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Create First OLAP Cube in SQL Server Analysis Services



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Learn creation of OLAP Cube in SSAS (SQL Server Analysis Services) using Microsoft BIDS (Business Intelligence Development Studio) Environment and Data Warehouse

[Download SalesDataAnalysis.zip - 53.7 KB](#)

[Download Data_WareHouse_SQLScript.zip - 8.1 KB](#)

Introduction

This article is created to help those technical newbies who want to learn creation of OLAP Cube in SSAS (SQL Server Analysis Services) using Microsoft BIDS (Business Intelligence Development Studio) Environment and Data Warehouse. We will first take a glimpse at the basic introduction to requirement of OLAP Cube, and then create OLAP Cube in SQL Server Analysis Service by following 10 easy steps.

Before preparing OLAP Cube, we need to create and populate our data warehouse. If you are totally new to Data Warehouse concepts, please take a quick look at my previous article "[Create First Data Warehouse](#)" which can give you a brief idea on data warehouse concepts which are used in this article.

Brief Introduction to OLAP Cube

What is OLAP Cube & Why do we need it?

- An OLAP cube is a technology that stores data in an optimized way to provide a quick response to various types of complex queries by using dimensions and measures.

Most cubes store pre-aggregates of the measures with its special storage structure to provide quick response to queries.

- SSRS Reports and Excel Power Pivot is used as front end for Reporting and data analysis with SSAS (SQL Server Analysis Services) OLAP Cube.
- SSAS (SQL Server Analysis Services) is Microsoft BI Tool for creating Online Analytical Processing and data mining functionality.
- BIDS (Business Intelligence Development Studio) provides environment for developing your OLAP Cube and Deploy on SQL Server.
- BIDS (Business Intelligence Development Studio) comes with Microsoft SQL Server 2005, 2008 (e.g. Developer, Enterprise Edition) .
- We have to choose OLAP Cube when performance is a key factor, the key decision makers of the company can ask for statistics from the data anytime from your huge database.
- We can perform various types of analysis on data stored in Cube, it is also possible to create data mining structure on this data which can be helpful in forecasting, prediction.

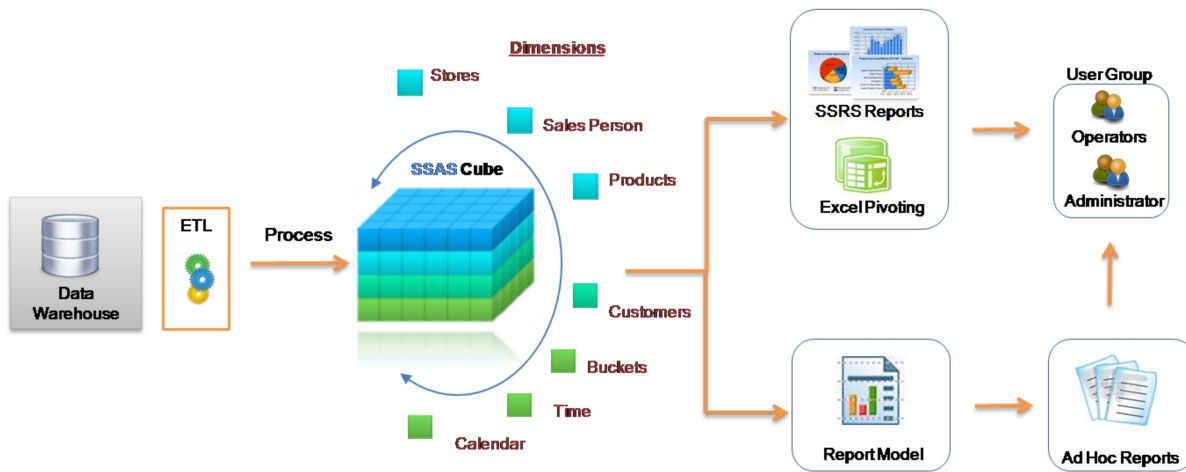
What is the difference between OLAP and OLTP?

Online Transaction Processing (OLTP)	Online Analytical Processing (OLAP)
Designed to support Daily DML Operations of your application	Designed to hold historical data for analyses and forecast business needs
Holds daily Latest Transactional Data related to your application	Data is consistent up to the last update that occurred in your Cube
Data stored in normalized format	Data stored in denormalized format
Databases size is usually around 100 MB to 100 GB	Databases size is usually around 100 GB to a few TB
Used by normal users	Used by users who are associated with the decision making process, e.g., Managers, CEO.
CPU, RAM, HDD space requirement is less.	CPU, RAM, HDD space requirement is higher.
Query response may be slower if the amount of data is very large, it can impact the reporting performance.	Query Response is quicker, management can do Trend analysis on their data easily and generate quicker reports.
T-SQL language used for query	MDX is used for querying on OLAP Cube

Basic Architecture

In our case, data warehouse is used as a source of data to Cube in BIDS. Once Cube gets ready with data, users can run queries on Cube created in SSAS. SSRS Reports and Excel Pivoting/Power Pivot can use OLAP Cube as source of data instead of OLTP database to get performance for resolving Complex Queries.

SSRS Reports, Excel Power Pivot can be used for visualization/analysis of data from cube.



Scenario

X-Mart is having different malls in our city, where daily sales take place for various products. Higher management is facing an issue while decision making due to non availability of integrated data they can't do study on their data as per their requirement. So they asked us to design a system which can help them quickly in decision making and provide Return on Investment (ROI).

So as a part of the design, we had completed designing of First Data Warehouse in my previous article. Now we have to Design / Create OLAP Cube in SSAS, on which our reports can do a quick query and we can also provide self service BI capability to users later on.

Creating Data Warehouse

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

Download 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.

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

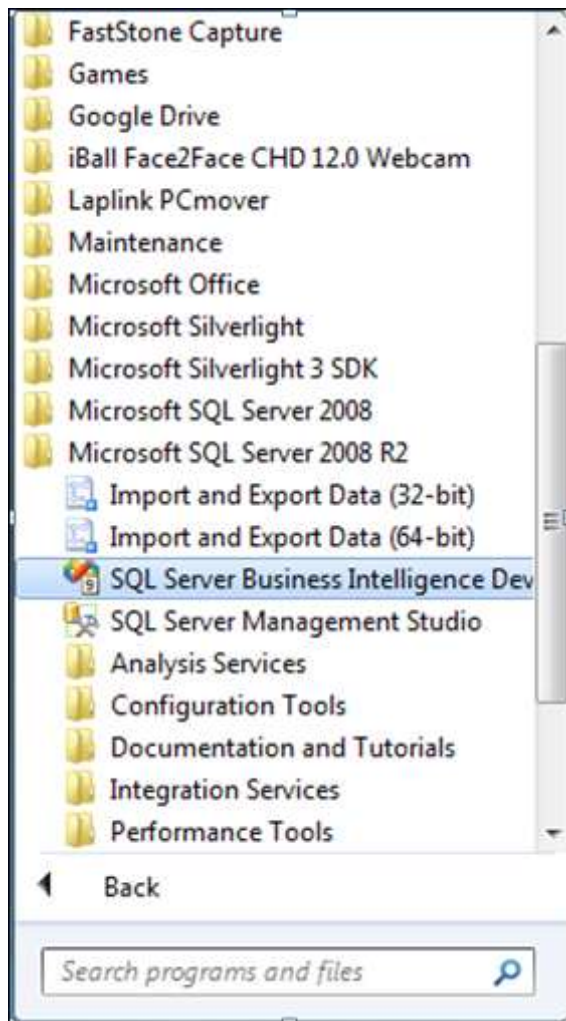
1. Open SQL Server Management Studio 2008
2. Connect Database Engine
3. Open **New Query** editor
4. Copy paste Scripts given below in various steps in new query editor window one by one
5. To run the given SQL Script, press **F5**
6. It will create and populate "**Sales_DW**" database on your SQL Server

Developing an OLAP Cube

For creation of OLAP Cube in Microsoft BIDS Environment, follow the 10 easy steps given below.

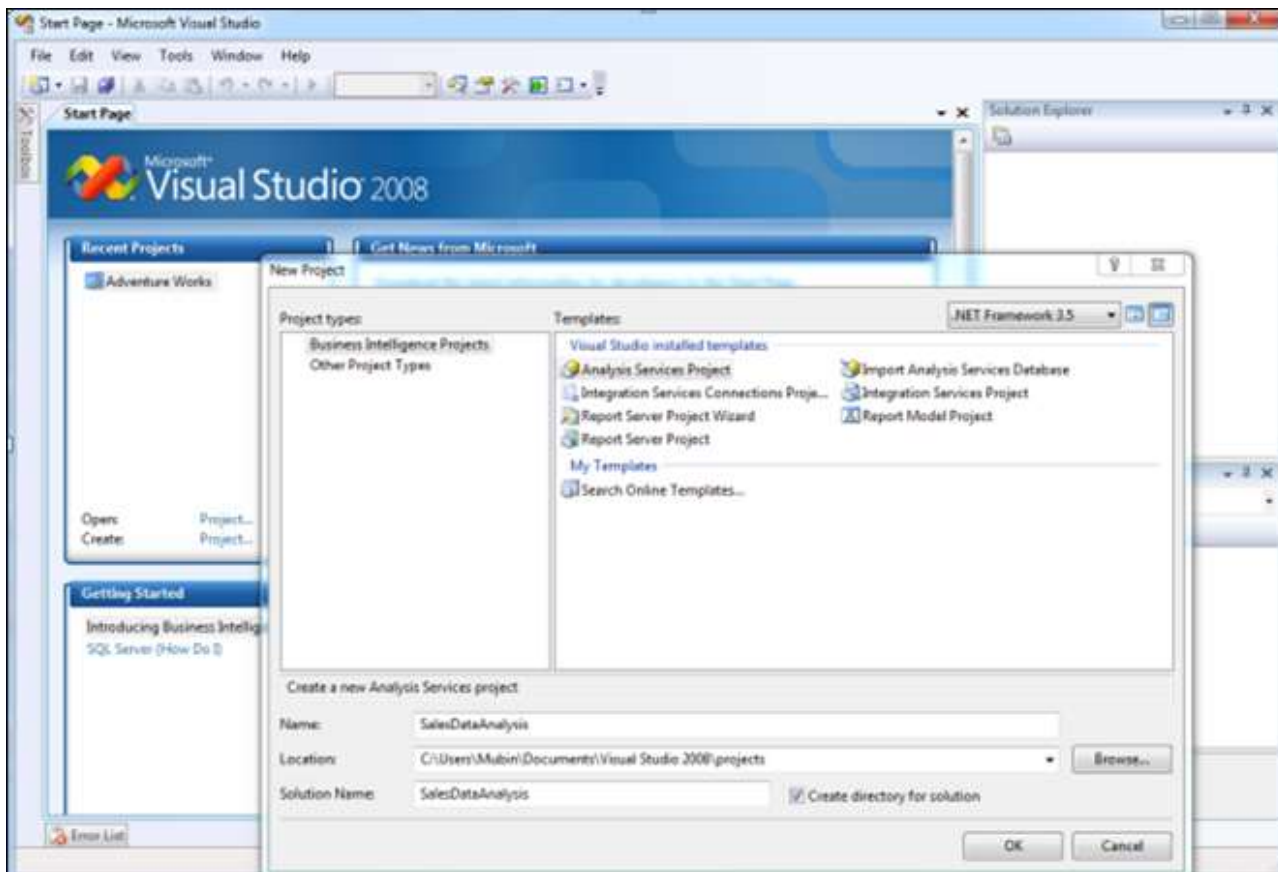
Step 1: Start BIDS Environment

Click on **Start Menu** -> Microsoft **SQL Server 2008 R2** -> Click **SQL Server Business Intelligence Development Studio**.



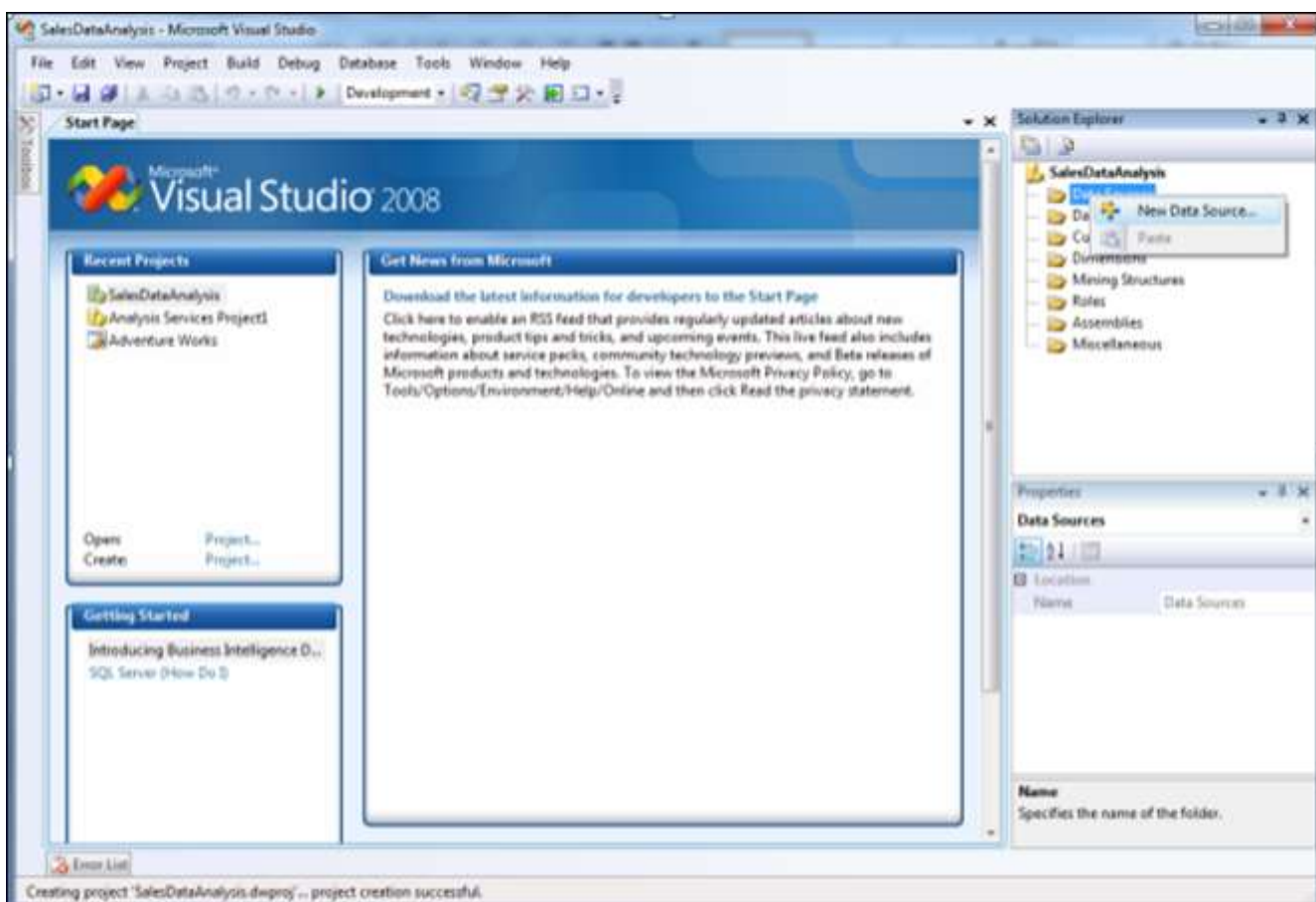
Step 2: Start Analysis Services Project

Click **File** -> **New** -> **Project** -> **Business Intelligence Projects** -> select **Analysis Services Project**-> Assign Project **Name** -> Click **OK**

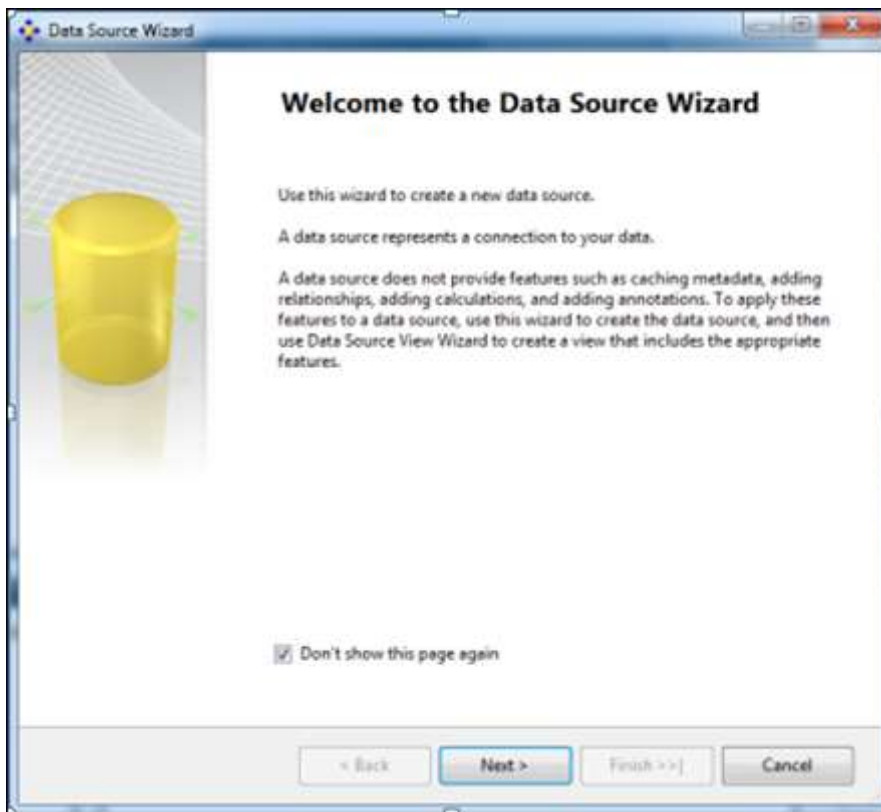


Step 3: Creating New Data Source

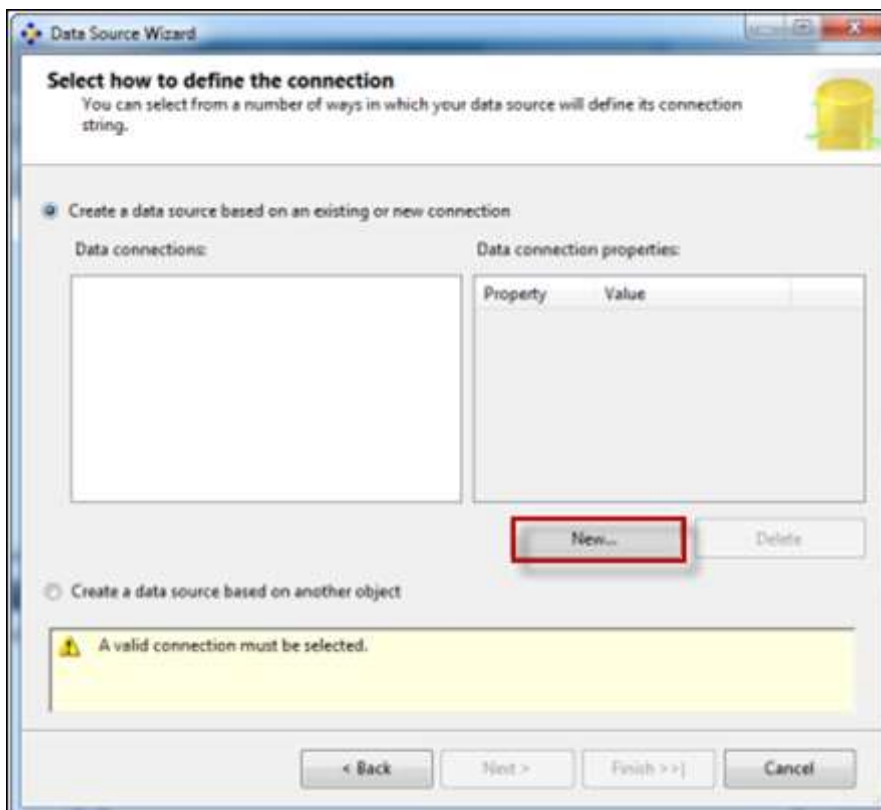
3.1 In Solution Explorer, Right click on **Data Source** -> Click **New Data Source**



3.2 Click on **Next**



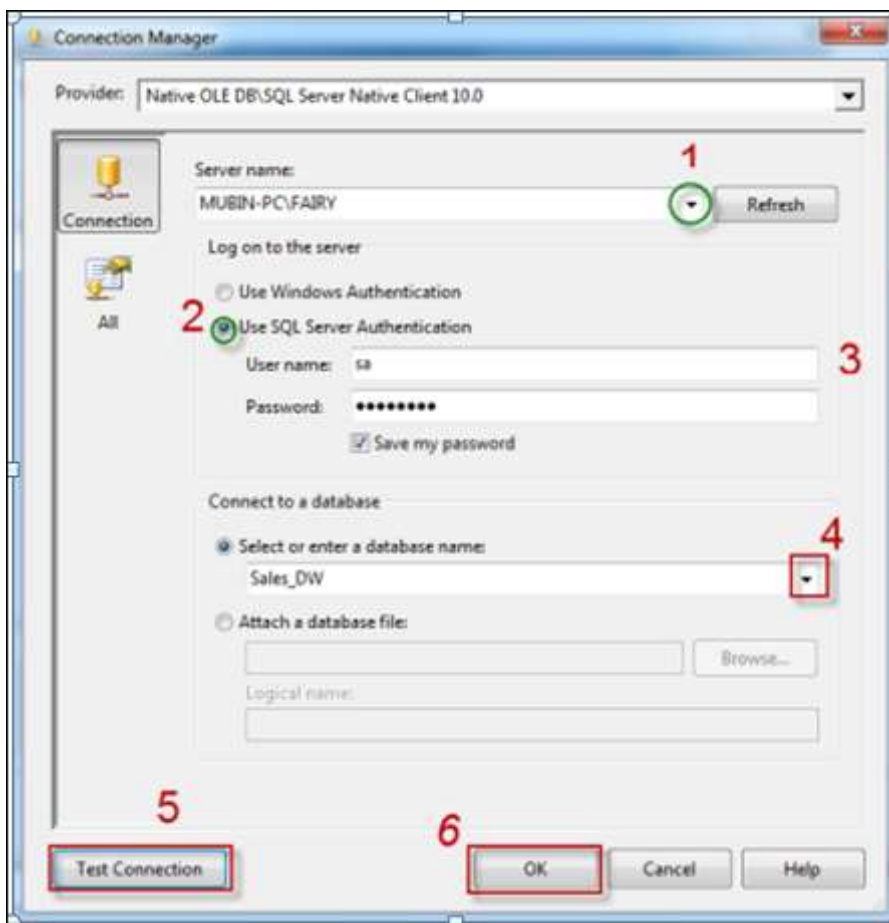
3.3 Click on New **Button**



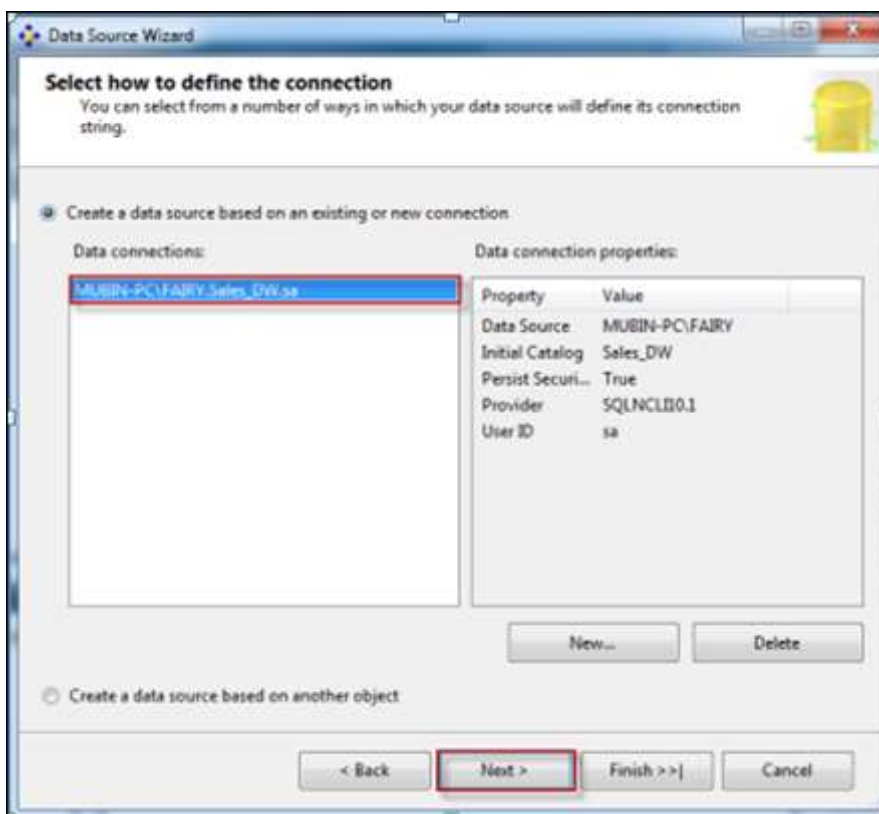
3.4 Creating **New connection**

1. Specify Your SQL **Server Name** where your Data Warehouse was created
2. Select Radio Button according to your **SQL Server Authentication** mode
3. Specify your **Credentials** using which you can connect to your SQL Server

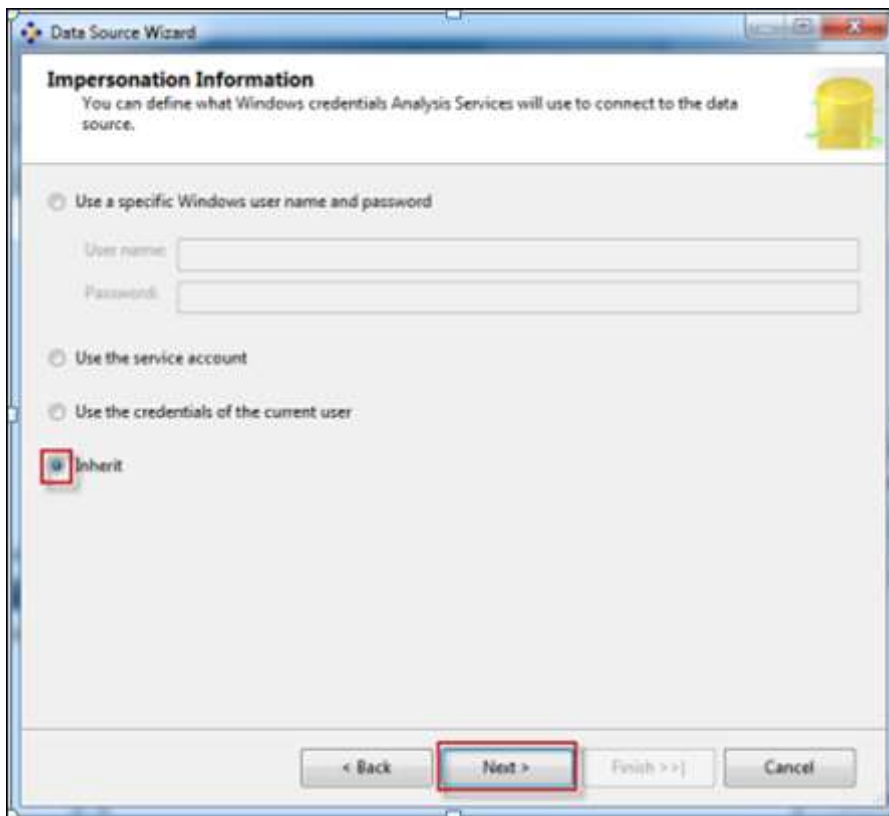
4. Select database **Sales_DW**.
5. Click on **Test Connection** and verify for its success
6. Click **OK**.



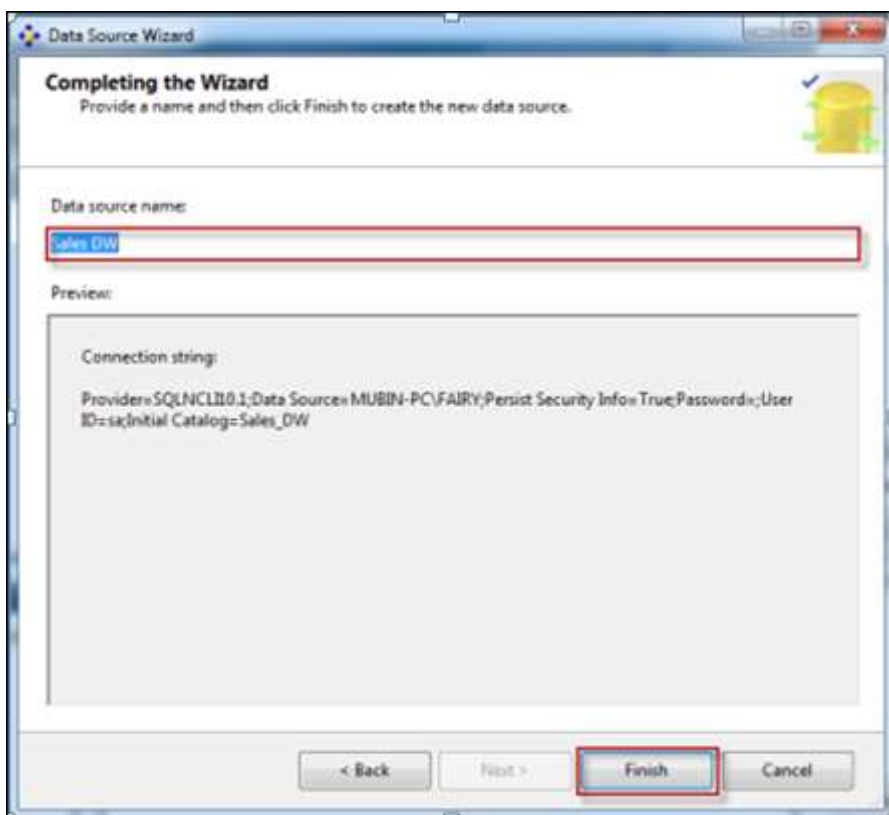
3.5 Select Connection created in **Data Connections**-> Click **Next**



3.6 Select Option **Inherit**

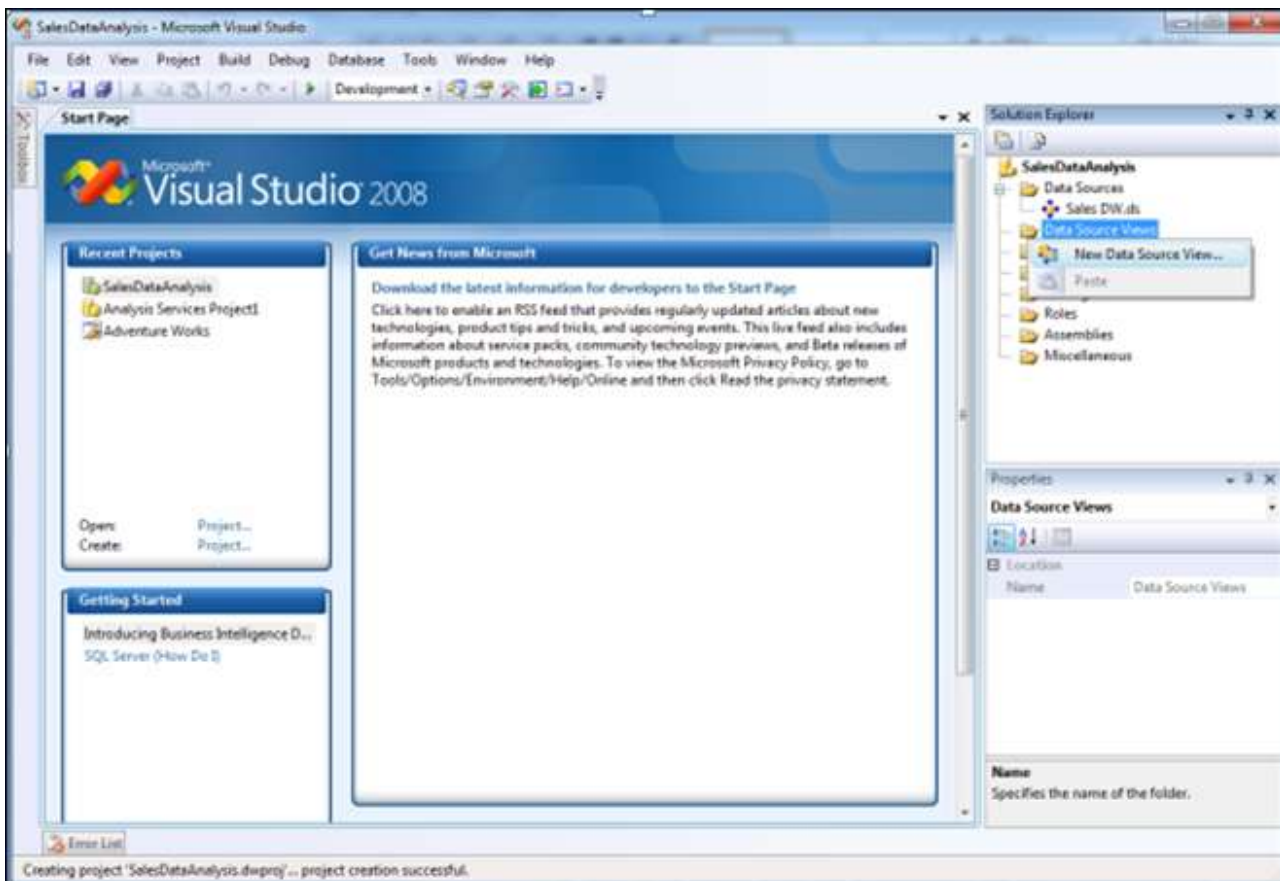


3.7 Assign Data Source **Name** -> Click **Finish**

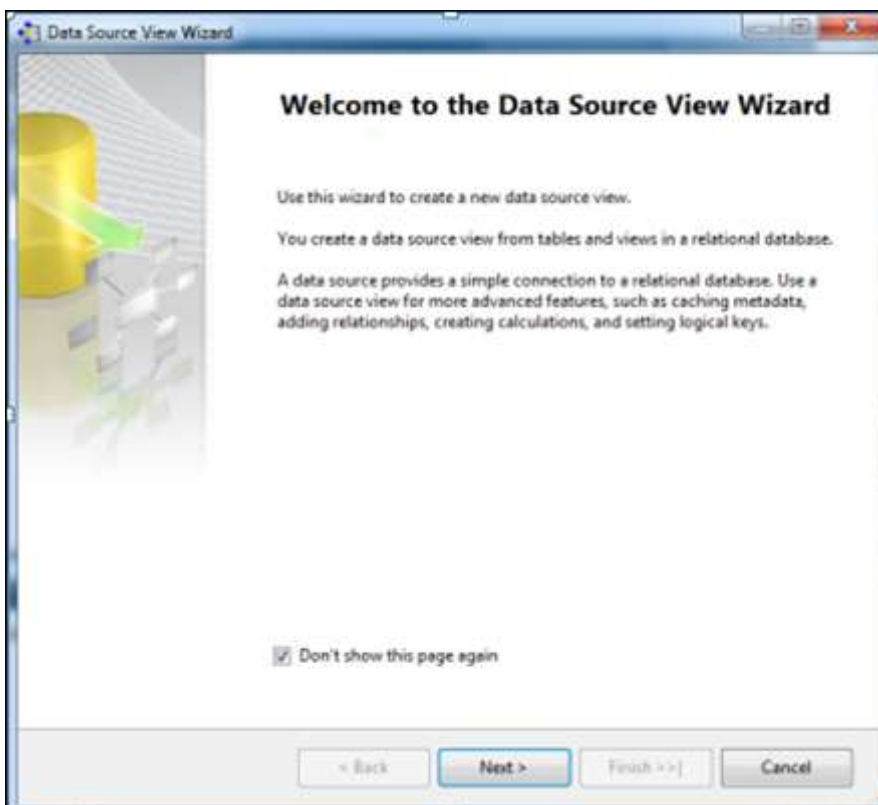


Step 4: Creating New Data Source View

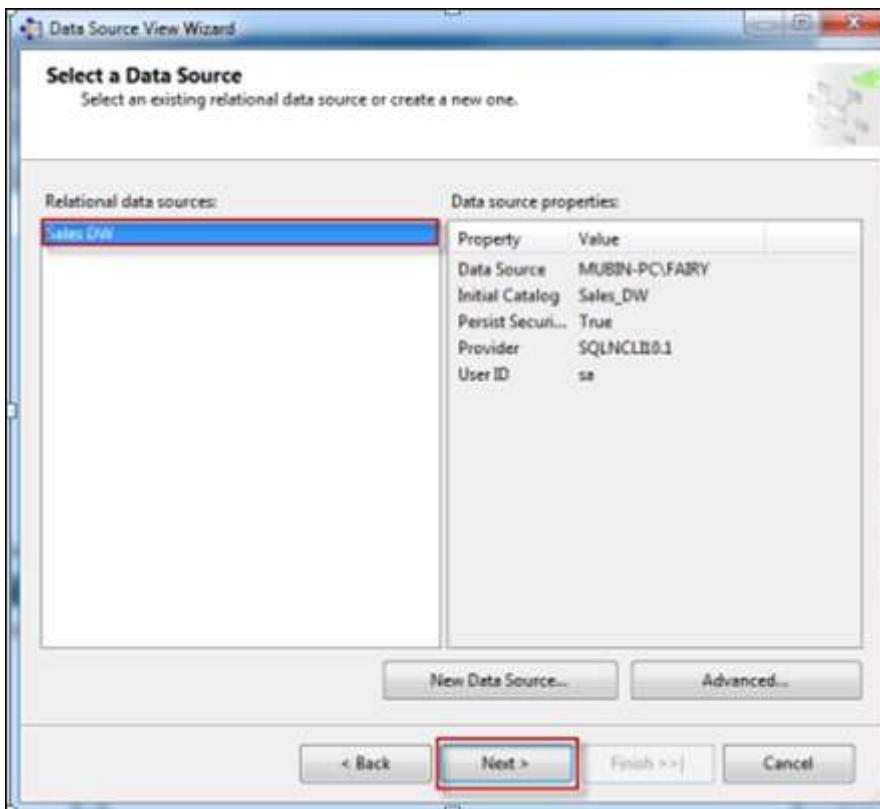
4.1 In the Solution Explorer, Right Click on **Data Source View** -> Click on **New Data Source View**



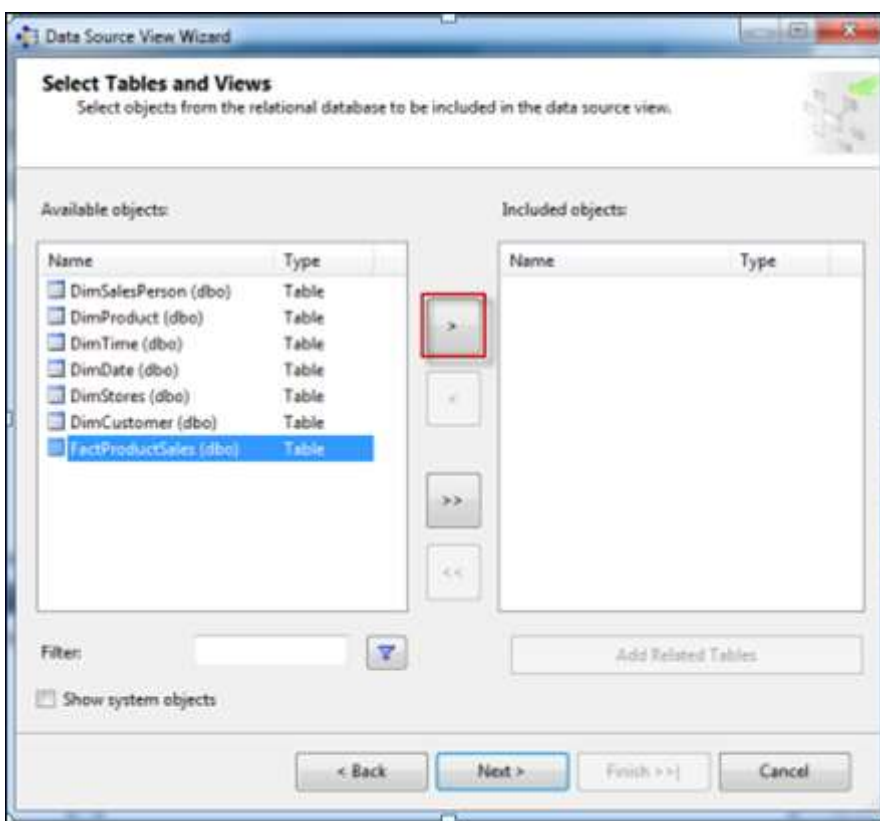
4.2 Click **Next**



4.3 Select **Relational Data Source** we have created previously (**Sales_DW**)-> Click **Next**



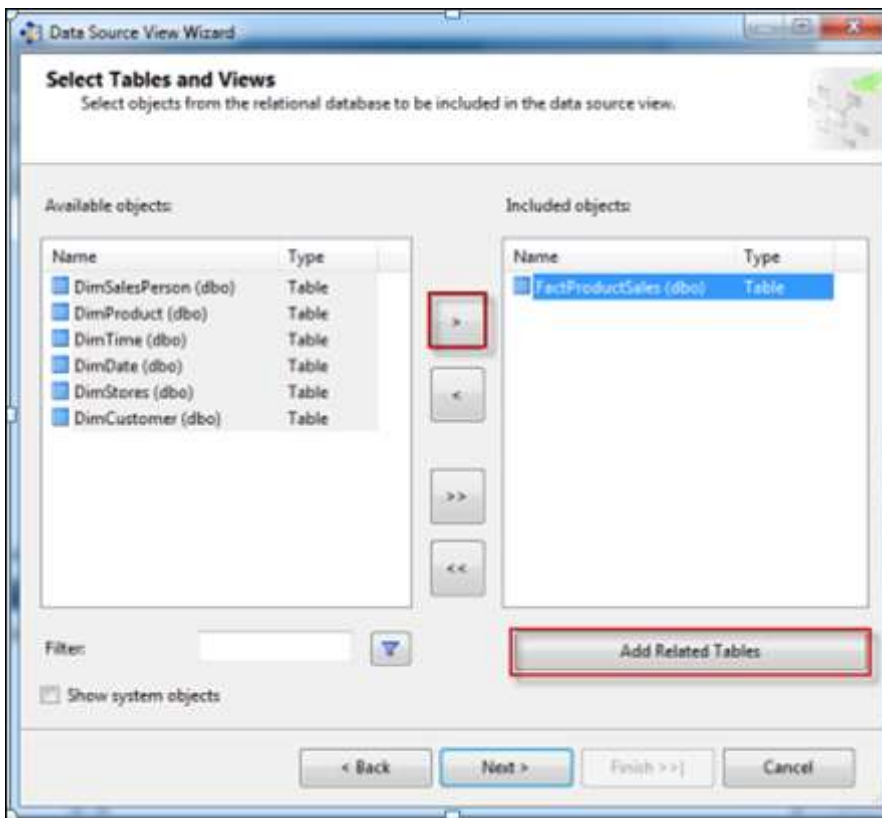
4.4 First move your **Fact Table** to the right side to include in object list.



Select **FactProductSales** Table -> Click on Arrow Button to move the selected object to Right Pane.

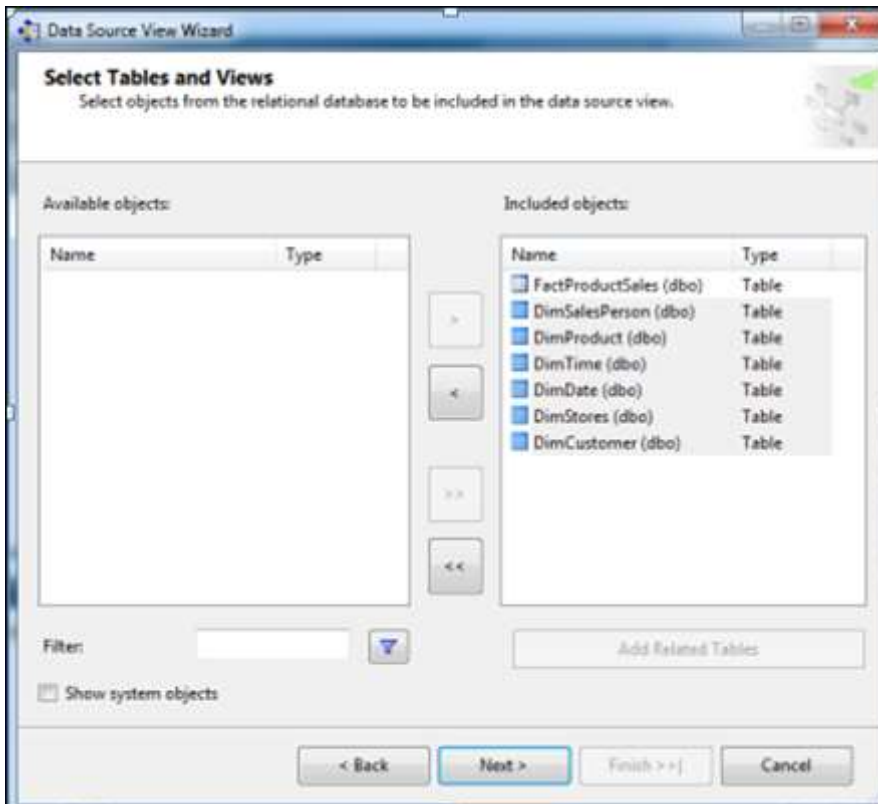
4.5 Now to **add dimensions** which are **related** to your **Fact Table**, follow the given steps:

Select **Fact Table** in Right Pane (Fact product Sales) -> Click On **Add Related Tables**

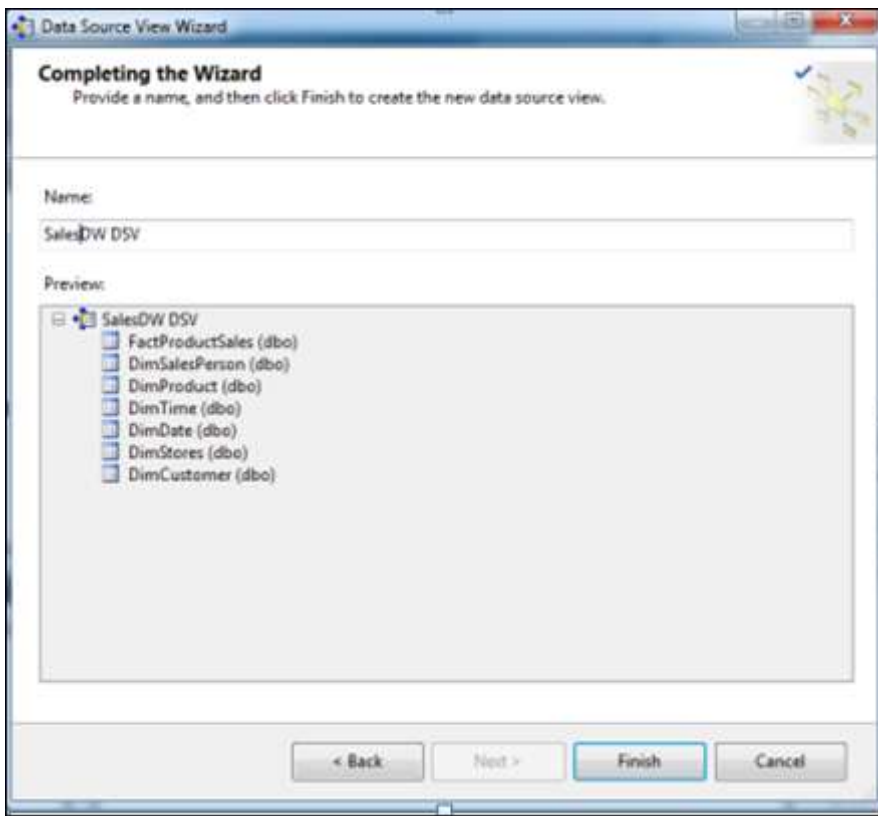


4.6 It will add all associated dimensions to your Fact table as per relationship specified in your SQL DW (**Sales_DW**).

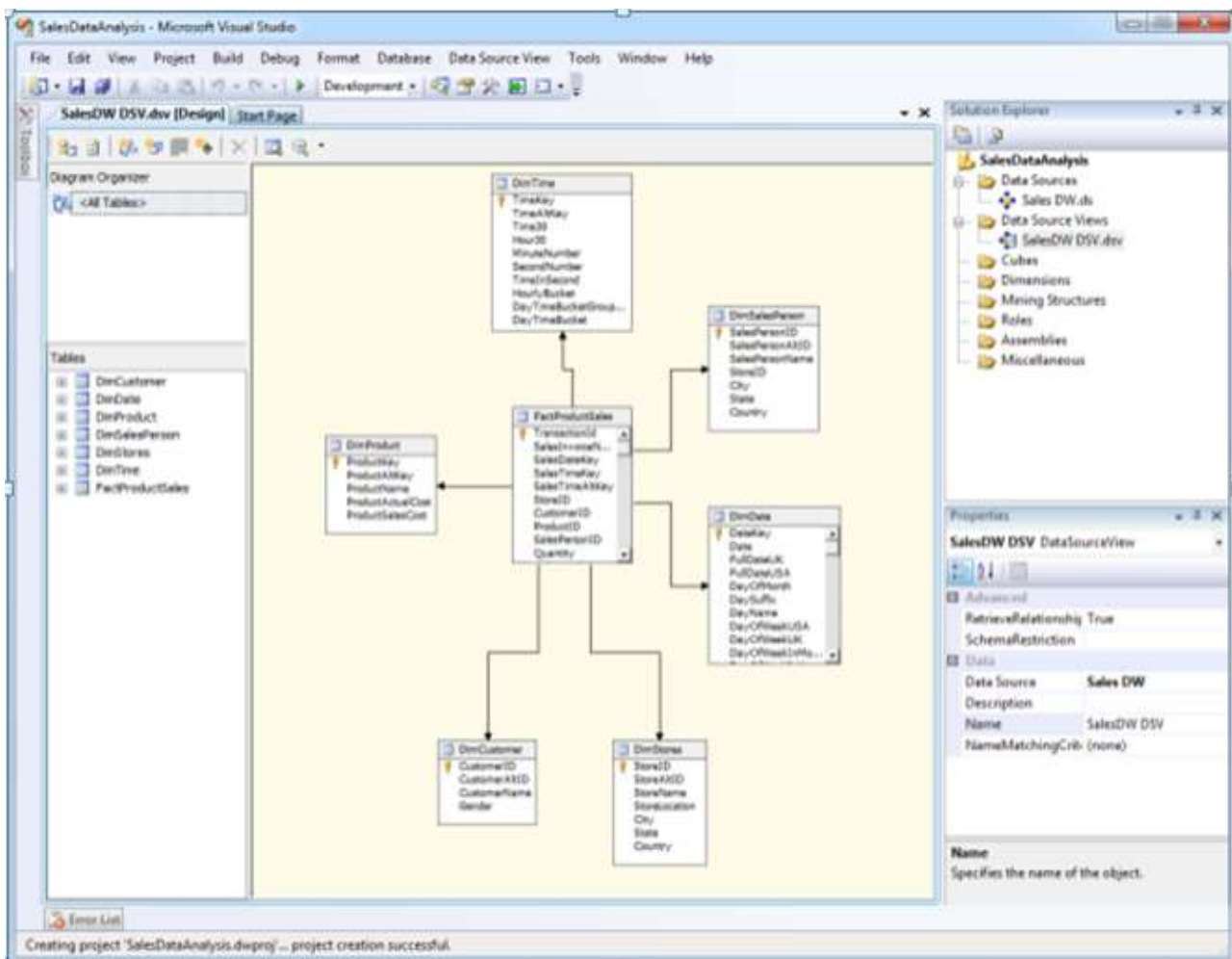
Click **Next**.



4.7 Assign **Name (SalesDW DSV)**-> Click **Finish**

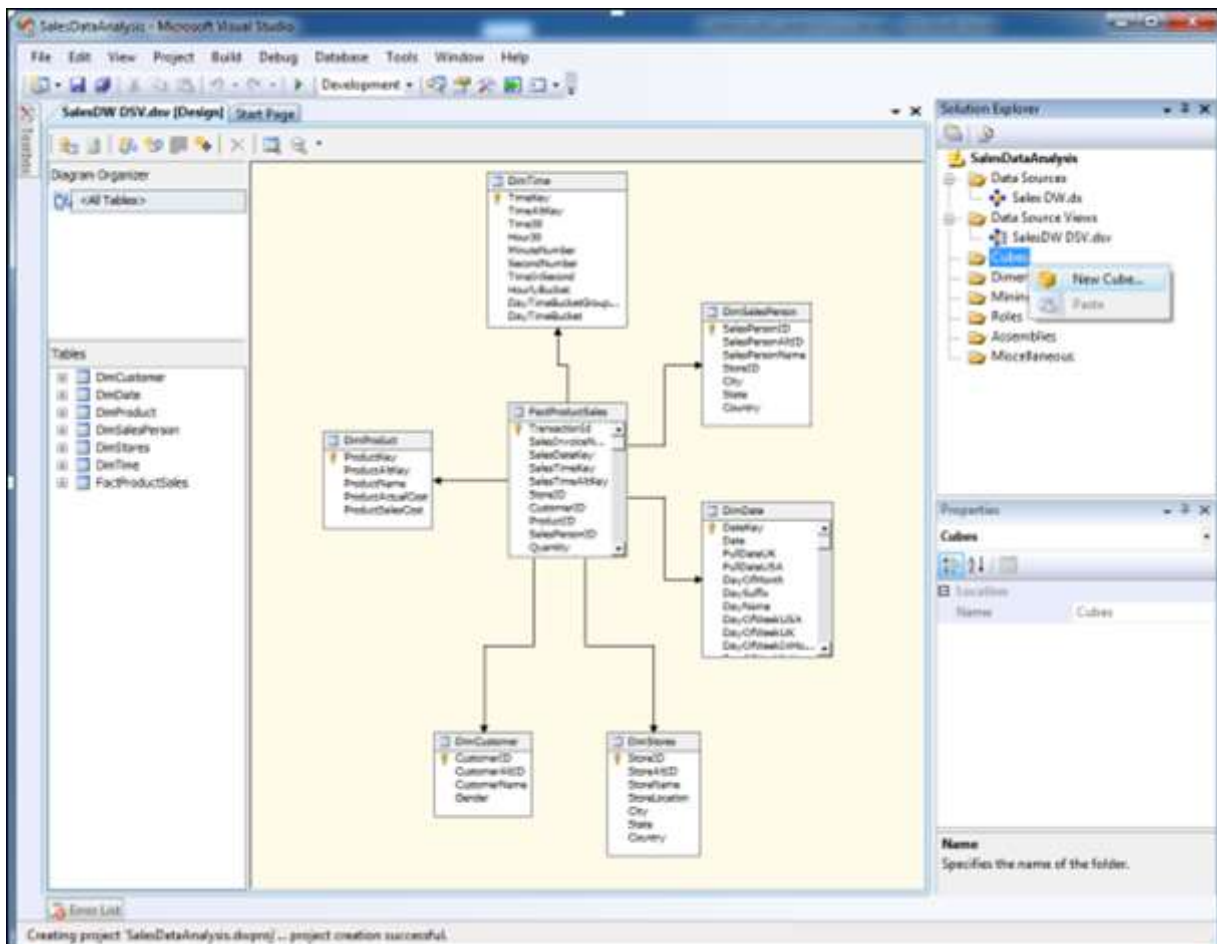


4.8 Now Data Source View is ready to use.

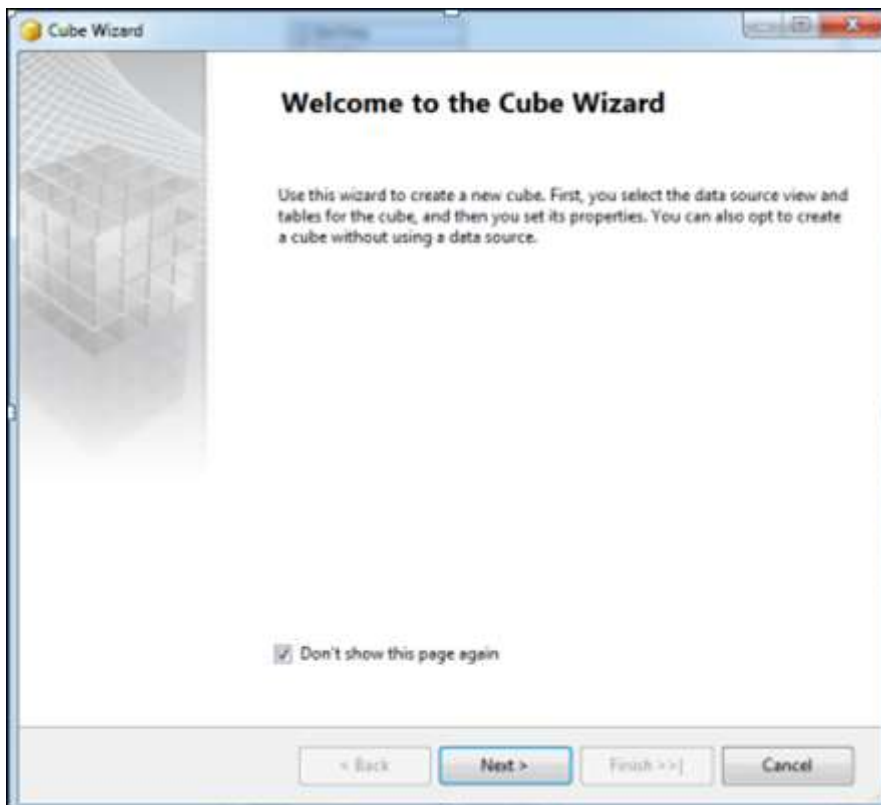


Step 5: Creating New Cube

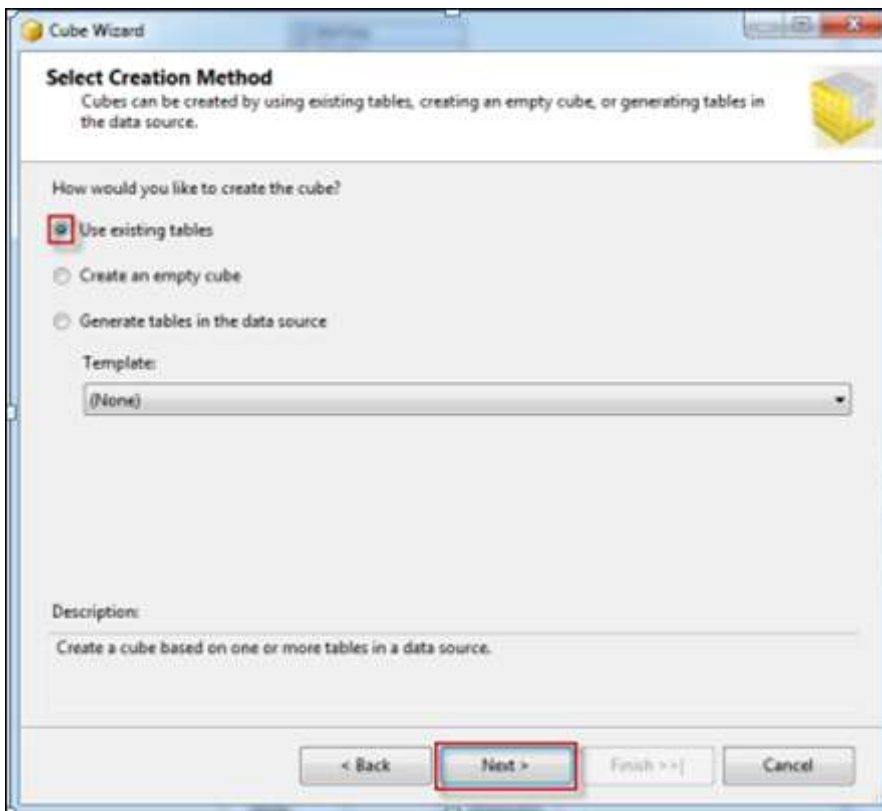
5.1 In Solution Explorer -> Right Click on **Cube**-> Click **New Cube**



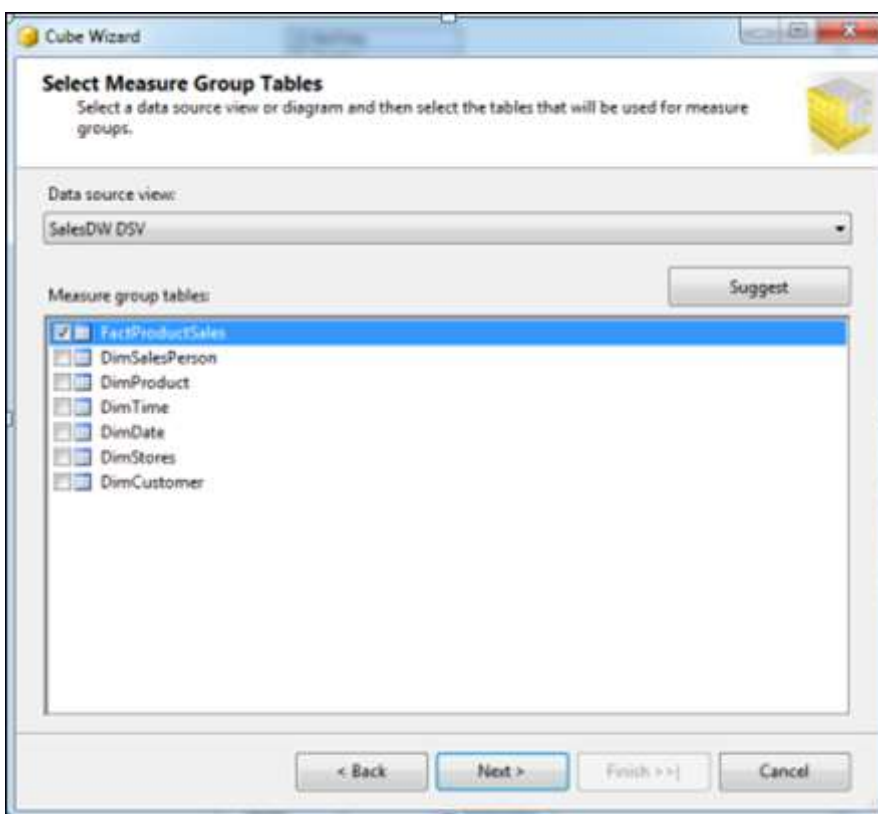
5.2 Click **Next**



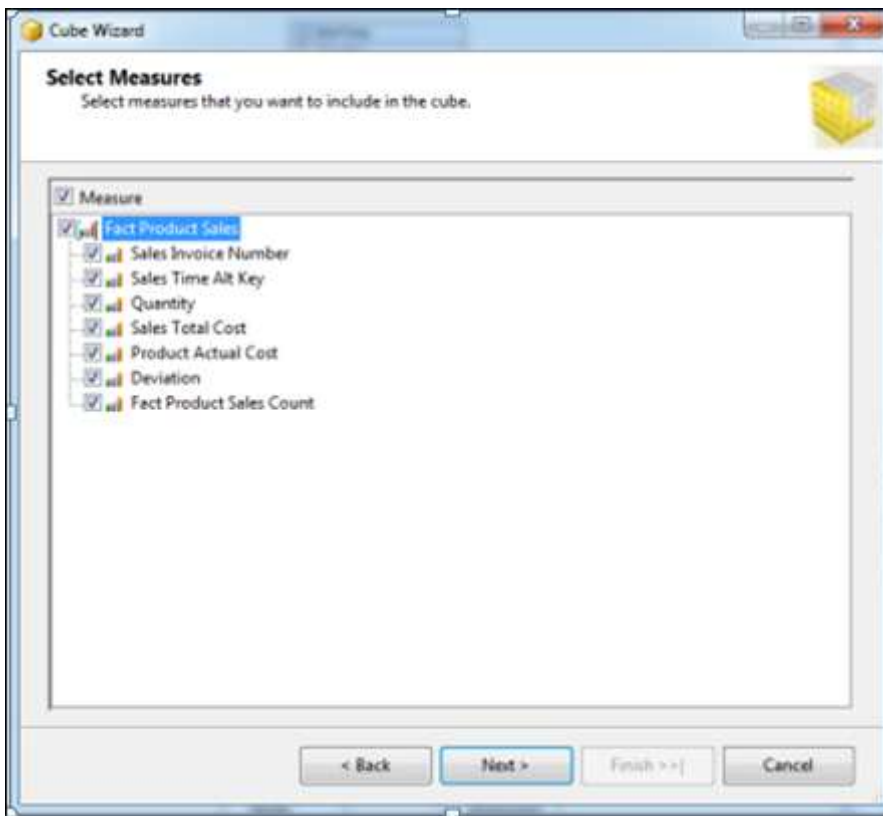
5.3 Select Option **Use existing Tables** -> Click **Next**



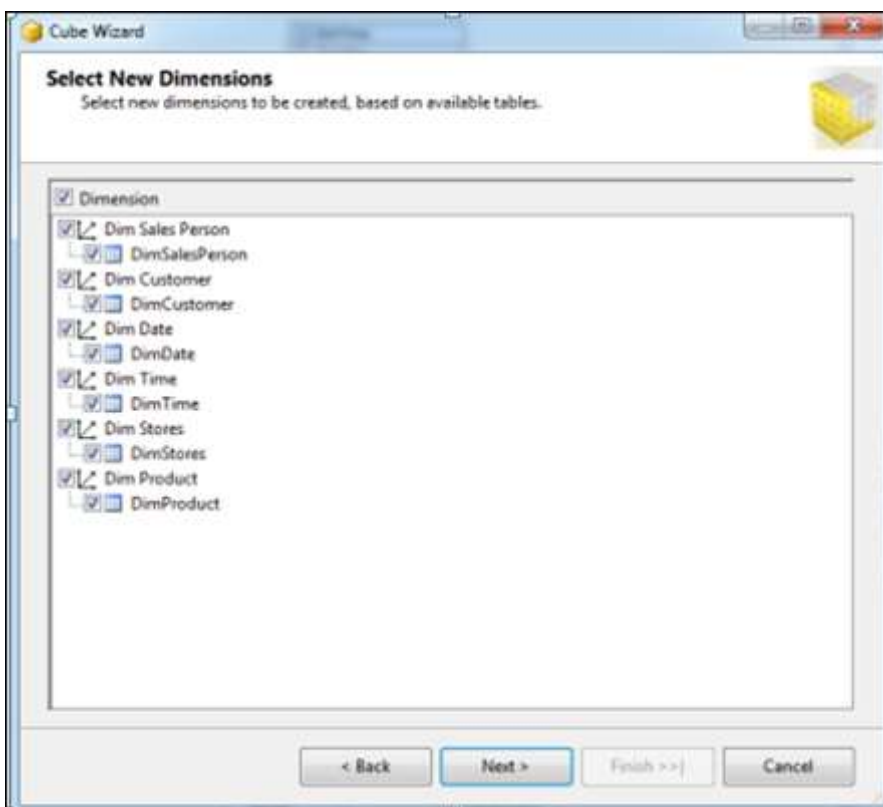
5.4 Select Fact Table Name from **Measure Group Tables (FactProductSales)** -> Click **Next**



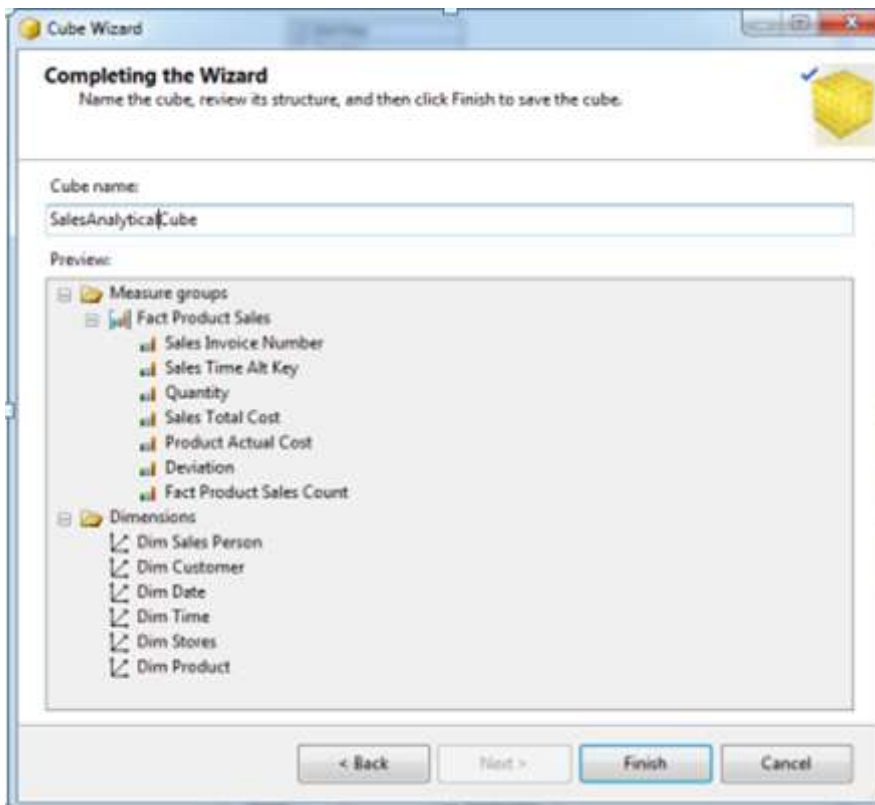
5.5 Choose **Measures** from the List which you want to place in your Cube --> Click **Next**



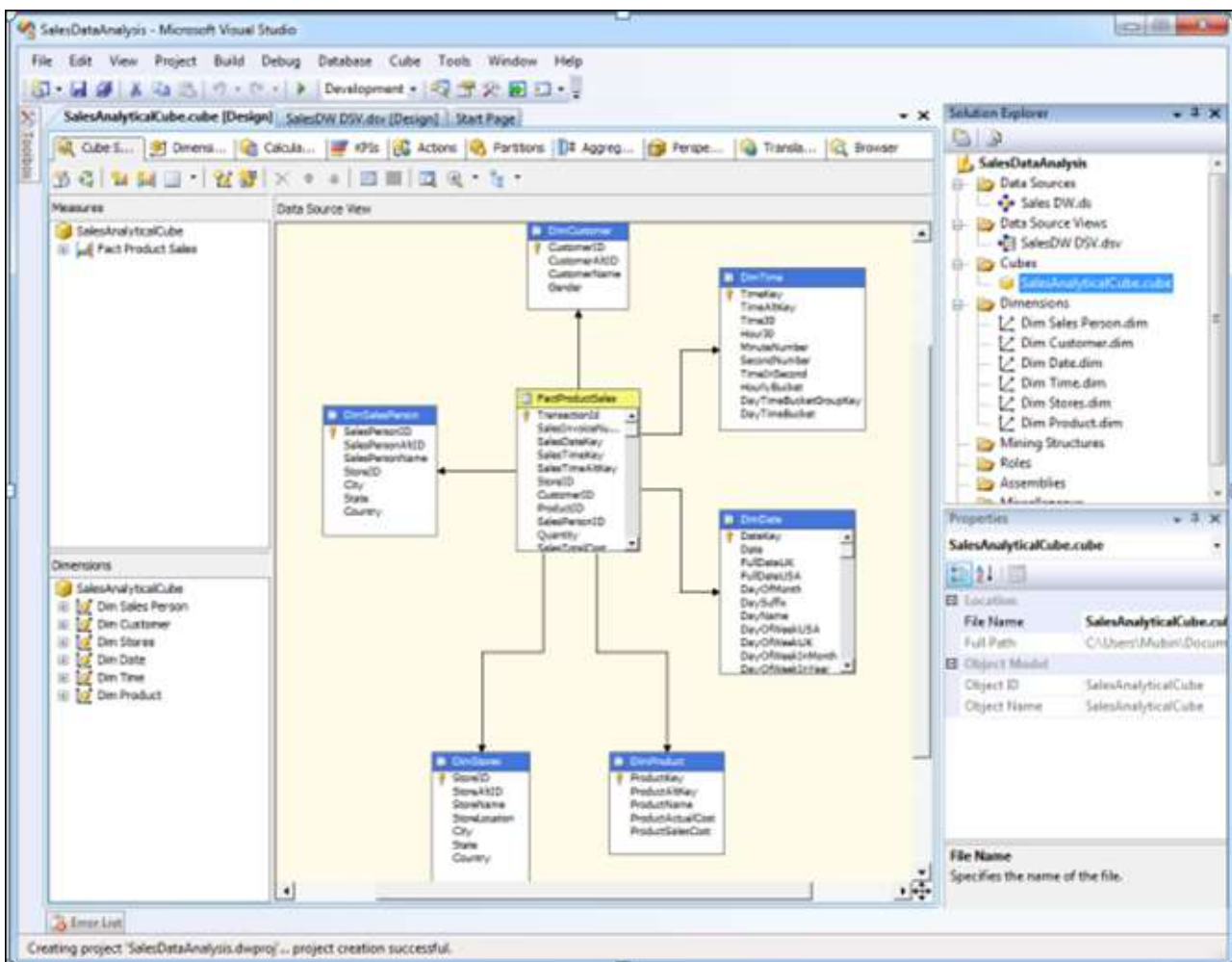
5.6 Select All **Dimensions** here which are associated with your Fact Table-> Click **Next**



5.7 Assign **Cube Name** (SalesAnalyticalCube) -> Click **Finish**

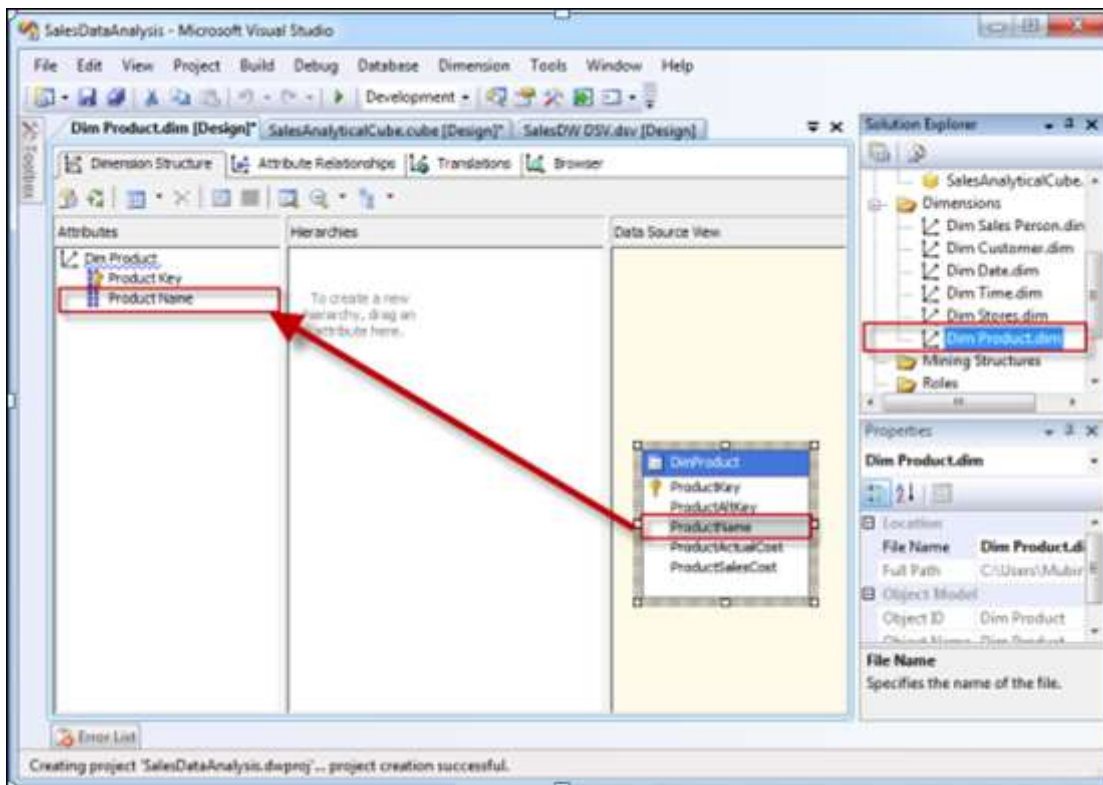


5.8 Now your Cube is ready, you can see the newly created cube and dimensions added in your solution explorer.



Step 6: Dimension Modification

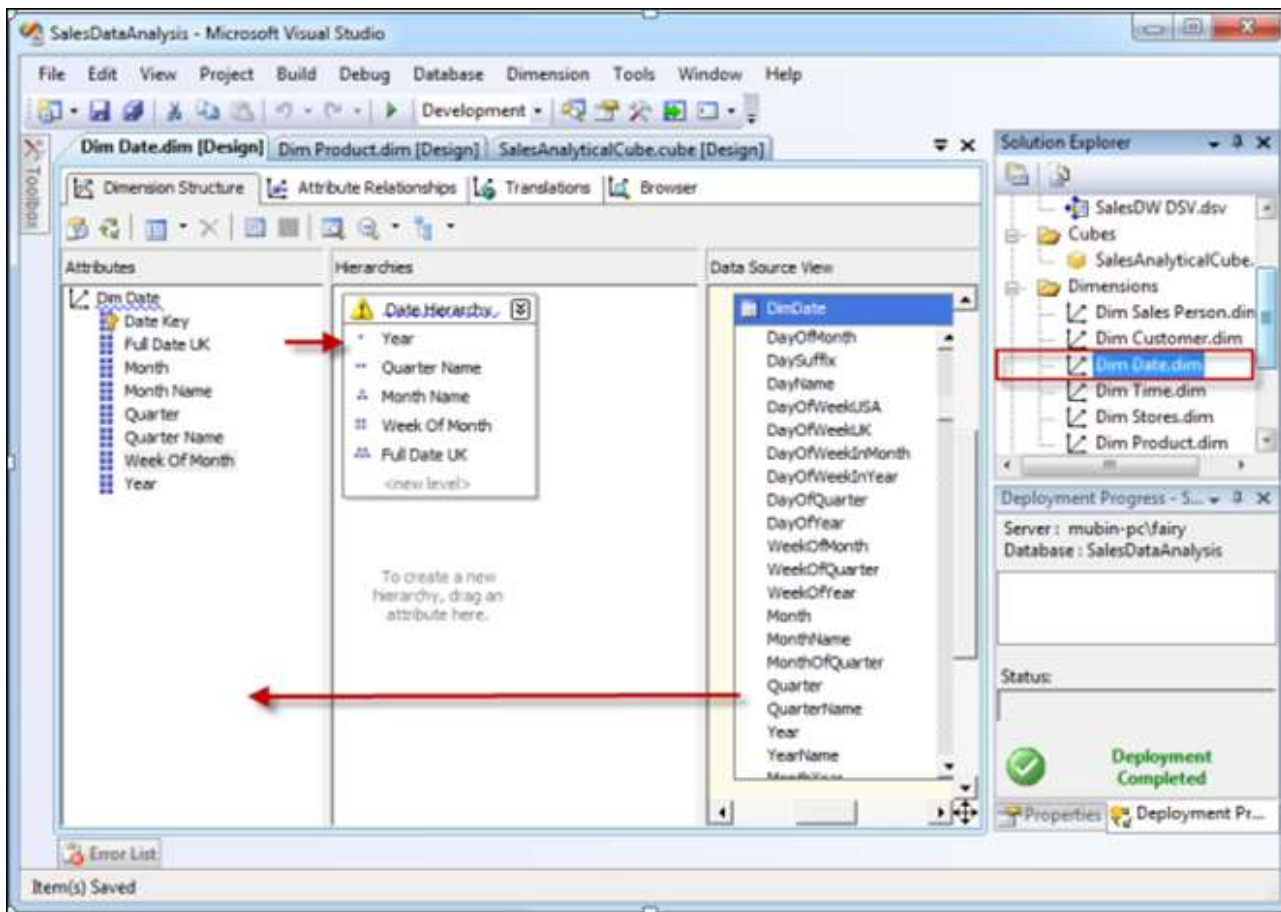
In Solution Explorer, double click on dimension **Dim Product** -> Drag and Drop Product Name from Table in Data Source View and Add in Attribute Pane at left side.



Step 7: Creating Attribute Hierarchy In Date Dimension

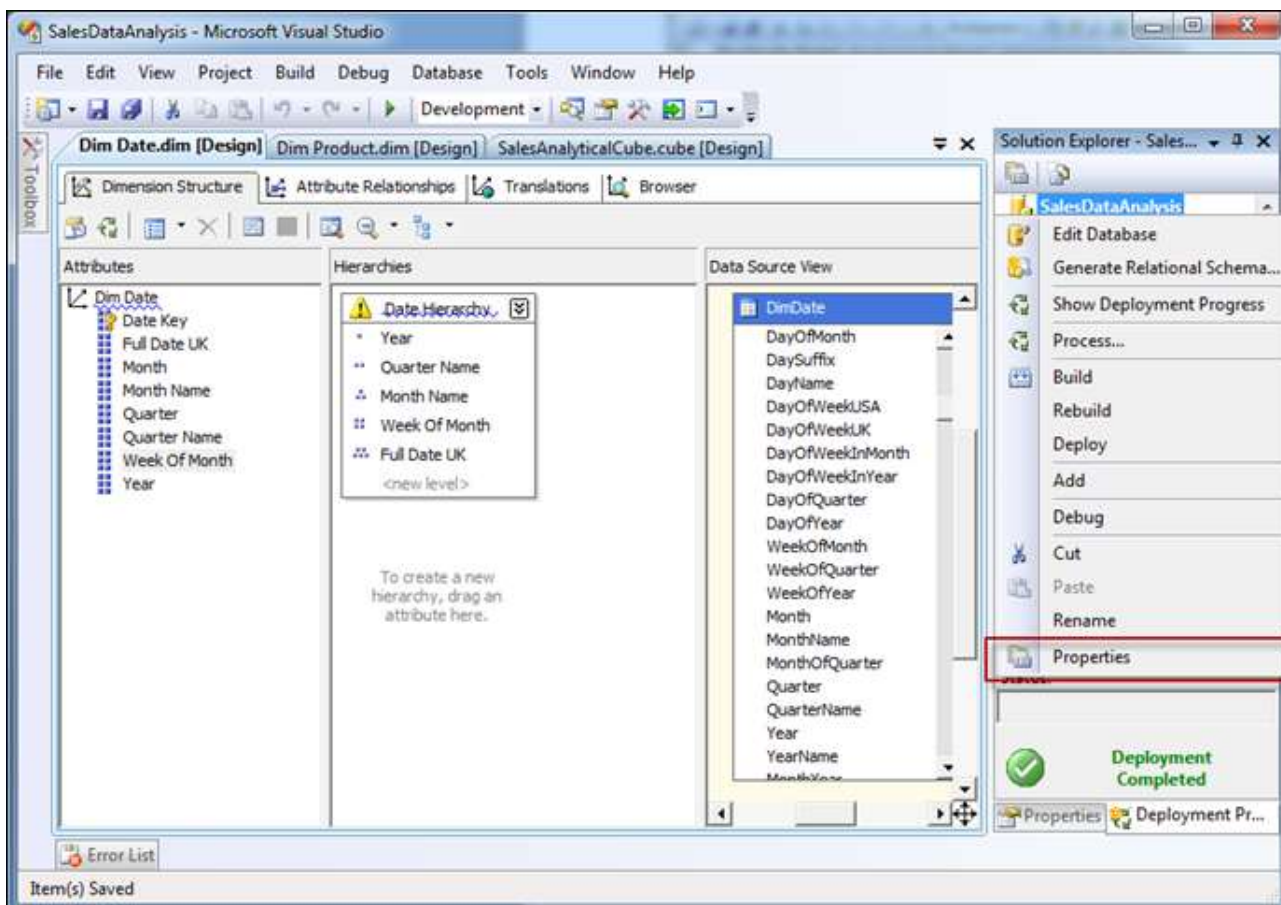
Double click On **Dim Date** dimension -> Drag and Drop Fields from Table shown in Data Source View to Attributes-> Drag and Drop attributes from leftmost pane of attributes to middle pane of Hierarchy.

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



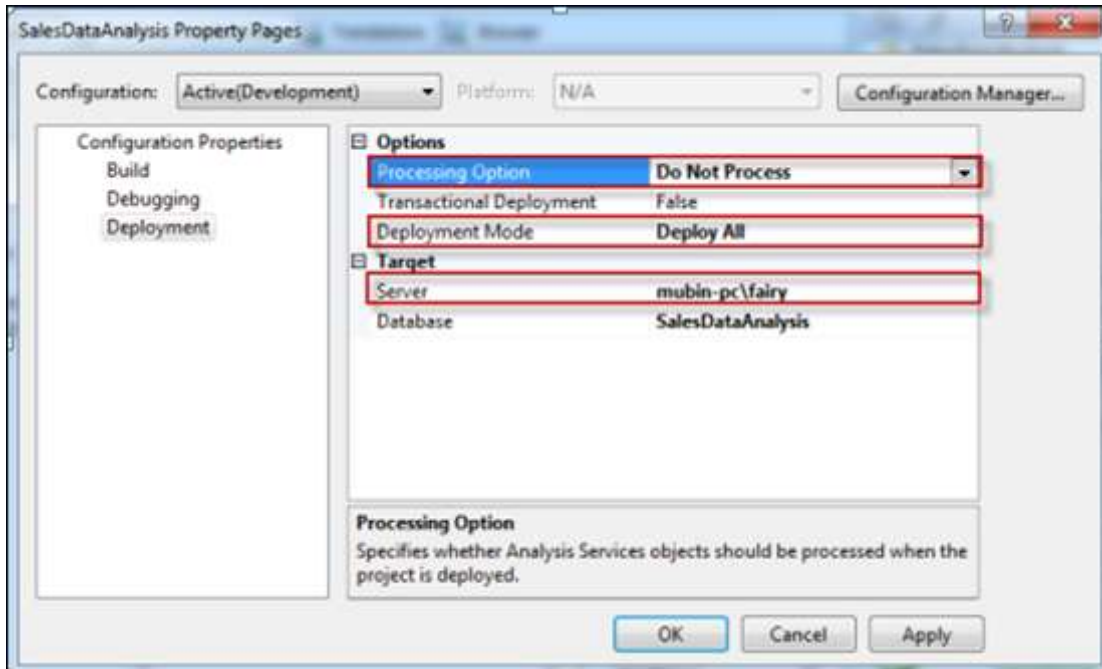
Step 8: Deploy the Cube

8.1 In Solution Explorer, right click on Project Name (**SalesDataAnalysis**) -- > Click **Properties**

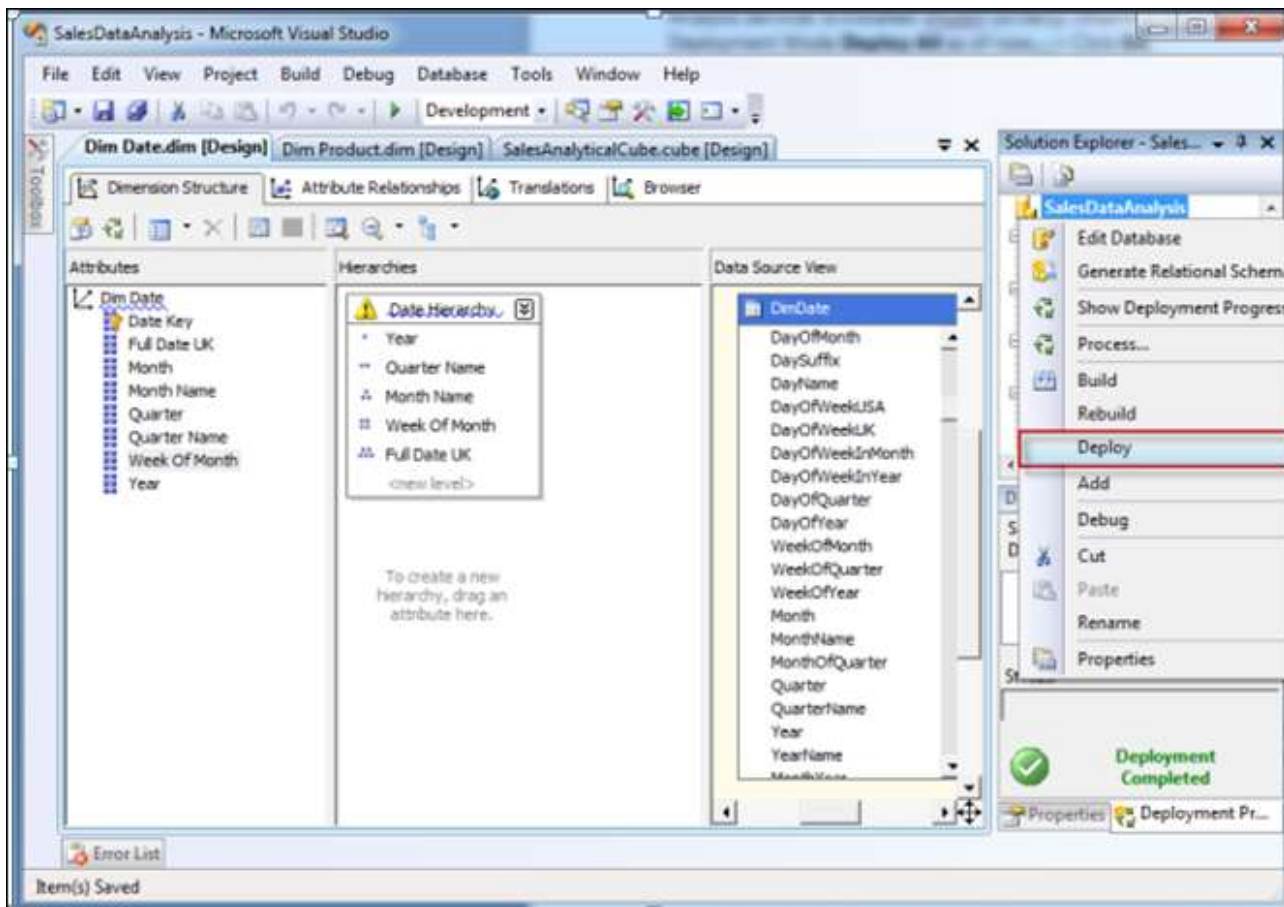


8.2 Set **Deployment Properties** First

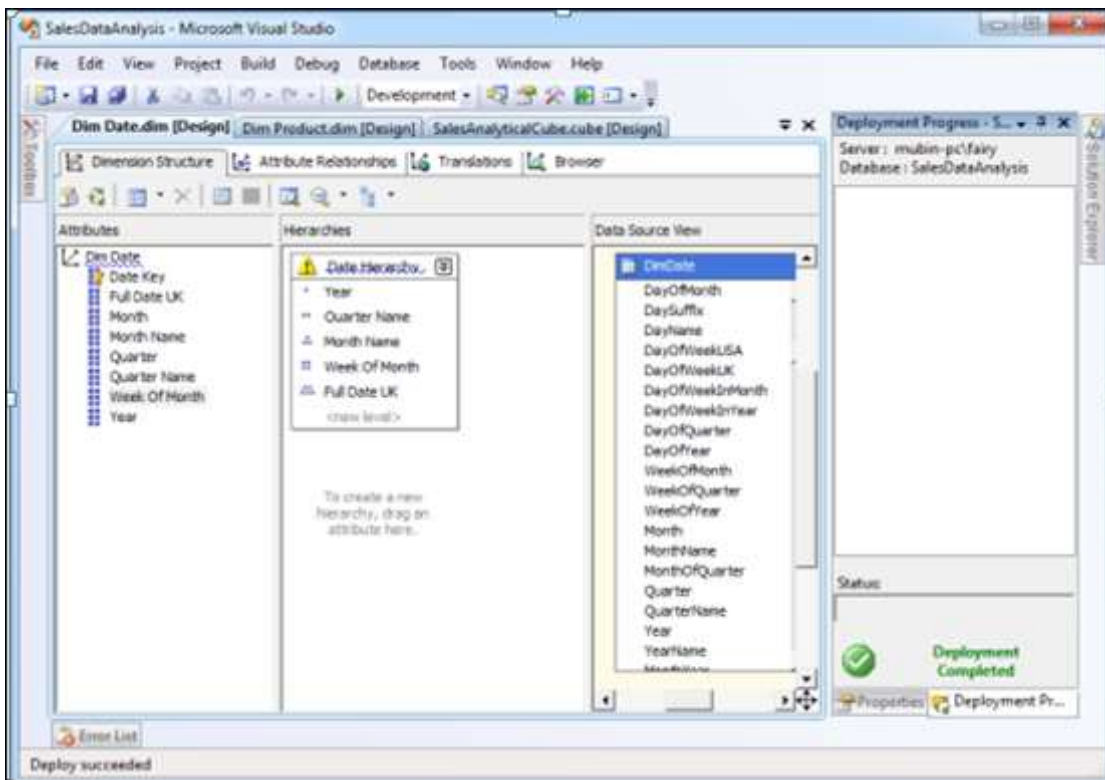
In Configuration Properties, Select Deployment-> Assign Your SQL Server Instance Name Where Analysis Services Is Installed (*mubin-pc\fairy*) (*Machine Name\Instance Name*) -> Choose Deployment Mode **Deploy All** as of now -> Select Processing Option **Do Not Process** -> Click **OK**



8.3 In Solution Explorer, right click on **Project Name** (*SalesDataAnalysis*) -- > Click **Deploy**

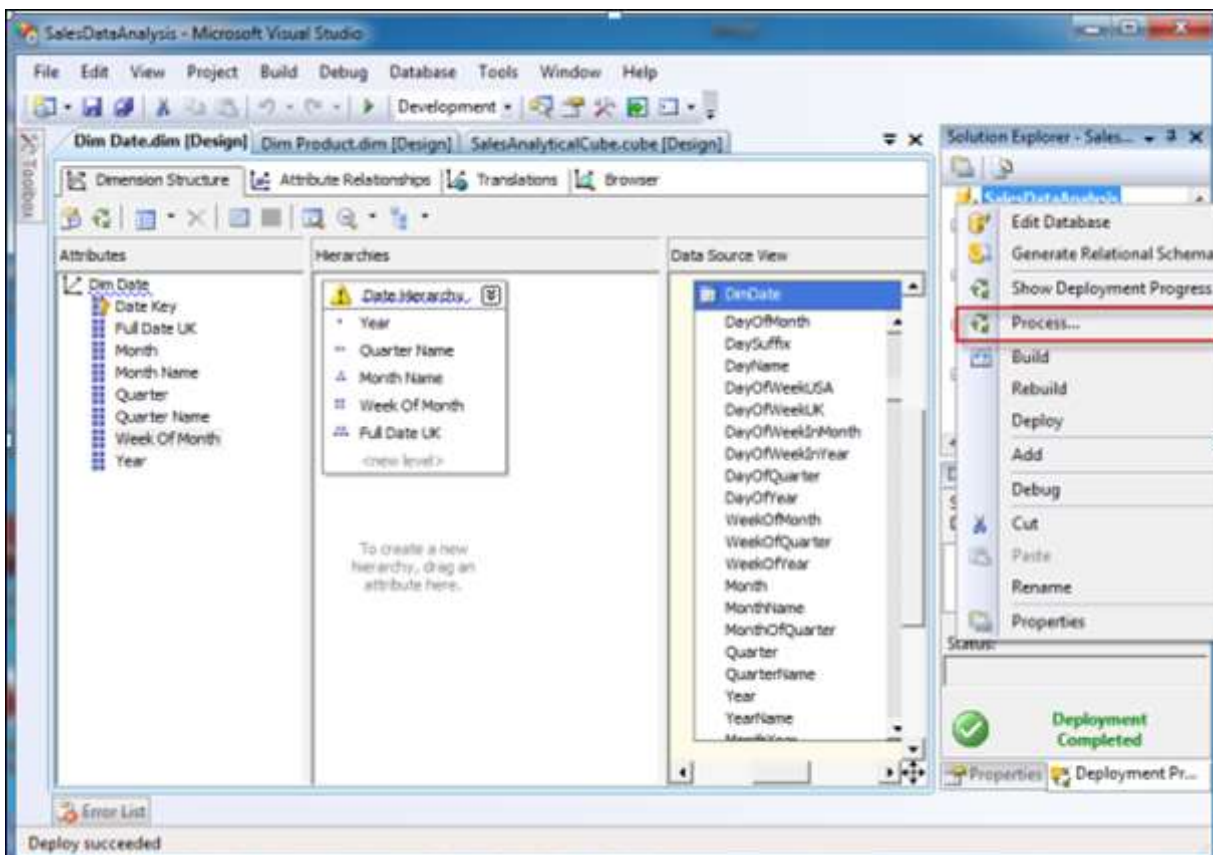


8.4 Once Deployment will finish, you can see the message **Deployment Completed** in deployment Properties.

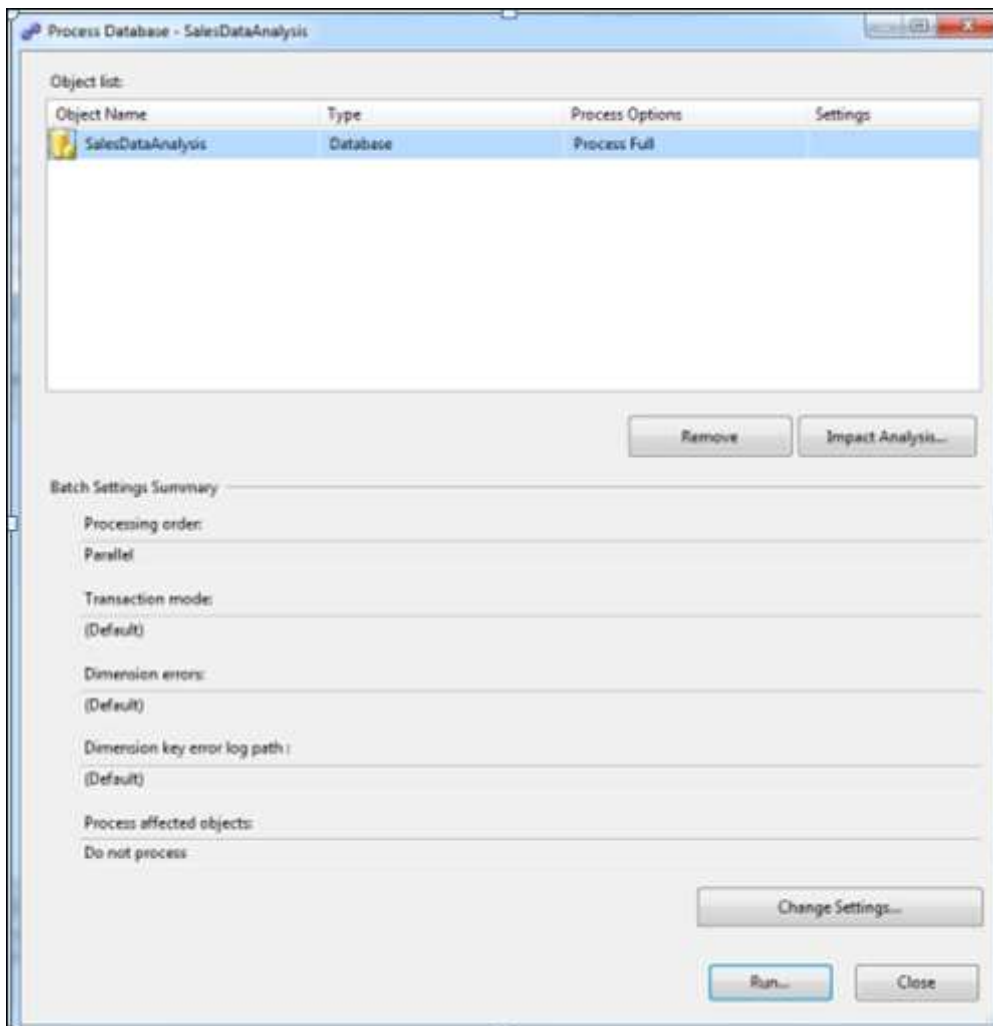


Step 9: Process the Cube

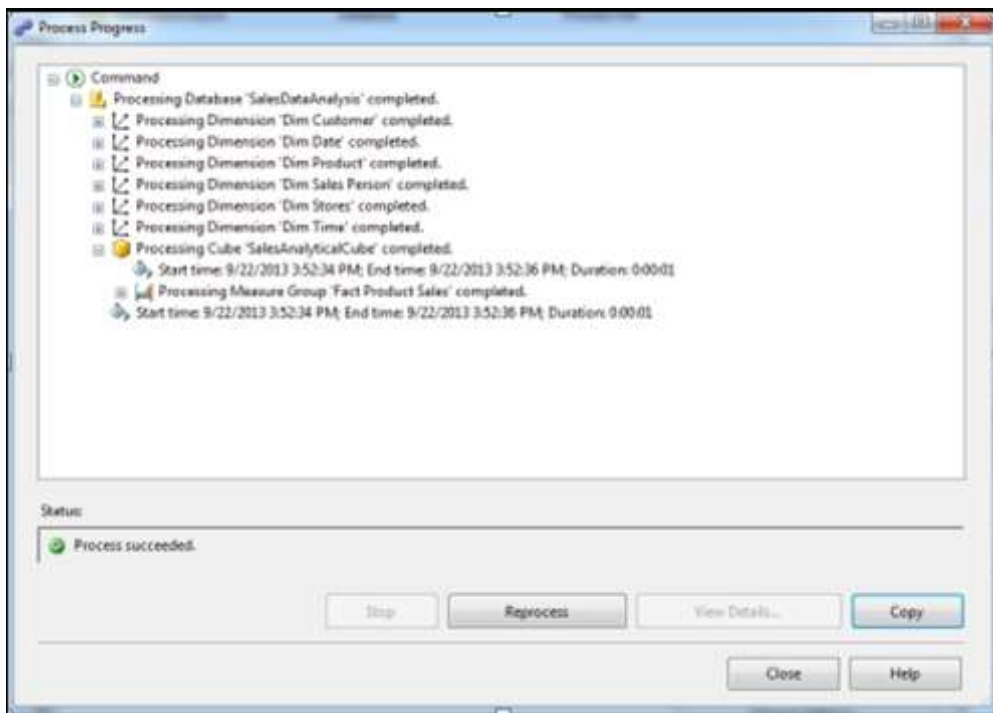
9.1 In Solution Explorer, right click on Project Name (**SalesDataAnalysis**) -- > Click **Process**



9.2 Click on **Run** button to process the Cube

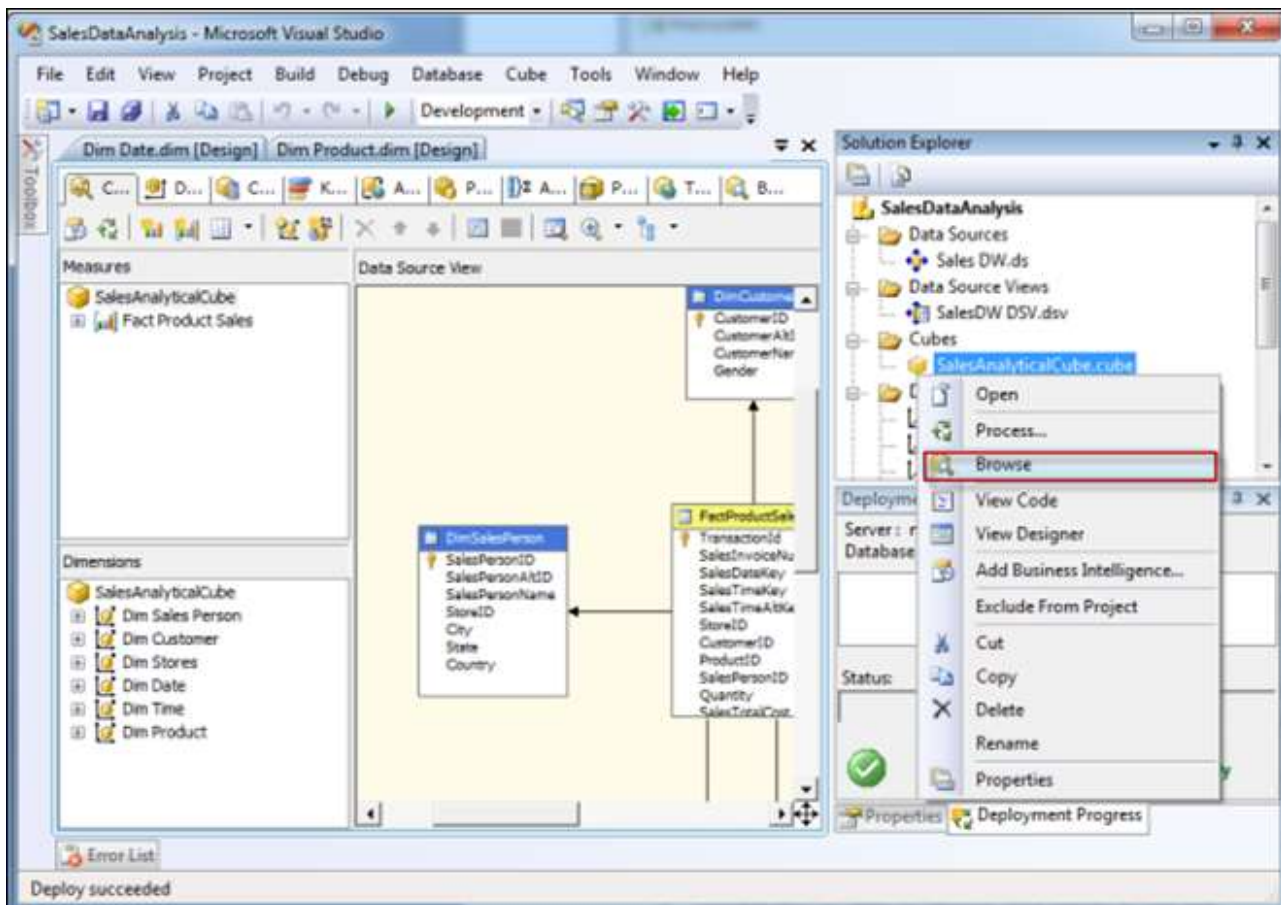


9.3 Once processing is complete, you can see **Status** as **Process Succeeded** --> Click **Close** to close both the open windows for processing one after the other.



Step 10: Browse the Cube for Analysis

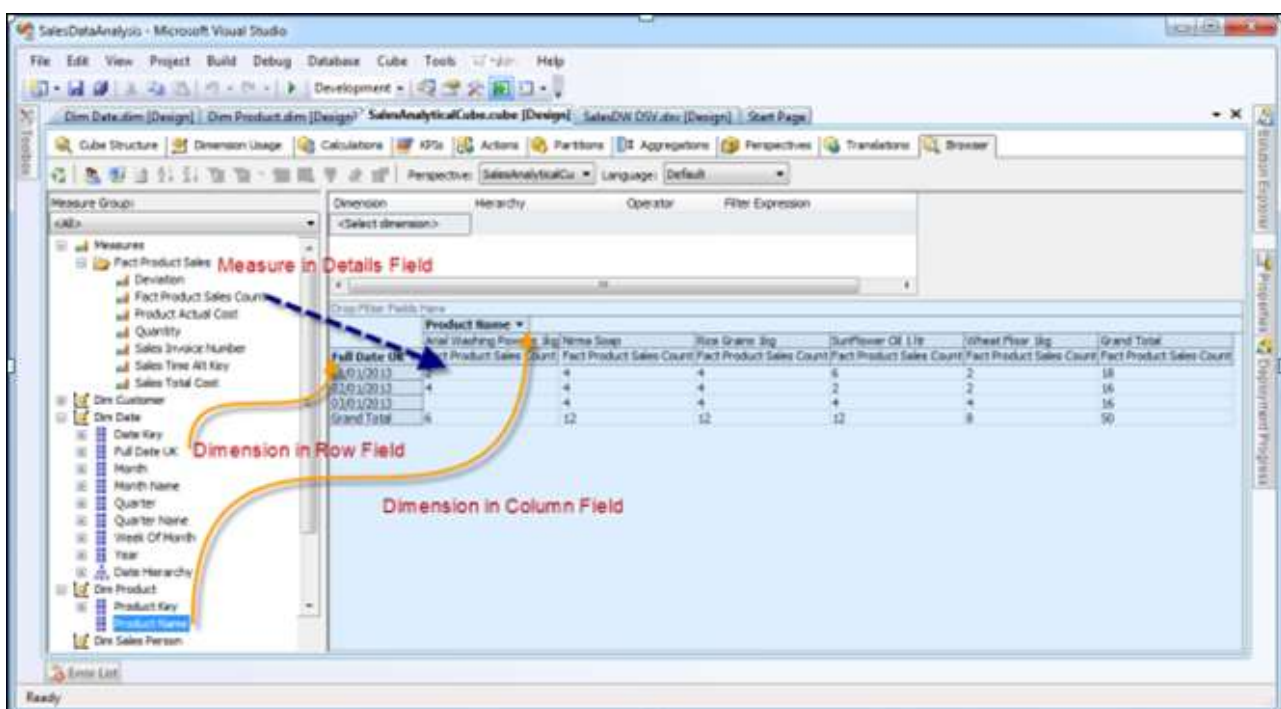
10.1 In Solution Explorer, right click on Cube Name (**SalesDataAnalysisCube**) -- > Click **Browse**



10.2 Drag and drop measures in to Detail fields, & Drag and Drop Dimension Attributes in Row Field or Column fields.

Now to **Browse Our Cube**

1. Product Name Drag & Drop into Column
2. Full Date UK Drag & Drop into Row Field
3. **FactProductSalesCount** Drop this measure in Detail area



We will see some more features shortly - how can we assign user friendly names, named calculations, named query, ordering on hierarchy, hiding dimension attributes, creating perspective, KPI, security roles, etc.

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