



Group Project Report

Promote the ‘best’ products

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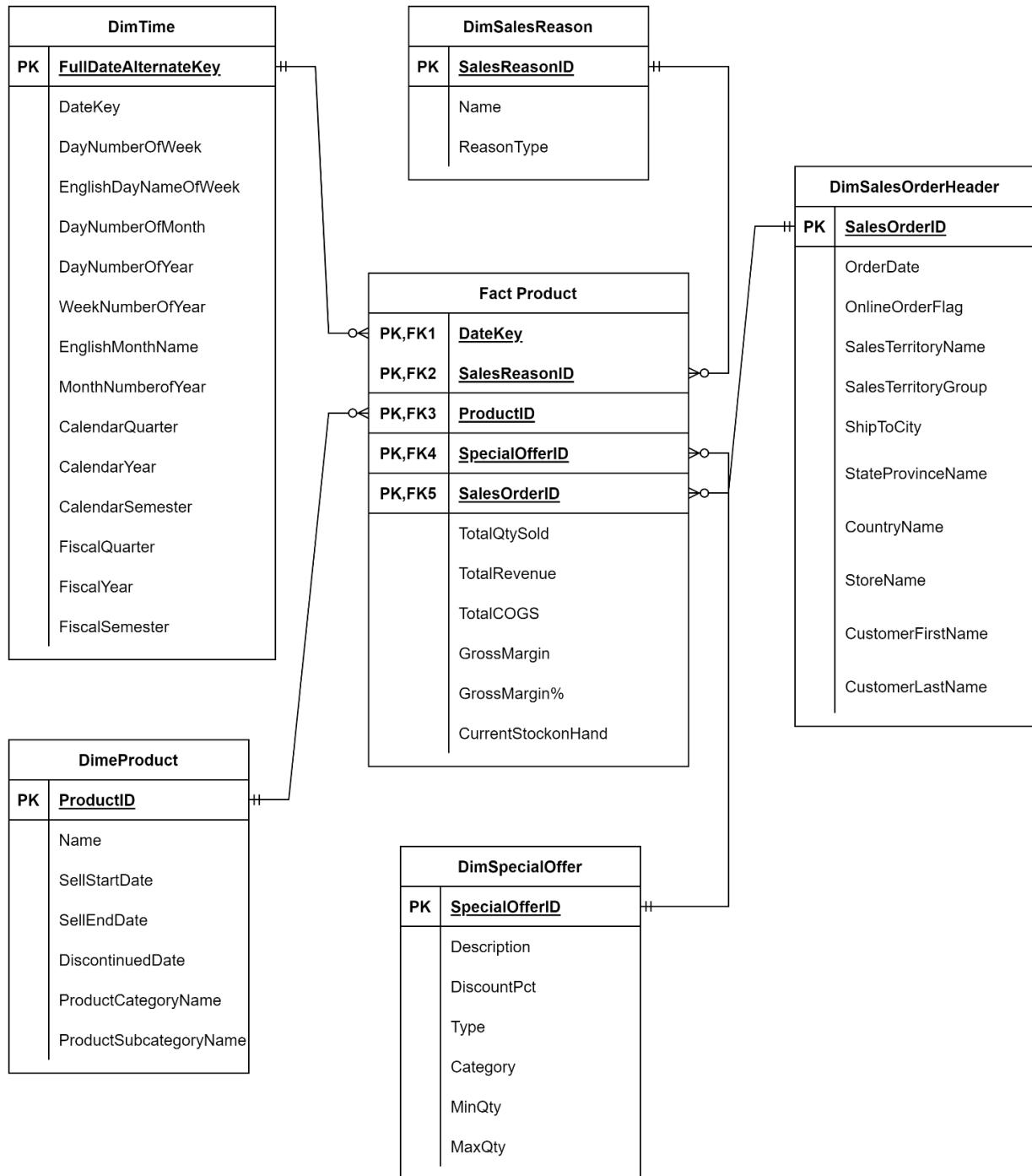
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Task a

We selected focus area 2 to build the DW.

Task b

i:



AW OLTP database (AdventureWorks 2012)

ii:

To study the impact of in-store or online product popularity and in-store or online product profit on revenue, we set up a star schema. There are five-dimension tables and one fact table in the star schema.

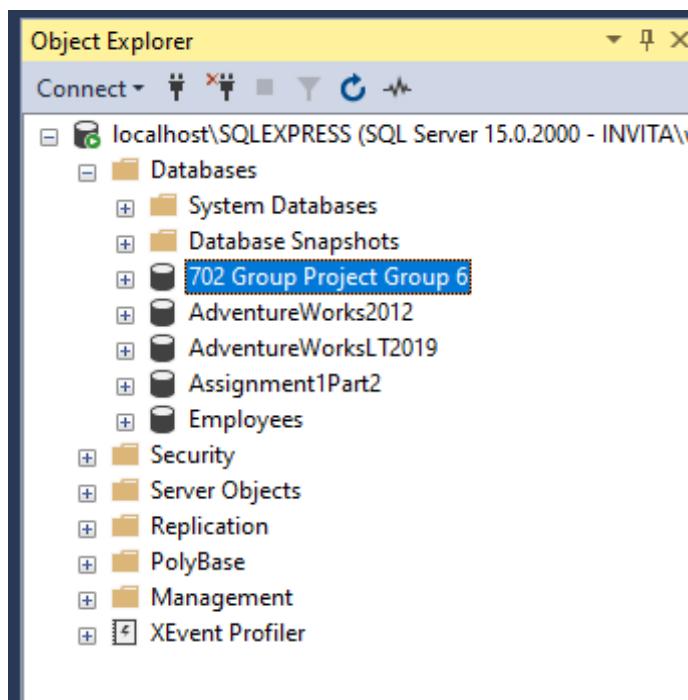
The fact table we constructed contains the total number of goods sold, total profit, cost of goods sold, gross margin, gross margin %, and available inventory. From a data warehouse perspective, by analysing the details stored in the fact table, we can learn about the popularity of the product and the impact of the product's profit on revenue. As the fact tables are refreshed periodically by inserting aggregated data from the business database, each fact table is associated with a corresponding dimension table. Each dimension table contains a primary key, and the primary key of each dimension is combined to become the combined primary key of the fact table.

As we need to analyse products by product information, we set up a product dimension table with attributes such as product ID (primary key), product name, sales start date, sales end date, etc. According to the case description, AW sells its products in five countries. To obtain the relevant sales information, we created the sales order header dimension table with attributes such as sales order ID (primary key), order date, online order flag, sales region name, and customer name. A sales order can have multiple products, and each product can have different sales reasons and offers. Therefore, we created a sales reason dimension table and a special offer dimension table. The last dimension table is the time dimension with the following attributes: full date alternate key (primary key) and other attributes for a day, week, month, and year. We can use this dimension to analyse information by year, month, week, or day.

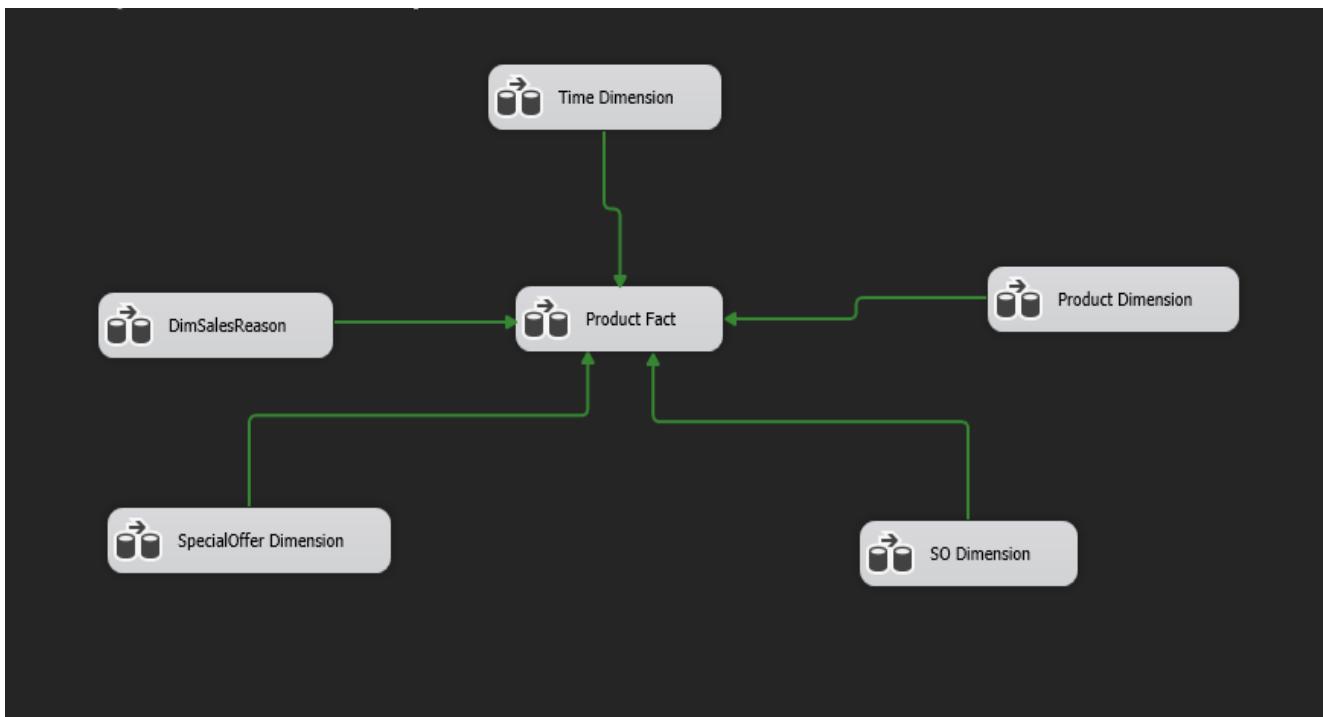
Task c

Based on the ERD we designed, we built those dimension tables and fact table by using SSIS.

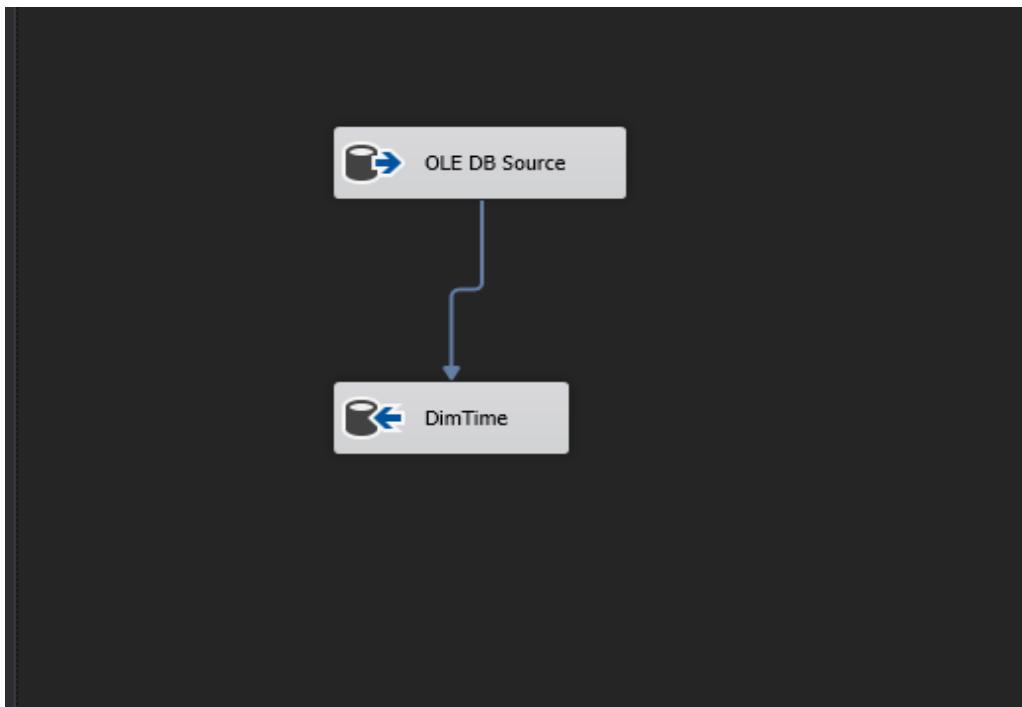
- Per task requirement, we created a new database named 702 Group Project Group 6



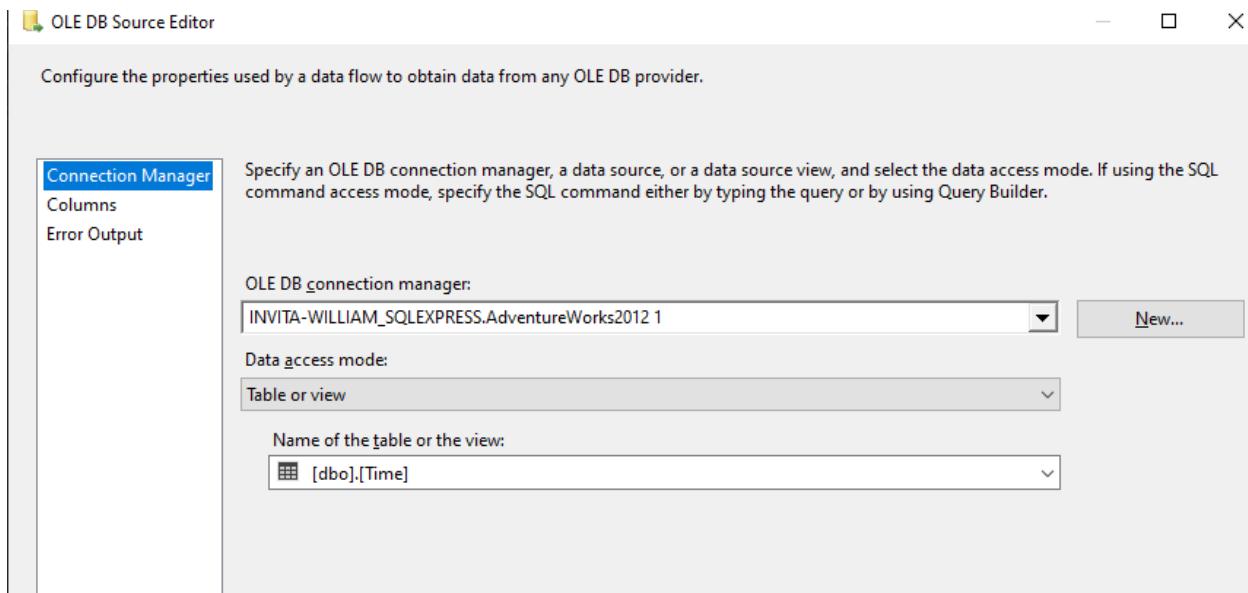
- Overview of Star Schema created in SSIS



- Time Dimension



- Extract Time table from the database AdventureWorks2012



- We select all columns except SpanishDayNameOfWeek, FrenchDayNameOfWeek, SpanishMonthName and FrenchMonthName

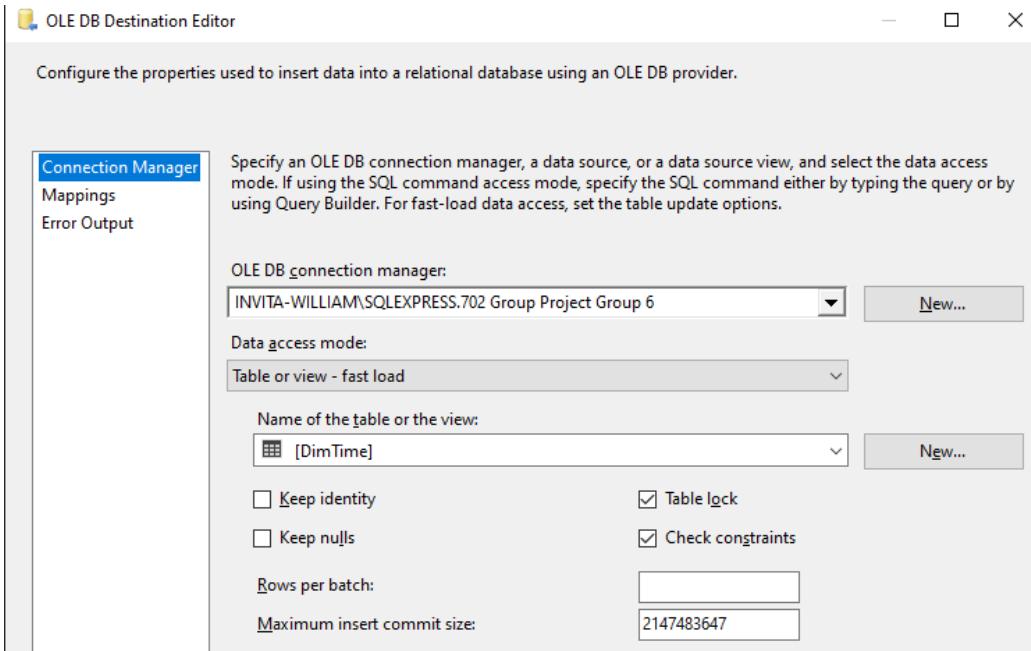
Available External Columns

<input type="checkbox"/> Name
<input checked="" type="checkbox"/> DateKey
<input checked="" type="checkbox"/> FullDateAlternateKey
<input checked="" type="checkbox"/> DayNumberOfWeek
<input checked="" type="checkbox"/> EnglishDayNameOfWeek
<input type="checkbox"/> SpanishDayNameOfWeek
<input type="checkbox"/> FrenchDayNameOfWeek
<input checked="" type="checkbox"/> DayNumberOfMonth
<input checked="" type="checkbox"/> DayNumberOfYear
<input checked="" type="checkbox"/> WeekNumberOfYear
<input checked="" type="checkbox"/> EnglishMonthName
<input type="checkbox"/> SpanishMonthName
<input type="checkbox"/> FrenchMonthName
<input checked="" type="checkbox"/> MonthNumberOfYear
<input checked="" type="checkbox"/> CalendarQuarter
<input checked="" type="checkbox"/> CalendarYear
<input checked="" type="checkbox"/> CalendarSemester
<input checked="" type="checkbox"/> FiscalQuarter
<input checked="" type="checkbox"/> FiscalYear
<input checked="" type="checkbox"/> FiscalSemester

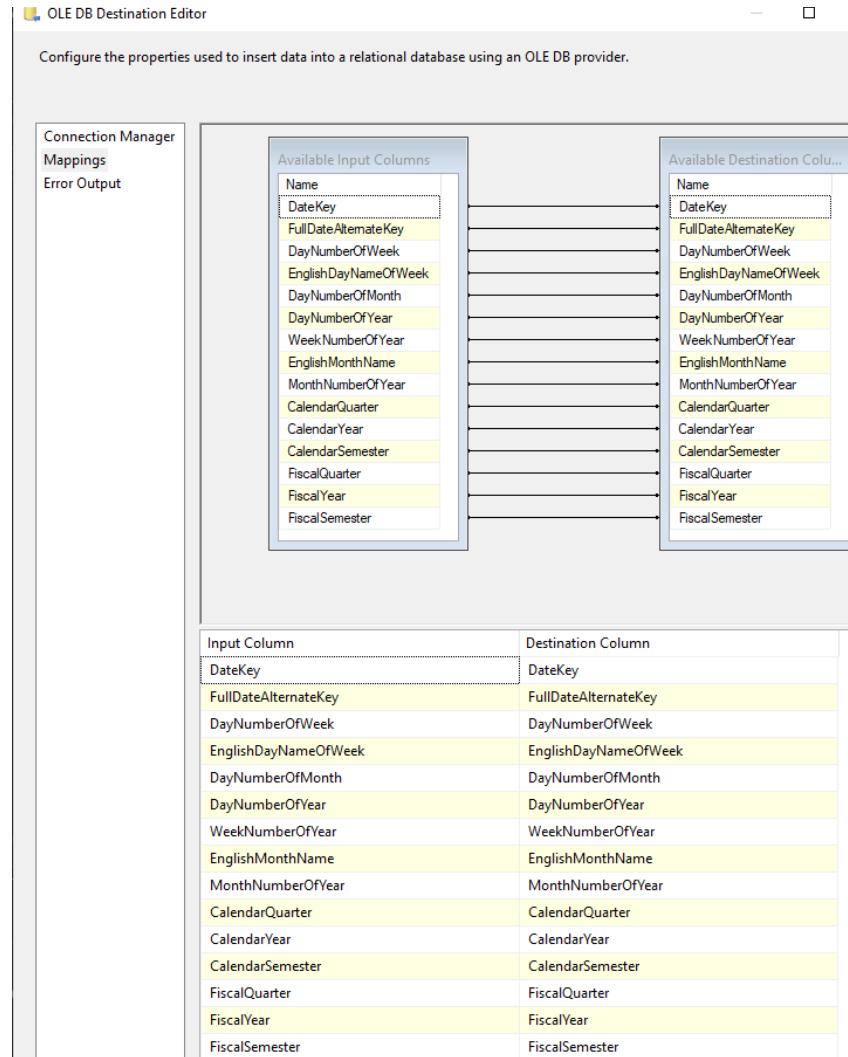
External Column Output Column

DateKey	DateKey
FullDateAlternateKey	FullDateAlternateKey
DayNumberOfWeek	DayNumberOfWeek
EnglishDayNameOfWeek	EnglishDayNameOfWeek
DayNumberOfMonth	DayNumberOfMonth
DayNumberOfYear	DayNumberOfYear
WeekNumberOfYear	WeekNumberOfYear
EnglishMonthName	EnglishMonthName
MonthNumberOfYear	MonthNumberOfYear
CalendarQuarter	CalendarQuarter
CalendarYear	CalendarYear
CalendarSemester	CalendarSemester
FiscalQuarter	FiscalQuarter
FiscalYear	FiscalYear
FiscalSemester	FiscalSemester

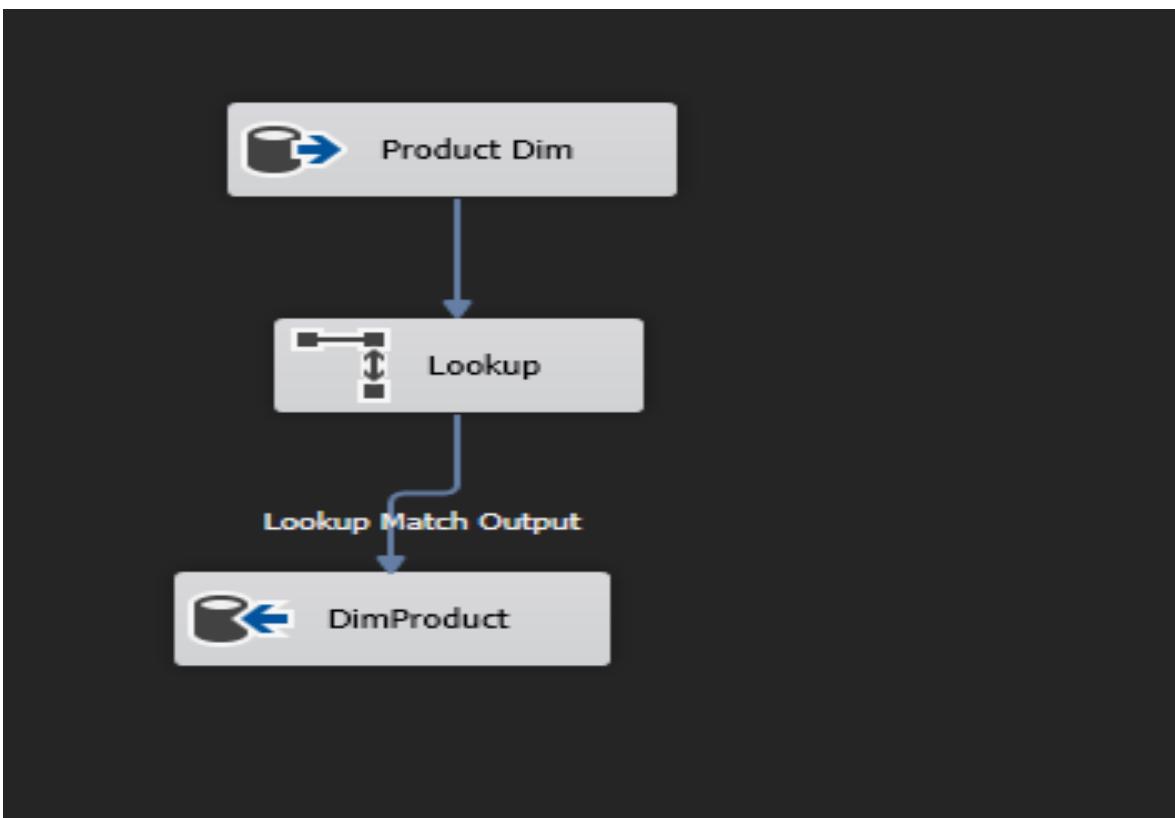
- Create a time dimension table in 702 Group Project Group 6 database



- Check that the mappings are correct.



- Product Dim



- Extract Product table from database AdventureWorks2012

OLE DB Source Editor

Configure the properties used by a data flow to obtain data from any OLE DB provider.

Connection Manager
Columns
Error Output

Specify an OLE DB connection manager, a data source, or a data source view, and select mode. If using the SQL command access mode, specify the SQL command either by using Query Builder.

OLE DB connection manager:

INVITA-WILLIAM_SQLEXPRESS.AdventureWorks2012 1

Data access mode:

Table or view

Name of the table or the view:

[Production].[Product]

- Select attributes based on our ERD

OLE DB Source Editor

Configure the properties used by a data flow to obtain data from any OLE DB provider.

Connection Manager
Columns
Error Output

External Column	Output Column
ProductID	ProductID
Name	Name
SellStartDate	SellStartDate
SellEndDate	SellEndDate
DiscontinuedDate	DiscontinuedDate

Available External Columns

- Name
- ProductID
- Name
- ProductNumber
- MakeFlag
- FinishedGoodsFlag
- Color
- SafetyStockLevel

- Extract product category name and product sub-category name from the product category table and product sub-category table which are not in the product table

Lookup Transformation Editor

This transform enables the performance of simple equi-joins between the input and a reference data source.

General
Connection
Columns
Advanced
Error Output

Specify a data source to use. You can select a table in a data source view, a connection, or the results of an SQL query.

OLE DB connection manager:
INVITA-WILLIAM_SQLEXPRESS.AdventureWorks2012.1

Use a table or a view:
 Use results of an SQL query:

```
select p.ProductID,pc.[Name] as 'ProductCategoryName',psc.[Name] as 'ProductSubcategoryName' from Production.Product p left join Production.ProductSubcategory psc on p.ProductSubcategoryId=psc.ProductSubcategoryId left join Production.ProductCategory pc on psc.ProductCategoryId=pc.ProductCategoryId
```

Preview Query Results

Query result (up to the first 200 rows):

ProductID	ProductCa...	ProductSu...
1	NULL	NULL
2	NULL	NULL
3	NULL	NULL
4	NULL	NULL
316	NULL	NULL
317	NULL	NULL
318	NULL	NULL
319	NULL	NULL
320	NULL	NULL
321	NULL	NULL
322	NULL	NULL
323	NULL	NULL
324	NULL	NULL
325	NULL	NULL

- Built relationship between product table and lookup columns and only showed one product ID column.

Lookup Transformation Editor

This transform enables the performance of simple equi-joins between the input and a reference data set.

General
Connection
Columns
Advanced
Error Output

The screenshot shows the 'Lookup Transformation Editor' window. On the left, there's a sidebar with tabs: General, Connection, **Columns**, Advanced, and Error Output. The main area has two lists: 'Available Input Columns' (containing ProductID, Name, SellStartDate, SellEndDate) and 'Available Lookup Columns' (containing Name, ProductID, ProductCategoryName, ProductSubcategoryName). A mapping line connects ProductID from the input to ProductID in the lookup. Below these lists is a table:

Lookup Column	Lookup Operation	Output Alias
ProductCategoryName	<add as new column>	ProductCategoryName
ProductSubcategoryName	<add as new column>	ProductSubcategoryName
ProductID	Replace 'ProductID'	ProductID

- Create DimProduct table in 702 Group Project Group 6 database.

OLE DB Destination Editor

Configure the properties used to insert data into a relational database using an OLE DB provider.

Connection Manager
Mappings
Error Output

Specify an OLE DB connection manager, a data source, or a data source view, and select mode. If using the SQL command access mode, specify the SQL command either by type using Query Builder. For fast-load data access, set the table update options.

OLE DB connection manager: INVITA-WILLIAM\SQLEXPRESS.702 Group Project Group 6

Data access mode: Table or view - fast load

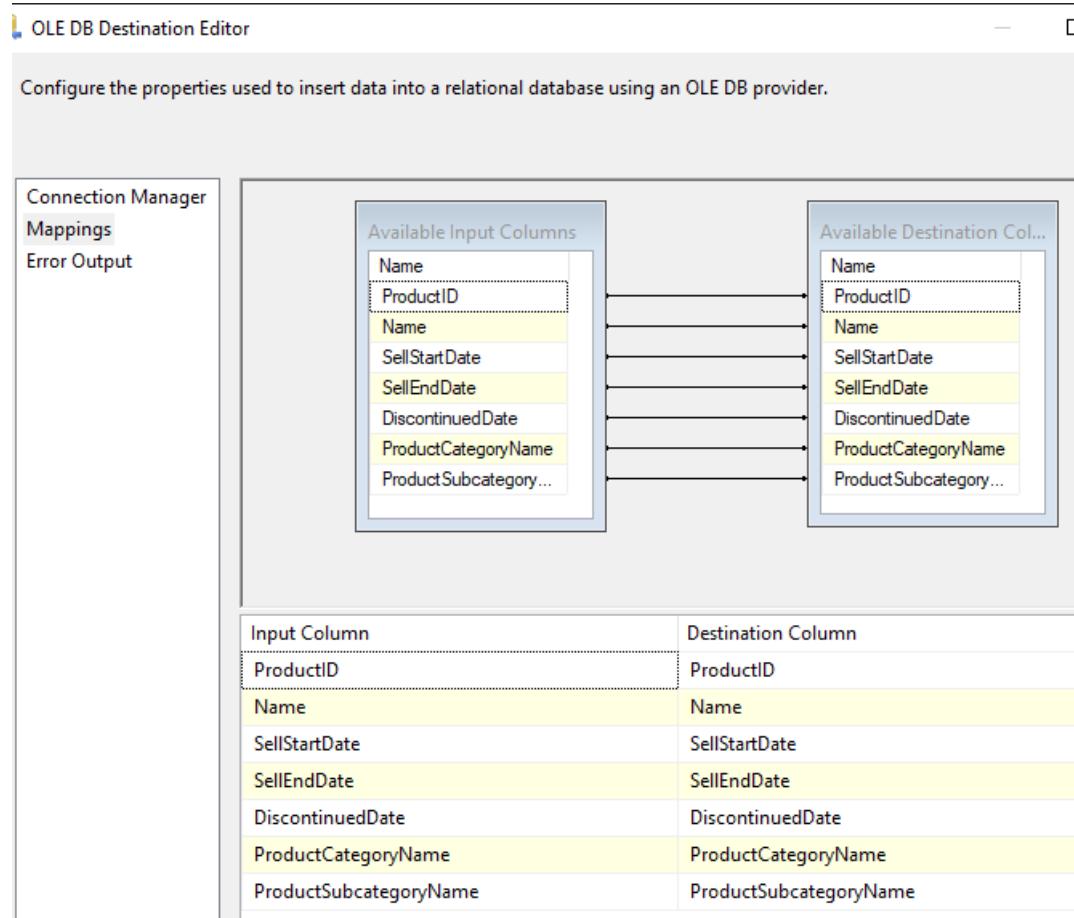
Name of the table or the view: [DimProduct]

Keep identity Table lock
 Keep nulls Check constraints

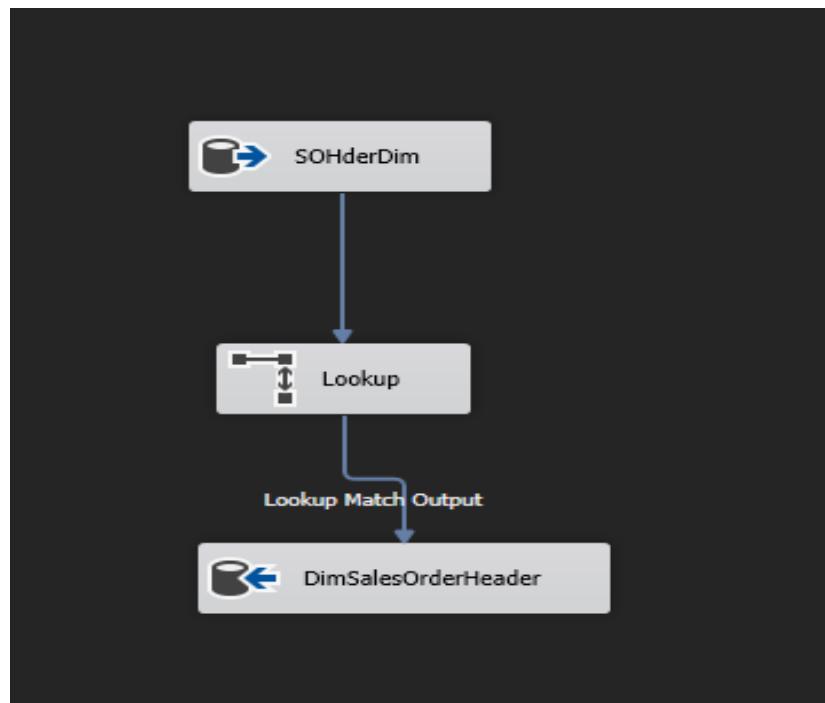
Rows per batch: _____

Maximum insert commit size: 2147483647

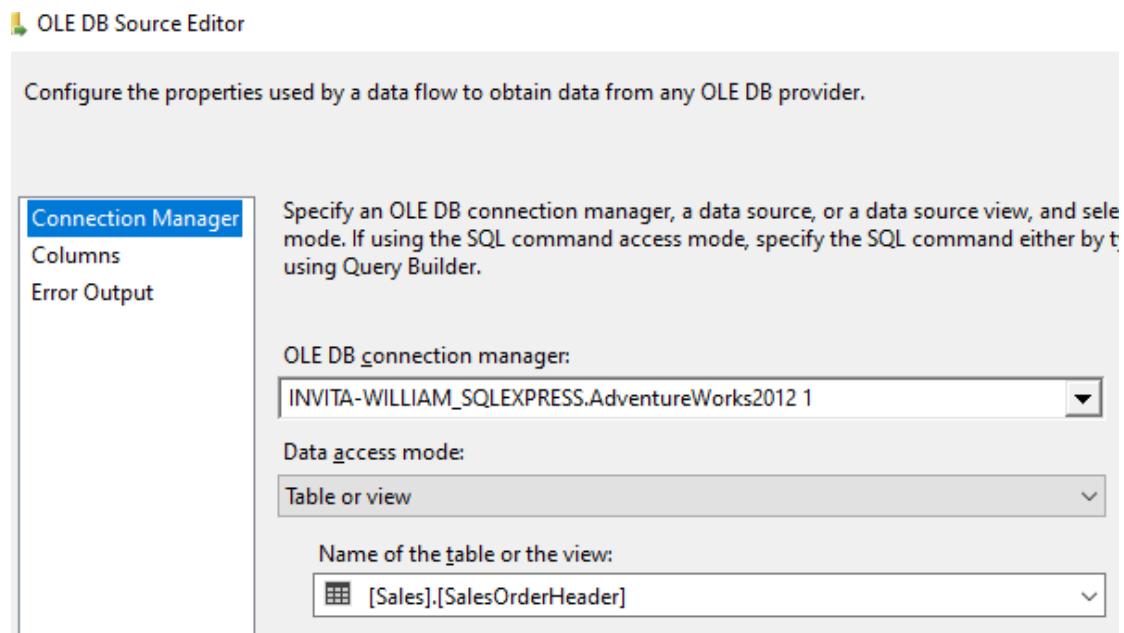
- Check the mappings are correct



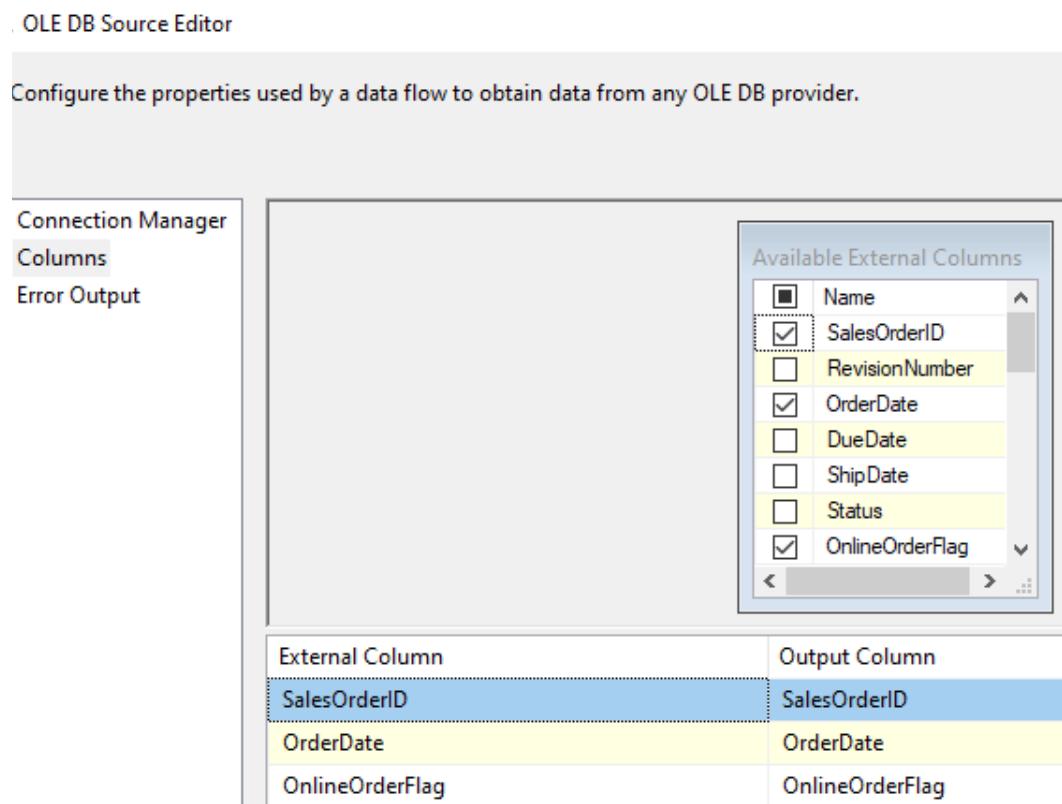
- SalesOrder Dimension



- Extract SalesOrderHeader table from AdventureWorks2012



- Based on our ERD, select the attributes that are in SalesOrderHeader table



- Select attributes needs that are not in the SalesOrderHeader table

Lookup Transformation Editor

This transform enables the performance of simple equi-joins between the input and a reference data source.

General
Connection
 Columns
 Advanced
 Error Output

Specify a data source to use. You can select a table in a data source view, connection, or the results of an SQL query.

OLE DB connection manager:

INVITA-WILLIAM_SQLEXPRESS.AdventureWorks2012 1

Use a table or a view:

Use results of an SQL query:

```
select soh.SalesOrderID,st.[Name] as 'SalesTerritoryName', st.[Group] as 'SalesTerritoryGroup',a.City as 'ShiptoCity', sp.[Name] as 'StateProvinceName',cr.[Name] as 'CountryName',isnull(s.[Name],'OnlineSale') as 'StoreName', isnull(p.firstname,'RetailStore') as 'CustomerFirstName',isnull(p.LastName,'RetailStore') as 'CustomerLastName'from Sales.SalesOrderHeader sohleft join sales.SalesTerritory st on soh.TerritoryID=st.TerritoryIDleft join Person.Address a on soh.ShipToAddressID=a.AddressIDleft join Person.StateProvince spon a.StateProvinceID=sp.StateProvinceIDleft join Person.CountryRegion cr on cr.CountryRegionID=a.CountryRegionID
```

Preview...

Preview Query Results

Query result (up to the first 200 rows):

SalesOrderID	SalesTerritoryID	SalesTerritoryName	ShiptoCity	StateProvinceID	CountryName	StoreName	CustomerFirstName	CustomerLastName
43659	Southeast	North America	Austell	Georgia	United States	Better Bikes	James	Hendergart
43660	Southeast	North America	Suwanee	Georgia	United States	Pedals West	Takiko	Collins
43661	Canada	North America	Toronto	Ontario	Canada	Original Bike Shop	Jauna	Elson
43662	Canada	North America	Toronto	Ontario	Canada	Health Sports	Robin	McGuigan
43663	Southwest	North America	Trabuco Canyon	California	United States	World Bikes	Jimmy	Bischoff
43664	Northwest	North America	Seattle	Washington	United States	Capable Sports	Sandeep	Katyal
43665	Northwest	North America	Seattle	Washington	United States	Latest Sports	Richard	Bready
43666	Southwest	North America	San Mateo	California	United States	Wheel Galore	Abraham	Swearengin
43667	Central	North America	Saint Louis	Missouri	United States	Yellow Bike Shop	Scott	MacDonald
43668	Canada	North America	Richmond	British Columbia	Canada	Retail Mall	Ryan	Calafato
43669	Northwest	North America	Puyallup	Washington	United States	The Bike Shop	Carolyn	Farino
43670	Central	North America	Redford	Michigan	United States	Historic Bike Shop	Mae	Black
43671	Northwest	North America	Port Orchard	Washington	United States	Basic Bike Shop	Peggy	Justice
43672	Canada	North America	Pointe-Rouge	Quebec	Canada	Red Bicycle Shop	Phyllis	Thomas
43673	Northeast	North America	Plaistow	New Hampshire	United States	Seventh Bike Shop	Nancy	Hirota
43674	Canada	North America	Ottawa	Ontario	Canada	Requisite Bikes	Eric	Brumfield

- Build relationships between SalesOrderHeader table lookup columns. Only show one SalesOrderID column.

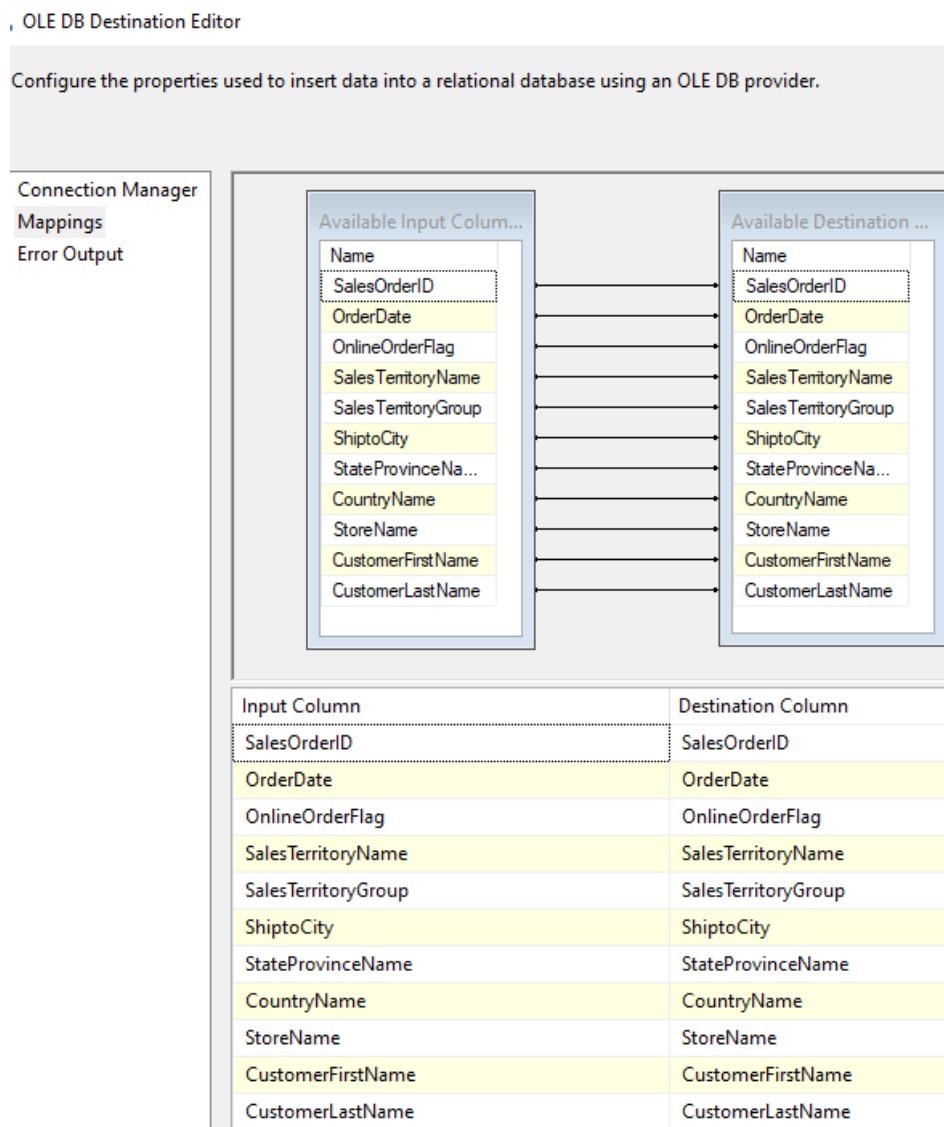
This screenshot shows the 'Lookup Transformation Editor' window. On the left, a navigation pane lists 'General', 'Connection', 'Columns', 'Advanced', and 'Error Output'. The main area displays the 'Available Input Columns' (SalesOrderID, OrderDate, OnlineOrderFlag) and 'Available Lookup Columns' (Name, SalesTerritoryName, SalesTerritoryGroup, ShiptoCity, StateProvinceName, CountryName, StoreName). A mapping grid below shows the relationship between input and lookup columns:

Lookup Column	Lookup Operation	Output Alias
SalesTerritoryName	<add as new column>	SalesTerritoryName
SalesTerritoryGroup	<add as new column>	SalesTerritoryGroup
ShiptoCity	<add as new column>	ShiptoCity
StateProvinceName	<add as new column>	StateProvinceName
CountryName	<add as new column>	CountryName
StoreName	<add as new column>	StoreName
CustomerFirstName	<add as new column>	CustomerFirstName
CustomerLastName	<add as new column>	CustomerLastName
SalesOrderID	Replace 'SalesOrderID'	SalesOrderID

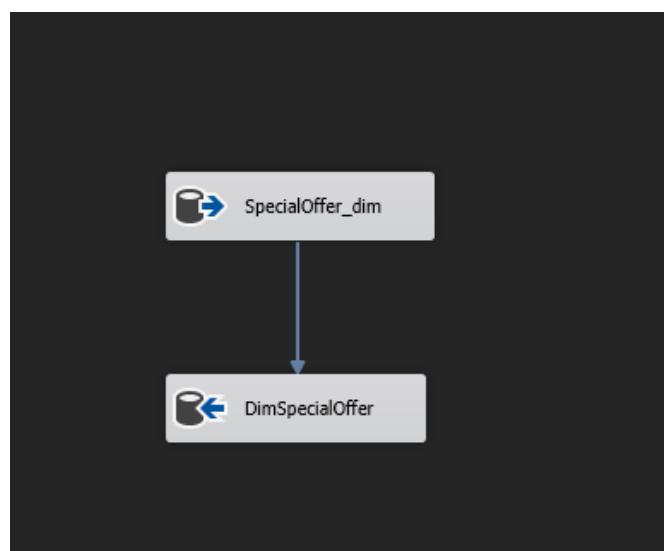
- Create DimSalesOrderHeader table in 702 Group Project Group 6 Database

This screenshot shows the 'OLE DB Destination Editor' window. On the left, a navigation pane lists 'Connection Manager', 'Mappings', and 'Error Output'. The main area displays the 'OLE DB connection manager' (INVITA-WILLIAM\SQLEXPRESS.702 Group Project Group 6), 'Data access mode' (Table or view - fast load), 'Name of the table or the view' ([DimSalesOrderHeader]), and various insert options like 'Keep identity', 'Table lock', 'Check constraints', 'Rows per batch', and 'Maximum insert commit size' (2147483647).

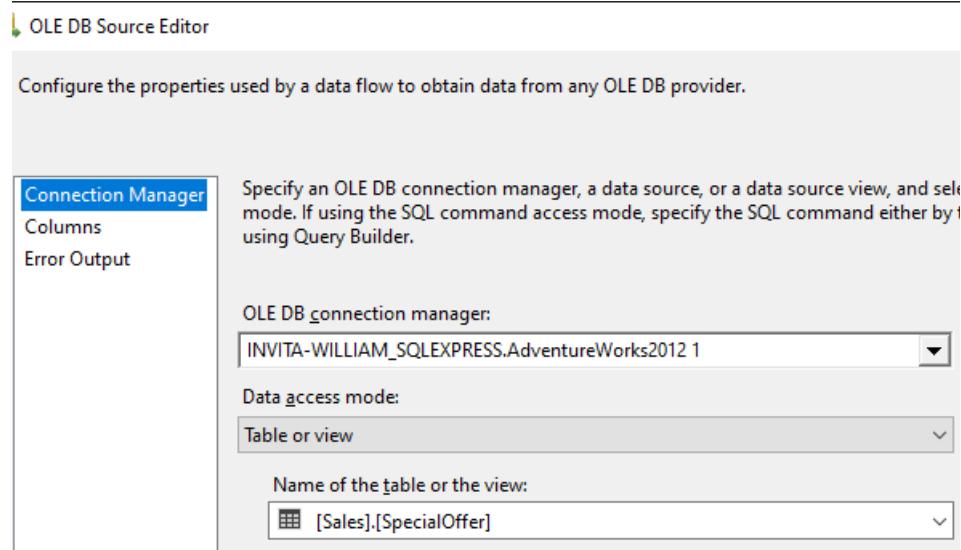
- Check the mappings are correct.



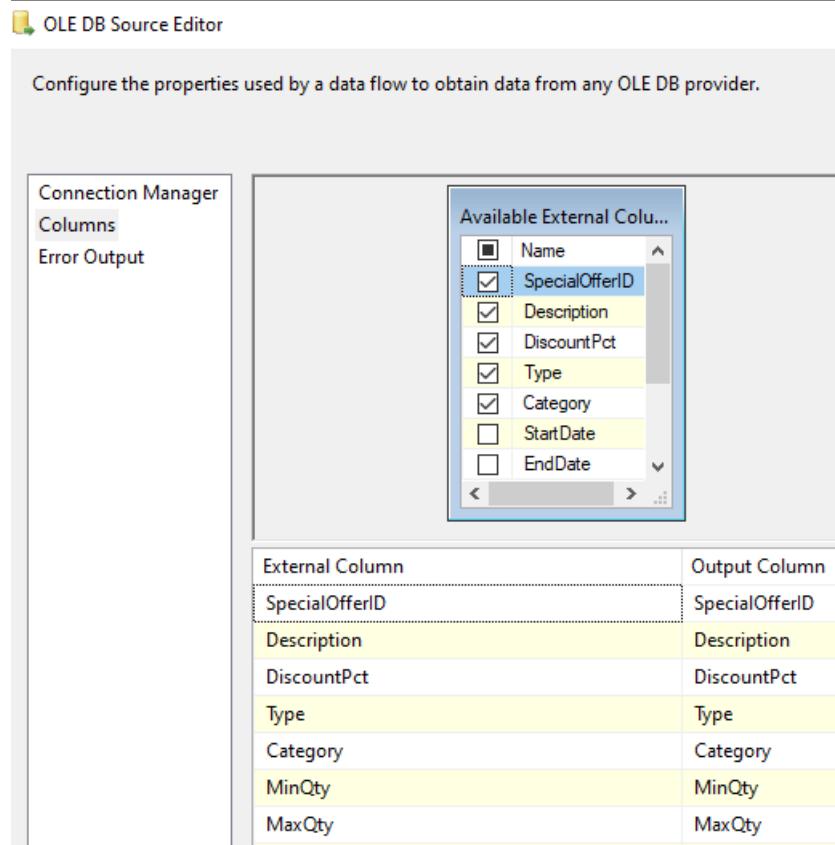
- SpecialOffer Dimension



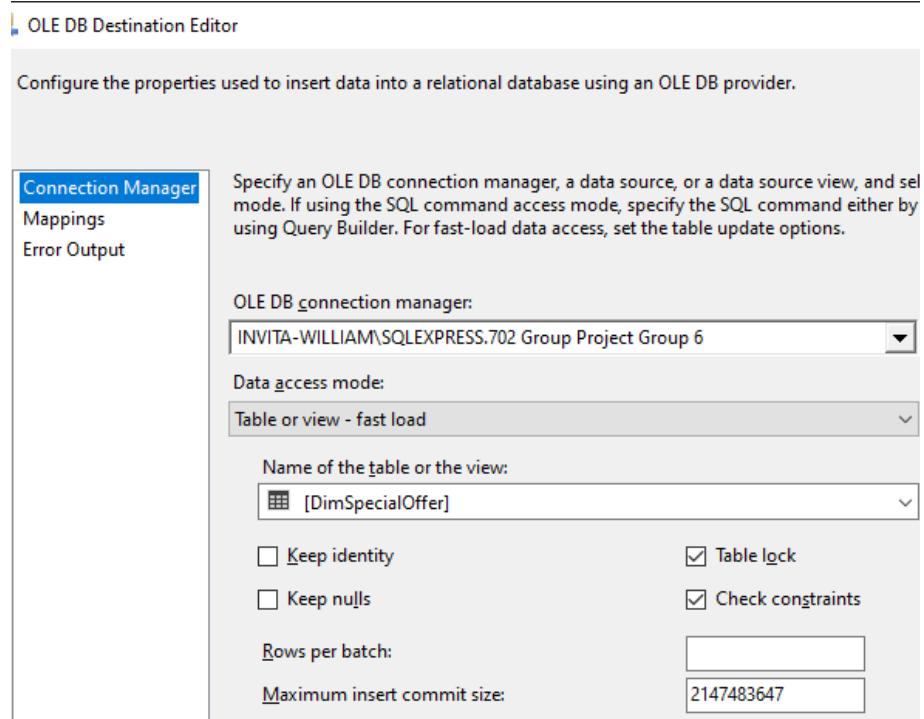
- Extract SpecialOffer table from AdventureWorks2012



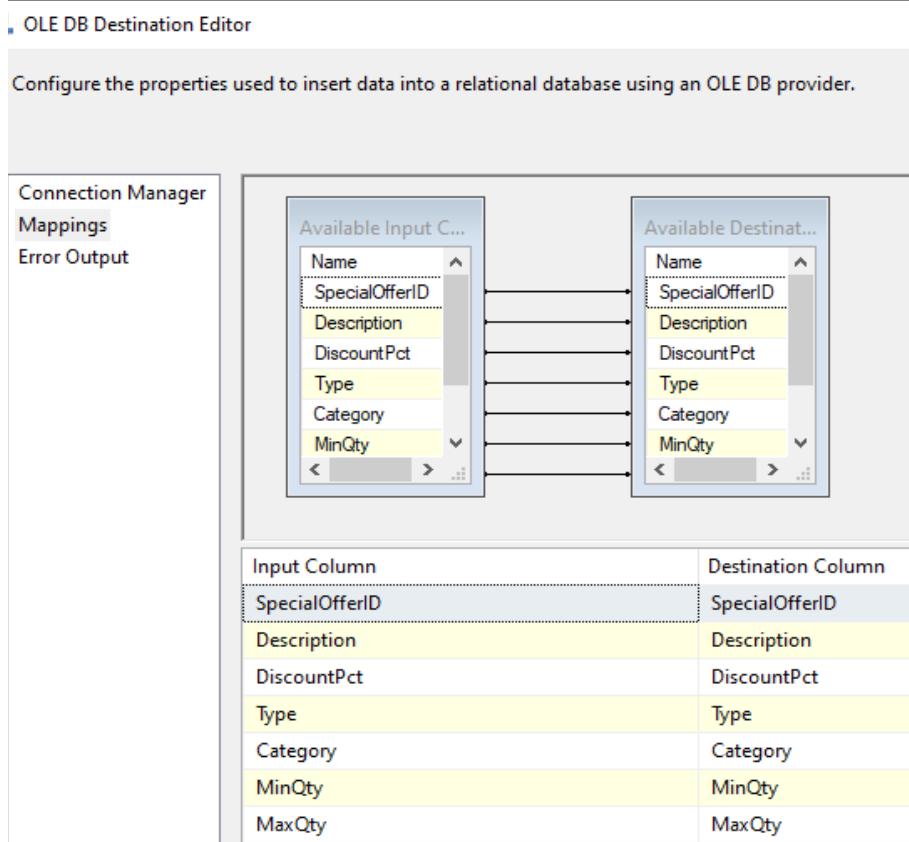
- Select attributes based on ERD that are in SpecialOffer table. We did not select startdate and enddate because we assume that if the special offer is a success, then we can recommend the management to restart/extend for a certain period. Therefore, those two attributes are not essential.



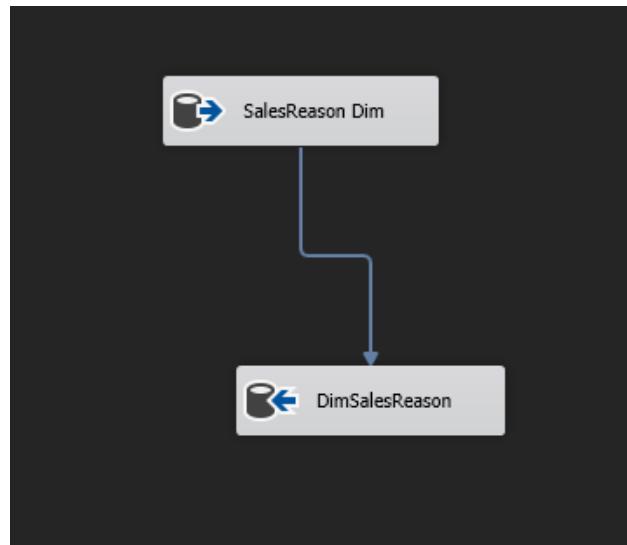
- Create DimSpecialOffer table in 702 Group Project Group 6 database



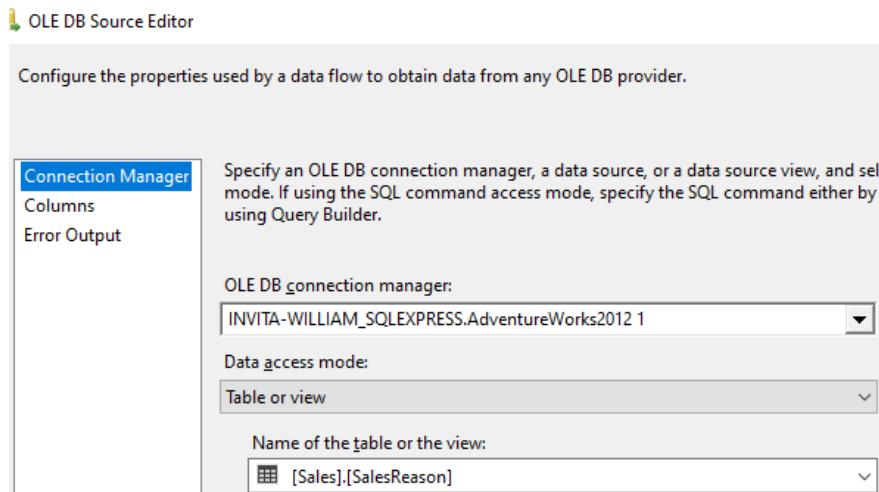
- Check the mappings are correct



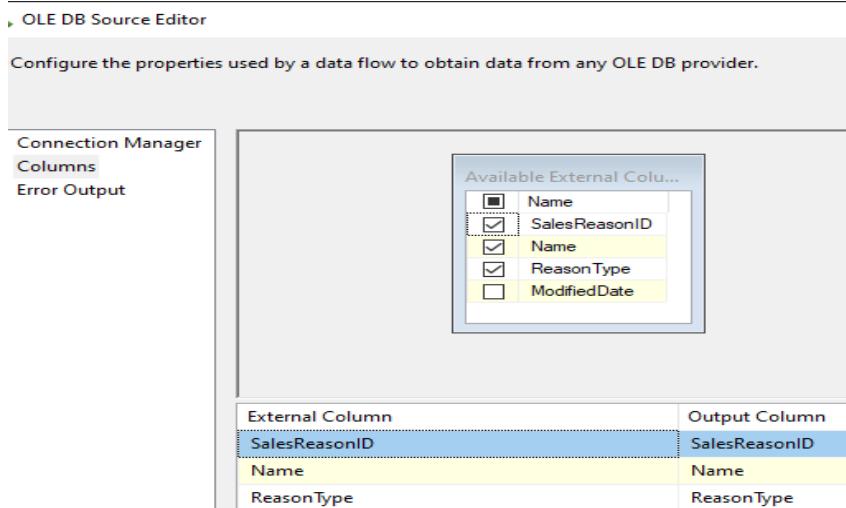
- SalesReason Dimension



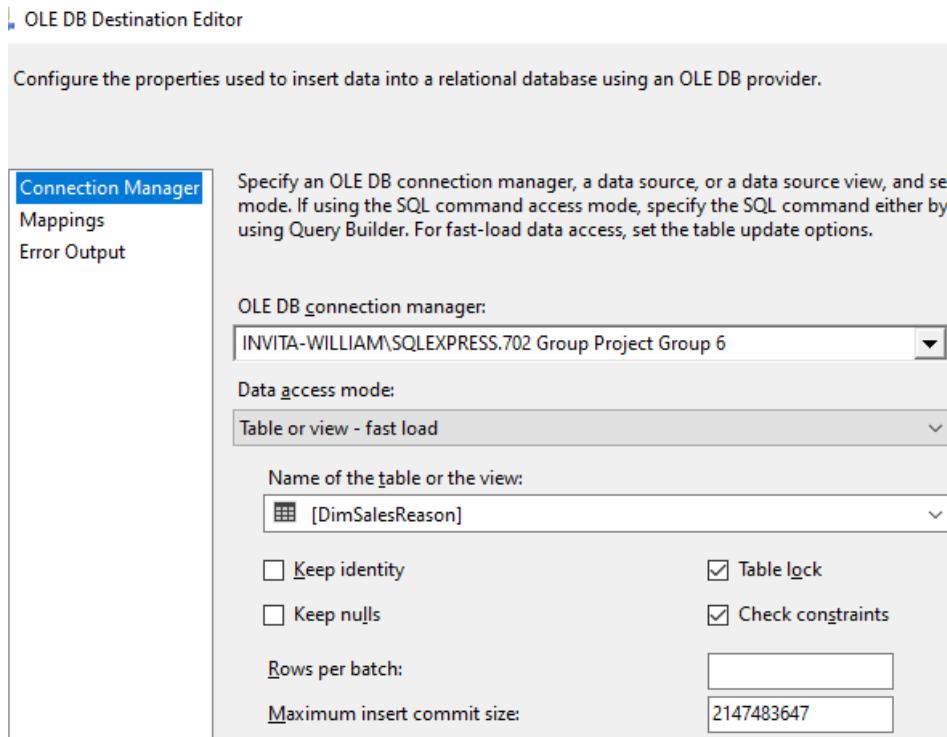
- Extract SalesReason table from AdventureWorks2012



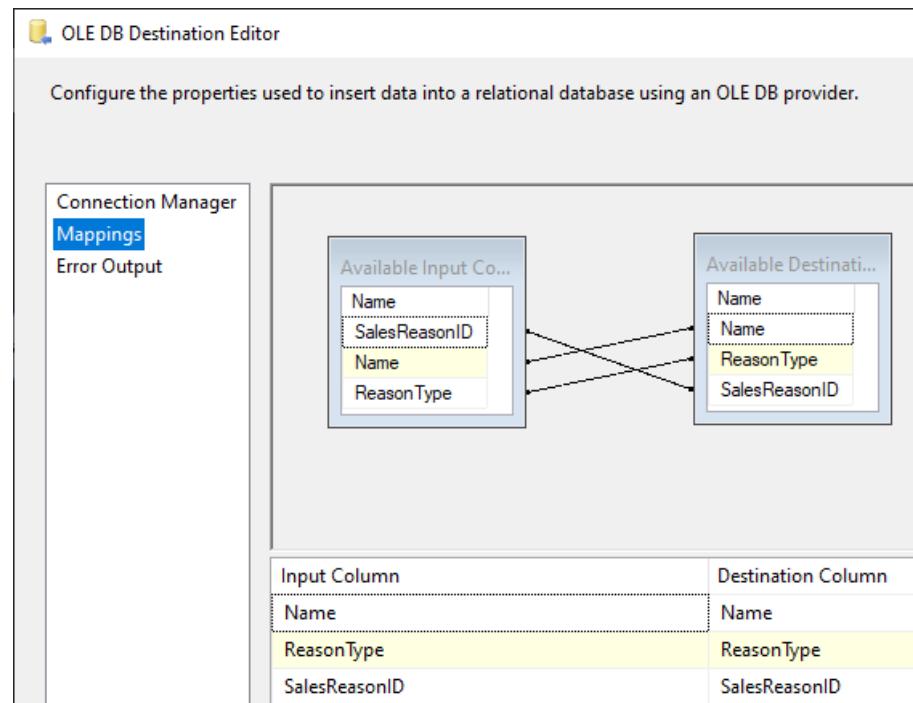
- Select attributes based on ERD which are in SalesReason table



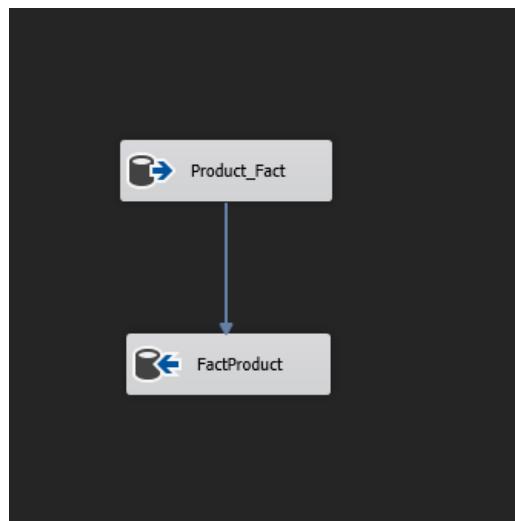
- Create DimSalesReason table in 702 Group Project Group 6 database



- Check the mappings are correct



- Product Fact



- Use SQL to extract information based on ERD from the AdventureWorks2012 database. One thing to mention that some of sales orders do not have a sales reason, and the sales reason ID is part of composite primary key in the fact table, so we defaulted it to 0.

OLE DB Source Editor

Configure the properties used by a data flow to obtain data from any OLE DB provider.

Connection Manager

Specify an OLE DB connection manager, a data source, or a data source view, and mode. If using the SQL command access mode, specify the SQL command either using Query Builder.

OLE DB connection manager:
INVITA-WILLIAM_SQLEXPRESS.AdventureWorks2012 1

Data access mode:
SQL command

SQL command text:

```

select
soh.SalesOrderID,sod.ProductID,sod.SpecialOfferID,t.FullDateAlternate
Key as 'DateKey',isnull(sr.SalesReasonID,'') as 'SalesReasonID'
,sod.orderqty as 'QtySold',sod.OrderQty*sod.UnitPrice*(1-
sod.UnitPriceDiscount) as 'Revenue', sod.orderqty*p.StandardCost as
'COGS', sod.OrderQty*sod.UnitPrice*(1-sod.UnitPriceDiscount)-
sod.orderqty*p.StandardCost as 'GrossMargin',
(sod.OrderQty*sod.UnitPrice*(1-sod.UnitPriceDiscount)-
sod.orderqty*p.StandardCost)/(sod.OrderQty*sod.UnitPrice*(1-
sod.UnitPriceDiscount))*100 as 'GrossMargin%',isnull
(sinv.CurrentStockOnHand,0) as 'CurrentStockOnHand'
from Sales.SalesOrderDetail sod
left join Sales.SalesOrderHeader soh
on sod.SalesOrderID=soh.SalesOrderID
  
```

Preview Query Results

Query result (up to the first 200 rows):

SalesOrderID	ProductID	SpecialOfferID	DateKey	SalesReasonID	QtySold	Revenue	COGS	GrossMargin	GrossMargin%	CurrentStockOnHand
43659	776	1	31/05/20...	0	1	2024.994	1898.0944	126.8996	6.26	194
43659	777	1	31/05/20...	0	3	6074.982	5694.2832	380.6988	6.26	149
43659	778	1	31/05/20...	0	1	2024.994	1898.0944	126.8996	6.26	153
43659	771	1	31/05/20...	0	1	2039.994	1912.1544	127.8396	6.26	149
43659	772	1	31/05/20...	0	1	2039.994	1912.1544	127.8396	6.26	153
43659	773	1	31/05/20...	0	2	4079.988	3824.3088	255.6792	6.26	158
43659	774	1	31/05/20...	0	1	2039.994	1912.1544	127.8396	6.26	164
43659	714	1	31/05/20...	0	3	86.5212	115.4769	-28.9557	-33.46	180
43659	716	1	31/05/20...	0	1	28.8404	38.4923	-9.6519	-33.46	252
43659	709	1	31/05/20...	0	6	34.2	20.3778	13.8222	40.41	180
43659	712	1	31/05/20...	0	2	10.373	13.8446	-3.4716	-33.46	288
43659	711	1	31/05/20...	0	4	80.746	52.3452	28.4008	35.17	216
43660	762	1	31/05/20...	0	1	419.4589	486.7066	-67.2477	-16.03	137
43660	758	1	31/05/20...	0	1	874.794	884.7083	-9.9143	-1.13	165
43661	745	1	31/05/20...	0	1	809.76	699.0928	110.6672	13.66	0
43661	743	1	31/05/20...	0	1	714.7043	739.041	-24.3367	-3.4	0
43661	747	1	31/05/20...	0	2	1429.4086	1478.082	-48.6734	-3.4	834
43661	712	1	31/05/20...	0	4	20.746	27.6892	-6.9432	-33.46	288
43661	715	1	31/05/20...	0	4	115.3616	153.9692	-38.6076	-33.46	216
43661	742	1	31/05/20...	0	2	1445.1898	1494.4004	-49.2106	-3.4	0

OLE DB Source Editor

Configure the properties used by a data flow to obtain data from any OLE DB provider.

Connection Manager

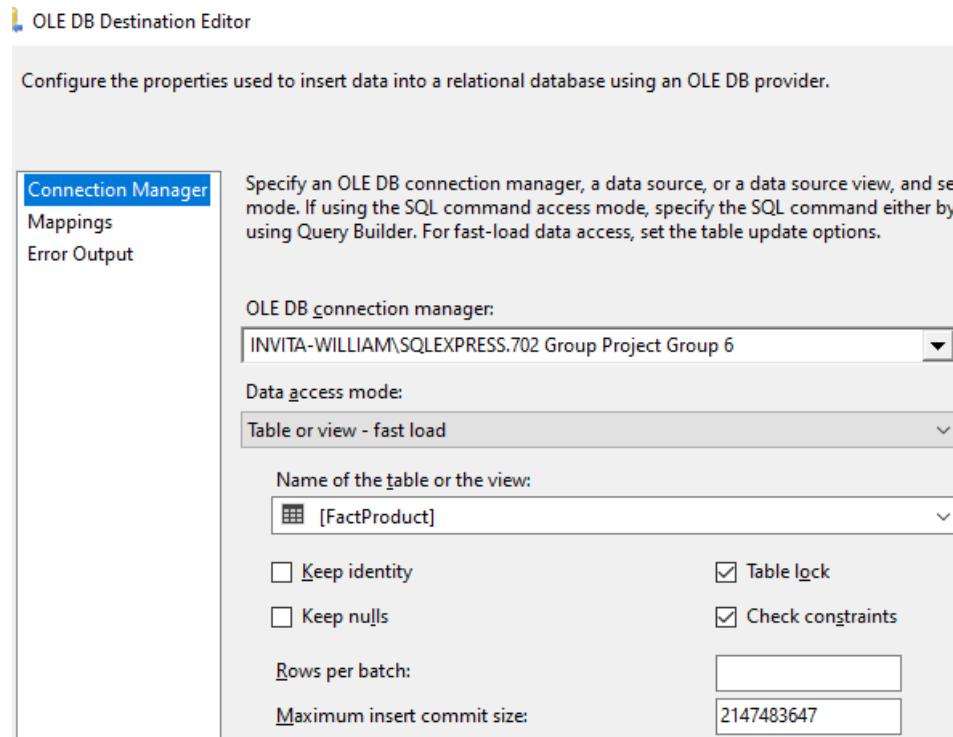
- Columns
- Error Output

Available External Columns

<input checked="" type="checkbox"/> Name
<input checked="" type="checkbox"/> SalesOrderID
<input checked="" type="checkbox"/> ProductID
<input checked="" type="checkbox"/> SpecialOfferID
<input checked="" type="checkbox"/> DateKey
<input checked="" type="checkbox"/> SalesReasonID
<input checked="" type="checkbox"/> QtySold
<input checked="" type="checkbox"/> Revenue

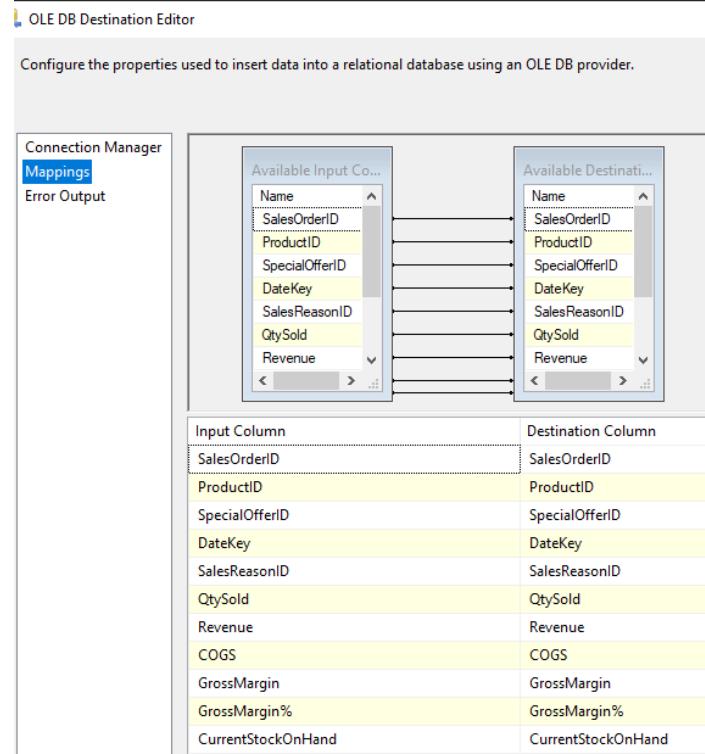
External Column	Output Column
SalesOrderID	SalesOrderID
ProductID	ProductID
SpecialOfferID	SpecialOfferID
DateKey	DateKey
SalesReasonID	SalesReasonID
QtySold	QtySold
Revenue	Revenue
COGS	COGS
GrossMargin	GrossMargin
GrossMargin%	GrossMargin%
CurrentStockOnHand	CurrentStockOnHand

- Create FactProduct table in 702 Group Project Group 6 database

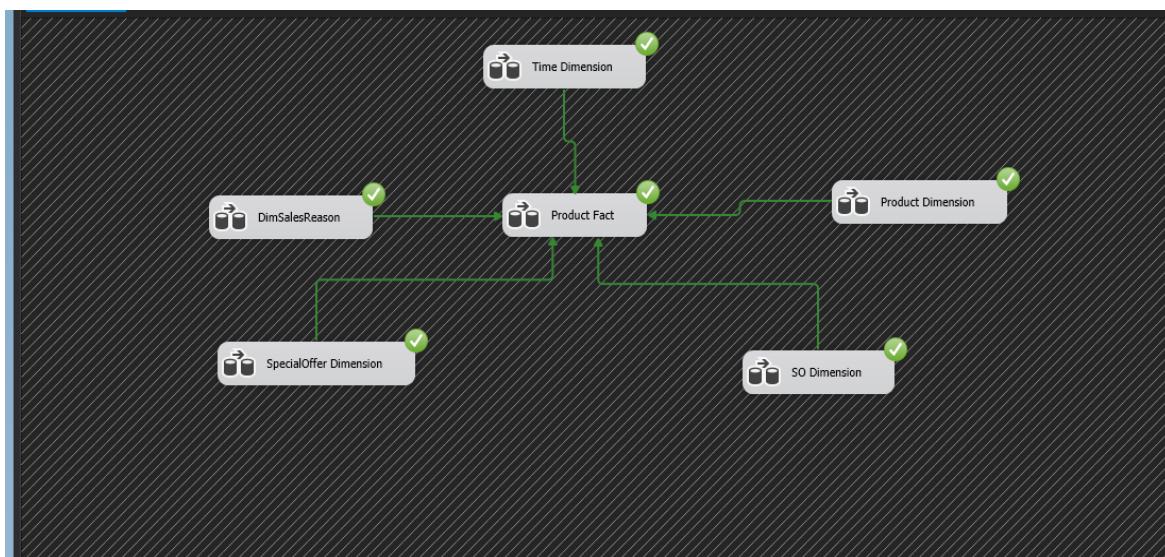


Preview Query Results											
Query result (up to the first 200 rows):											
SalesOrderID	ProductID	SpecialOff...	DateKey	SalesReas...	QtySold	Revenue	COGS	GrossMargin	GrossMarg...	CurrentSto...	
43659	709	1	31/05/20...	0	6	34.2	20.3778	13.8222	40.41	180	
43659	711	1	31/05/20...	0	4	80.746	52.3452	28.4008	35.17	216	
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43659	714	1	31/05/20...	0	3	86.5212	115.4769	-28.9557	-33.46	180	
43659	716	1	31/05/20...	0	1	28.8404	38.4923	-9.6519	-33.46	252	
43659	771	1	31/05/20...	0	1	2039.994	1912.1544	127.8396	6.26	149	
43659	772	1	31/05/20...	0	1	2039.994	1912.1544	127.8396	6.26	153	
43659	773	1	31/05/20...	0	2	4079.988	3824.3088	255.6792	6.26	158	
43659	774	1	31/05/20...	0	1	2039.994	1912.1544	127.8396	6.26	164	
43659	776	1	31/05/20...	0	1	2024.994	1898.0944	126.8996	6.26	194	
43659	777	1	31/05/20...	0	3	6074.982	5694.2832	380.6988	6.26	149	
43659	778	1	31/05/20...	0	1	2024.994	1898.0944	126.8996	6.26	153	
43660	758	1	31/05/20...	0	1	874.794	884.7083	-9.9143	-1.13	165	
43660	762	1	31/05/20...	0	1	419.4589	486.7066	-67.2477	-16.03	137	
43661	708	1	31/05/20...	0	5	100.9325	65.4315	35.501	35.17	324	

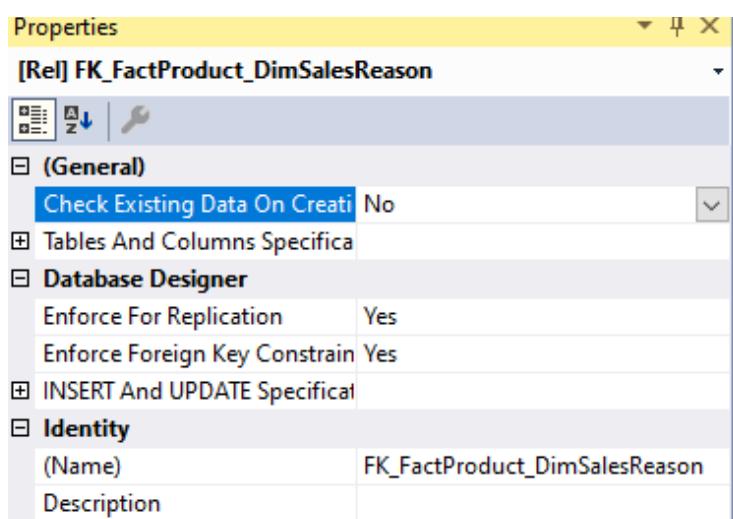
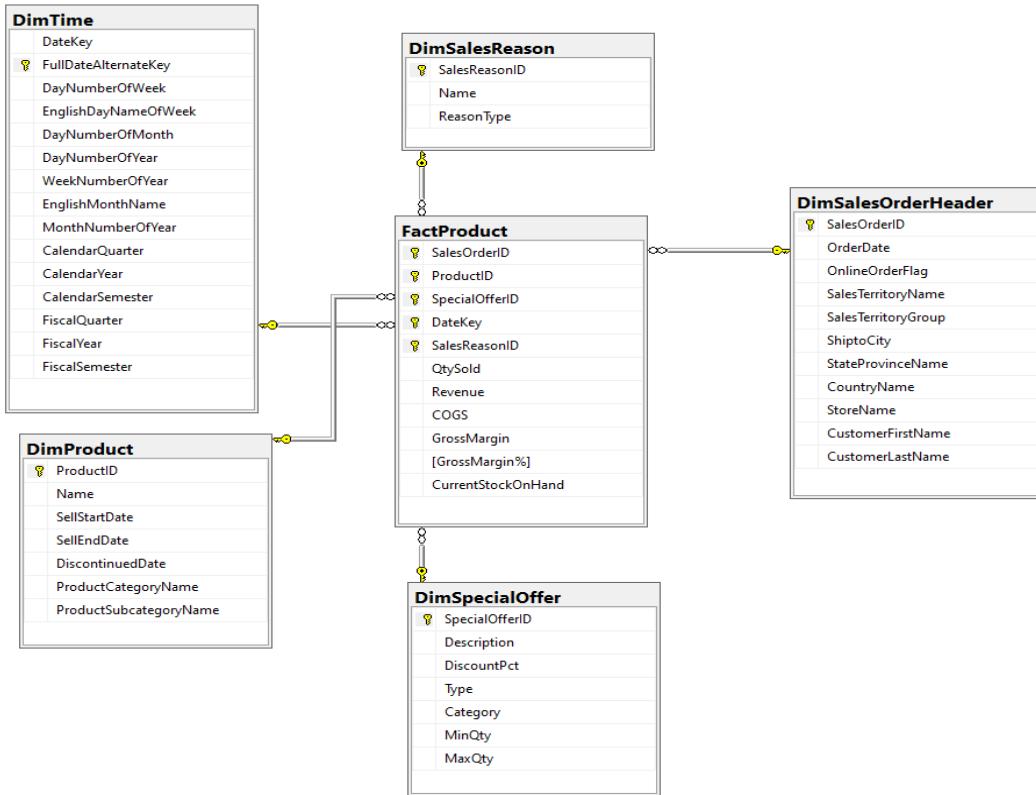
- Check the mappings are correct



- Click Start to load all designed tables with information into the 702 Group Project Group 6 database



- Database Diagram of 702 Group Project Group 6 database in SSMS
 - Set the primary key of each dimension table and fact table. Then set relationships between dimension tables and fact table
 - As mentioned in the fact table set up, we put 0 if there is no sales reason. As a result, when we set up relationship between the sales reason dimension table and fact table, we set to check existing data on creating to No.

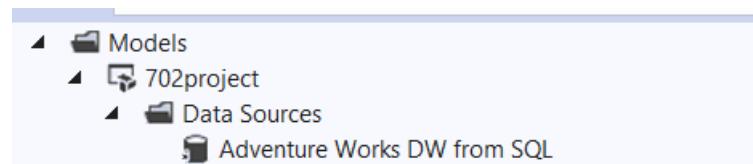


Task d

- Check the dimension and fact tables in the management studio.

□ Databases
+ □ System Databases
+ □ Database Snapshots
□ 702 Group Project Group 6
+ □ Database Diagrams
+ □ Tables
+ □ System Tables
+ □ FileTables
+ □ External Tables
+ □ Graph Tables
+ □ dbo.DimProduct
+ □ dbo.DimSalesOrderHeader
+ □ dbo.DimSalesReason
+ □ dbo.DimSpecialOffer
+ □ dbo.DimTime
+ □ dbo.FactProduct

- Open Analysis Services Tabular Project and import the data sources from 702 Group Project Group 6 database and name it Adventure Works DW from SQL.



- Change the name of FullDateAlternateKey to Date in the DimTime table and mark it as a date table.

DateKey	Date
1/07/2010 12:00:00 am	1/07/2010 12:00:00 am
2/07/2010 12:00:00 am	2/07/2010 12:00:00 am
3/07/2010 12:00:00 am	3/07/2010 12:00:00 am
4/07/2010 12:00:00 am	4/07/2010 12:00:00 am
5/07/2010 12:00:00 am	5/07/2010 12:00:00 am
6/07/2010 12:00:00 am	6/07/2010 12:00:00 am
7/07/2010 12:00:00 am	7/07/2010 12:00:00 am
8/07/2010 12:00:00 am	8/07/2010 12:00:00 am

- Add some useful functions under the column in the FactProduct table, making cube analysis easier. For the total number of orders and products, the distinct count function is used. For the sum of quantity sold, revenue, COGS, and gross margin are used in the sum function. The gross margin percentage uses the sum of gross margin divided by the sum of revenue. In the current stock on hand, the average function is used. This is the **cube structure** with all the measurements we needed.

Model.bim

SalesOrderID	ProdID	SpecialOfferID	Dat...	SalesReasonID	QtySold	Revenue	COGS	GrossMargin	GrossMargin%	CurrentStockOnHand
1	51178	870	1 30/05/201...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
2	51180	870	1 30/05/201...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
3	51191	870	1 31/05/201...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
4	51196	870	1 31/05/201...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
5	51197	870	1 31/05/201...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
6	51198	870	1 31/05/201...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
7	51199	870	1 31/05/201...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
8	51203	870	1 1/06/2013...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
9	51205	870	1 1/06/2013...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
10	51206	870	1 1/06/2013...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
11	51207	870	1 1/06/2013...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
12	51214	870	1 1/06/2013...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
13	51216	870	1 1/06/2013...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
14	51223	870	1 1/06/2013...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
15	51228	870	1 2/06/2013...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
16	51230	870	1 2/06/2013...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
17	51237	870	1 2/06/2013...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
18	51246	870	1 2/06/2013...	1	1	\$4.99	\$1.87	\$3.12	\$62.59	252
19	51247	870	1 2/06/2013...	1	1	\$4.00	\$1.87	\$2.13	\$62.59	252

Total number of product: 266

Sum of quantity sold: 285460

Sum of Revenue: \$118,272,781

Sum of COGS: \$105,537

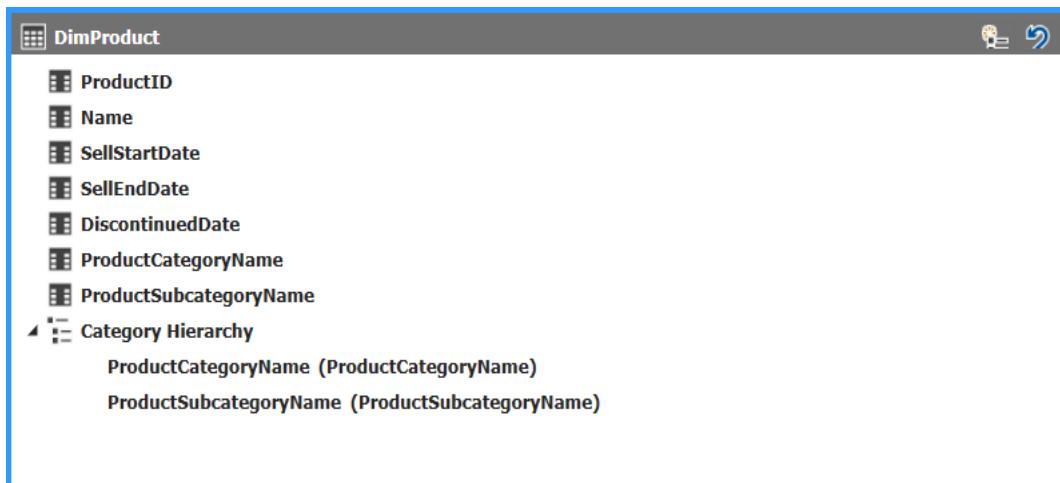
Sum of gross margin: \$127,353.90

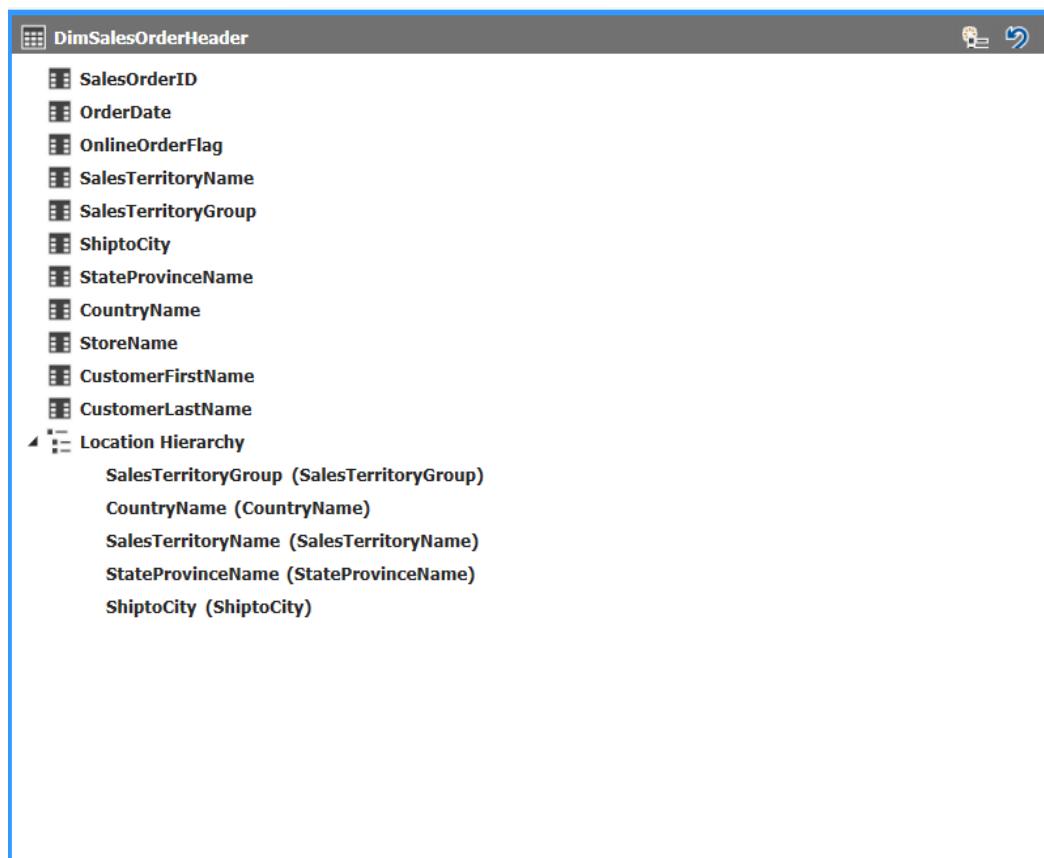
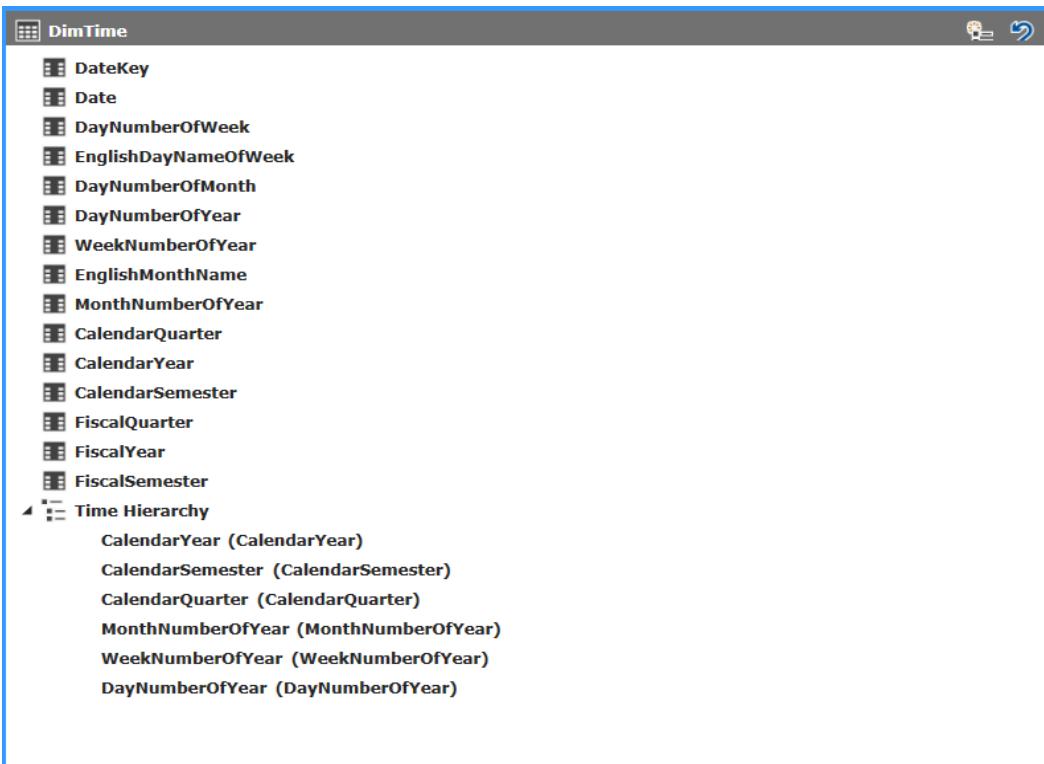
Gross margin percentage: 0.1076781145470

Current stock on hand: 258,763,845,809,666

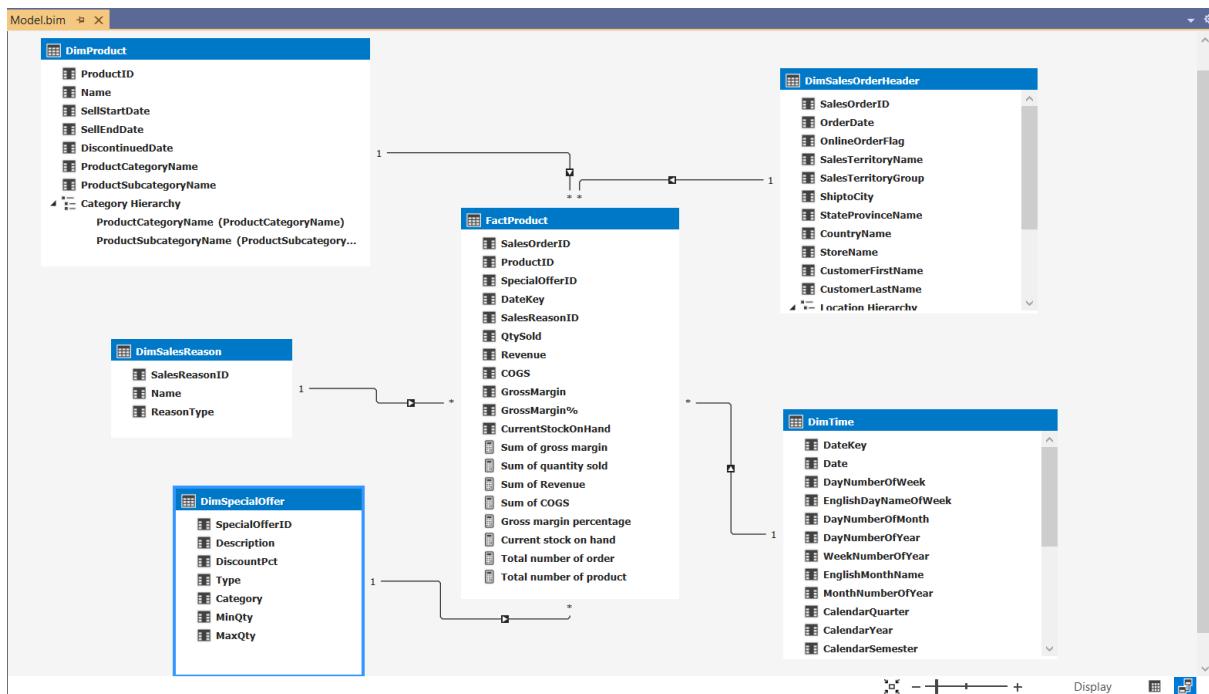
Record: 1 of 131,863

- Create the category hierarchy, time hierarchy, and location hierarchy for the table of DimProduct, DimTime, and DimSalesOrderHeader, respectively.

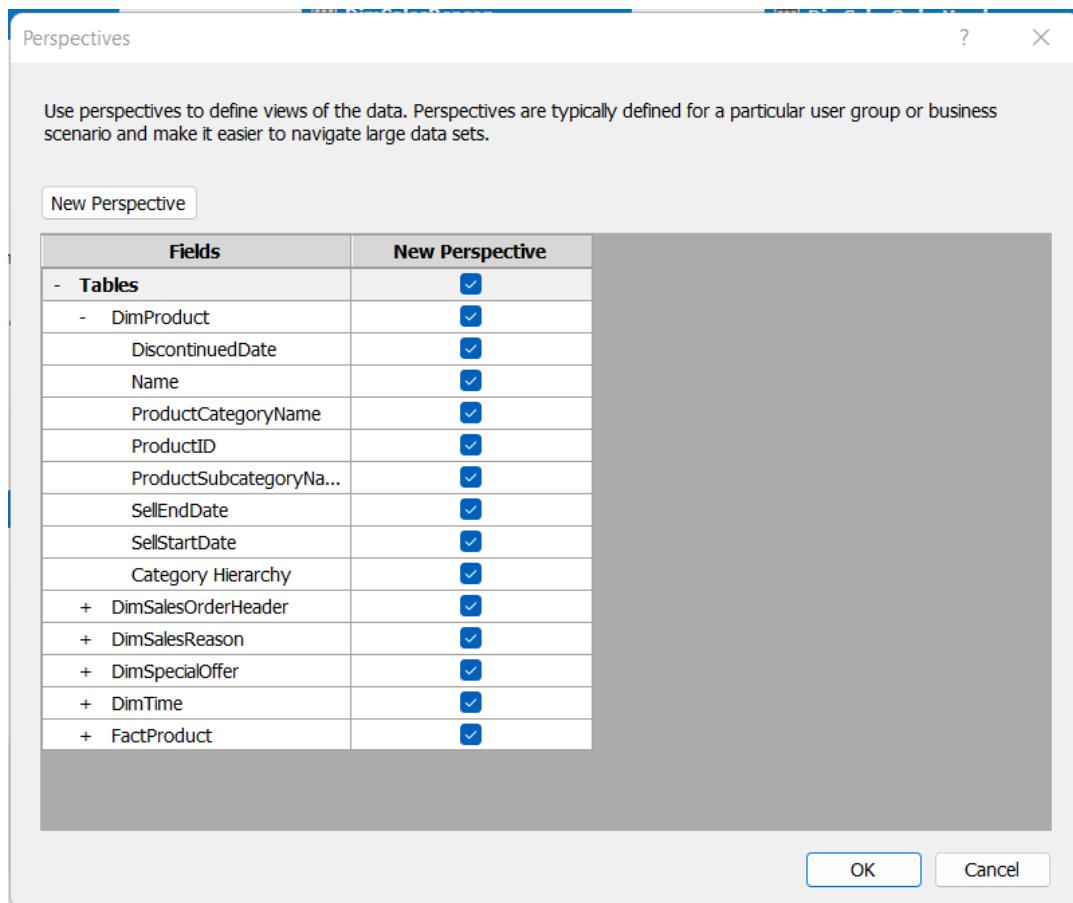




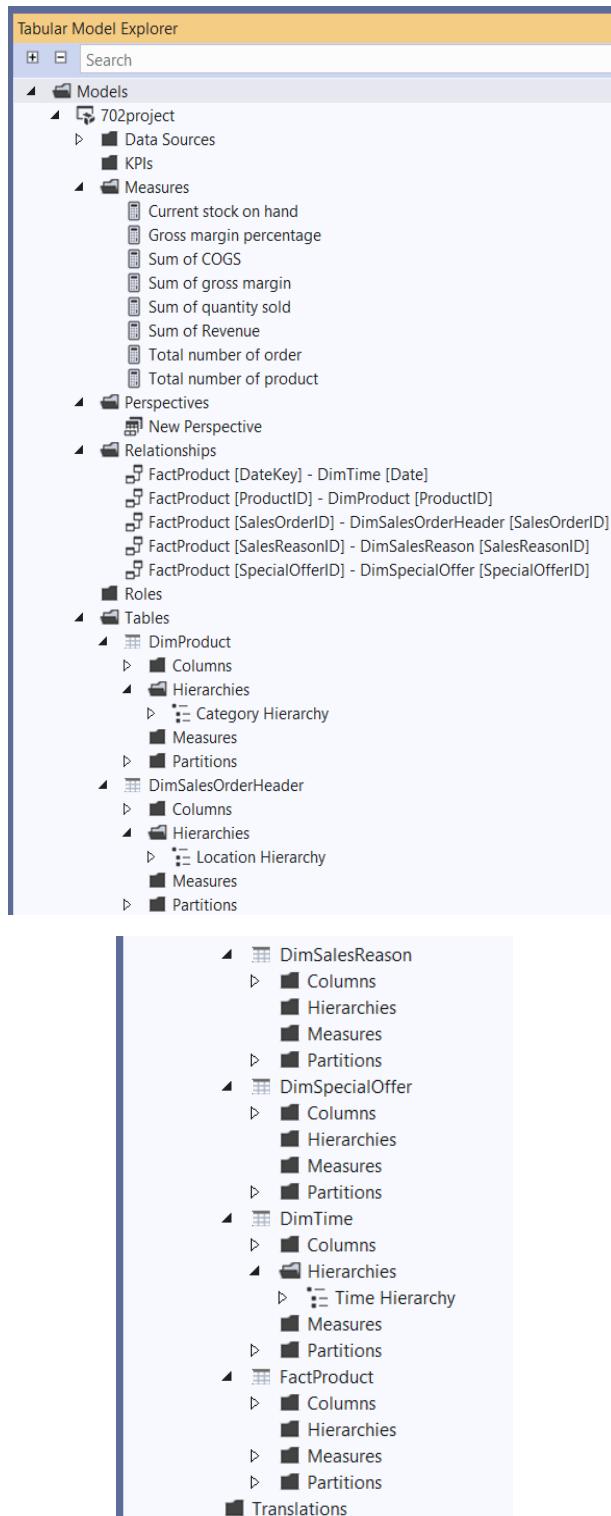
- Check the diagram and the one-to-many relationships between all the dimension tables and the fact table



- Create a new perspective to generate the cube and tick all the dimensions and fact tables.



- Display the whole data source view (dimension table, fact table, measure, relationships, perspective, and the corresponding hierarchy).



- Analyze the cube in the Excel.

Task e

Provide a brief description of how the cube is being used.

Instead of looping through millions of transactions to generate a query, slowing down, or making business operation systems unusable to create management reports, an OLAP cube is used to rapidly retrieve a value from transactional data defined by facts and dimensions. The values are a precomputed total stored, providing instant access and a snapshot of data specific to a query and a point in time. It can be filtered from our data model and pulled directly into a worksheet for business analysis.

The cube is built by dimensions and measures, where measures are what is being totaled, such as sales amount, item in stock, or sales quantity. Dimensions can be products such as “Cable Lock” or “Front Brakes”; another dimension could be the time hierarchy, distributed into quarters, months, and weeks. Hierarchy has a parent-child relationship. This comes to play when drilling down to data, such as getting detailed in time and expanding it from an analysis of March 2012 to weeks of 2012 or rolling up from March 2012 to the data of the year 2012. 2012 is the parent, and months are children within the hierarchies.

There are different methods to retrieve data from a cube. As mentioned above, the drill down and roll up method, where drill down is getting more specific information by stepping down a concept hierarchy, and roll up is climbing up a concept hierarchy. It can also be dimensional as well as hierarchical, i.e., dropping one or more dimensions to roll up, or it can be a mix or both. For slice and dice, it is reducing the size of the cube to gather the information we want. For example, to dice, the data extracted will be March’s total number of orders in the US for “Cable Lock.” It defines a sub-cube by drawing information from only a selection of two or more dimensions. Slice will be looking at one dimension of a given cube, such as we only want to see the total number of orders in the US, resulting in a sub cube. Pivoting is rotating the dimensions as a visualization operation to present an alternative view of the data. These methods are used to retrieve values in an OLAP cube to allow a brief analysis of a business query.

Overarching goal: Promote the ‘best’ products (either online or offline) to enable AW to sustain and accelerate its growth.

- **Which products are most/ least popular either instore or online and how does popularity impact revenue/ cost of products?**

By analysing the sum of quantity sold, the Long-Sleeve Logo Jersey, L (6140), AWC logo cap (6121), and Sport-100 Helmet, Blue (4618) are the most popular items for in-store transactions. (Appendix 1) Excluding those products which are not sold in the store, the least popular items in-store are LL Touring Frame - Blue, 58 (4), ML Mountain Frame-W - Silver, 38 (7), and LL Mountain Frame - Black, 40 (8) which are contrastingly popular with online purchases. (Appendix 2) For online, the Water Bottle - 30 oz (5084 units), Mountain Tire Tube (3595 units), and Patch Kit/8 Patches (3590 units). (Appendix 3) Excluding those products which are not sold online, the least popular items are Mountain-100 Silver, 48 (36 units), and silver 42 (42 units), 42, and black 42 (45 units). (Appendix 4) Popularity does not translate to higher revenue or profit. For example, the AWC logo cap yielded \$31,541.35 in revenue, and the “Long-Sleeve Logo Jersey, L” generated \$176,159.50. However, they both have higher COGS compared to revenue for in-store transactions, resulting in a negative gross margin. Despite the negative margin, since it is an “AW” logoed item, it serves well as a form of brand recognition, promotion, and advertisement, which can indirectly sustain sales and profit over the long term. The overall sum of gross margin, for instore, AW takes a loss of -\$2,316,039.23; however, online sales cover the losses and make \$15,051,429.33. Products that are popular online are often unlike in-store. For online products, the popular items have a positive gross margin and gross margin percentage. In comparison, in-store popular items tend to have a negative sum of gross margin. Therefore, if a negative margin item is popular in-store, it might generate revenue. However, it will still be a loss for AW in terms of margin.

- **Which products are most/ least profitable either instore or online and how does profitability impact revenue/cost of the products?**

We define an item as the most profitable not only by looking at the margin percentage but also by analysing the overall percentage of gross margin it brings in for AW. The overall most profitable products are mountain 200 black 38 bikes for in-store settings. Although it has a minimal 3.45% gross margin percentage, it brings over \$107,000 to the total gross margin and 3.86% of total revenue. (Appendix 5) For online sales, the Road-150 Red bike range brings in a combined 29% of gross margin as it has a high gross margin percentage online (Appendix 6). However, with in-store, it generates a negative gross margin percentage. The least profitable items instore are the Touring-1000 Yellow, 60 taking a loss of \$259,044.21, Road-250 Black, 44 (loss of \$243,353.52) and Touring-1000 Yellow, 46 loss of \$218,141.44). (Appendix 7) For online, there are numerous items that have not generated a transaction, but none of the items are generating negative margins. In comparison, transactions in-store majority have a small or negative margin. (Appendix 8) This can be partly due to extra accumulated costs. Or they are AW's loss leader product, where AW strategically accepts a margin loss to lure retail stores to consider AW as a preferred supplier. Stores are persuaded to be part of AW's product ecosystem, where AW can sell bike accessories and components at higher margins to cover the negative margins or cover the losses with the online store. This pricing strategy could also be AW's penetration pricing strategy to grow its global presence and establish a foothold in the marketplace. This tactic is usually a long-term strategy with the negative margins tapering off as revenue, brand, and customer base grow.

- Which products would your team recommend to AW to target with sales and marketing promotions and why?

Idle products have been stored for too long, it can be caused by different reasons such as economic conditions where supply no longer matches the customer's demand, or the buyer makes wrong estimates. Products decrease in quality over time; they rust, dry, or wear out and, at the same time, decrease in value. Therefore, the longer the idle inventory stays at the warehouse, it will result in more loss and negatively affect AW's bottom line. To identify idle products, we analysed the 2013 and 2014 yearly sum of quantity sold and cross-evaluating it with the current stock on hand. If the product did not have a sale in 2014 and there are stocks on hand, we can identify it as obsolete stock. The reason that those products were not selling in 2013 or 2014 (Appendix 9) is that the company stopped selling those in 2012 or 2013. (Appendix 10) Those products have a total working capacity of over \$5.86 million. If AW can sell those stocks, it can free up quite a lot of cash, and it will have a very positive impact on the business. By analysing further product financial performance, selling them online will give AW a much better return. (Appendix 11) Also, it sells very similar quantities in each territory. (Appendix 12)

We recommend a promotion campaign for these products to free up capital. This capital can be used to reinvest in things that generate revenue. We have also segmented the promotion recommendation to online shopping groups, as it will give a better return to AW.

Appendix

Appendix 1.

Row Labels	Column Labels	Instore	Sum of QtySold	Sum of Revenue	Sum of COGS	Sum of GrossMargin	Gross Margin %
Long-Sleeve Logo Jersey, L			6140	\$176,159.50	\$236,342.72	-\$60,183.23	-34.16%
AWC Logo Cap			6121	\$31,541.35	\$42,371.40	-\$10,830.05	-34.34%
Sport-100 Helmet, Blue			4618	\$91,052.87	\$60,432.53	\$30,620.33	33.63%
Sport-100 Helmet, Black			4447	\$87,915.37	\$58,194.78	\$29,720.59	33.81%
Classic Vest, S			4079	\$145,730.07	\$96,872.17	\$48,857.90	33.53%
Sport-100 Helmet, Red			4036	\$79,744.70	\$52,816.31	\$26,928.39	33.77%
Short-Sleeve Classic Jersey, XL			3455	\$107,063.66	\$143,632.30	-\$36,568.64	-34.16%
Full-Finger Gloves, L			3378	\$69,943.21	\$52,936.30	\$17,006.91	24.32%
Long-Sleeve Logo Jersey, M			3194	\$93,153.64	\$122,944.41	-\$29,790.77	-31.98%
Women's Mountain Shorts, S			2992	\$115,887.17	\$78,319.49	\$37,567.68	32.42%
Half-Finger Gloves, M			2965	\$42,324.98	\$27,157.32	\$15,167.65	35.84%
Women's Mountain Shorts, L			2881	\$111,367.65	\$75,413.92	\$35,953.73	32.28%
Hitch Rack - 4 Bike			2838	\$197,736.16	\$127,369.44	\$70,366.72	35.59%
Water Bottle - 30 oz.			2571	\$7,476.60	\$4,798.26	\$2,678.35	35.82%
Long-Sleeve Logo Jersey, XL			2567	\$74,965.33	\$98,809.73	-\$23,844.41	-31.81%
Short-Sleeve Classic Jersey, L			2474	\$78,280.46	\$102,849.87	-\$24,569.41	-31.39%
Bike Wash - Dissolver			2411	\$11,188.37	\$7,168.63	\$4,019.75	35.93%
Mountain-200 Black, 38			2395	\$3,105,726.66	\$2,998,495.21	\$107,231.45	3.45%
Full-Finger Gloves, M			2206	\$48,210.18	\$34,570.01	\$13,640.17	28.29%
Racing Socks, L			2203	\$11,357.29	\$7,407.15	\$3,950.14	34.78%
Road-650 Red, 44			2182	\$888,810.90	\$1,061,993.80	-\$173,182.90	-19.48%
Road-650 Black, 52			2181	\$975,992.10	\$1,061,507.09	-\$85,515.00	-8.76%
Road-650 Red, 60			2179	\$976,456.71	\$1,060,533.68	-\$84,076.97	-8.61%
Women's Tights, L			2123	\$94,090.64	\$65,671.61	\$28,419.04	30.20%
Classic Vest, M			2085	\$77,614.10	\$49,516.67	\$28,097.44	36.20%
Women's Tights, S			2072	\$91,330.80	\$64,094.00	\$27,236.80	29.82%
Mountain-200 Black, 42			2050	\$2,646,352.67	\$2,566,561.67	\$79,791.00	3.02%
Hydration Pack - 70 oz.			2028	\$65,518.75	\$41,708.46	\$23,810.29	36.34%
Road-650 Red, 62			1821	\$822,445.96	\$886,292.72	-\$63,846.76	-7.76%
Road-650 Red, 48			1800	\$811,944.73	\$876,071.88	-\$64,127.15	-7.90%
Mountain-200 Silver, 38			1798	\$2,354,215.24	\$2,275,583.86	\$78,631.37	3.34%
Road-650 Black, 58			1795	\$811,635.59	\$873,638.35	-\$62,002.75	-7.64%
Half-Finger Gloves, S			1700	\$24,539.43	\$15,570.81	\$8,968.62	36.55%
Mountain-200 Silver, 42			1674	\$2,181,044.29	\$2,118,647.04	\$62,397.24	2.86%
Mountain-200 Silver, 46			1636	\$2,133,156.84	\$2,070,553.50	\$62,603.34	2.93%
Men's Bib-Shorts, M			1616	\$86,166.05	\$59,987.37	\$26,178.67	30.38%
LL Road Frame - Black, 52			1581	\$299,595.52	\$323,512.28	-\$23,916.76	-7.98%
Short-Sleeve Classic Jersey, S			1549	\$49,686.13	\$64,395.49	-\$14,709.36	-29.60%
Road-550-W Yellow, 48			1502	\$950,134.77	\$1,071,045.86	-\$120,911.09	-12.73%
Mountain-200 Black, 46			1491	\$1,936,203.67	\$1,866,704.12	\$69,499.55	3.59%
Road-550-W Yellow, 38			1474	\$934,021.56	\$1,051,079.63	-\$117,058.06	-12.53%
ML Mountain Handlebars			1465	\$51,753.71	\$40,276.51	\$11,477.19	22.18%

Appendix 2.

Row Labels	Column Labels	Instore	Sum of QtySold	Sum of Revenue	Sum of COGS	Sum of GrossMargin	Gross Margin %
Long-Sleeve Logo Jersey, S			4	\$800.21	\$799.41	\$0.80	0.10%
All-Purpose Bike Stand			7	\$1,529.18	\$1,395.63	\$133.55	8.73%
Touring Tire Tube			8	\$1,198.99	\$1,094.28	\$104.71	8.73%
ML Road Tire			10	\$162.72	\$120.41	\$42.31	26.00%
HL Mountain Tire			12	\$457.20	\$284.99	\$172.21	37.67%
Mountain Bottle Cage			15	\$3,000.78	\$2,997.78	\$3.00	0.10%
LL Mountain Tire			15	\$2,248.11	\$2,051.78	\$196.34	8.73%
Mountain Tire Tube			17	\$13,765.92	\$11,884.58	\$1,881.34	13.67%
ML Mountain Tire			25	\$5,001.30	\$4,996.30	\$5.00	0.10%
Road Bottle Cage			36	\$7,201.87	\$7,194.67	\$7.20	0.10%
HL Road Tire			44	\$6,970.92	\$6,362.13	\$608.79	8.73%
Fender Set - Mountain			56	\$1,548.62	\$1,145.98	\$402.64	26.00%
Short-Sleeve Classic Jersey, M			64	\$10,574.78	\$7,825.34	\$2,749.45	26.00%
LL Road Tire			68	\$14,229.41	\$12,635.71	\$1,593.70	11.20%
Touring Tire			68	\$10,464.79	\$7,743.95	\$2,720.84	26.00%
LL Touring Frame - Blue, 58			83	\$49,994.72	\$49,944.73	\$49.99	0.10%
ML Mountain Frame-W - Silver, 38			84	\$1,972.66	\$1,459.77	\$512.89	26.00%
LL Mountain Frame - Black, 40			87	\$52,404.10	\$52,351.70	\$52.40	0.10%
LL Road Seat/Saddle			90	\$513.00	\$305.67	\$207.33	40.42%
Classic Vest, L			90	\$32,120.82	\$31,692.55	\$428.27	1.33%
LL Touring Frame - Blue, 62			91	\$1,480.75	\$1,095.76	\$384.99	26.00%
LL Touring Frame - Yellow, 58			94	\$20,238.16	\$14,902.25	\$5,335.91	26.37%
LL Mountain Frame - Silver, 48			95	\$1,949.40	\$1,442.56	\$506.84	26.00%
LL Touring Handlebars			100	\$20,104.44	\$18,715.71	\$1,388.73	6.91%
ML Road Rear Wheel			109	\$89,872.17	\$94,681.13	-\$4,808.95	-5.35%
ML Mountain Frame - Black, 40			109	\$89,872.17	\$94,681.13	-\$4,808.95	-5.35%
ML Crankset							
HL Touring Frame - Yellow, 50							
ML Touring Seat/Saddle							
HL Touring Frame - Yellow, 46							
Mountain Bike Socks, L							
ML Road Frame - Red, 52							
LL Touring Seat/Saddle							
HL Road Rear Wheel							
LL Headset							
LL Road Frame - Red, 52							
HL Road Frame - Black, 48							
HL Road Frame - Red, 48							

Appendix 3.

Row Labels	Column Labels	Online	Sum of QtySold	Sum of Revenue	Sum of COGS	Sum of GrossMargin	Gross Margin %
4 Water Bottle - 30 oz.			5084	25369.16	\$9,488.27	15880.8908	62.60%
5 Mountain Tire Tube			3595	17939.05	\$6,709.35	11229.7015	62.60%
6 Patch Kit/8 Patches			3590	8221.1	\$3,074.84	5146.265	62.60%
7 Fender Set - Mountain			2637	57961.26	\$21,677.46	36283.8015	62.60%
8 Road Tire Tube			2596	10358.04	\$3,874.01	6484.0292	62.60%
9 AWC Logo Cap			2588	23266.12	\$17,914.91	5351.2076	23.00%
10 Sport-100 Helmet, Red			2515	87999.85	\$32,912.04	55087.8055	62.60%
Sport-100 Helmet, Blue			2415	84500.85	\$31,603.41	52897.4355	62.60%
Sport-100 Helmet, Black			2377	83171.23	\$31,106.14	52065.0949	62.60%
Road Bottle Cage			2359	21207.41	\$7,931.67	13275.7443	62.60%
Mountain Bottle Cage			2280	22777.2	\$8,518.76	14258.436	62.60%
Touring Tire Tube			1587	7919.13	\$2,961.82	4957.3119	62.60%
HL Mountain Tire			1502	52570	\$19,661.18	32908.82	62.60%
ML Mountain Tire			1366	40966.34	\$15,321.47	25644.8742	62.60%
LL Road Tire			1213	26067.37	\$9,749.24	16318.1251	62.60%
LL Mountain Tire			1156	28888.44	\$10,804.32	18084.1172	62.60%
Bike Wash - Dissolver			1061	8434.95	\$3,154.67	5280.2787	62.60%
HL Road Tire			1028	33512.8	\$12,533.79	20979.0128	62.60%
ML Road Tire			1010	25239.9	\$9,439.76	15800.137	62.60%
Touring Tire			1000	28990	\$10,842.30	18147.7	62.60%
Hydration Pack - 70 oz.			808	44431.92	\$16,617.57	27814.3496	62.60%
Mountain-200 Silver, 38			682	1538981.93	\$863,152.50	675829.4314	43.91%
Mountain-200 Black, 42			675	1503136.483	\$845,087.38	658049.1059	43.78%
Road-150 Red, 48			674	2411753.98	\$1,463,452.29	948301.6892	39.32%
Road-150 Red, 62			672	2404597.44	\$1,459,109.70	945487.7376	39.32%
Mountain-200 Black, 46			671	1490514.038	\$840,079.45	650434.5859	43.64%
Mountain-200 Silver, 46			645	1451899.448	\$816,324.58	635574.8709	43.78%
Mountain-200 Black, 38			633	1411910.631	\$792,504.16	619406.4683	43.87%
Mountain-200 Silver, 42			628	1415193.893	\$794,809.05	620384.8468	43.84%
Road-150 Red, 52			604	2161275.08	\$1,311,461.70	849813.3832	39.32%
Half-Finger Gloves, M			595	14571.55	\$5,449.78	9121.7665	62.60%
Half-Finger Gloves, S			590	14449.1	\$5,403.99	9045.1113	62.60%
Road-150 Red, 56			590	2111179.3	\$1,281,063.58	830115.722	39.32%
Road-150 Red, 44			562	2010987.74	\$1,220,267.34	790720.3996	39.32%
Road-750 Black, 52			543	293214.57	\$186,601.73	106612.8372	36.36%
Half-Finger Gloves, L			529	12955.21	\$4,845.27	8109.9403	62.60%
Long-Sleeve Logo Jersey, L			511	25544.89	\$19,669.57	5875.3247	23.00%
Road-750 Black, 48			505	272694.95	\$173,543.05	99151.902	36.36%
Road-750 Black, 44			495	267295.05	\$170,106.55	97188.498	36.36%
Long-Sleeve Logo Jersey, M			492	24595.08	\$18,938.21	5656.8684	23.00%
Long-Sleeve Logo Jersey, S			484	24195.16	\$18,630.27	5564.8868	23.00%
Long-Sleeve Logo Jersey, XL			468	23395.32	\$18,014.40	5380.9236	23.00%

Appendix 4.

Row Labels	Column Labels	Online	Sum of QtySold	Sum of Revenue	Sum of COGS	Sum of GrossMargin	Gross Margin %
4 Mountain-100 Silver, 48			36	122399.64	\$68,837.56	53562.0816	43.76%
5 Mountain-100 Silver, 42			42	142799.58	\$80,310.48	62489.0952	43.76%
6 Mountain-100 Black, 42			45	151874.55	\$85,414.25	66460.302	43.76%
7 Mountain-100 Silver, 44			49	166599.51	\$93,695.57	72903.9444	43.76%
8 Mountain-100 Black, 38			49	165374.51	\$93,006.63	72367.8844	43.76%
9 Mountain-500 Silver, 44			49	27684.51	\$15,102.68	12581.8329	45.45%
10 Road-650 Red, 60			53	40072.3094	\$25,795.45	14276.8596	35.63%
11 Touring-3000 Blue, 50			55	40829.25	\$25,379.46	15449.786	37.84%
12 Touring-3000 Yellow, 58			56	41571.6	\$25,840.91	15730.6912	37.84%
13 Mountain-500 Black, 52			57	30779.43	\$16,791.04	13988.3871	45.45%
14 Mountain-100 Black, 48			57	192374.43	\$108,191.38	84183.0492	43.76%
15 Touring-3000 Yellow, 54			57	42313.95	\$26,302.35	16011.5964	37.84%
16 Mountain-500 Silver, 42			57	32204.43	\$17,568.42	14636.0097	45.45%
17 Mountain-100 Silver, 38			58	197199.42	\$110,904.96	86294.4648	43.76%
18 Road-650 Black, 48			60	45553.2394	\$29,202.40	16350.8434	35.89%
19 Mountain-100 Black, 44			60	202499.4	\$113,885.66	88613.736	43.76%
20 Road-650 Red, 52			61	46084.554	\$29,689.10	16395.4514	35.58%
Touring-3000 Yellow, 62			61	45283.35	\$28,148.13	17135.2172	37.84%
Mountain-500 Black, 40			63	34019.37	\$18,558.52	15460.8489	45.45%
Road-650 Black, 44			63	47566.6422	\$30,662.52	16904.1264	35.54%
Mountain-500 Silver, 40			63	35594.37	\$19,417.73	16176.6423	45.45%
Mountain-500 Silver, 48			64	36159.36	\$19,725.95	16433.4144	45.45%
Road-650 Black, 62			65	49048.7304	\$31,635.93	17412.8014	35.50%
Mountain-500 Silver, 52			66	37289.34	\$20,342.38	16946.9586	45.45%
Touring-3000 Yellow, 44			66	48995.1	\$30,455.36	18539.7432	37.84%
Touring-3000 Blue, 58			66	48995.1	\$30,455.36	18539.7432	37.84%
Touring-3000 Blue, 44			67	49737.45	\$30,916.80	18820.6484	37.84%
Touring-3000 Blue, 54			67	49737.45	\$30,916.80	18820.6484	37.84%
Touring-3000 Yellow, 50			69	51222.15	\$31,839.69	19382.4588	37.84%
Road-650 Red, 44			72	54529.6604	\$35,042.88	19486.7852	35.74%
Touring-3000 Blue, 62			72	53449.2	\$33,224.03	20225.1744	37.84%
Road-650 Red, 58			74	56347.3158	\$36,016.29	20331.0274	36.08%
Mountain-500 Black, 42			75	40499.25	\$22,093.48	18405.7725	45.45%
Road-650 Red, 62			75	57381.9812	\$36,503.00	20878.9862	36.39%
Road-650 Black, 60			76	57158.2696	\$36,989.70	20168.568	35.29%
Road-650 Black, 58			76	57997.1876	\$36,989.70	21007.486	36.22%
Mountain-500 Black, 48			78	42119.22	\$22,977.22	19142.0034	45.45%
Mountain-500 Black, 44			81	43739.19	\$23,860.96	19878.2343	45.45%
Road-650 Red, 48			88	66721.9332	\$42,830.18	23891.7524	35.81%
Road-650 Black, 52			89	66917.6806	\$43,316.89	23600.7932	35.27%
Touring-2000 Blue, 60			97	117840.45	\$73,249.63	44590.8224	37.84%
Touring-2000 Blue, 54			108	131203.8	\$81,556.29	49647.5136	37.84%

Appendix 5.

		Column Labels	Instore						
1	2	3	Row Labels	Sum of QtySold	Sum of Revenue	Sum of COGS	Sum of GrossMargin	Gross Margin %	
4	Mountain-200 Black, 38	2395	\$3,105,726.66	\$2,998,495.21	\$107,231.45	3.45%			
5	Mountain-200 Black, 42	2050	\$2,646,352.67	\$2,566,561.67	\$79,791.00	3.02%			
6	Mountain-200 Silver, 38	1798	\$2,354,215.24	\$2,275,583.86	\$78,631.37	3.34%			
7	Hitch Rack - 4-Bike	2838	\$197,736.16	\$127,369.44	\$70,366.72	35.59%			
8	Mountain-200 Black, 46	1491	\$1,936,203.67	\$1,866,704.12	\$69,499.55	3.59%			
9	Mountain-200 Silver, 46	1636	\$2,133,156.84	\$2,070,553.50	\$62,603.34	2.93%			
10	Mountain-200 Silver, 42	1674	\$2,181,044.29	\$2,118,647.04	\$62,397.24	2.86%			
11	Classic Vest, S	4079	\$145,730.07	\$96,872.17	\$48,857.90	33.53%			
12	HL Mountain Rear Wheel	850	\$166,013.28	\$123,490.98	\$42,522.31	25.61%			
13	HL Crankset	613	\$148,622.58	\$110,226.96	\$38,395.62	25.83%			
14	Women's Mountain Shorts, S	2992	\$115,887.17	\$78,319.49	\$37,567.68	32.42%			
15	Mountain-300 Black, 40	776	\$501,648.88	\$464,385.87	\$37,263.00	7.43%			
16	Mountain-300 Black, 44	747	\$484,051.52	\$447,031.24	\$37,020.27	7.65%			
17	Mountain-300 Black, 48	740	\$479,071.90	\$442,842.20	\$36,229.70	7.56%			
18	Women's Mountain Shorts, L	2881	\$111,367.65	\$75,413.92	\$35,953.73	32.28%			
19	Mountain-300 Black, 38	684	\$442,477.09	\$409,329.81	\$33,147.27	7.49%			
20	ML Mountain Rear Wheel	851	\$119,892.16	\$89,180.63	\$30,711.53	25.62%			
21	Sport-100 Helmet, Blue	4618	\$91,052.87	\$60,432.53	\$30,620.33	33.63%			
22	Sport-100 Helmet, Black	4447	\$87,915.37	\$58,194.78	\$29,720.59	33.81%			
23	HL Mountain Frame - Silver, 38	1206	\$930,780.68	\$901,123.44	\$29,657.24	3.19%			
24	HL Road Front Wheel	567	\$112,286.41	\$83,091.92	\$29,194.49	26.00%			
25	HL Mountain Frame - Black, 42	1181	\$901,590.23	\$872,807.42	\$28,782.81	3.19%			
26	Women's Tights, L	2123	\$94,090.64	\$65,671.61	\$28,419.04	30.20%			
27	Classic Vest, M	2085	\$77,614.10	\$49,516.67	\$28,097.44	36.20%			
28	Women's Tights, S	2072	\$91,330.80	\$64,094.00	\$27,236.80	29.82%			
29	Sport-100 Helmet, Red	4036	\$79,744.70	\$52,816.31	\$26,928.39	33.77%			
30	Men's Bib-Shorts, M	1616	\$86,166.05	\$59,987.37	\$26,178.67	30.38%			
31	Hydration Pack - 70 oz.	2028	\$65,518.75	\$41,708.46	\$23,810.29	36.34%			
32	ML Mountain Frame - Black, 48	959	\$200,284.50	\$178,200.71	\$22,083.79	11.03%			
33	ML Road Front Wheel	532	\$79,354.04	\$58,670.50	\$20,683.54	26.06%			
34	Mountain-400-W Silver, 40	489	\$225,209.10	\$205,271.64	\$19,937.46	8.85%			
35	HL Mountain Frame - Silver, 48	173	\$141,635.10	\$122,278.30	\$19,356.80	13.67%			
36	Full-Finger Gloves, L	3378	\$69,943.21	\$52,936.30	\$17,006.91	24.32%			
37	ML Mountain Frame-W - Silver, 40	899	\$195,826.39	\$179,238.75	\$16,587.63	8.47%			
38	HL Fork	444	\$61,034.61	\$45,240.76	\$15,793.85	25.88%			
39	LL Road Rear Wheel	868	\$58,655.37	\$43,381.69	\$15,273.69	26.04%			
40	Half-Finger Gloves, M	2965	\$42,324.98	\$27,157.32	\$15,167.65	35.84%			
41	HL Mountain Frame - Black, 38	659	\$501,788.20	\$487,028.02	\$14,760.18	2.94%			
42	Men's Bib-Shorts, S	876	\$47,214.37	\$32,517.91	\$14,696.46	31.13%			
43	HL Mountain Frame - Silver, 46	649	\$499,556.57	\$484,932.93	\$14,623.64	2.93%			
44	ML Mountain Frame - Black, 44	619	\$129,529.46	\$115,022.15	\$14,507.32	11.20%			
45	HL Mountain Frame - Black, 48	131	\$106,078.56	\$91,581.16	\$14,497.40	13.67%			

Appendix 6.

		Column Labels	Instore						
1	2	3	Row Labels	Sum of QtySold	Sum of Revenue	Sum of COGS	Sum of GrossMargin	Gross Margin %	
4	Road-150 Red, 48	156	\$334926.072	\$338,721.90	-3795.8232	-1.13%	674	2411753.98	\$1,463,452.29
5	Road-150 Red, 62	264	566797.968	\$573,221.67	-6423.7008	-1.13%	672	2404597.44	\$1,459,109.70
6	Road-150 Red, 52	156	\$334926.072	\$338,721.90	-3795.8232	-1.13%	604	2161275.08	\$1,311,461.70
7	Road-150 Red, 56	369	792228.978	\$801,207.56	-8978.5818	-1.13%	590	2111179.3	\$1,281,063.58
8	Road-150 Red, 44	156	\$334926.072	\$338,721.90	-3795.8232	-1.13%	562	2010987.74	\$1,210,267.34
9	Mountain-200 Silver, 38	1798	\$2354215.235	\$2,275,583.86	78631.374	3.34%	682	1538981.93	\$863,152.50
10	Mountain-200 Black, 42	2050	\$2646352.669	\$2,566,561.67	79791.0035	3.02%	675	1503136.483	\$845,087.38
11	Mountain-200 Black, 46	1491	\$1936203.669	\$1,866,704.12	69499.5505	3.59%	671	1490514.038	\$840,079.45
12	Mountain-200 Silver, 46	1636	\$2133156.844	\$2,070,553.50	62603.3416	2.93%	645	1451899.448	\$846,324.58
13	Mountain-200 Silver, 42	1674	\$2181044.288	\$2,118,647.04	62397.2448	2.86%	628	1415193.893	\$794,809.05
14	Mountain-200 Black, 38	2395	\$3105726.659	\$2,998,495.21	107231.4457	3.45%	633	1411910.631	\$792,504.16
15	Road-250 Black, 57	926	\$1278046.575	\$1,439,881.76	-161835.1804	-12.66%	343	7930416.5	\$533,347.13
16	Road-250 Black, 48	1200	\$1656499.691	\$1,865,937.48	-209487.7891	-12.65%	316	735186.5625	\$491,363.54
17	Road-250 Red, 58	640	\$884370.5322	\$995,166.66	-110796.1235	-12.53%	321	739287.9	\$499,138.28
18	Road-250 Black, 44	1371	\$188840.522	\$1,231,833.57	-243353.5185	-12.89%	281	652810.7625	\$436,940.36
19	Road-250 Black, 58	640	\$884370.5322	\$995,166.66	-110796.1235	-12.53%	283	653770.65	\$440,050.026
20	Touring-1000 Blue, 46	825	\$1164973.183	\$1,222,598.77	-57625.5844	-4.95%	220	524495.4	\$326,026.34
21	Touring-1000 Yellow, 46	833	\$1016312.829	\$1,234,454.27	-218141.4413	-21.46%	218	519726.25	\$323,062.46
22	Touring-1000 Blue, 54	253	\$361901.826	\$374,930.29	-13028.4627	-3.60%	200	476814.2	\$296,387.58
23	Touring-1000 Yellow, 54	239	\$290475.0888	\$354,183.16	-63708.0693	-21.93%	199	474429.93	\$294,905.64
24	Touring-1000 Blue, 50	499	\$713790.558	\$379,487.01	-25696.4541	-3.60%	188	448205.16	\$278,604.33
25	Touring-1000 Yellow, 50	501	\$621193.2792	\$742,450.90	-121257.6087	-19.52%	181	431516.6	\$268,230.76
26	Road-350-W Yellow, 40	1231	\$1238754.641	\$1,332,569.81	-93815.1675	-7.57%	263	447360.37	\$284,700.13
27	Touring-1000 Blue, 60	973	\$1370784.224	\$1,441,925.58	-71141.3523	-5.19%	179	426748.53	\$265,266.88
28	Touring-1000 Yellow, 60	974	\$1184363.301	\$1,443,407.51	-259044.2133	-21.87%	173	412444.11	\$264,375.26
29	Road-350-W Yellow, 48	1390	\$1380253.877	\$1,504,688.90	-124435.0228	-9.02%	248	421845.52	\$268,462.48
30	Road-350-W Yellow, 42	709	\$720337.113	\$767,499.59	-47165.8757	-6.55%	248	421845.52	\$268,462.48
31	Road-250 Red, 48	650	\$952396.7975	\$877,211.16	-34274.3625	-3.60%	162	395822.7	\$246,043.40
32	Road-350-W Yellow, 44	320	\$326590.05	\$346,403.20	-19813.12	-6.07%	233	396330.67	\$252,224.83
33	Road-250 Red, 44	751	\$1096280.079	\$1,140,608.59	-44328.5074	-4.04%	144	351842.4	\$218,705.24
34	Road-550-W Yellow, 42	943	\$597453.2715	\$672,434.25	-74980.9799	-12.55%	343	376044.4475	\$244,586.37
35	Road-550-W Yellow, 44	640	\$405489.324	\$456,371.07	-50881.748	-12.55%	325	354915.2075	\$231,750.94
36	Road-250 Red, 52	506	\$741801.00	\$768,505.92	-26704.8584	-3.60%	133	324965.55	\$201,998.59
37	Road-550-W Yellow, 40	1234	\$781284.9587	\$879,940.47	-98655.5145	-12.63%	308	337067.4025	\$219,628.58
38	Road-550-W Yellow, 38	1474	\$934021.5600	\$1,051,079.63	-117058.0643	-12.53%	300	327503.22	\$213,923.94
39	Road-550-W Yellow, 48	1502	\$950134.7677	\$1,071,045.86	-120911.0919	-12.73%	284	309575.38	\$202,514.66
40	Road-750 Black, 52	952	\$307230.7665	\$327,154.92	-19932.6527	-6.48%	543	293214.57	\$186,601.73
41	Road-750 Black, 48	1193	\$382157.943	\$409,973.97	-27816.0298	-7.28%	505	272694.95	\$173,543.05
42	Road-750 Black, 44	296	\$95902.24	\$101,720.28	-5818.0576	-6.07%	495	267295.05	\$170,106.55
43	Road-750 Black, 58	558	\$180788.652	\$191,756.48	-10967.8248	-6.07%	456	246235.44	\$156,704.22
44	Mountain-100 Black, 44	618	\$1163352.978	\$1,173,022.34	-9669.3609	-0.83%	60	202499.4	\$113,885.66
45	Mountain-100 Silver, 38	584	\$104669.281	\$1,116,698.17	-27028.8886	-2.01%	58	197199.42	\$110,904.96

Appendix 7.

Row Labels	Column Labels	Instore	Sum of QtySold	Sum of Revenue	Sum of COGS	Sum of GrossMargin	Gross Margin %
4 Touring-1000 Yellow, 60			974	\$1184363.301	\$1,443,407.51	-259044.2133	-21.87%
5 Road-250 Black, 44			1371	\$1888480.052	\$2,131,833.57	-243353.5185	-12.89%
6 Touring-1000 Yellow, 46			833	\$1016312.829	\$1,234,454.27	-218141.4413	-21.46%
7 Road-250 Black, 48			1200	\$1656449.691	\$1,865,937.48	-209487.7891	-12.65%
8 Road-650 Red, 44			2182	\$888810.8994	\$1,061,993.80	-173182.9018	-19.48%
9 Road-250 Black, 52			926	\$1278046.575	\$1,439,881.76	-161835.1804	-12.66%
10 Road-350-W Yellow, 48			1390	\$1380253.877	\$1,504,688.90	-124435.0228	-9.02%
11 Touring-1000 Yellow, 50			501	\$621193.2792	\$742,450.89	-121257.6087	-19.52%
12 Road-550-W Yellow, 48			1502	\$950134.7677	\$1,071,045.86	-120911.0919	-12.73%
13 Road-550-W Yellow, 38			1474	\$934021.5609	\$1,051,079.63	-117058.0643	-12.53%
14 Road-250 Black, 58			640	\$884370.5325	\$995,166.66	-110796.1235	-12.53%
15 Road-250 Red, 58			640	\$884370.5325	\$995,166.66	-110796.1235	-12.53%
16 Road-550-W Yellow, 40			1234	\$781284.9587	\$879,940.47	-98655.5145	-12.63%
17 Road-350-W Yellow, 40			1231	\$1238754.643	\$1,332,569.81	-93815.1675	-7.57%
18 Road-650 Black, 52			2181	\$975992.0976	\$1,061,507.09	-85514.997	-8.76%
19 Road-650 Red, 60			2179	\$976456.7092	\$1,060,533.68	-84076.9722	-8.61%
20 Road-550-W Yellow, 42			943	\$597453.2715	\$672,434.25	-74980.9799	-12.55%
21 Touring-1000 Blue, 60			973	\$1370784.224	\$1,441,925.58	-71141.3523	-5.19%
22 Road-650 Red, 48			1800	\$811944.7305	\$876,071.88	-64127.1495	-7.90%
23 Road-650 Red, 62			1821	\$822445.9571	\$886,292.72	-63846.7615	-7.76%
24 Touring-1000 Yellow, 54			239	\$290475.0888	\$354,183.16	-63708.0693	-21.93%
25 Road-650 Black, 58			1795	\$811635.5949	\$873,638.35	-62002.7521	-7.64%
26 Long-Sleeve Logo Jersey, L			6140	\$176159.4954	\$236,342.72	-60183.2266	-34.16%
27 Touring-1000 Blue, 46			825	\$1164973.183	\$1,222,598.77	-57625.5844	-4.95%
28 Touring-3000 Blue, 50			793	\$312948.7051	\$365,925.73	-52977.0213	-16.93%
29 Touring-3000 Yellow, 62			794	\$314430.2127	\$366,387.17	-51956.9585	-16.52%
30 Touring-3000 Yellow, 44			792	\$314323.2401	\$365,464.28	-51141.0415	-16.27%
31 Road-550-W Yellow, 44			640	\$405489.324	\$456,371.07	-50881.748	-12.55%
32 Road-350-W Yellow, 42			709	\$720333.7143	\$767,499.59	-47165.8757	-6.55%
33 Road-250 Red, 44			751	\$1096280.079	\$1,140,608.59	-44328.5074	-4.04%
34 Touring-3000 Blue, 54			631	\$249245.8693	\$291,171.67	-41925.7995	-16.82%
35 Touring-3000 Yellow, 50			627	\$247948.6129	\$289,325.89	-41377.2767	-16.69%
36 Short-Sleeve Classic Jersey, XL			3455	\$107063.6605	\$143,632.30	-36568.636	-34.16%
37 Road-250 Red, 48			650	\$952936.7975	\$987,211.16	-34274.3625	-3.60%
38 Road-650 Red, 52			1051	\$477545.5918	\$511,528.64	-33983.0448	-7.12%
39 Road-650 Black, 60			1024	\$464739.9918	\$498,387.56	-33647.5666	-7.24%
40 Road-650 Black, 44			1017	\$461678.3668	\$494,980.61	-33302.2454	-7.21%
41 ML Road Frame-W - Yellow, 44			1435	\$485700.5469	\$517,952.92	-32252.3711	-6.64%
42 Touring-2000 Blue, 54			922	\$665395.2123	\$696,249.04	-30853.8253	-4.64%
43 Long-Sleeve Logo Jersey, M			3194	\$93153.635	\$122,944.41	-29790.7712	-31.98%
44 Road-750 Black, 48			1193	\$382157.943	\$409,973.97	-27816.0298	-7.28%
45 Touring-3000 Blue, 58			425	\$168632.227	\$196,114.04	-27481.813	-16.30%

Appendix 8.

Row Labels	Column Labels	Online	Sum of QtySold	Sum of Revenue	Sum of COGS	Sum of GrossMargin	Gross Margin %
4 Racing Socks, L			318	\$2858.82	\$1,069.21	1789.6086	62.60%
5 Racing Socks, M			347	\$3119.53	\$1,166.72	1952.8119	62.60%
6 Touring Tire Tube			1587	\$7919.13	\$2,961.82	4957.3119	62.60%
7 Patch Kit/8 Patches			3590	\$8221.1	\$3,074.84	5146.265	62.60%
8 Bike Wash - Dissolver			1061	\$8434.95	\$3,154.67	5280.2787	62.60%
9 Short-Sleeve Classic Jersey, L			429	\$23161.71	\$17,834.52	5327.1933	23.00%
10 AWC Logo Cap			2588	\$23266.12	\$17,914.91	5351.2076	23.00%
11 Long-Sleeve Logo Jersey, XL			468	\$23395.32	\$18,014.40	5380.9236	23.00%
12 Long-Sleeve Logo Jersey, S			484	\$24195.16	\$18,630.27	5564.8868	23.00%
13 Short-Sleeve Classic Jersey, M			455	\$24565.45	\$18,915.40	5650.0535	23.00%
14 Long-Sleeve Logo Jersey, M			492	\$24595.08	\$18,938.21	5656.8684	23.00%
15 Short-Sleeve Classic Jersey, S			463	\$24997.37	\$19,247.97	5749.3951	23.00%
16 Short-Sleeve Classic Jersey, XL			464	\$25051.36	\$19,289.55	5761.8128	23.00%
17 Long-Sleeve Logo Jersey, L			511	\$25544.89	\$19,669.57	5875.3247	23.00%
18 Road Tire Tube			2596	\$10358.04	\$3,874.01	6484.0292	62.60%
19 Classic Vest, S			181	\$11493.5	\$4,298.57	7194.931	62.60%
20 Half-Finger Gloves, L			529	\$12955.21	\$4,845.27	8109.9403	62.60%
21 Classic Vest, L			209	\$13271.5	\$4,963.54	8307.959	62.60%
22 Classic Vest, M			211	\$13398.5	\$5,011.04	8387.461	62.60%
23 Half-Finger Gloves, S			590	\$14449.1	\$5,403.99	9045.113	62.60%
24 Half-Finger Gloves, M			595	\$14571.55	\$5,449.78	9121.7665	62.60%
25 Mountain Tire Tube			3595	\$17939.05	\$6,709.35	11229.7015	62.60%
26 Mountain-500 Silver, 44			49	\$27684.51	\$15,102.68	12581.8329	45.45%
27 Road Bottle Cage			2359	\$21207.41	\$7,931.67	13275.7443	62.60%
28 Women's Mountain Shorts, S			304	\$21276.96	\$7,957.60	13319.3648	62.60%
29 Mountain-500 Black, 52			57	\$30779.43	\$16,791.04	13988.3871	45.45%
30 Mountain Bottle Cage			2280	\$22777.2	\$8,518.76	14258.436	62.60%
31 Road-650 Red, 60			53	\$40072.3094	\$25,795.45	14276.8596	35.63%
32 Mountain-500 Silver, 42			57	\$32204.43	\$17,568.42	14636.0097	45.45%
33 Women's Mountain Shorts, M			352	\$24636.48	\$9,214.06	15422.4224	62.60%
34 Touring-3000 Blue, 50			55	\$40829.25	\$25,379.46	15449.786	37.84%
35 Mountain-500 Black, 40			63	\$34019.37	\$18,558.52	15460.8489	45.45%
36 Touring-3000 Yellow, 58			56	\$41571.6	\$25,840.91	15730.6912	37.84%
37 ML Road Tire			1010	\$25239.9	\$9,439.76	15800.137	62.60%
38 Water Bottle - 30 oz.			5084	\$25369.16	\$9,488.27	15880.8908	62.60%
39 Women's Mountain Shorts, L			363	\$25406.37	\$9,502.00	15904.3731	62.60%
40 Touring-3000 Yellow, 54			57	\$42313.95	\$26,302.35	16011.5964	37.84%
41 Mountain-500 Silver, 40			63	\$35594.37	\$19,417.73	16176.6423	45.45%
42 LL Road Tire			1213	\$26067.37	\$9,749.24	16318.1251	62.60%
43 Road-650 Black, 48			60	\$45553.2394	\$29,202.40	16350.8434	35.89%
44 Road-650 Red, 52			61	\$46084.554	\$29,689.10	16395.4514	35.58%
45 Mountain-500 Silver, 48			64	\$36159.36	\$19,725.95	16433.4144	45.45%

Appendix 9.

1	Sum of QtySold	Column Labels		Online				Grand Total		
		Instore		2012	2013	2014	2011			
2	Row Labels	2011								
3	Mountain-100 Black, 38		333	300			23	26	682	
4	Mountain-100 Black, 42		314	275			25	20	634	
5	Mountain-100 Black, 44		338	280			35	25	678	
6	Mountain-100 Black, 48		295	264			24	33	616	
7	Mountain-100 Silver, 38		312	272			39	19	642	
8	Mountain-100 Silver, 42		277	274			21	21	593	
9	Mountain-100 Silver, 44		297	255			28	21	601	
10	Mountain-100 Silver, 48		246	223			14	22	505	
11	Road-150 Red, 44		60	96			314	248	718	
12	Road-150 Red, 48		58	98			358	316	830	
13	Road-150 Red, 52		61	95			310	294	760	
14	Road-150 Red, 56		196	173			334	256	959	
15	Road-150 Red, 62		123	141			394	278	936	
16	Road-250 Red, 44		524	227			86	58	895	
17	Road-250 Red, 48		462	188			105	57	812	
18	Road-250 Red, 52		347	159			90	43	639	
19	Road-650 Black, 44		153	653	211		14	31	18	1080
20	Road-650 Black, 48		70	406	108		4	29	27	644
21	Road-650 Black, 52		395	1322	464		20	40	29	2270
22	Road-650 Black, 58		301	1106	387	1	11	39	26	1871
23	Road-650 Black, 60		155	653	216		15	39	22	1100
24	Road-650 Black, 62		73	403	103		15	29	21	644
25	Road-650 Red, 44		386	1316	477	3	9	36	27	2254
26	Road-650 Red, 48		293	1119	387	1	13	43	32	1888
27	Road-650 Red, 52		160	667	224		10	27	24	1112
28	Road-650 Red, 58		64	382	98		9	35	30	618
29	Road-650 Red, 60		378	1358	437	6	13	26	14	2232
30	Road-650 Red, 62		308	1114	397	2	4	48	23	1896
31	Grand Total		5646	14578	4083	13	2056	2282	451	29109

Appendix 10.

A	B	C	D
1 Row Labels	SellEndDate	CurrentStockLevel	Stock On Hand Value
2 Mountain-100 Black, 38	29/05/2012	155	294204.632
3 Mountain-100 Black, 42	29/05/2012	194	368230.3136
4 Mountain-100 Black, 44	29/05/2012	149	282816.0656
5 Mountain-100 Black, 48	29/05/2012	153	290408.4432
6 Mountain-100 Silver, 38	29/05/2012	149	284911.0056
7 Mountain-100 Silver, 42	29/05/2012	153	292559.6232
8 Mountain-100 Silver, 44	29/05/2012	158	302120.3952
9 Mountain-100 Silver, 48	29/05/2012	164	313593.3216
10 Road-150 Red, 44	29/05/2012	223	484198.6066
11 Road-150 Red, 48	29/05/2012	140	303981.188
12 Road-150 Red, 52	29/05/2012	128	277925.6576
13 Road-150 Red, 56	29/05/2012	163	353920.9546
14 Road-150 Red, 62	29/05/2012	133	288782.1286
15 Road-250 Red, 44	29/05/2013	163	247562.1832
16 Road-250 Red, 48	29/05/2013	185	280975.484
17 Road-250 Red, 52	29/05/2013	148	224780.3872
18 Road-650 Black, 44	29/05/2013	148	72032.5768
19 Road-650 Black, 48	29/05/2013	133	64731.9778
20 Road-650 Black, 52	29/05/2013	227	110482.3982
21 Road-650 Black, 58	29/05/2013	134	65218.6844
22 Road-650 Black, 60	29/05/2013	165	80306.589
23 Road-650 Black, 62	29/05/2013	188	91500.8408
24 Road-650 Red, 44	29/05/2013	137	66678.8042
25 Road-650 Red, 48	29/05/2013	223	108535.5718
26 Road-650 Red, 52	29/05/2013	140	68138.924
27 Road-650 Red, 58	29/05/2013	163	79333.1758
28 Road-650 Red, 60	29/05/2013	185	90040.721
29 Road-650 Red, 62	29/05/2013	148	72032.5768
30		4549	5860003.23

Appendix 11.

1	2	3	Column Labels									
			Instore			Online						
Row Labels		Sum of QtySold	Sum of Revenue	Sum of COGS	Sum of GrossMargin	Gross Margin %	Sum of QtySold	Sum of Revenue	Sum of COGS	Sum of GrossMargin	Gross Margin %	
4	Mountain-100 Black, 38	633	\$1,174,622.74	\$1,201,493.76	-\$26,871.01	-2.29%	49	\$165,374.51	\$93,006.63	\$72,367.88	43.76%	
5	Mountain-100 Black, 42	589	\$1,102,848.18	\$1,117,977.60	-\$15,129.42	-1.37%	45	\$151,874.55	\$85,414.25	\$66,460.30	43.76%	
6	Mountain-100 Black, 44	618	\$1,163,352.98	\$1,173,022.34	-\$9,669.36	-0.83%	60	\$202,499.40	\$113,885.66	\$88,613.74	43.76%	
7	Mountain-100 Black, 48	559	\$1,041,901.60	\$1,061,034.77	-\$19,133.17	-1.84%	57	\$192,374.43	\$108,191.38	\$84,183.05	43.76%	
8	Mountain-100 Silver, 38	584	\$1,094,669.28	\$1,116,698.17	-\$22,028.89	-2.01%	58	\$197,199.42	\$110,904.96	\$86,294.46	43.76%	
9	Mountain-100 Silver, 42	551	\$1,043,695.27	\$1,053,597.07	-\$9,901.80	-0.95%	42	\$142,799.58	\$80,310.48	\$62,489.10	43.76%	
10	Mountain-100 Silver, 44	552	\$1,050,610.85	\$1,055,509.23	-\$4,898.38	-0.47%	49	\$166,599.51	\$93,695.57	\$72,903.94	43.76%	
11	Mountain-100 Silver, 48	469	\$897,257.36	\$896,800.41	\$456.95	0.05%	36	\$122,399.64	\$68,837.56	\$53,562.08	43.76%	
12	Road-150 Red, 44	156	\$334,926.07	\$338,721.90	-\$3,795.82	-1.13%	562	\$2,010,987.74	\$1,220,267.34	\$790,720.40	39.32%	
13	Road-150 Red, 48	156	\$334,926.07	\$338,721.90	-\$3,795.82	-1.13%	674	\$2,411,753.98	\$1,463,452.29	\$948,301.69	39.32%	
14	Road-150 Red, 52	156	\$334,926.07	\$338,721.90	-\$3,795.82	-1.13%	604	\$2,161,275.08	\$1,311,461.70	\$849,813.38	39.32%	
15	Road-150 Red, 56	369	\$792,228.98	\$801,207.56	-\$8,978.58	-1.13%	590	\$2,111,179.30	\$1,281,063.58	\$830,115.72	39.32%	
16	Road-150 Red, 62	264	\$566,797.97	\$573,221.67	-\$6,423.70	-1.13%	672	\$2,404,597.44	\$1,459,109.70	\$945,487.74	39.32%	
17	Road-250 Red, 44	751	\$1,096,280.08	\$1,140,608.59	-\$44,328.51	-4.04%	144	\$351,842.40	\$218,705.24	\$133,137.16	37.84%	
18	Road-250 Red, 48	650	\$952,936.80	\$987,211.16	-\$34,274.36	-3.60%	162	\$395,822.70	\$246,043.40	\$149,779.30	37.84%	
19	Road-250 Red, 52	506	\$741,801.06	\$768,505.92	-\$26,704.86	-3.60%	133	\$324,965.55	\$201,998.59	\$122,966.96	37.84%	
20	Road-650 Black, 44	1017	\$461,678.37	\$494,980.61	-\$33,302.25	-7.21%	63	\$47,566.64	\$30,662.52	\$16,904.13	35.54%	
21	Road-650 Black, 48	584	\$265,393.34	\$284,236.65	-\$18,843.32	-7.10%	60	\$45,553.24	\$29,202.40	\$16,350.84	35.89%	
22	Road-650 Black, 52	2181	\$975,992.10	\$1,061,507.09	-\$85,515.00	-8.76%	89	\$66,917.68	\$43,316.89	\$23,600.79	35.27%	
23	Road-650 Black, 58	1795	\$811,635.59	\$873,638.35	-\$62,002.75	-7.64%	76	\$57,997.19	\$36,989.70	\$21,007.49	36.22%	
24	Road-650 Black, 66	1024	\$464,739.99	\$498,387.56	-\$33,647.57	-7.24%	76	\$57,158.27	\$36,989.70	\$20,168.57	35.29%	
25	Road-650 Black, 62	579	\$263,202.08	\$281,803.12	-\$18,601.04	-7.07%	65	\$49,048.73	\$31,635.93	\$17,412.80	35.50%	
26	Road-650 Red, 44	2182	\$888,810.90	\$1,061,993.80	-\$173,182.90	-19.48%	72	\$54,529.66	\$35,042.88	\$19,486.79	35.74%	
27	Road-650 Red, 48	1800	\$811,944.73	\$876,071.88	-\$64,127.15	-7.90%	88	\$66,721.93	\$42,830.18	\$23,891.75	35.81%	
28	Road-650 Red, 52	1051	\$477,545.59	\$511,528.64	-\$33,983.04	-7.12%	61	\$46,084.55	\$29,689.10	\$16,395.45	35.58%	
29	Road-650 Red, 58	544	\$247,665.33	\$264,768.39	-\$17,103.07	-6.91%	74	\$56,347.32	\$36,016.29	\$20,331.03	36.08%	
30	Road-650 Red, 60	2179	\$976,456.71	\$1,060,533.68	-\$84,076.97	-8.61%	53	\$40,072.31	\$25,795.45	\$14,276.86	35.63%	
31	Road-650 Red, 62	1821	\$822,445.96	\$886,292.72	-\$63,846.76	-7.76%	75	\$57,381.98	\$36,503.00	\$20,878.99	36.39%	
32	Grand Total	24320	\$21,191,292.05	\$22,118,796.43	-\$927,504.37	-4.38%	4789	\$14,158,924.73	\$8,571,022.34	\$5,587,902.39	39.47%	

Appendix 12.

1	2	3	Row Labels	Column Labels				Grand Total		
				Online		Europe	North America	Pacific		
Sum of QtySold				10	14	25	49			
4	Mountain-100 Black, 38			10	14	25	49			
5	Mountain-100 Black, 42			11	12	22	45			
6	Mountain-100 Black, 44			14	19	27	60			
7	Mountain-100 Black, 48			7	16	34	57			
8	Mountain-100 Silver, 38			17	20	21	58			
9	Mountain-100 Silver, 42			10	12	20	42			
10	Mountain-100 Silver, 44			10	11	28	49			
11	Mountain-100 Silver, 48			6	9	21	36			
12	Road-150 Red, 44			134	250	178	562			
13	Road-150 Red, 48			124	332	218	674			
14	Road-150 Red, 52			114	288	202	604			
15	Road-150 Red, 56			120	256	214	590			
16	Road-150 Red, 62			140	310	222	672			
17	Road-250 Red, 44			61	33	50	144			
18	Road-250 Red, 48			55	46	61	162			
19	Road-250 Red, 52			54	32	47	133			
20	Road-650 Black, 44			18	29	16	63			
21	Road-650 Black, 48			21	26	13	60			
22	Road-650 Black, 52			33	30	26	89			
23	Road-650 Black, 58			26	39	11	76			
24	Road-650 Black, 60			26	28	22	76			
25	Road-650 Black, 62			17	31	17	65			
26	Road-650 Red, 44			24	21	27	72			
27	Road-650 Red, 48			24	37	27	88			
28	Road-650 Red, 52			23	22	16	61			
29	Road-650 Red, 58			21	29	24	74			
30	Road-650 Red, 60			22	20	11	53			
31	Road-650 Red, 62			26	30	19	75			
32	Grand Total			1168	2002	1619	4789			

Task f

Reflection: Kan Wei 3813752

I think the group project went quite well despite some small technical issues we had. The group project requires each team member to participate and cooperate in a team with limited time. I learned from this whole project to know your team members, learn & lead, time management, and deal with conflicts/disagreements. I will explain those 4 points below.

- Know your team members

As we do not know each other at all at the beginning, so it is quite important to know each team member's strengths and preferences at the right beginning so that we can allocate those suitable tasks to that team member. We did well on this; we introduced ourselves and let everyone know the strength we have. Then based on this, we allocated the task to each team member. i.e., people who are good at coding are doing task b – d, people who are good at writing are doing task e.

- Learn & Lead

Once we know each other and make the whole process smooth, it will be good to have a leader to do coordination. Because I did some preparation before our first meeting, and I believe I have more business knowledge than my team members, I was trying to lead the team and make sure we delivered the result with good quality on time. The way how I did it was to be helpful and make sure everyone did their part and completed it on time.

Sometimes I would have small sessions with team members who had issues. I think it worked quite well from my perspective, but I am not sure what my team members' thoughts.

- Time management

We have 2 team members working at the moment, so their availability is quite limited. Also, we have 2 group projects due in the same week. To manage this, we started reasonably early and set up a timeline for each task, and we made sure we strictly stuck to the plan. We met up on Saturday, two weeks before the due date. We completed task b to task d on the following Sunday, which leaves us five days to complete task e and individual reflection. I believe it gives us the confidence to complete this project on time with good quality.

- Deal with conflicts/disagreements

We don't have any conflicts/disagreements within our team; everyone is quite disciplined in completing this project with good quality. We have different understandings of the design of the star schema at the beginning. To overcome this, we quickly asked for a meeting with lecturer Udayangi for clarification. Udayangi was kind enough to meet us via Zoom on the same day. This session was very productive and answered our confusion about the ERD design, which helped us save a lot of discussion time. Therefore, what I learned from here is if we can't agree on something within the team, it is always good to ask for an external authority to help us with guidance so that we can keep the project going.

By doing this group project, it gives me ways and confidence to work with people who I do not know at all. And make sure we can complete group project with good quality on time.

Reflection: Chun Hei Lai 590025946

I think my members and I work efficiently, and I have learned task allocation, communication, time management, leadership, technical skills, and problem-solving in this process. We meet online to discuss who is doing those different tasks to ensure everyone distributes. It is clever as different people are experts in different areas, such as writing reports and coding. Besides, we share our screen to show what we have done so that we know everything is on the right track. Also, we will talk about the next meeting time, as the time is limited. I feel this pushes me a lot, and this improves my time management. I will set a schedule for when I should finish the task.

Besides, I want to talk about my member William, a group leader who provides many good insights for us for improvement and is willing to help us when we are stuck. I have learned leadership. Assisting others with patience, providing some influential opinions, and being unselfish that doesn't care about distributing more. This is what I hope to achieve. William is an excellent example for me to learn, like respecting other members. I have learned some great personalities from him, like patience and not giving up easily when facing difficulties.

Then, I will talk about what techniques aspect I have learned. I do the SSAS part. This is a challenge for me as I have never used it before, and I must ensure everything is right and pass it on to another member. So, I feel nervous, but I try to follow the lab's guide and do some research. I learn how to create hierarchies, connect relationships for primary and foreign keys and complete the cube structure with some calculations using sum and average functions. This highly improves my technical skills in SSAS, and I am confident to do it in my future workplace.

However, we have struggled with some issues and overcame them together. For example, I pass it to Ginni after I finish my part. But unfortunately, the system doesn't work when we transfer our SSAS database. We have tried many ways, such as restoring the database again, but it doesn't work as the connection hasn't been created, or the project is recompiled. Finally, I share my screen and teach Ginni what I have done. Then she follows my guide, puts all my code into her computer, and it works in the end. In this process, I realize the importance of teamwork. It leads the problem to a better outcome and lets us learn from each other.

I have learned something in this project. For example, my technical skill in SASS has been enhanced, and I feel I can become an expert in it in the future. Also, I have learned to organize a better timetable, don't do the work at the last minute. Another thing I have gained the most is teamwork, how to work as a group through communication, providing ideas, and solving difficulties together.

Reflection: Ginne 2928275

According to LinkedIn, collaboration and teamwork are the third most demanded soft skill asked for by employers. I learned that having a great team with members who collaborated well made us a more productive and valuable team. Having a great leader that drove and influenced the team strived us to want to be high achieving. Another lesson is that technical issues will always arise, but effective planning and aiming to complete the project earlier than the deadline will alleviate the problem. However, for me, other commitments outside the project consumed more time than predicted. Future improvement will be to work on better time management on my part.

Our project had great team members who could identify and appreciate each other's strengths, as leveraging our strengths in a group can increase productivity and engagement. We first discussed our strengths and allocated the project tasks accordingly. It allowed us to utilize group members effectively to produce a higher quality project than we could on our own. All members demonstrated open and transparent communication. Each member was willing to share their screens and discuss their completed tasks. We openly communicated what we agreed with and why we disagreed. We achieved collaborative communication through Facebook messenger and MS Team. It helped everyone stay on the same page and showed equal commitment. We had the same end goal – to complete the project at a high standard.

All members demonstrated conflict resolution skills, where disagreements were not left unresolved but addressed respectfully. We also investigated further by asking for help through Piazza or with the lecturer for the ERD diagram. Our team also had a great leader. William did a great job, provided direction and guidance to the team, and monitored the project's progress. We had clear expectations and precise time frames that our group complied with.

Working with other team members has taught me how to and should manage my time effectively by establishing clear timelines and expectations. From the beginning of the project, we outlined each member's responsibilities in the project. We also aimed to complete the project a day earlier to meet the draft submission deadline. It worked in our favor, as we experienced technical issues where the SSAS task file was not transferable. We had to tediously go through and replicate Edmond's task and replicate it on my VisualStudio. Because everything before that worked and linked seamlessly, we did not expect the SASS part not to load. One member also had a mac which meant files didn't calibrate properly, and he had to use the university's computers.

How we collaborated worked exceptionally well, our team delegated tasks to each member, and everything was completed well. We would then return to the group to explain what they have done, and the group will add their opinions and suggestions or help with any issues encountered. It promoted effective communication from everyone. However, to improve efficiency further, in hindsight, we could discuss how we will approach the task, brainstorm ideas, and create a plan on the direction of the task before the individual member completes it. It will resolve any disagreements beforehand and potentially save a bit more time. Time management on my part was a bit poor as I had unexpected circumstances. Therefore, future learning would be to prioritize my time better and factor in more time so that time constraints would not be an issue when unforeseen issues arise.

In this project, I learned how to work as a team in a remote environment, a beneficial skill set in today's environment. The content also taught me how data analysis and business intelligence could solve business problems. Learning in a team environment allowed me to learn from others and gain new perspectives.

Reflection: Wenzhuo Mao 567507023

Reflection allows me to become more aware of my expertise and actions. The process of reflection encourages me to collaborate with others as I can share experiences and shortcomings of my practice to seek support from others. In addition, through reflection, I have developed data-based problem-solving skills. Through the project, I mastered using critical data management software and tools (SSMS, SSIS, and SSAS). Learned to plan, design, and execute Extract-Transform-Load (ETL) data flows. Exercised my independent and reflective thinking.

Reflection is also a cyclical process, and I did it several times during practice in this group project. In the first group meeting, we first introduced ourselves, had an understanding of others, and assigned tasks based on each person's strengths. We discussed creating an ERD chart based on the problem in the second group assignment. During this process, it gave me great inspiration; at the same time, we had different opinions. I was impressed by William's mobility, as he immediately decided to meet with lecturer Udayangi to clarify the issue. Udayangi was very kind in answering our questions during the meeting with our group. William's mobility is worth learning from me and can significantly improve learning efficiency. Previously, I preferred to study on my own, and researching problems on my own can be inefficient when they are difficult to understand. Therefore, I should form a good habit of asking questions when I don't understand the process of work and studying afterward.

In our group project practice, we have frequent group meetings and set the following task before the end of the meeting. From the aspect of time management, dividing a task into multiple short-term mini-goals can be very helpful in improving efficiency (George, 2012). I will also apply this approach to improve the efficiency of my learning in the future. I did not allocate the time for the task reasonably well in my previous group assignment, resulting in a rushed final check before the deadline. In future group tasks, I will also actively communicate with other group members to make reasonable time allocations and improve the group's efficiency.

In completing the group project, we all strived for group excellence rather than individual excellence. In each video conference, each person presented their part and answered questions, and others actively added features that might be missing. I think everyone's positive attitude was one of the reasons for completing the project efficiently, and another reason was the appropriate way to communicate. Videoconferencing and face-to-face communication convey more information and are more efficient than email or SMS contact (Kennedy, McComb, & Vozdolska, 2011). I should follow this approach in subsequent group assignments and conduct video conferencing or face-to-face communication.

In summary, professionally, I learned from this group practice the ability to design and logically validate data warehouse dimensional models and how to demonstrate data-based business intelligence problem-solving skills. In terms of individual learning and group work, I learned not to procrastinate and to divide tasks wisely. Appropriate communication style is also essential. I should use these experiences and methods to solve problems in my future learning work.

Reference

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