

**College of Computer and Information Sciences**

**Department of Information Systems**

**IS 466: Decision Support Systems Project Report**

**1st Semester 2019**

**Decision Support Systems Project**

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# Abstract

The project is about creating and processing data cubes in the database. In this project we should do four steps based on Project Requirement as following:

1. The full snowflake schema for the shops supply cube.
2. Query samples for the OLAP operations in SQL format & SQL Server.
3. Table that display information of supply quantity by considering all levels of dimension hierarchies.
4. Example of OLAP operations by using MDX query language.

So, in this project we will consider of all those steps.

# Introduction

We created the first step snowflake schema by using SQL Server Data Tools. Tools that we used in our project are as following:

1. SQL server 2008 (for generating and creating the database).
2. SQL server management studio 2012 for creating our schema and Analysis Manager).
3. SQL data tools (for creating the data cube).

# Snowflake Schema

Snowflake Schema is type of multidimensional model which is used for data warehouse. In snowflake schema, the fact tables, dimension tables as well as sub dimension tables are contained. This schema forms a snowflake with fact tables, dimension tables as well as sub-dimension tables. [See Figure 1]

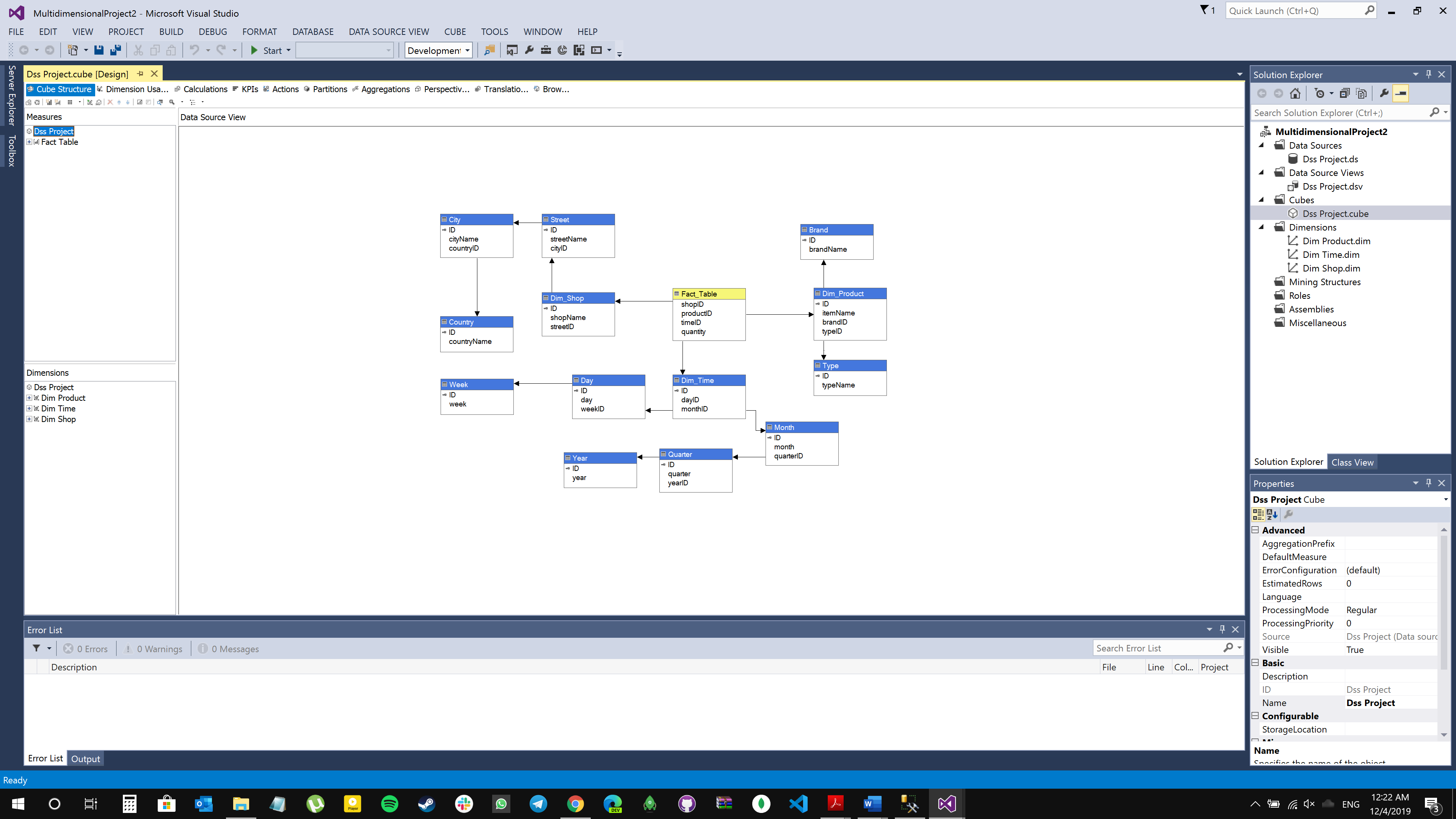


Figure 1: Snowflake Schema

# OLAP Operations

We have three type of OLAP operations drill-down, roll-up, and slice. For each operation we will do a query samples in SQL format and under Analysis Manager of SQL Server 2008.

* 1. Drill Down

This is a reverse of the ROLL UP operation discussed above. The data is aggregated from a higher level to a lower level data. [Please see Figure 2&3]

* + 1. SQL Format

Select Dim\_Shop.shopName , City.cityName ,Dim\_Time.ID as TimeID , Dim\_Product.itemName,

Type.typeName, Sum(Fact\_Table.Quantity) as Quantity

from Dim\_Shop , Dim\_Product, City, Dim\_Time ,Fact\_Table, Street, Country, Type

Where Dim\_Shop.ID = Fact\_Table.shopID AND Dim\_Product.ID = Fact\_Table.productID AND

Dim\_Time.ID = Fact\_Table.timeID AND Street.ID = Dim\_Shop.streetID AND

Country.ID=city.CountryID AND Street.CityID = City.ID AND Type.ID = Dim\_Product.typeID

GROUP By Dim\_Shop.shopName,City.cityName, Dim\_Time.ID , Dim\_Product.itemName, Type.typeName

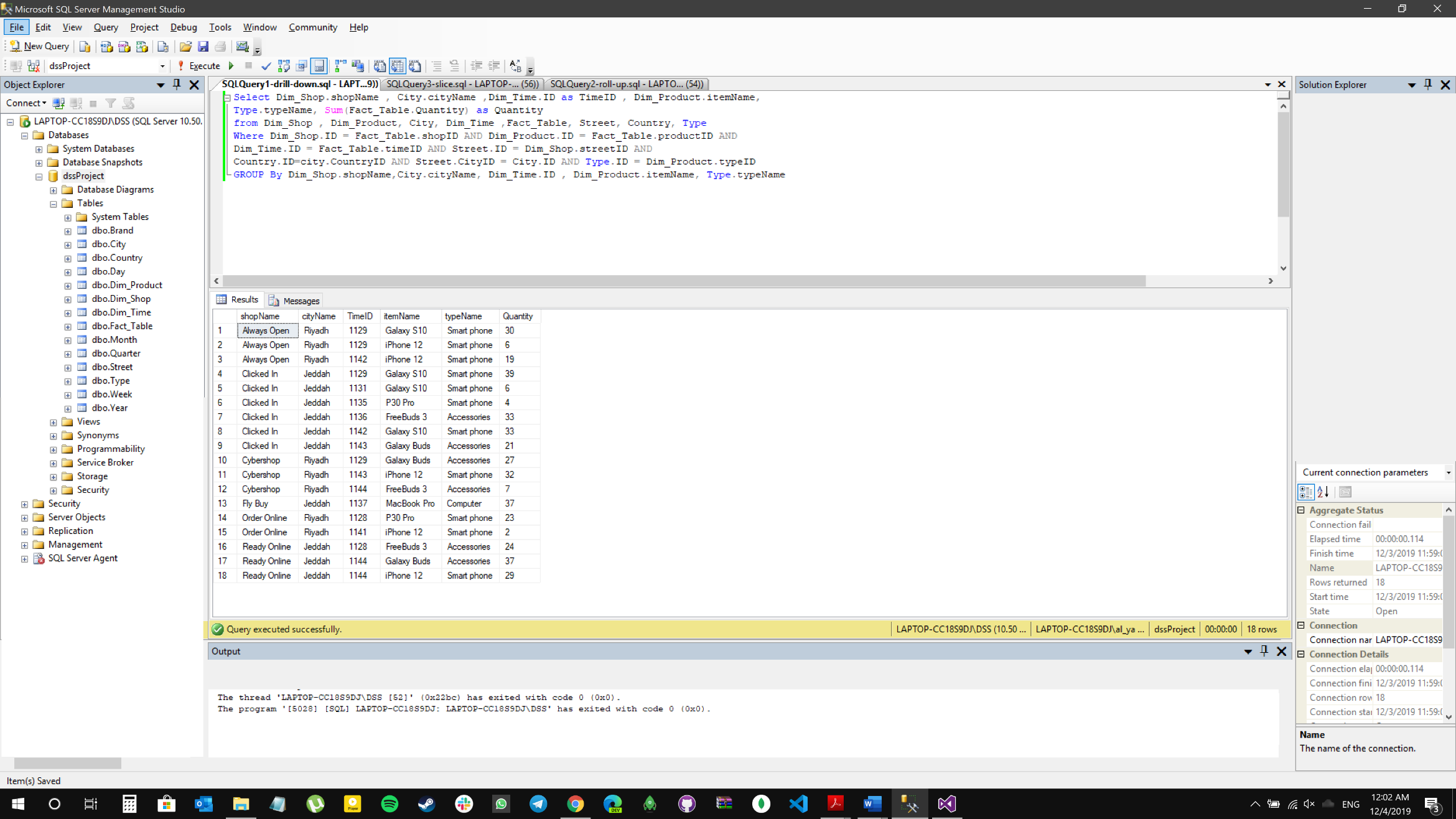


Figure 2: Drill Down SQL Format

* + 1. SQL Server

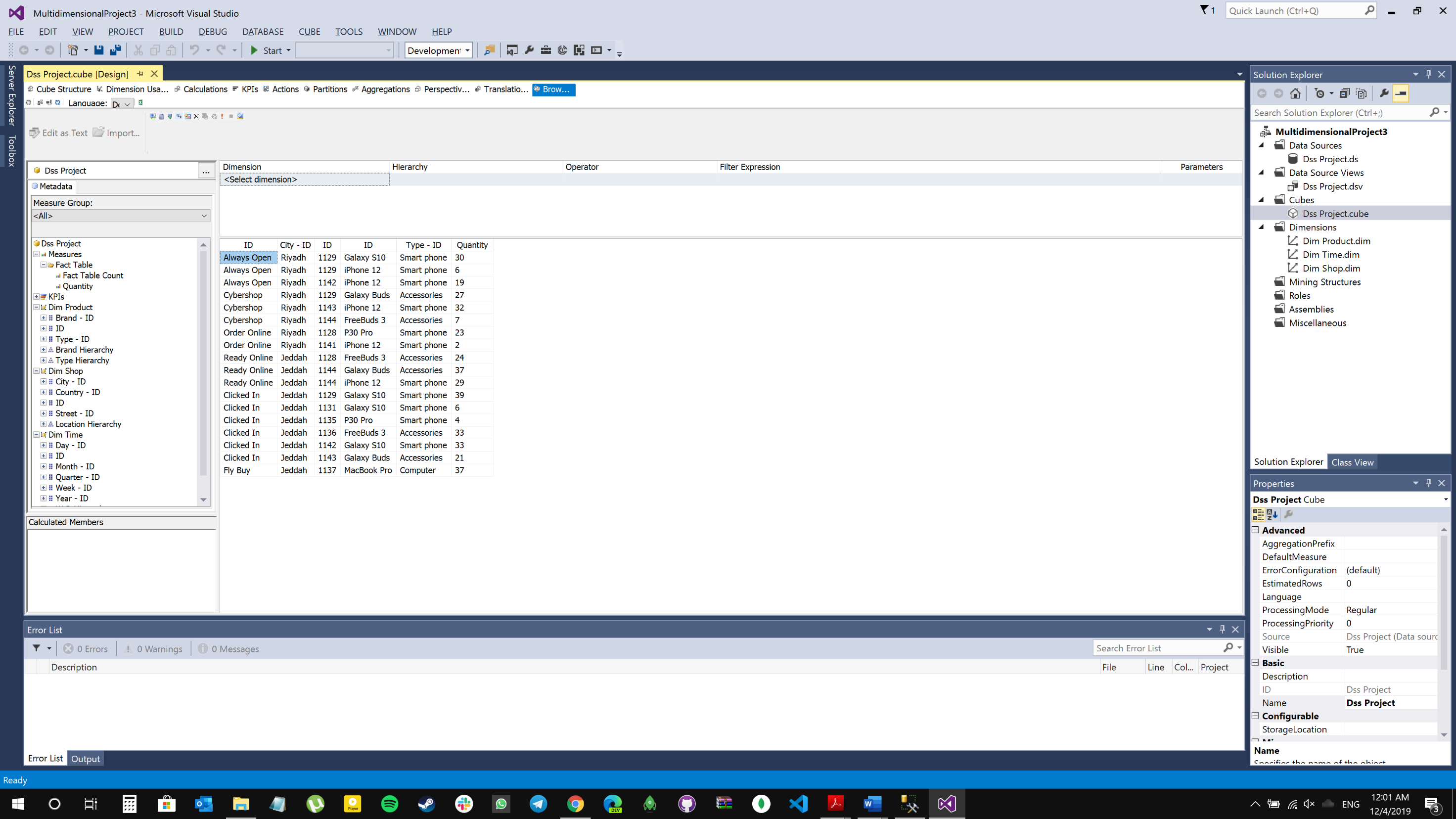


Figure 3: Drill Down SQL Server

* 1. Roll Up

ROLLUP is used in tasks involving subtotals. It creates subtotals at any level of aggregation needed, from the most detailed up to a grand total i.e. climbing up a concept hierarchy for the dimension such as time or geography.

* + 1. SQL Format

Select Dim\_Product.itemName , SUM(Fact\_Table.quantity)

from Dim\_Product , Fact\_Table

where Dim\_Product.ID = Fact\_Table.productID

Group By Dim\_Product.itemName [See Figure 4]

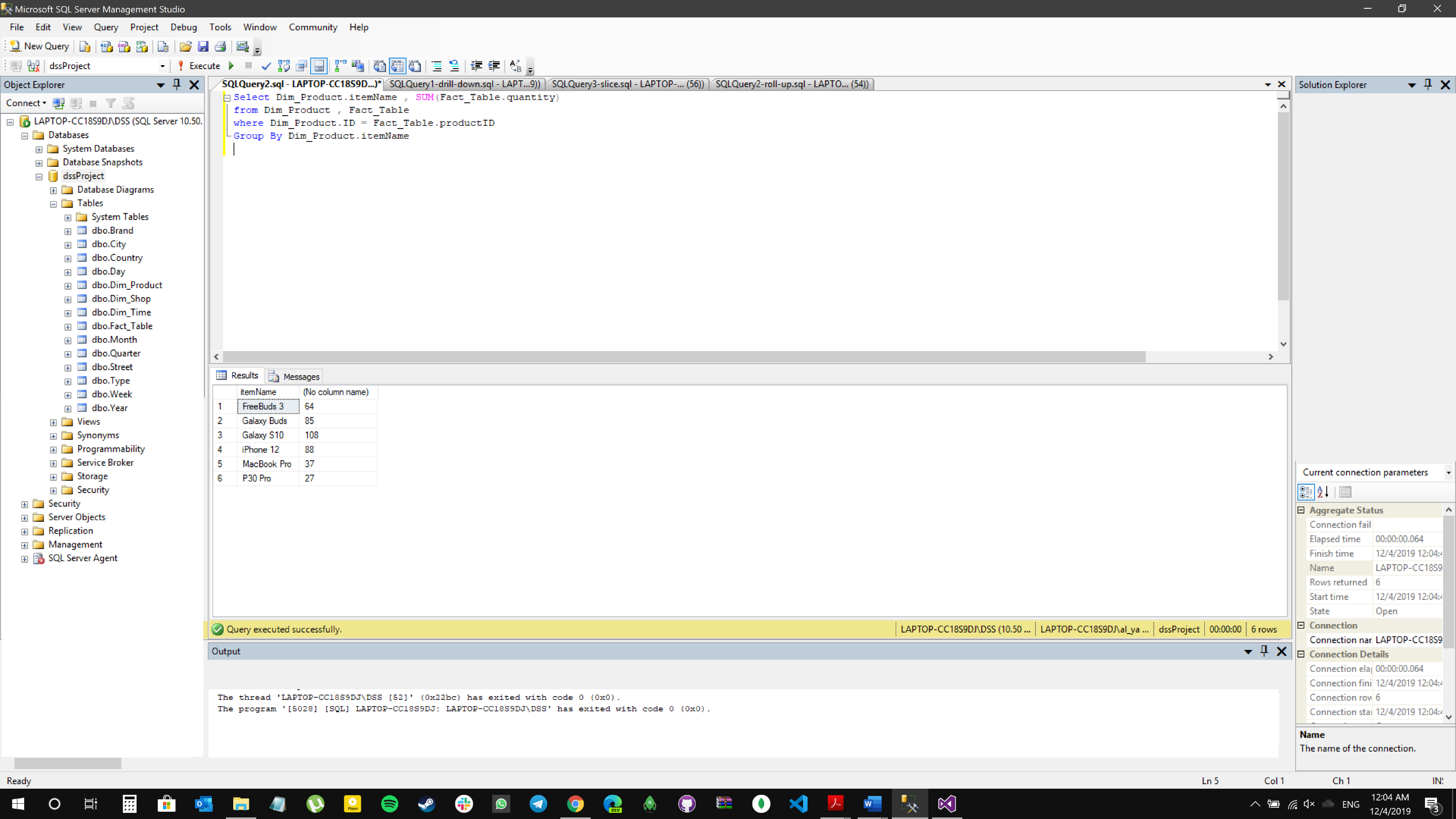


Figure 4: Roll Up SQL Format

* + 1. SQL Server

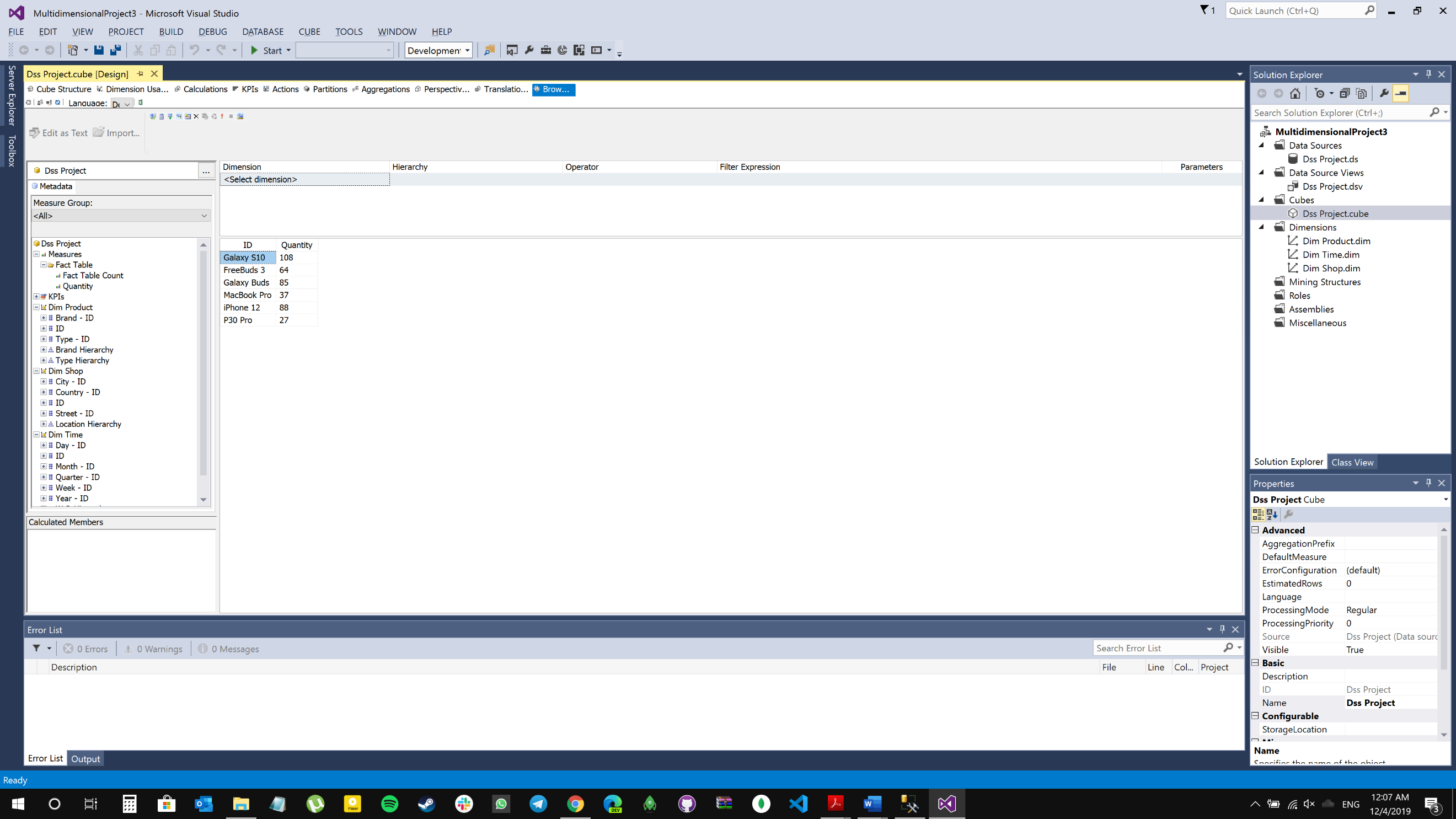


Figure 5: Roll Up SQL Server

* 1. Slice

A slice in a multidimensional array is a column of data corresponding to a single value for one or more members of the dimension.

* + 1. SQL Format

Select Dim\_Shop.shopName , City.cityName , Dim\_Time.ID ,Dim\_Product.itemName, SUM(Fact\_Table.quantity) as Quantity

from Dim\_Shop , Dim\_Product , Dim\_Time , Fact\_Table , City, Street, Country

where Dim\_Shop.ID = Fact\_Table.shopID AND Dim\_Product.ID = Fact\_Table.productID AND Dim\_Time.ID = Fact\_Table.timeID AND

Street.ID = Dim\_Shop.streetID AND Country.ID=city.CountryID AND Street.CityID = City.ID AND

Dim\_Shop.shopName = 'Always Open'

Group By Dim\_Shop.shopName, City.cityName, Dim\_Time.ID , Dim\_Product.itemName [See Figure 6]

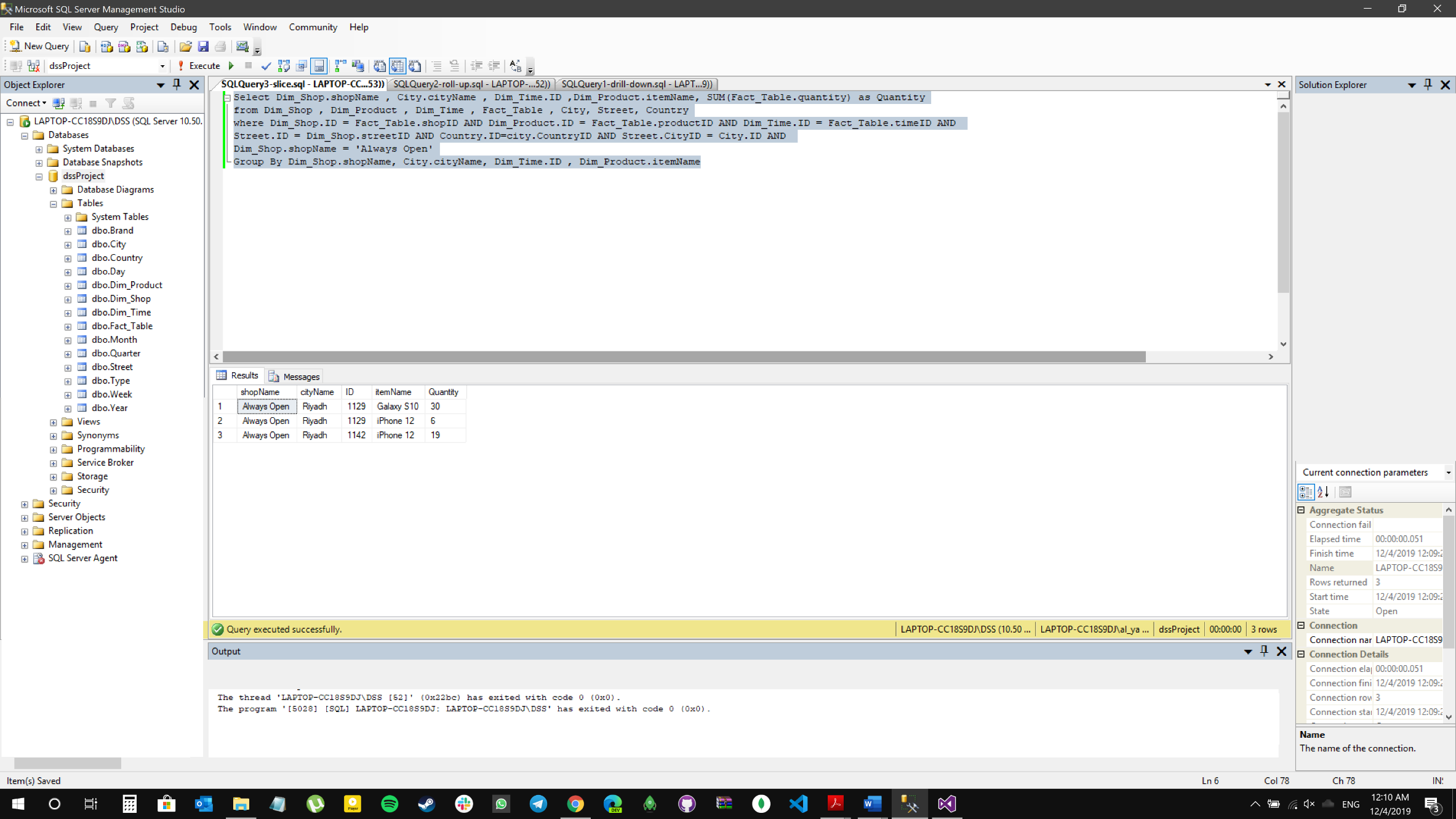


Figure 6: Slice SQL Format

* + 1. SQL Server

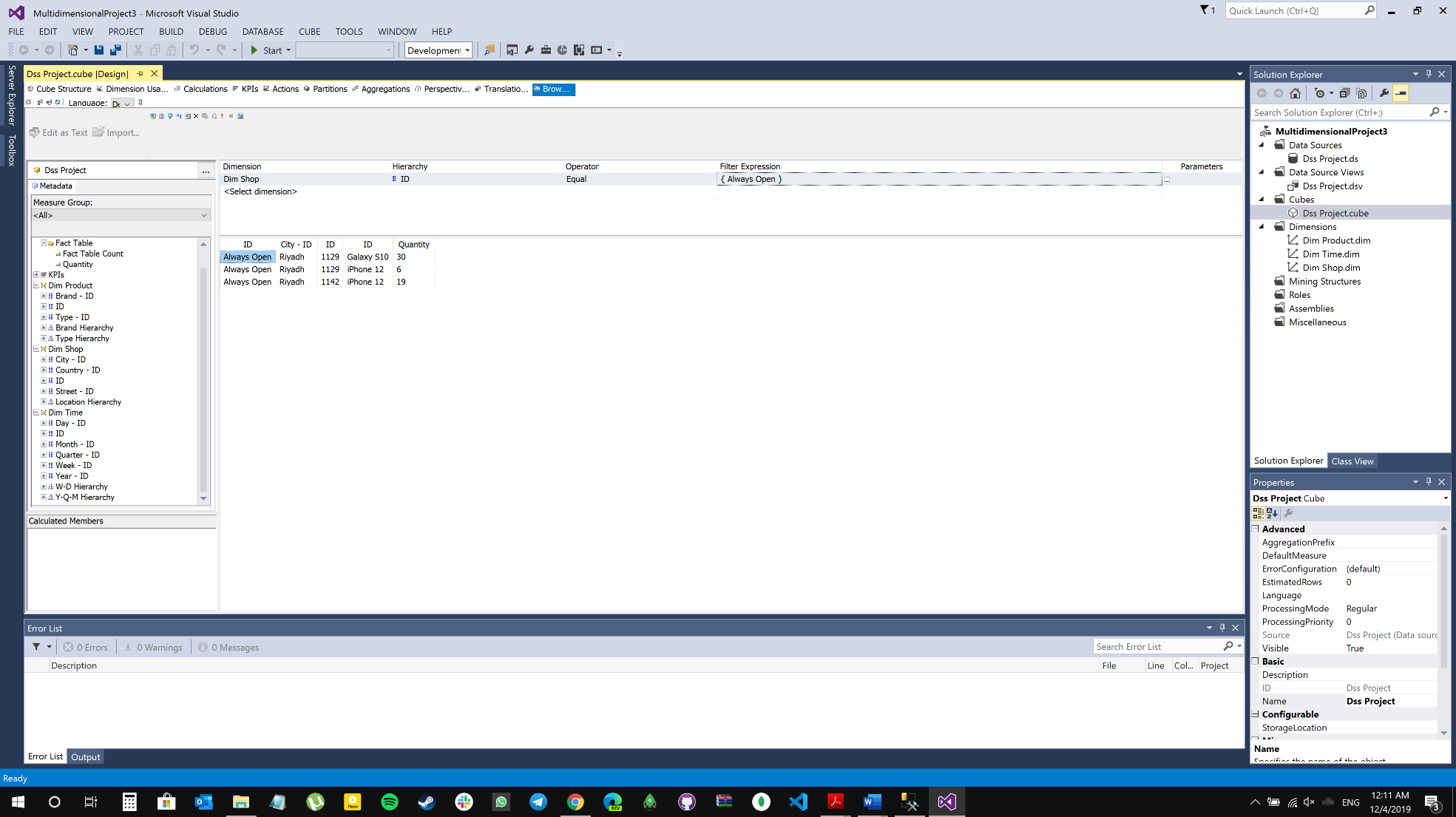


Figure 7: Slice SQL Server

# All Levels of Dimension Hierarchies

Overall look... all levels of the hierarchical dimension [See Figure 8]:

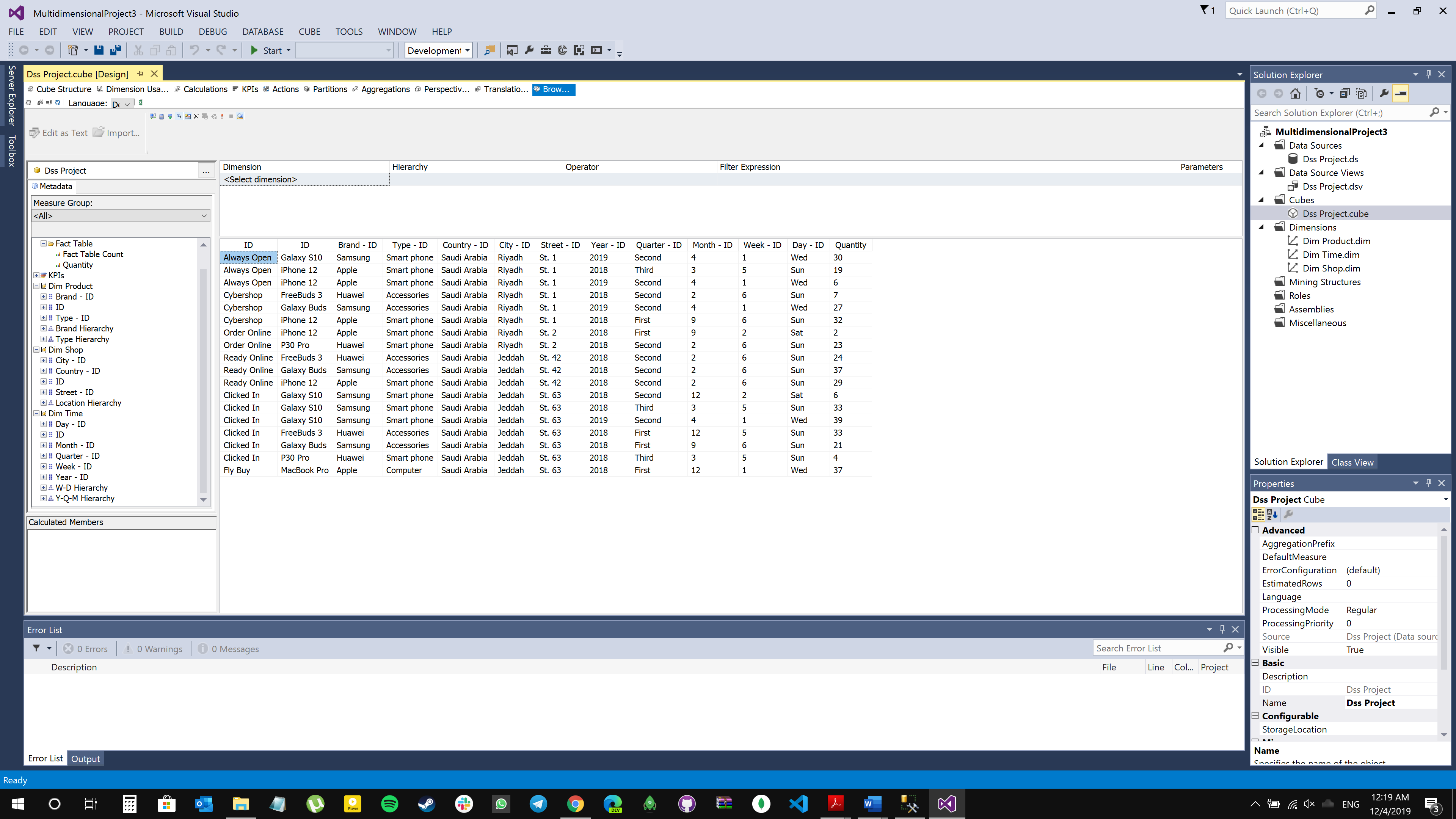


Figure 8: All Levels of Dimension Hierarchies

# References

1. <https://www.youtube.com/watch?v=wbqwSM26Y8o>
2. <https://blogs.perficient.com/2017/08/02/data-cube-operations-sql-queries/>
3. <https://www.youtube.com/watch?v=0ZMndP_Y32U>