

M365 Excel Basics Video 10: Relationship for Excel Tables

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Topics Covered in the M365 Excel Basics Video 10

- ❖ Relationships instead of the XLOOKUP Function
- ❖ Comparing XLOOKUP Function and the Relationship Feature
- ❖ Convert tables to Excel Tables
- ❖ Create Relationship for Excel Tables
- ❖ Data Model
- ❖ Insert PivotTables from the Data Model
- ❖ Insert Slicers

The screenshot displays the Microsoft Excel interface with the 'Data Model' ribbon selected. The ribbon includes options like 'Manage Data Model', '3D Map', and 'Relationships'. Two dialog boxes are open: 'Create Relationship' and 'Edit Relationship'. Both dialog boxes show a relationship between 'City' (Foreign) and 'Continent' (Primary) on the 'Country' column. Below the dialog boxes, a diagram shows the relationship between the 'City' and 'Continent' tables, with a '1' indicating a one-to-many relationship. To the right, a PivotTable is shown with 'Continent' as the filter and 'Total Population' as the value field.

Continent	Total Population
Africa	58,629,853
Asia	66,641,302
Australia	15,714,301
Europe	12,558,328
North America	128,078,866
South America	4,857,600
Grand Total	286,480,250

Comparing XLOOKUP Function and the Relationship Feature

XLOOKUP is one of the new functions in Microsoft Office 365 in Excel, and it addresses many of the problems with the older lookup function VLOOKUP function. You have learned VLOOKUP in this class as some employers may still require that you use VLOOKUP. The XLOOKUP function is a new function that replaces VLOOKUP and some other lookup functions.

Relationship – you create a relationship between two tables of data. It is a connection between two tables of data and one column in each table is the basis of this relationship. The column connecting both tables has to have the same matching data in each table. Once we create the Relationship, the data is now stored in the Data Model. Excel does this behind the scenes and automatically stores the tables and the relationships in the Data Model.

If you do not have a huge data XLOOKUP will be easy and fast for you to use by creating helper columns on your proper dataset. If you have huge data even though XLOOKUP could seem easier you will have a file that has a large size compared to using the Relationship feature in Excel. The formulas also take time to calculate and slow down your workbook.

If you have a huge amount of data which could be 50,000 rows or more, it is better to use the Relationship Feature in Excel. Since the Tables and the Relationships are stored in the Data Model, this helps your workbook not to slow down and also reduces the size of your workbook file.

Some people may find it easier to use XLOOKUP whereas others may find it easier to use the Relationship feature in Excel.




Either way, whichever option you find easier for you to use, you will still be able to use the Data from your tables for your data analysis.

In our last video we used XLOOKUP function, we created helper columns with the Continent name and on another table we created two helper columns with the Product and SalesRep names. We then created PivotTables to analyze our data.

Refer to the M365 Excel Basics Video 10_XLOOKUP Finished File included in the files to download for this week.

In this video we will see how to use the Relationship feature in Excel as a substitute for the XLOOKUP Function. As noted earlier, with the Relationship feature the file size will be smaller than the file with the XLOOKUP function and we will not use formulas to calculate thus helping our workbook not to slow down as the formulas calculate. See the screenshot below, the XLOOKUP finished file has the largest size compared to the Relationship finished file.

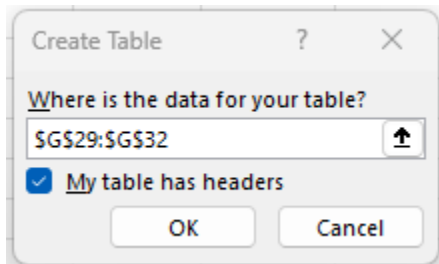
Here is a screenshot of all the file sizes:

Name	Date modified	Type	Size
 M365 Excel Basics Video 10_Relationships For Excel Tables and PivotTables FinishedFile.xlsx	10/25/2024 6:22 AM	Microsoft Excel Worksheet	3,814 KB
 M365 Excel Basics Video 10_Relationships For Excel Tables and PivotTables StartFile.xlsx	10/25/2024 6:23 AM	Microsoft Excel Worksheet	2,611 KB
 M365 Excel Basics Video 10_XLOOKUP FinishedFile.xlsx	10/25/2024 6:24 AM	Microsoft Excel Worksheet	7,095 KB

Convert Tables to Excel Tables and Create a Relationship

Steps to convert Tables to an Excel Table and Create a Relationship. These are the same steps that you will use to convert a Table to an Excel Table and create a Relationship. *(In these steps below, we are using the data in the Population worksheet for our example 1).*

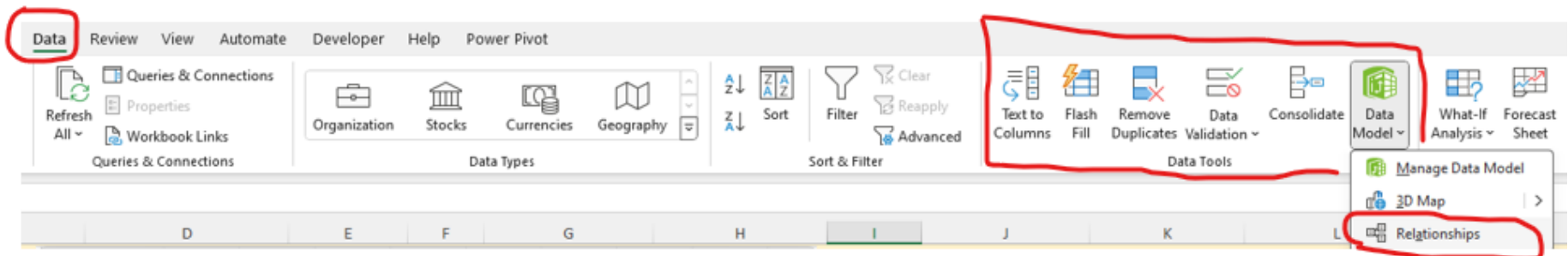
1. Convert both Tables to an Excel Table and name them. *Name the Table 'City' Table and the Lookup Table 'Continent' Table*
 - a. Click on one cell in your table
 - b. Press CTRL + T on your keyboard.
 - c. In the Format as Table (Create a Table) dialog box, select the checkbox next to My table as headers if you want the first row of the range to be the header row, and then click OK

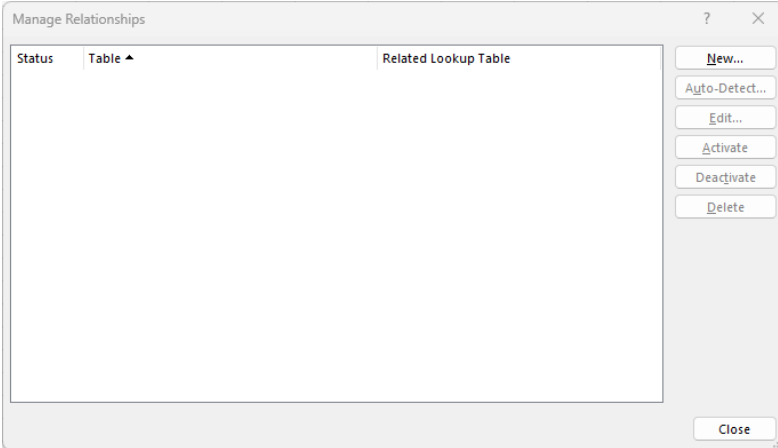


- d. Name the Table.

2. Steps to create a Relationship

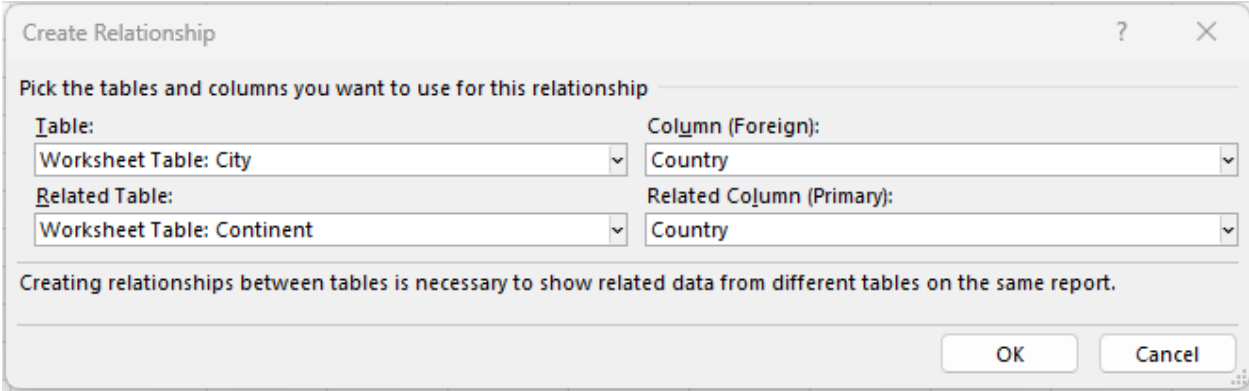
- a. Go to the Data Ribbon Tab then to the Data Tools Group and click on the Data Model, select and click on the Relationship button to open the Relationship dialog box.



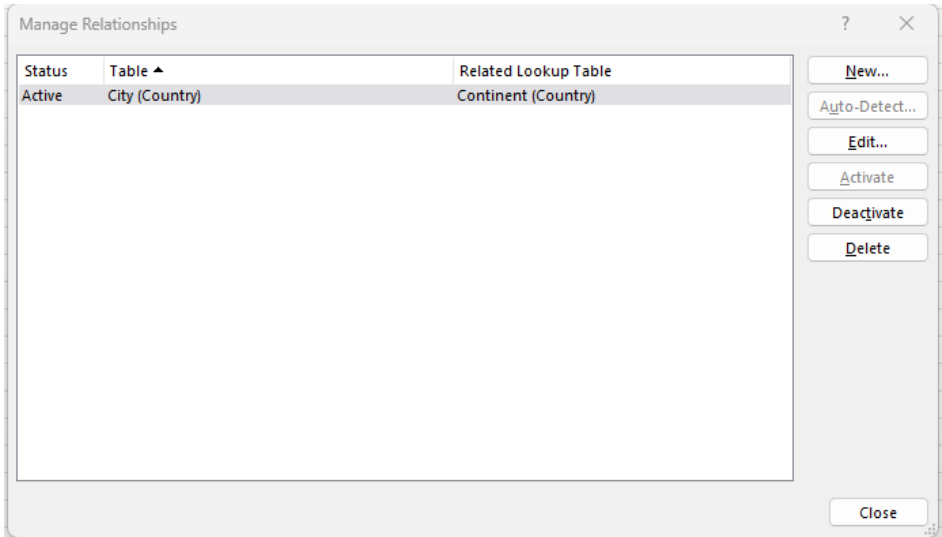


Manage Relationship dialog box.

- b. Click on the New button on the Manage Relationship dialog box to open the Create Relationship dialog box.
- c. On the Table box, click on the arrow and select 'Worksheet Table: City'. And on the column (Foreign): box, click on the arrow and select 'Country' field.
- d. On the Related Table box, click on the arrow and select 'Worksheet Table: Continent'. And on the Related Column (Primary): box, click on the arrow and select 'Country' field.
- e. Click OK button to create the Relationship. A One-To-Many Relationship will be created between the Country Field in the City Table and the Country field in the Continent Table. The Country field is the one column that is the basis for this Relationship.

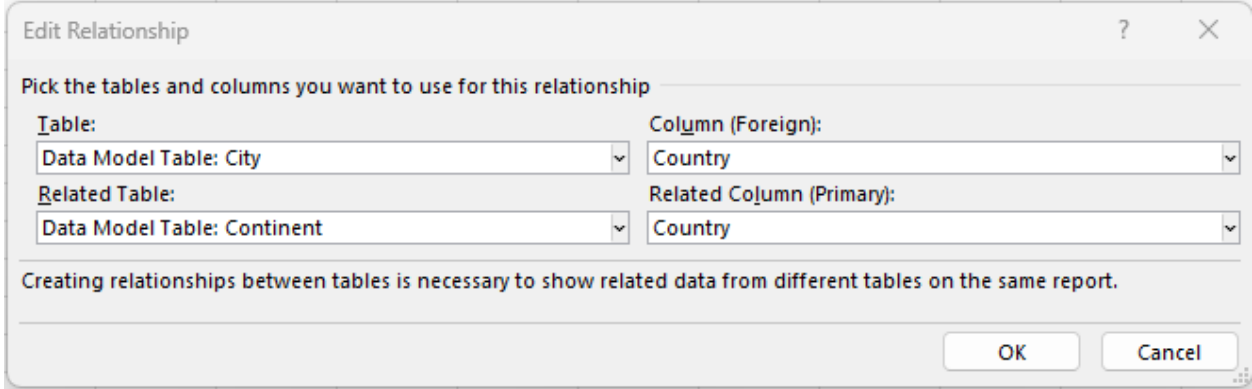


- f. Once the Relationship is created, the Manage Relationship dialog box lists the Relationship.

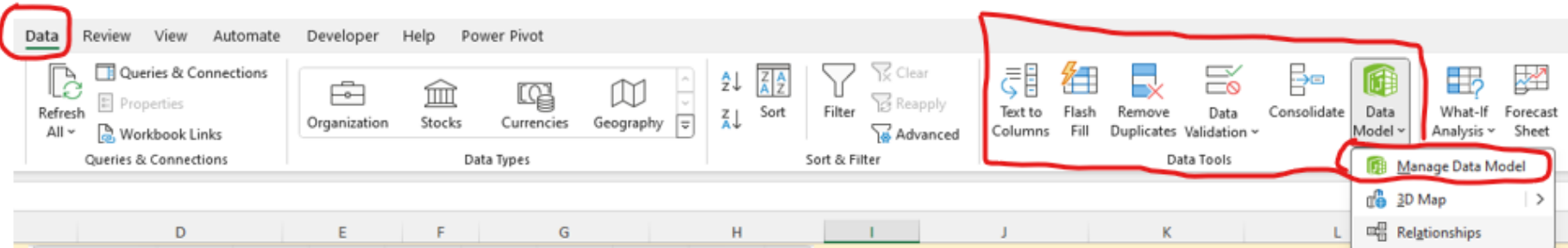


When we create a Relationship between two Tables, the tables and the Relationship are stored in a behind the scenes database, this database is called the Data Model.

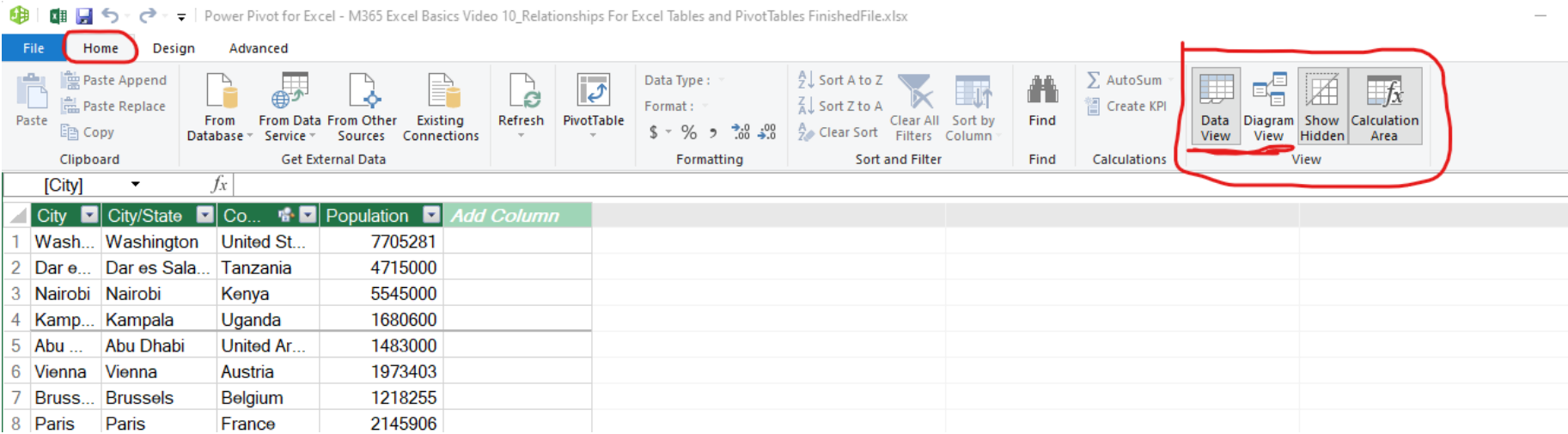
- g. Click on the Edit button to open the Create Relationship dialog box and see that the tables are now stored in the Data Model, and it has changed from Worksheet Table to Data Model Table. Click OK to close the Edit Relationship dialog box and the Close button to close the Manage Relationship dialog box.



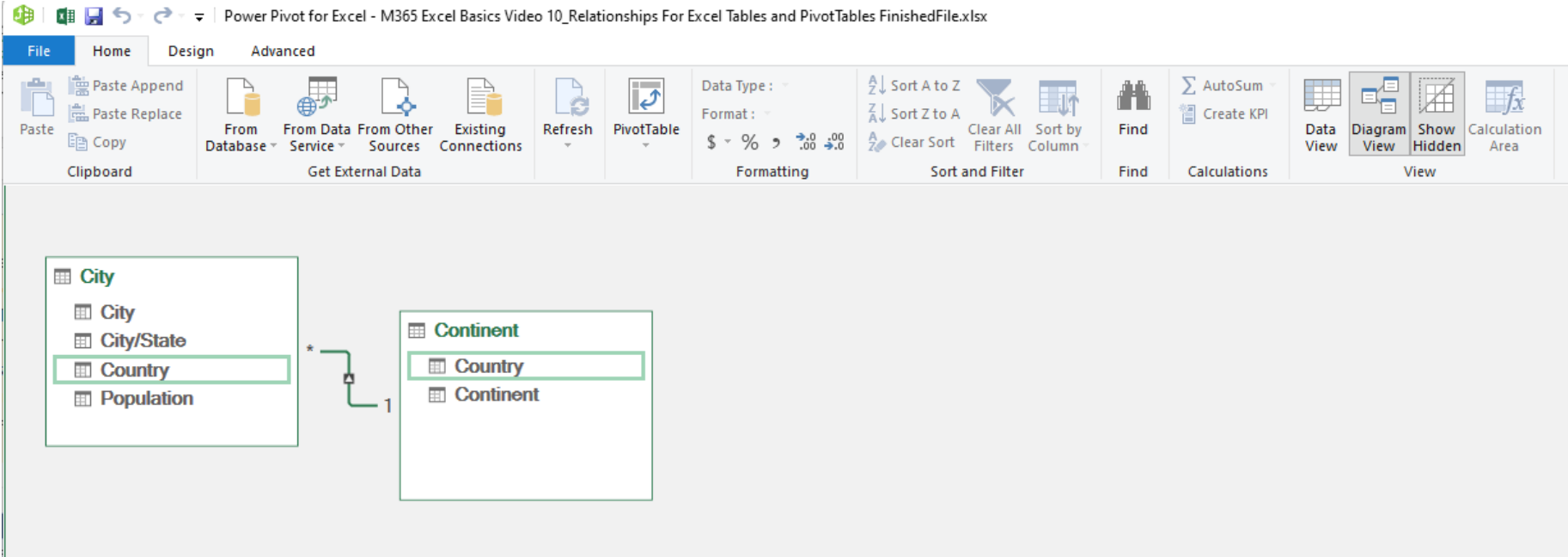
- h. Go to the Data Ribbon Tab then to the Data Tools Group and click on the Data Model, select and click on the Manage Data Model button to open the PowerPivot and view the data that is stored in the Data Model.



i. You can view the data in the Data View or in the Diagram View to see the Relationship.



This is the Data View that shows the Tables stored in the Data Model.



This is the Diagram view that shows the Relationship stored in the Data Model.

Now that you see the tables and the Relationship stored in the Data Model, you can go ahead and close the Power Pivot Window. If you need to view the Data Model again, you can follow the step h above.

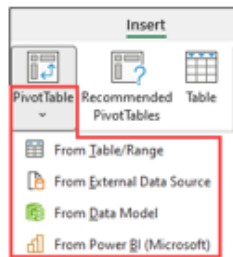
Create or Insert a Data Model PivotTable

We have created PivotTables in this class but in the past our data for the PivotTables was from the Table/Range, which are **Standard PivotTables**. In this video since we have created a relationship between our tables, and our tables are stored in the Data Model, we will insert a PivotTable but in this case our Data is coming from the Data Model. This is called the Data Model PivotTable. A **Data Model PivotTable** stores its data in the Power Pivot Data Model Columnar Database. This is best when you have a large amount of data, you have multiple related tables, or you want to make calculations that a Standard PivotTable cannot easily make.

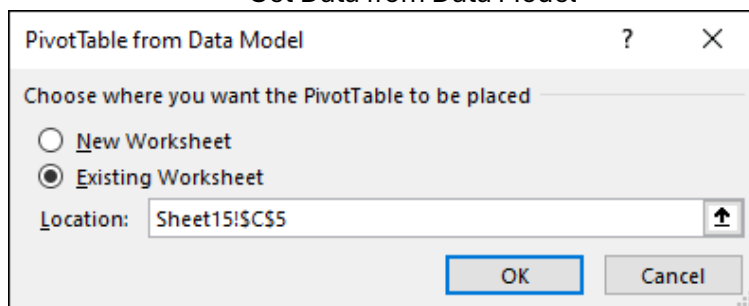
Note: Use the Data Model PivotTable if your workbook contains a Data Model and you want to create a PivotTable from multiple tables, use custom measures for your PivotTable, or are working with very large datasets.

Steps to create a PivotTable from Data Model

1. Select any cell outside of the Tables. If inserting a PivotTable in a new worksheet, you can select the cell where you would like to place your PivotTable in the new worksheet.
2. Select **Insert > PivotTable**.
 - Keyboard shortcut to create a standard PivotTable:
 - Data from Data Model: ALT, N, V, D

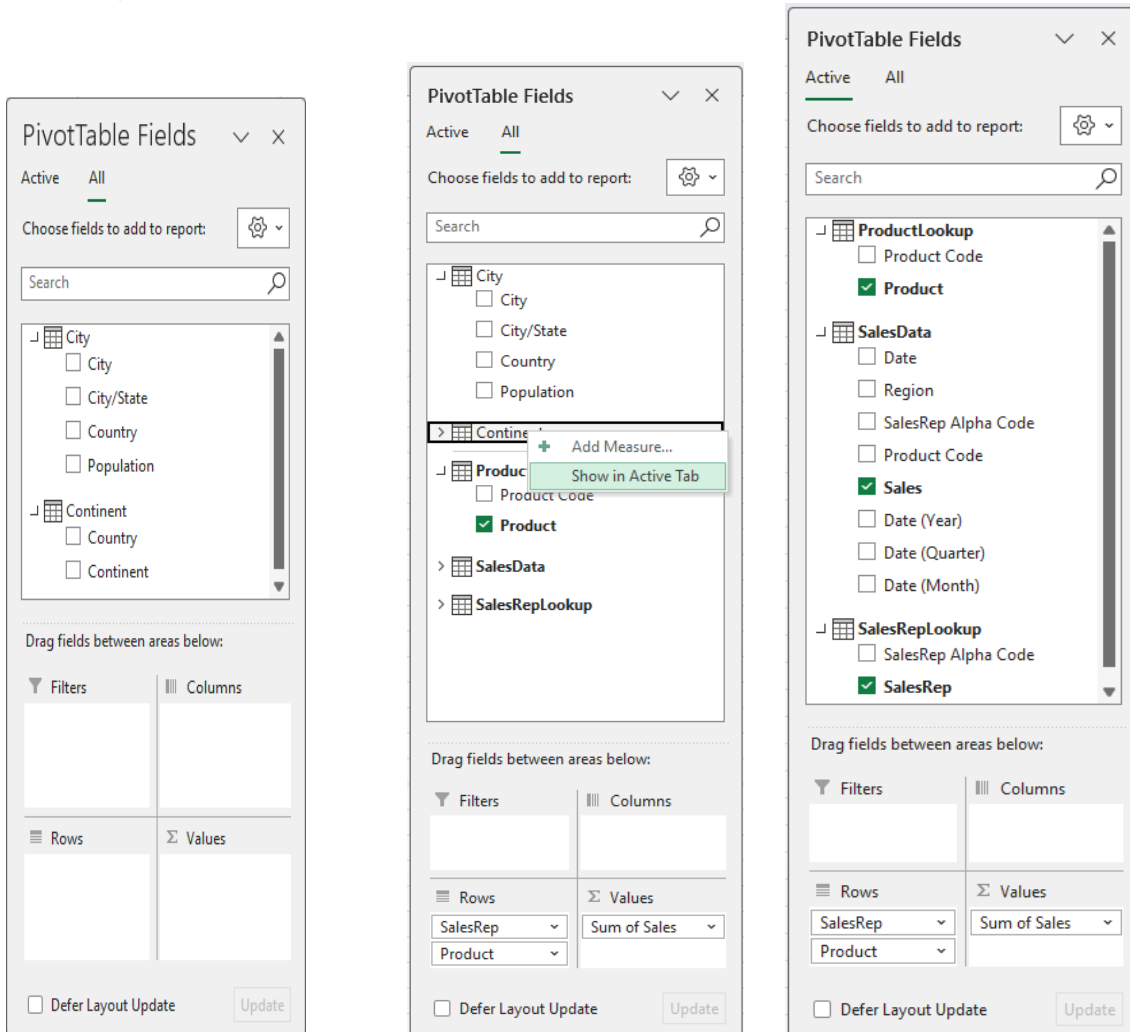


- Get Data from Data Model



3. Once you have chosen the location where you want the PivotTable to be placed, click OK.
4. This then opens the PivotTable Fields Task pane. From the PivotTable Fields Task pane, you will see all the Tables that are in the workbook. The Tables that are stored in the Data Model will show with a Dark Shading showing at the top of the table icon.
 - a. The Tables in the Workbook will show in the 'ALL' tab. If you would like to move the Tables that you are using for the PivotTable report, follow these steps:
 - i. Right click on the Table that you would like to use.
 - ii. From the drop-down menu, select Show in Active Tab
 - iii. The Table will now be moved to the Active Tab and you can click on the Active Tab to see the tables you moved in the Active Tab to use for creating your PivotTable.
See the screenshot pictures in the next page.

Now that you have all the steps above to create the Excel Tables, create a Relationship and Insert a Data Model PivotTable follow these steps, complete Example 1 and 2 for this video. Follow the same steps too to complete the homework for this video. Be sure that you are selecting the correct Tables and fields to use for the PivotTable reports.



In the above screenshots, the first one is showing PivotTable Fields Task Pane with the All tab, the second one is showing the PivotTable Fields Task Pane with a Table selected and a drop-down menu to select the Table to Show in Active Tab, and the third screenshot shows the PivotTable Fields Task Pane showing the Tables that are in the Active Tab.

Example 1: Use the Relationship Feature for the Data Model PivotTable Report

Note: For the Data Model PivotTable report, Continent field from the Continent Table should be in the Rows Area of your PivotTable and the Population field from the City Table should be in the Values Area of your PivotTable. Rename the Population column on your PivotTable to Total Population. Name your PivotTable, add Number Format and Show in Tabular Form. (see also the instructions and the screenshot below and on the Excel workbook file – Population worksheet).

1	Example 1:												
2	Goal: To create a relationship between these two table and make a PivotTable that shows the Population by Continent												
3	Convert both Tables to Excel Tables and name them. Name the Table 'City' and the LookupTable 'Continent' Table												
4	Create a Relationship to connect the two tables 'City' Table and 'Continent' Table												
5	When you create a relationship use the 'Country' Column												
6	Create a PivotTable in this same worksheet that shows population by continent												
7	Be sure to name your PivotTable, add number format and show in Tabular Form												
8	A picture of the PivotTable is shown on the right =====>>>>												
9													
10													
11													
12	City	City/State	Country	Population				Country	Continent	Continent	Total Population		
13	Washington	Washington	United States	7,705,281				Angola	Africa	Africa	58,629,853		
14	Dar es Salaam	Dar es Salaam	Tanzania	4,715,000				Australia	Australia	Asia	66,641,302		
15	Nairobi	Nairobi	Kenya	5,545,000				Austria	Europe	Australia	15,714,301		
16	Kampala	Kampala	Uganda	1,680,600				Bangladesh	Asia	Europe	12,558,328		
17	Abu Dhabi	Abu Dhabi	United Arab Emirates	1,483,000				Belgium	Europe	North America	128,078,866		
18	Vienna	Vienna	Austria	1,973,403				Brazil	South America	South America	4,857,600		
19	Brussels	Brussels	Belgium	1,218,255				Burundi	Africa	Grand Total	286,480,250		
20	Paris	Paris	France	2,145,906				Christmas Island	Australia				
21	Berlin	Berlin	Germany	3,755,251				Comoros	Africa				
22	Rome	Rome	Italy	2,872,800				Democratic Republic of the Congo	Africa				
23	Dublin	Dublin	Ireland	592,713				Egypt	Africa				
24	New Delhi	New Delhi	India	249,998				Ethiopia	Africa				
25	Tokyo	Tokyo	Japan	14,047,594				France	Europe				
26	Dhaka	Dhaka	Bangladesh	16,800,000				Germany	Europe				
27	Beirut	Beirut	Lebanon	2,421,354				Ghana	Africa				
28	Colombo	Colombo	Sri Lanka	752,993				Guinea-Bissau	Africa				
29	Hanoi	Hanoi	Vietnam	8,330,800				India	Asia				
30	Canberra	Canberra	Australia	452,670				Ireland	Europe				
31	Flying Fish Cove	Flying Fish Cove	Christmas Island	1,355				Italy	Europe				
32	Wellington	Wellington	New Zealand	215,100				Japan	Asia				

Example 2: Use the Relationship Feature for the Data Model PivotTable Report

Follow the steps above to convert the 3 tables to Excel Tables, name the Tables 'SalesData' Table, 'ProductLookup' Table and 'SalesRepLookup' Table respectively. Create a new Relationship between the SalesData Table and the ProductLookup Table using the Product Code field. Create also another new Relationship between the SalesData Table and the SalesRepLook Table using the SalesRep Alpha Code field.

- a. Click on the New button on the Manage Relationship dialog box to open the Create Relationship dialog box.
 - i. On the Table box, click on the arrow and select 'Worksheet Table: SalesData'. And on the column (Foreign): box, click on the arrow and select 'Product Code' field.
 - ii. On the Related Table box, click on the arrow and select 'Worksheet Table: ProductLookup'. And on the Related Column (Primary): box, click on the arrow and select 'Product code' field.
 - iii. Click OK to close the Edit Relationship dialog box and the Close button to close the Manage Relationship dialog box.
- b. Click on the New button on the Manage Relationship dialog box to open the Create Relationship dialog box.
 - i. On the Table box, click on the arrow and select 'Data Model Table: SalesData'. And on the column (Foreign): box, click on the arrow and select 'SalesRep Alpha Code field.
 - ii. On the Related Table box, click on the arrow and select 'Worksheet Table: SalesRepLookup'. And on the Related Column (Primary): box, click on the arrow and select 'SalesRep Alpha Code' field.
 - iii. Click OK to close the Edit Relationship dialog box and the Close button to close the Manage Relationship dialog box.

A One-To-Many Relationship will be created between SalesData Table and the ProductLookup Table and between the SalesData Table and the SalesRepLookup Table. *(A screenshot of the tables and the Relationship in the Power Pivot Data Model are seen on pages 15 and 16).*

On a new worksheet create a Data Model PivotTable report. Steps to insert a Data Model PivotTable report are on page 9 above.

Be sure to name the new worksheet. Follow the instructions as seen on the picture below and also on the SalesData worksheet for this video file and create the PivotTable and the slicers. Screenshots are included in the next two pages.

NOTE: To Group the Date field, use the PivotTable grouping feature, drag the Date to the Rows area of your PivotTable, this groups the date field into Months, Quarter and Years. Drag all these grouped fields from the Rows Area of the PivotTable. This helps you to have the Year field that you will use to insert the Year slicer for your PivotTable report. *(On your PivotTable Fields Task Pane be sure to only have the SalesRep and Product fields in the Rows Area and the Sales in the Values Area).*

1 **Example 2: Goal: Rather than use XLOOKUP to add Helper Columns to our Sales Table, We are going to use the Relationships feature for our PivotTable Report.**

2 **Step 1:** Convert each Table to an Excel Table and name the tables to reflect the data that is in the table

3 **Step 2:** Using the Relationships button in the Data Tools group in the Data Ribbon Tab, create Relationships between the sales tables and the two lookup tables.

4 Relationships can be used when you are doing Exact Match Lookup

5 First Column of Lookup Table Always has a Unique List of Items (One of each item is in first column)

6 In Relationships dialog Box:

7 1) Table = Column (Foreign) *(This is the main Data Table and has duplicates)*

8 2) Related Table = Related Column (Primary) *(Lookup Table and has a unique list of every item)*

9 When you create a Relationships between tables, the tables are sent to a "Behind the Scenes" Database called the "Data Model".

10 Data Model Tables have a black Bar at the top to indicate that they are from the Data Model

11 **Step 3:** On a New Sheet create a PivotTable. Insert a PivotTable from the Data Model. Hint: Select on the cell where you would like to place your PivotTable in the new worksheet and insert PivotTable 'From Data Model'. *keyboard shortcut ALT, N, V, D*

12 **Step 4:** Drag the SalesRep field from the SalesRepLookup Table to the Rows area, the Product Field from the ProductLookupTable to the Rows area, and the Sales Field from the SalesDataTable to the Values area. Insert a Region and Year Slicer

13 Show your PivotTables in Tabular Form, Add Number Formatting and Name the PivotTables

Date	Region	SalesRep Alpha Code	Product Code	Sales	Product Code	Product	SalesRep Alpha Code	SalesRep
10/30/2022	West	MA3321	RHD213	\$257.96	RHD213	Rainbow High Dolls	CA5564	Carmen
4/2/2022	North	CA5564	RHD213	\$219.50	SAB455	Stuffed Animals/Bears	CI4452	Cinderelli
3/11/2023	West	MI2245	RHD213	\$130.12	OMLS55	LOL OMG Surprise	MA3321	Macen
1/5/2023	North	TI7723	SAB455	\$176.26	MNT412	Monster Trucks	MI2245	Miles
7/13/2022	South	CA5564	OMLS55	\$128.57	HWS775	Hot Wheels	TI7723	Tiana
6/28/2023	North	TI7723	MNT412	\$468.02	LOSS523	LOL Surprise		
4/10/2023	Central	TI7723	MNT412	\$449.20				
5/27/2022	West	TI7723	OMLS55	\$325.73				
5/26/2022	North	MA3321	SAB455	\$306.42				
7/3/2023	NorthWest	MA3321	HWS775	\$211.67				
11/16/2022	South	MA3321	HWS775	\$499.53				
8/11/2023	NorthWest	MI2245	HWS775	\$354.88				
8/27/2023	Central	CI4452	LOSS523	\$313.60				
6/15/2023	North	CA5564	LOSS523	\$373.04				
9/6/2022	NorthWest	MI2245	RHD213	\$403.66				
7/3/2023	Central	MA3321	SAB455	\$309.44				
7/4/2023	West	CA5564	SAB455	\$310.82				
8/16/2023	West	CA5564	HWS775	\$399.11				

A screenshot of the 'SalesData' worksheet showing the example 2 instructions and the 3 Excel Tables.

The screenshot displays an Excel PivotTable with the following data:

SalesRep	Product	Sum of Sales
Carmen	Hot Wheels	738,374
	LOL OMG Surprise	748,405
	LOL Surprise	759,008
	Monster Trucks	748,769
	Rainbow High Dolls	733,480
	Stuffed Animals/Bears	728,661
Carmen Total		4,456,696
Cinderelli	Hot Wheels	727,562
	LOL OMG Surprise	710,580
	LOL Surprise	747,087
	Monster Trucks	729,658
	Rainbow High Dolls	748,040
	Stuffed Animals/Bears	714,364
Cinderelli Total		4,377,290
Macen	Hot Wheels	733,804
	LOL OMG Surprise	751,715
	LOL Surprise	719,299
	Monster Trucks	684,888
	Rainbow High Dolls	747,414
	Stuffed Animals/Bears	736,655
Macen Total		4,373,775
Miles	Hot Wheels	748,393
	LOL OMG Surprise	746,491
	LOL Surprise	730,549
	Monster Trucks	699,366
	Rainbow High Dolls	705,781
	Stuffed Animals/Bears	742,706
Miles Total		4,373,286
Tiana	Hot Wheels	716,544
	LOL OMG Surprise	745,986
	LOL Surprise	739,519
	Monster Trucks	739,781
	Rainbow High Dolls	716,265
	Stuffed Animals/Bears	737,547
Tiana Total		4,395,642
Grand Total		21,976,689

The slicers are configured as follows:

- Year Slicer:** 2021, 2022, 2023
- Region Slicer:** Central, North, NorthWest, South, West

The PivotTable Fields task pane shows the following configuration:

- Tables used:** ProductLookup, SalesData, SalesRepLookup
- Fields in Rows:** SalesRep, Product
- Fields in Values:** Sum of Sales
- Fields in Filters:** (Empty)
- Fields in Columns:** (Empty)

A screenshot showing the completed PivotTable and Slicers report and the PivotTable Fields Task pane showing the Tables used in the Active Tab and the fields used in the Rows and Values Area.

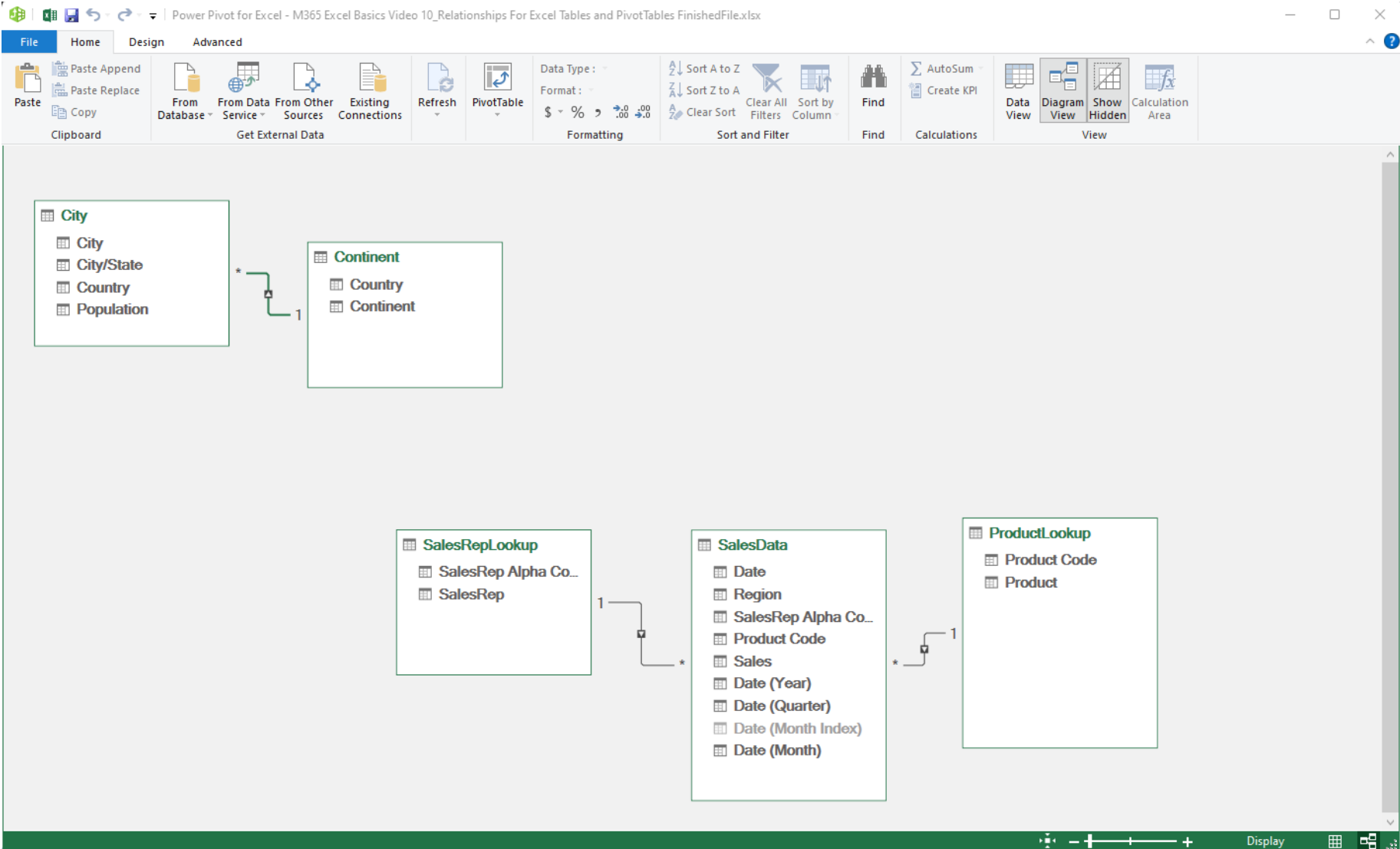
A Screenshot showing the Power Pivot for Excel

The screenshot displays the Microsoft Excel interface with the Power Pivot Data Model in Data View. The ribbon is set to the 'Advanced' group, showing options for data manipulation and analysis. The data table contains the following information:

	City	City/State	Co...	Population	Add Column
1	Wash...	Washington	United St...	7705281	
2	Dar e...	Dar es Sala...	Tanzania	4715000	
3	Nairobi	Nairobi	Kenya	5545000	
4	Kamp...	Kampala	Uganda	1680600	
5	Abu ...	Abu Dhabi	United Ar...	1483000	
6	Vienna	Vienna	Austria	1973403	
7	Bruss...	Brussels	Belgium	1218255	
8	Paris	Paris	France	2145906	
9	Berlin	Berlin	Germany	3755251	
10	Rome	Rome	Italy	2872800	
11	Dublin	Dublin	Ireland	592713	
12	New ...	New Delhi	India	249998	
13	Tokyo	Tokyo	Japan	14047594	
14	Dhaka	Dhaka	Bangladesh	16800000	
15	Beirut	Beirut	Lebanon	2421354	
16	Colo...	Colombo	Sri Lanka	752993	
17	Hanoi	Hanoi	Vietnam	8330800	
18	Canb...	Canberra	Australia	452670	
19	Flying...	Flying Fish ...	Christma...	1355	
20	Welli...	Wellington	New Zeal...	215100	
21	Luanda	Luanda	Angola	2487444	
22	Kinsh...	Kinshasa	Democrat...	11855000	
23	Accra	Accra	Ghana	2388000	

The status bar at the bottom indicates 'Record: 1 of 68'.

Power Pivot Data Model in Data View.



Power Pivot Data Model in a diagram View.