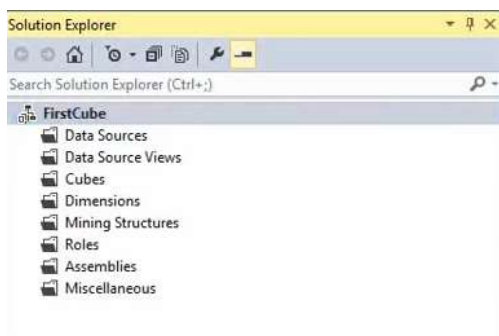
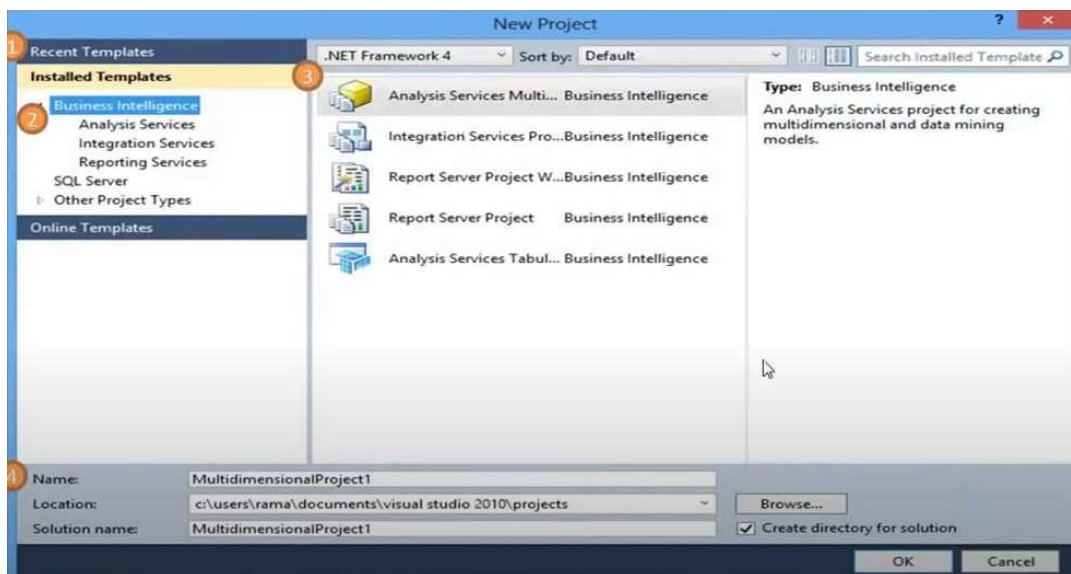
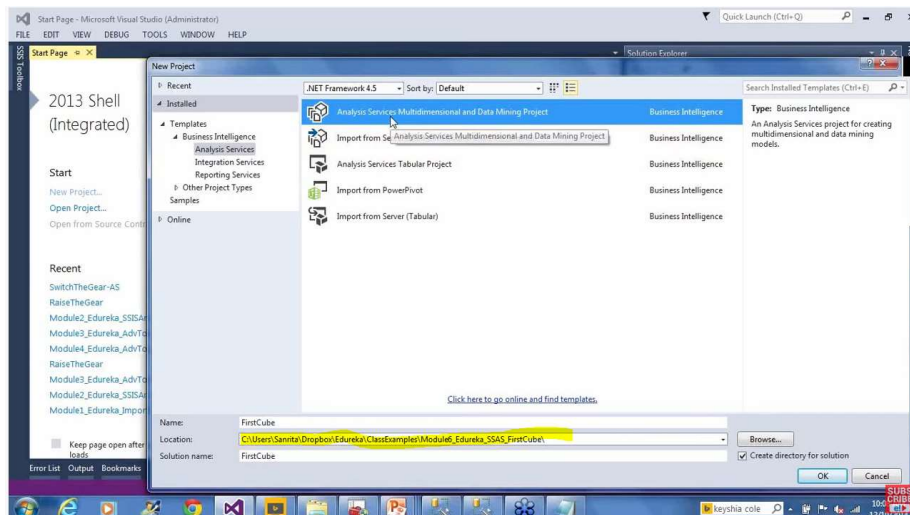


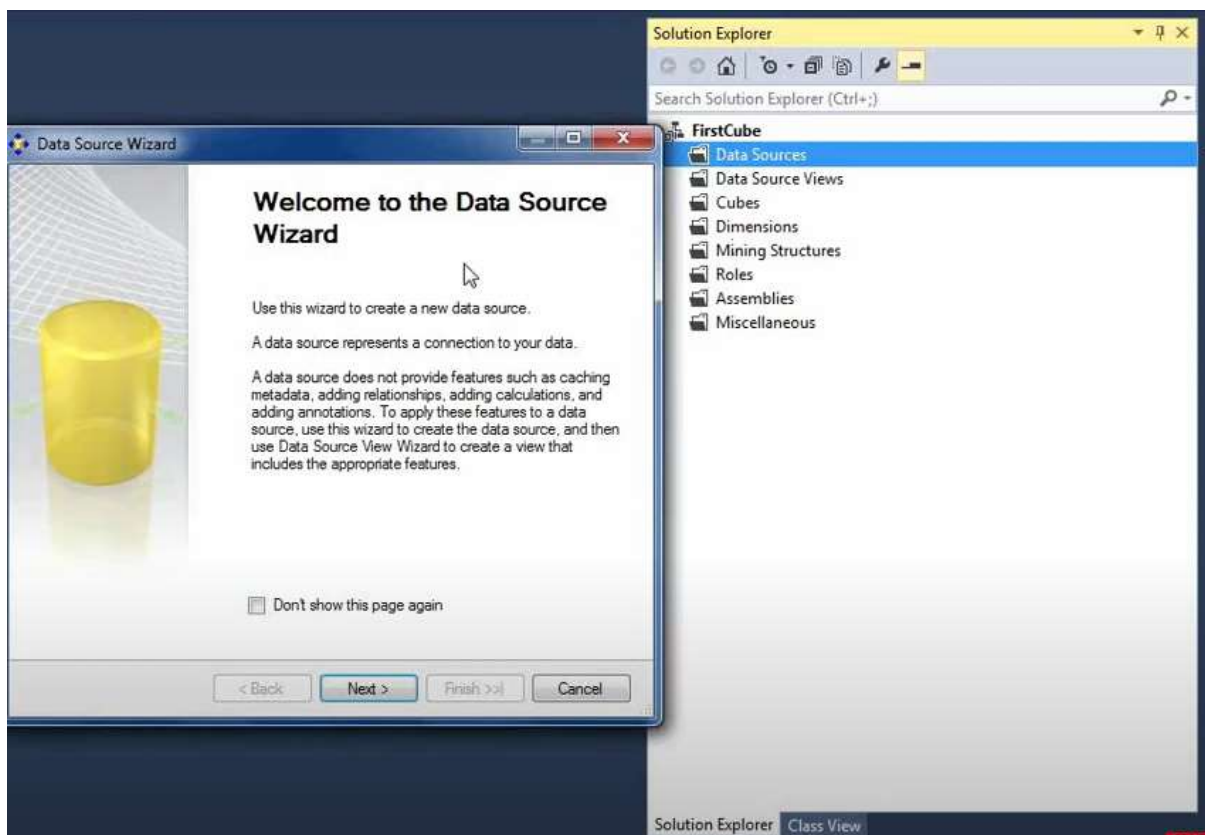
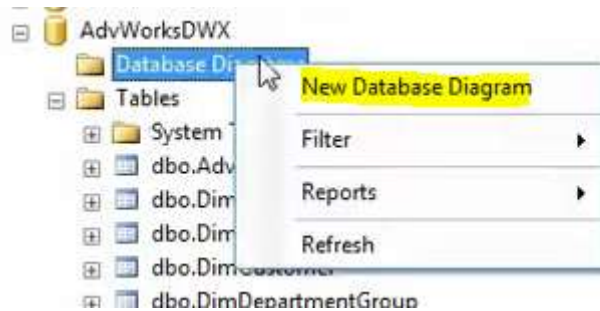
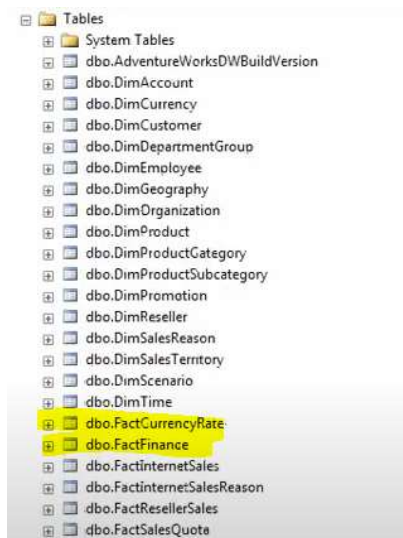
SSAS

New Project

<https://www.youtube.com/watch?v=CgtCRK9rTGs>



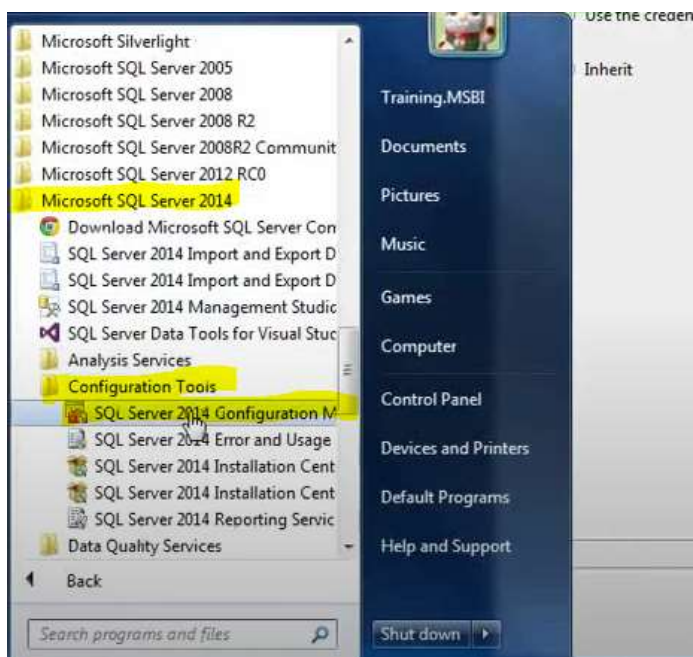
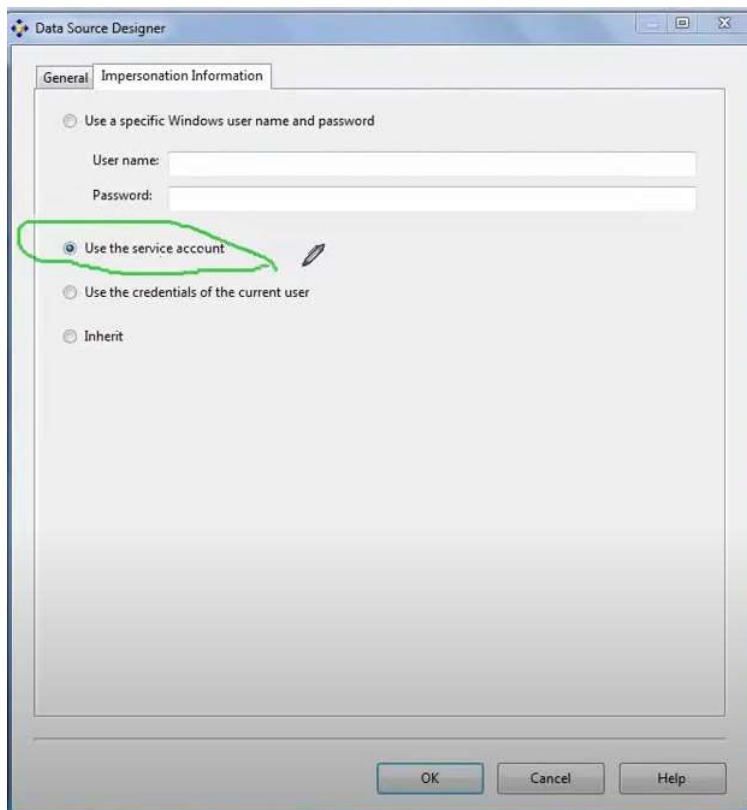
AdventureWork DB:



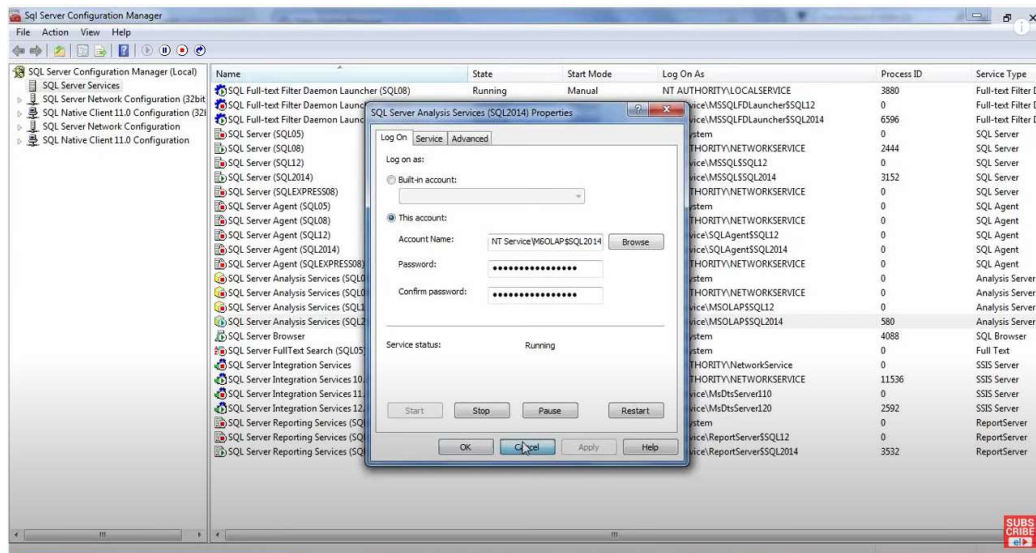
Choose Connection to Server and DB

Impersonation Information

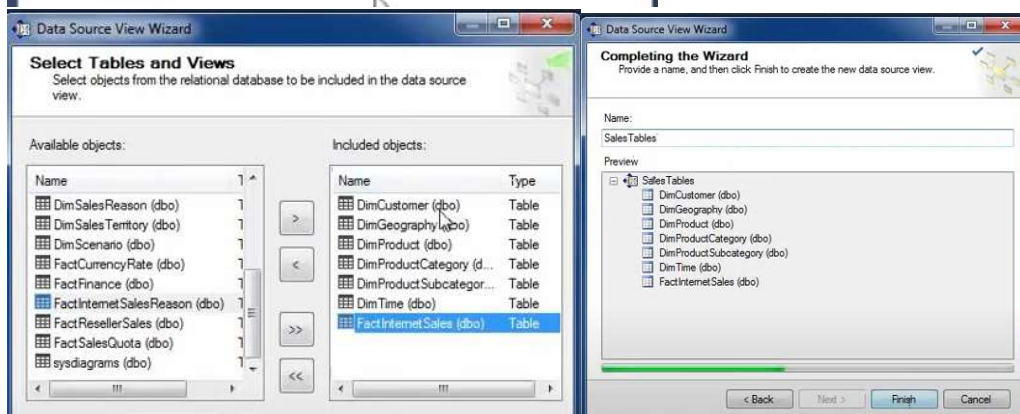
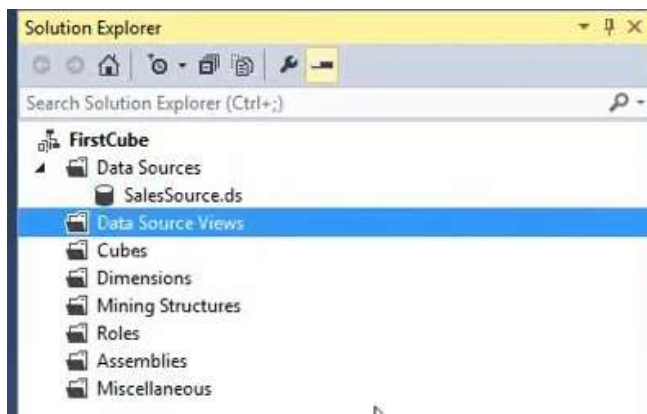
Tells the DB SSAS engine how to connect to SQL Server source:



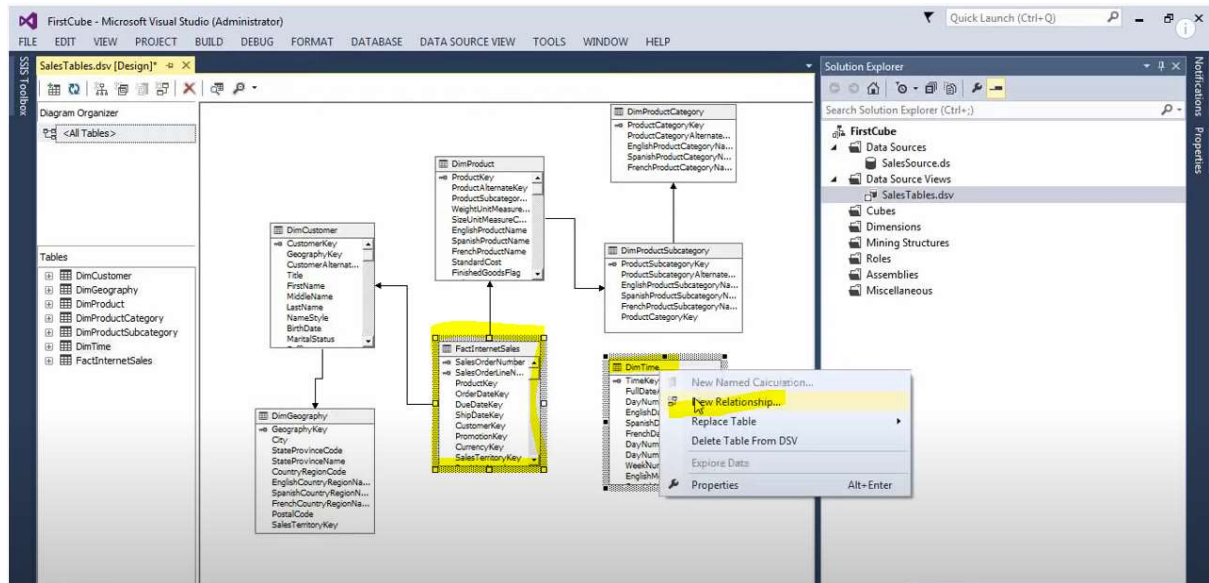
List of services that are running, double click on SQL Server Analysis Services will show the Service Account that is being used by that Service:



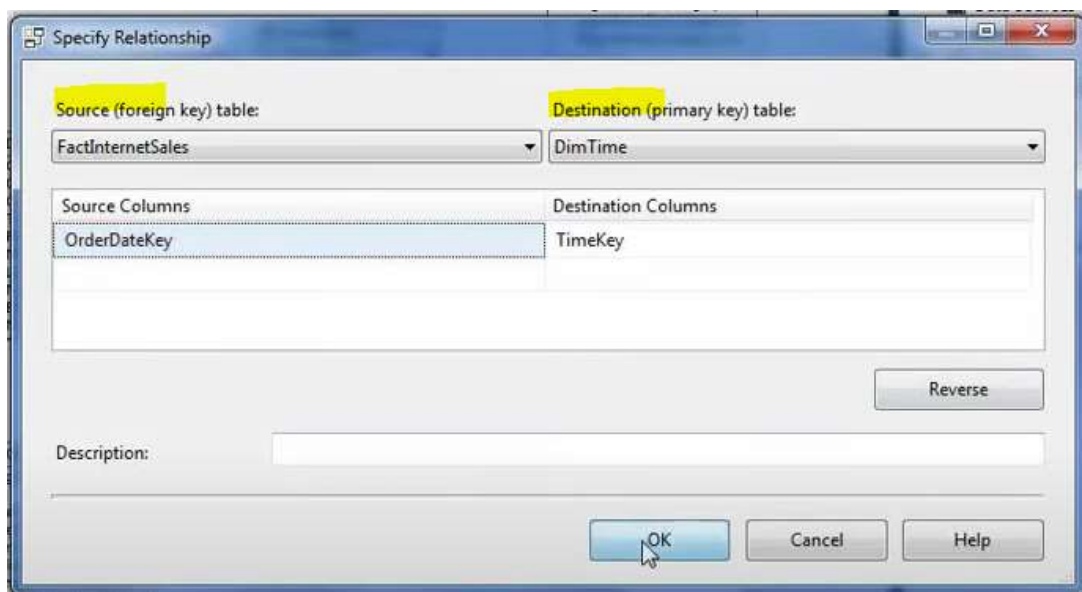
After defining the Data Sources (connections) it is about creating the Data Source Views i.e. the tables we would like to use:



The result is a Snowflake Schema rather than a Star Schema because not all of the tables are connected directly to the FACT table:

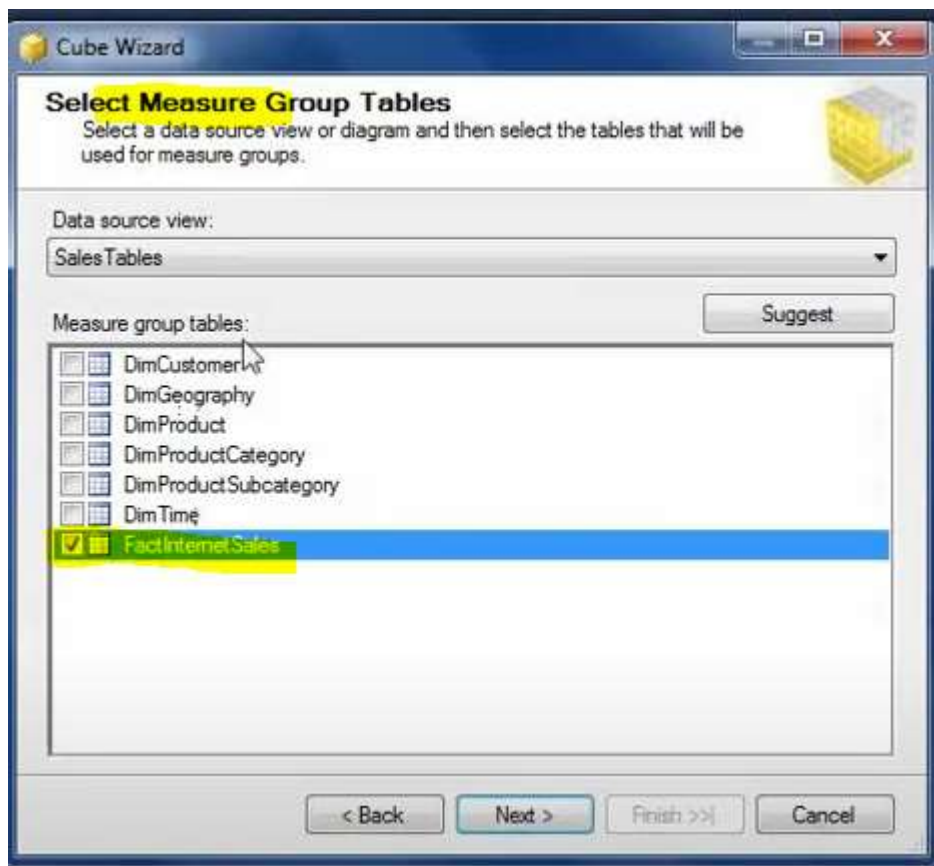


New Relationship for not linked table:

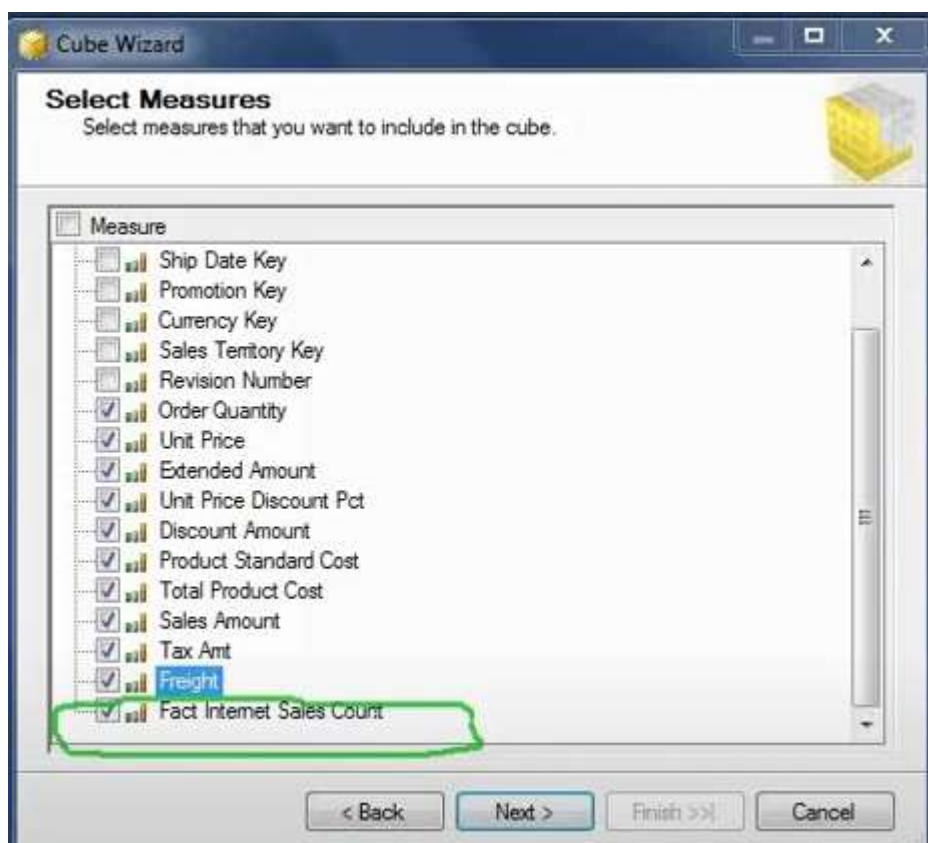


The data model has been established the Cube can be defined:

First the Measures have to be selected:

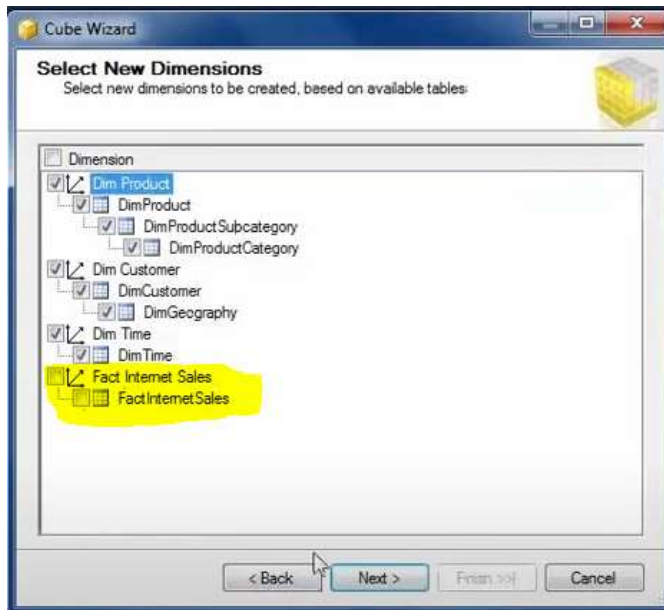


After the Fact=Measure table has been selected the measures within that table need to be selected but not the surrogate/linking keys to the dimensions:

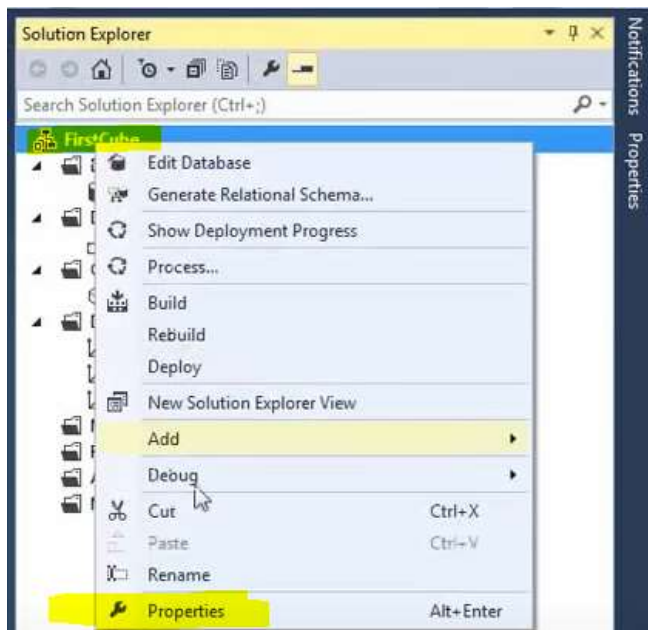


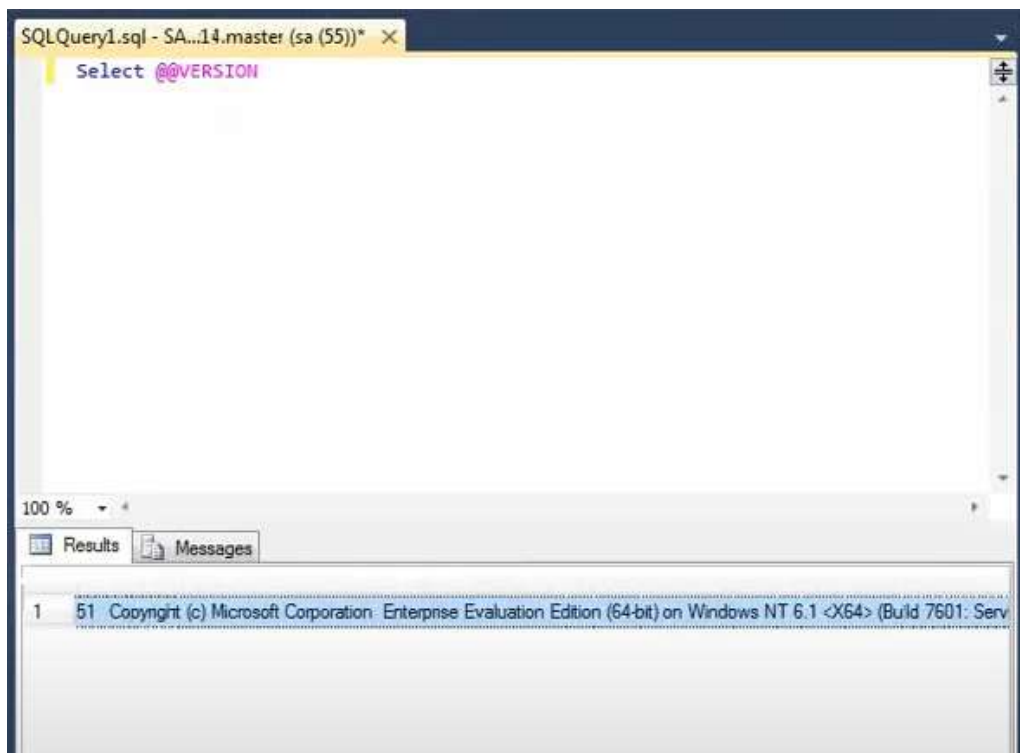
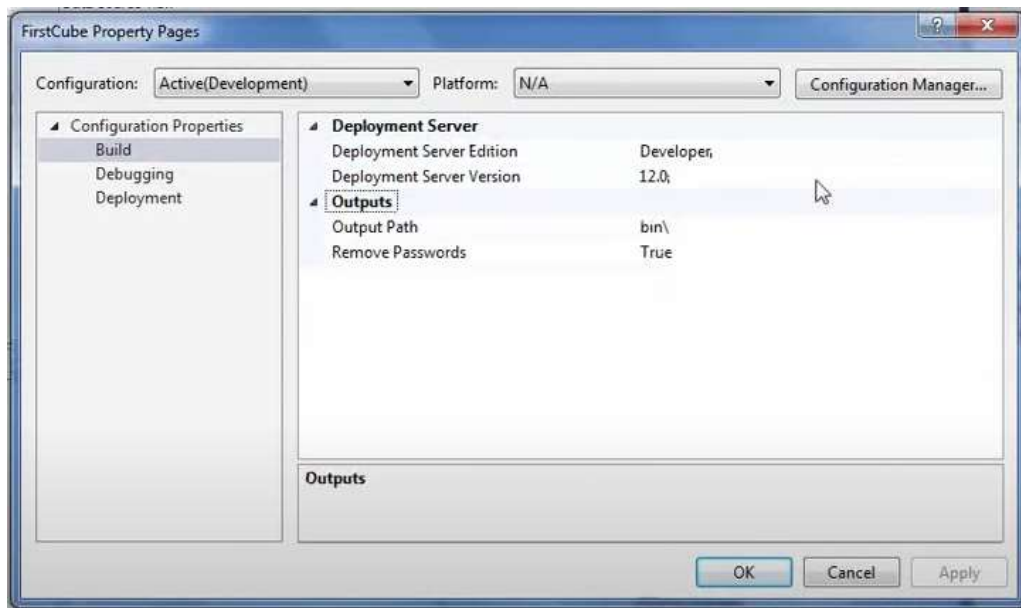
In this example, Fact Internet Sales Count is added by the engine (it should not be selected)

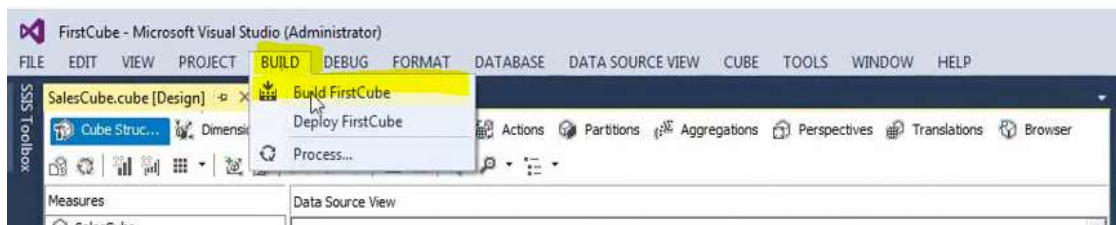
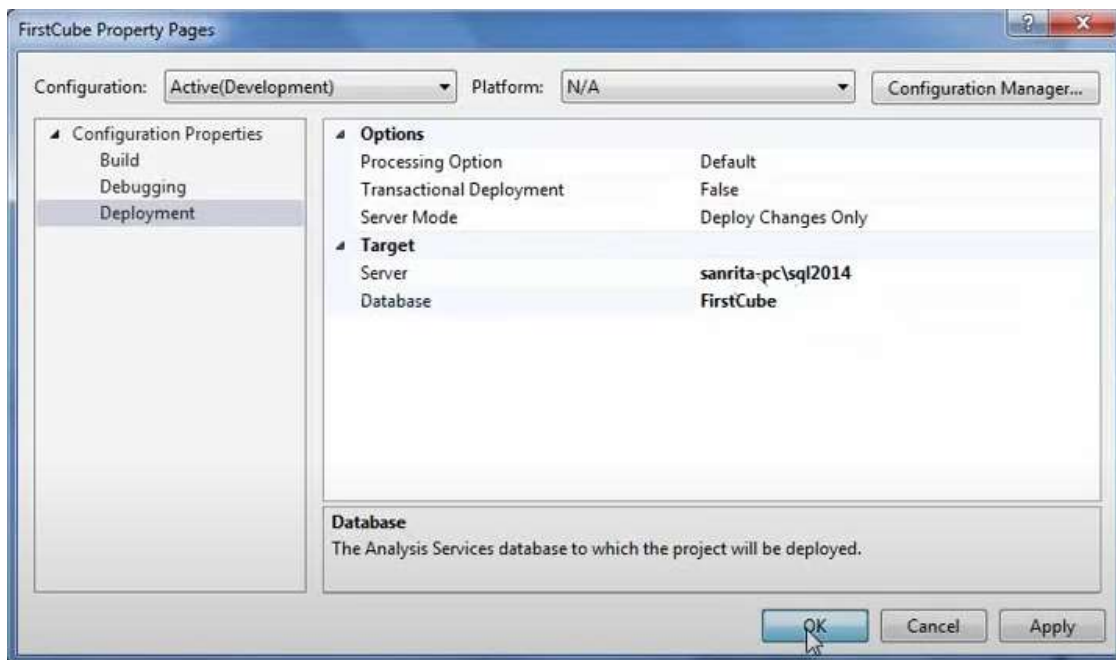
Thereafter, the dimension tables need to be selected **without the Fact table!**:



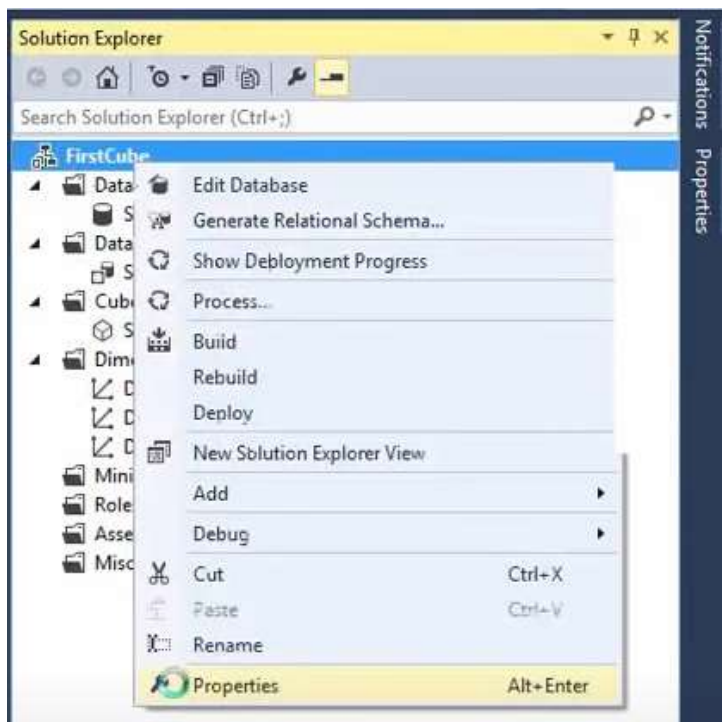
After creation of the CUBE, it can be deployed:



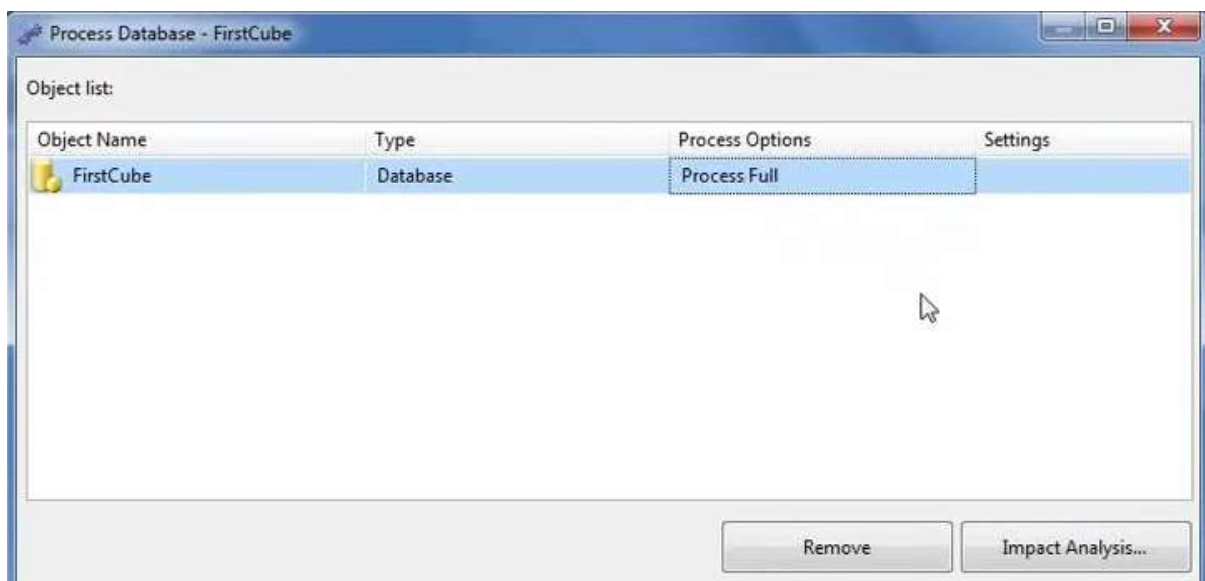
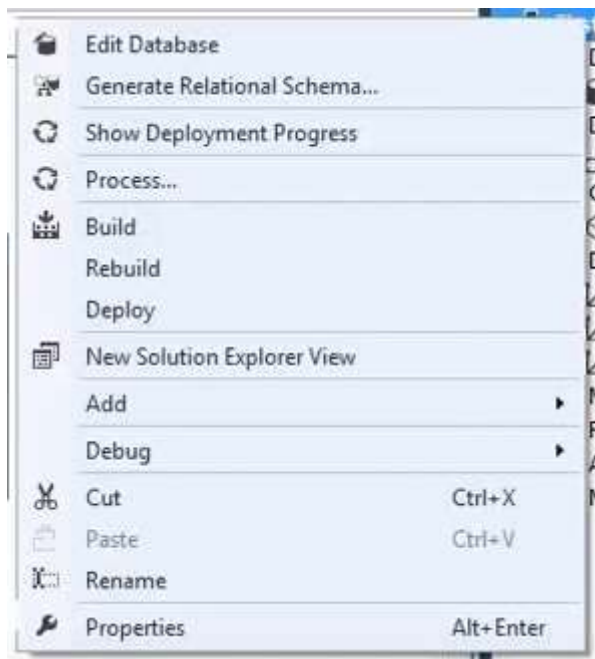




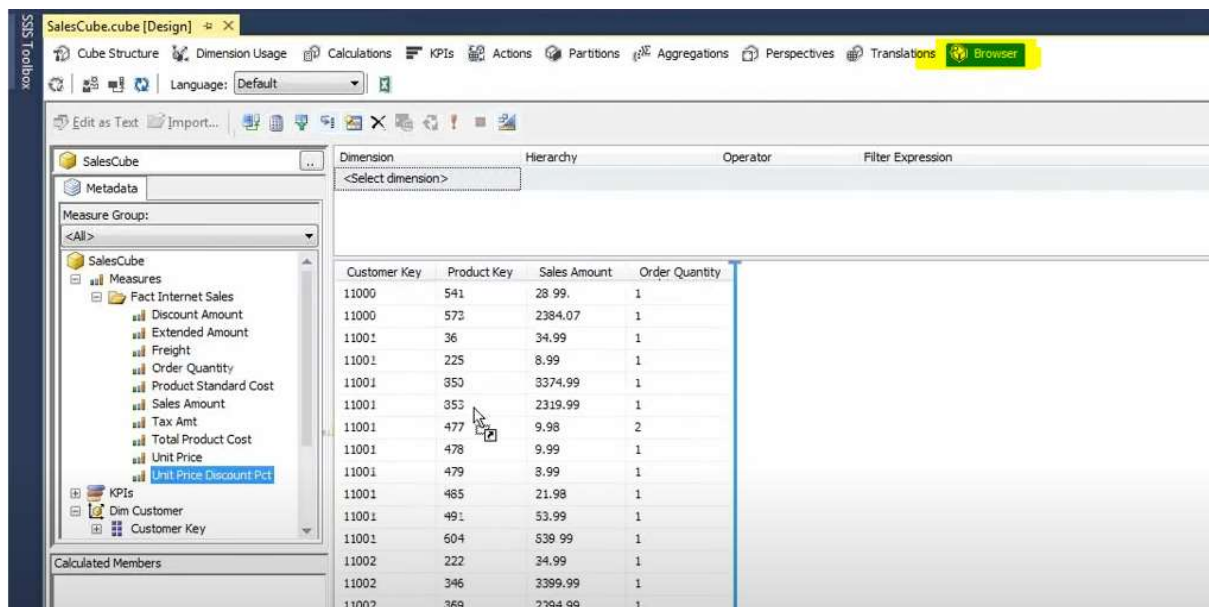
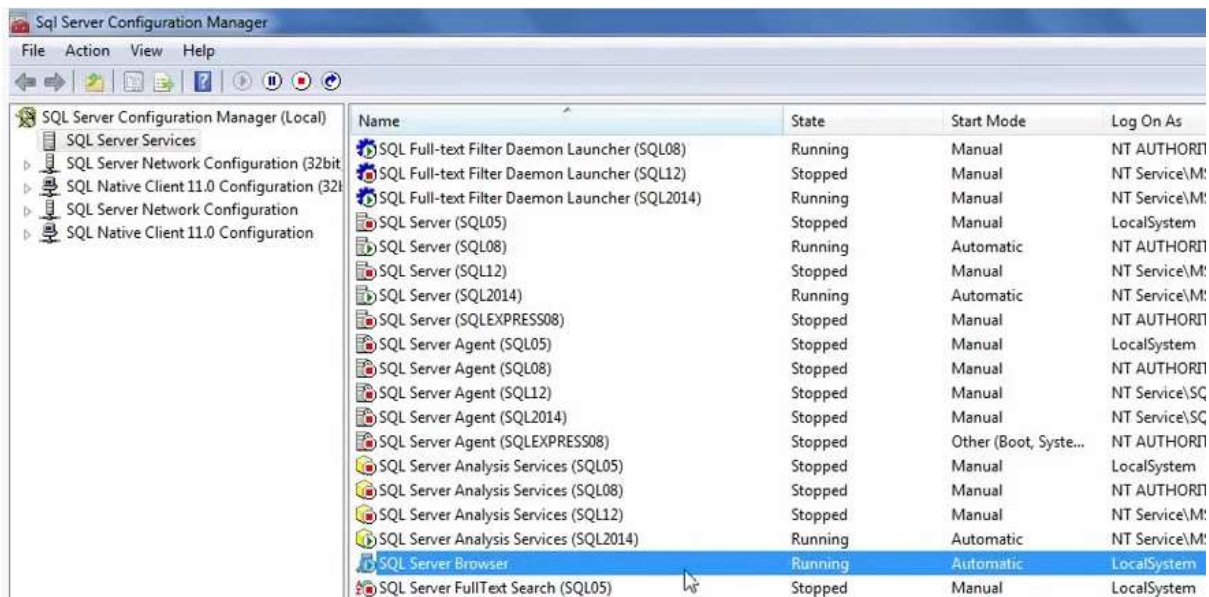
After Build (= setting the properties) the Deployment can take place:



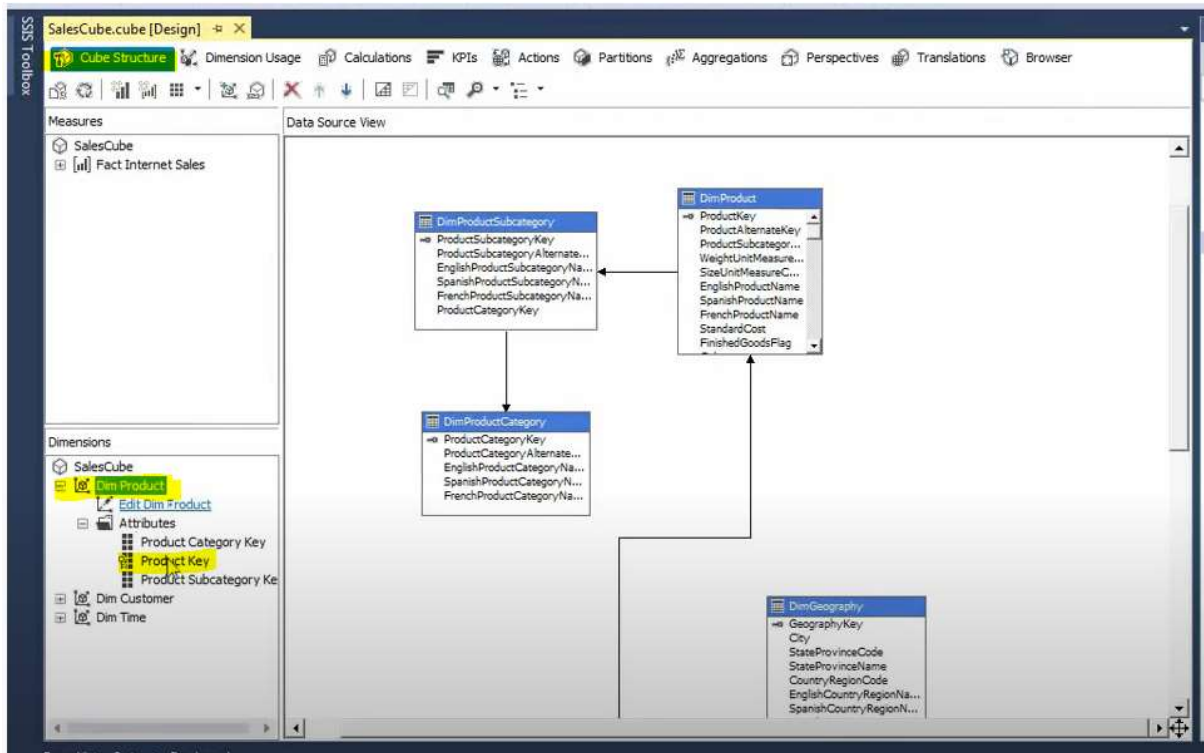
Once the deployment has taken place it needs to be processed i.e. SSAS needs to create aggregations for the cube by applying a right-click, Process...



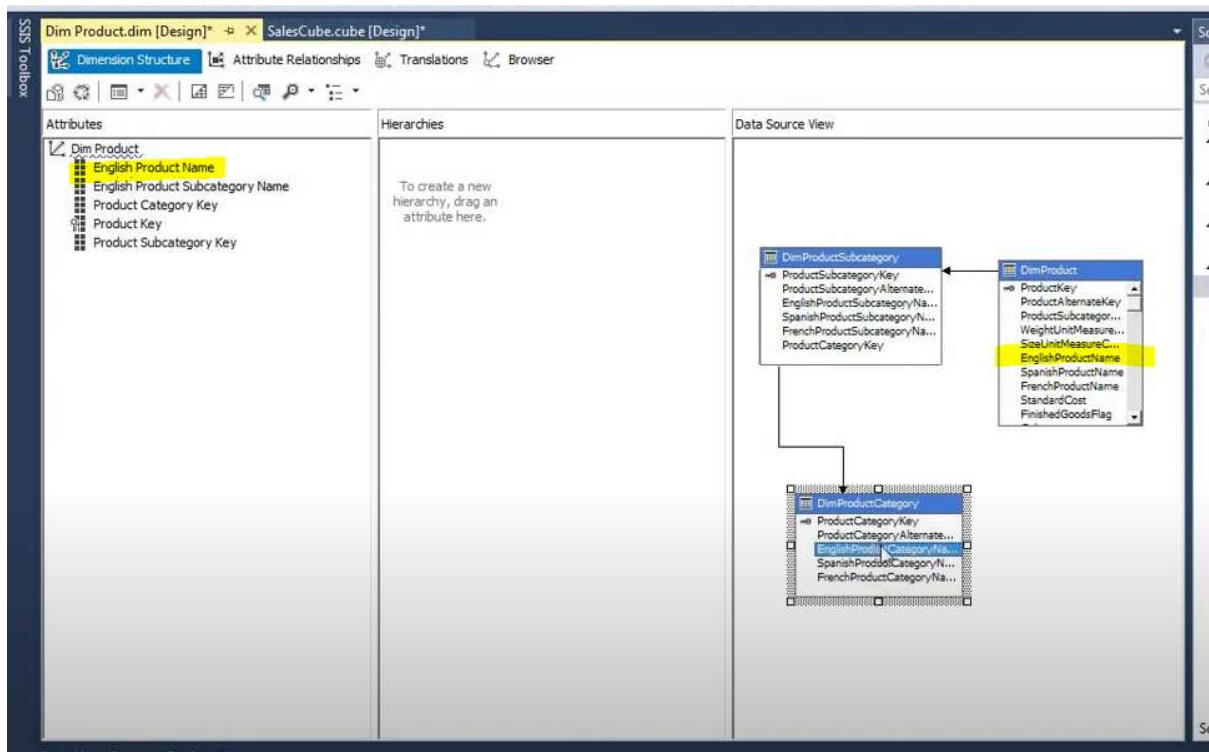
Now the Cube can be used. This needs the SQL Server Browser to be up and running:



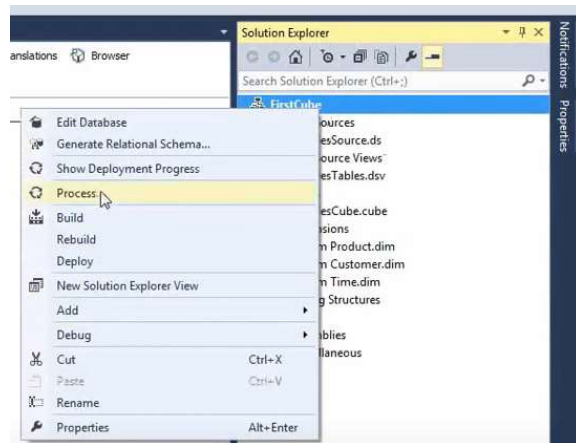
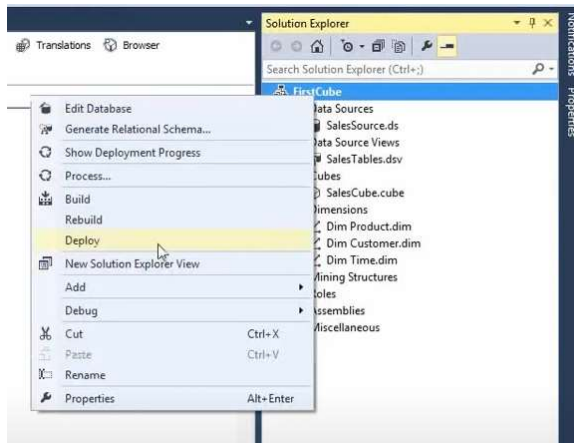
The column ProductKey is not telling much without the description which can be obtained as follows:



Click above **Edit Dim Product** and drag and drop in the fields:



After making these changes the need to be made available. This is done by **1. Deploying** and **2. Processing**:



Then there needs to be a reconnection to have this change available in the browser

This screenshot shows the 'SalesCube.cube [Design]' window. On the left, the 'SalesCube' project is expanded, showing 'Measures' and 'KPIs'. The main area displays a table with the following data:

Customer Key	Product Key	Sales Amount	Order Quantity	Unit Price Discount Pct	Tax Amt
11000	33	34.99	1	0	2.7992
11000	344	3399.99	1	0	271.9992
11000	353	2319.99	1	0	185.5992
11000	485	21.98	1	0	1.7584
11000	488	53.99	1	0	4.3192
11000	530	4.99	1	0	0.3992
11000	541	28.99	1	0	2.3192
11000	573	2384.07	1	0	190.7256
11001	36	34.99	1	0	2.7992
11001	225	8.99	1	0	0.7192
11001	350	3374.99	1	0	269.9992
11001	353	2319.99	1	0	185.5992
11001	477	9.98	2	0	0.7984
11001	478	9.99	1	0	0.7992
11001	479	8.99	1	0	0.7192
11001	485	21.98	1	0	1.7584
11001	491	53.99	1	0	4.3192

At the bottom of the window, a yellow message bar states: "The cube has been reprocessed on the server. To prevent possible browsing errors, click [Reconnect](#). To hide this message, click [here](#)."

FirstCube - Microsoft Visual Studio (Administrator)

FILE EDIT VIEW PROJECT BUILD DEBUG DATABASE CUBE TOOLS WINDOW HELP

SalesCube.cube [Design] X

SSS Toolbox

Cube Structure Dimension Usage Calculations KPIs Actions Partitions Aggregations Perspectives Translations Browser

Language: Default

Edit as Text Import...

SalesCube

Metadata

Measure Group: <All>

SalesCube

- Fact Internet Sales
 - Discount Amount
 - Extended Amount
 - Freight
 - Order Quantity
 - Product Standard Cost
 - Sales Amount
 - Tax Amt
 - Total Product Cost
 - Unit Price
 - Unit Price Discount Pct
- KPIs
- Dim Customer

Calculated Members

Dimension	Hierarchy	Operator	Filter Expression	Param...
<Select dimension>				
English Country Region ...	English Product Category N...	Calendar Year	Sales Amount	
Australia	Accessories	2003	57381.4699999993	
Australia	Accessories	2004	81309.1600000011	
Australia	Bikes	2001	1309047.1978	
Australia	Bikes	2002	2154284.8835	
Australia	Bikes	2003	2947789.48310008	
Australia	Bikes	2004	2440928.44000004	
Australia	Clothing	2003	28613.2600000004	
Australia	Clothing	2004	41646.6900000001	
Canada	Accessories	2003	43618.9200000003	
Canada	Accessories	2004	59758.9299999992	
Canada	Bikes	2001	146829.8074	
Canada	Bikes	2002	621602.3823	
Canada	Bikes	2003	471445.472399998	
Canada	Bikes	2004	581424.729999998	
Canada	Clothing	2003	20720.0700000001	
Canada	Clothing	2004	32444.5500000005	
France	Accessories	2003	25985.4800000006	
France	Accessories	2004	37421.3000000006	

Now information it can be **sliced** (where... in SQL):

SalesCube.cube [Design] X

FILE EDIT VIEW PROJECT BUILD DEBUG DATABASE CUBE TOOLS WINDOW HELP

SalesCube.cube [Design] X

SSS Toolbox

Cube Structure Dimension Usage Calculations KPIs Actions Partitions Aggregations Perspectives Translations Browser

Language: Default

Edit as Text Import...

SalesCube

Metadata

Measure Group: <All>

SalesCube

- Customer Key
- English Country Region Name
- First Name
- Geography Key
- Last Name
- Dim Product
 - English Product Category Name
 - English Product Name
 - English Product Subcategory Name
 - Product Category Key
 - Product Key
 - Product Subcategory Key
- Dim Time:
 - Calendar Quarter
 - Calendar Year

Calculated Members

Dimension	Hierarchy	Operator	Filter Expression	Parameters
Dim Time	Calendar Year	Equal	{ 2004 }	
<Select dimension>				
English Country Region ...	English Product Categor...	Calendar Year	Sales Amount	
Australia	Accessories	2004	81309.1600...	
Australia	Bikes	2004	2440928.44...	
Australia	Clothing	2004	41646.6900...	
Canada	Accessories	2004	59758.9299...	
Canada	Bikes	2004	581424.729...	
Canada	Clothing	2004	32444.5500...	
France	Accessories	2004	37421.3000...	
France	Bikes	2004	870221.819...	
France	Clothing	2004	14535.9199...	
Germany	Accessories	2004	36908.6000...	
Germany	Bikes	2004	1025888.90...	
Germany	Clothing	2004	14093.2599...	
United Kingdom	Accessories	2004	43481.3500...	
United Kingdom	Bikes	2004	1148585.75...	
United Kingdom	Clothing	2004	18219.16	
United States	Accessories	2004	148170.910...	
United States	Bikes	2004	3095275.19...	
United States	Clothing	2004	80585.0600...	

Analysis Services Multidimensional vs Tabular

<https://www.youtube.com/watch?v=Q1MYRi9-DCI>

Why Analysis Services?

- Semantically models the business for end users
- Provides an abstraction layer between the database and reporting/client tools
- Pre-aggregates data for fast querying
- Delivers pre-built calculations for certain data domains
- Offers an accessible way for users to query and analyze their information

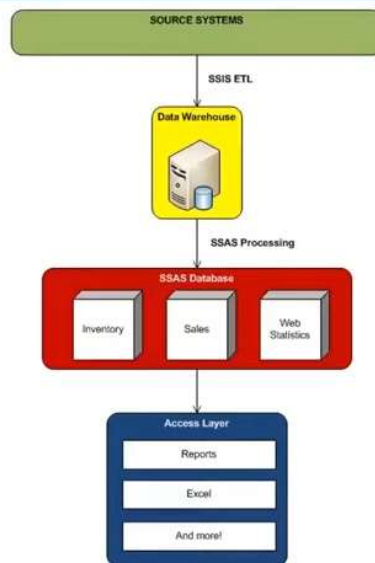
= a friendly analytical tool that users love!

What is Analysis Services?

- An analytical and reporting tool
- A service that you install as part of SQL Server
- Container for databases and cubes, which are physical objects

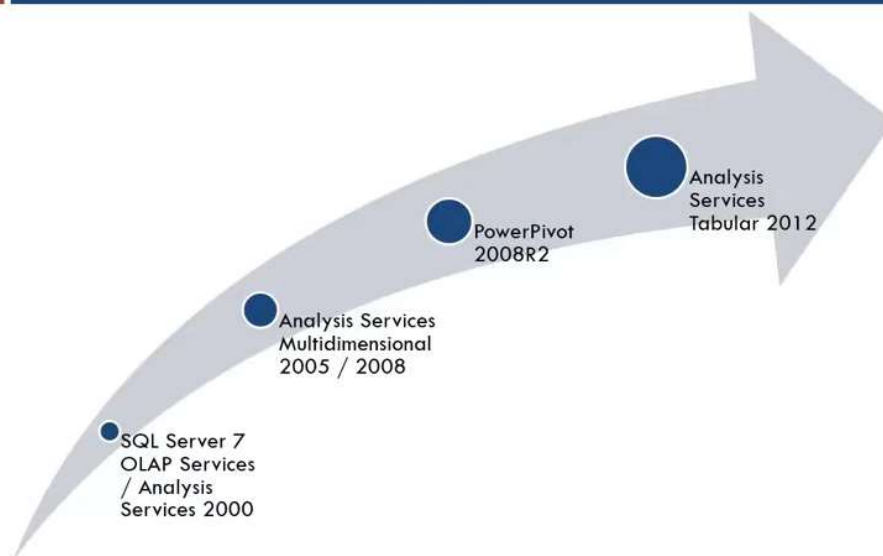


Where does Analysis Services fit?



Power query in Excel includes in memory columnar data store.

How did Analysis Services start?



Let's start with Multidimensional

- Multidimensional databases are OLAP cubes
- Most features of a multidimensional model are included in editions: Standard, BI, Enterprise
- Multidimensional databases contain the following:
 - Data sources: links to the underlying data used in the cubes and dimensions
 - Cubes: the objects that store aggregated values in a star schema containing facts and dimensions
 - Dimensions: the shared objects that are included in the cube

Multidimensional Data

- Underlying data is a data warehouse / dimensional model with data from:
 - Access, SQL Server, Oracle, Teradata, etc.
- Information is accessed through:
 - MOLAP - multidimensional
 - ROLAP - relational
 - HOLAP - hybrid
- The query language is MDX (multidimensional expressions)

Molap holds aggregates (speed) whereas Rolap gets the latest data via querying SSAS. MDX can deal with CUBES vs. SQL which deals with rows and columns. MDX can deal with Rows, Columns, Sets, Pages and more.

Multidimensional

- Objects in the AdventureWorks multidimensional model include one data source, multiple data source views, two cubes, and many dimensions



Multidimensional Pros

- Advanced features and properties
- Not limited by memory
- Can use dimension and cell-level security
- Excel PivotTable Writeback functionality

Tabular Model

And moving onto Tabular...

- A tabular model is a **columnar, in-memory** database
- Most features of a tabular model are included in editions: BI, Enterprise
- Tabular databases contain the following:
 - Data sources: links to the underlying data used in the tables
 - Tables: the objects that store data from the data sources

Tabular Data

- Available data sources include:
 - Access, SQL Server, Oracle, Teradata, text files, Excel files, data feeds, ODBC data sources
- Information is accessed through:
 - InMemory
 - DirectQuery
- The query language is DAX (data analysis expressions), but can also interpret MDX

- The tabular model contains one model file containing all objects



Feature Comparison

	Multidimensional	Tabular
Actions	Yes	No
Aggregation objects	Yes	No
Calculated Measures	Yes	Yes
Custom Assemblies	Yes	No
Custom Rollups	Yes	No
Distinct Count	Yes	Yes (via DAX)
Drillthrough	Yes	Yes
Hierarchies	Yes	Yes
KPIs	Yes	Yes
Linked measure groups	Yes	No
Many-to-many relationships	Yes	No
Parent-child Hierarchies	Yes	Yes (via DAX)
Partitions	Yes	Yes
Perspectives	Yes	Yes
Semi-additive Measures	Yes	Yes
Translations	Yes	No
User-defined Hierarchies	Yes	Yes
Writeback	Yes	No

<http://msdn.microsoft.com/en-us/library/hh212940.aspx>

Tabular Pros

- Easy to develop
- Fast querying
- More data sources (includes text files, Excel files, data feeds)
- Sometimes higher compression
- Supports MDX and DAX
- Power View in Office 365 / Power BI sites as a source

So Which One?

- It depends on:
 - Available SQL version and edition
 - Existing underlying data sources
 - Desired client tool
 - Preferred advanced features
 - Current server memory
 - Staff and technology knowledge

Summary

- Multidimensional and Tabular models both have their benefits and disadvantages
- Understand your analysis needs and how they fit into both models
- Pick the model that makes the most sense for you!

“Choose your friends wisely-they will make or break you.” – J. Willard Marriot

Dbo.DimTime

<http://elhorousama-blog.com/en/dimtime-partie1/>

<http://elhorousama-blog.com/en/dimtime-partie2/>

SSAS Slowly Changing Dimension

https://www.youtube.com/watch?v=P1An0_LSlvk&feature=emb_logo