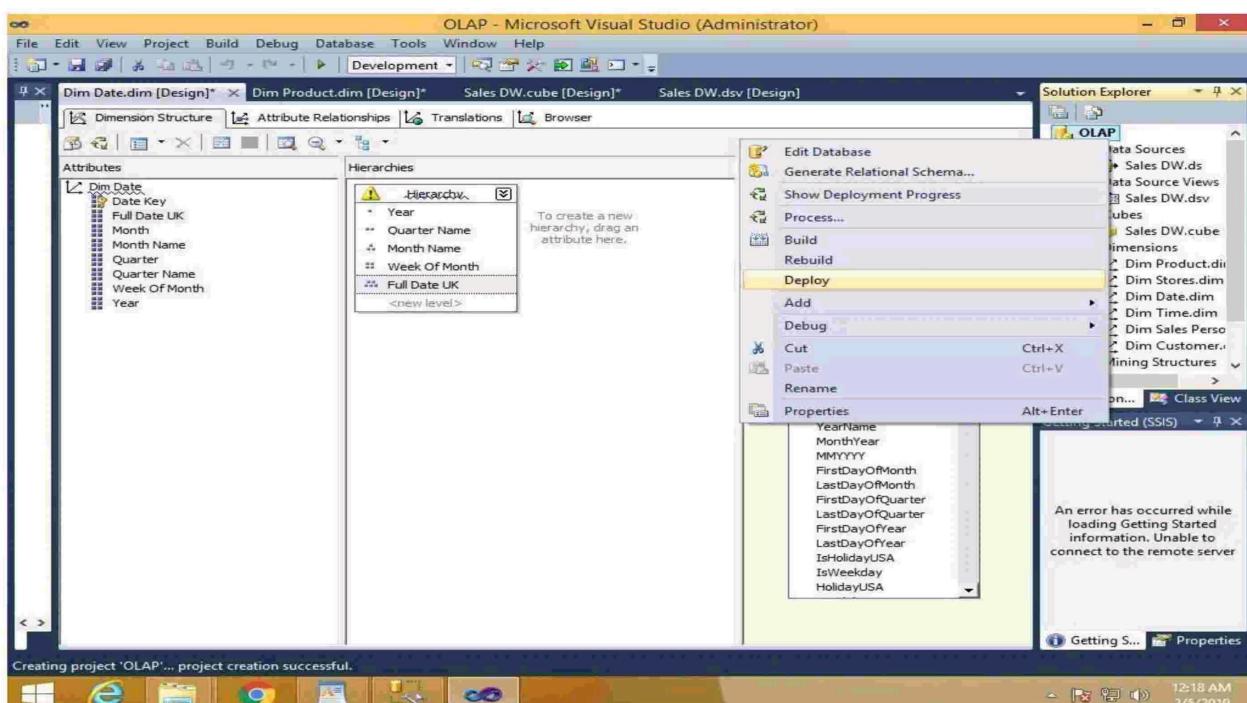
This window appears



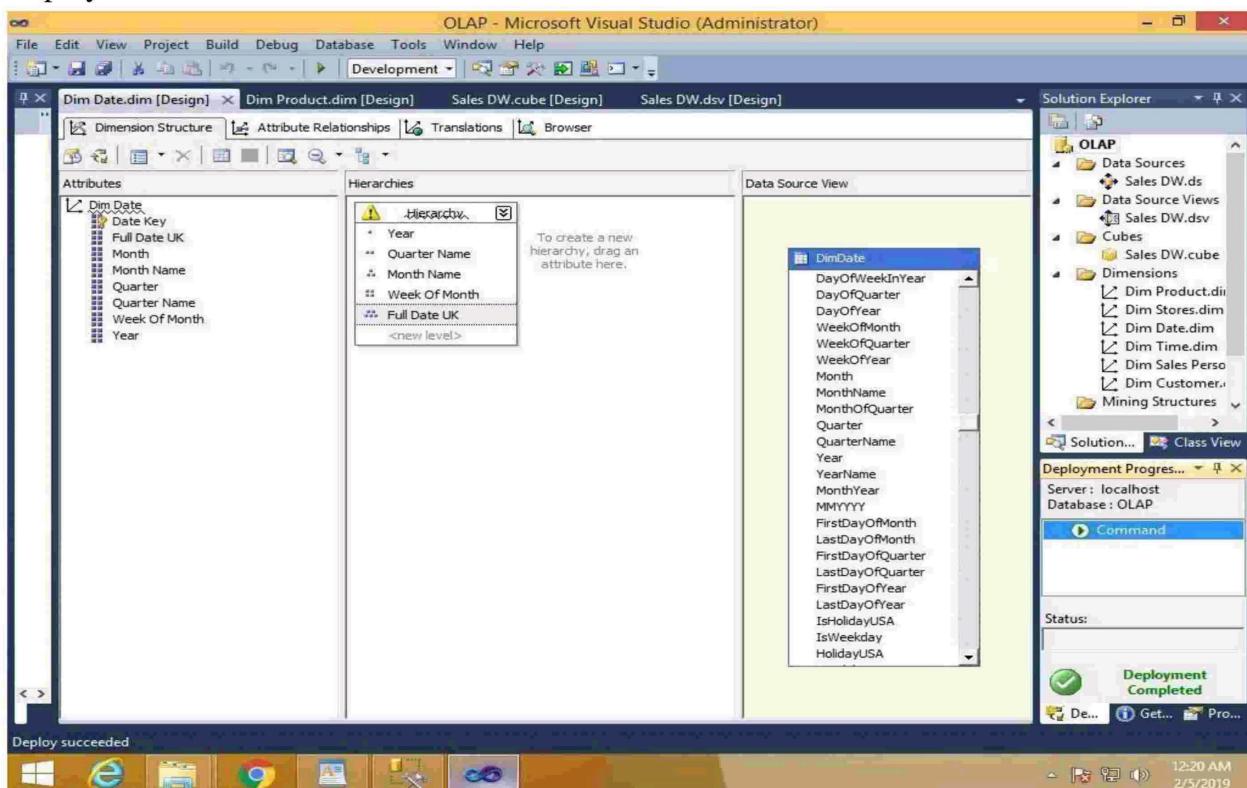
Do following changes and click on Apply & ok



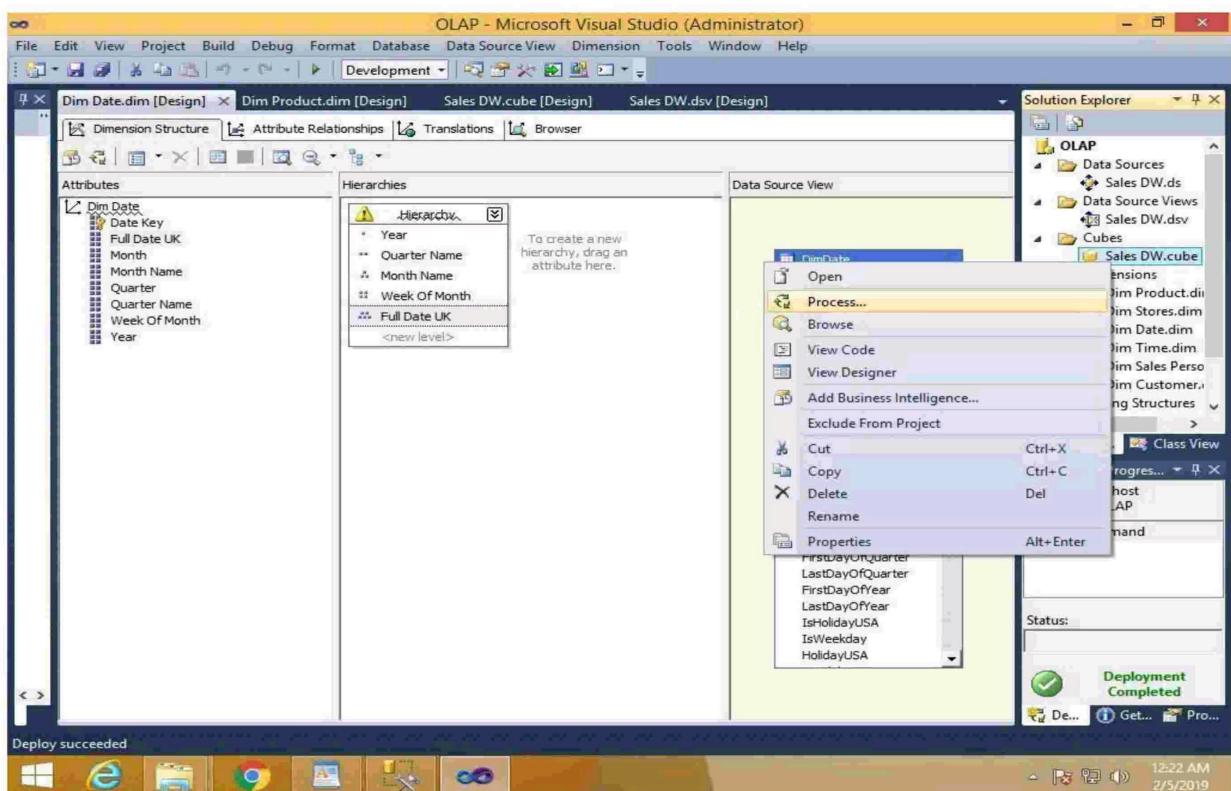
Right click on project name → Deploy



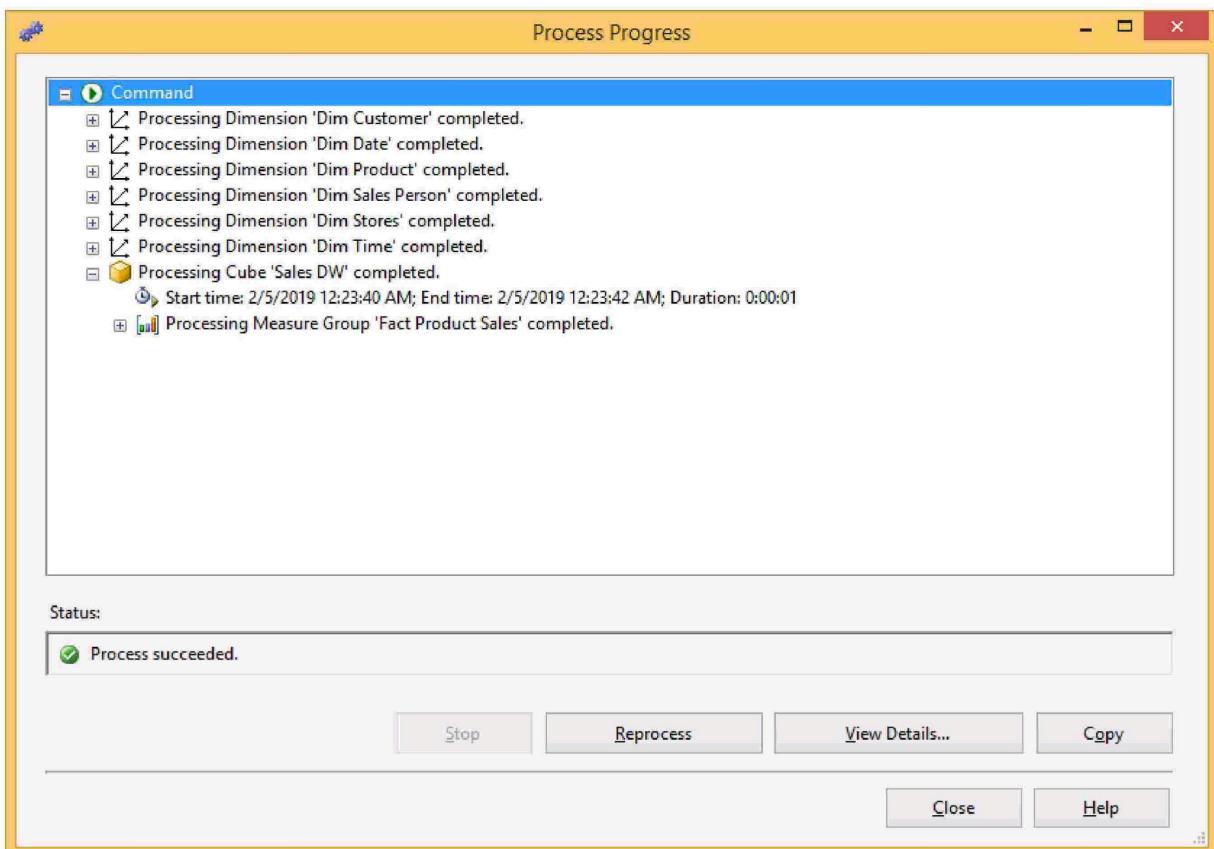
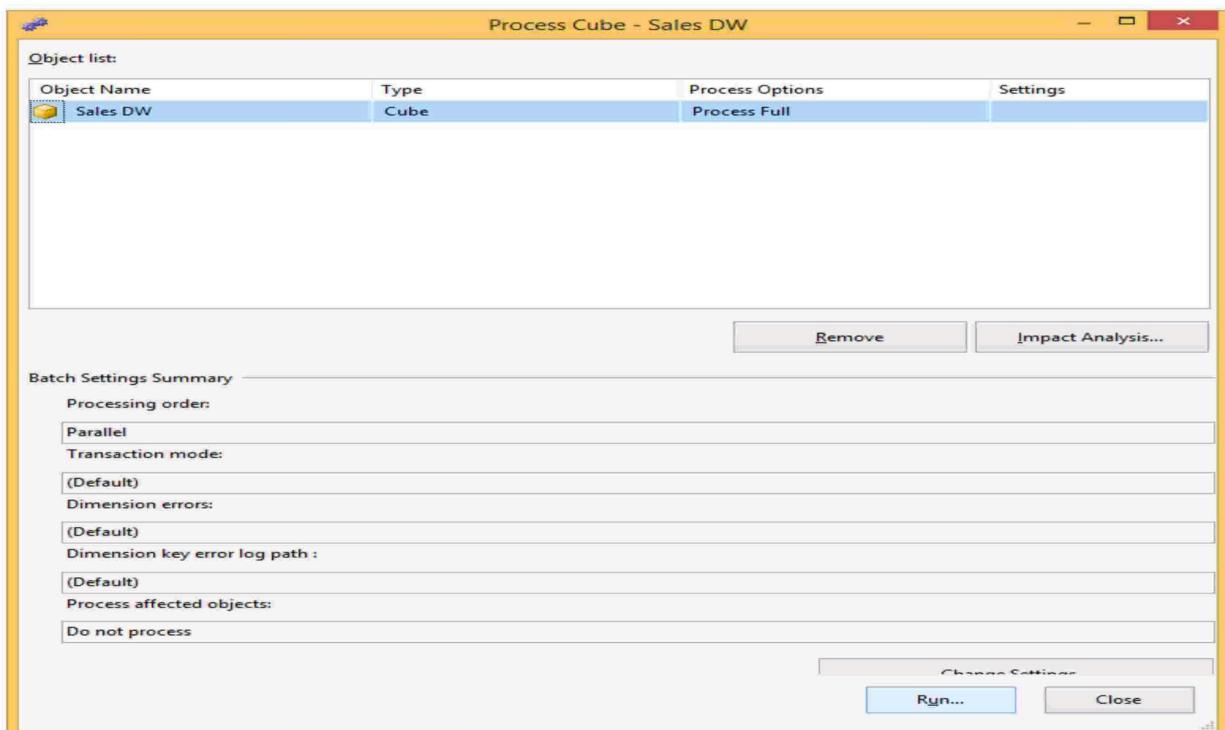
Deployment successful



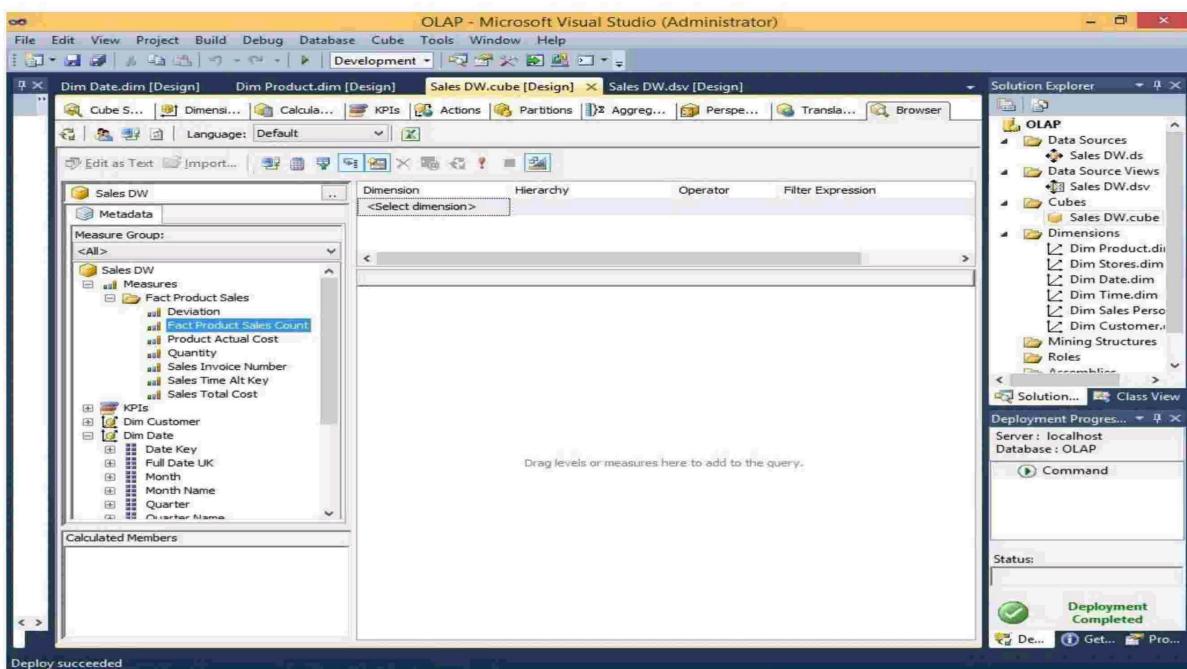
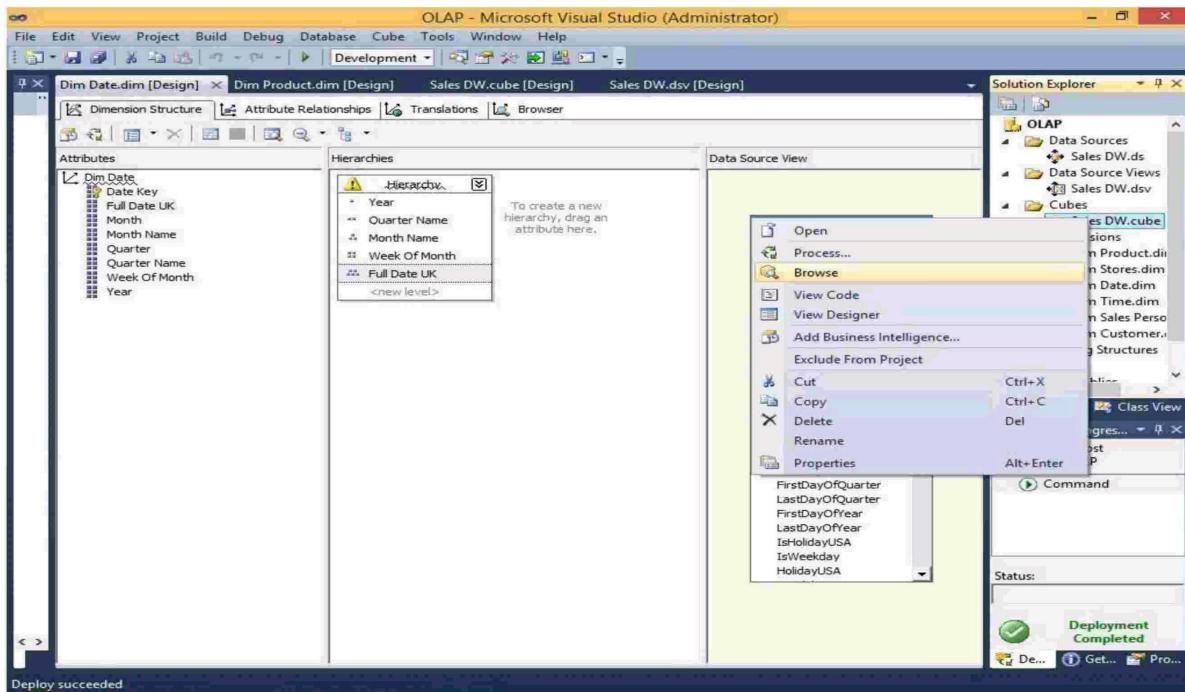
To process cube right click on Sales_DW.cube → Process



Click run



Browse the cube for analysis in solution explorer



Conclusion : In this way we successfully implement cube with suitable dimension and fact tables based on ROLAP, MOLAP and HOLAP model.

Assignment Questions :

4.1 Define Fact Table ?

4.2 What is OLAP ?