

# Excel 2016 Format As Table Features

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By

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## Introduction

Excel is a spreadsheet not a data base, but it does have many useful data handling features. Excel works well with tables and lists. You can add structure to your spreadsheet files by using tables and lists for your options.

Excel 2007 updated a little used feature in Excel 2003 called Lists and renamed it to Format As Table. This feature, which has an icon on the Home Ribbon tab, has greatly improved how Excel deals with tables.

Sheets have over one million rows and over 16,000 columns, so Excel can handle large amounts of data.

This session will cover the Format as Table feature in depth as well as some features that work better with it or require it.

### Terminology

In data base terms a row is a Record and a column is a Field. Column headings are Field headings.

### Data Table rules

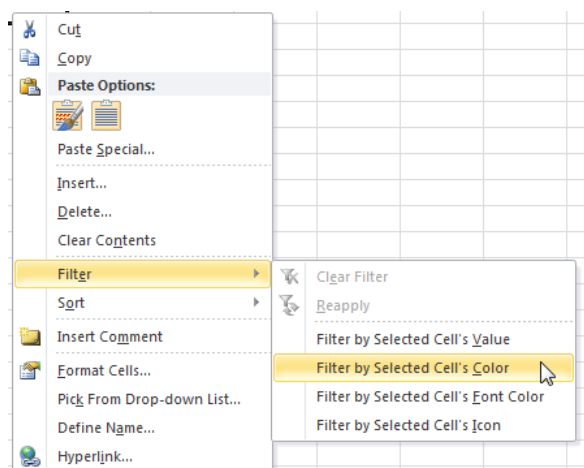
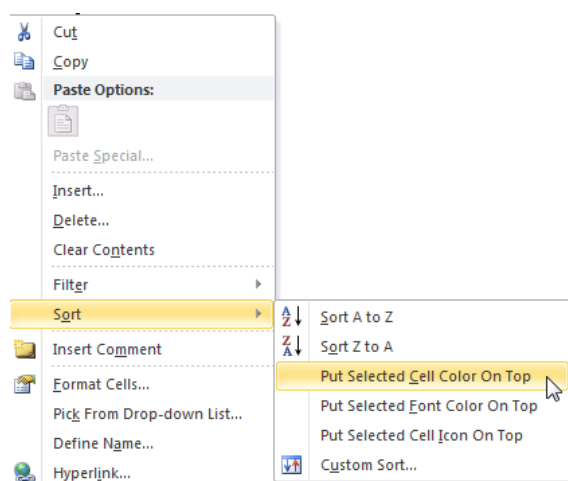
Don't have blank rows within your data (if you need a visual break between types of data in a data table change the row height rather than inserting a blank row). Blank rows can also affect the usefulness of some shortcuts.

Don't have blank columns within your data (a column heading with no data underneath is ok).

If you have blank rows or columns it affects how well Excel "guesses" the data table range.

### Right Clicking

Excel 2007 added extra right click options associated with Data. A Filter and Sort option is available.



### Colours

The right click options now also include the ability to filter and sort by colour. This can work hand in hand with conditional formatting to provide some advanced filtering and sorting options.

**Note: The example data tables used in this session are all fictitious**

## Format As Table



This button, which is on the Home ribbon, was added in Excel 2007. It is actually a feature that was in Excel 2003, where it was called Lists. The functionality and formatting was updated in Excel 2007 and it was tweaked a little more in Excel 2010.

If you use data tables or PivotTables then I highly recommend that you start to use the Format as Table feature in your files.

Unfortunately most people think this feature is just about formatting, but it has many other advantages.

Some of those are listed below.

- Autofilter icons are automatically added to the column headings
- Field names become column headings as you scroll down the page
- Tables automatically extend as you add rows (records)
- Tables automatically extend as you add columns (fields)
- Formulas automatically copy down the column when created or modified
- Table format expands as you add columns or rows, this also include cell formats like conditional formats
- Data Validations in cells in the table also extend as you add rows
- Table names (structured references) are automatically created and work like range names
- PivotTables based on formatted tables, when refreshed, automatically have their data extended as rows or columns are added
- A Design ribbon tab is displayed when the table is selected. This allows you to name your table and to add totals and control formatting.
- Additional right click options when you right click within the table
- Some keyboard shortcuts work differently within tables and make tasks easier
- You can't use a merged cell in a table (I consider that an advantage)
- You can use Slicers as filters with table in Excel 2013 and later versions

## Limitations of Tables

- You have to be careful copying/dragging formulas that contain table column references. If you use the Fill Handle to drag the formula across, the fields (columns) are treated like relative references and move as you drag. In most cases this is not what you expect. This issue will be demonstrated in the session.
- Can't use Subtotal (on the Data ribbon tab) on a Formatted Table
- Can't share a workbook containing a Formatted Table. (Sharing is a little-used feature but formatted table stops its use)
- Can't use a multi-cell array formula in a table
- Sheet protection can affect some table functionality
- In some cases you can't copy a sheet containing a formatted table

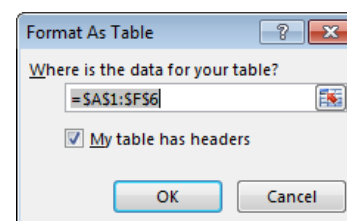
	A	B	C	D	E	F
1	Code	Product	Colour	Weight (g)	Cost	Price
2	1234	Widget	Blue	645	0.34	0.90
3	2345	Widget	Pink	327	0.28	0.70
4	3456	Widget	Orange	651	0.70	1.80
5	4567	Gadget	Blue	347	0.13	0.30
6	5678	Gadget	Pink	346	0.86	2.20

## PRACTICE:

1. Click anywhere within the above table in the Format\_As\_Table sheet. Click the Format as Table icon on the Home ribbon.

2. A gallery of colour schemes is displayed – click a colour scheme.

The keyboard shortcut Ctrl + T uses the default colour and also opens this dialog.



3. The Format As Table dialog is displayed confirming the data range. Providing the data has no blank rows, or blank columns, Excel should automatically select the correct range. Click OK.

4. Excel will apply the format to the table and add the filter icons to the column headings.

	A	B	C	D	E	F
1	Code	Product	Colour	Weight (g)	Cost	Price
2	1234	Widget	Blue	645	0.34	0.90
3	2345	Widget	Pink	327	0.28	0.70
4	3456	Widget	Orange	651	0.70	1.80
5	4567	Gadget	Blue	347	0.13	0.30
6	5678	Gadget	Pink	346	0.86	2.20

5. Entering a new code in cell A7 will automatically extend the table.

6. Enter the word Margin in cell G1. This will extend the table to the right.

7. In cell G2 type = and use your mouse to select cell F2. Note what happens to the formula. This is called a “structured reference”.

	F	G
1	Price	Margin
2	0.90	=[@Price]

8. You can finish the formula by subtracting the Cost amount in cell E2 – watch what happens when you press Enter to accept the formula.

9. Note the formula was copied down, even to the new row that only has a code in it. The square brackets refer to structured references.

10. Modifying any formula in the column will update each other formula in the same column when you press Enter.

11. The @ symbol instructs Excel to refer to the field on the same row as the formula it is used in. In Excel 2007 the symbol used was #.

12. The table is given a default name eg Table1, but you can change that to a more descriptive name. When you have a cell selected within the table the Design ribbon tab is visible.

13. On the far left of the Design ribbon tab is the Table Name box – you can click inside it and modify the name. I use the prefix tbl for my table names. Eg tblParts, tblSales.

Table Name:	Table Name:
Table1	tblParts
Resize Table	Resize Table
Properties	Properties

14. The Table Name and structured references can also be used in normal formulas outside of the table. In cell J1 enter

=SUM(

J	K
=SUM(tblParts[Margin])	

Then click cell G2 then hold the Ctrl key and press the Space Bar. This will select the whole column and enter the structured reference in the formula. Press Enter to accept the formula – this will also add the closing bracket to the formula. The advantage with using this type of reference is that as the table expands the reference to the range expands with it.

15. When using the VLOOKUP function it is best practice to use a table name or range name as the reference for the table within the function. In cell I2 enter 5678. In cell J2 enter the following start of a formula

=VLOOKUP(I2,

I	J	K	L
	3.59		
5678	=VLOOKUP(I2,tbl I		

Start typing tbl and notice that the Table Name is displayed. Since it is highlighted in blue you can press the Tab key to enter it. Using the tbl prefix ensures all the Tables are listed together. Using the table name in a formula ensures the reference to the table doesn't change as you copy the formula within the spreadsheet. Usually you have to use a fixed reference for the table. Using the table name avoids having to use the \$ signs. The final formula is shown below.

=VLOOKUP(I2,tblParts,2,0)

**Copy Across Warning:** In general do not use the Fill Handle (cross at the bottom right corner of a cell) to copy formulas containing structured column references across as the results are not what you would expect. Use copy and paste instead.

**VLOOKUP Warning:** When working with columns in tables always add new column to the right. Don't insert columns within the table. Inserting columns within the table can break existing VLOOKUPS, whereas adding columns to the right won't break any existing VLOOKUP calculations

#### Other Shortcuts – within formatted tables

**Tab key** – the tab key works slightly differently in a formatted table. At the end of the row it will go to the start of the next row. At the end of the table it will insert a blank row at the bottom of the table.

**Ctrl + +** within a formatted table this will insert a row in the table, but not the rest of the sheet

**Ctrl + -** within a formatted table this will delete a row in the table, but not the rest of the sheet

**Ctrl + a** – on the first press this selects just the data, pressed again it includes the headings as well

**Ctrl + Spacebar** – selects the whole data column

**Shift + Spacebar** – selects the current data row

#### Using Range Names with Tables

One problem with structured references is that the formulas that use them become long. In general the longer the formula, the harder it is to read. To get around that limitation you can use range names.

I won't go into detail about range names, but I will give you a couple of examples where their use can make things easier. Range names are a separate webinar topic in themselves.

## SUMIFS function

This function performs multi-criteria sum calculations and it can quickly become long when using structured references. We can replace the structured references with range names to shorten the formula and make them easier to create.

The table we will create is in the Sales Data sheet.

1. Click in the table and press Ctrl + t and then press Enter to create the formatted table. Change the name of the table to tblSales.
2. We want to summarise the table. The report layout we want to use is in the Report sheet.

	A	B	C	D	E	F	G
1	<b>Customer Category</b>	<b>NSW</b>	<b>QLD</b>	<b>SA</b>	<b>VIC</b>	<b>WA</b>	<b>Total</b>
2	Government						
3	Retail						
4	Wholesale						
5	Other						
6	<b>Total</b>						

3. If we use the structured references the formula for cell B2 will be

=SUMIFS(tblSales[Value],tblSales[Customer Category],\$A2,tblSales[State],B\$1)

This can be copied down and across. **Remember don't use the Fill Handle to copy across when using structured references. It is OK to use the Fill Handle to copy down.**

Because you have included the table name and column names the formula expands quickly.

4. We can create three range names that will shorten the formula plus you will be able to copy the formula across with the Fill Handle.
5. In the Sales Data sheet select the Value column - data only. Click cell L2 and then press Ctrl + Spacebar. This selects just the data in the column and not the heading.
6. Press Ctrl + Alt + F3 this opens the New Name dialog.

Change the name to SalesValue and click OK.

There is a function called VALUE, so best to avoid that name.

7. Repeat that process for the Customer Category column and call it Category and then the State column and call it State.
8. We can now create a new formula this time with range names. The new formula for cell B2 is

=SUMIFS(SalesValue,Category,\$A2,State,B\$1)

You can use the Fill Handle to copy across and down.

Range names can be used throughout the file. Because these range names refer to the structured references they automatically expand when new data is added. Range names can also be safely copied across.

## Data Validation

It is very common to use Data Validation to insert a drop-down list within a cell. It is also common to want the item list to expand as new items are added to it.

In the past this required a range name and a complex formula. Now you use a range name and a structured reference just like we did with the previous SUMIFS example.

In the Tables sheet we have a listing of states.

	A
1	<b>States</b>
2	WA
3	NSW
4	VIC
5	QLD

1. We want to create a drop-down list of states in cell E2.
2. Create a table for the States in A1:A5 called tblState.

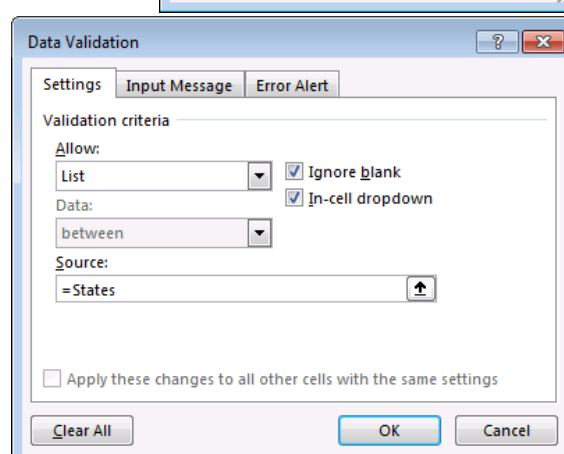
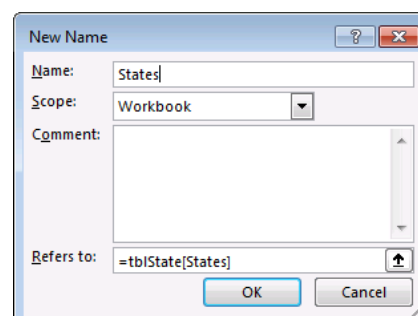
**Note:** we will use another name later in the session called tblStates

3. Select the range A2:A5 and press Ctrl + Alt + F3 change the name to States and click OK.
4. In cell E2 press Alt a v v in sequence don't hold them down. This opens the Data Validation dialog.
5. Select List from the Allow drop-down and then in the Source box type

=States

Click OK.

Try the drop down in cell E2 and then add some other states to the bottom of the list in column A and see if the drop down updates.





## Running Total in a Formatted Table

Formatted Tables allow you to create formulas that automatically copy down as the table expands. To create a running total in a column you have a couple of options.

The example on the right is in the Running Total sheet. We want to create a running total in column C.

There are two solutions.

First create a formatted table and call it tblData.

### Structured references only

We can use those structured references to create the running total formula.

	A	B	C
1	Date	Amount	Running Total 1
2	1/01/2018	105	
3	2/01/2018	561	
4	3/01/2018	-725	
5	4/01/2018	172	
6	5/01/2018	-7	
7	6/01/2018	103	
8	7/01/2018	894	
9	8/01/2018	892	
10	9/01/2018	852	
11	10/01/2018	692	
12	11/01/2018	624	
13	12/01/2018	683	
14	13/01/2018	25	
15	14/01/2018	-84	
16	15/01/2018	-188	
17	16/01/2018	-131	
18	17/01/2018	490	
19	18/01/2018	272	

We can use the SUM function but there is trick to creating the formula. We need to use the colon : symbol to separate the starting cell and the last cell for the SUM range. The problem with this technique is that sometimes Excel won't let you use the colon. It will let you use the comma , so that is the workaround. Try to create it using the colon, if it doesn't let you then use the comma and then change the comma to a colon.

In cell C2 type

=SUM(

And click on cell B1 this enters the headers reference. Type a colon (or a comma if it won't let you type a colon) and click on cell B2 and add the closing bracket to the formula.

Then change the comma into a colon if necessary.

Press Enter.

The final formula is

=SUM(tblData[ [#Headers],[Amount]]:[@Amount])

This formula is identical in all the formula cells in column C.

This formula works because the SUM function treats text entries as zero – e.g. the heading in cell B1 is treated a zero.

### Structured reference and a cell reference

The second technique combines a structured reference with a relative cell reference.

We will add another column to demonstrate this technique. In cell D2 type

=SUM(

Then click on cell B2 and type a comma then type D1 and press Enter.

The final formula for cell D2 is

=SUM([@Amount],D1)

This formula works because the SUM function treats text entries (cell D1) as zero and doesn't display a #VALUE! error.

If you had used

=[@Amount]+D1

It would display have displayed a #VALUE! error.

### Referring to other rows

In general you don't refer to another row in a table, but in this case the running total formula works even when the table is sorted.

### Automatically adding text in a table

Let's say you want the word Actuals in a new column in all the rows of the Sales table. If you type it as an input and copy it down and add new rows then the new rows will be blank in that new column.

What you can do is instead is to create a formula like

= "Actuals"

Because this is a formula it will automatically be copied down when you add new rows.

### WARNING: Pasting in new rows

When pasting at the bottom of an existing table make sure the data has the same number of columns or less. Obviously the columns need to line up.

If you paste more columns beneath an existing formatted table the table won't expand to include those new rows.

Try copying using the data on the Paste sheet to paste on the bottom of the Sales table. The data has three extra columns.

## Using Formatted Tables with PivotTables

Let's return to the Sales Data sheet. Click inside the table and click the Design ribbon tab.

The Summarize with PivotTable button allows you to create a PivotTable to summarise the table.

You can also use Alt n v pressed in sequence.

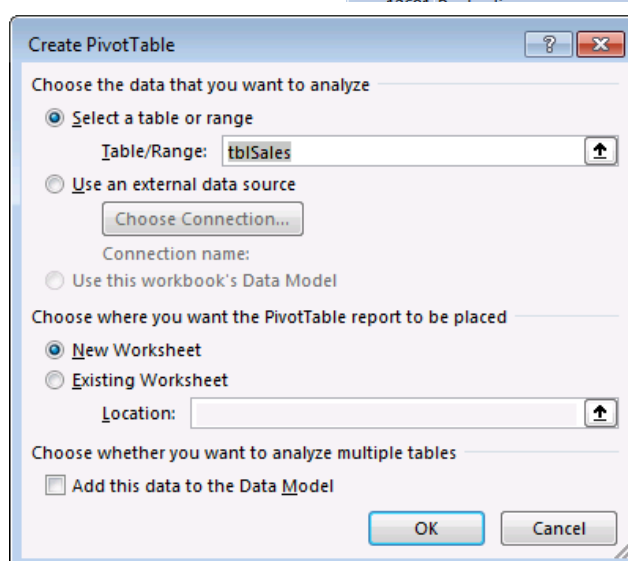
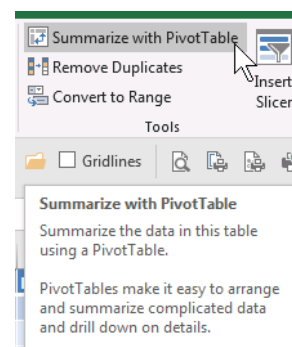
PivotTables have a drag and drop interface that allow you to create reports.

They take a copy of the data and the copy is what you are working with.

Hence, if the data is changed you must Refresh the PivotTable to update the figures.

The advantage with using a formatted table as the data source for a PivotTable is that when you Refresh the PivotTable any additional rows or deletions are automatically updated in the PivotTable.

We can create the same report we created earlier without any formulas – see image below.



	A	B	C	D	E	F	G	H	I	J
1										
2										
3	Sum of Value	Column Labels								
4	Row Labels	ACT	NSW	NT	QLD	SA	TAS	VIC	WA	Grand Total
5	Government	10294.8	1070592.85	659.6	676774.75	1122990.95	3178.05	473862.7	749587.6	4107941.3
6	Other	1987						341744.6	185819.25	1533689.95
7	Retail	1576						250252.25	997465.1	6227209.45
8	Wholesale	1683						470625.85	649884.6	5467294.95
9	Grand Total	6277						3536485.4	2582756.55	17336135.65
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
26										
27										

## Filtering Formatted Tables with Slicers

Slicers were added in Excel 2010. They are a filtering interface for PivotTables.

In Excel 2013 you can add a Slicer to a formatted table. In the Design ribbon tab use the Insert Slicer Icon.

Return to the Sales Data sheet and add a Slicer to the table.

The interface is quick and easy to use.

Hold the Ctrl key down to select multiple items.

There is an icon at the top of the slicer that also allows multi-selection.

### Removing a Table

If you need to remove the formatted table features – eg you might need to insert subtotals, then you can use an icon on the Design ribbon table that reverts the Table back to a normal range.

**Note:** it doesn't remove the formats that have already been applied. It removes all the formatted table features. Any formulas are converted into normal Excel cell references.



To remove the formatted table features you can use the Convert to Range icon on the Design ribbon tab. You can also right click the table and select Table and see the option.

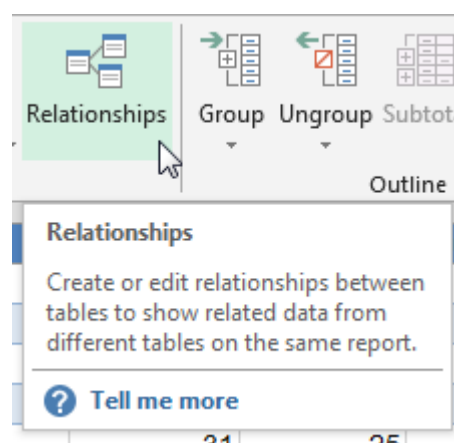
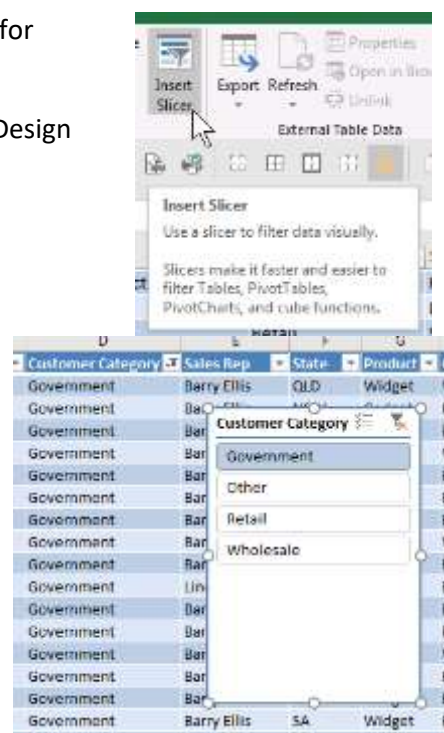
## Relationships

This applies to Excel 2013 and later versions.

In older versions of Excel a VLOOKUP function would have been used to achieve what we will do with a new feature added in Excel 2013, called Relationships (Data menu).

### The Problem

We have a Sales Data table that contains a State field and we have a State table that has a listing of states and their respective regions – see image on the following page.



	A	B	C	D	E	F	G	
1	Date	Invoice	Customer	Customer Category	Sales Rep	Sales_State	Product	Col
2	1/01/2018	12689	Northern Products Ltd	Wholesale	Kylie Ford	QLD	Widget	Wh
3	1/01/2018	12690	XYZ Ltd	Retail	Linda Garland	VIC	Gadget	Bla
4	1/01/2018	12691	Peabodies	Retail	Shirley Clark	QLD	Widget	Bla
5	1/01/2018	12692	XYZ Ltd	Retail	Linda Garland	NSW	Gadget	Blu
6	1/01/2018	12693	Consolidated Distributors Ltd	Wholesale	Barry Ellis	SA	Widget	Rec
7	1/01/2018	12695	Peabodies	Retail	Shirley Clark	ACT	Widget	Bla

We want to use a Pivot Table to report on sales by region.

Pivots Tables can only use ONE table as its source – that is until Relationships were added that allow you to create a relationship between tables.

Since we have a state field in the Sales data we can “relate” that to the state field in the State table and find the region. That region can then be used in the Pivot Table for reporting.

This is similar to relational data base reporting where tables have a unique field that can allow you to link tables together based on a common field between two tables.

	A	B
1	State	Region
2	QLD	North
3	NT	North
4	VIC	South
5	TAS	South
6	NSW	East
7	ACT	East
8	WA	West
9	SA	West
10		

In Excel fields are columns and rows are records.

When using Relationships one of the tables must have unique entries for the shared field – in our case that is the State table – the two column table above. This is commonly called the lookup table.

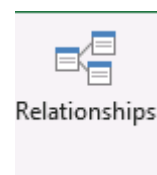
### Format as Table

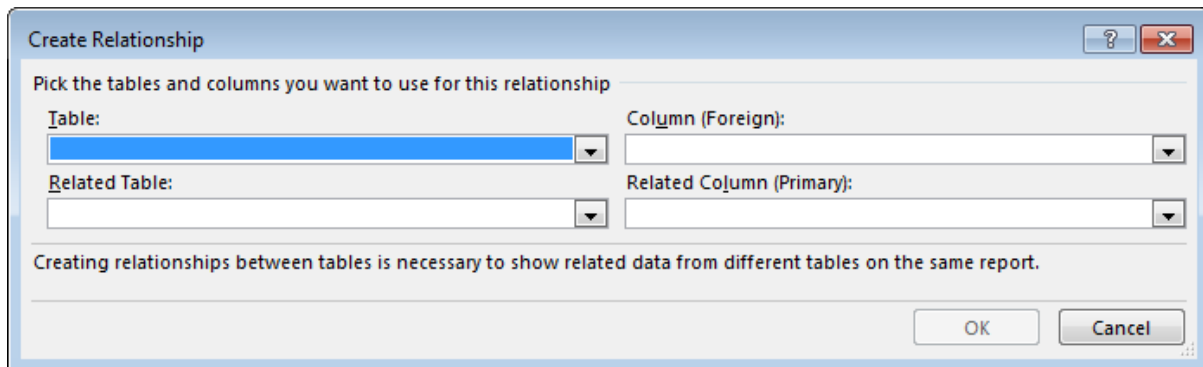
To use Relationships both tables have to be defined using the Format as Table. Using descriptive table names makes creating the Relationship easier.

The Sales data table is already name tblSales. Use Format as Table on the two column table and name it tblStates.

### The Set Up

Click the Data ribbon, click the Relationships button and click New.





**Create Relationship**

Pick the tables and columns you want to use for this relationship

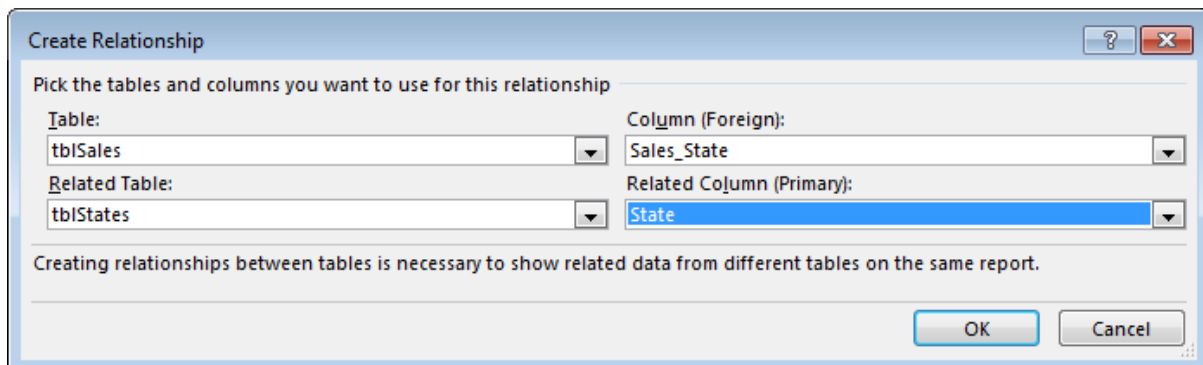
Table:  Column (Foreign):

Related Table:  Related Column (Primary):

Creating relationships between tables is necessary to show related data from different tables on the same report.

OK Cancel

Select tblSales and Sales\_State in the top two drops downs and tblStates and State in the bottom two drop downs – see image on the following page.



**Create Relationship**

Pick the tables and columns you want to use for this relationship

Table:  Column (Foreign):

Related Table:  Related Column (Primary):

Creating relationships between tables is necessary to show related data from different tables on the same report.

OK Cancel

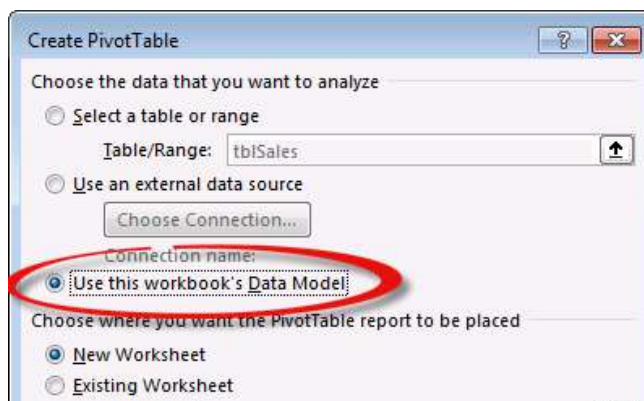
Click OK and then click Close.

Manage Relationships		
Status	Table	Related Lookup Table
Active	tblSales (Sales_State)	tblStates (State)

To create the Pivot Table report requires selection of a different options than usual.

Click the Insert ribbon and click Pivot Table.

Select the “Use this workbook’s Data Model” option and click OK.



On the following page is an example of a PivotTable report using multiple tables.

The Customer Category and Value columns (fields) are in the tblSales table.

The Region field is in the tblStates table.

As both tables are related you can use fields from each to create the report.

Creating relationships between tables expands reporting options.

Row Labels	East	North	South	West	Grand Total
Government	1080887.65	677434.35	477040.75	1872578.55	4107941.3
Other	415987.65	408026.25	348037.1	361638.95	1533689.95
Retail	1408343.7	1130903.75	1269242.55	2418719.45	6227209.45
Wholesale	1242481.9	1134340.4	1487585.05	1602887.6	5467294.95
<b>Grand Total</b>	<b>4147700.9</b>	<b>3350704.75</b>	<b>3581905.45</b>	<b>6255824.55</b>	<b>17336135.65</b>

## Date Tables

Another common use of Relationships is to create a date table to allow reporting by financial year in a PivotTable. The date table needs to include every day of the period you are working with.