

# Module 5: Modeling Data

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**Note:** Lab Solution is present in Desktop\power-bi-quickstart\Labfiles\Lab05\Solution folder:

## Lab: Modeling Data

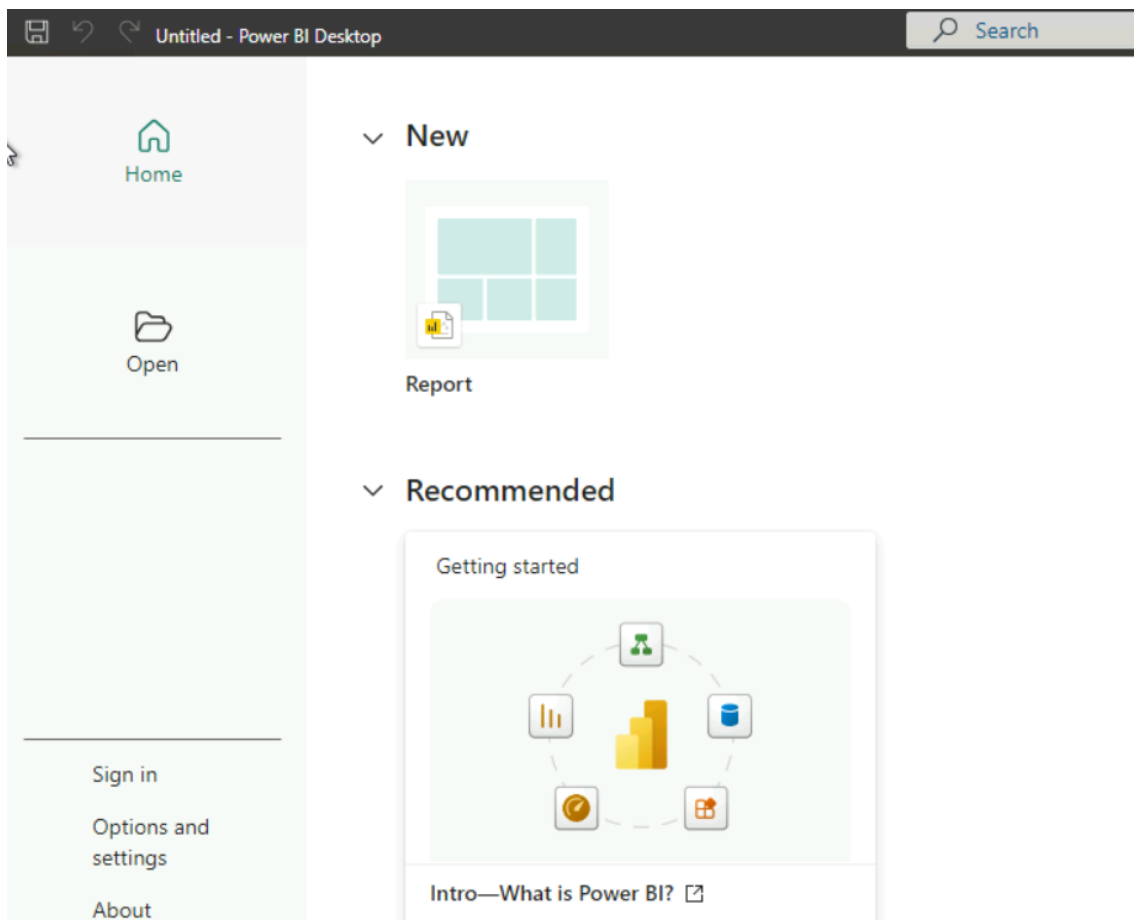
### Exercise 1: Create Relationships

#### Task 1: Preparing the Environment

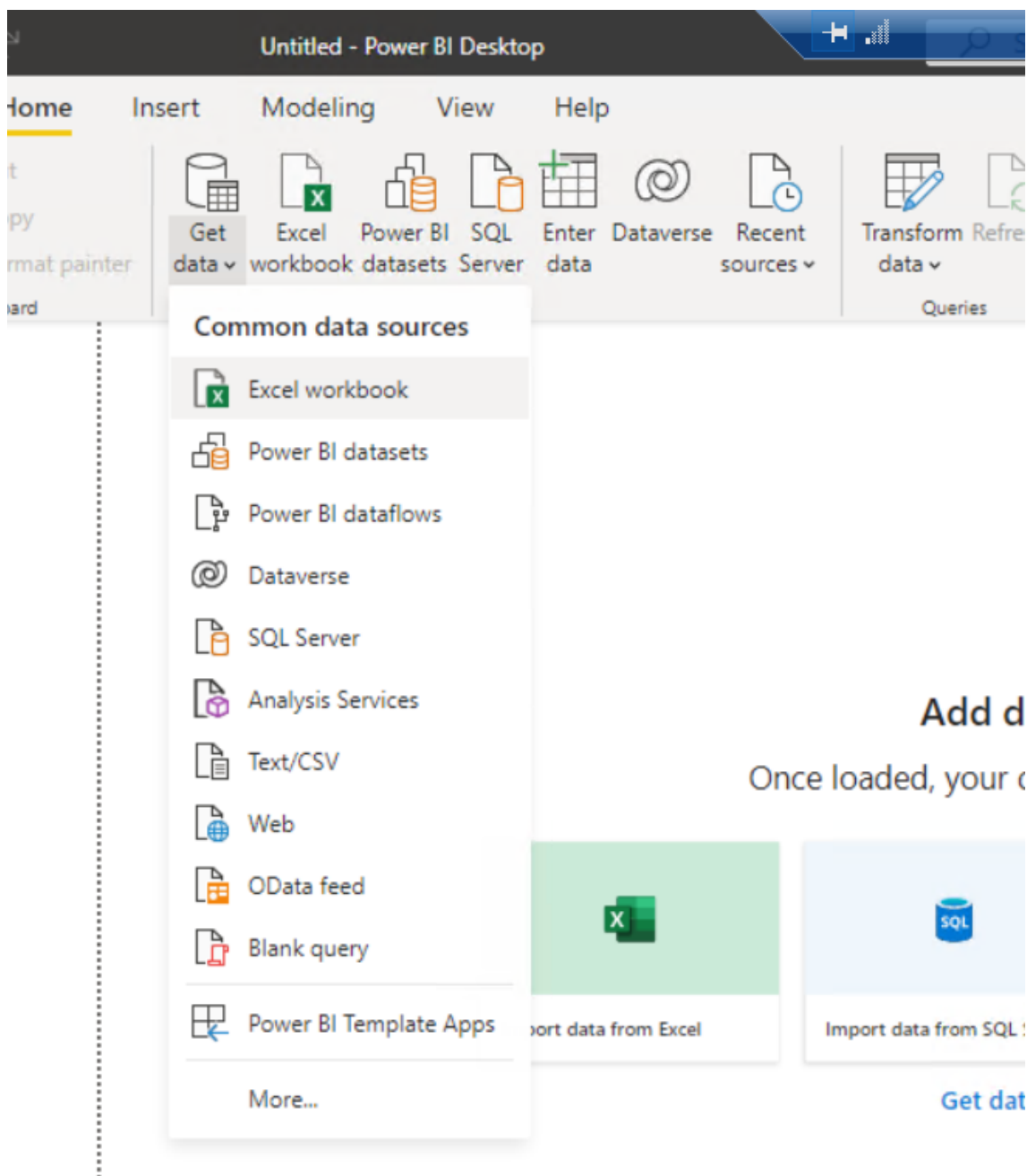
Lab environment is already setup.

#### Task 2: Automatic Relationships

1. Make sure previous tasks was completed.
2. On the Taskbar, click **Power BI Desktop**.
3. Click **New > Report**:



5. In the **Power BI Desktop** window, click **Get data**.
6. In the **Get Data** dialog box, ensure **Excel Workbook** is selected.



7. In the **Open** dialog box, navigate to **Desktop\power-bi-quickstart\Labfiles\Lab05\Starter\Project**, click **Adventure Works Sales Data.xlsx**, and then click **Open**.
8. In the **Navigator** dialog box, select the **DimCurrency**, **DimCustomer**, **DimDate**, **DimProduct**, **DimPromotion**, **DimSalesTerritory**, and **FactInternetSales** check boxes, and then click **Load**.

## Navigator

Display Options ▾

Adventure Works Sales Data.xlsx [14]

- ☐ Table1
- ☐ Table2
- ☐ Table3
- ☐ Table5
- ☐ Table6
- ☐ Table7
- ☐ Table8
- ☒ DimCurrency
- ☒ DimCustomer
- ☒ DimDate
- ☒ DimProduct
- ☒ DimPromotion
- ☒ DimSalesTerritory
- ☒ FactInternetSales

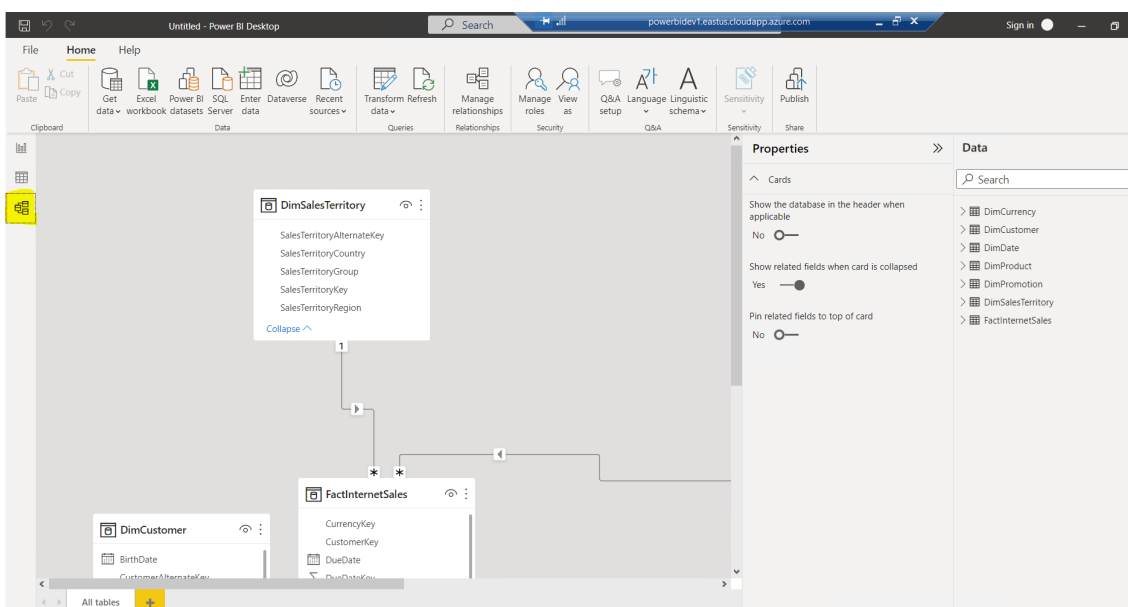
### FactInternetSales

ProductKey	OrderDateKey	DueDateKey	ShipDateKey	CustomerKey	Pro
310	20050701	20050713	20050708	21768	
346	20050701	20050713	20050708	28389	
346	20050701	20050713	20050708	25863	
336	20050701	20050713	20050708	14501	
346	20050701	20050713	20050708	11003	
311	20050702	20050714	20050709	27645	
310	20050702	20050714	20050709	16624	
351	20050702	20050714	20050709	11005	
344	20050702	20050714	20050709	11011	
312	20050703	20050715	20050710	27621	
312	20050703	20050715	20050710	27616	
330	20050703	20050715	20050710	20042	
313	20050703	20050715	20050710	16351	
314	20050703	20050715	20050710	16517	
314	20050704	20050716	20050711	27606	
311	20050704	20050716	20050711	13513	
310	20050705	20050717	20050712	27601	
311	20050705	20050717	20050712	13591	
314	20050705	20050717	20050712	16483	
311	20050705	20050717	20050712	16529	
336	20050705	20050717	20050712	25249	
311	20050706	20050718	20050713	27668	

The data in the preview has been truncated due to size limits.

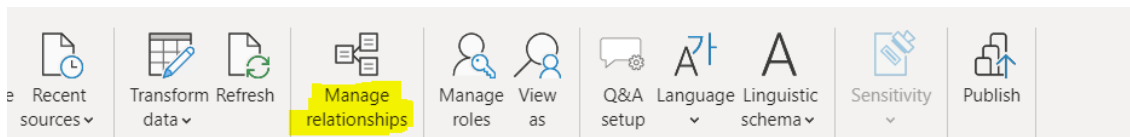
Load
Transform Data
Cancel

14. In the views pane on the left-hand side, click **Model**.



15. On the **Home** tab, click **Manage Relationships**.

16. In the **Manage relationships** dialog box, click **New**.



## Manage relationships

Active	From: Table (Column)	To: Table (Column)
<input checked="" type="checkbox"/>	DimCustomer (CustomerKey)	FactInternetSales (CustomerKey)
<input checked="" type="checkbox"/>	FactInternetSales (CurrencyKey)	DimCurrency (CurrencyKey)
<input checked="" type="checkbox"/>	FactInternetSales (ProductKey)	DimProduct (ProductKey)
<input checked="" type="checkbox"/>	FactInternetSales (PromotionKey)	DimPromotion (PromotionKey)
<input checked="" type="checkbox"/>	FactInternetSales (SalesTerritoryKey)	DimSalesTerritory (SalesTerritoryKey)

17. In the **Create relationship** dialog box, in the top table list, click **FactInternetSales**. When the table preview appears below, click the **OrderDateKey** column.
18. In the bottom table list, click **DimDate**. When the table preview appears below, click the **DateKey** column.
19. Check that the **Cardinality** is selected to **Many to one (\*:1)**, the **Cross filter direction** is **Single**, and **Make this relationship active** is selected, and then click **OK**.



## Create relationship

Select tables and columns that are related.

FactInternetSales

ProductKey	OrderDateKey	DueDateKey	ShipDateKey	CustomerKey	PromotionKey	CurrencyKey	S
310	20050702	20050714	20050709	16624	1	6	
313	20050703	20050715	20050710	16351	1	6	
314	20050703	20050715	20050710	16517	1	6	

DimDate

DateKey	FullDateAlternateKey	DayNumberOfWeek	EnglishDayNameOfWeek	SpanishDayNameOfWeek	Fr
20050701	Friday, July 1, 2005	6	Friday	Viernes	V
20050702	Saturday, July 2, 2005	7	Saturday	Sábado	S
20050703	Sunday, July 3, 2005	1	Sunday	Domingo	D

Cardinality

Many to one (\*:1)

Cross filter direction

Single

☒ Make this relationship active

☐ Apply security filter in both directions

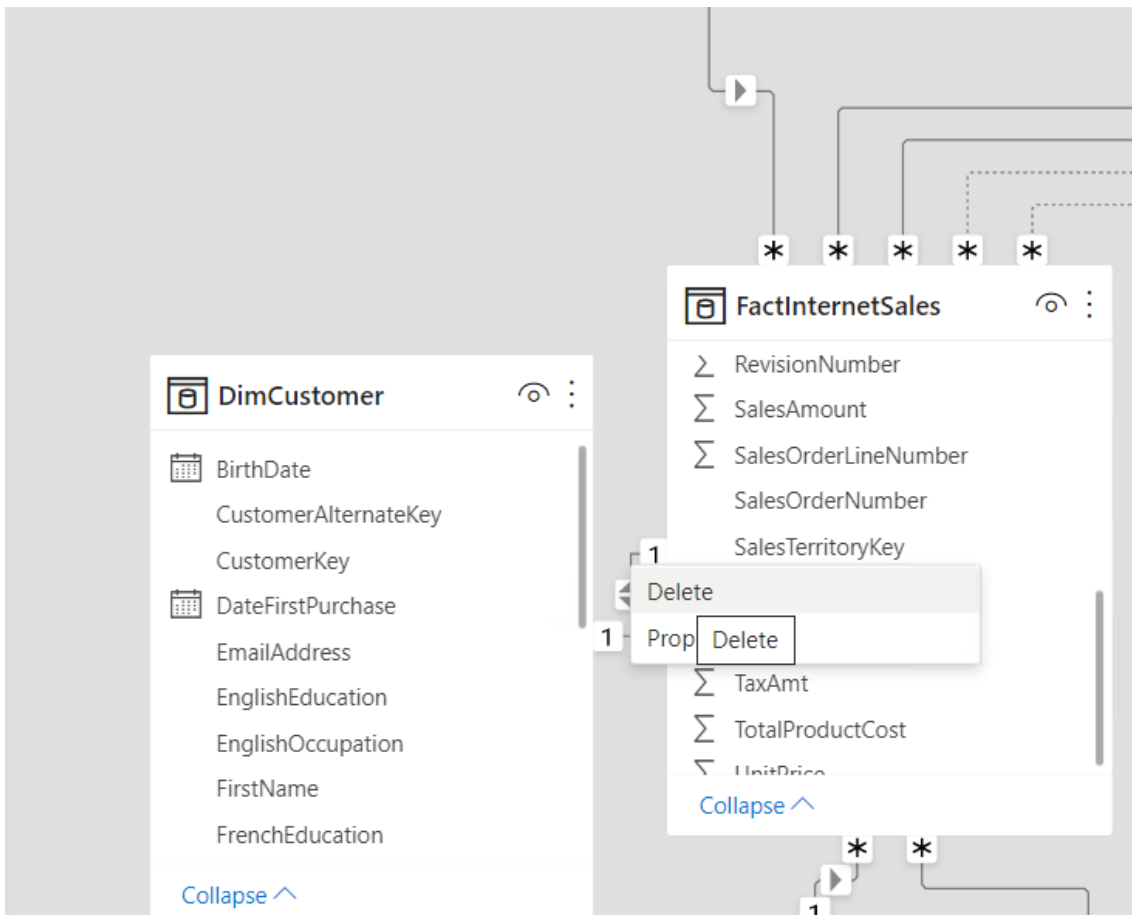
☐ Assume referential integrity

OK

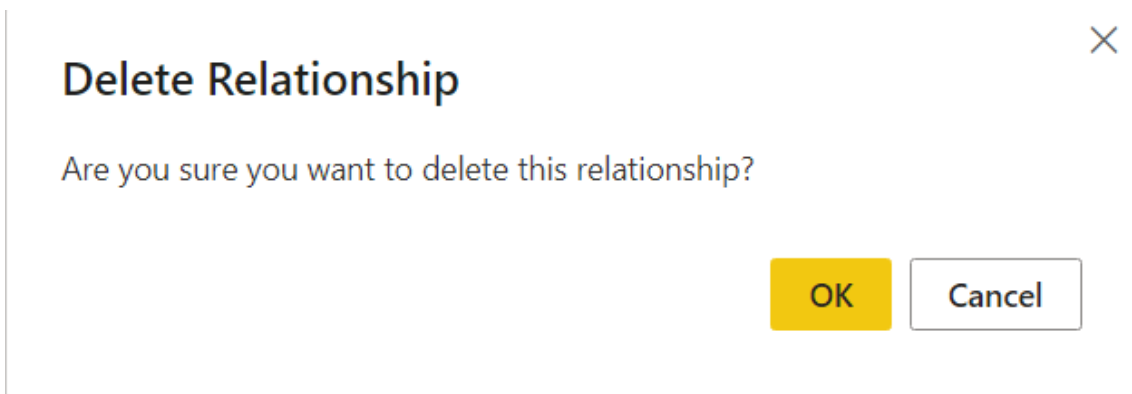
Cancel

20. In the **Manage relationships** dialog box, click **Close**.
21. In the diagram, in the **FactInternetSales** table, click the **DueDateKey** column. Drag the **DueDateKey** column to the **DateKey** column of the **DimDate** table.
22. In the diagram, in the **FactInternetSales** table, click the **ShipDateKey** column. Drag the **ShipDateKey** column to the **DateKey** column of the **DimDate** table.
23. On the **Home** tab, click **Manage Relationships**.
24. In the **Manage relationships** dialog box, double-click the **FactInternetSales (CurrencyKey)** relationship.
25. In the **Edit relationships** dialog box, in the **Cross filter direction** list, ensure **Single** is selected, and then click **OK**.
26. In the **Manage relationships** dialog box, double-click the **FactInternetSales (ProductKey)** relationship.
27. In the **Edit relationships** dialog box, in the **Cross filter direction** list, ensure **Single** is selected, and then click **OK**.
28. In the **Manage relationships** dialog box, double-click the **FactInternetSales (PromotionKey)** relationship.
29. In the **Edit relationships** dialog box, in the **Cross filter direction** list, ensure **Single** is selected, and then click **OK**.

30. In the **Manage relationships** dialog box, double-click the **FactInternetSales (SalesTerritoryKey)** relationship.
31. In the **Edit relationships** dialog box, in the **Cross filter direction** list, ensure **Single** is selected, and then click **OK**.
32. In the **Manage relationships** dialog box, click **Close**.
33. Right-click the relationship line between **FactInternetSales** and **DimCustomer**, and then click **Delete**.



34. In the **Delete Relationship** dialog box, click **Delete**.



35. On the **Home** tab, click **Manage Relationships**.
36. In the **Manage relationships** dialog box, click **New**.
37. In the **Create relationship** dialog box, in the top table list, click **FactInternetSales**, and in the data preview, click **CustomerKey**.
38. In the bottom table list, click **DimCustomer**, and in the data preview, click **CustomerKey**.
39. In the **Cardinality** list, click **Many to one (\*:1)**, and then click **OK**.
40. In the **Manage relationships** dialog box, click **Close**.
41. On the **File** menu, click **Save**.
42. In the **Save As** dialog box, navigate to the **Desktop\power-bi-quickstart\Labfiles\Lab05\Starter** folder, and in the **File name** box, type **Adventure Works Sales 5.pbix**, and then click **Save**.

### Task 3: Manual Relationships

1. In Power BI Desktop, on the **Home** tab, click the **Get Data** arrow, and then click **Excel**.
2. In the **Open** dialog box, navigate to **Desktop\power-bi-quickstart\Labfiles\Lab05\Starter\Project**, click **Adventure Works Product Categories.xlsx**, and then click **Open**.
3. In the **Navigator** dialog box, select the **DimProductCategory**, and **DimProductSubcategory** check boxes, and then click **Load**.

### Navigator

Display Options ▾
🔗

Adventure Works Product Categories.xlsx [4]

☐

Table1

☐

Table2

☒

DimProductCategory

☒

DimProductSubcategory

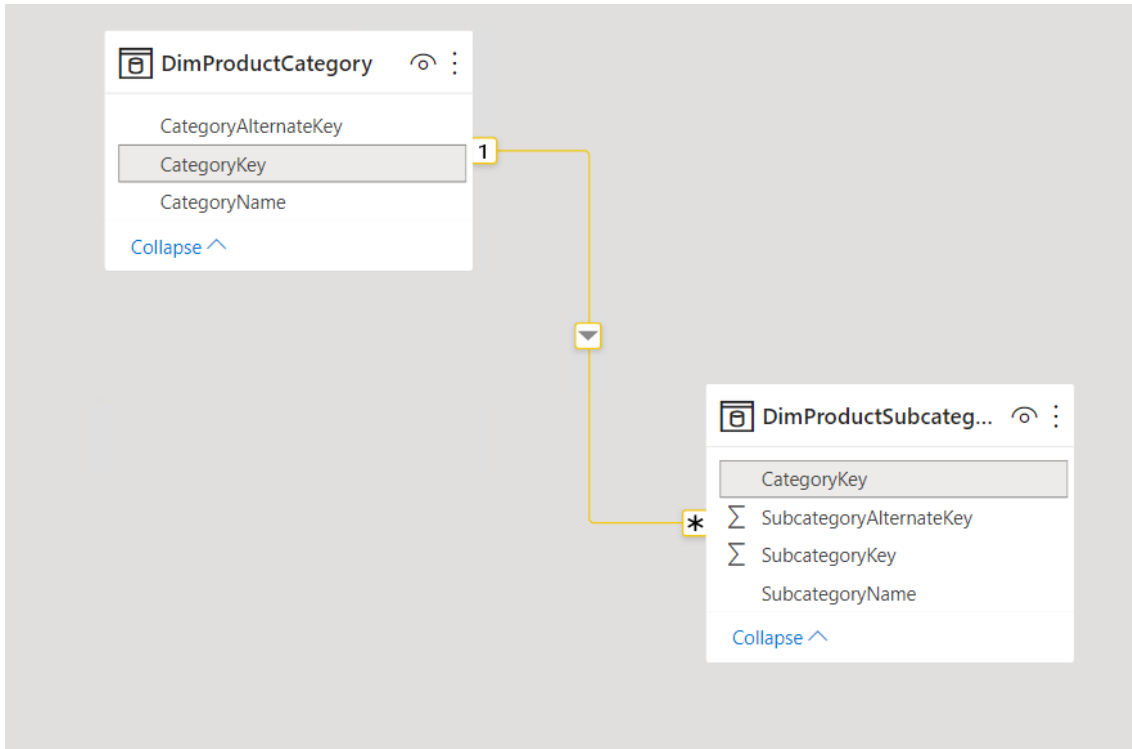
DimProductSubcategory
🔗

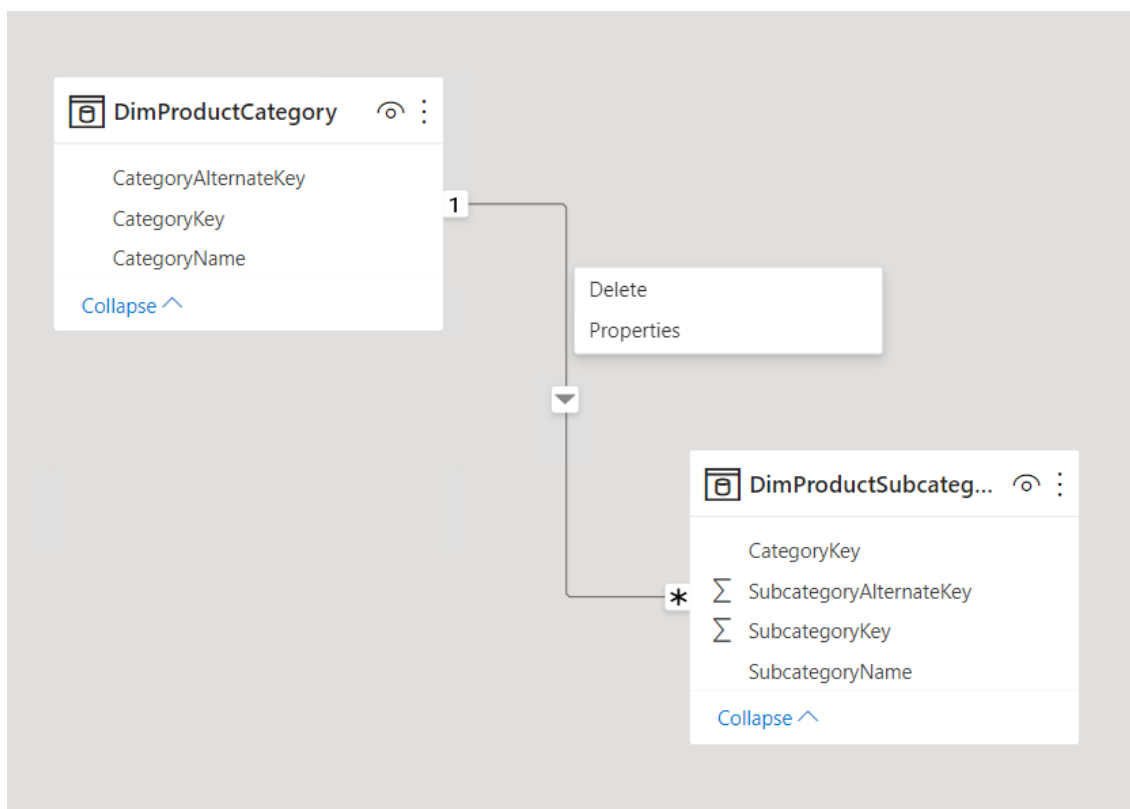
SubcategoryKey	SubcategoryAlternateKey	SubcategoryName	CategoryKey
1		Mountain Bikes	
2		Road Bikes	
3		Touring Bikes	
4		Handlebars	
5		Bottom Brackets	
6		Brakes	
7		Chains	
8		Cranksets	
9		Derailleurs	
10		Forks	
11		Headsets	
12		Mountain Frames	
13		Pedals	
14		Road Frames	
15		Saddles	
16		Touring Frames	
17		Wheels	
18		Bib-Shorts	
19		Caps	
20		Gloves	
21		Jerseys	
22		Shorts	
23		Socks	

Load
Transform Data
Cancel



4. In the Model pane, look at the relationship that Power BI has created between the two tables.
5. Right-click the relationship line between **DimProductCategory**, and **DimProductSubcategory**, and then click **Delete**.





6. In the **Delete Relationship** dialog box, click **Delete**.
7. In the **DimProductSubcategory** table, drag the **CategoryKey** column to the **CategoryKey** column in the **DimProductCategory** table.
8. Double-click the relationship line between **DimProductCategory**, and **DimProductSubcategory**.
9. In the **Edit relationship** dialog box, ensure the **Cardinality** is set to a **Many to one (\*:1)** relationship.
10. In the **Cross filter direction** list, click **Both**, and then click **OK**.
11. In the **DimProduct** table, drag the **ProductSubcategoryKey** column to the **SubcategoryKey** column in the **DimProductSubcategory** table, to create a **Many to one (\*:1)** relationship.
12. Right-click the relationship line between **DimProductSubcategory**, and **DimProduct**, and then click **Properties**.
13. In the **Edit relationship** dialog box, in the **Cross filter direction** list, click **Both**, and then click **OK**.
14. On the **File** menu, click **Save**.
15. Leave Power BI Desktop open for the next exercise.

## Exercise 2: Calculations

### Task 1: Adding Calculated Columns

1. In Power BI Desktop, in the views pane on the left-hand side, click **Data**.
2. In the **Data** pane, right-click **DimCustomer**, and then click **New column**.

CustomerKey	GeographyKey	CustomerAlternateKey	FirstName	LastName	BirthDate	MaritalStatus	Gender	EmailAddress	YearlyIncome	TotalChildren	NumberChildrenAtHome
11012	611	AW00011012	Lauren	Walker	Thursday, January 18, 1968	M	F	lauren41@adventure-works.com	100000	2	
11017	39	AW00011017	Shannon	Wang	Monday, June 26, 1944	S	F	shannon1@adventure-works.com	20000	4	
11018	32	AW00011018	Clarence	Rai	Monday, October 9, 1944	S	M	clarence32@adventure-works.com	30000	2	
11019	52	AW00011019	Luke	Lal	Tuesday, March 7, 1978	S	M	luke18@adventure-works.com	40000	2	
11020	53	AW00011020	Jordan	King	Wednesday, September 20, 1978	S	M	Jordan73@adventure-works.com	40000		
11024	311	AW00011024	Russell	Xie	Sunday, September 17, 1978	M	M	russell7@adventure-works.com	60000		
11026	4	AW00011026	Harold	Sai	Wednesday, April 3, 1946	S	M	harold3@adventure-works.com	30000		
11027	40	AW00011027	Jessie	Zhao	Saturday, December 7, 1946	M	M	jessie16@adventure-works.com	30000		
11028	17	AW00011028	Jill	Jimenez	Thursday, April 11, 1946	M	F	jill13@adventure-works.com	30000		
11029	32	AW00011029	Jimmy	Moreno	Saturday, December 21, 1946	M	M	jimmy9@adventure-works.com	30000		
11031	8	AW00011031	Theresa	Ramos	Friday, August 22, 1947	M	F	theresa13@adventure-works.com	20000		
11032	35	AW00011032	Denise	Stone	Wednesday, June 11, 1947	M	F	denise10@adventure-works.com	20000		
11033	9	AW00011033	Jaime	Nath	Tuesday, September 23, 1947	M	M	jaime41@adventure-works.com	20000		
11034	12	AW00011034	Ebony	Gonzalez	Thursday, June 19, 1947	M	F	ebony19@adventure-works.com	20000		
11036	341	AW00011036	Jennifer	Russell	Monday, December 18, 1977	M	F	jennifer93@adventure-works.com	60000		
11037	49	AW00011037	Chloe	Garcia	Sunday, November 27, 1977	S	F	chloe27@adventure-works.com	40000		
11039	19	AW00011039	Marc	Martha	Friday, December 17, 1948	M	M	marc3@adventure-works.com	30000		
11040	642	AW00011040	Jesse	Murphy	Monday, August 11, 1977	M	M	jesse13@adventure-works.com	30000		
11041	325	AW00011041	Amanda	Carter	Sunday, October 16, 1977	M	F	amanda53@adventure-works.com	60000		
11042	336	AW00011042	Megan	Sanchez	Monday, June 13, 1977	M	F	megan38@adventure-works.com	70000		
11043	828	AW00011043	Nathan	Simmons	Tuesday, February 24, 1976	M	M	nathan11@adventure-works.com	60000		
11045	8	AW00011045	Leonard	Nara	Friday, May 19, 1950	S	M	leonard18@adventure-works.com	30000		
11046	6	AW00011046	Christine	Yuan	Wednesday, March 22, 1950	M	F	christine4@adventure-works.com	30000	3	
11047	34	AW00011047	Jaclyn	Lu	Monday, February 27, 1950	M	F	jaclyn12@adventure-works.com	30000	3	
11048	39	AW00011048	Jeremy	Powell	Wednesday, November 22, 1950	M	M	jeremy16@adventure-works.com	30000	3	
11049	307	AW00011049	Carol	Rai	Friday, July 18, 1980	S	F	carol8@adventure-works.com	40000	0	
11050	31	AW00011050	Alan	Zheng	Friday, September 7, 1951	M	M	alan21@adventure-works.com	30000	3	

3. In the formula bar, highlight **Column =**, type the following script, and then press Enter:

```
IncomeStatus = IF (DimCustomer[YearlyIncome] < 25000, "Lower Income",
IF (AND(DimCustomer[YearlyIncome] >= 25000, DimCustomer[YearlyIncome] < 60000),
"Middle Income",
IF (AND(DimCustomer[YearlyIncome] >= 60000, DimCustomer[YearlyIncome] <
100000), "Higher Income",
IF (DimCustomer[YearlyIncome] >= 100000, "Very High Income", "Other"))))
```

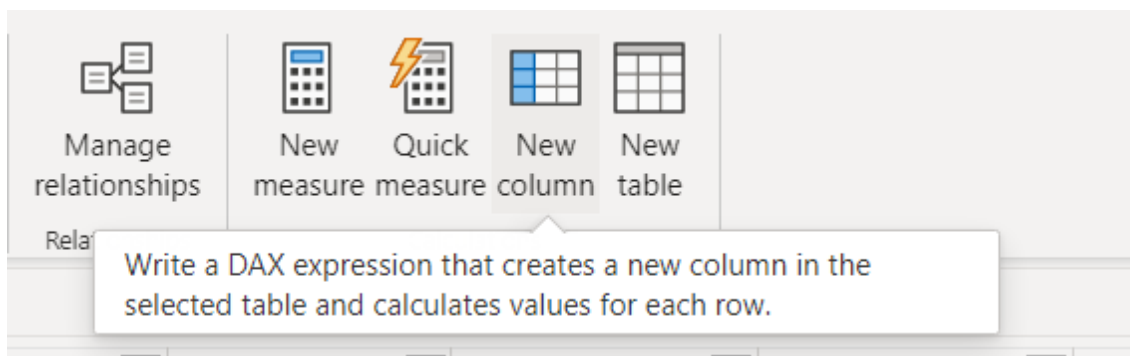
EnglishEducation	SpanishEducation	FrenchEducation	EnglishOccupation	SpanishOccupation	FrenchOccupation	HouseOwnerFlag	NumberCarsOwned	DateFirstPurchase	IncomeStatus
0 Bachelors	Licenciatura	Bac + 4	Management	Gestión	Direction	1	2	Monday, September 17, 2007	Very High Income
0 High School	Educación secundaria	Bac + 2	Skilled Manual	Obrero especializado	Techician	1	2	Friday, July 15, 2005	Lower Income
0 Partial College	Estudios universitarios (en curso)	Baccalauréat	Clerical	Administrativo	Employé	1	2	Wednesday, July 20, 2005	Middle Income
0 High School	Educación secundaria	Bac + 2	Skilled Manual	Obrero especializado	Techician	0	2	Thursday, August 16, 2007	Middle Income
0 High School	Educación secundaria	Bac + 2	Skilled Manual	Obrero especializado	Techician	0	2	Monday, July 2, 2007	Middle Income
0 Partial College	Estudios universitarios (en curso)	Baccalauréat	Skilled Manual	Obrero especializado	Techician	1	2	Saturday, December 29, 2007	Higher Income
0 Partial College	Estudios universitarios (en curso)	Baccalauréat	Clerical	Administrativo	Employé	0	2	Tuesday, July 26, 2005	Middle Income
0 Partial College	Estudios universitarios (en curso)	Baccalauréat	Clerical	Administrativo	Employé	1	2	Tuesday, July 25, 2005	Middle Income
0 Partial College	Estudios universitarios (en curso)	Baccalauréat	Clerical	Administrativo	Employé	1	2	Friday, July 29, 2005	Middle Income
0 Partial College	Estudios universitarios (en curso)	Baccalauréat	Clerical	Administrativo	Employé	1	2	Friday, July 22, 2005	Middle Income
0 High School	Educación secundaria	Bac + 2	Skilled Manual	Obrero especializado	Techician	1	2	Thursday, August 4, 2005	Lower Income
0 High School	Educación secundaria	Bac + 2	Skilled Manual	Obrero especializado	Techician	1	2	Sunday, August 21, 2005	Lower Income
0 High School	Educación secundaria	Bac + 2	Skilled Manual	Obrero especializado	Techician	1	2	Thursday, August 18, 2005	Lower Income
0 High School	Educación secundaria	Bac + 2	Skilled Manual	Obrero especializado	Techician	1	2	Thursday, August 4, 2005	Lower Income
0 Partial College	Estudios universitarios (en curso)	Baccalauréat	Skilled Manual	Obrero especializado	Techician	1	2	Thursday, July 26, 2007	Higher Income
0 Partial High School	Educación secundaria (en curso)	Niveau bac	Clerical	Administrativo	Employé	0	2	Tuesday, July 24, 2005	Middle Income
0 Partial College	Estudios universitarios (en curso)	Baccalauréat	Clerical	Administrativo	Employé	1	2	Wednesday, August 10, 2005	Middle Income
0 Partial College	Estudios universitarios (en curso)	Baccalauréat	Skilled Manual	Obrero especializado	Techician	1	2	Friday, October 5, 2007	Middle Income
0 Partial College	Estudios universitarios (en curso)	Baccalauréat	Skilled Manual	Obrero especializado	Techician	1	2	Wednesday, July 18, 2007	Higher Income
0 Partial College	Estudios universitarios (en curso)	Baccalauréat	Skilled Manual	Obrero especializado	Techician	1	2	Wednesday, July 25, 2007	Higher Income
0 Partial College	Estudios universitarios (en curso)	Baccalauréat	Skilled Manual	Obrero especializado	Techician	1	2	Friday, November 9, 2007	Higher Income
0 High School	Educación secundaria	Bac + 2	Skilled Manual	Obrero especializado	Techician	0	2	Friday, October 12, 2007	Middle Income

4. On the **Modeling** tab, in the **Calculations** group, click **New Column**.

5. In the formula bar, highlight **Column =**, type the following script, and then press Enter:

```
DaysSinceFirstPurchase = DATEDIFF(DimCustomer[DateFirstPurchase], TODAY(), DAY)
```

6. On the **Modeling** tab, in the **Calculations** group, click **New Column**.



7. In the formula bar, highlight **Column =**, type the following script, and then press Enter:

```
FullName = [FirstName] & " " & [LastName]
```

8. On the **Modeling** tab, in the **Calculations** group, click **New Column**.

9. In the formula bar, highlight **Column =**, type the following script, and then press Enter:

```
MaleFemale = IF([Gender] = "M", "Male", "Female")
```

10. On the **Modeling** tab, in the **Calculations** group, click **New Column**.

11. In the formula bar, highlight **Column =**, type the following script, and then press Enter:

```
Relationship = IF([MaritalStatus] = "M", "Married", "Single")
```

1 Relationship = IF([MaritalStatus] = "M", "Married", "Single")										Data
EnglishEducation	EnglishOccupation	SpanishOccupation	FrenchOccupation	HouseOwnerFlag	NumberCarsOwned	DateFirstPurchase	IncomeStatus	DaysSinceFirstPurchase	FullName	Relationship
ic + 4	Management	Gestión	Direction		1	2	Monday, September 17, 2007	Very High Income	5296 Lauren Walker	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Friday, July 15, 2005	Lower Income	6090 Shannon Wang	Single
ic + 2	Skilled Manual	Obrero especializado	Technicien		0	2	Wednesday, July 20, 2005	Middle Income	6085 Clarence Rai	Single
ic + 2	Skilled Manual	Obrero especializado	Technicien		0	2	Thursday, August 16, 2007	Middle Income	5328 Luke Lal	Single
ic + 2	Skilled Manual	Obrero especializado	Technicien		0	2	Monday, July 2, 2007	Middle Income	5373 Jordan King	Single
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Saturday, December 29, 2007	Higher Income	5193 Russell Xie	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		0	2	Tuesday, July 26, 2005	Middle Income	6079 Harold Sai	Single
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Tuesday, July 19, 2005	Middle Income	6086 Jessie Zhao	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Friday, July 29, 2005	Middle Income	6076 Jill Jimenez	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Friday, July 22, 2005	Middle Income	6083 Jimmy Moreno	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Thursday, August 4, 2005	Lower Income	6070 Theresa Ramos	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Sunday, August 21, 2005	Lower Income	6053 Denise Stone	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Thursday, August 18, 2005	Lower Income	6056 Jaime Nath	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Thursday, August 4, 2005	Lower Income	6070 Ebony Gonzalez	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Thursday, July 26, 2007	Higher Income	5349 Jennifer Russell	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		0	2	Tuesday, July 24, 2007	Middle Income	5351 Chloe Garcia	Single
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Wednesday, August 10, 2005	Middle Income	6064 Marc Martin	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Friday, October 5, 2007	Middle Income	5278 Jesse Murphy	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Wednesday, July 18, 2007	Higher Income	5357 Amanda Carter	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Wednesday, July 25, 2007	Higher Income	5350 Megan Sanchez	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Friday, November 9, 2007	Higher Income	5243 Nathan Simmons	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		0	2	Friday, October 12, 2007	Middle Income	5271 Leonard Nara	Single
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Tuesday, August 9, 2005	Middle Income	6065 Christine Yuan	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		0	2	Saturday, August 6, 2005	Middle Income	6068 Jaclyn Lu	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Saturday, September 13, 2005	Middle Income	6061 Jeremy Powell	Married
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Monday, September 10, 2007	Middle Income	5303 Carol Rai	Single
ic + 2	Skilled Manual	Obrero especializado	Technicien		1	2	Tuesday, August 23, 2005	Middle Income	6051 Alan Zheng	Married

12. In the **Data** pane, right-click **DimProductSubcategory**, and then click **New column**.

13. In the formula bar, highlight **Column =**, type the following script, and then press Enter:

```
MainCategory = RELATED(DimProductCategory[CategoryName])
```

14. In the **Data** pane, right-click **DimPromotion**, and then click **New column**.

15. In the formula bar, highlight **Column =**, type the following script, and then press Enter:

```
PromotionLengthDays = DATEDIFF(DimPromotion[StartDate], DimPromotion[EndDate],  
DAY)
```

16. In the **Data** pane, right-click **FactInternetSales**, and then click **New column**.

17. In the formula bar, highlight **Column =**, type the following script, and then press Enter:

```
Profit = CURRENCY(FactInternetSales[UnitPrice] -  
FactInternetSales[ProductStandardCost])
```

18. Close Power BI Desktop, saving any changes.