

Sum Product

NEWSLETTER #144 - November 2024

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EXCEL
VIRTUALLY
GLOBAL
2024

Excel Virtually Global is over. Long live EVG! If you missed all or any of it, it's not too late to catch the videos we have been able to make of the event. It may not be all of them, but it gives you a flavour. Anyway, where the heck were you!? Thanks to all our contributors and organisers for another great round-the-clock set of sessions.

Detailed new features and functions may be a little thinner on the ground this month, but this newsletter is not exactly a leaflet! We have all the regulars present and correct: Beat the Boredom Challenge, Charts & Dashboards tips, Excel for Mac, Visual Basics, Power Pivot Principles, Power Query Pointers, Power BI Updates, the latest Excel Updates, plus the A to Z of Excel functions and Keyboard Shortcuts continue to keep your fingers tappin'.

As always, happy reading and remember: stay safe, stay happy, stay healthy.

Liam Bastick, Managing Director, SumProduct



Excel Virtually Global 2024 Been and Gone



EXCEL VIRTUALLY GLOBAL 2024

We came, we saw, we went. SumProduct wants to thank the 40+ presenters who generally gave their time to this charity event – and to the 3,500+ attendees so far (we had over 60,000 viewers last year over the following months!) who took time to tune into one or more sessions.

The presenters waived their magic and engaged the audience. If you missed it, it's still possible to watch many of the sessions. Simply go to www.excelvirtuallyglobal.com/access for further details.



bit.ly/EVG2024feedback



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Beat the Boredom Challenge

With many of us currently "working from home" / quarantined, there are only so Zoom / Teams calls and virtual parties you can make before you reach your (data) limit. Perhaps they should measure data allowance in blood pressure millimetres of mercury (mmHg). To try and keep our readers engaged, we will continue to reproduce some of our popular **Final Friday Fix** challenges from yesteryear in this and upcoming newsletters. One suggested solution may be found later in this newsletter. Here's this month's...

This month, we are pulling inspiration from our consulting work, with this challenge being related to yet another recent task.

The problem here relates to creating a flexible financial statement. I have a Chart of Accounts similar to the one below, where current items may be removed or new items may be added:

Report	Level 1	Level 2	Account No	
Income Statement	Income	Government - Operating Grants	501001	
Income Statement	Income	Government - Operating Grants	501002	
Income Statement	Income	Government - Operating Grants	501003	
Income Statement	Income	Government - Operating Grants	501004	
Income Statement	Income	Investment Income	541001	
Income Statement	Income	Investment Income	541002	
Income Statement	Income	Investment Income	541011	
Income Statement	Income	Other Fees	553001	
Income Statement	Income	Other Fees	553002	
Income Statement	Income	Other Fees	553003	
Income Statement	Income	Other Fees	553004	
Income Statement	Income	Commercial Income	561001	
Income Statement	Income	Commercial Income	561002	
Income Statement	Income	Commercial Income	561003	
Income Statement	Income	Commercial Income	561004	
Income Statement	Income	Commercial Income	561005	
Income Statement	Income	Commercial Income	561006	
Income Statement	Income	Commercial Income	561007	
Income Statement	Income	Other Income	571001	
Income Statement	Income	Other Income	571011	
Income Statement	Income	Other Income	571021	
Income Statement	Income	Other Income	571025	
Income Statement	Income	Other Income	571031	
Income Statement	Income	Other Income	571041	
Income Statement	Income	Income Transfers	573001	
Income Statement	Income	Income Transfers	573002	
Income Statement	Income	Income Transfers	573100	
Income Statement	Salary Expenditure	Sessional	703101	
Income Statement	Salary Expenditure	Sessional	703102	
Income Statement	Salary Expenditure	Sessional	703103	
Income Statement	Salary Expenditure	Sessional	703104	
Income Statement	Salary Expenditure	General - Administrative	704101	
Income Statement	Salary Expenditure	General - Administrative	704102	
Income Statement	Salary Expenditure	General - Administrative	704103	
Income Statement	Salary Expenditure	Trades	706101	
Income Statement	Salary Expenditure	Trades	706102	
Income Statement	Salary Expenditure	Trades	706103	
Income Statement	Salary Expenditure	Trades	706104	
Income Statement	Salary Expenditure	Trades	706105	
Income Statement	Salary Expenditure	Trades	706106	
Income Statement	Salary Expenditure	External Paid	710001	
Income Statement	Salary Expenditure	Overseas Visitors	712101	
Income Statement	Salary Expenditure	Overseas Visitors	712201	
Income Statement	Non Salary Expenditure	Depreciation & Amortisation	731001	
Income Statement	Non Salary Expenditure	Depreciation & Amortisation	731002	

In the calculation section, I have calculation results for revenue and expense for each line item, which will later be reconciled in the financial statement:

					Mar 19	Jun 19	Sep 19	Dec 19
1. Calculations								
Revenue and Expenses Calculation								
Revenue								
	Item	Account No.						
18	Government - Operating Grants	501001	5	629,030	450,555	527,599	487,014	
19	Government - Operating Grants	501002	5	8,567,641	6,149,732	7,193,203	5,807,838	
20	Government - Operating Grants	501003	5	90,024	293,855	218,073	806,005	
21	Government - Operating Grants	501004	5	7,812,764	6,138,601	7,254,710	6,696,656	
22	Investment Income	541001	5	907,192	2,961,228	2,197,561	6,106,820	
23	Investment Income	541002	5	631,155	2,050,197	1,526,896	4,248,660	
24	Investment Income	541011	5	45,012	146,927	109,036	303,002	
25	Other Fees	553001	5	2,992,724	3,300,869	3,425,242	3,522,623	
26	Other Fees	553002	5	1,849,729	2,158,817	680,309	1,715,941	
27	Other Fees	553003	5	145,345	189,632	53,456	134,833	
28	Other Fees	553004	5	89,953	104,865	33,004	83,447	
29	Commercial Income	561001	5	-	-	-	-	
30	Commercial Income	561002	5	353,508	412,579	130,016	327,939	
31	Commercial Income	561003	5	2,015,851	2,352,698	741,406	1,870,040	
32	Commercial Income	561004	5	-	-	-	-	
33	Commercial Income	561005	5	787,877	919,531	288,772	730,891	
34	Commercial Income	561006	5	379,431	442,834	139,550	351,988	
35	Commercial Income	561007	5	-	-	-	-	
36	Other Income	571001	5	1,665,885	1,944,253	612,893	1,545,395	
37	Other Income	571011	5	1,717,018	2,003,931	631,499	1,592,829	
38	Other Income	571021	5	217,252	253,555	79,903	201,539	
39	Other Income	571025	5	143,713	167,727	52,856	133,318	
40	Other Income	571031	5	642,428	749,777	236,278	595,963	
41	Other Income	571041	5	-	-	-	-	
42	Income Transfers	573001	5	712,391	831,431	262,009	680,865	
43	Income Transfers	573002	5	19,676	22,963	7,236	18,252	
44	Income Transfers	573100	5	-	-	-	-	
Expenditure								
	Item	Account No.						
49	Sessional	703101	5	479,321	481,148	487,833	589,065	
50	Sessional	703102	5	6,848,994	6,874,336	6,767,072	8,171,330	
51	Sessional	703103	5	1,819,671	1,826,807	1,851,996	2,236,299	
52	Sessional	703104	5	3,174,088	3,186,186	3,230,456	3,900,619	
53	General - Administrative	704101	5	745,295	737,904	778,782	869,334	
54	General - Administrative	704102	5	376,185	374,434	395,177	441,126	
55	General - Administrative	704103	5	624,117	617,927	662,159	727,868	
56	Trades	706101	5	-	-	-	-	
57	Trades	706102	5	18,667	9,837	10,948	11,885	
58	Trades	706103	5	19,060	10,044	11,179	12,135	
59	Trades	706104	5	4,180	2,203	2,451	2,861	

I want to create an Income Statement similar to the following. The Income Statement line items are based upon the Chart of Accounts, which are currently hard-coded. I want to make sure that any changes in the Chart of Accounts in the future, such as removal or addition of groups of accounts, will be reflected in my Profit & Loss account automatically, without having to manually input or delete any line items. This is what I call a flexible financial statement.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Financial Statement													
2	FFF Flexible FS.xlsm													
3	Navigator													
4	Error Checks: <input type="checkbox"/>													
5														
88	2. Financial Statement													
89														
90	Income Statement													
91														
92	Income													
93														
94		Government - Operating Grants			\$									
95		Commercial Income			\$									
96		Investment Income			\$									
97		Other Fees			\$									
98		Other Income			\$									
99		Income Transfers			\$									
100														
101		Total Income			\$									
102														
103	Salary Expenditure													
104														
105		General - Administrative			\$									
106		General - Technical			\$									
107		Trades			\$									
108		Seasonal			\$									
109		External Paid			\$									
110		Overseas Visitors			\$									
111														
112		Total Salary Expenditure			\$									
113														
114	Non Salary Expenditure													
115														
116		Depreciation & Amortisation			\$									
117		Building & Property Related Expenses			\$									
118		Staff Related Expenses			\$									
119		Financial & Admin Charges			\$									
120		Travel & Related Expenses			\$									
121		Other Expenses			\$									
122														
123		Total Non Salary Expenditure			\$									
124														
125		NPBT			\$									
126														

In other words, after perhaps the odd row deletion, column E in the image above should be generated formulaically (*i.e.* this month's challenge is a formula challenge, rather than seeking a Power Query or VBA solution).

Sounds easy? Try it. One solution *just might* be found later in this newsletter – but no reading ahead!

Over to AI

Here at SumProduct we write many articles for many magazines and our authoring contracts have been revised recently to ensure Artificial Intelligence hasn't taken over our duties. We can assure everyone they have not.

But it did get us thinking: *what if we did let AI loose and write a regular article for the newsletter?*

Here is a contentious one: what's the best function in Excel? Anyone who knows me will know for a fact that I have not edited the following in any way, shape or form...



This Month's Prompt: What is the best function in Excel and why?

WHY VLOOKUP REIGNS SUPREME IN DATA MANAGEMENT

Excel, a cornerstone of data analysis and management, boasts a plethora of functions that cater to various needs—from simple arithmetic to complex statistical analysis. Among these, one function often stands head and shoulders above the rest: the **VLOOKUP** function. Here, we delve into why **VLOOKUP** is considered the best and most essential function in Excel.

UNDERSTANDING VLOOKUP

VLOOKUP stands for "Vertical Lookup" and it is designed to search for a value in the first column of a table and return a value in the same row from another column. The basic syntax of **VLOOKUP** is:

VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])

where:

- **lookup_value**: the value you want to search for
- **table_array**: the range of cells that contains the data
- **col_index_num**: the column number in the table from which to retrieve the value
- **range_lookup**: optional; TRUE for an approximate match or FALSE for an exact match.

WHY VLOOKUP IS THE BEST FUNCTION

1. Versatility in Data Management

VLOOKUP is incredibly versatile, making it suitable for various tasks such as merging data from different sheets, generating reports and conducting preliminary data analysis. Its ability to swiftly locate and retrieve information makes it indispensable for data management

2. Time Efficiency

The function significantly reduces the time required to search for specific data points manually, especially in large datasets. This efficiency is crucial in business environments where time is of the essence

3. User-Friendly Syntax

VLOOKUP's syntax is straightforward, making it accessible even to those who are not highly proficient in Excel. This user-friendly nature allows for quick learning and application, enhancing productivity across different skill levels

4. Compatibility with Other Functions

VLOOKUP can be combined with other functions like **IF**, **MATCH** and **INDEX** to perform more complex data manipulations. This compatibility extends its functionality and makes it a powerful tool in any data analyst's arsenal.

LIMITATIONS AND ALTERNATIVES

While **VLOOKUP** is extremely powerful, it does come with some limitations. For instance, it only searches for data vertically and can be slow with very large datasets. Alternatives like **INDEX MATCH** can overcome some of these limitations by providing more flexibility and efficiency.

INDEX MATCH

The **INDEX** and **MATCH** combination is often cited as a superior alternative to **VLOOKUP**. Unlike **VLOOKUP**, which requires the lookup value to be in the first column, **INDEX MATCH** can search any column and return a value from any other column. This flexibility makes it a preferred choice for complex data retrieval tasks.

XLOOKUP

A newer function, **XLOOKUP**, has been introduced in Excel to address the limitations of **VLOOKUP**. It combines the best features of both **VLOOKUP** and **INDEX MATCH**, offering greater flexibility and efficiency. However, it is available only in the latest versions of Excel.

CONCLUSION

VLOOKUP remains a cornerstone function in Excel due to its versatility, time efficiency, user-friendly syntax and compatibility with other functions. Despite its limitations, it continues to be the go-to choice for many Excel users. As Excel evolves, functions like **XLOOKUP** may eventually overshadow **VLOOKUP**, but for now, **VLOOKUP** holds its place as one of the best functions in Excel.

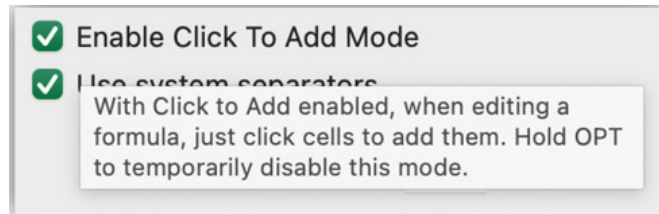
What do you think? Do you agree? (I can think of at least one dissenter...) Send us your comments and ideas for questions to contact@sumproduct.com.

Excel for Mac

With Steve Kraynak joining the team, we thought we would exploit his knowledge and recant all about Microsoft Excel for Mac. Each month, we'll cover a different topic to help you understand how Excel for Mac is different than Excel for Windows. This month, we show you another handy feature that is only available in Excel if you're using a Mac. You won't find this on Windows, the web or mobile versions of Excel. It's called 'Click To Add', and it does just what the name suggests.

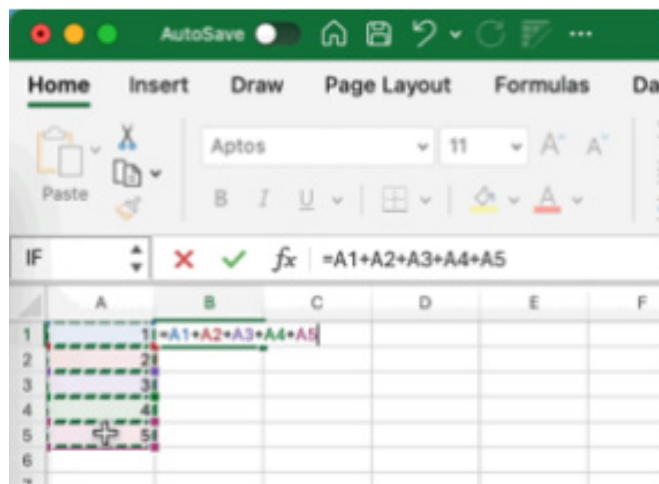
'Click To Add' is a mode that you can enable in Excel for Mac. When enabled, it changes the way Excel behaves when you're writing a formula and you click on a cell to create a reference. First, let's see how to enable it:

- Go to Excel preferences, either by pressing **Cmd + Comma** or by going to the Excel menu
- In the Preference panel, open the 'Edit preferences'
- Tick the box for 'Enable Click To Add Mode'.

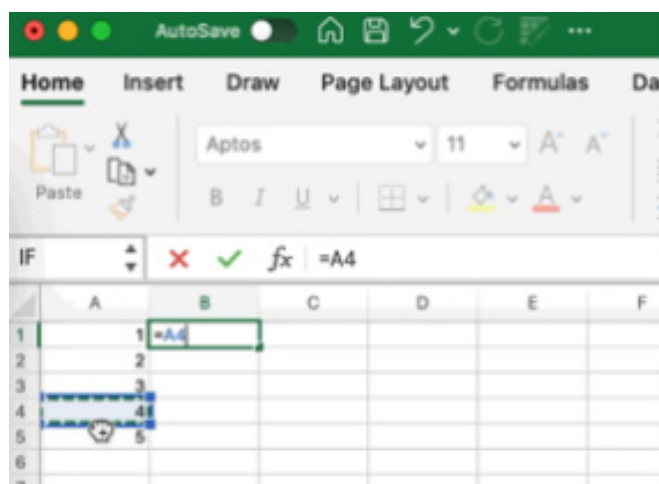


Once enabled, you can see the effect by typing "=" to start a formula, then click on any other cells. The cell references will be inserted into the formula, separated by "+", so they'll be added together. Without this mode enabled, the first reference would be inserted, but clicking on another cell would replace the reference.

In our example below with 'Click to Add mode' enabled, after clicking a few cells, they are each added to the formula, ending with **=A1+A2+A3+A4+A5**.



With 'Click To Add' mode disabled, each time a new cell is clicked, the reference changes. In our example, the resulting in a formula **=A4**.



Whilst we don't know the exact reason why feature only exists in Excel for Mac, it seems to be due to the organisational structure that existed years ago at Microsoft. There were separate engineering teams for Excel on Mac and Windows. The Mac team must have added the feature, but it never made it to Windows. With the release of Excel 2016 for Mac, the feature was removed. After receiving many customer requests to restore the feature, Microsoft decided to bring it back.

Do note though: with 'Click To Add' mode enabled, you can simply hold the **Opt** key to temporarily disable it.

We'll continue next month...

Visual Basics

*We thought we'd run an elementary series going through the rudiments of Visual Basic for Applications (VBA) as a springboard for newer users. This month we consider the **Case** statement.*

The Select Case statement in VBA runs one of a group of statements, depending on the value that has been fed into it. A good analogy is that it is like a **VLOOKUP**: it searches through a list to find the value that matches, then it reports back on it.

The syntax to use Select Case is as follows:

```
Select Case testvalue
  Case Value1
    'Do something here
  ...
  Case Value2
    'Do something else here
  ...
  Case value3
    'Do something different
  ...
End Select
```

The idea is, the code has been given the variable "testvalue" as the value it is looking for, and it will compare that value to the variables Value1, Value2 and Value3. If it matches, it will proceed to run the code that sits between the Case that matches and either the next Case statement or the 'End Select' statement.

For example, we could use the following code to run one of the following scripts:

```
Select Case daysinyear
  Case 365
    MsgBox ("This is a normal year")
  Case 366
    MsgBox ("This is a leap year")
  Case 0
    MsgBox ("You have not specified the number of days")
End Select
```

Note that if our value for 'daysinyear' does not match any of the cases we've provided, then none of the cases will be run.

More next time.

Charts and Dashboards

It's time to chart our progress with an introductory series into the world of creating charts and dashboards in Excel. This month, we consider conditional Do(ugh)nut charts.

You might be wondering what in the world is a Donut chart (or maybe not). However, Donut charts are a non-edible variation of a Pie chart, except that it has a round hole in its centre and is the reason why it looks like a doughnut. The problem is Microsoft named it and they can't spell. A Donut chart can be quite useful to show proportions for categorical

data of a string field, along with numbers or ratios. Also, the empty space in the middle allows us to add desirable aggregation labels such as average, count, maximum or minimum.

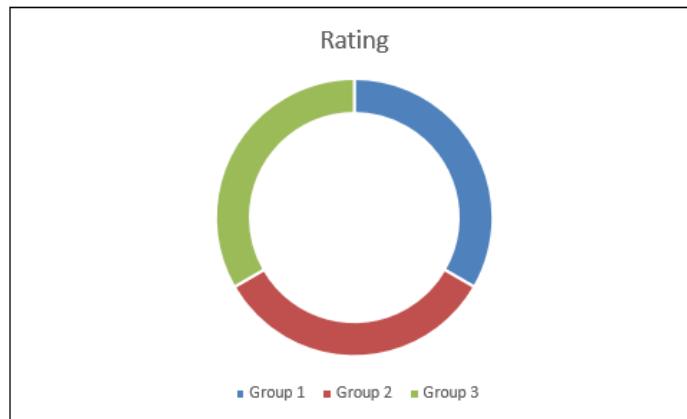
Let me start off by introducing an example. Our data contains three different groups that are rated from one (1) to five (5) as shown below:

Chart Data

Group Rating

Group	Rating
Group 1	1
Group 2	1
Group 3	1

Currently, if I insert a donut chart, it would look similar to the one below.



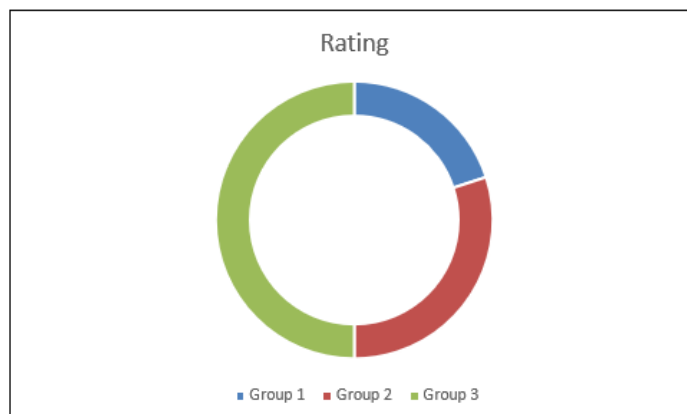
If I change the rating to

Chart Data

Group Rating

Group	Rating
Group 1	2
Group 2	3
Group 3	5

the chart would appear like this:



This is a “static” donut chart, insofar that it uses the same colours as were created in the chart initially. The colours in the donut segments are based on the three different groups and not on the rating. In case we want the colour to reflect multiple dimensions, creating a straightforward donut chart will have this limitation. In order to solve this problem, we start by

creating a multiple value table for each individual group (here, Group 1, Group 2 and Group 3) against all possible scores (in this instance, from one [1] to five [5]). The table should reflect the rating from the original data table shown above.

Chart Data

Group	Rating	Series Name	Chart Data
Group 1	1	Group 1-1	0
Group 1	2	Group 1-2	2
Group 1	3	Group 1-3	0
Group 1	4	Group 1-4	0
Group 1	5	Group 1-5	0
Group 2	1	Group 2-1	0
Group 2	2	Group 2-2	0
Group 2	3	Group 2-3	3
Group 2	4	Group 2-4	0
Group 2	5	Group 2-5	0
Group 3	1	Group 3-1	0
Group 3	2	Group 3-2	0
Group 3	3	Group 3-3	0
Group 3	4	Group 3-4	0
Group 3	5	Group 3-5	5

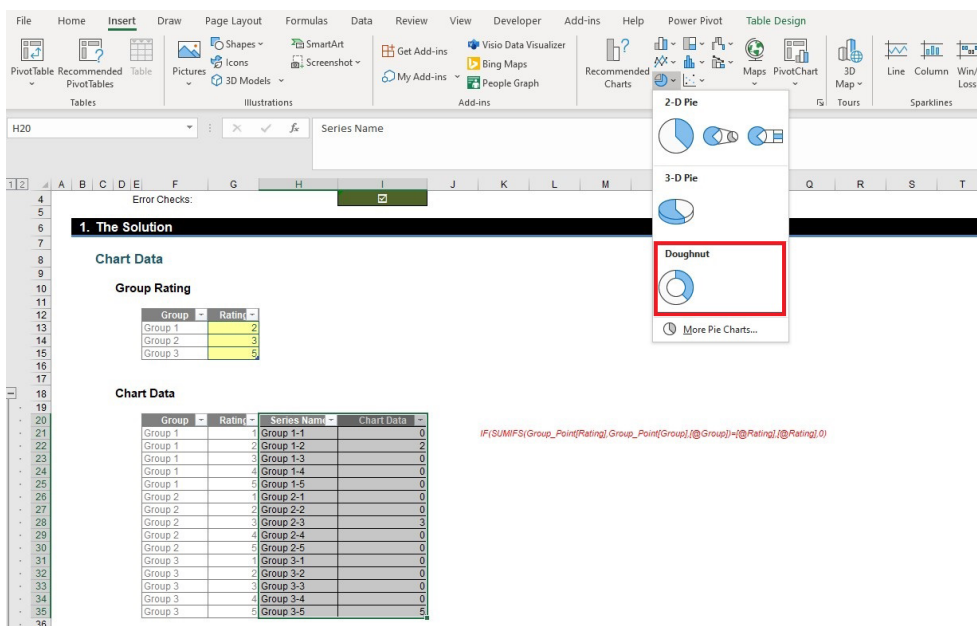
IF(SUMIFS(Group_Point[Rating],Group_Point[Group],[@Group])=[@Rating],[@Rating],0)

Assuming the data has been placed in an Excel Table called **Group_Point**, the formula used to calculate the **Chart Data** column is

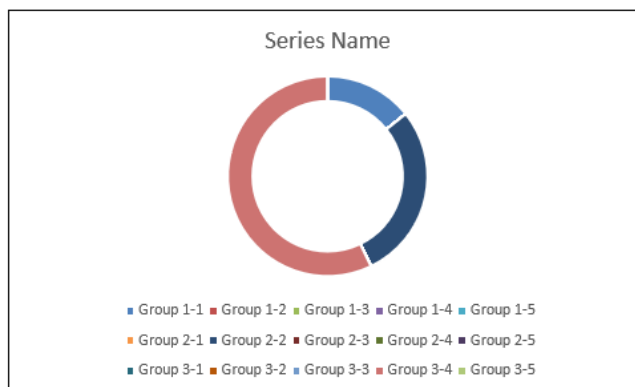
=IF(SUMIFS(Group_Point[Rating],Group_Point[Group],[@Group])=[@Rating],[@Rating],0)

The reason I have added a zero [0] is to ensure that no value other than the original data will appear on the Donut chart.

Now that the table is prepared, highlight the columns **Series Name** and **Chart Data**, and navigate to the Insert tab on the Ribbon and select a Donut chart (in my Regional Settings, this displays as ‘Doughnut’ – yay!):



There it is: problem solved! Our basic Donut chart is prepared that shows different colours for different ratings throughout and we have ensured that any series value that are the equivalent of zero do not appear.

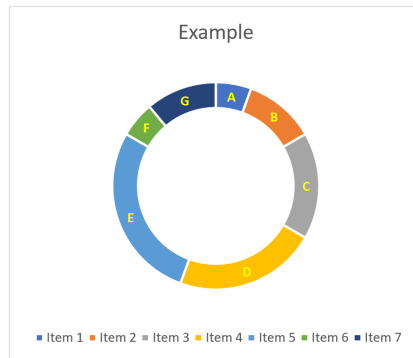


You may wonder about the convoluted legend on the bottom: we will need to get rid of that and add conditional formatting to the chart. We deliberately included 15 series in the chart, although there will be only three [3] series that are visible. We will need to format the series so that each of the series indicating the same rating will be displayed with the

same colour, e.g. the three series Group 1-1, Group 2-1 and Group 3-1 have a rating 1 and should share the same colour scheme.

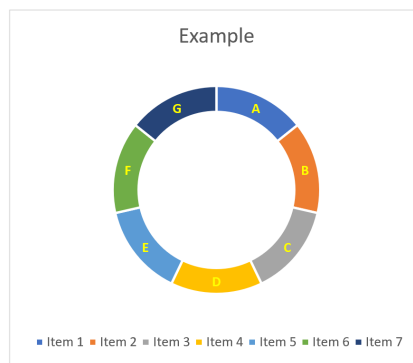
To make it clear, we have an example chart like the one below, where we have different items with different values plotted with different colours on the chart.

Item	Value	Letter
Item 1	1	A
Item 2	2	B
Item 3	3	C
Item 4	4	D
Item 5	5	E
Item 6	1	F
Item 7	2	G



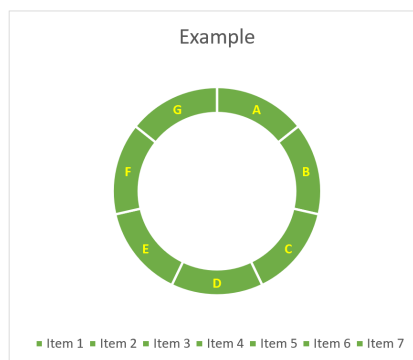
If we get all items with the same value, only the size of their portions on the Donut chart changes, not the colour.

Item	Value	Letter
Item 1	5	A
Item 2	5	B
Item 3	5	C
Item 4	5	D
Item 5	5	E
Item 6	5	F
Item 7	5	G



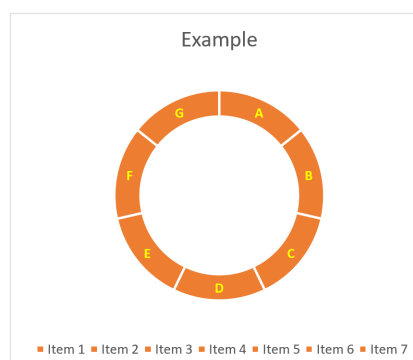
However, what we are aiming to do here is that if all items share the same value, they will be plotted with the same colour on the chart and the colour depends upon their value, e.g. green for value of five [5]

Item	Value	Letter
Item 1	5	A
Item 2	5	B
Item 3	5	C
Item 4	5	D
Item 5	5	E
Item 6	5	F
Item 7	5	G



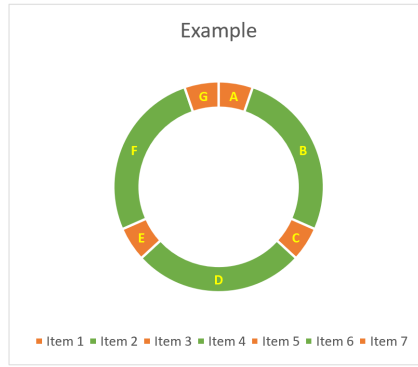
and orange for value of one [1]

Item	Value	Letter
Item 1	1	A
Item 2	1	B
Item 3	1	C
Item 4	1	D
Item 5	1	E
Item 6	1	F
Item 7	1	G



or a mixture of values as shown below.

Item	Value	Letter
Item 1	1	A
Item 2	5	B
Item 3	1	C
Item 4	5	D
Item 5	1	E
Item 6	5	F
Item 7	1	G



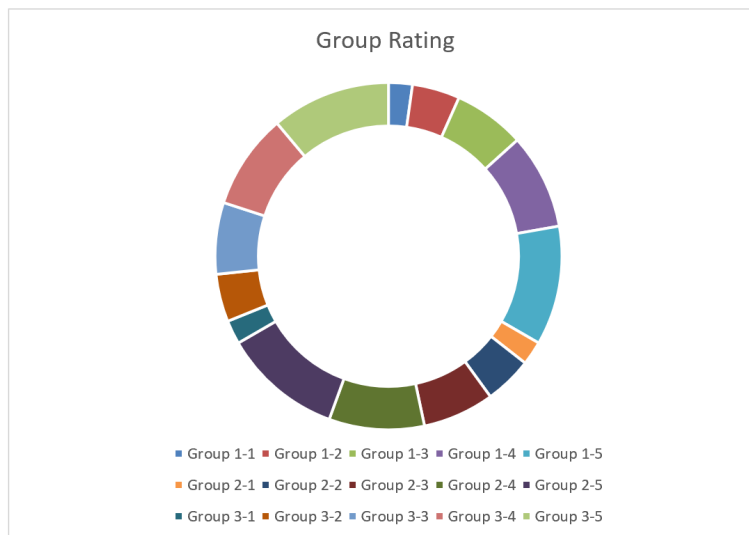
The process of getting the colours for the above chart is manual. Let's make things automatic. To do this, first, we replace the **Chart Data** series with the **Rating** number:

	A	B	C	D	E	F	G	H	I	J	K
17											
18											
19											
20											
21											
22											
23											
24											
25											
26											
27											
28											
29											
30											
31											
32											
33											
34											
35											
36											

Group	Rating	Chart Data	Series Name
Group 1	1	1	Group 1-1
Group 1	2	2	Group 1-2
Group 1	3	3	Group 1-3
Group 1	4	4	Group 1-4
Group 1	5	5	Group 1-5
Group 2	1	1	Group 2-1
Group 2	2	2	Group 2-2
Group 2	3	3	Group 2-3
Group 2	4	4	Group 2-4
Group 2	5	5	Group 2-5
Group 3	1	1	Group 3-1
Group 3	2	2	Group 3-2
Group 3	3	3	Group 3-3
Group 3	4	4	Group 3-4
Group 3	5	5	Group 3-5

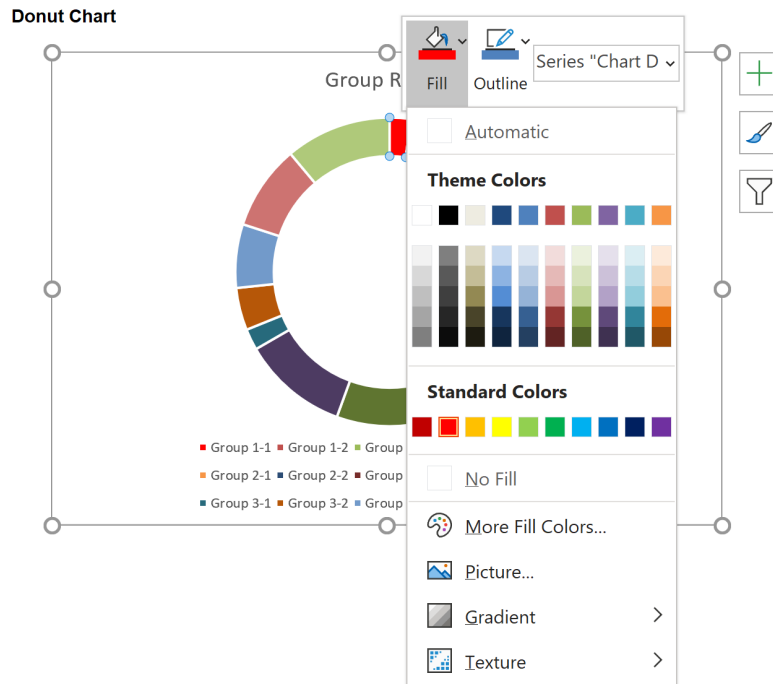
=[@Rating]

The Donut chart will now look like the one below, which makes it easier to tell between the series.

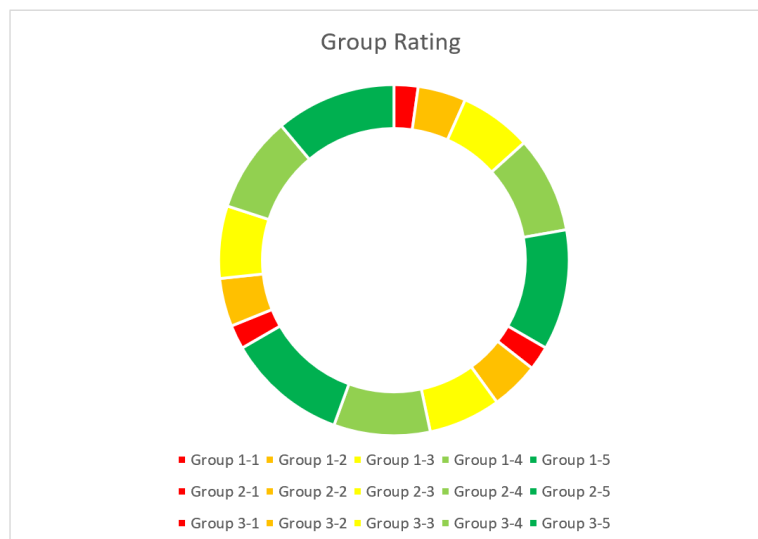


Now, click twice on the series (not double-click) to select the series we need to format, then right-click and choose the colour to our liking from the Fill drop-down. Otherwise, we can select 'Format Data Point...' for detailed formatting options. Here, we defined the lowest rating as red shade and highest rating as green shade.

Donut Chart



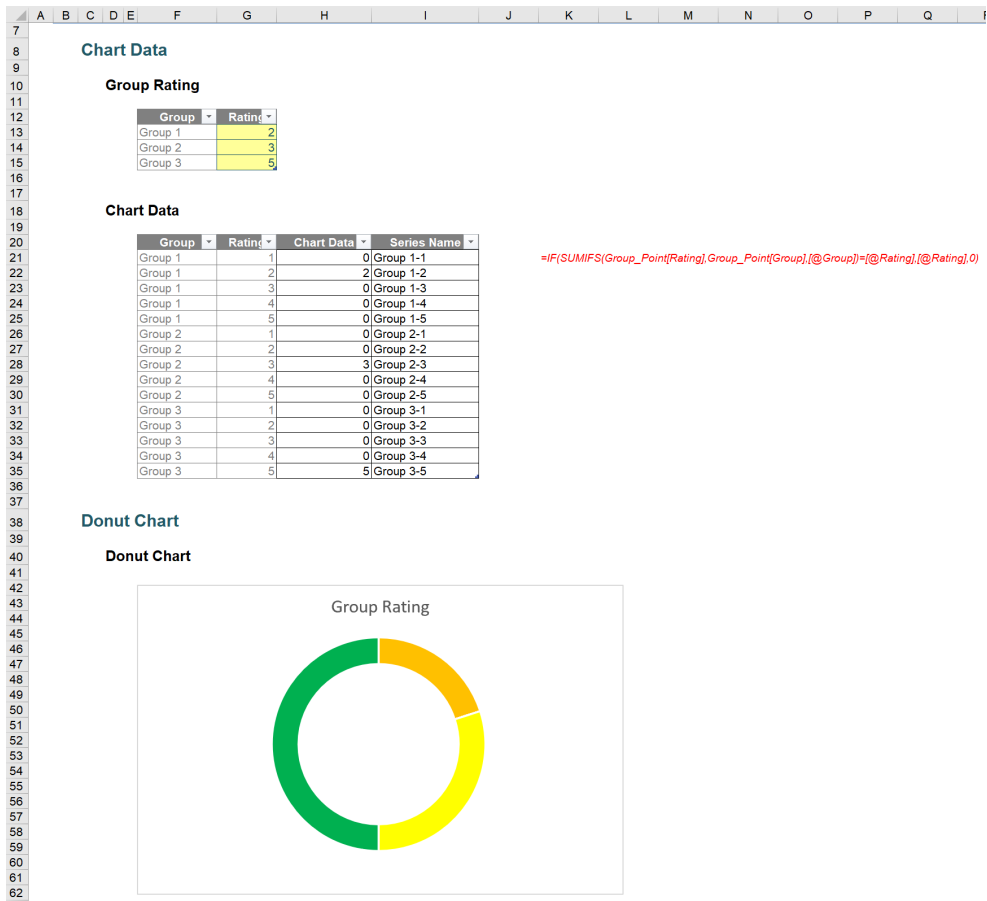
When we are finished with the colour formatting, the chart should resemble something similar to the one below:



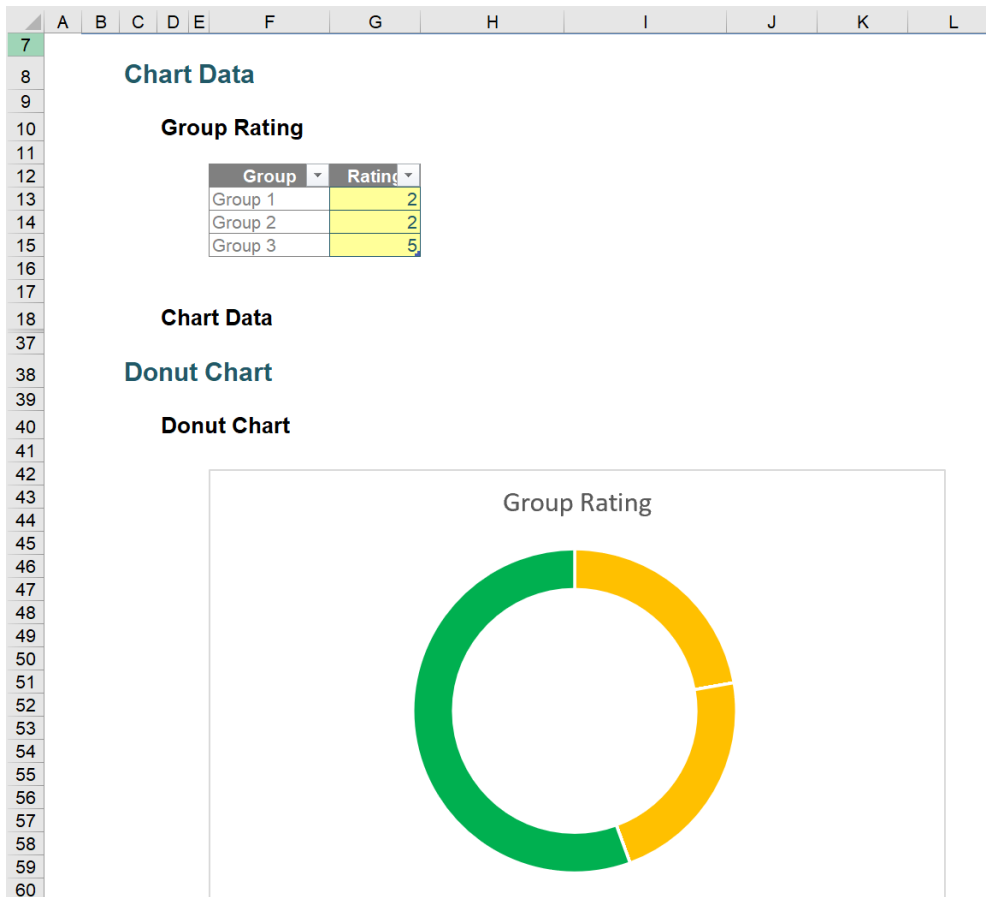
By reverting the **Chart Data** series to the initial formula

=IF(SUMIFS(Group_Point[Rating],Group_Point[Group],[@Group])=[@Rating],[@Rating],0)

we will get the Donut chart with the conditional colouring.



If we change the group rating as two, two and five for Group 1, 2 and 3 respectively, our Donut chart will show the same colour for the rating as two points for Group 1 and 2.

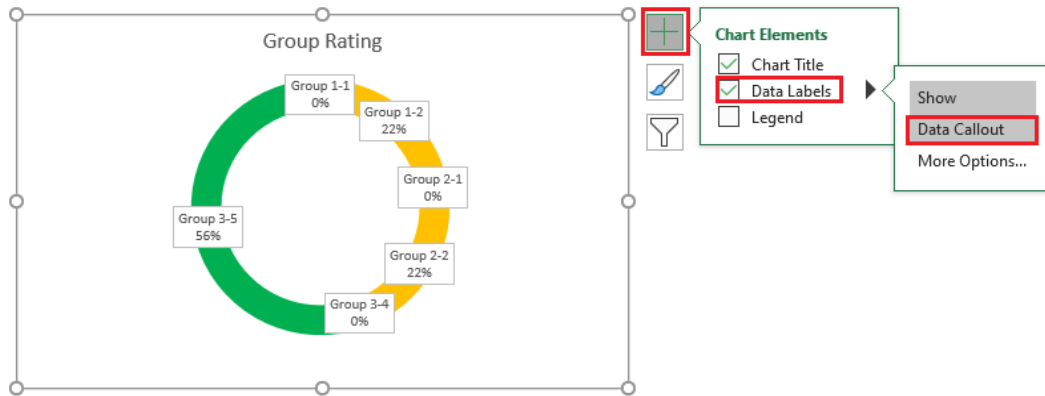


As we already removed the legend (we do not need 15!), we will need another legend or data label for our chart.

There is not much information that can be drawn from the chart, as we could not distinguish between the groups and their ratings. Hence, it's a good idea to add data labels to the chart by getting the 'Data Labels' from the 'Chart Elements' list, viz.

Donut Chart

Donut Chart



We only have three groups and their ratings, but we get more than three data labels; furthermore, the names of the group do not seem right. To fix this, we need to go back to the **Chart Data** table. First, we need to change the formula in the Chart Data column *i.e.* **H21:H35**, from

=IF(SUMIFS(Group_Point[Rating],Group_Point[Group],[@Group])=[@Rating],[@Rating],0)

to

=IF(SUMIFS(Group_Point[Rating],Group_Point[Group],[@Group])=[@Rating],[@Rating],NA())

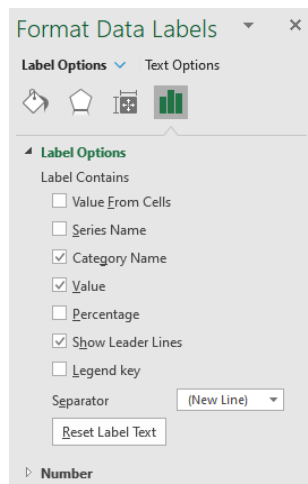
Originally, the series with the zero [0] value will still be plotted in the chart (we just cannot see it because it is zero), hence, our chart has 15 series in it. Meanwhile, the series with #N/A will not be plotted. Thus, our chart will only show three series.

Next, we change the **Series Name** column to be equal to the **Group** column. We can also use the **Group** column to draw a chart. However, the current chart is using the **Series Name** column (and I am lazy).

Group	Rating	Chart Data	Series Name
Group 1	1	#N/A	Group 1
Group 1	2	2	Group 1
Group 1	3	#N/A	Group 1
Group 1	4	#N/A	Group 1
Group 1	5	#N/A	Group 1
Group 2	1	#N/A	Group 2
Group 2	2	2	Group 2
Group 2	3	#N/A	Group 2
Group 2	4	#N/A	Group 2
Group 2	5	#N/A	Group 2
Group 3	1	#N/A	Group 3
Group 3	2	#N/A	Group 3
Group 3	3	#N/A	Group 3
Group 3	4	#N/A	Group 3
Group 3	5	5	Group 3

=IF(SUMIFS(Group_Point[Rating],Group_Point[Group],[@Group])=[@Rating],[@Rating],[@Rating],0)

Then, right-click on the data labels and choose 'Format Data Labels'. In the 'Format Data Labels' panel, under 'Label Options', tick 'Value' and choose '(New Line)' as a Separator from the drop-down list.



We now have a Donut chart which looks like the one below.

Chart Data

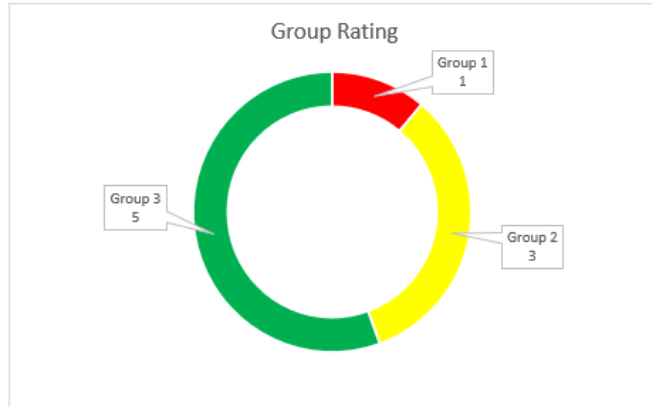
Group Rating

Group	Rating
Group 1	1
Group 2	3
Group 3	5

Chart Data

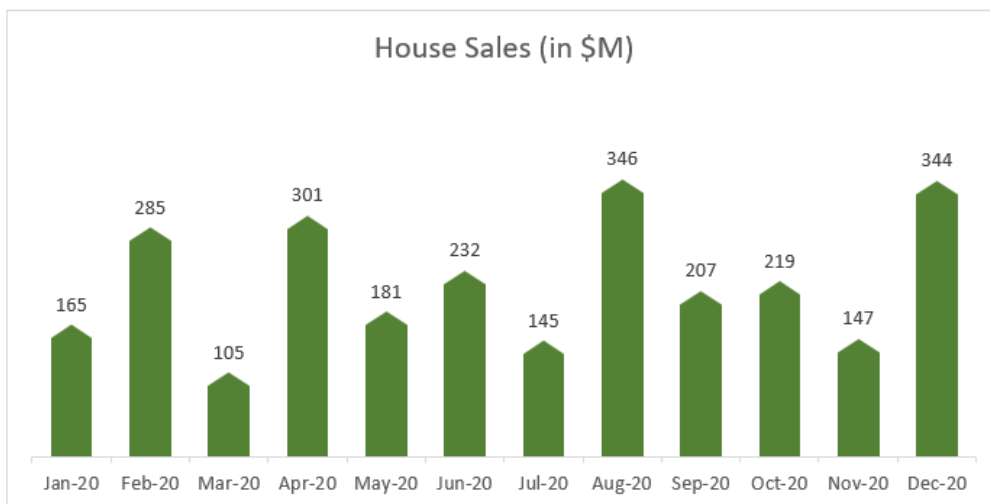
Donut Chart

Donut Chart



More next time.

Charts and Dashboards - Addendum



Last month, we discussed customising chart shapes and built the above chart. Well, we got some great feedback that we'd like to share with you. No less than the Chart Legend himself, Excel MVP **Jon Peltier**, got into touch to suggest an easier way to place totals data labels on the Stacked Column House Sales chart (*above*).

From the maestro himself:

"Place the sum of Floor and Roof into the Label Series column, then add it to the chart. Right click on any of the series and pick 'Change Series Chart Type'. Find 'Label Series' in the list, and change it to Line.

Format this line to use 'No Line' (to hide it), then add data labels above the points, using the default Values option (no need to use 'Values from Cells')".

Thanks Jon!

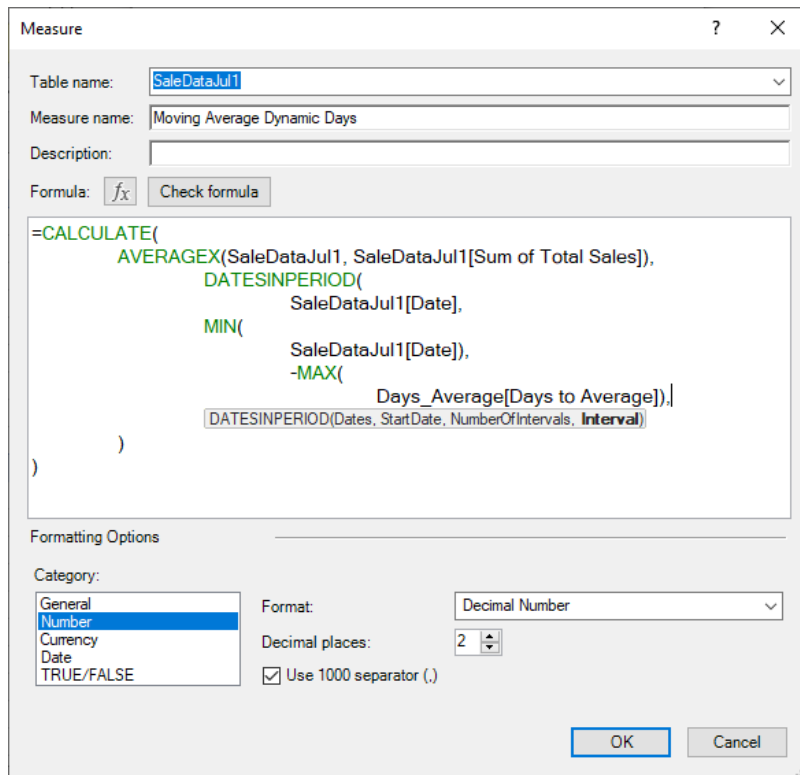
By the way, you don't need to be an Excel MVP to leave feedback for *any* article here. We value any improvements / suggestions from anywhere and everywhere. If you have something to say, drop us a line at contact@sumproduct.com.

Power Pivot Principles

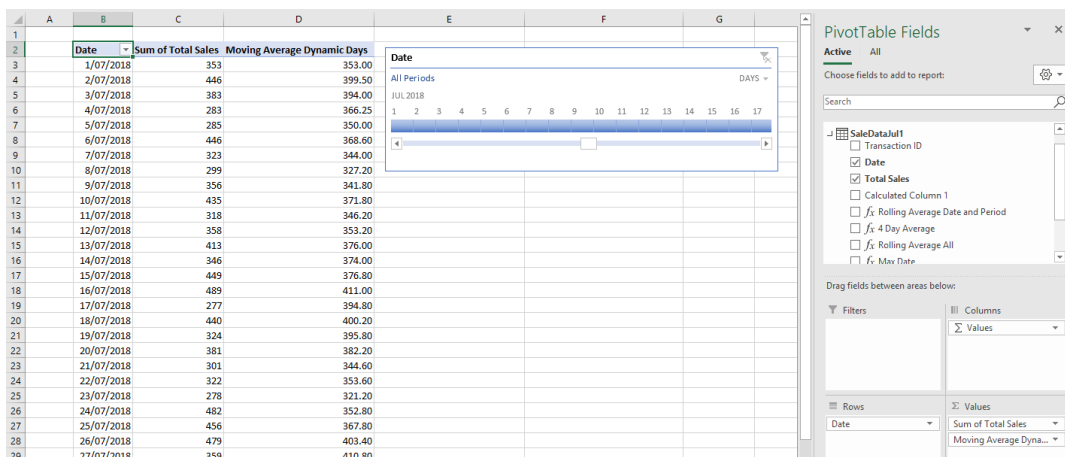
We continue our series on the Excel COM add-in, Power Pivot. This month, continue the rolling average concept, first introduced in last month's newsletter, and show you how to include a dynamic period selection range in a rolling average measure.

Last month, we talked about creating a dynamic average range for a measure. As a recap, we used this measure to include a dynamic selection for the average range:

```
=CALCULATE(
    AVERAGEX(SaleDataJul1, SaleDataJul1[Sum of Total Sales]),
    DATESINPERIOD(
        SaleDataJul1[Date],
        MIN(
            SaleDataJul1[Date]),
        -MAX(
            Days_Average[Days to Average]),
        DAY
    )
)
```



What if we also had to build in the ability to select the date range for our rolling average? The first thing one would think of is to create a timeline slicer for our PivotTable:



This should allow us to select different dates on the slicer filters of our PivotTable. However, our measure ignores the date filter and returns with the same moving average values:

	A	B	C	D	E	F	G
1							
2		Date	Sum of Total Sales	Moving Average Dynamic Days			
3		2/07/2018	446	399.50			
4		3/07/2018	383	394.00			
5		4/07/2018	283	366.25			
6		5/07/2018	285	350.00			
7		6/07/2018	446	368.60			
8		7/07/2018	323	344.00			
9		8/07/2018	299	327.20			
10		Grand Total	2465	399.50			
11							

We want the measure to calculate the rolling average starting from the first date in our date selection. We use the **FILTER** and **ALLSELECTED** functions to create a new measure that will incorporate date selection ranges into the rolling average calculation as follows:

```
=CALCULATE(
    AVERAGE(SaleDataJul1[Total Sales]),
    FILTER(
        ALLSELECTED(SaleDataJul1),
        SaleDataJul1[Date] > MAX(SaleDataJul1[Date]) - MAX(Days_Average[Days to Average]) &&
        SaleDataJul1[Date] <= MAX(SaleDataJul1[Date])
    )
)
```

Measure configuration dialog box showing the following details:

- Table name: SaleDataJul1
- Measure name: Rolling Average Date and Period
- Description: (empty)
- Formula: `=CALCULATE(AVERAGE(SaleDataJul1[Total Sales]), FILTER(ALLSELECTED(SaleDataJul1), SaleDataJul1[Date] > MAX(SaleDataJul1[Date]) - MAX(Days_Average[Days to Average]) && SaleDataJul1[Date] <= MAX(SaleDataJul1[Date])))`
- Formatting Options:
 - Category: Number
 - Format: Decimal Number
 - Decimal places: 2
 - Use 1000 separator (,):

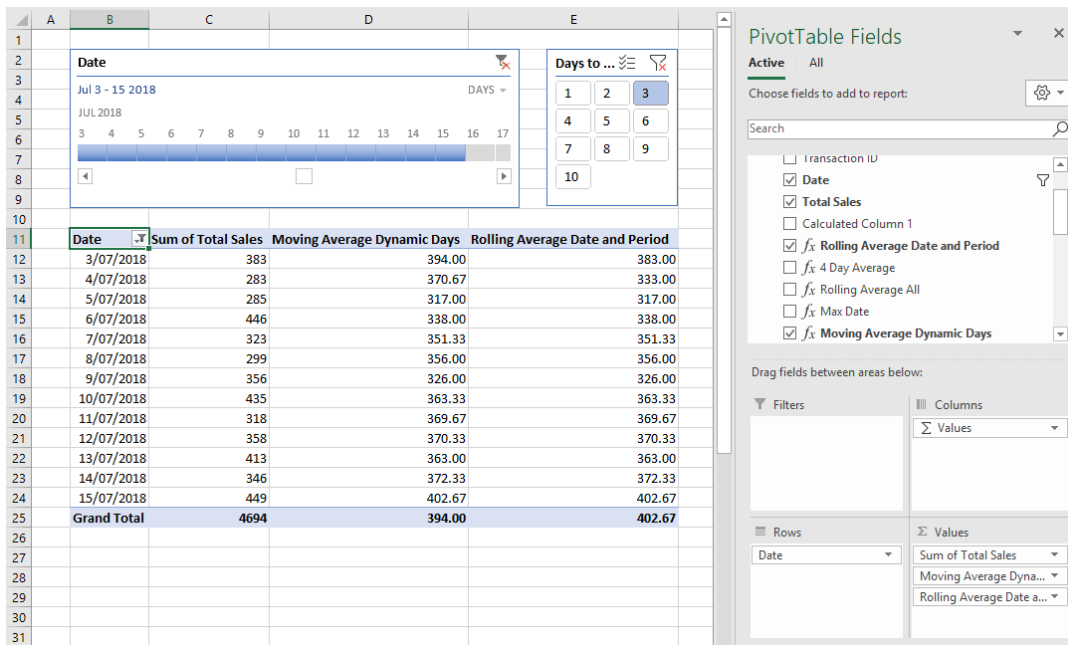
In this measure we use the filter in the **CALCULATE** function, so we do not need to use the **AVERAGEX** function. The filter expression in this measure is a combination of two criteria combined with a double ampersand delimiter “&&” (the “and” operator). The first criterion

SaleDataJul1[Date] > MAX(SaleDataJul1[Date]) - MAX(Days_Average[Days to Average])

considers the later range of dates to average, less the number of days to the average from our input. The second criterion

SaleDataJul1[Date] <= MAX(SaleDataJul1[Date])

assesses the earlier range of dates to include in the average. With these two criteria combined the measure is able to take in the inputs of our **Date** slicer and our **Days to Average** slicer to calculate our rolling average:



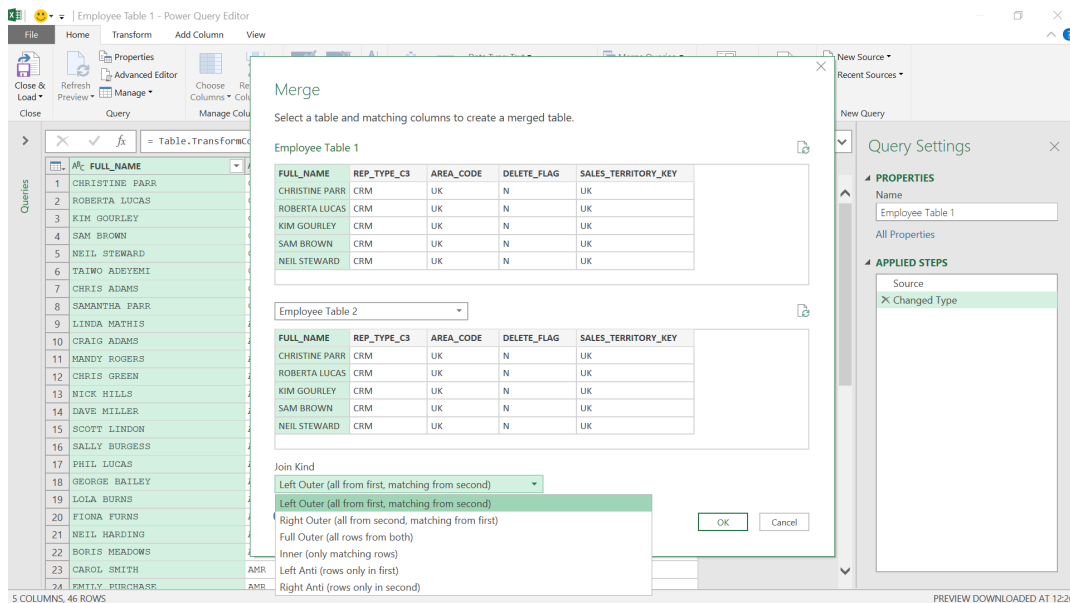
There we have it: a dynamic rolling average measure that can take inputs from both a date range to average and the number of days to average. That's it for this month; more next time.

Power Query Pointers

Each month we'll reproduce one of our articles on Power Query (Excel 2010 and 2013) / Get & Transform (Office 365, Excel 2016 and 2019) from www.sumproduct.com/blog. If you wish to read more in the meantime, simply check out our Blog section each Wednesday. This month, we consider bridge (bridging) tables.

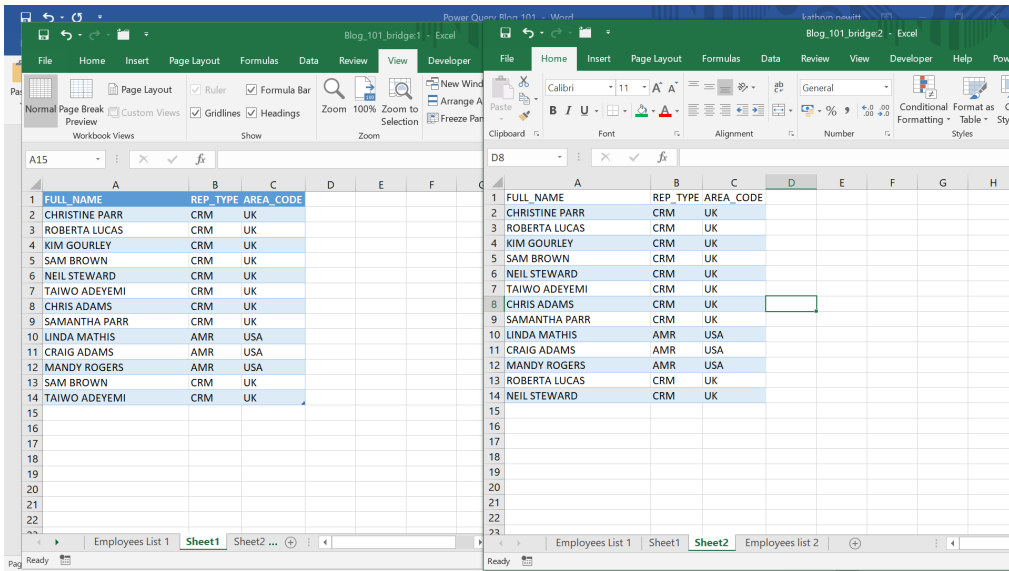
This month we shall consider how to construct and use a bridge (sometimes known as a bridging) table. This does not mean we've taken up playing cards; this kind of bridge table can also be called an intermediate table, and it allows us to create a 'many to many' join.

Previously, we have looked at using different types of joins in order to see what was missing from two similar looking tables.

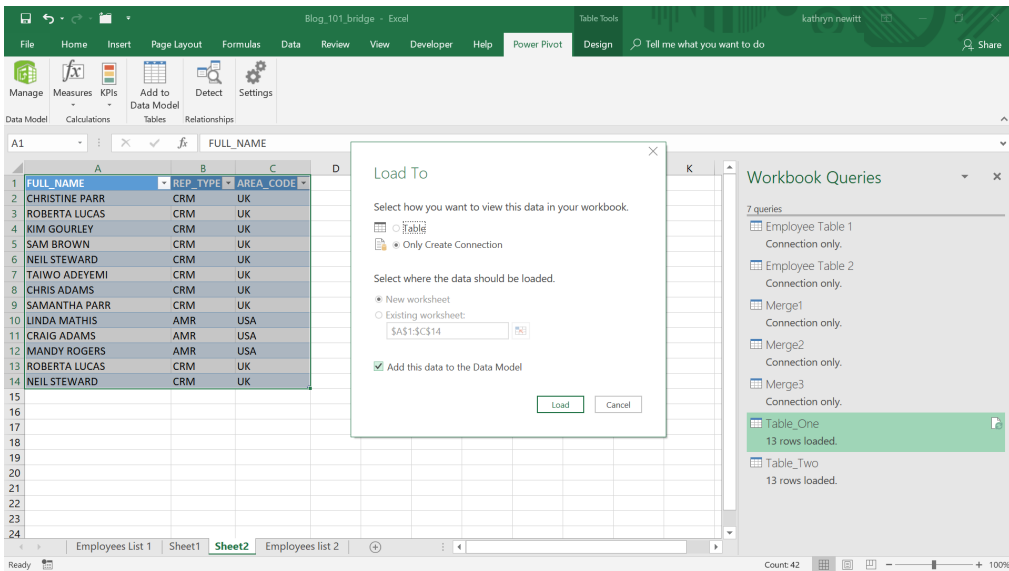


The screenshot above shows the data we used previously and the join options available. Whilst we may happily merge these queries in Power Query, once we upload their product to the data model, we encounter problems joining our two queries if they have duplicate entries, as will now be shown.

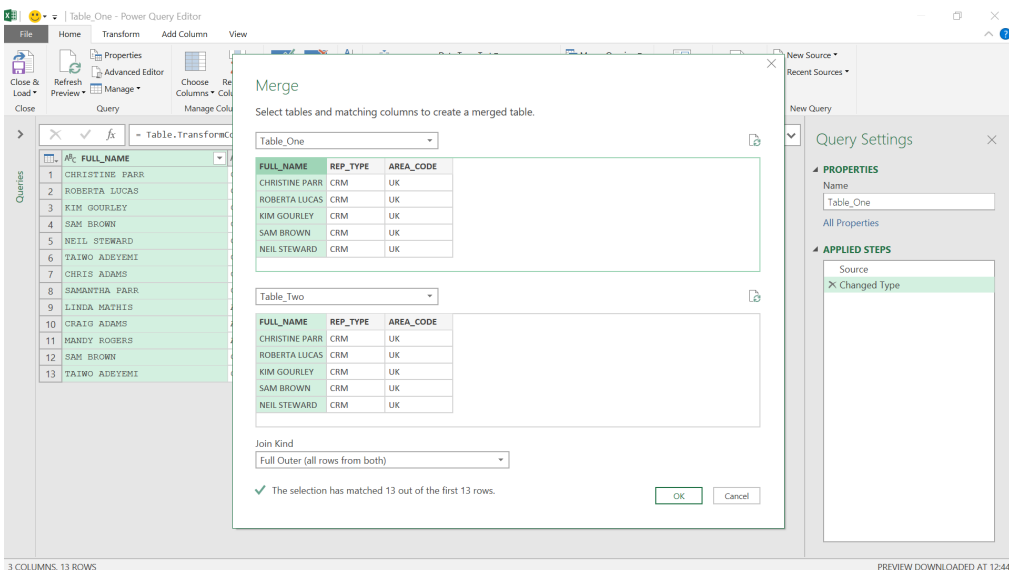
In order to look at 'many to many' joins in the data model and how to achieve them with Power Query, let's create two simple subsets of this data.



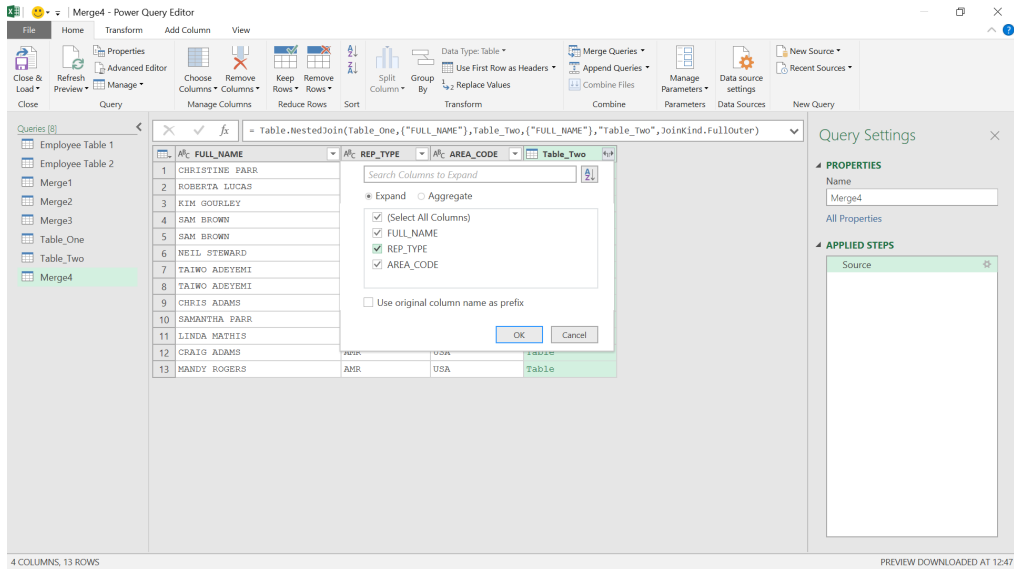
We create queries for each of these tables by using the 'From Table' option on the 'Get and Transform' section of the 'Data' tab. Let's create the queries as 'Connection Only' and add them to the Data Model. This may be done at any time by right-clicking on the query and choosing 'Load to':



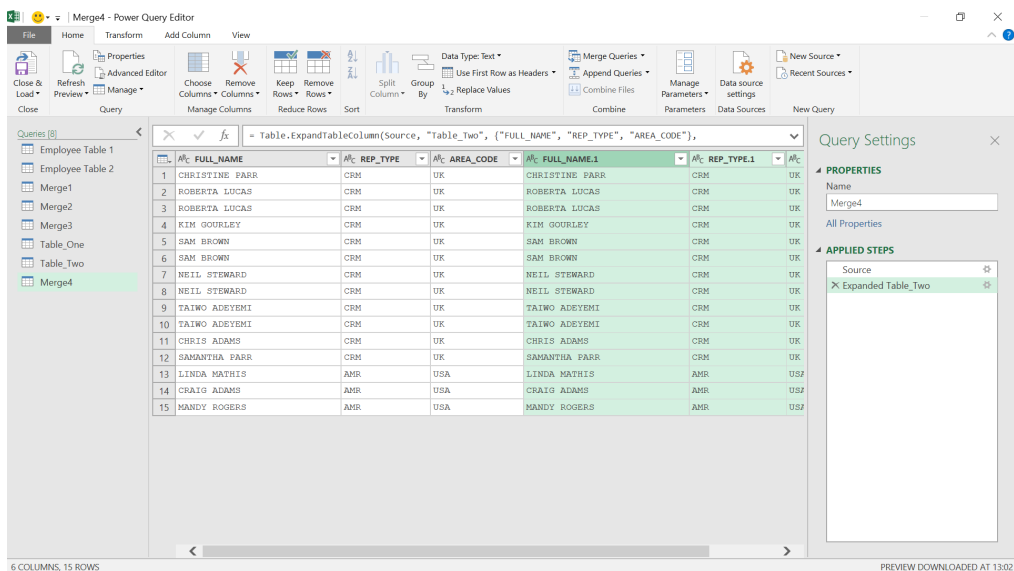
We then merge the queries.



We will choose the 'Full Outer' join, which should include all rows from both.

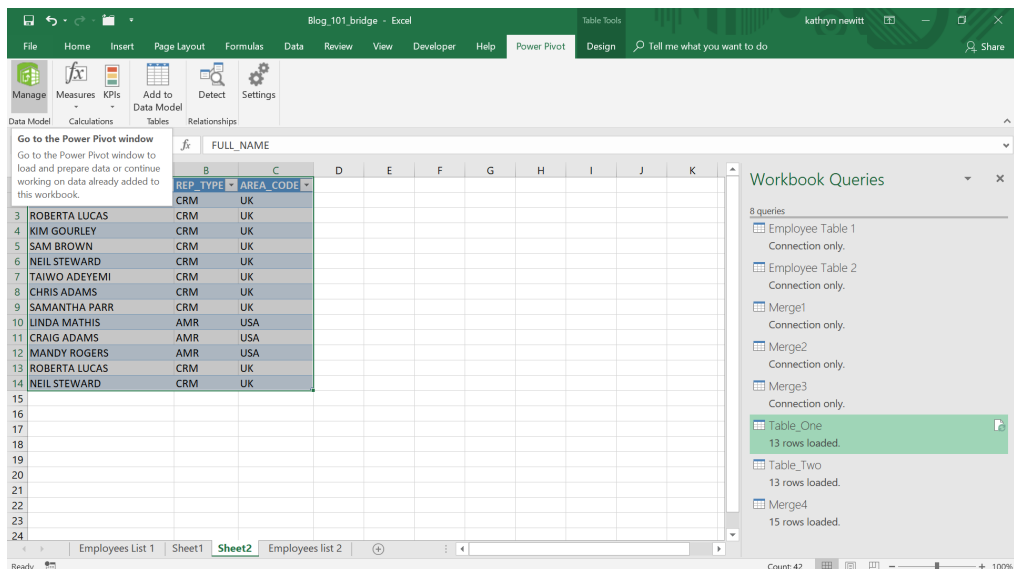


The first table rows are shown, and we can expand the final column to see the data from the second table.

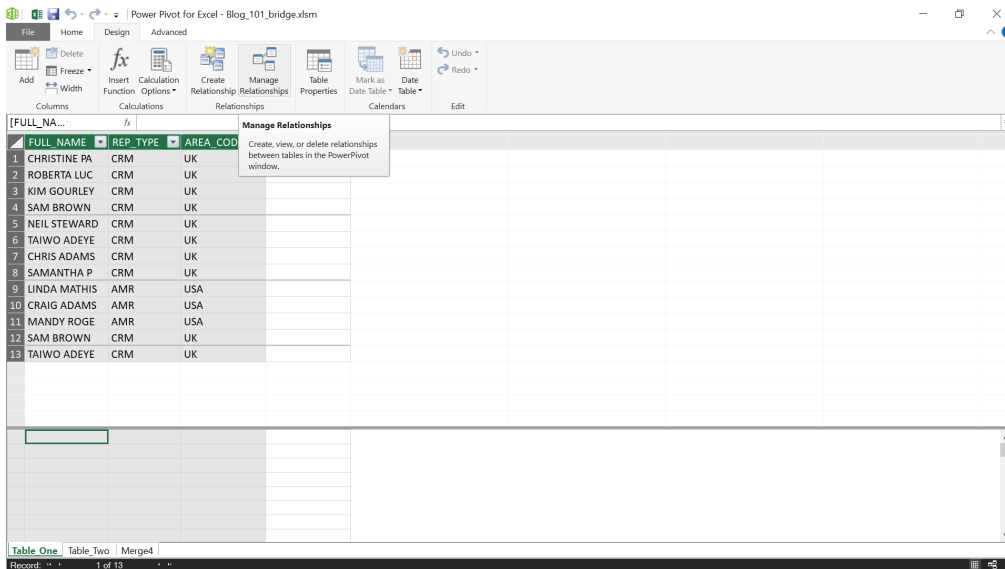


We have all 15 rows.

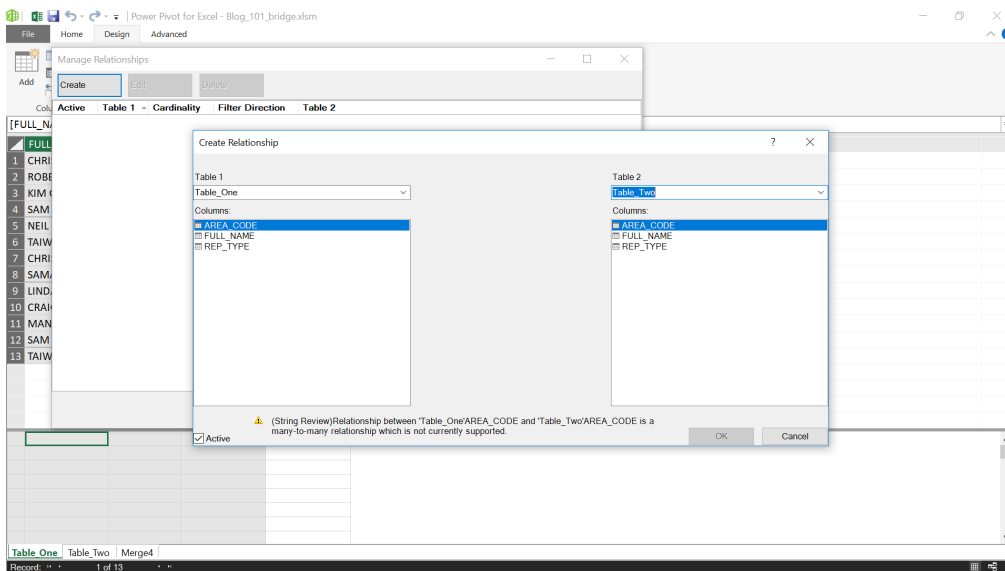
Now we will check what happens when we link 'Table_One' to 'Table_Two' in the Data Model. This will involve a small excursion into Power Pivot!



In the 'Power Pivot' tab, we shall select 'Manage' to enter the Data Model from the 'Power Pivot' tab.

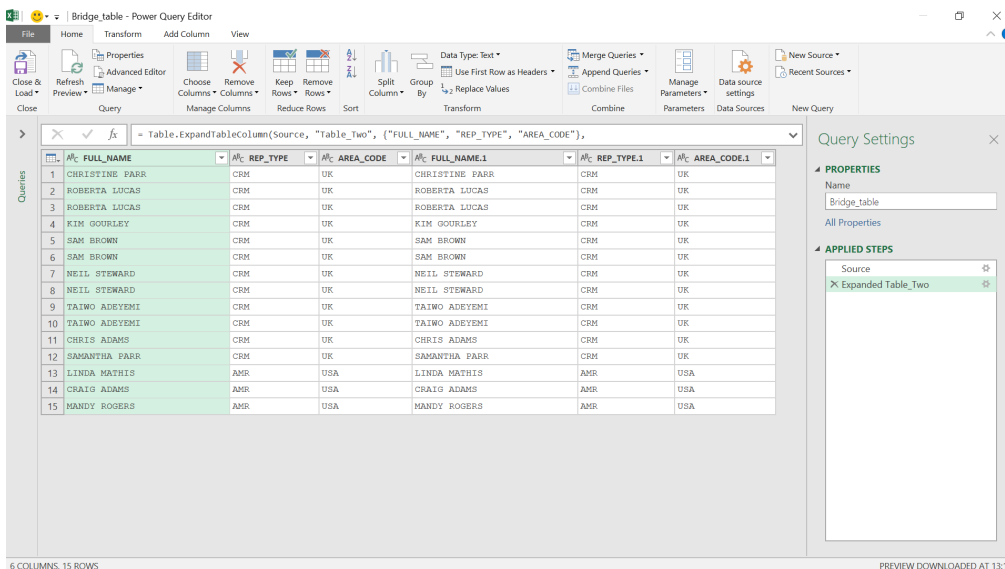


In the Power Pivot window, if we choose the 'Design' tab, we may 'Manage Relationships', viz.

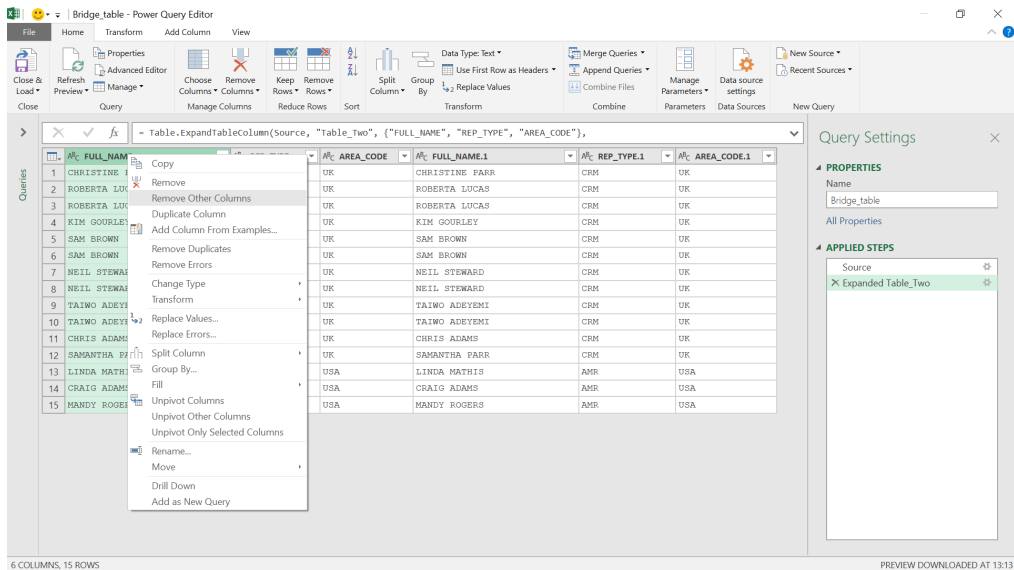


When we try to link 'Table_One' to 'Table_Two' we get the message that it is a 'many to many' relationship, and therefore is not currently supported. We need to create a **bridge table** between 'Table_One' and

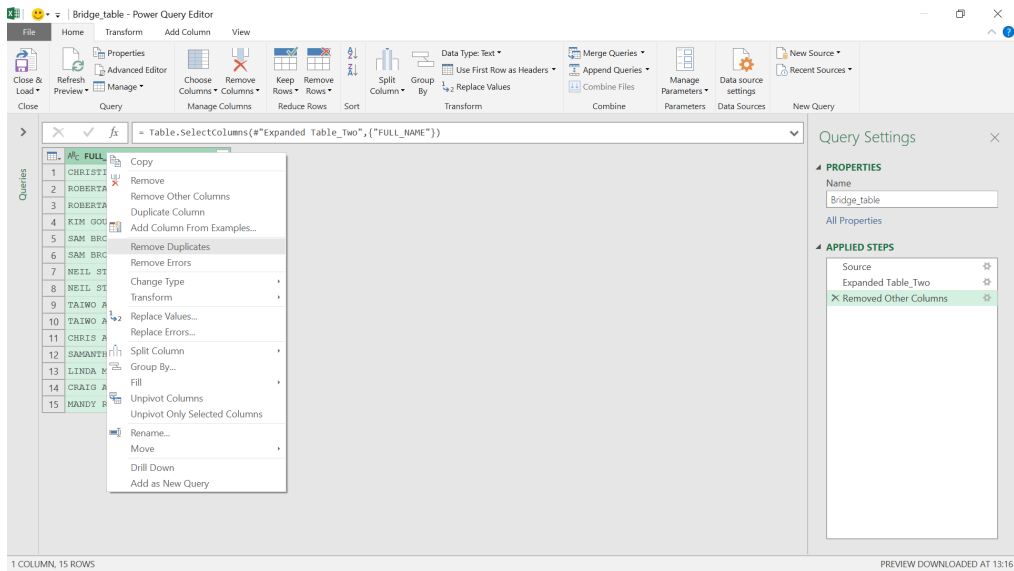
'Table_Two' so that we may join them. Our bridge table will contain unique entries of all the data in 'Table_One' and 'Table_Two', so we can build it from our merged table, currently called '**Merge4**'.



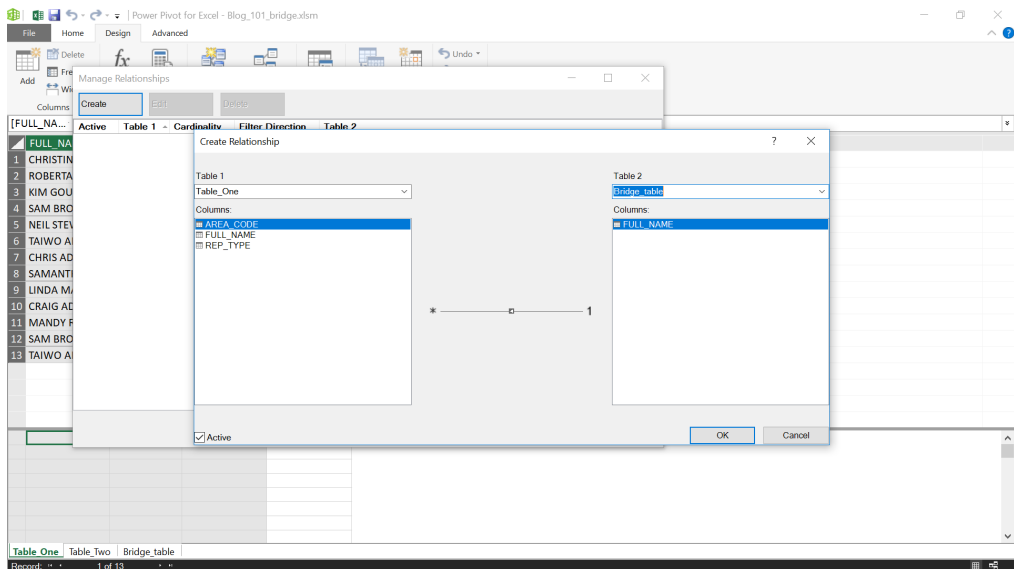
We rename the table 'Bridge_table'. We need to clean it up, as we only need a list of unique full names. We'll delete all the other columns by selecting the FULL_NAME column and choosing to 'Remove Other Columns'.



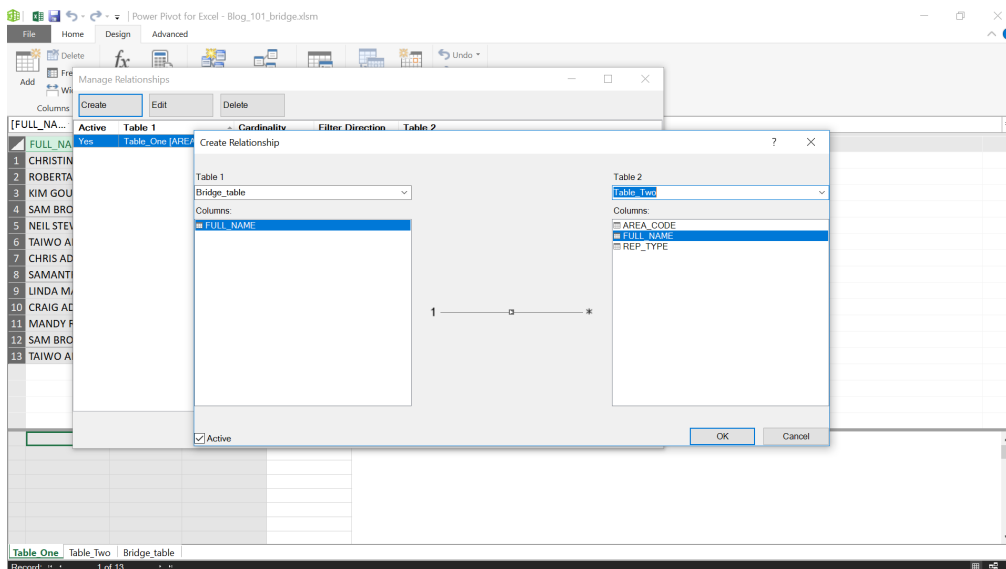
This gives us one column, and right-clicking again, we can select to 'Remove Duplicates'.



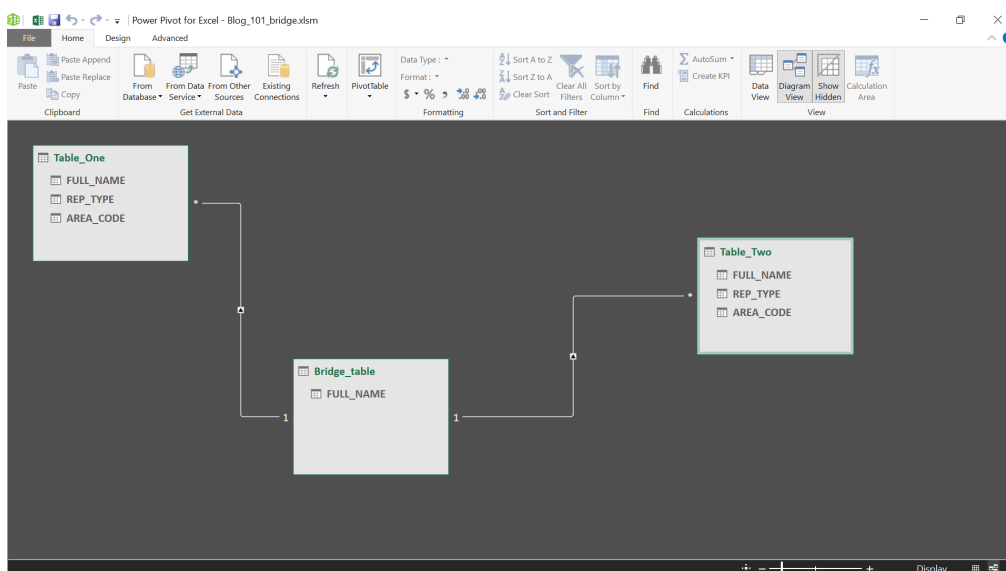
We now have a unique list of names which we may use as a bridge table. Back in the Power Pivot window, we'll link 'Table_One' to the bridge table.



This is fine as it is a 'many to one' relationship.



We'll also create a relationship between the bridge table and 'Table_Two'. This is a 'one to many' relationship.



Looking at the 'Diagram View' from the 'Home' tab in the PowerPivot window, we can see that the two tables are now connected via the bridge table. Slicing or filtering on this intermediate, bridge table will affect both dependent tables. This is a common technique employed in relational databases and if you have never encountered this before, once you start using this technique, you'll wonder how you ever got by without it.

Until next month.

Power BI Updates

The Power BI updates continue unabated. Quick Measure Suggestions with Copilot has been replaced with Microsoft Fabric Copilot, and there is also an update with Azure Map – Data Bound Reference Layers, plus a preview of the New List Slicer.

The full list of updates is as follows:

Copilot and AI

- Enhanced Power BI report creation with Copilot (Preview)
- Quick Measure Suggestions with Copilot to be replaced with Microsoft Fabric Copilot

Reporting

- Visual calculations update (Preview)
- Azure Map update: data bound reference layers
- Marker enhancements
- New List Slicer (Preview)
- Power BI in Teams: announcing the retirement of the 'Teams activity analytics' report

Modelling

- Dynamic format strings for measures (Generally Available)
- Introducing **INFO.VIEW** Data Analysis eXpressions (**DAX**) functions
- Value filter behaviour (Preview)

Data Connectivity

- Snowflake connector updates

Mobile

- Power BI Mobile applications will no longer connect to Report Server using OAuth and AD FS 2016

Visualisations

- New visuals in AppSource
- Date Picker by Powerviz
- Cycle Plot by Nova Silva
- Drill Down Network PRO by ZoomCharts
- Decomposition Tree – All Expanding
- EDI Table for reference / master data management with approval workflow, audit and governance
- ADWISE Advanced Column v1.0

Developers

- Power BI enhanced report format (PBIR) update (Preview)

Let's look at each in turn.

Enhanced Power BI report creation with Copilot (Preview)

Improvements have been made to the page creation capability in Power BI with Copilot. These updates are designed to make the user experience clearer and more transparent.

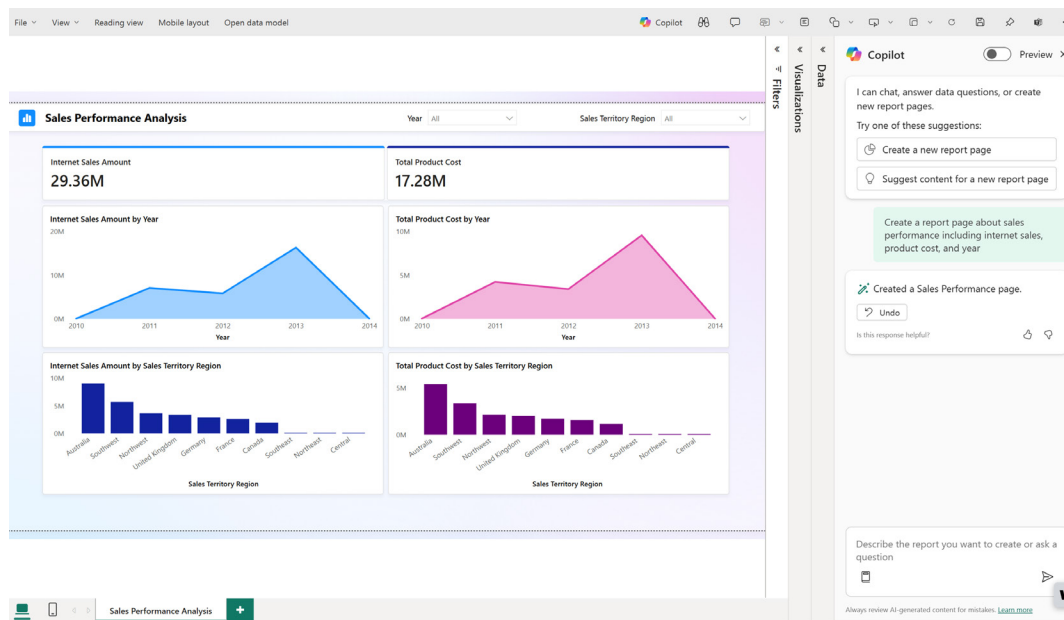
INCREASED CLARITY AND CONTEXTUAL AWARENESS

To help build reports, Copilot can now engage with users to gather more details before creating a page. This ensures that Copilot has a comprehensive understanding of your needs right from the start to create a more relevant page for you. Copilot can also offer recommendations on fields and measures to use in a report.

PAGE OUTLINE AND INCREASING TRANSPARENCY

After creating a page with Copilot, you'll now see an outline in the Copilot chat pane. This allows you to review the content and ensure that the page meets your requirements. The outline also helps add transparency so users can see what data fields Copilot is using to build out the report.

USING COPILOT



You need to select a compatible workspace that you have write access to. It needs to be a workspace that's assigned to a Copilot-enabled capacity, in other words, a paid Fabric capacity (F64 or higher) or a Power BI Premium capacity (P1 or higher). In particular:

- your administrator needs to enable Copilot in Microsoft Fabric
- your F64 or P1 capacity needs to be in one of the regions below; if it isn't, you can't use Copilot

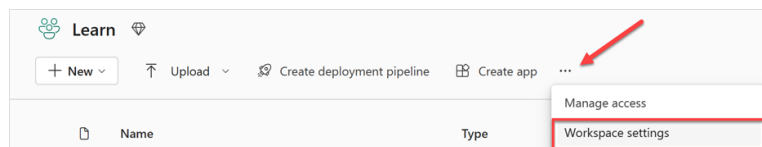
Africa	Americas	Asia Pacific	Europe	Middle East
South Africa North	Brazil South	Australia East	France Central	UAE North
	Canada Central	Australia South East	Germany West Central	
	Canada East	Central India	Italy North	
	Central US	East Asia	North Europe	
	East US	Japan East	Norway East	
	East US 2	Korea Central	Poland Central	
	North Central US	South East Asia	Sweden Central	
	South Central US	South India	Switzerland North	
	West US		Switzerland West	
	West US 2		UK South	
	West US 3		UK West	
			West Europe	

- your administrator needs to enable the tenant switch before you start using Copilot. See the article Copilot tenant settings for details
- if your tenant or capacity is outside the US or France, Copilot is disabled by default unless your Fabric tenant admin enables the Data sent to Azure OpenAI can be processed outside your tenant's geographic region, compliance boundary, or national cloud instance tenant setting in the Fabric Admin portal
- Copilot in Microsoft Fabric isn't supported on trial SKUs. Only paid SKUs (F64 or higher, or P1 or higher) are supported.

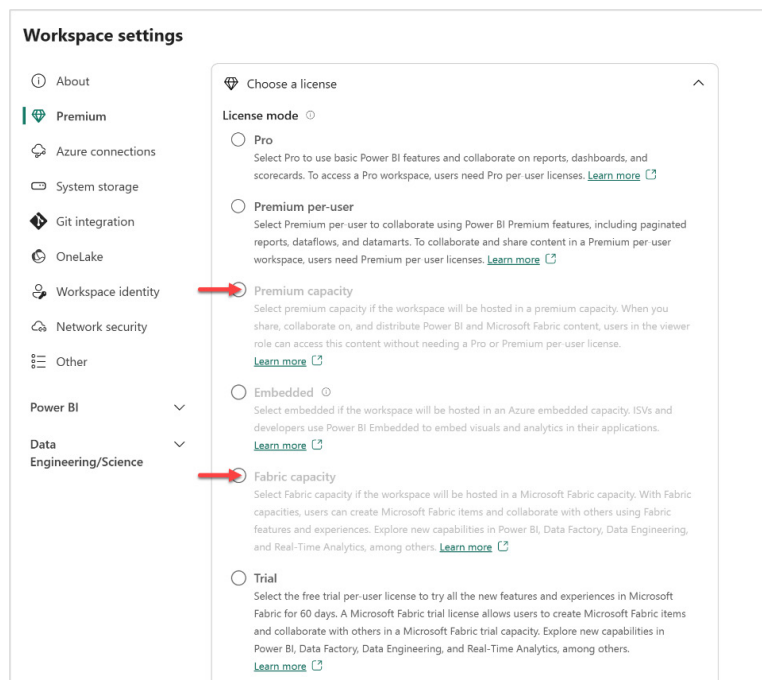
To use Copilot in the Power BI Service, you will need to ensure that reports are located in a workspace in the right capacity. The workspace must be in either Premium Power BI (P1 and above) or paid Fabric (F64 and above) capacity.

Check your license type in the Workspace settings:

- Select More to navigate to the Workspace settings



- Apply either 'Premium capacity' or 'Fabric capacity' to the workspace and use the 'X' to exit workspace settings

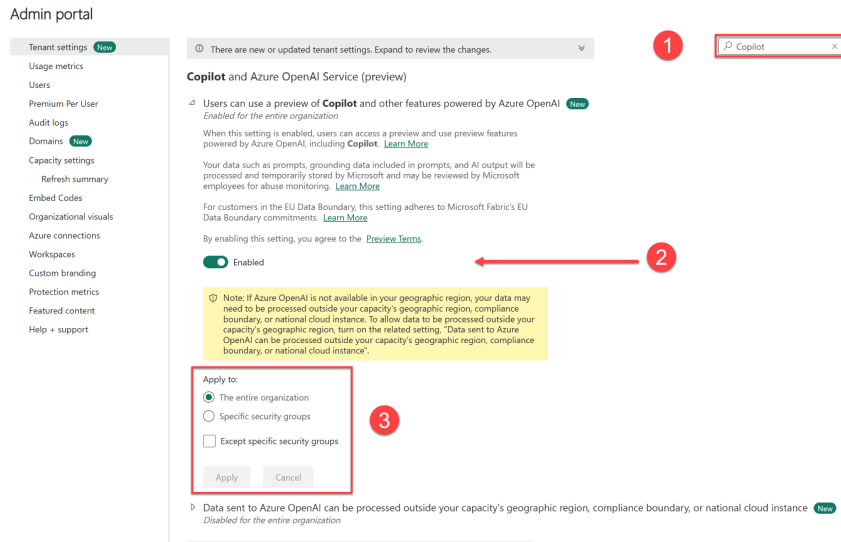


You can see which license mode is applied to your workspace under Premium. If License modes are greyed out, this workspace doesn't have access to the appropriate capacity

- Now you're ready to create a report with Copilot in the Power BI Service.

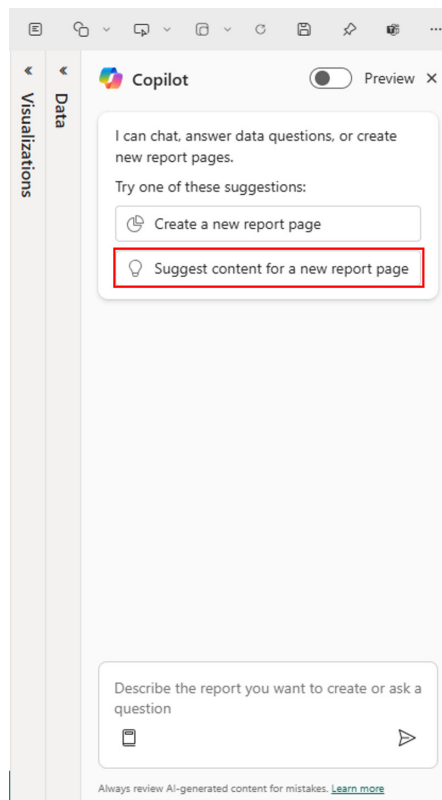
To see the Copilot button in your report, you first need to select a semantic model.

- If this is your first time using Copilot in the Power BI Service, check the Admin portal:

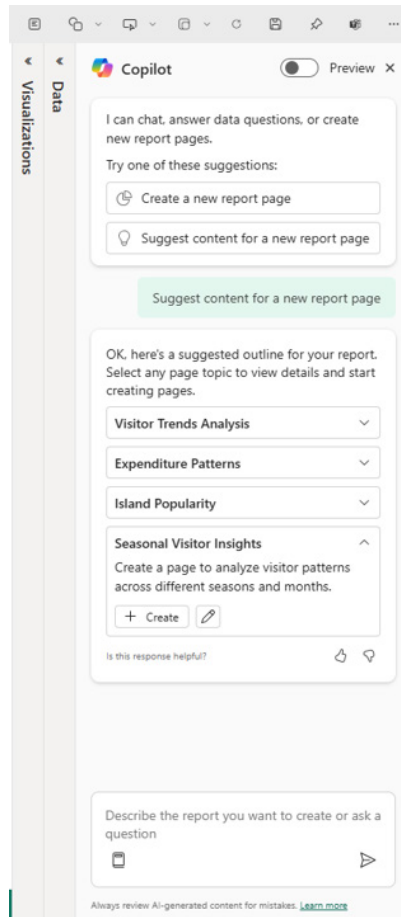


- Use the search bar (or scroll) to find the 'Copilot and Azure OpenAI Service (Preview)' settings
- Toggle the switch to the on position
- Specify who can access Copilot in Fabric; select 'Apply' to save your changes.

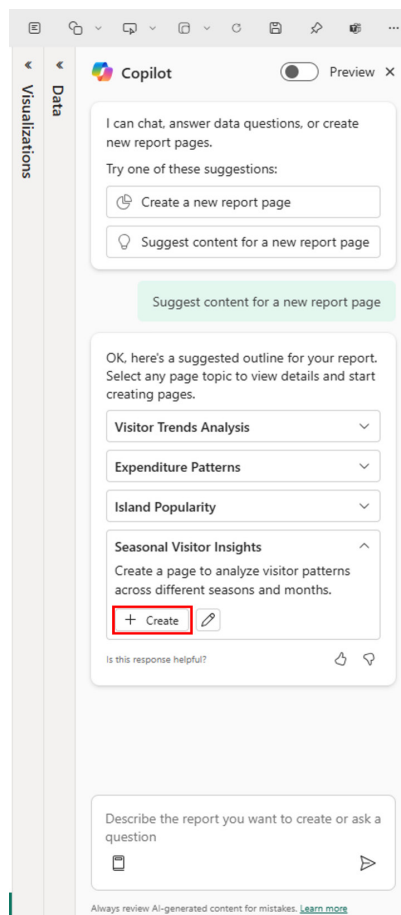
- Select the Data hub, then select 'More options' (...) for the dataset you want to explore, and then 'Create report'
- In the Ribbon, select the Copilot icon. If you don't see Copilot, your administrators may not have enabled it in Microsoft Fabric or you may not have selected a semantic model. Select a semantic model to see it
- In the Copilot pane, select 'Suggest content for this report'. Copilot evaluates the data and makes suggestions:



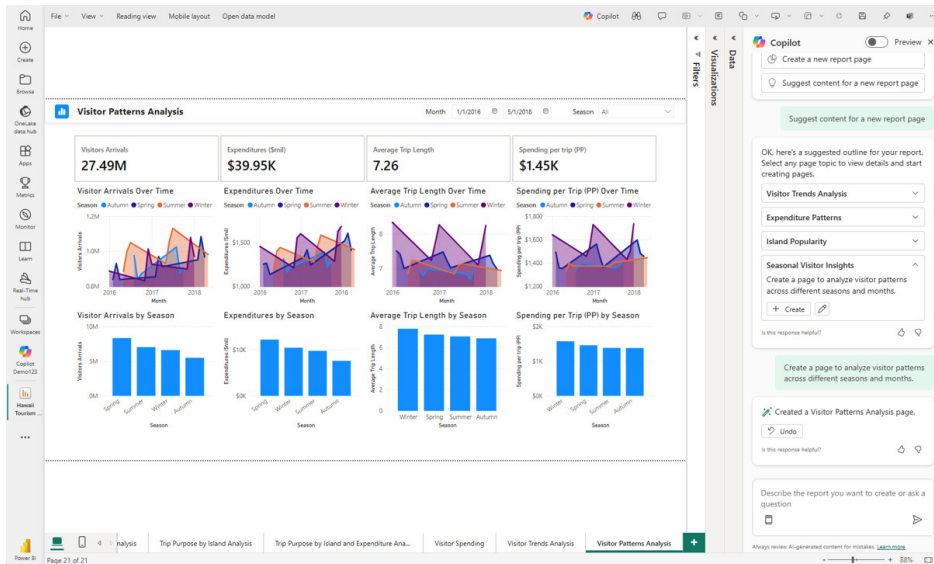
- Copilot suggests possible pages for your report



- Select 'Create' next to the first page you want Copilot to create



- Copilot creates that page



- Continue creating the pages that Copilot suggests. Otherwise, select 'Create a report that shows' and provide guidance on what you want in the report.

You can also use Copilot for Power BI to create a narrative summary with just a few clicks. This narrative can summarise the entire report, specific pages or even specific visuals.

After Copilot generates the page, then you can review it. You have the option to start over by selecting the Undo button. If you select the Undo button, Copilot starts over. The content on the page is removed and

you start over with topic selection by either generating new topics or selecting the one from the top, when you first started.

When you're satisfied with the report, you save the report just like any other report. If you close and reopen the report that Copilot generated in the Power BI Service, the report is in Reading view and you don't see Copilot. Simply select Edit to see the Copilot button again.

There are limitations related to creating pages in specific semantic model scenarios:

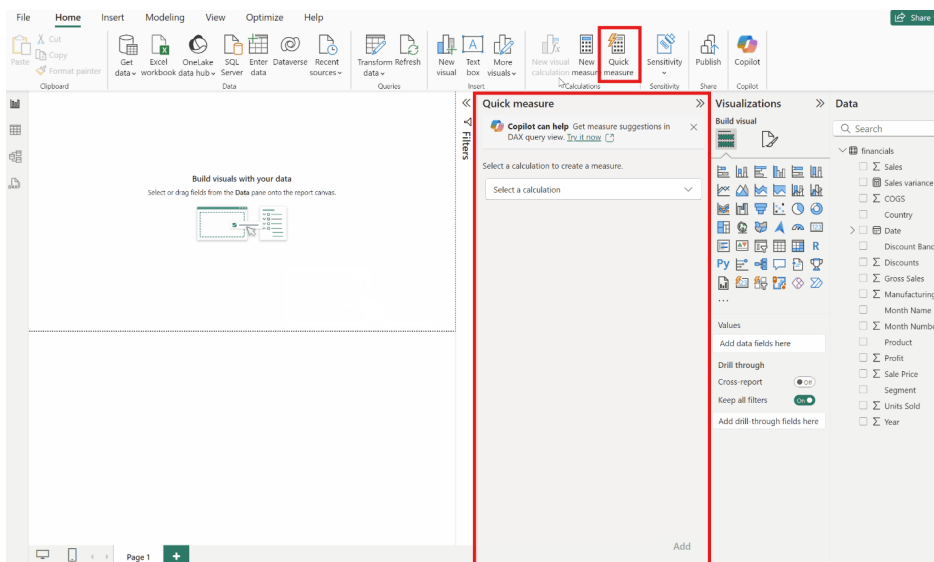
- **Real-Time Streaming Models:** report pages can't be created by Copilot for semantic models utilising real-time streaming
- **Live Connection to Analysis Services:** semantic models connected live to Analysis Services aren't supported by page creation
- **Semantic models with implicit measures disabled:** in scenarios where implicit measures are disabled in your semantic model, Copilot cannot create report pages.

Quick Measure Suggestions with Copilot to be replaced with Microsoft Fabric Copilot

The 'Quick Measure Suggestions with Copilot' feature is no longer available in public Preview. To continue to use natural language to write DAX formulae for measures, Microsoft Fabric Copilot in DAX query view can help you write DAX queries, which can include query-scoped measures that can be added to your model.

'Quick measures' will continue to let you choose a calculation from a list and create a measure using a drag-and-drop template, generating

the DAX formula upon clicking 'Add'. You can see and modify these measures in the DAX formula bar. 'Quick Measure Suggestions' public Preview introduced quick queries as a pane, allowing you to drag-and-drop from the Data pane instead of within a dialog. The quick measures will continue to be in the 'Quick measures' pane, but the dialog experience will no longer be available.

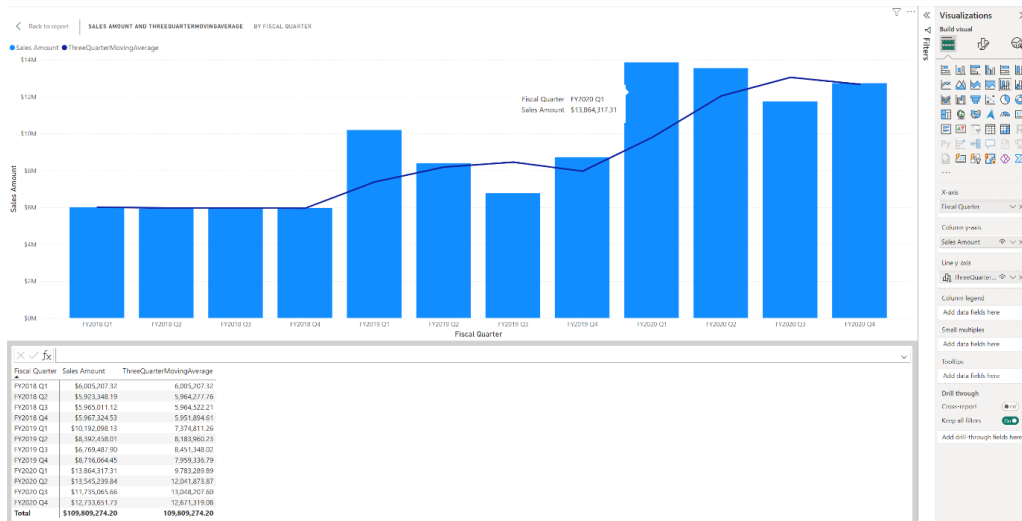


Starting last month (October 2024), the tenant setting for this feature will also no longer be available. Users who have older versions of Power BI Desktop and have the public Preview switch enabled will see the feature as disabled.

Visual calculations update (Preview)

COMBINATION (“COMBO”) CHARTS ARE NOW SUPPORTED

You can now use visual calculations in Combo charts, such as the Line and Clustered Column chart, just like you could in the other chart types. For example, here is a visual calculation returning the moving average over three quarters:



The visual calculation used here on the Line y-axis is:

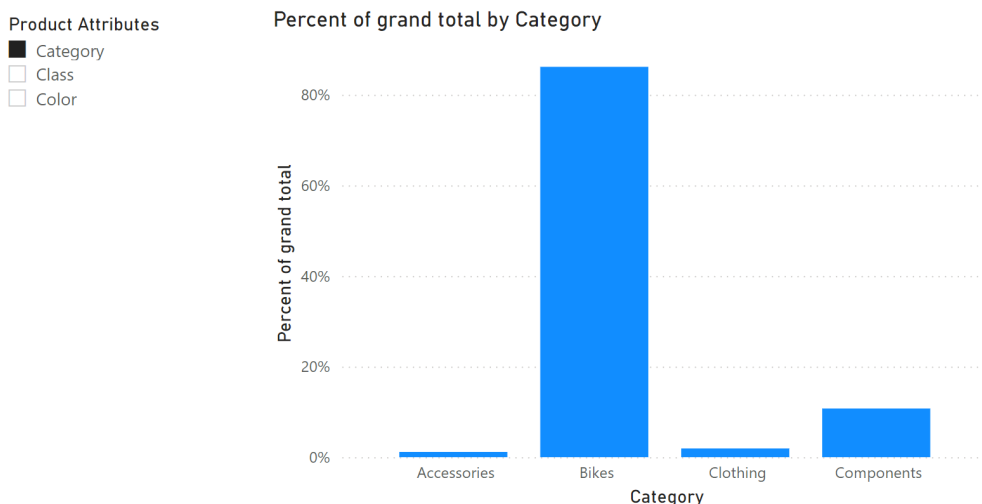
$$\text{ThreeQuarterMovingAverage} = \text{MOVINGAVERAGE}([\text{Sales Amount}], 3)$$

FIELD PARAMETERS ARE NOW SUPPORTED

This month, Power BI has enabled the use of visual calculations with field parameters. You may now add a visual calculation to a visual that contains a field parameter and vice versa.

Field parameters may be used to quickly switch around what is shown in

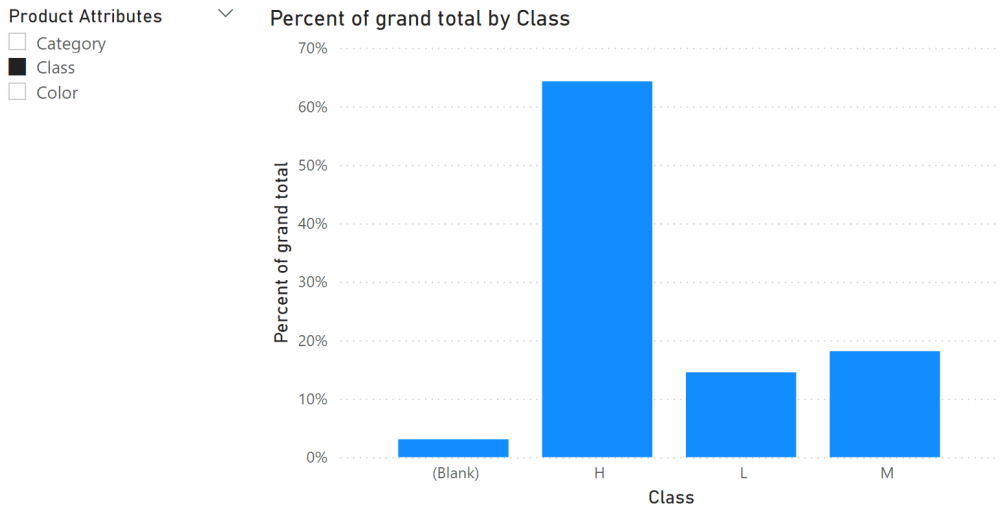
a visual. For example, you can create a field parameter to enable your users to decide which attributes of a dimension to show. In this example, a field parameter called **Product Attribute** can be used to determine what the 'Percent of grand total' visual calculation returns:



The Percent of grand total visual calculation is defined using the template as:

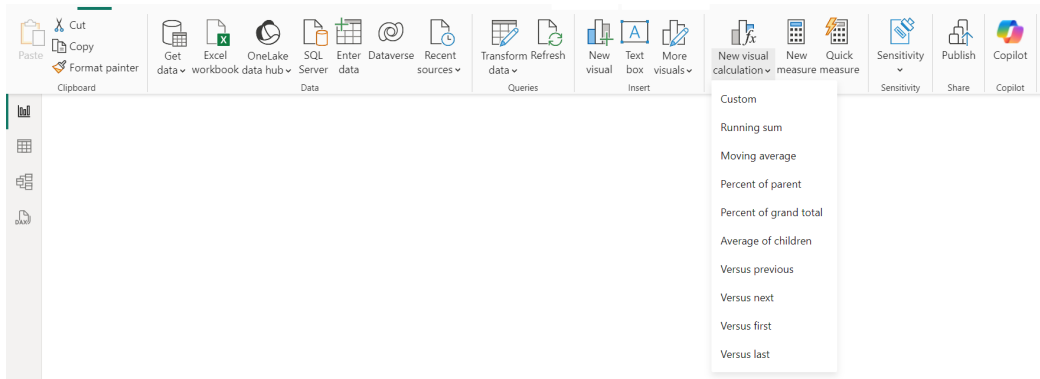
$$\text{Percent of grand total} = \text{DIVIDE}([\text{Sales Amount}], \text{COLLAPSEALL}([\text{Sales Amount}], \text{ROWS}))$$

Since the Percent of grand total visual calculation used here refers to **ROWS** as its axis, it will update and reflect the correct values when another product attribute is picked:



FASTER WAY TO ADD A TEMPLATED VISUAL CALCULATION

You may now add a templated visual calculation with fewer clicks by clicking on the bottom part of the 'New visual calculation' Ribbon button to see a menu that includes the templates. Clicking on a template will open the visual calculation mode, where you may fill in the template and add your visual calculation.



If you want to create a new visual calculation without using a template, either select the top part of the 'New visual calculation' button or choose 'Custom' from the 'Visual calculation' template menu shown above.

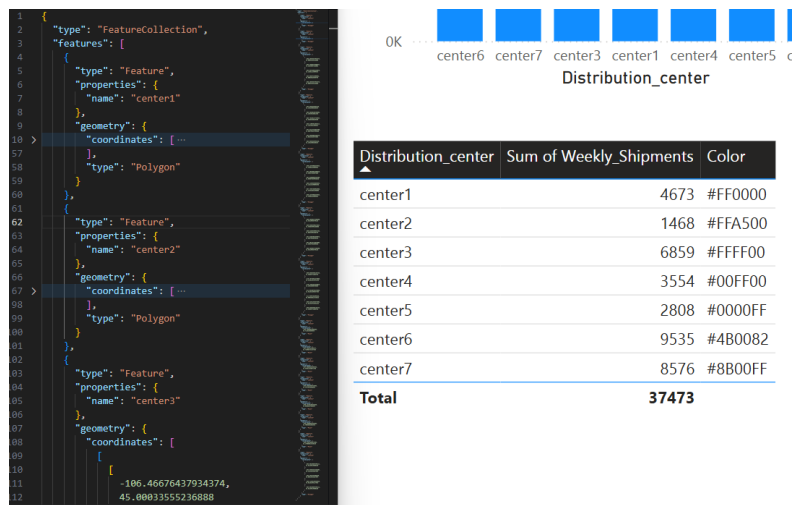
Azure Map update: data bound reference layers

This month, the Azure Maps visual brings a powerful enhancement to its functionality with data bound reference layers.

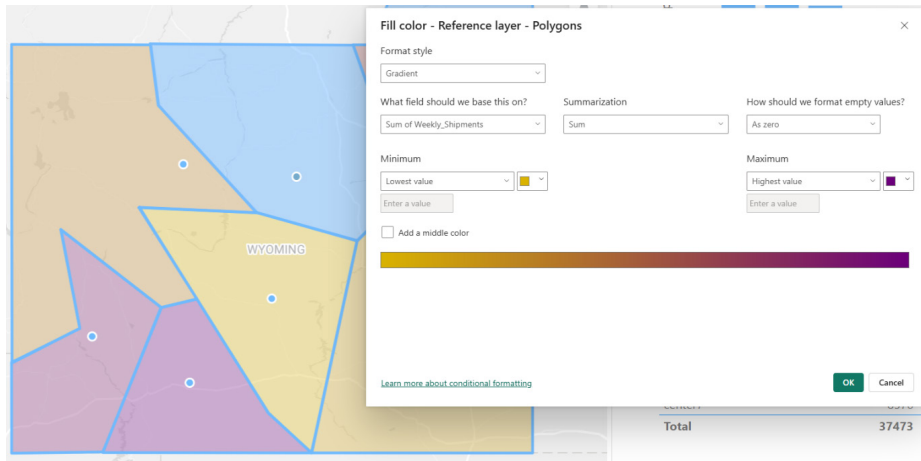
In previous releases, the Azure Maps reference layer was limited to static shapes without the ability to conditionally format or bind geometries to customers' business data. Additionally, the static nature of the reference layers limited user interaction, preventing actions such as selecting, filtering, clicking or accessing ToolTips for polygons and points, unlike other visual components.

With the data bound reference layer, this limitation is addressed by allowing integration between the reference layers and customer business data. Reference layers may now be dynamically bound with the spatial fields used, allowing you to visualise your business data in context with geographic or spatial elements. Users may now update their visuals in real time, interact with their data through Power BI's standard features such as filtering, cross-highlighting and ToolTips, greatly enhancing the flexibility and interactivity of the Azure Map visual.

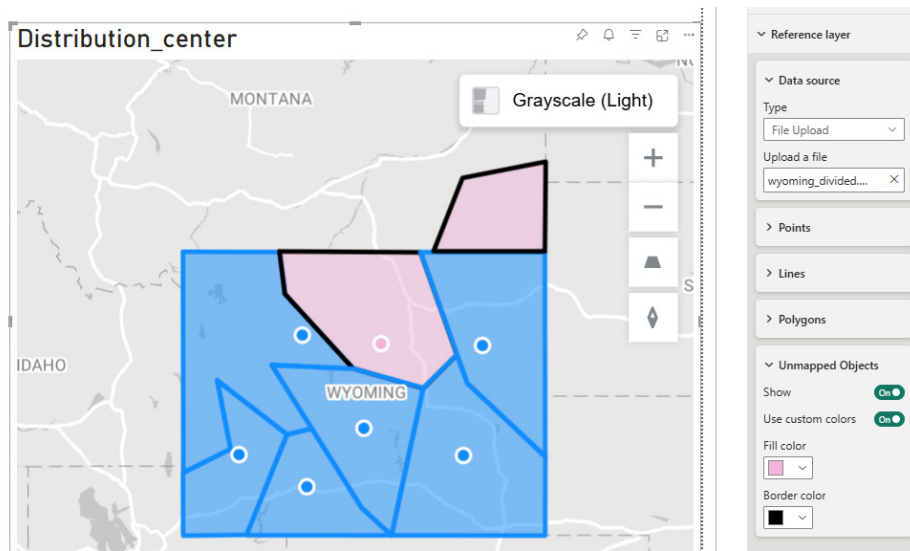
Making your reference layers data bound is easy to do. Power BI will automatically map the shapes in your reference layer to values of the field in the 'Location' bucket in the Build pane based upon the name property you provide in your reference layer file.



This update also allows you to customise the colours of your shapes as well, using features like conditional formatting or through tying their colour to a legend colour.



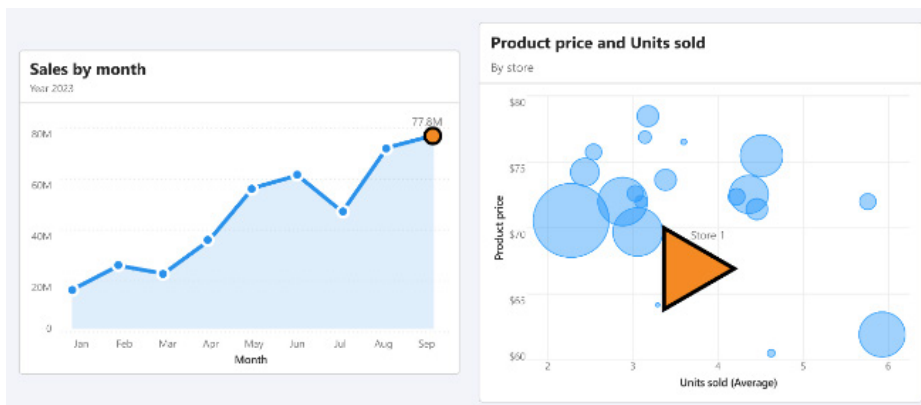
Shapes that aren't tied to a value in your model are considered unmapped. You may format them to use custom colours or hide them completely from your map. As cross-highlighting is a temporary filter on the map, the treatment you apply here is also what will happen to unselected shapes when cross-highlighting from another visual.



Marker enhancements

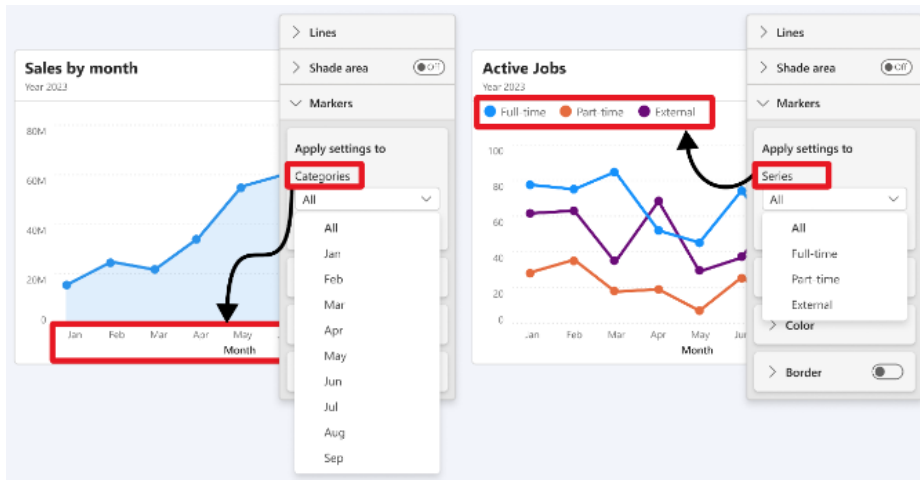
Revamping the rendering of columns, bars, Ribbons, lines, Area charts and markers is apparently a top priority for Microsoft. These elements form the foundation of their core visuals and will eventually impact other areas. By providing more control, report creators can enhance their storytelling and help users easily interpret data.

In this update, markers for Line charts, Scatter charts and various anomalies are improved. This amendment introduces new options that offer greater customisation and flexibility.



Markers for Line and Scatter charts may be adjusted in two ways:

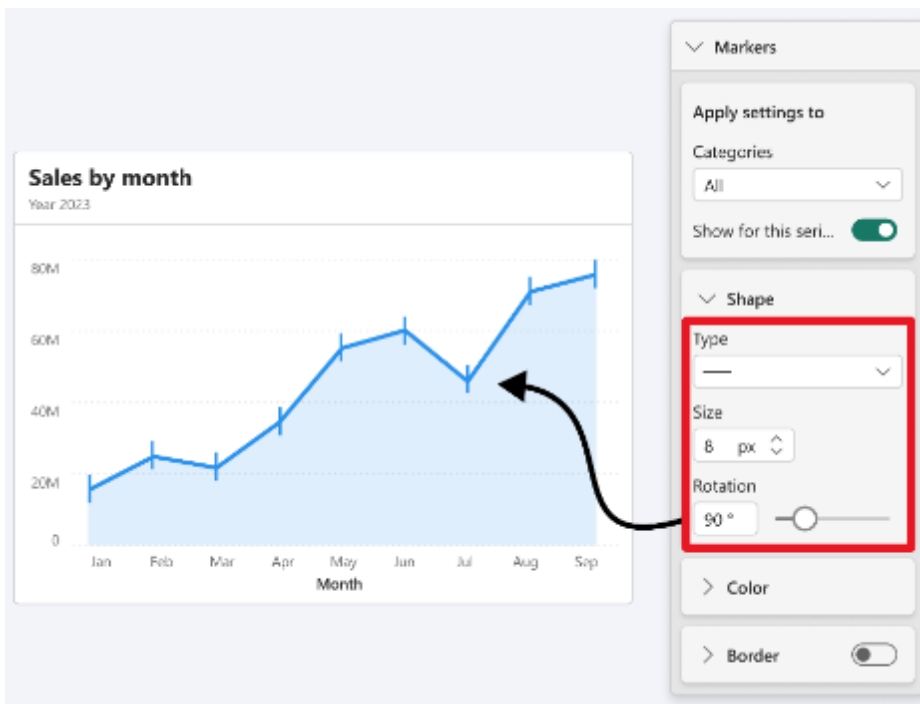
1. **Categories:** when the chart has no series, the dropdown menu displays categories. You can customise each data point's marker based on the selected x-axis category
2. **Series:** when the chart displays a legend, the dropdown menu displays series. You may customise the markers for the complete set of data points within the selected series.



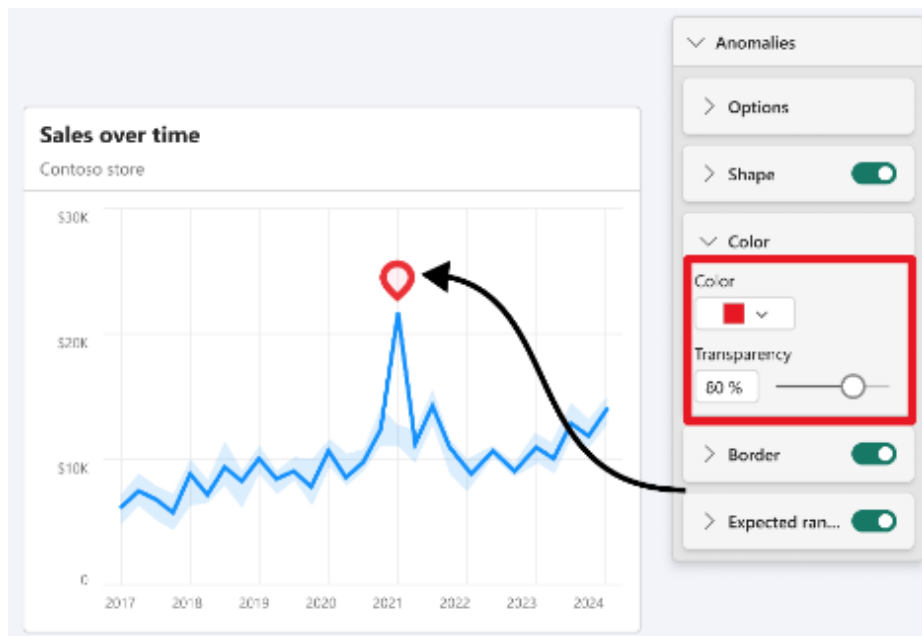
You can hide or show markers for a specific data point category by toggling the 'Show for this category' option. Please note that the 'Markers' toggle has been moved to now being under 'Show for all series'.

New format settings have been added to markers for Line charts, Scatter charts and various anomalies, including:

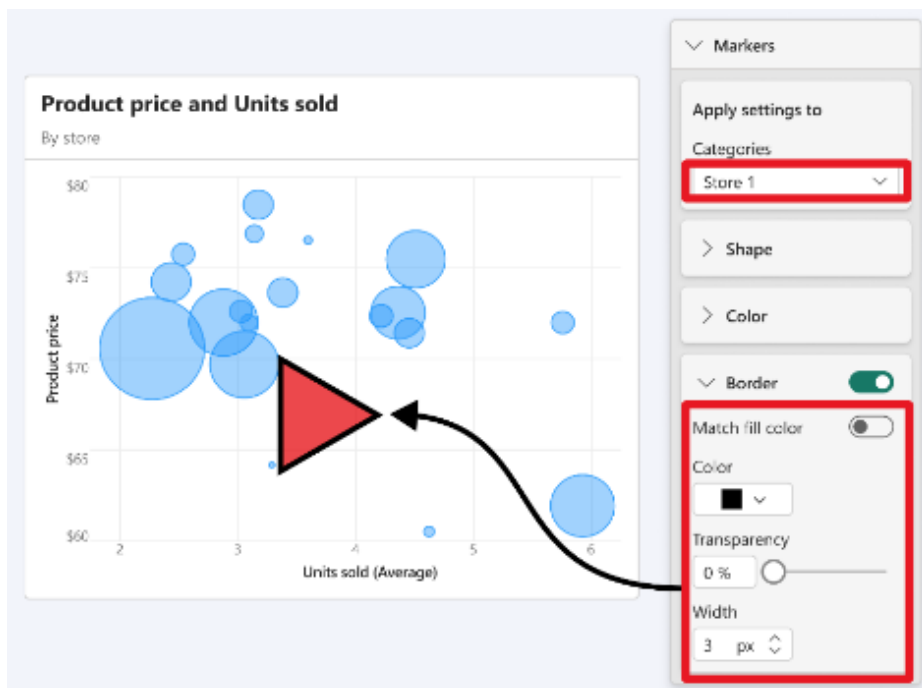
- **Shape:** Shape markers continue to offer control over their type and size. Additionally, 'rotation' is now available for all shape types, except for the circle shape. Rotating shapes enhance the variety of shape types at your disposal, which is particularly convenient when multiple lines require unique shapes



- **Colour:** changing the colour of markers has always been a convenient control. Now, you can also modify the 'transparency' of markers for a specific category, series or all markers



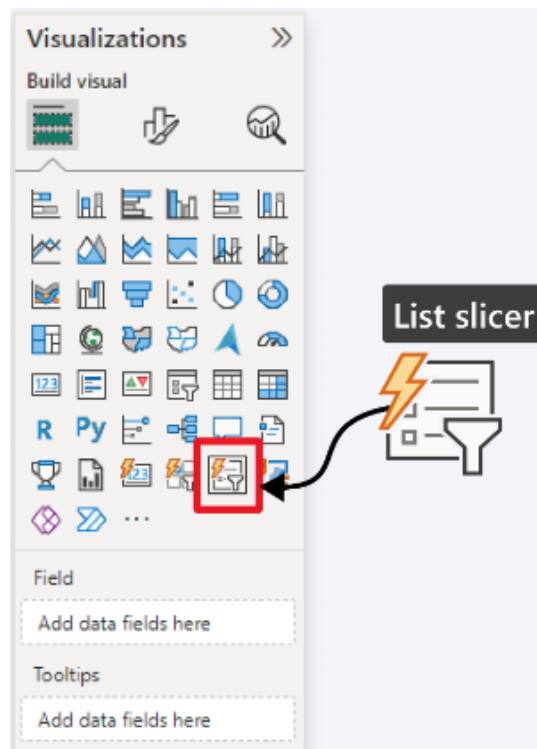
- **Border (new):** Borders for markers have been introduced, allowing you to add borders to a specific marker category, series or all markers. Additionally, you can fully customise the marker borders by adjusting their transparency and width.



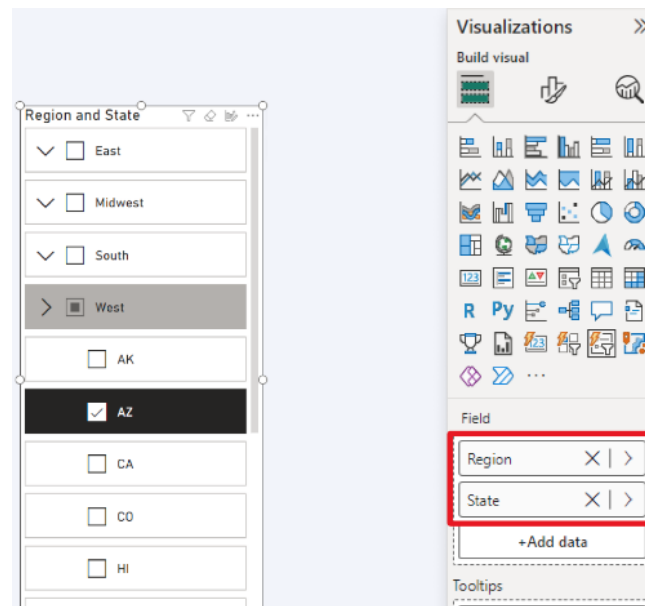
New List Slicer (Preview)

In this update, Power BI has introduced the new List Slicer. To try it, navigate to **Options and settings -> Options -> Preview features -> List slicer visual**. Major enhancements are coming, including image support, labels, additional conditional formatting options and improved default styles specifically designed for hierarchical layouts.

It should be noted that this new visual is in its early development stage. Therefore, Microsoft does not recommend using it in production currently. However, this is an excellent opportunity to experience the capabilities of this new slicer.



The new List Slicer can become hierarchical when more than one field is dragged into the field data well. This action will activate additional format settings specific to hierarchical data.



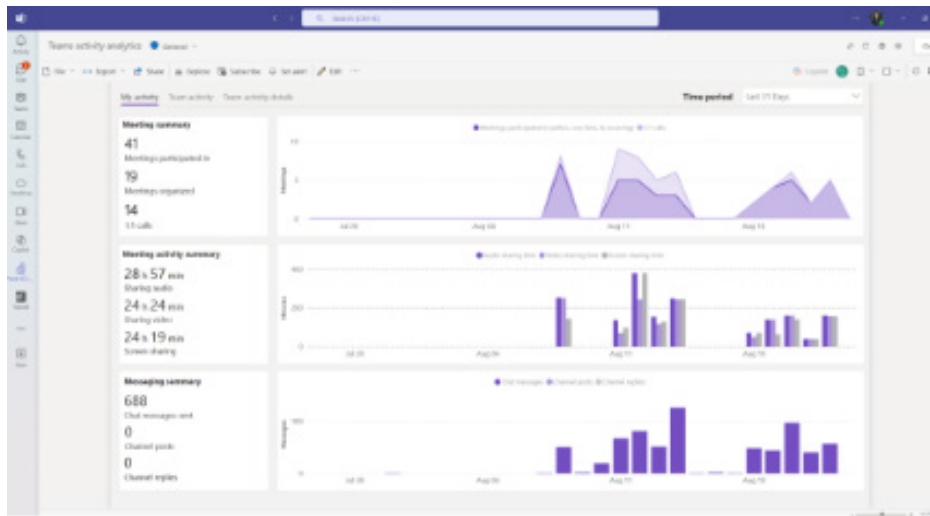
Another advantage of the new slicer is the level of customisation it offers, including:

- **Selection:** customise how items are selected within the slicer
- **Shape:** adjust the shape of the slicer to fit your design needs
- **Layout:** modify the layout to better organise the slicer elements
- **Overflow:** manage how the slicer handles overflow content (e.g. continuous scroll, paginated)
- **State styles:** define styles for different states (e.g. selected, unselected, on hover)
- **Selection icon:** choose an icon to represent selected items. This is available for the 'Tile slicer' too
- **Expand / Collapse icon:** select icons for expanding or collapsing hierarchical data
- **Button styles:** customise the appearance of buttons within the slicer.

Power BI in Teams: announcing the retirement of the ‘Teams activity analytics’ report

The ‘Teams activity analytics’ report is an out of the box report users may create in their own workspace, which tracks their Teams usage data. The option to create this report is from Power BI application in Teams, Outlook and M365.

Microsoft will be retiring this feature starting from 31 December 2024. Starting the next day, users will not be able to create that report, and reports that were already created will not be updated.

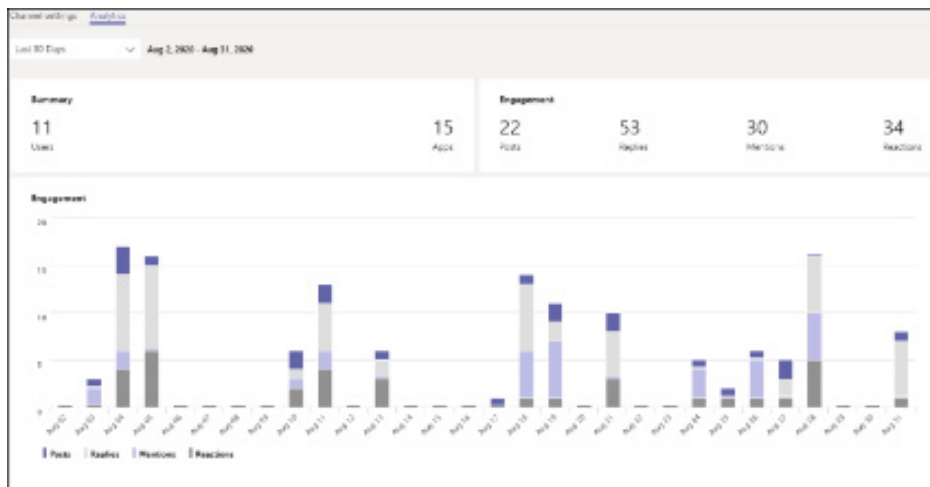


Teams provide a native analytics view for teams and channels, which gives users insight into usage patterns and activity on their teams. Users can see data such as the number of active users, posts, replies, and more.

This is part of a more complete set of reporting available in Teams which provides a wider view of Teams usage. For example, you can see how many users communicate through channel and chat messages and the kinds of devices they use to connect to Teams.

If you have already created your ‘Teams activity analysis’ report, the data in this report will no longer be updated. The option to create a new ‘Teams activity analytics’ report will be removed from the ‘Create’ section in the Power BI application inside Teams / Outlook. Therefore, you will no longer be able to create this report.

For users who need to understand how Teams is being used in their organisation, Microsoft advises you to use Teams ‘Teams Analytics’ instead.



Dynamic format strings for measures (Generally Available)

Dynamic format strings for measures are now Generally Available, giving you ultimate flexibility in how measures are displayed in visuals. These format strings can be conditionally applied using Data Analysis

expressions (**DAX**) based upon the measures value, filters applied and / or to add additional information, such as units.

Product	Sales Amount (Auto)
LL Road Seat/Saddle	\$163
Mountain Bike Socks. L	\$513
LL Touring Frame - Blue, 59	\$800
LL Mountain Frame - Black, 40	\$1.2K
LL Touring Seat/Saddle	\$1.5K
ML Mountain Frame-W - Silver, 38	\$1.5K
LL Touring Handlebars	\$1.5K
LL Headset	\$1.9K
ML Touring Seat/Saddle	\$2.0K
LL Mountain Frame - Black, 52	\$2.2K
LL Touring Frame - Blue, 62	\$3.0K
HL Road Seat/Saddle	\$4.2K
LL Touring Frame - Blue, 44	\$5.0K
LL Road Handlebars	\$5.4K
LL Mountain Seat/Saddle	\$5.6K
Mountain Bike Socks. M	\$6.1K
LL Mountain Frame - Silver, 48	\$7.0K
Touring Pedal	\$7.1K
Total	\$109.8M

If the Sales Amount is lower than 1,000 then show without any special formatting, then show in thousands with a K, then finally millions or more with an M.

456 = \$456
 2352 = \$2.4K
 2020000 = \$2.0M

```
Dynamic format string DAX expression
1 SWITCH(
2   TRUE(),
3   SELECTEDMEASURE() < 1000, "$#,##0",
4   SELECTEDMEASURE() < 1000000, "$#,##0,.0K",
5   "$#,##0,.,0M"
6 )
```



Introducing INFO.VIEW Data Analysis eXpressions (DAX) functions

DAX query view introduced new DAX functions to get metadata about your semantic model with the INFO DAX functions, and now four [4] of these functions are also available as INFO.VIEW DAX functions, which

convert IDs to friendly names, and can be used in calculated tables of the semantic model in addition to being able to run them in DAX query view.

1 evaluate info.view.

- fx INFO.VIEW.COLUMNS
- fx INFO.VIEW.MEASURES
- fx INFO.VIEW.RELATIONSHIPS
- fx INFO.VIEW.TABLES

Adding them as calculated tables ensures your model self-documents and stays current with all your latest changes automatically. Not only can these be used in calculated tables, but they will show the name or value of a column previously only displaying an ID.

INFO.VIEW.TABLES() shows information about the tables in your model, including what storage mode each table is in. You can also quickly identify tables marked as a date table by the Data Category of Time.

- 1 EVALUATE
- 2 INFO.VIEW.TABLES()

Results | Result 1 of 1 | Copy

ID	[Name]	[Model]	[DataCategory]	[Description]	[IsHidden]	[StorageMode]	[TableStorage]
1	Date	00e4400c...	Time		False	Direct Lake	date (14)
2	Pick a measure	00e4400c...	Regular		False	Direct Lake	measuregroup (17)
3	Product	00e4400c...	Regular		False	Direct Lake	productcategory (20)
4	Geo	00e4400c...	Regular		False	Direct Lake	geo (23)
5	Sales 1	00e4400c...	Regular		False	Direct Lake	sales 1 (26)
6	Sales 2	00e4400c...	Regular		False	Direct Lake	sales 2 (29)

1 xTables = INFO.VIEW.TABLES()

ID	Name	Mod	DataCategory	Description	IsHidden	StorageMode	TableStorage	Expression	ShowAsVariationOnly	IsPrivate	Calcu
10	Date	71b3fdd	Regular		False	Direct Lake	date (10)		False	False	
13	Sales	71b3fdd	Regular		False	Direct Lake	sales 1 (13)		False	False	
19	Geo	71b3fdd	Regular		False	Direct Lake	geo (19)		False	False	
22	Pick a measure	71b3fdd	Regular		False	Direct Lake	measuregroup (22)		False	False	
25	Product	71b3fdd	Regular		False	Direct Lake	productcategory (25)		False	False	
444	xTables	71b3fdd	Regular		False	Import	Table (444)	INFO.VIEW.TABLES()		False	False
841	xRelationships	71b3fdd	Regular		False	Import	Table (841)	INFO.VIEW.RELATIONSHIPS()		False	False
1468	xColumns	71b3fdd	Regular		False	Import	Table (1468)	INFO.VIEW.COLUMNS()		False	False
2644	xMeasures	71b3fdd	Regular		False	Import	Table (2644)	INFO.VIEW.MEASURES()		False	False

INFO.VIEW.RELATIONSHIPS() shows information about all the relationships in your model, including a relationship column giving a quick summary of the to and from columns with direction and cardinality.

1 EVALUATE
2 INFO.VIEW.RELATIONSHIPS()

Results Result 1 of 1 Copy

[ID]	[Name]	[Relationship]	[Model]	[IsActive]	[CrossFilteringBehavior]	[RelyOnReferentialIntegrity]	[FromTable]	[FromColumn]	[FromCardinality]	[ToTable]
1	c0b85feb-d...	'Sales 1[DateID] *[-1] 'Date[DateID]	00e4400c-c...	True	OneDirection	False	Sales 1	DateID	Many	Date
2	b0470329-a...	'Sales 1[GeoID] *[-1] 'Geo[GeoID]	00e4400c-c...	True	OneDirection	False	Sales 1	GeoID	Many	Geo
3	539 bc063d1d-...	'Sales 1[ProductCategoryID] *[-1] 'Product[ProductCategoryID]	00e4400c-c...	True	OneDirection	False	Sales 1	ProductCategoryID	Many	Product
4	546 e72c736d-d...	'Sales 2[DateID] *[-1] 'Date[DateID]	00e4400c-c...	True	OneDirection	False	Sales 2	DateID	Many	Date
5	597 38cf5db7-6...	'Sales 2[GeoID] *[-1] 'Geo[GeoID]	00e4400c-c...	True	OneDirection	False	Sales 2	GeoID	Many	Geo
6	648 7f0f6ceb-1e...	'Sales 2[ProductCategoryID] *[-1] 'Product[ProductCategoryID]	00e4400c-c...	True	OneDirection	False	Sales 2	ProductCategoryID	Many	Product

1 xRelationships = INFO.VIEW.RELATIONSHIPS()

Relationship	Mod	IsActive	CrossFilteringBehavior	RelyOn	FromTable	FromColumn	FromCardinality	ToTable	ToColumn	ToCar
'Sales[DateID] *[-1] 'Date[DateID]	71b3fdd	True	OneDirection	False	Sales	DateID	Many	Date	DateID	One
'Sales[ProductCategoryID] *[-1] 'Product[ProductCategoryID]	71b3fdd	True	OneDirection	False	Sales	ProductCategoryID	Many	Product	ProductCategoryID	One
'Sales[GeoID] *[-1] 'Geo[GeoID]	71b3fdd	True	OneDirection	False	Sales	GeoID	Many	Geo	GeoID	One

INFO.VIEW.MEASURES() shows information about the model measures, including if it's in a valid or error state.

1 EVALUATE
2 INFO.VIEW.MEASURES()

Results Result 1 of 1 Copy

[ID]	[Name]	[Table]	[Description]	[DataType]	[Expression]	[FormatString]	[IsHidden]	[State]
1	706	Total Sales	Pick a measure	Integer	SUM('Sales 1[Sales]) + SUM('Sales 2[Sales])		False	Valid
2	707	Total Costs	Pick a measure	Integer	SUM('Sales 1[Costs]) + SUM('Sales 2[Costs])		False	Valid
3	708	Profit	Pick a measure	Integer	[Total Sales] - [Total Costs]		False	Valid
4	709	Order Count	Pick a measure	Integer	COUNTROWS('Sales 1) + COUNTROWS('Sales 2)		False	Valid

1 xMeasures = INFO.VIEW.MEASURES()

ID	Name	Table	Description	DataType	Expression	FormatString	IsHidden	State	KPI
11073	Orders	Pick a measure	Counts the number of rows in the Sales table, representing the total number of	Integer	COUNTROWS(Sales)		False	Valid	
13008	Total Sales	Pick a measure	Calculates the total sum of all sales.	Integer	SUM('Sales[Sales])		False	Valid	
13009	Total Costs	Pick a measure	Calculates the total sum of all costs from the 'Sales' table.	Integer	SUM('Sales[Costs])		False	Valid	
13010	Profit	Pick a measure	Calculates the profit by subtracting total costs from total sales.	Integer	[Total Sales] - [Total Costs]		False	Valid	
13011	Profit Margin	Pick a measure	Calculates the profit margin by dividing the total profit by total sales.	Number	DIVIDE([Profit], [Total Sales], 0)		False	Valid	

INFO.VIEW.COLUMNS() shows information about the columns, including data category and data type.

1 EVALUATE
2 INFO.VIEW.COLUMNS()

Results Result 1 of 1 Copy

[ID]	[Name]	[Table]	[DataType]	[DataCategory]	[Description]	[IsHidden]	[IsUnique]	[IsKey]	[IsNullable]	[Alignment]	[SummarizeBy]	[ColumnStorage]	[Type]
1	15	RowNumber-26629798-...	Date	Integer	RowNumber	True	True	False	False	Default	Default	date (14)RowNumber ...	RowNumber
2	33	Date	Date	Regular		False	True	True	False	Default	None	date (14)Date (33)	Data
3	34	DateID	Date	Integer	Regular	False	True	False	False	Default	None	date (14)DateID (34)	Data
4	35	Monthly	Date	Regular		False	False	False	True	Default	None	date (14)Monthly (35)	Data
5	36	Month	Date	Text	Regular	False	False	False	True	Default	None	date (14)Month (36)	Data
6	37	MonthYear	Date	Text	Regular	False	False	False	True	Default	None	date (14)MonthYear (37)	Data
7	38	MonthOfYear	Date	Integer	Regular	False	False	False	True	Default	Sum	date (14)MonthOfYear ...	Data
8	39	Year	Date	Integer	Regular	False	False	False	True	Default	Sum	date (14)Year (39)	Data
9	40	EndOfMonth	Date	Date	Regular	False	False	False	True	Default	None	date (14)EndOfMonth ...	Data
10	41	DayOfWeekNum	Date	Integer	Regular	False	False	False	True	Default	Sum	date (14)DayOfWeekN...	Data
11	42	DayOfWeek	Date	Text	Regular	False	False	False	True	Default	None	date (14)DayOfWeek (...	Data
12	43	WeeklyStartSun	Date	Date	Regular	False	False	False	True	Default	None	date (14)WeeklyStartS...	Data
13	44	WeeklyStartMon	Date	Date	Regular	False	False	False	True	Default	None	date (14)WeeklyStartM...	Data
14	18	RowNumber-26629798-...	Pick a measure	Integer	RowNumber	True	True	True	False	Default	Default	measuregroup (17)SRo...	RowNumber
15	45	ID	Pick a measure	Integer	Regular	True	False	False	True	Default	Count	measuregroup (17)SID (...	Data
16	46	Col1	Pick a measure	Text	Regular	True	False	False	True	Default	None	measuregroup (17)SCol...	Data
17	21	RowNumber-26629798-...	Product	Integer	RowNumber	True	True	True	False	Default	Default	productcategory (20)SR...	RowNumber

1 xColumns = INFO.VIEW.COLUMNS()

ID	Name	Table	DataType	DataCategory	Description	IsHidden	IsUnique	IsKey	IsNullable	Alignment	SummarizeBy	Type
29	Date	Date	Date	Regular		False	False	False	True	Default	None	date (
30	DateID	Date	Integer	Regular		False	True	False	False	Default	None	date (
31	Monthly	Date	Date	Regular		False	False	False	True	Default	None	date (
32	Month	Date	Text	Regular		False	False	False	True	Default	None	date (
33	MonthYear	Date	Text	Regular		False	False	False	True	Default	None	date (
34	MonthOfYear	Date	Integer	Regular		False	False	False	True	Default	None	date (
35	Year	Date	Integer	Regular		False	False	False	True	Default	None	date (
36	EndOfMonth	Date	Date	Regular		False	False	False	True	Default	None	date (
37	DayOfWeekNum	Date	Integer	Regular		False	False	False	True	Default	None	date (
38	DayOfWeek	Date	Text	Regular		False	False	False	True	Default	None	date (
39	WeeklyStartSun	Date	Date	Regular		False	False	False	True	Default	None	date (
40	WeeklyStartMon	Date	Date	Regular		False	False	False	True	Default	None	date (
42	ProductCategoryID	Sales	Integer	Regular		False	False	False	True	Default	None	sales
43	GeoID	Sales	Integer	Regular		False	False	False	True	Default	None	sales
44	DateID	Sales	Integer	Regular		False	False	False	True	Default	None	sales
53	GeoID	Geo	Integer	Regular		False	True	False	False	Default	None	geo (

Value filter behaviour (Preview)

DAX has an automatic filtering mechanism that occurs when multiple columns from the same table are filtered. This behaviour is informally called 'auto-exist'. **DAX** understands that not all combinations of values across these columns are valid and as a result it automatically excludes invalid combinations. The **DAX** engine generated a coalesced value filter that not only returns valid combinations but also affects measured calculations. This month, Power BI is giving you more control over whether you want this behaviour in your semantic model. You can decide whether you want to turn off coalesced values filters and turn on independent value filters instead. Turning on independent value filters by setting the 'Value filter behaviour' setting to Independent (*see below*) results in multiple filters on the same table being kept separate instead of the **DAX** engine combining these into one.

When you are filtering multiple columns on the same table, the current default value filter behaviour takes these filters and combines them into one, considering only the combinations that exist. Consider the following two columns on the same table:

1. **Year**, which contains values like '2023'
2. **Month**, which contains values like 'January 2024'.

If you filter on both **Year** and **Month**, since these columns are on the same table, the value filter behaviour combines the filters into one, but only the combinations that exist are considered. Of course, the combination of the month January 2024 with year 2023 does not exist and would not be included in the filter. There are, however, situations in which the results are surprising.

Let's look at an example, where we have a catalogue (**Catalog**) showing availability of colours for products by year. The manufacturer of these products has experimented with making products in various colours throughout the years:

Year	Product	Color
2022	Helmet	Black
2022	Mountain Bike	Black
2022	Shirt	Black
2023	Helmet	Black
2023	Helmet	Blue
2023	Helmet	Red
2023	Mountain Bike	Blue
2023	Shirt	Blue
2024	Helmet	Black
2024	Mountain Bike	Blue
2024	Shirt	Black
2024	Shirt	Blue

We have three [3] products that have been available in various colours over the years. Notice how there are no red products offered in 2024. That is going to be important a little later. Now, let's count the number of products by adding the following measure:

Number of Products = COUNTROWS('Catalog')

The following matrix shows the number of products that are available in various colours per year:

Color	2022	2023	2024	Total
Black	3	1	2	6
Blue		3	2	5
Red		1		1
Total	3	5	4	12

Now, let's add another measure to calculate the total number of products for all years:

Number of Products All Years = CALCULATE ([Number of Products], ALL ('Catalog'[Year]))

Let's put these measures side-by-side and filter to year 2023 and just the blue and red colours (no black). As you can see, the number of products is four [4] and the number of products across all years for these two colours is six [6]:

Year	Product	Color
2022	Helmet	Black
2022	Mountain Bike	Black
2022	Shirt	Black
2023	Helmet	Black
2023	Helmet	Blue
2023	Helmet	Red
2023	Mountain Bike	Blue
2023	Shirt	Blue
2024	Helmet	Black
2024	Mountain Bike	Blue
2024	Shirt	Black
2024	Shirt	Blue



If we switch the Year to 2024, we expect the 'Number of Products' measure to return two [2], as there are just two products that are blue in 2024 and there are no red products in that year. Furthermore, we would

expect that the number of products for all years will not change, because, after all, it is supposed to be calculated across all years. However, the 'Number of Products for All Years' changes from six [6] to five [5]:

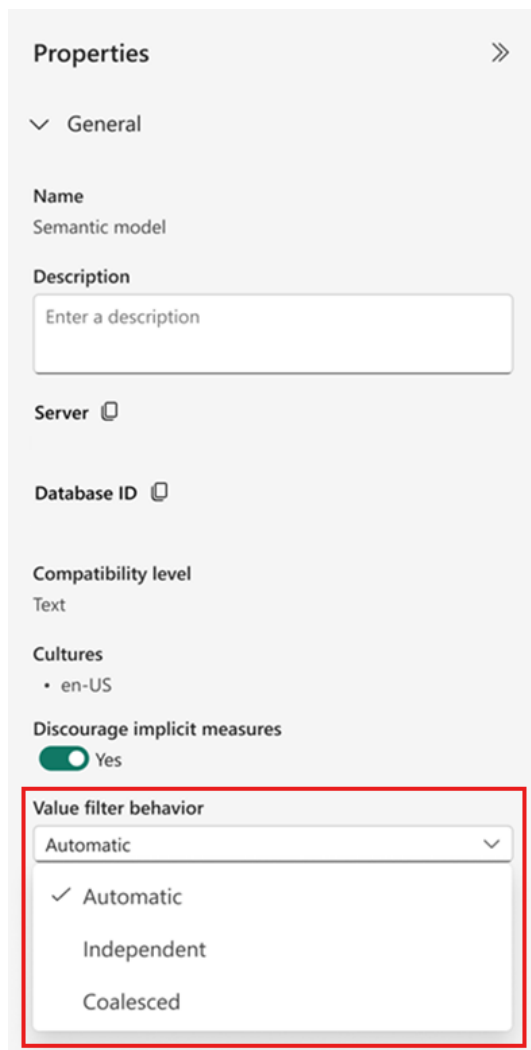
Year	Product	Color
2022	Helmet	Black
2022	Mountain Bike	Black
2022	Shirt	Black
2023	Helmet	Black
2023	Helmet	Blue
2023	Helmet	Red
2023	Mountain Bike	Blue
2023	Shirt	Blue
2024	Helmet	Black
2024	Mountain Bike	Blue
2024	Shirt	Black
2024	Shirt	Blue



The number of products across all years should still be six, not five. What we are seeing here is the value filter behaviour in action: it is combining filters on the same table, removing combinations that did not exist. The filters are **Year** = 2024 and **Color** = Blue or Red. Since these two filters are on the same table, these filters are combined into one filter that only filters for the combinations that exist. Since there are no red products in 2024, the applied filter is **Year** = 2024 and **Color** = Blue. Therefore,

the number of products for all years now counts just the number of blue products, not the blue or red products. This returns five [5], as you can confirm in the table.

This month sees Power BI giving you the control over whether you want this behaviour in your semantic model, by using the 'Value filter behavior' setting on your semantic model in the Properties pane in the Model view:



Three options are available:

1. **Automatic:** this is the default setting and currently turns on the Coalesced behaviour. When Microsoft wraps up this Preview, new models set to 'Automatic' will use Independent. There will be an announcement at that time
2. **Independent:** this forces filters on the same table to be kept separate. After setting the 'Value filter behavior' setting to 'Independent', the total number of products for all years returns six [6] as expected (*see below*)
3. **Coalesced:** this forces the value filter behaviour to be enabled for the semantic model and will result in combining the filters on the same table into one. The number of products for all years in the above example will continue to return five [5].

The table below shows the impact of this setting on the illustration:

'Value filter behavior' setting	Filters applied in the example	Result of example measure
Automatic	Year = 2024 Color = Blue	5
Independent	Year = 2024 Color = Blue or Red	6
Coalesced	Year = 2024 Color = Blue	5

It should be noted that setting the 'Value filter behavior' to Automatic, means it is equal to Coalesced for now, but will be switched to Independent for new semantic models in the future.

If you set the 'Value filter behavior' to Independent, the number of products for all returns six [6], as expected, since the filters are **Year** = 2024 and **Color** = Blue or Red and are no longer combined:

Year	Product	Color
2022	Helmet	Black
2022	Mountain Bike	Black
2022	Shirt	Black
2023	Helmet	Black
2023	Helmet	Blue
2023	Helmet	Red
2023	Mountain Bike	Blue
2023	Shirt	Blue
2024	Helmet	Black
2024	Mountain Bike	Blue
2024	Shirt	Black
2024	Shirt	Blue

Year

2023

2024

Color

Black

Blue

Red

2

Number of Products

6

Number of Products All Years

Snowflake connector updates

The driver used by Snowflake connector is updated to the latest version for incremental improvements. This connector has improved performance by reducing metadata queries when not necessary.

Power BI Mobile applications will no longer connect to Report Server using OAuth and AD FS 2016

As of 1 March 2025, the Power BI Mobile application will no longer be able to connect to Report Server using the OAuth protocol through AD FS configured on Windows Server 2016.

Today, the Power BI Mobile apps use two authentication libraries:

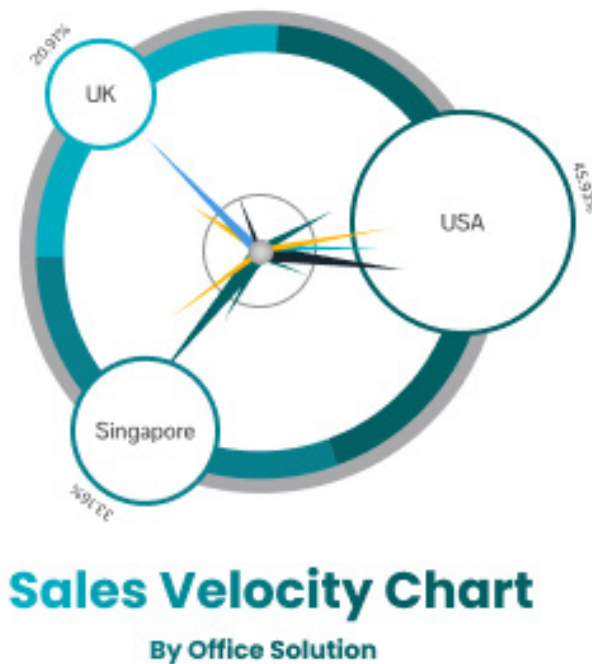
1. **MSAL** when connecting to Power BI Service and non-AD FS based Report Server scenarios
2. **ADAL** when connecting to AD FS using OAuth protocol.

Since ADAL library reaches end-of-life, it is time for Microsoft to migrate all authentication scenarios to use MSAL. Given that MSAL requires AD FS 2019 or newer, the Power BI Mobile applications will no longer be able to connect to AD FS 2016 once this migration is completed.

If your organisation is using AD FS 2016 with their Report Server, you will have to upgrade to Windows Server 2019 or later, or use Microsoft Entra application proxy, to be able to connect from Power BI mobile apps to their Report Server, by 1 March 2025.

New visuals in AppSource

There is just the one to mention this month (not discussed below): Sales Velocity Compass by Office Solution.



Date Picker by Powerviz

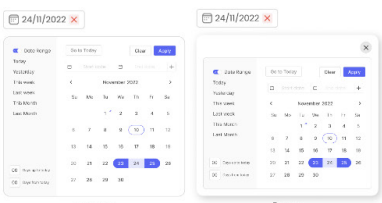
This is a Date Slicer for Power BI. The 'All language support' and 'Highlight Invalid dates using DAX' options were added in the recent version update. The Date Picker visual offers a modern calendar view, Presets, Pop-up mode, Default Selection, Themes, and more, making it a must-have date slicer for Power BI reports. Its formatting options help with brand consistency.

Key features include:

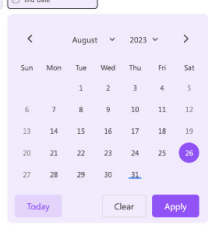
- **Display Mode:** choose between Pop-up and Canvas modes
- **Presets:** many commonly used presets like Today, Last Week, YTD, MTD, or create your preset using field
- **Default Selection:** control the date period selected when the user refreshes or reopens the report
- **Filter Type:** choose between Range and Start / End types
- **Month Style:** select single- or double-month date slicer
- **Multiple Date Ranges:** flexibility to select multiple date ranges
- **Themes:** 15+ pre-built themes with full customisation
- **Holidays and Weekends:** customise holidays / weekends representation
- **Import / Export JSON:** build templates and share your designs
- **Invalid Dates:** customise invalid dates in your data or the ability to mark certain dates invalid via **DAX**.

Date Picker is available for free from AppSource.

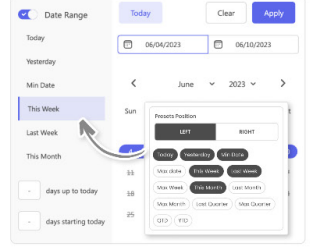
MOST ADVANCED DATE SLICER FOR POWER BI
WITH CALENDAR VIEW, DEFAULT SELECTION, PRESETS, THEMES AND FULL CUSTOMIZATION



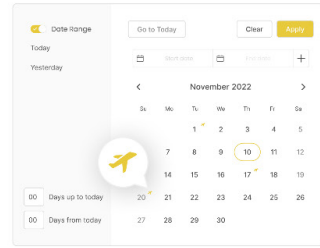
Canvas/Pop-up



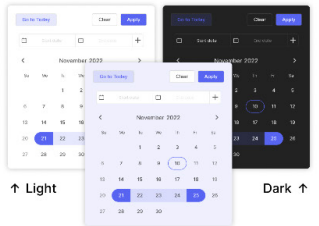
Start/End Style



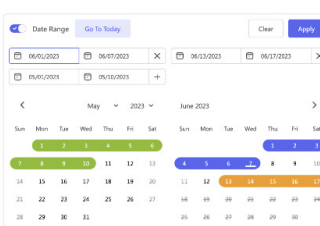
Presets



Holidays/Weekends




**Monet
15+ Themes**

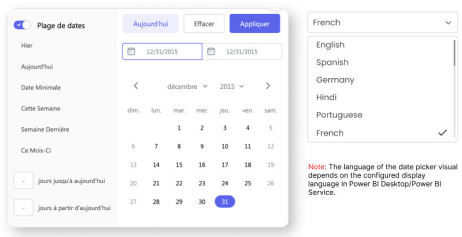


Multiple Date Ranges

MOST ADVANCED DATE SLICER FOR POWER BI
WITH CALENDAR VIEW, DEFAULT SELECTION, PRESETS, THEMES AND FULL CUSTOMIZATION



All Language Support



Invalid Dates via DAX

Su	Mo	Tu	We	Th	Fr	Sat
	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Invalid Dates via DAX

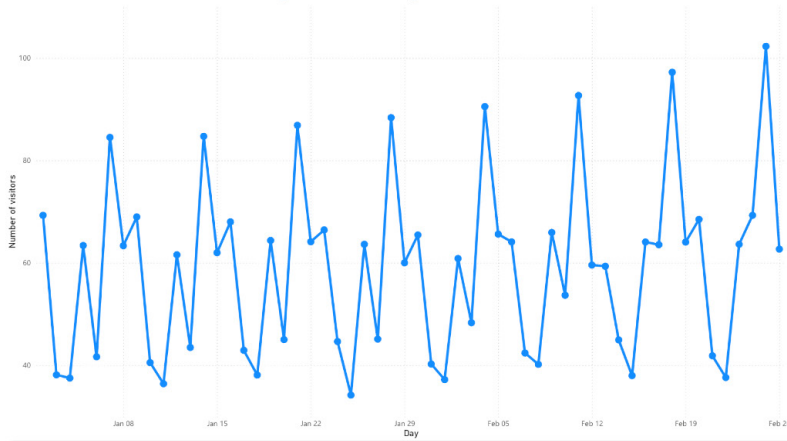
- 03 Aug 2024
- 04 Aug 2024
- 05 Aug 2024
- 06 Aug 2024

Cycle Plot by Nova Silva

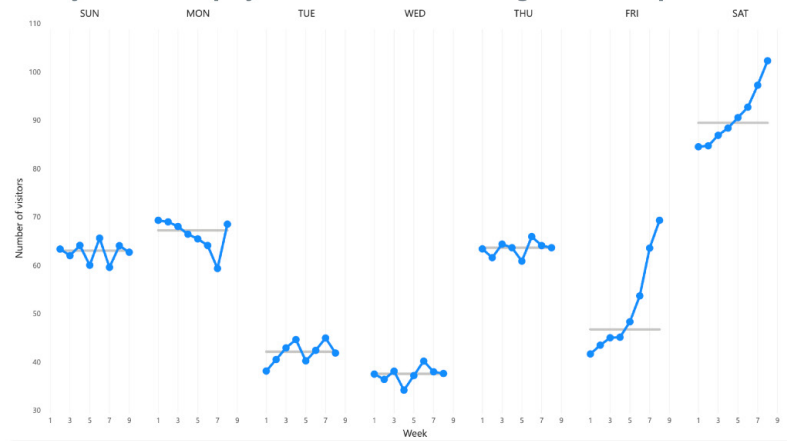
A cycle plot is a powerful tool for visualising and understanding seasonal patterns in time series data. Unlike traditional Line graphs, which may obscure cyclical trends, cycle plots separate data into cycles (e.g. months, days or quarters) and plot them individually for each period within a cycle.



Standard line charts may obscure cyclical trends



The Cycle Plot helps you uncover and leverage seasonal patterns



This method highlights within-cycle variations and trends across cycles. For example, a cycle plot of monthly sales over several years would display each month's trend over time, making it easier to identify whether certain months consistently perform better or worse. It also reveals how overall trends (like yearly growth) affect individual periods.

Cycle plots are particularly useful for businesses and analysts who need to identify seasonality in sales, website traffic or other metrics. By

visualising data this way, decision-makers can better plan for seasonal peaks and troughs, optimise inventory and tailor marketing efforts.

In summary, cycle plots offer a useful, detailed perspective on time series data, making them a flexible tool for uncovering and leveraging seasonal patterns.

You may try the Cycle Plot for free now on your own data by downloading it from the AppSource.

Drill Down Network PRO by ZoomCharts

You may create Network charts from your categorical data easily with Network PRO. Simply add category and value fields, and the visual will automatically detect relationships and visualise them as nodes in an interactive and easy-to-explore chart with a force-directed layout. With more than 100 customisation settings for nodes, links, legends, labels and other aspects, you can create flexible reports.

Network PRO visualises hierarchies, making it easier to understand relationships and faster to find answers. Whereas the Pin version of Network PRO is designed for dashboards, the Filter version will integrate into your reports to make them more interactive and insightful. With cross-chart filtering enabled, selecting one or multiple nodes will dynamically filter data in other visuals and vice versa.

Main features include:

- Automatic relationship detection
- Up to nine [9] levels of hierarchy
- Dynamic node scaling based on value
- Node, link, and label customization
- Force-directed layout
- Touch support
- Cross-chart filtering.

You can get Drill Down Network PRO on AppSource.



VISUALIZE RELATIONSHIPS EASILY

Create interactive and user-friendly network charts from your categorical data with Network PRO.

Automatic Relationship Detection

Force-Directed Layout

Cross-chart Filtering



YOUR CHART, YOUR RULES

Customize node, and label appearance for each category or entire chart.

Rich Customization Options

Custom Node Images

Link Label Field

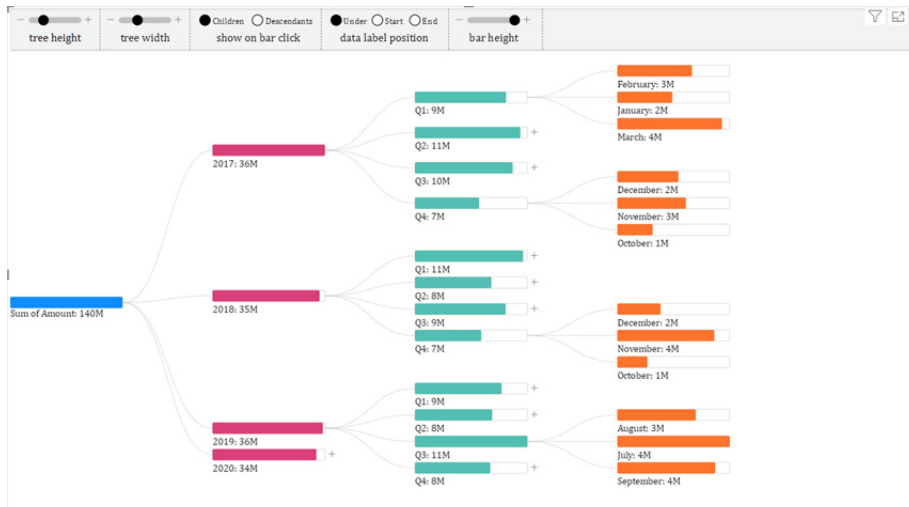
Dynamic Node Scaling (based on value)

Decomposition Tree – All Expanding

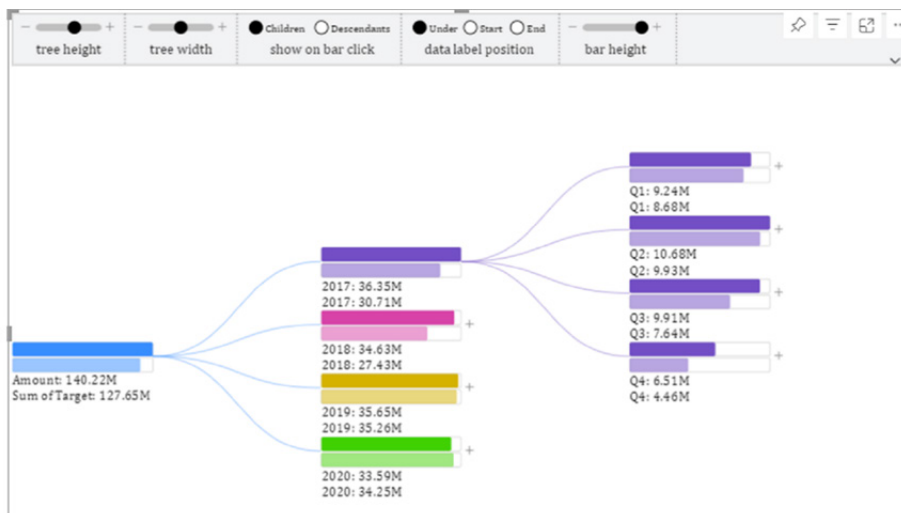
This custom visual helps to break down a metric or a key performance indicator (KPI) into its contributing factors. It can be used to identify the underlying causes behind a particular metric's value.

The following features make it unique compared to native decomposition tree visual:

1. It allows users to expand all nodes simultaneously



2. Users can add a target measure as well



3. It allows two colour patterns. The first pattern allows separate colours for each level. The second pattern allows a node and its descendants to have different colours from other nodes. This is depicted in the image below:



4. It allows users to select whether to display children only or all descendants on node click
5. It allows users to adjust tree height, tree width and bar height
6. It allows different label positioning such as under the bar, start and end.

The visual and a demo file may be downloaded from AppSource.

EDITable for reference / master data management with approval workflow, audit and governance

EDITable provides a self-service platform that helps you manage reference data, master data and metadata for your Power BI reports and applications. It complements your Master Data Management (MDM) solution and offers a lightweight alternative for business users that supports both reference data (such as Customer Region and Product master) and flat tables (such as Price List, Contracts, Projects and Discounts).

Highlights include:

- Edit dimensions and measures in flat tables
- Designed for business users requires minimal help and setup from IT
- Supports live synchronisation with data residing in Azure SQL, Databricks, Snowflake, Microsoft Fabric, RedShift and Postgres.

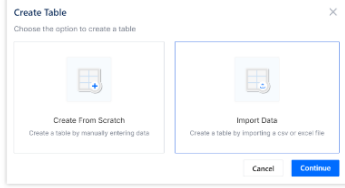
Features include:

- Bulk Insert / Edit values
- Custom approval workflows (table-level, dimension-level and value-based)
- Supports Slowly Changing Dimensions (SCD) Type II
- Change log for enabling audit
- Conditional formatting
- Commenting and collaboration
- Data integration with webhooks
- Granular user activity permissions (add / delete / edit rows)
- Columnar permissions (ACL).

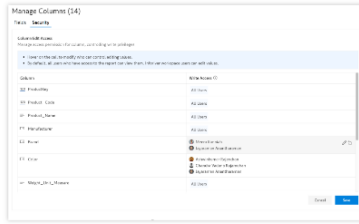
Use cases include Master Data, Reference Data, Meta Data and a Flat table editor.

ProductKey	Product Name	Manufacturer	Brand	Color	Weight	Unit Cost	Unit Price	Subcategory	Category
1	Contoso 512MB MP3 Player E51 Silver	Contoso, Ltd	Contoso	Silver	4.80	6.62	12.99	MP&MMP3	Audio
2	Contoso 512MB MP3 Player E51 Blue	Contoso, Ltd	Contoso	Transparent	4.18	6.62	12.99	MP&MMP3	Audio
3	Contoso 1G MP3 Player F100 White	Contoso, Ltd	Contoso	White	4.58	7.48	14.52	MP&MMP3	Audio
4	Contoso 2G MP3 Player E200 Silver	Contoso, Ltd	Contoso	Silver	4.58	11.00	21.57	MP&MMP3	Audio
5	Contoso 2G MP3 Player E200 Red	Contoso, Ltd	Contoso	Red	2.40	11.00	21.57	MP&MMP3	Audio
6	Contoso 2G MP3 Player E200 Black	Contoso, Ltd	Contoso	Black	8.80	11.00	21.57	MP&MMP3	Audio
7	Contoso 2G MP3 Player E200 Blue	Contoso, Ltd	Contoso	Blue	2.10	11.00	21.57	MP&MMP3	Audio
8	Contoso 4G MP3 Player E400 Silver	Contoso, Ltd	Contoso	Transparent	5.60	38.58	59.99	MP&MMP3	Audio
9	Contoso 4G MP3 Player E400 Black	Contoso, Ltd	Contoso	Transparent	2.10	38.58	59.99	MP&MMP3	Audio
10	Contoso 4G MP3 Player E400 Green	Contoso, Ltd	Contoso	Green	11.00	38.58	59.99	MP&MMP3	Audio
11	Contoso 4G MP3 Player E400 Orange	Contoso, Ltd	Contoso	Orange	14.18	38.58	59.99	MP&MMP3	Audio
12	Contoso 4GB Flash MP3 Player E401 Blue	Contoso, Ltd	Contoso	Blue	7.40	35.72	77.68	MP&MMP3	Audio
13	Contoso 4GB Flash MP3 Player E401 Black	Contoso, Ltd	Contoso	Black	2.68	35.72	77.68	MP&MMP3	Audio
14	Contoso 4GB Flash MP3 Player E401 Silver	Contoso, Ltd	Contoso	Silver	8.00	35.72	77.68	MP&MMP3	Audio
15	Contoso 4GB Flash MP3 Player E401 White	Contoso, Ltd	Contoso	White	2.18	35.72	77.68	MP&MMP3	Audio
16	Contoso 8GB Super-Slim MP3/Video Player M800 White	Contoso, Ltd	Contoso	White	11.00	58.56	189.95	MP&MMP3	Audio
17	Contoso 8GB Super-Slim MP3/Video Player M800 Red	Contoso, Ltd	Contoso	Red	11.00	58.56	189.95	MP&MMP3	Audio
18	Contoso 8GB Super-Slim MP3/Video Player M800 Green	Contoso, Ltd	Contoso	Green	2.18	58.56	189.95	MP&MMP3	Audio
19	Contoso 8GB Super-Slim MP3/Video Player M800 Pink	Contoso, Ltd	Contoso	Pink	5.90	58.56	189.95	MP&MMP3	Audio
20	Contoso 8GB MP3 Player new model M820 Black	Contoso, Ltd	Contoso	Black	1.00	61.62	134.00	MP&MMP3	Audio
21	Contoso 8GB MP3 Player new model M820 Blue	Contoso, Ltd	Contoso	Blue	10.60	61.62	134.00	MP&MMP3	Audio
22	Contoso 8GB MP3 Player new model M820 Yellow	Contoso, Ltd	Contoso	Yellow	1.00	61.62	134.00	MP&MMP3	Audio
23	Contoso 8GB MP3 Player new model M820 White	Contoso, Ltd	Contoso	White	2.60	61.62	134.00	MP&MMP3	Audio
24	Contoso 16GB Mp5 Player M1600 Blue	Contoso, Ltd	Contoso	Blue	11.00	91.93	199.90	MP&MMP3	Audio

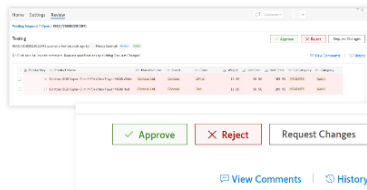
Migrate your spreadsheet tables



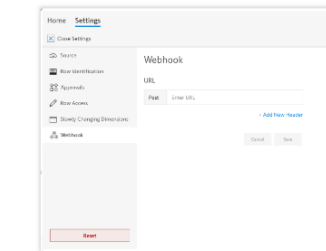
Control who can edit each field



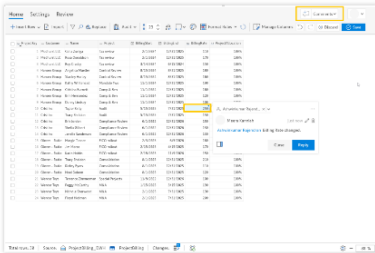
Define custom approval workflows



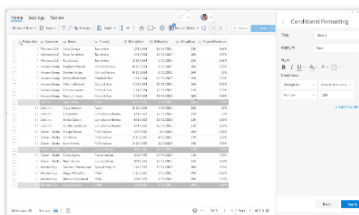
Write anywhere using webhooks



Collaborate with your peers



Apply advanced conditional formatting



ADWISE Advanced Column v1.0

Advanced Column is an easy-to-use Column chart for comparing one or more values with clearly interpretable difference lines. It is best suited for comparison of values between time periods, categories or quantities. As usual with our visuals, you can apply multiple formatting options to render the visual the way you want, to be easily readable for users and

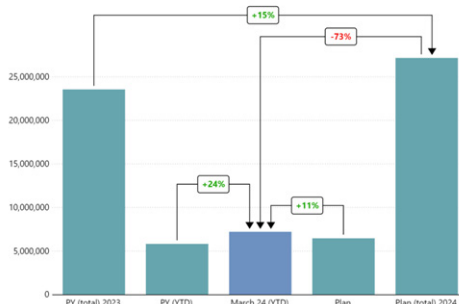
to correspond with your corporate identity. You can still use all the standard features of column chart such as Axis X, Y formatting, gridlines, values + totals, legend and so on, but with the ability to compare any columns with “drag & drop” simplicity.

ADWISE Advanced Column
Microsoft Power BI Custom Visual, v1.0

Advanced Column is easy to use column chart for comparing one or more columns/values with clearly interpretable difference lines. It is best suited for comparison of values between time periods, categories or quantities.



Turnover Comparison

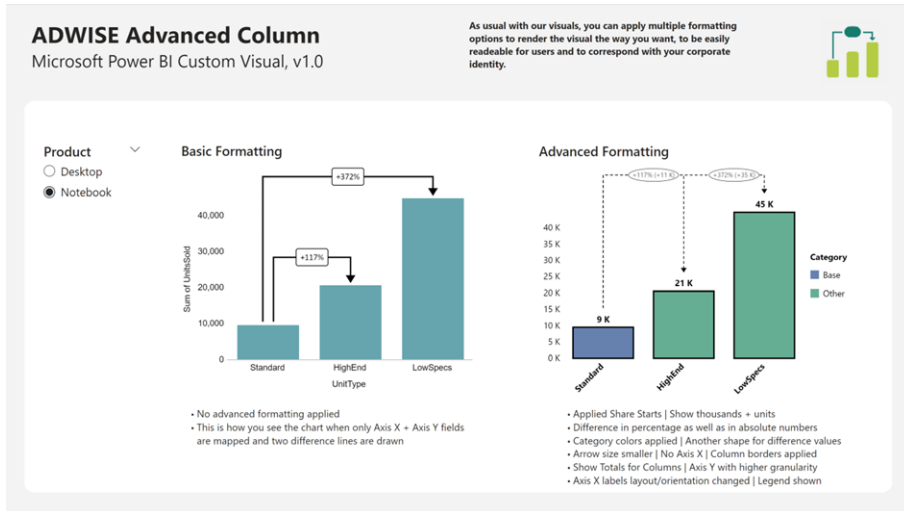


Basic controls

- Show the Difference line**
 - Click and hold left mouse button on the first column and go with the pointer on the second column, then release the button.
 - The columns are getting transparent once over them, so you can better see which column you have chosen.
 - The difference line is directional, so the first column is the one you compare to the second.
- Delete the Difference line**
 - Go over with mouse pointer anywhere on (above) difference line you want to delete and you see the line getting thicker - to delete, click left mouse button.
- Column chart**
 - Column chart is basically the same you are using in Power BI (Stacked column chart), so you only need to map Axis X (series) + Axis Y (values) to show and format it the way you are used to.

This new visual includes the following features:

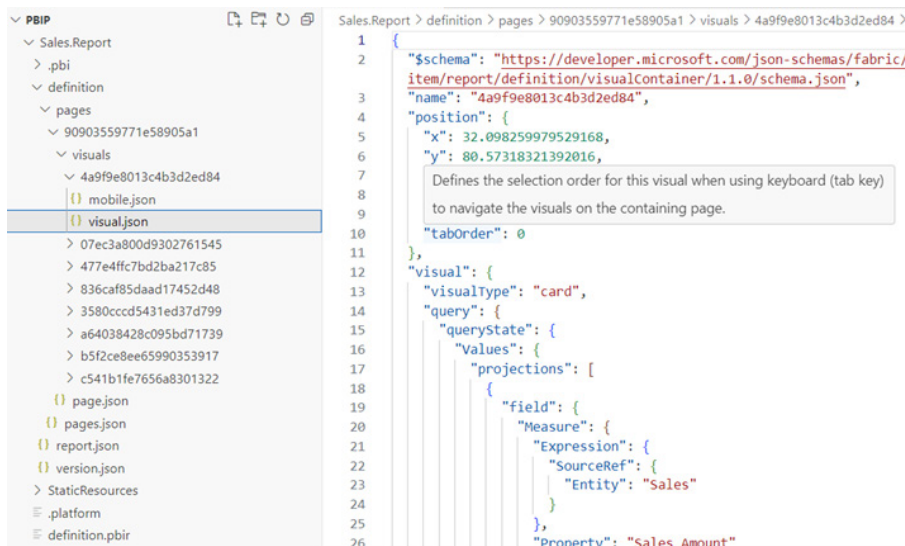
- **Difference lines:** configurable lines to clearly show compared columns
- **Values:** show difference in percentage or absolute values, or both
- **Shapes:** you may choose from rectangle, circle or ellipse with configurable positioning
- **Positive / negative difference:** distinguish differences with colours and symbols to be readily identifiable by users
- **Series labels:** use changing labels for Axis X, e.g. when you use calendar months for column names
- **Series formatting:** format data and total labels per category (legend)
- **Other formatting:** thousand and decimal separator, interaction with other visuals, empty data screen.



This visual offer in-app purchases and comes with a 30-day free trial version.

Power BI enhanced report format (PBIR) update (Preview)

The Power BI enhanced report format (PBIR), along with Power BI Project (PBIP) files, provides a great source-control and co-development experience due to its folder representation of the report definition in a public JSON format.



During the PBIR launch a few months ago, Microsoft acknowledged important service limitations and commitment to addressing them in the upcoming months. The following features are now available for reports using PBIR format:

- publishing a PBIR report from Power BI Desktop
- downloading a PBIX file using PBIR format from a workspace
- uploading a PBIX file using PBIR format to a workspace
- in the coming weeks, PBIR reports will be supported within Power BI Apps.

More next month.

New Features for Excel

This month's updates see the announcement of Copilot in Excel and Python in Excel, both of which are now Generally Available and ready to assist data-driven professionals around the world. In addition, there's the public Preview of Copilot in Excel with Python, enabling powerful advanced analysis too.

The full list is as follows:

Excel for Windows, Mac and the web

- Copilot in Excel

Excel for Windows

- Copilot in Excel with Python (Insiders)
- Python in Excel
- TRIMRANGE and accompanying trim references (Insiders)
- Accessibility Assistant.

Let's get started.

Copilot in Excel

Microsoft has recently unveiled the next wave of Copilot including the announcement that Copilot in Excel is now Generally Available in Excel for Windows, Mac and the web.

Copilot in Excel is built into your workbook, enabling you to iterate with it quickly and easily. Copilot in Excel with Python will further help you gain deeper insights without needing to be a Python expert. That's good news for me then.

Many of us spend hours every day just formatting your data sheets to more clearly view and use your data. Some of us have evolved to use

Power Query to assist extraction, said transformation and loading of the data into Excel. Now, Copilot can help you with these frequent tasks too.

Copilot can now reason over structured data, not just tables, and it can complete tasks such as adding filters or splitting text. Copilot can also help you highlight important information with formula based conditional formatting. For example, Copilot simplifies the process of highlighting crucial information, such as spending that's higher than revenue in a sales sheet.

Date	Product ID	Product Name	Category	Street address (public charge)	Sales Channel	Shipping State	Marketing Spend	Avg Customer Rating	Units Sold	Unit Price	Total Revenue
6/30/2024	FC-3001	Fast Charger Basic	Fast Chargers		Distributor	Wisconsin	\$ 16,500	4.6	9	\$ 4,500	\$ 40,500
6/30/2024	CC-2002	Commercial Charger Advanced	Commercial Chargers		Distributor	New Jersey	\$ 23,500	4.0	26	\$ 1,600	\$ 41,600
6/29/2024	HC-1001	Home Charger Basic	Home Chargers		Retail	Louisiana	\$ 35,000	4.2	12	\$ 360	\$ 4,320
6/29/2024	HC-1003	Home Charger Premium	Home Chargers		Direct	Tennessee	\$ 28,000	4.7	33	\$ 480	\$ 15,840
6/29/2024	FC-3001	Fast Charger Basic	Fast Chargers		Direct	Tennessee	\$ 16,500	4.6	35	\$ 4,500	\$ 155,250
6/28/2024	PC-4002	Public Charger Advanced	Public Chargers	1234 La Crosse Lar	Distributor	Wisconsin	\$ 14,500	4.1	18	\$ 4,500	\$ 81,000
6/28/2024	CC-2002	Commercial Charger Advanced	Commercial Chargers		Distributor	Louisiana	\$ 23,500	4.0	194	\$ 1,600	\$ 309,600
6/27/2024	PC-4001	Public Charger Standard	Public Chargers	2345 Gator Gully, C	Distributor	Louisiana	\$ 23,000	3.7	1	\$ 1,800	\$ 1,800
6/27/2024	PC-4003	Public Charger Pro	Public Chargers	3456 Freesia Ct, G	Direct	South Carolina	\$ 25,200	2.8	48	\$ 9,000	\$ 432,000
6/27/2024	HC-1001	Home Charger Basic	Home Chargers		Distributor	Kentucky	\$ 35,000	4.2	4	\$ 360	\$ 1,440
6/27/2024	CC-2001	Commercial Charger Standard	Commercial Chargers		Direct	Oregon	\$ 10,400	3.5	194	\$ 1,200	\$ 232,200
6/26/2024	CC-2002	Commercial Charger Adv	Commercial Chargers							\$ 1,600	\$ 216,800
6/25/2024	PC-4001	Public Charger Standard	Public Chargers							\$ 1,800	\$ 48,600
6/25/2024	HC-1001	Home Charger Basic	Home Chargers							\$ 360	\$ 5,040
6/25/2024	HC-1003	Home Charger Premium	Home Chargers							\$ 480	\$ 5,280
6/23/2024	CC-2002	Commercial Charger Adv	Commercial Chargers							\$ 1,600	\$ 24,000
6/22/2024	HC-1002	Home Charger Plus	Home Chargers							\$ 400	\$ 28,800
6/21/2024	FC-3001	Fast Charger Basic	Fast Chargers		Distributor	Georgia	\$ 16,500	4.6	35	\$ 4,500	\$ 155,250
6/21/2024	FC-3003	Fast Charger Premium	Fast Chargers		Direct	North Carolina	\$ 27,800	4.8	9	\$ 8,000	\$ 72,000
6/19/2024	HC-1001	Home Charger Basic	Home Chargers		Direct	Arizona	\$ 35,000	4.2	25	\$ 360	\$ 9,000
6/19/2024	FC-3002	Fast Charger Plus	Fast Chargers		Direct	New Jersey	\$ 34,871	3.3	112	\$ 6,750	\$ 756,000
6/19/2024	CC-2003	Commercial Charger Pro	Commercial Chargers		Direct	Alabama	\$ 24,200	2.9	32	\$ 2,700	\$ 86,400
6/19/2024	CC-2001	Commercial Charger Standard	Commercial Chargers		Direct	Texas	\$ 10,400	3.5	17	\$ 1,200	\$ 20,400
6/19/2024	CC-2001	Commercial Charger Standard	Commercial Chargers		Distributor	Kentucky	\$ 10,400	3.5	203	\$ 1,200	\$ 243,000
6/17/2024	CC-2003	Commercial Charger Pro	Commercial Chargers		Distributor	California	\$ 24,200	2.9	162	\$ 2,700	\$ 437,400
6/16/2024	PC-4003	Public Charger Pro	Public Chargers	5678 Wrangler Wa	Direct	Kentucky	\$ 25,200	2.8	23	\$ 9,000	\$ 207,000
6/16/2024	PC-4003	Public Charger Pro	Public Chargers	678 Dusty Trail, Tu	Direct	Arizona	\$ 25,200	2.8	1	\$ 9,000	\$ 9,000
6/15/2024	FC-3001	Fast Charger Basic	Fast Chargers		Direct	Washington	\$ 16,500	4.6	9	\$ 4,500	\$ 40,500
6/15/2024	HC-1002	Home Charger Plus	Home Chargers		Distributor	Massachusetts	\$ 22,500	3.1	24	\$ 400	\$ 9,600
6/15/2024	CC-2003	Commercial Charger Pro	Commercial Chargers		Distributor	Indiana	\$ 24,200	2.9	16	\$ 2,700	\$ 43,200
6/14/2024	PC-4003	Public Charger Pro	Public Chargers	789 Fleur-de-lis Fl	Distributor	Louisiana	\$ 25,200	2.8	21	\$ 9,000	\$ 189,000

Calculate the profit and the profitability

Looking at A1:L4533, here are 2 formula columns to review and insert in Columns M and N:

1. Profit

Calculates the profit for each product by multiplying the number of units sold by the unit price and then subtracting the marketing spend.

$$=[\text{Units Sold}]*[\text{Unit Price}]-[\text{Marketing Spend}]$$

Show explanation

2. Profitability

Determines the profitability of each product by calculating the difference between the total revenue from units sold and the marketing spend, then dividing this difference by the marketing spend to express it as a percentage.

$$=((([\text{Units Sold}]*[\text{Unit Price}])-[\text{Marketing Spend}])/[\text{Marketing Spend}]$$

2. Profitability

Determines the profitability of each product by calculating the difference between the total revenue from units sold and the marketing spend, then dividing this difference by the marketing spend to express it as a percentage.

$$=((([\text{Units Sold}]*[\text{Unit Price}])-[\text{Marketing Spend}])/[\text{Marketing Spend}]$$

Show explanation

	M	N
1	Profit	Profitability
2	\$24,000	145.45%
3	\$18,100	77.02%
4	\$(30,680)	-87.66%
5	\$(12,160)	-43.43%
...

+ Insert columns

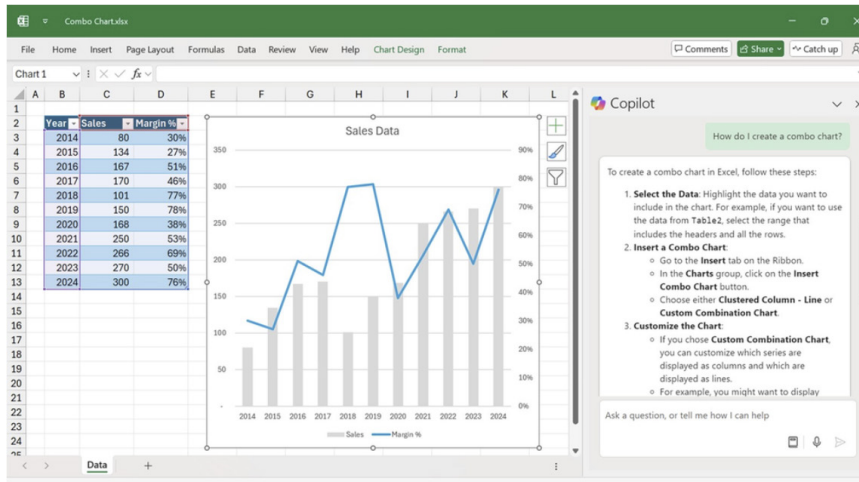
All-generated content may be incorrect

Date	Product ID	Product Name	Category	Street address (public charge)	Sales Channel	Shipping State	Marketing Spend	Avg Customer Rating	Units Sold	Unit Price	Total Revenue	Profit	Profitability
6/30/2024	FC-3001	Fast Charger Basic	Fast Chargers		Distributor	Wisconsin	\$ 16,500	4.6	9	\$ 4,500	\$ 40,500	\$ 24,000	145.45%
6/30/2024	CC-2002	Commercial Charger Advanced	Commercial Chargers		Distributor	New Jersey	\$ 23,500	4.0	26	\$ 1,600	\$ 41,600	\$ 18,100	77.02%
6/29/2024	HC-1001	Home Charger Basic	Home Chargers		Retail	Louisiana	\$ 35,000	4.2	12	\$ 360	\$ 4,320	\$(30,680)	-87.66%
6/29/2024	HC-1003	Home Charger Premium	Home Chargers		Direct	Tennessee	\$ 28,000	4.7	33	\$ 480	\$ 15,840	\$(12,160)	-43.43%
6/29/2024	FC-3001	Fast Charger Basic	Fast Chargers		Direct	Tennessee	\$ 16,500	4.6	35	\$ 4,500	\$ 155,250	\$ 138,750	840.91%
6/28/2024	PC-4002	Public Charger Advanced	Public Chargers	1234 La Crosse Ln	Distributor	Wisconsin	\$ 14,500	4.1	18	\$ 4,500	\$ 81,000	\$ 66,500	458.62%
6/28/2024	CC-2002	Commercial Charger Advanced	Commercial Chargers		Distributor	Louisiana	\$ 23,500	4.0	194	\$ 1,600	\$ 309,600	\$ 286,100	1217.45%
6/27/2024	PC-4001	Public Charger Standard	Public Chargers	2345 Gator Gulch	Distributor	Louisiana	\$ 23,000	3.7	1	\$ 1,800	\$ 1,800	\$ (21,200)	-92.17%
6/27/2024	PC-4003	Public Charger Pro	Public Chargers	3456 Freesia Ct, Gt	Direct	South Carolina	\$ 25,200	2.8	48	\$ 9,000	\$ 432,000	\$ 406,800	1614.29%
6/27/2024	HC-1001	Home Charger Basic	Home Chargers		Distributor	Kentucky	\$ 35,000	4.2	4	\$ 360	\$ 1,440	\$(33,560)	-95.89%
6/27/2024	CC-2001	Commercial Charger Standard	Commercial Chargers		Direct	Oregon	\$ 10,400	3.5	194	\$ 1,200	\$ 232,200	\$ 221,800	2132.69%
6/26/2024	CC-2002	Commercial Charger Advanced	Commercial Chargers		Direct	Texas	\$ 23,500	4.0	198	\$ 1,600	\$ 316,800	\$ 293,300	1248.09%
6/25/2024	PC-4001	Public Charger Standard	Public Chargers	456 Cedar Lane, Cr	Distributor	North Carolina	\$ 23,000	3.7	27	\$ 1,800	\$ 48,600	\$ 25,600	111.30%
6/25/2024	HC-1001	Home Charger Basic	Home Chargers		Retail	Maryland	\$ 35,000	4.2	14	\$ 360	\$ 5,040	\$(29,960)	-85.60%
6/25/2024	HC-1003	Home Charger Premium	Home Chargers		Retail	Colorado	\$ 28,000	4.7	11	\$ 480	\$ 5,280	\$(22,720)	-81.14%
6/23/2024	CC-2002	Commercial Charger Advanced	Commercial Chargers		Distributor	New York	\$ 23,500	4.0	15	\$ 1,600	\$ 24,000	\$ 900	2.13%
6/22/2024	HC-1002	Home Charger Plus	Home Chargers		Direct	Illinois	\$ 22,500	3.1	72	\$ 400	\$ 28,800	\$ 6,300	28.00%
6/21/2024	FC-3001	Fast Charger Basic	Fast Chargers		Distributor	Georgia	\$ 16,500	4.6	35	\$ 4,500	\$ 155,250	\$ 138,750	840.91%
6/21/2024	FC-3003	Fast Charger Premium	Fast Chargers		Direct	North Carolina	\$ 27,800	4.8	9	\$ 8,000	\$ 72,000	\$ 44,200	158.99%
6/19/2024	HC-1001	Home Charger Basic	Home Chargers		Direct	Arizona	\$ 35,000	4.2	25	\$ 360	\$ 9,000	\$(26,000)	-74.29%
6/19/2024	FC-3002	Fast Charger Plus	Fast Chargers		Direct	New Jersey	\$ 34,871	3.3	112	\$ 6,750	\$ 756,000	\$ 721,129	2067.99%
6/19/2024	CC-2003	Commercial Charger Pro	Commercial Chargers		Direct	Alabama	\$ 24,200	2.9	32	\$ 2,700	\$ 86,400	\$ 62,200	257.02%
6/19/2024	CC-2001	Commercial Charger Standard	Commercial Chargers		Direct	Texas	\$ 10,400	3.5	17	\$ 1,200	\$ 20,400	\$ 10,200	96.15%
6/19/2024	CC-2001	Commercial Charger Standard	Commercial Chargers		Distributor	Kentucky	\$ 10,400	3.5	203	\$ 1,200	\$ 243,000	\$ 232,600	2236.54%
6/17/2024	CC-2003	Commercial Charger Pro	Commercial Chargers		Distributor	California	\$ 24,200	2.9	162	\$ 2,700	\$ 437,400	\$ 413,200	1707.44%
6/16/2024	PC-4003	Public Charger Pro	Public Chargers	5678 Wrangler Way	Direct	Kentucky	\$ 25,200	2.8	23	\$ 9,000	\$ 207,000	\$ 181,800	721.43%
6/16/2024	PC-4003	Public Charger Pro	Public Chargers	678 Dusty Trail, Tu	Direct	Arizona	\$ 25,200	2.8	1	\$ 9,000	\$ 9,000	\$(16,200)	-64.29%
6/15/2024	FC-3001	Fast Charger Basic	Fast Chargers		Direct	Washington	\$ 16,500	4.6	9	\$ 4,500	\$ 40,500	\$ 24,000	145.45%
6/15/2024	HC-1002	Home Charger Plus	Home Chargers		Distributor	Massachusetts	\$ 22,500	3.1	24	\$ 400	\$ 9,600	\$(12,900)	-57.33%
6/15/2024	CC-2003	Commercial Charger Pro	Commercial Chargers		Distributor	Indiana	\$ 24,200	2.9	16	\$ 2,700	\$ 43,200	\$ 19,000	78.51%
6/14/2024	PC-4003	Public Charger Pro	Public Chargers	789 Fleur-de-lis Pl	Distributor	Louisiana	\$ 25,200	2.8	21	\$ 9,000	\$ 189,000	\$ 163,800	650.00%

Here, Copilot in Excel was asked to calculate the profit and profitability. Copilot provided suggested formulae. One of the suggestions is previewed, then inserted into the spreadsheet.

As well as constructing formulae and implementing formatting, Copilot also provides steps and explanations along the way. When you ask Copilot

a question, it will now respond with a suggestion and an explanation of all the steps to show its "thinking". You can preview the suggested action and then choose what to apply. When Copilot can't make a direct change to your data, it will provide you with steps you can take to make the change yourself.



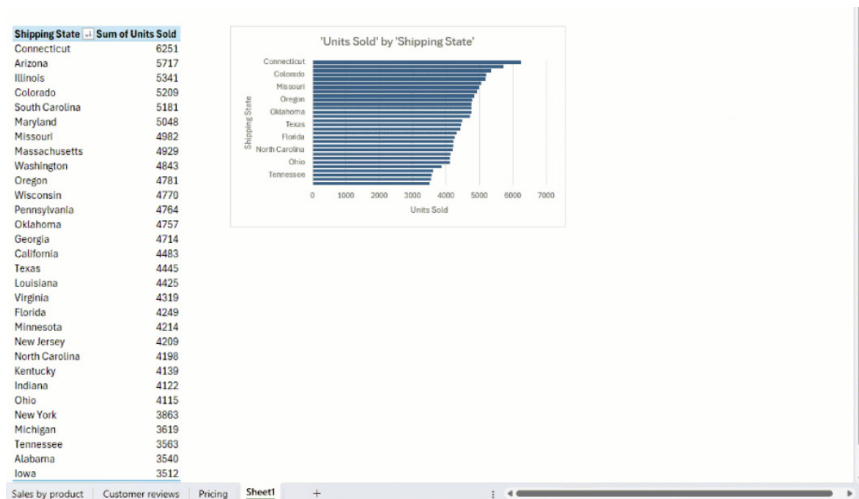
In this example, Copilot in Excel provides steps to manually accomplish a task, creating a specific chart.

Gaining insights is one of the most difficult parts of working with data. Copilot can help simply request insights from Copilot using its natural language.

As part of Copilot's analysis, Microsoft also announced that it now recommends the best visual formats, like Bar charts, Line graphs, or

PivotTables and offers what it considers to be the right sets of fields layouts and filters for you, creating a specific chart or PivotTable so you can get all the benefits of Excel's powerful capabilities without being an expert.

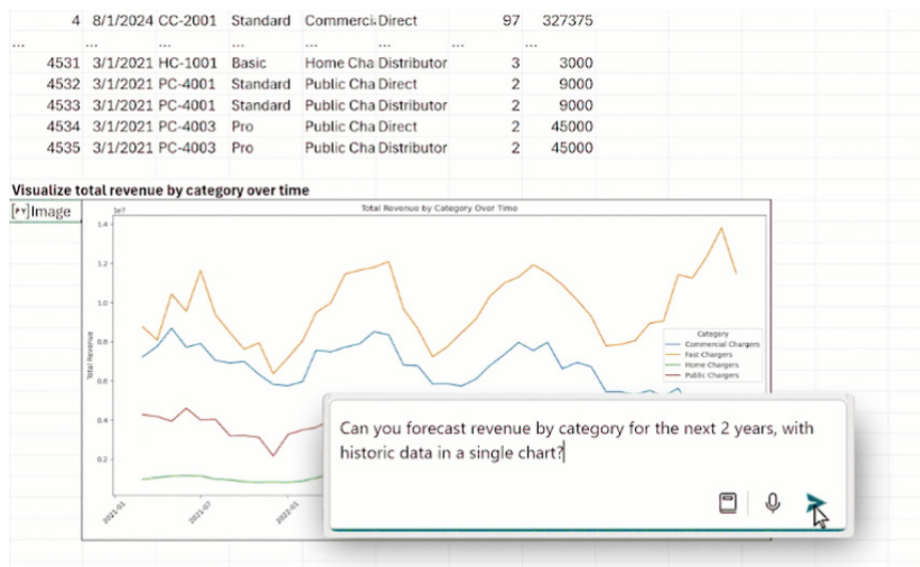
For example, a sales consultant can easily understand the relationship between ad spend and campaign reach, with Copilot generating a PivotTable to aid in planning the next quarter's budget:



Copilot in Excel is asked to group units sold by state. Copilot provides a suggested PivotTable. The PivotTable is inserted onto a new spreadsheet.

Copilot in Excel with Python (Insiders)

Copilot in Excel works with Python too in Windows (Insiders). Analysts often have specific needs to conduct analysis which takes time and expertise. Now using Copilot in Excel with Python, you can conduct assisted analysis. You can use natural language to describe the analysis you want to perform, and Copilot will automatically generate, explain, and insert Python code into your Excel spreadsheet.



4	8/1/2024	CC-2001	Standard	Commerci-Direct	97	327375
4531	3/1/2021	HC-1001	Basic	Home Cha Distributor	3	3000
4532	3/1/2021	PC-4001	Standard	Public Cha Direct	2	9000
4533	3/1/2021	PC-4001	Standard	Public Cha Distributor	2	9000
4534	3/1/2021	PC-4003	Pro	Public Cha Direct	2	45000
4535	3/1/2021	PC-4003	Pro	Public Cha Distributor	2	45000

Visualize total revenue by category over time

Can you forecast revenue by category for the next 2 years, with historic data in a single chart?

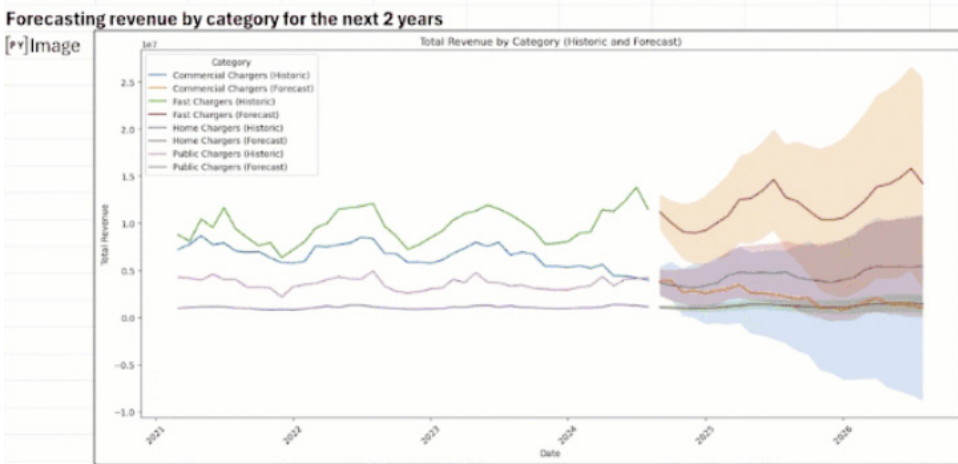
To forecast revenue by category for the next 2 years, I will use the SARIMAX model from the statsmodels library. This model is suitable for time series forecasting and can handle seasonal effects. I will first prepare the data by aggregating the total revenue by date and category, then fit the SARIMAX model for each category, and finally plot the historic and forecasted revenue in a single chart.

AI-generated content may be incorrect.

```

Python
1 #Forecasting revenue by category for
  the next 2 years
2 from statsmodels.tsa.statespace.
  sarimax import SARIMAX
3 import numpy as np
4
  
```

Show explanation



Here, Copilot in Excel with Python is prompted to forecast revenue. Copilot creates and inserts Python code including a chart.

This unlocks powerful analytics via Python for visualisations, cleaning data, machine learning, predictive analytics, and more - without needing to be Python proficient yourself. Unique visuals like heatmaps, pairplots, multiplots, and violin plots help you understand and communicate your analysis. That was much more difficult in the past.

A21

	A	B	C	D	E	F	G
1	Advanced Analysis						
2	This sheet will include all Python code generated by Copilot.						
3							
4	Load data from EV Charger Data, Table14						
5	[+] DataFrame						
6							
7	Preview						
8		Product_ID	Category	Revenue	Units_Sold	Marketing_Prod	
9	0	P001	Standard C	2505	55	1323.7	Abso
10	1	P002	Fast Charge	2515	58	1241.6	Not s
11	2	P003	Standard C	2515	55	1219.7	This p
12	3	P004	Standard C	3658	54	1265	Great
13	4	P005	Standard C	5006	51	1326.8	Wors
14
15	45	P046	Fast Charge	11648.25	49	1432.83	Charg
16	46	P047	Fast Charge	17460	85	2233	Satis
17	47	P049	Standard C	20257	94	2468.7	Simp
18	48	P048	Fast Charge	11297.25	56	1425.73	Great
19	49	P050	Standard C	11961.06	53	1426.11	Good
20							
21							
22							

AI-generated content may be incorrect.

The boxplot above shows the revenue distribution by product category. It provides insights into the spread and central tendency of revenue within each category. You can proceed with further analysis such as examining the correlation between marketing spend and units sold, performing sentiment analysis on product reviews, or identifying top-performing products.

AI-generated content may be incorrect.

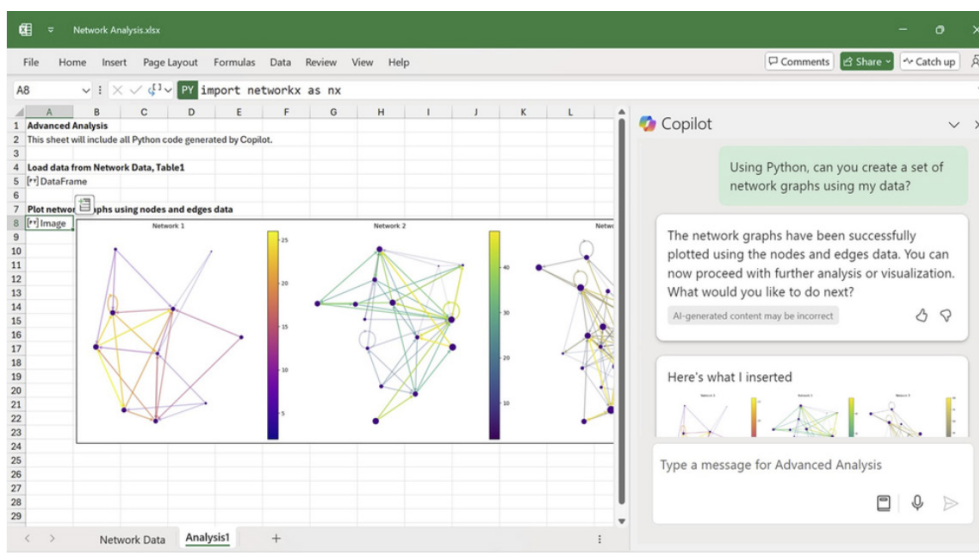
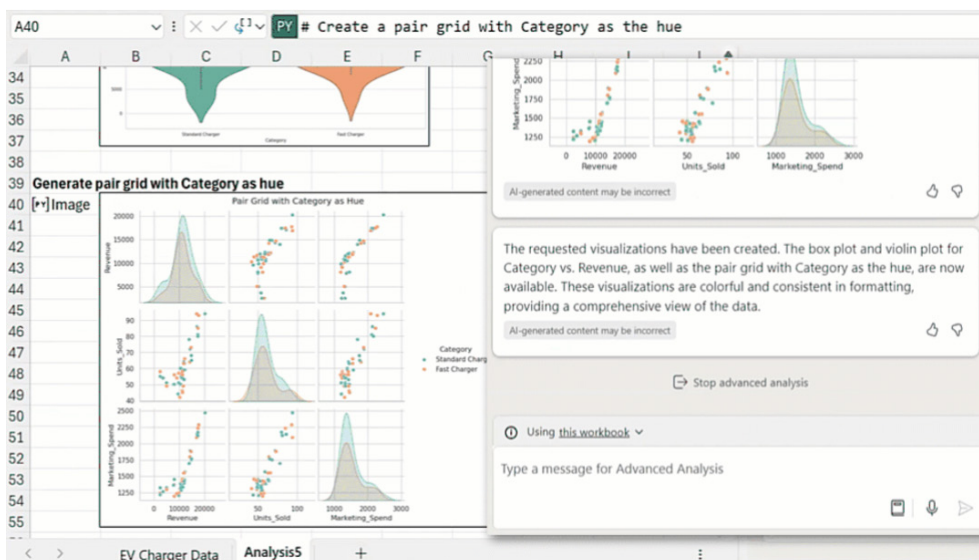
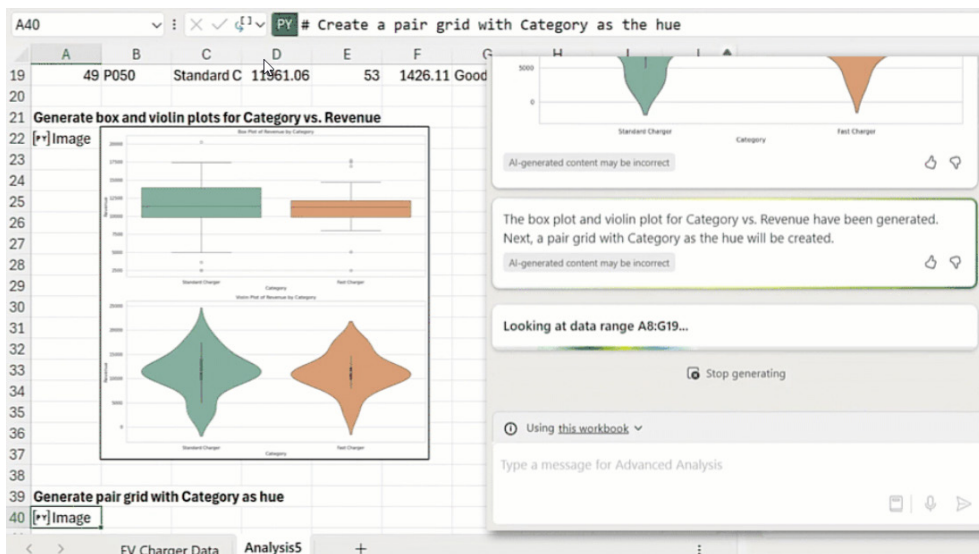
Stop advanced analysis

Analyze the correlation between marketing spend and units sold.

Perform sentiment analysis on product reviews.

Using this workbook

Create 3 visualizations for me including a box and violin plot using Category and revenue, as well as a pair grid using Category as the Hue. Make them colorful, and consistent in formatting.



Copilot in Excel with Python is asked to visualise data. Copilot creates and inserts Python code resulting in three [3] chart types.

Python in Excel leverages Anaconda Distribution for Python which includes the most popular Python libraries such as pandas, Matplotlib and scikit-learn. Now, Copilot in Excel with Python can use these libraries too, unlocking their potential with everyday language.

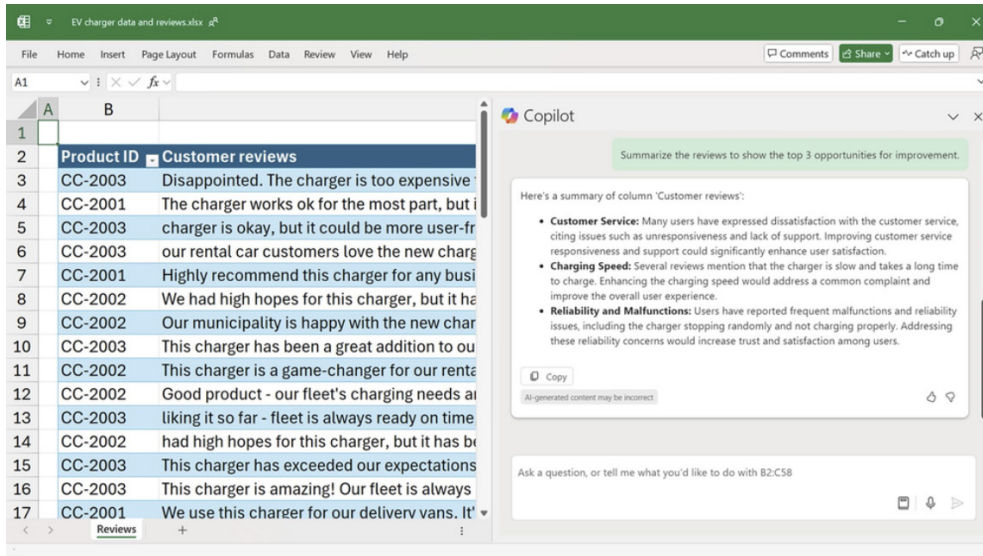
Copilot in Excel with Python not only analyses and visualises data, it also shares its thinking, showing and explaining the code it's using so that you understand how it's working. It creates a dedicated analysis sheet, with a sandbox for you to collaborate with Copilot, whilst leaving the original source data untouched. The analysis is refreshable so when source data is updated, you can get an updated analysis as well. You may even edit the code directly in the spreadsheet giving you full control to adjust as you wish.

Copilot in Excel with Python is rolling out to Windows for Insiders and requires a Microsoft 365 Copilot licence. Once enabled you can simply click the 'Advanced analysis' prompt suggestion or write a customised prompt asking Copilot to 'analyze with Python'.

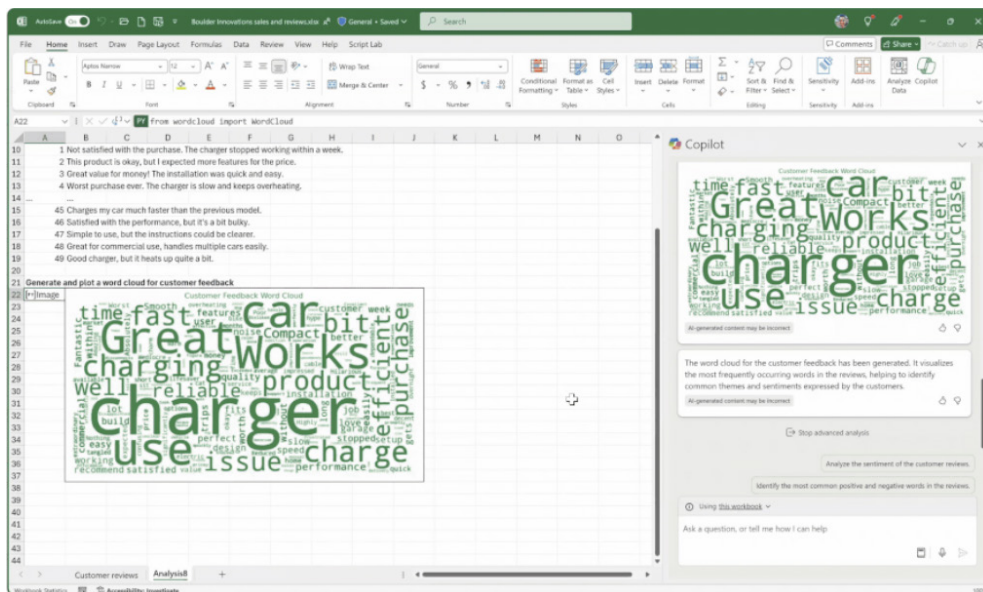
Furthermore, not all analysis is undertaken with numerical data: Copilot can now analyse text, transforming raw textual data into actionable

insights. Copilot can handle reasonably complex datasets, whether they are numerical or textual.

For instance, a marketing manager can obtain a summary of product reviews to better understand opportunities and challenges. Being able to analyse text with Copilot saves the marketing manager valuable time and energy.



Copilot in Excel with Python helps you go even further by analysing text-based data too. This provides even deeper insights such as sentiment analysis and keyword extraction, powerful text analytics libraries such as NLTK, and unique visuals like a word cloud that help communicate text-based trends.



Copilot is now available in Excel with a Microsoft 365 Copilot licence; join the Microsoft 365 Insider's program for Copilot in Excel with Python too.

Python in Excel

Python in Excel is now Generally Available for Windows users of Microsoft 365 Business and Enterprise. Back in August 2023, in partnership with Anaconda, Microsoft introduced Python integrated into Excel, making it possible to combine Python and Excel analytics within the same workbook, with no setup required. Since then, Excel has brought the power of popular Python analytics libraries such as pandas, Matplotlib and NLTK to analytical users.

With Python in Excel, users can implement advanced analytics for visualisations, data clean(s)ing, machine learning, predictive analytics, and more.

Advanced modelling capabilities in Python offer detailed and flexible optimisation analysis, such as Monte Carlo simulations. These capabilities allow users to handle complex scenarios, providing deeper insights into their data.

```

I2 PY results = [simulate_farm_costs() for _ in range(n_simulations)]
# Visualization
plt.hist(results, bins=50, edgecolor='black', color=colors[3])
plt.title('Distribution of Total Farm Costs')

```

Dizzy Duck Acres

Input Farm Model Output Image

Product	Cost Avg.	Std. Dev
Wheat	\$ 2	\$ 3
Soybean Seed	\$ 5	\$ 5
Fertilizer Wheat	\$ 5	\$ 5
Fertilizer Soybean	\$ 6	\$ 4
Labor	\$ 1	\$ 3
Pesticide	\$ 3	\$ 3
Fuel Maintenance	\$ 2	\$ 2
Miscellaneous	\$ 1	\$ 1

Acres: 100
Simulations: 100,000

NetworkX is a powerful tool for creating and analysing complex networks, offering flexibility to model and visualise relationships between nodes effectively.

```

D11 PY # Draw the nodes with a golf ball-like appearance
def draw_golf_ball(ax, center, color, size):
    circle = plt.Circle(center, size, linewidth=2, zorder=5)
    ax.add_patch(circle)

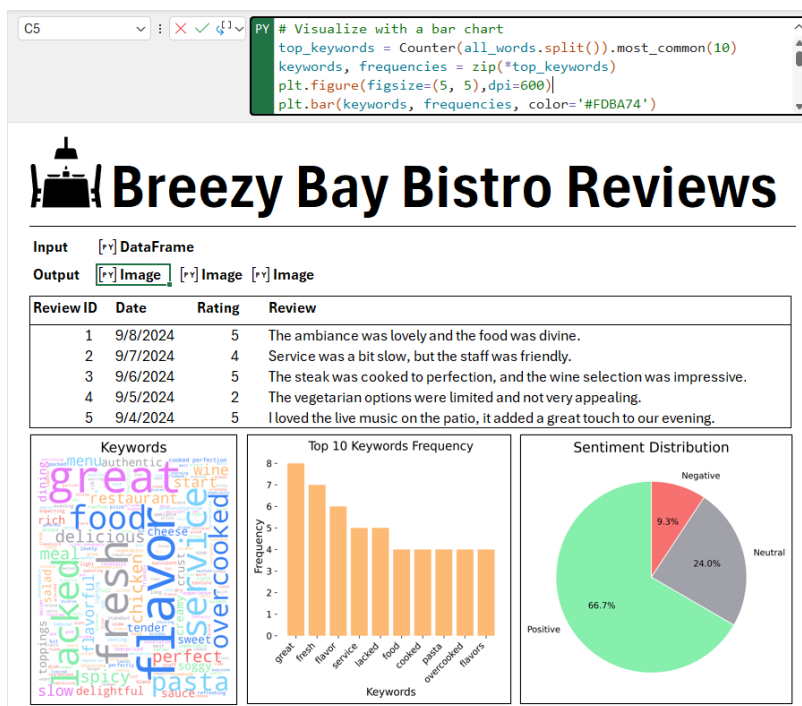
```

Emerald Cup Classic

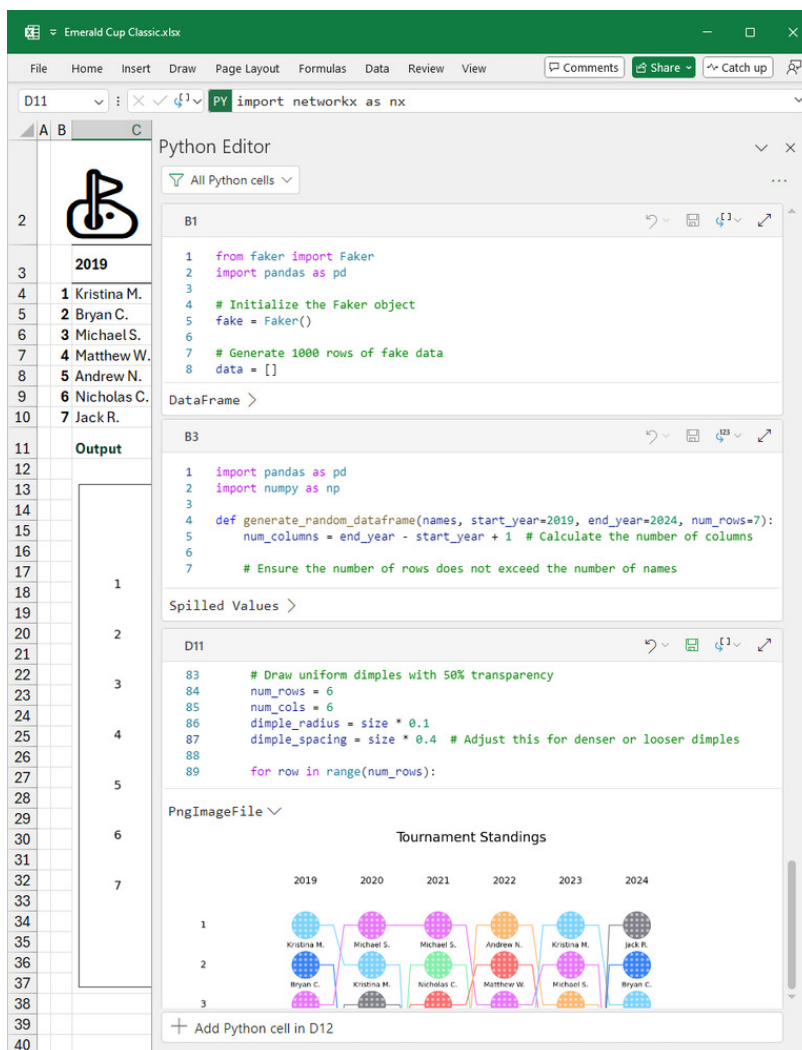
2019	2020	2021	2022	2023	2024
1 Megan R.	Jessica W.	Megan R.	Cassandra F.	Michael C.	Cassandra F.
2 Christine B.	Christine B.	Derrick M.	Megan R.	Jessica W.	Megan R.
3 Jessica W.	Megan R.	Cassandra F.	Derrick M.	Megan R.	Derrick M.
4 Michael C.	Michael C.	Jessica W.	Debra B.	Debra B.	Debra B.
5 Cassandra F.	Cassandra F.	Michael C.	Michael C.	Cassandra F.	Jessica W.
6 Debra B.	Derrick M.	Debra B.	Christine B.	Christine B.	Michael C.
7 Derrick M.	Debra B.	Christine B.	Jessica W.	Derrick M.	Christine B.

Output Image

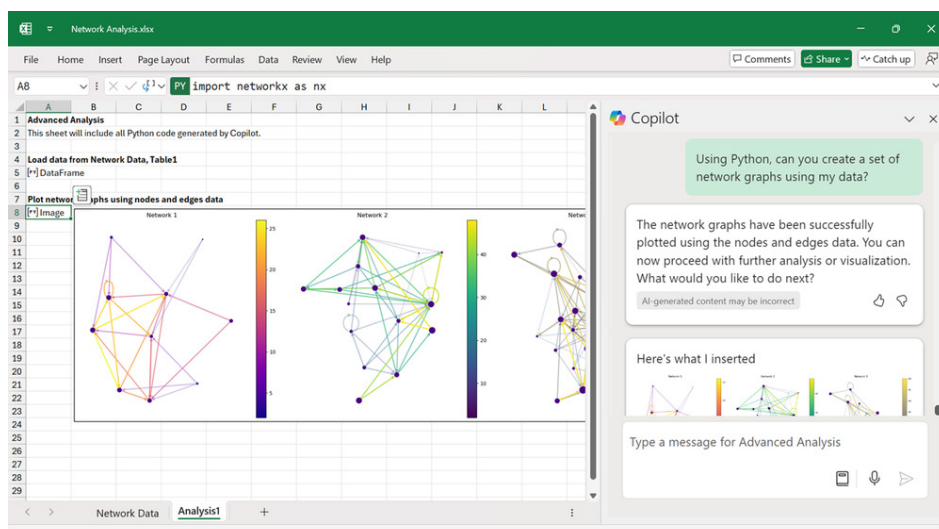
The NLTK and word cloud libraries in Python provide robust tools for text analysis and visualisation. NLTK excels in natural language processing tasks, whilst Word Cloud generates visually engaging representations of textual data.



Python includes new features like syntax highlighting, code completion and aid when referencing data with the `xl()` function. All of these have been added directly to the Formula bar. Furthermore, the recently announced the Python Editor acts as a new platform for authoring code and leverages many of the same experiences found in Visual Studio Code.



The public Preview of Copilot in Excel with Python is designed to leverage AI to unlock the power of Python in Excel to a broader set of users. With Copilot, you can use natural language to describe the analysis you want to perform, and it will automatically generate, explain and insert Python code into your Excel spreadsheet.



Python code used by Excel runs on the Microsoft Cloud with enterprise-level security as a compliant Microsoft 365 connected experience, just like OneDrive. The Python code runs in its own hypervisor isolated container using Azure Container Instances and secure, source-built packages from Anaconda through a secure software supply chain. Python in Excel keeps your data private by preventing the Python code from knowing who you are, and opening workbooks from the internet in further isolation within their own separate containers. Data from your workbooks can only be sent via the built-in `xl()` Python function, and the output of the Python code can only be returned as the result of the `=PY()` Excel function. The containers stay online as long as the workbook is

open or until a timeout occurs. Microsoft emphasises that your data does not persist in the Microsoft Cloud.

Python in Excel is now Generally Available for Windows users of Microsoft 365 Business and Enterprise. With qualifying Microsoft 365 subscriptions, you can calculate Python formulae with standard compute and automatic recalculation mode. For faster calculations with premium computing and access to manual or partial recalculation modes, you must purchase the Python in Excel add-on licence or request the licence from your organisation's administrator.

TRIMRANGE and accompanying trim references (Insiders)

Microsoft recently announced a new function, **TRIMRANGE**, and an accompanying set of new reference operators for Excel for Windows. Albeit in Preview only (and presently only to a select few which seems to be slightly less than the number of lottery winners on the moon), **TRIMRANGE** scans in from the edges of a range or array until it finds

the first non-blank cell (or value). It then excludes those blank rows or columns.

It should be noted that **TRIMRANGE** and the associated new reference operators are not text functions, so they are not going to be useful for cell contents, such as line breaks or carriage returns.

The syntax is as follows:

TRIMRANGE(range, [trim_rows], [trim_columns])

It has three [3] arguments:

- **range:** this argument is required and represents the range (or array) to be trimmed
- **trim_rows:** this argument is optional and determines which rows should be trimmed by selecting one of four [4] values:
 - **0:** none
 - **1:** trims leading blank rows
 - **2:** trims trailing blank rows
 - **3 (default if omitted):** trims both leading and trailing blank rows
- **trim_columns:** this argument is optional and determines which columns should be trimmed by selecting one of four [4] values:
 - **0:** none
 - **1:** trims leading blank columns
 - **2:** trims trailing blank columns
 - **3 (default if omitted):** trims both leading and trailing blank columns.

In essence, the **TRIMRANGE** function removes empty rows and / or columns from the edges of a range. This can be particularly useful when writing dynamic array formulae or optimising aggregation, array or lambda functions for performance.

just at the beginning and end of a text string but throughout. We can't help feeling options to remove blank rows / columns throughout the range might be welcomed by many and feel there are many areas where this would be beneficial (e.g. charting, dashboards, summary outputs).

We think **TRIMRANGE** may have missed a trick here in its initial Preview guise as we think of the **TRIM** function which removes excess space, not

In the example below, **TRIMRANGE** has been used to calculate the length of any text entered into column **A**:

	A	B	C
1	Eggs		4
2	Milk		4
3	Butter		6
4	Bananas		7
5	Cookies		7
6			

The formula here is given by

=LEN(A1:A5)

However, we might wish to extend the range to add more words in column A, and this can lead to redundant calculations and possibly slower performance as the spreadsheet becomes more complex.

	A	B	C	D
1	Eggs		4	
2	Milk		4	
3	Butter		6	
4	Bananas		7	
5	Cookies		7	
6			0	
7			0	
8			0	
9			0	
10			0	
11			0	

This is where the formula

=LEN(TRIMRANGE(A:A))

can come to the rescue and remove unused calculations (but reinstate them later if more text is added in column A):

	A	B	C	D
1	Eggs		=LEN(TRIMRANGE(A:A))	
2	Milk		4	
3	Butter		6	
4	Bananas		7	
5	Cookies		7	
6			0	
7			0	
8			0	
9			0	
10			0	
11			0	

Easy!

	A	B	C
1	Eggs		4
2	Milk		4
3	Butter		6
4	Bananas		7
5	Cookies		7
6			

Without the use of **TRIMRANGE**,

=LEN(A:A)

would calculate for every cell in column **C**, returning over a million unnecessary results. Besides being inefficient, trailing undesirable zeroes are returned to the grid. This can be especially problematic if you then try and operate on the spill using **=C1#** notation.

TRIMRANGE is also a useful tool for optimising the performance of lambda functions that operate on ranges. No doubt Microsoft has some particular scenarios in mind here (more new dynamic array functions soon

possibly?). It allows lambda authors to more tightly scope ranges, which can reduce the number of required computations.

We don't have this function ourselves yet, but anecdotal evidence suggests this function will not work with three-dimensional references, but it does seem to work with arrays as well as ranges. We shall do more testing as and when we can!

This new function has provided Microsoft with the opportunity to introduce **Trim References**, also known as **Trim Refs**. These may be used to achieve the same functionality as **TRIMRANGE** more succinctly by replacing the range's colon ":" with one of the three Trim Ref types described below:

Type	Example	Equivalent TRIMRANGE	Description
Trim All (.:)	A1:..E10	TRIMRANGE(A1:E10,3,3)	Trim leading and trailing blanks
Trim Trailing (.:)	A1:..E10	TRIMRANGE(A1:E10,2,2)	Trim trailing blanks
Trim Leading (.:)	A1:..E10	TRIMRANGE(A1:E10,1,1)	Trim leading blanks

Personally, I'd like a different syntax such as **<:>**, **<:** and **:>** to make it easier to read for accessibility purposes, but hey, beggars cannot be choosers. Remember, all of the above is in Preview: your feedback is welcomed and there is still time to make a difference before they land in production / become Generally Available.

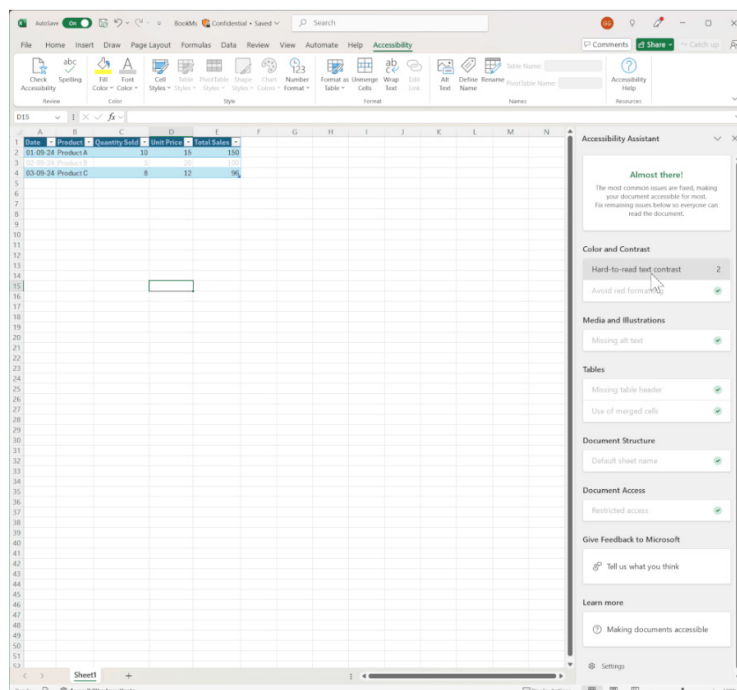
Full-column references are often avoided because they can have poor performance with some functions. However, with Trim Refs, they are

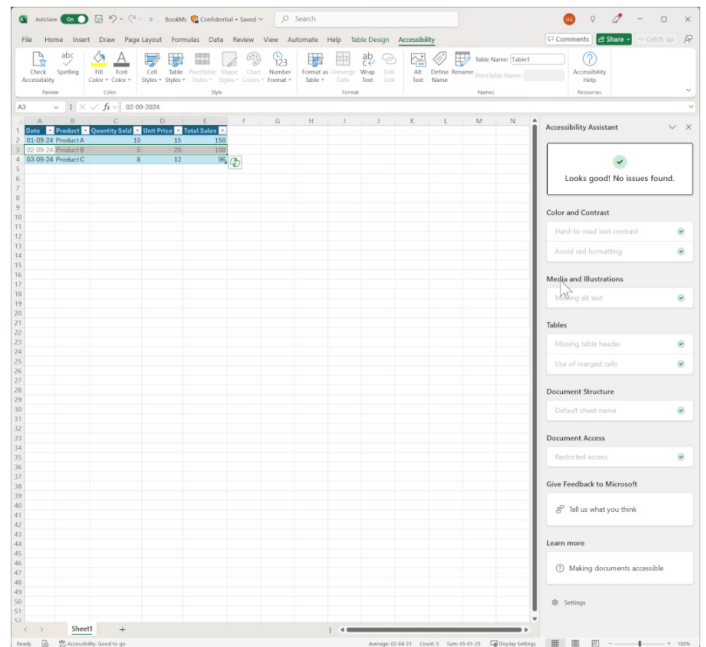
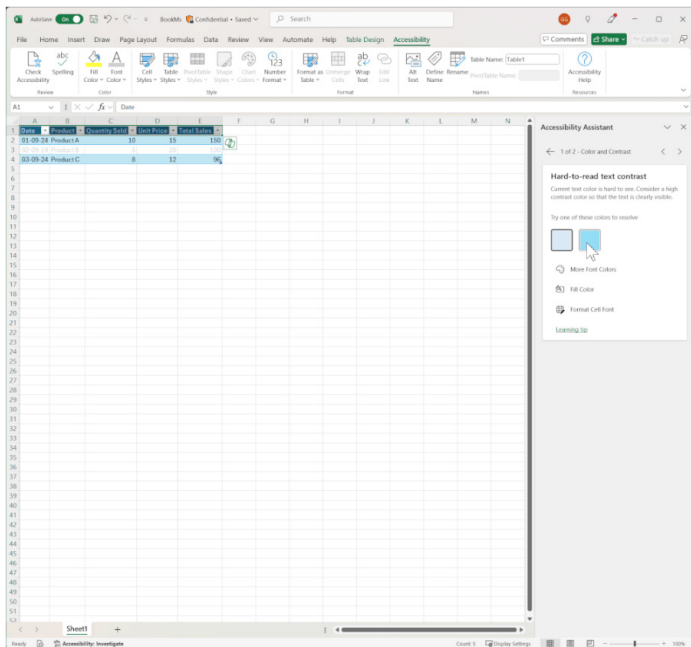
much more performant as the full-column reference can be constrained to just the portion with values.

Before you get too excited, this new function and these new references are currently available to Beta Channel users running **Version 2409 (Build 18020.2000)** or later, and even then, it's not everyone – yet! Pray Santa thinks you've been good!

Accessibility Assistant

Also for Excel for Windows, the Accessibility Assistant helps you to create inclusive content that is accessible to all readers. It flags and helps you fix issues that could prevent your documents from being understood and used by everyone.





Until next month.

The A to Z of Excel Functions: OCT2BIN

This function converts an octal number (base eight) to a binary number (base two).



The **OCT2BIN** function employs the following syntax to operate:

OCT2BIN(number, [places])

The **OCT2BIN** function has the following arguments:

- **number:** this is required and represents the octal number you wish to convert. It should be noted that **number** cannot contain more than 10 octal characters (30 bits) and that the most significant bit of **number** is the sign bit. The remaining 29 bits are magnitude bits. Negative numbers are represented using **two's complement** notation
- **places:** this is optional and represents the number of characters to use. If **places** is omitted, **OCT2BIN** uses the minimum number of characters necessary. The argument **places** is useful for padding the return value with leading 0s (zeroes).

Two's complement is a mathematical operation on binary numbers, as well as a binary signed number representation based on this operation. The two's complement of an **N**-bit number is defined as the complement with respect to 2^N ; in other words, it is the result of subtracting the number from 2^N . This is also equivalent to taking the

ones' complement and then adding one, since the sum of a number and its ones' complement is all 1 bits. The two's complement of a number behaves like the negative of the original number in most arithmetic, and positive and negative numbers can coexist in a natural way.

It should be further noted that:

- if **number** is negative, **OCT2BIN** ignores **places** and returns a 10-character binary number
- if **number** is negative, it cannot be less than 7777777000, and if **number** is positive, it cannot be greater than 777
- If **number** is not a valid octal number, **OCT2BIN** returns the **#NUM!** error value
- if **OCT2BIN** requires more than **places** characters, it returns the **#NUM!** error value
- if **places** is not an integer, it is truncated
- if **places** is nonnumeric, **OCT2BIN** returns the **#VALUE!** error value
- if **places** is negative, **OCT2BIN** returns the **#NUM!** error value.

Please see some examples below:

	A	B	C	D
1	Value	Result	Formula	Description
2	3	011	=OCT2BIN(A2,3)	Converts octal 3 to binary with three characters
3	7777777000	1000000000	=OCT2BIN(A3)	Converts octal 7777777000 to binary
4	150	#NUM!	=OCT2BIN(A4,2)	Converts octal 150 to binary with two characters, producing an error
5	150	0001101000	=OCT2BIN(A5,10)	Converts octal 150 to binary with 10 characters

The A to Z of Excel Functions: OCT2DEC

This function converts an octal number (base eight) to a decimal number (base 10).

October 2022

SUN	MON	TUE	WED	THU	FRI	SAT
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

November 2022

SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

December 2022

SUN	MON	TUE	WED	THU	FRI	SAT
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

The **OCT2DEC** function employs the following syntax to operate:

OCT2DEC(number)

The **OCT2DEC** function has the following arguments:

- **number**: this is required and represents the octal number you wish to convert. It should be noted that **number** cannot contain more than 10 octal characters (30 bits) and that the most significant bit of **number** is the sign bit. The remaining 29 bits are magnitude bits. Negative numbers are represented using **two's complement** notation.

It should be further noted that:

- if **number** is not a valid octal number, **OCT2DEC** returns the **#NUM!** error.

Please see our example below:

	A	B	C	D
1	Value	Result	Formula	Description
2	54	44	=OCT2DEC(A2)	Converts octal 54 to decimal
3	777777533	-165	=OCT2DEC(A3)	Converts octal 777777533 to decimal

The A to Z of Excel Functions: OCT2HEX

This function converts an octal number (base eight) to a hexadecimal number (base 16).



The **OCT2HEX** function employs the following syntax to operate:

OCT2HEX(number, [places])

The **OCT2HEX** function has the following arguments:

- **number**: this is required and represents the octal number you wish to convert. It should be noted that **number** cannot contain more than 10 octal characters (30 bits) and that the most significant bit of **number** is the sign bit. The remaining 29 bits are magnitude bits. Negative numbers are represented using **two's complement** notation
- **places**: this is optional and represents the number of characters to use. If **places** is omitted, **OCT2HEX** uses the minimum number of characters necessary. The argument **places** is useful for padding the return value with leading 0s (zeros).

It should be further noted that:

- if **number** is negative, **OCT2HEX** ignores **places** and returns a 10-character hexadecimal number
- If **number** is not a valid octal number, **OCT2HEX** returns the **#NUM!** error value
- if **OCT2HEX** requires more than **places** characters, it returns the **#NUM!** error value
- if **places** is not an integer, it is truncated
- if **places** is nonnumeric, **OCT2HEX** returns the **#VALUE!** error value
- if **places** is negative, **OCT2HEX** returns the **#NUM!** error value.

Please see our final example for this month below:

	A	B	C	D
1	Value	Result	Formula	Description
2	100	0040	=OCT2HEX(A2,4)	Converts octal 100 to hexadecimal with four characters
3	777777000	FFFFFFE00	=OCT2HEX(A3)	Converts octal 777777000 to binary
4	150	68	=OCT2HEX(A4,2)	Converts octal 150 to hexadecimal with two characters, producing an error
5	150	000000068	=OCT2HEX(A5,10)	Converts octal 150 to hexadecimal with 10 characters

More Excel Functions next month.

Beat the Boredom Suggested Solution

Were you able to work around the flexible Income Statement from earlier in the newsletter?

The challenge

To recap, I had a Chart of Accounts which was subject to change, such as line items that might be added or removed.

Report	Level 1	Level 2	Account No
Income Statement	Income	Government - Operating Grants	501001
Income Statement	Income	Government - Operating Grants	501002
Income Statement	Income	Government - Operating Grants	501003
Income Statement	Income	Government - Operating Grants	501004
Income Statement	Income	Investment Income	541001
Income Statement	Income	Investment Income	541002
Income Statement	Income	Investment Income	541011
Income Statement	Income	Other Fees	553001
Income Statement	Income	Other Fees	553002
Income Statement	Income	Other Fees	553003
Income Statement	Income	Other Fees	553004
Income Statement	Income	Commercial Income	561001
Income Statement	Income	Commercial Income	561002
Income Statement	Income	Commercial Income	561003
Income Statement	Income	Commercial Income	561004
Income Statement	Income	Commercial Income	561005
Income Statement	Income	Commercial Income	561006
Income Statement	Income	Commercial Income	561007
Income Statement	Income	Other Income	571001
Income Statement	Income	Other Income	571011
Income Statement	Income	Other Income	571021
Income Statement	Income	Other Income	571025
Income Statement	Income	Other Income	571031
Income Statement	Income	Other Income	571041
Income Statement	Income	Income Transfers	573001
Income Statement	Income	Income Transfers	573002
Income Statement	Income	Income Transfers	573100
Income Statement	Salary Expenditure	Sessional	703101
Income Statement	Salary Expenditure	Sessional	703102
Income Statement	Salary Expenditure	Sessional	703103
Income Statement	Salary Expenditure	Sessional	703104
Income Statement	Salary Expenditure	General - Administrative	704101
Income Statement	Salary Expenditure	General - Administrative	704102
Income Statement	Salary Expenditure	General - Administrative	704103
Income Statement	Salary Expenditure	Trades	706101
Income Statement	Salary Expenditure	Trades	706102
Income Statement	Salary Expenditure	Trades	706103
Income Statement	Salary Expenditure	Trades	706104
Income Statement	Salary Expenditure	Trades	706105
Income Statement	Salary Expenditure	Trades	706106
Income Statement	Salary Expenditure	External Paid	710001
Income Statement	Salary Expenditure	Overseas Visitors	712101
Income Statement	Salary Expenditure	Overseas Visitors	712201
Income Statement	Non Salary Expenditure	Depreciation & Amortisation	731001
Income Statement	Non Salary Expenditure	Depreciation & Amortisation	731002

I also had the calculation results for each item in the Chart of Accounts, which were to be used to build the financial report:

Item	Account No.	Mar 19	Jun 19	Sep 19	Dec 19
Revenue					
Government - Operating Grants	501001	629,030	450,555	527,599	487,014
Government - Operating Grants	501002	8,567,641	6,149,732	7,193,203	5,807,838
Government - Operating Grants	501003	90,024	263,855	218,073	696,805
Government - Operating Grants	501004	7,812,764	6,138,601	7,254,710	6,696,656
Investment Income	541001	907,192	2,961,228	2,197,561	6,106,820
Investment Income	541002	631,155	2,060,197	1,528,896	4,248,660
Investment Income	541011	45,012	146,927	108,036	303,002
Other Fees	553001	2,992,724	3,300,880	3,425,242	3,522,623
Other Fees	553002	1,849,729	2,158,817	680,309	1,715,941
Other Fees	553003	145,345	169,632	53,456	134,833
Other Fees	553004	89,953	104,985	33,084	83,447
Commercial Income	561001	-	-	-	-
Commercial Income	561002	353,508	412,579	130,016	327,939
Commercial Income	561003	2,015,851	2,352,698	741,406	1,870,048
Commercial Income	561004	-	-	-	-
Commercial Income	561005	787,877	919,531	289,772	730,891
Commercial Income	561006	379,431	442,834	139,550	351,988
Commercial Income	561007	-	-	-	-
Other Income	571001	1,665,885	1,944,253	612,683	1,545,395
Other Income	571011	1,717,018	2,003,931	631,499	1,592,829
Other Income	571021	217,252	253,555	79,903	201,539
Other Income	571025	143,713	167,727	52,856	133,318
Other Income	571031	642,428	749,777	236,278	595,963
Other Income	571041	-	-	-	-
Income Transfers	573001	712,391	831,431	262,009	660,865
Income Transfers	573002	19,676	22,963	7,236	18,252
Income Transfers	573100	-	-	-	-
Expenditure					
Sessional	703101	479,321	481,148	487,833	589,065
Sessional	703102	6,648,994	6,674,336	6,767,072	8,171,330
Sessional	703103	1,819,671	1,826,607	1,851,986	2,236,299
Sessional	703104	3,174,088	3,186,186	3,230,456	3,900,819
General - Administrative	704101	745,295	737,904	778,782	869,334
General - Administrative	704102	370,195	374,434	395,177	441,126
General - Administrative	704103	624,117	617,927	652,159	727,988
Trades	706101	-	-	-	-
Trades	706102	18,667	9,837	10,948	11,885
Trades	706103	19,060	10,044	11,179	12,135
Trades	706104	4,180	2,203	2,451	2,661

I wanted to create a financial statement that automatically updated to changes in Chart of Accounts, without having to manually add or remove items when the Chart of Accounts changes so that column E (below) would generated formulaically (i.e. no Power Query or VBA):

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Financial Statement													
2	FFF Flexible FS.xlsm													
3	Navigator													
4	Error Checks: <input checked="" type="checkbox"/>													
5														
	Mar 19 Jun 19 Sep 19 Dec 19													
88	2. Financial Statement													
89														
90	Income Statement													
91														
92	Income													
93														
94		Government - Operating Grants			\$									
95		Commercial Income			\$									
96		Investment Income			\$									
97		Other Fees			\$									
98		Other Income			\$									
99		Income Transfers			\$									
100														
101		Total Income			\$									
102														
103	Salary Expenditure													
104														
105		General - Administrative			\$									
106		General - Technical			\$									
107		Trades			\$									
108		Sessional			\$									
109		External Paid			\$									
110		Overseas Visitors			\$									
111														
112		Total Salary Expenditure			\$									
113														
114	Non Salary Expenditure													
115														
116		Depreciation & Amortisation			\$									
117		Building & Property Related Expenses			\$									
118		Staff Related Expenses			\$									
119		Financial & Admin Charges			\$									
120		Travel & Related Expenses			\$									
121		Other Expenses			\$									
122														
123		Total Non Salary Expenditure			\$									
124														
125		NPBT			\$									
126														

Suggested solution

Firstly, I need to prepare the Chart of Accounts ready for flexible financial statement. I am going to create a formula-based rank for items in each group, so that they will be sorted accordingly (this means the data should be sorted initially as well). I add two new columns, **Level 2 Rank** and **IS Rank** ("IS" stands for Income Statement). In the image below, I create a **Level 2 Rank** as follows:

	A	B	C	D	E	F	G	H	I	J	K
1	Data-COA										
2	FFF Flexible FS.xlsm										
3	Navigator										
4	Error Checks: <input checked="" type="checkbox"/>										
5											
6	1. Data - COA										
7											
8	Chart of Accounts										
9											
10		Report	Level 1	Level 2	Account No	Level 2 Rank	IS Rank				
11		Income Statement	Income	Government - Operating Grants	501001	1	Income1				
12		Income Statement	Income	Government - Operating Grants	501002	1	Income1				
13		Income Statement	Income	Government - Operating Grants	501003	1	Income1				
14		Income Statement	Income	Government - Operating Grants	501004	1	Income1				
15		Income Statement	Income	Investment Income	541001	2	Income2				
16		Income Statement	Income	Investment Income	541002	2	Income2				
17		Income Statement	Income	Investment Income	541011	2	Income2				
18		Income Statement	Income	Other Fees	553001	3	Income3				
19		Income Statement	Income	Other Fees	553002	3	Income3				
20		Income Statement	Income	Other Fees	553003	3	Income3				
21		Income Statement	Income	Other Fees	553004	3	Income3				
22		Income Statement	Income	Commercial Income	561001	4	Income4				
23		Income Statement	Income	Commercial Income	561002	4	Income4				
24		Income Statement	Income	Commercial Income	561003	4	Income4				
25		Income Statement	Income	Commercial Income	561004	4	Income4				
26		Income Statement	Income	Commercial Income	561005	4	Income4				
27		Income Statement	Income	Commercial Income	561006	4	Income4				
28		Income Statement	Income	Commercial Income	561007	4	Income4				
29		Income Statement	Income	Other Income	571001	5	Income5				
30		Income Statement	Income	Other Income	571011	5	Income5				
31		Income Statement	Income	Other Income	571021	5	Income5				
32		Income Statement	Income	Other Income	571025	5	Income5				
33		Income Statement	Income	Other Income	571031	5	Income5				
34		Income Statement	Income	Other Income	571041	5	Income5				
35		Income Statement	Income	Income Transfers	573001	6	Income6				
36		Income Statement	Income	Income Transfers	573002	6	Income6				
37		Income Statement	Income	Income Transfers	573100	6	Income6				
38		Income Statement	Salary Expenditure	Sessional	703101	1	Salary Expenditure1				
39		Income Statement	Salary Expenditure	Sessional	703102	1	Salary Expenditure1				
40		Income Statement	Salary Expenditure	Sessional	703103	1	Salary Expenditure1				
41		Income Statement	Salary Expenditure	Sessional	703104	1	Salary Expenditure1				
42		Income Statement	Salary Expenditure	General - Administrative	704101	2	Salary Expenditure2				
43		Income Statement	Salary Expenditure	General - Administrative	704102	2	Salary Expenditure2				
44		Income Statement	Salary Expenditure	General - Administrative	704103	2	Salary Expenditure2				
45		Income Statement	Salary Expenditure	Trades	706101	3	Salary Expenditure3				
46		Income Statement	Salary Expenditure	Trades	706102	3	Salary Expenditure3				
47		Income Statement	Salary Expenditure	Trades	706103	3	Salary Expenditure3				

The formula in cell I11

=IF(F11<>F10,1,IF(G11<>G10,I10+1,I10))

provides a similar rank for all of the **Level 2** items with the same description, assuming the Chart of Accounts has been sorted accordingly. This ranking is repeated for each time the **Level 1** description changes (e.g. from Income to Salary Expenditure).

Then, I concatenate the text of **Level 1** and this ranking, which later will be used in my lookup:

Report	Level 1	Level 2	Account No	Level 2 Rank	IS Rank
Income Statement	Income	Government - Operating Grants	501001	1	Income1
Income Statement	Income	Government - Operating Grants	501002	1	Income1
Income Statement	Income	Government - Operating Grants	501003	1	Income1
Income Statement	Income	Government - Operating Grants	501004	1	Income1
Income Statement	Income	Investment Income	541001	2	Income2
Income Statement	Income	Investment Income	541002	2	Income2
Income Statement	Income	Investment Income	541011	2	Income2
Income Statement	Income	Other Fees	553001	3	Income3
Income Statement	Income	Other Fees	553002	3	Income3
Income Statement	Income	Other Fees	553003	3	Income3
Income Statement	Income	Other Fees	553004	3	Income3
Income Statement	Income	Commercial Income	561001	4	Income4
Income Statement	Income	Commercial Income	561002	4	Income4
Income Statement	Income	Commercial Income	561003	4	Income4
Income Statement	Income	Commercial Income	561004	4	Income4
Income Statement	Income	Commercial Income	561005	4	Income4
Income Statement	Income	Commercial Income	561006	4	Income4
Income Statement	Income	Commercial Income	561007	4	Income4
Income Statement	Income	Other Income	571001	5	Income5
Income Statement	Income	Other Income	571011	5	Income5
Income Statement	Income	Other Income	571021	5	Income5
Income Statement	Income	Other Income	571025	5	Income5
Income Statement	Income	Other Income	571031	5	Income5
Income Statement	Income	Other Income	571041	5	Income5
Income Statement	Income	Income Transfers	573001	6	Income6
Income Statement	Income	Income Transfers	573002	6	Income6
Income Statement	Income	Income Transfers	573100	6	Income6
Income Statement	Salary Expenditure	Sessional	703101	1	Salary Expenditure1
Income Statement	Salary Expenditure	Sessional	703102	1	Salary Expenditure1
Income Statement	Salary Expenditure	Sessional	703103	1	Salary Expenditure1
Income Statement	Salary Expenditure	Sessional	703104	1	Salary Expenditure1
Income Statement	Salary Expenditure	General - Administrative	704101	2	Salary Expenditure2
Income Statement	Salary Expenditure	General - Administrative	704102	2	Salary Expenditure2
Income Statement	Salary Expenditure	General - Administrative	704103	2	Salary Expenditure2

Going back to my Income Statement, I create a series and use this to look up the relevant group in the Chart of Accounts based upon the rank:

	Mar 19	Jun 19	Sep 19	Dec 19
Income Statement				
Income				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Total Income				
Salary Expenditure				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Total Salary Expenditure				
Non Salary Expenditure				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Total Non Salary Expenditure				
NPBT				

To look up the line items, I use **INDEX** and **MATCH** functions in combination to create the descriptions. If there is no item match, the formula will return a blank. For example, the formula in cell **E94** is

=IFERROR(INDEX(COA[Level 2],MATCH(CONCATENATE(D\$92,D94),COA[IS Rank],0)), "")

		Mar 19	Jun 19	Sep 19	Dec 19
Income Statement					
Income					
1	Government - Operating Grants				
2	Investment Income				
3	Other Fees				
4	Commercial Income				
5	Other Income				
6	Income Transfers				
Total Income					
Salary Expenditure					
1	Sessional				
2	General - Administrative				
3	Trades				
4	External Paid				
5	Overseas Visitors				
6					
7					
8					
9					
10					
Total Salary Expenditure					
Non Salary Expenditure					
1	Depreciation & Amortisation				
2	Building & Property Related Expenses				
3	Staff Related Expenses				
4	Travel & Related Expenses				
5	Financial & Admin Charges				
6	Other Expenses				
7					
8					
9					
10					
Total Non Salary Expenditure					
NPBT					

I can delete rows containing no line items and use a **SUMIFS** formula to pull the relevant data from the calculation section to fill in the financial statements.

		Mar 19	Jun 19	Sep 19	Dec 19
Income Statement					
Income					
1	Government - Operating Grants	17,099,459	13,032,742	15,193,584	13,597,512
2	Investment Income	1,583,360	5,168,352	3,835,493	10,658,483
3	Other Fees	5,077,751	5,734,314	4,192,091	5,456,845
4	Commercial Income	3,536,667	4,127,641	1,300,745	3,280,866
5	Other Income	4,386,297	5,119,243	1,613,229	4,069,044
6	Income Transfers	732,067	854,394	269,246	679,118
Total Income		32,415,601	34,036,685	26,404,388	37,741,867
Salary Expenditure					
1	Sessional	12,122,075	12,168,277	12,337,348	14,897,514
2	General - Administrative	1,747,596	1,730,265	1,826,119	2,038,448
3	Trades	84,279	44,413	49,429	53,659
4	External Paid	19,233	10,135	11,280	12,245
5	Overseas Visitors	229,015	350,388	352,583	621,484
Total Salary Expenditure		14,202,199	14,303,479	14,576,758	17,623,350
Non Salary Expenditure					
1	Depreciation & Amortisation	5,297,182	5,706,555	5,522,677	7,953,682
2	Building & Property Related Expenses	503,923	781,118	1,092,328	1,494,363
3	Staff Related Expenses	130,745	151,269	171,754	232,416
4	Travel & Related Expenses	812,644	1,632,130	1,787,575	2,206,383
5	Financial & Admin Charges	8,663	8,663	8,663	8,663
6	Other Expenses	319,106	344,555	299,599	948,067
Total Non Salary Expenditure		7,072,262	8,624,288	8,882,595	12,843,573
NPBT		11,141,140	11,108,918	2,945,035	7,274,944

Success! If the Chart of Accounts is changed in the future, I just need to insert or remove rows and copy the formulae across the cells. The Income Statement is now flexible assuming the Chart of Accounts is sorted!

More next month.

Upcoming SumProduct Training Courses

Location	Course	Course Date	Local Time	UTC	Duration
Melbourne Australia	Power Pivot, Power Query and Power BI	5 November 2024 - 6 November 2024	09:00 - 17:00 AEDT	4 Nov 2024 22:00 UTC - 6 Nov 2024 06:00 UTC	2 Days
Philadelphia USA	Excel Tips and Tricks	11 December 2024	14:00 - 17:00 EDT	11 Dec 2024 19:00 UTC - 11 Dec 2024 22:00 UTC	3 Hours

Key Strokes

Each newsletter, we'd like to introduce you to useful keystrokes you may or may not be aware of. This time, we start to play we put in an **AL**ternative **SHIFT** with the function keys this month:

Keystroke	What it does
CTRL + ALT + F1	Insert new macro sheet
CTRL + ALT + F2	Open
CTRL + ALT + F3	New name
CTRL + ALT + F4	Close application
CTRL + ALT + F5	Refresh all
CTRL + ALT + F8	Disconnect display (Windows Key + P restores)
CTRL + ALT + F9	Full recalculation
CTRL + ALT + F12	Thai dictionary

There are c.550 keyboard shortcuts in Excel. For a comprehensive list, please download our Excel file at <http://www.sumproduct.com/thought/keyboard-shortcuts>. Also, check out our new daily **Excel Tip of the Day** feature on the www.sumproduct.com homepage.

Our Services

We have undertaken a vast array of assignments over the years, including:

- **Business planning**
- **Building three-way integrated financial statement projections**
- **Independent expert reviews**
- **Key driver analysis**
- **Model reviews / audits for internal and external purposes**
- **M&A work**
- **Model scoping**
- **Power BI, Power Query & Power Pivot**
- **Project finance**
- **Real options analysis**
- **Refinancing / restructuring**
- **Strategic modelling**
- **Valuations**
- **Working capital management**

If you require modelling assistance of any kind, please do not hesitate to contact us at contact@sumproduct.com.

Link to Others

These newsletters are not intended to be closely guarded secrets. Please feel free to forward this newsletter to anyone you think might be interested in converting to "the SumProduct way".

If you have received a forwarded newsletter and would like to receive future editions automatically, please subscribe by completing our newsletter registration process found at the foot of any www.sumproduct.com web page.

Any Questions?

If you have any tips, comments or queries for future newsletters, we'd be delighted to hear from you. Please drop us a line at newsletter@sumproduct.com.

Training

SumProduct offers a wide range of training courses, aimed at finance professionals and budding Excel experts. Courses include Excel Tricks & Tips, Financial Modelling 101, Introduction to Forecasting and M&A Modelling.

Check out our more popular courses in our training brochure:



Drop us a line at training@sumproduct.com for a copy of the brochure or download it directly from www.sumproduct.com/training.

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