SumProduct

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EXCEL SUMMIT SOUTH
COMING Soon

All change please!!

Excel Summit South 2019 is coming very soon and we have some new faces presenting – will you be attending? In this month's newsletter, we reveal our speaker line-up and where you can find out more details.

Things can change all of the time in Excel too – if you use volatile functions – and we explain what they are in this month's issue and why they may not necessarily be a good thing.

With the usual goodies involving on Power Pivot, Power Query, Power BI updates, VBA, Keyboard Shortcuts and the A to Z of Excel Functions all in situ too, it's another "mega" monthly newsletter with something for everyone even if no one is likely to read it cover to cover (*our editor included!*).

Until next month.

Liam Bastick, Managing Director, SumProduct

Excel Summit South: Coming Soon…

We promised you more details about this year's **Excel Summit** South – known in a past life as ***Unlock Excel***, we have gone back to our roots as we listened to the feedback. And this month, we even have the logo for you!

Apologies to our New Zealand readers, but we will be going around Australia this time:

- **Brisbane:** Monday 29 and Tuesday 30 July
- **Sydney:** Thursday 1 and Friday 2 August
- **Melbourne:** Monday 5 and Tuesday 6 August
- **Perth:** Thursday 8 and Friday 9 August.

However, for our Antipodean brethren, we will offer a discounted deal: drop us a line at contact@sumproduct.com for more details.

As always, we will have Microsoft in attendance and MVPs aplenty, past and present. At the time of writing, our line-up looks as follows:

EXCEL SUMMIT SOUTH 2019

Liam Bastick

How did he come out first? Oh yes, it's alphabetical order…

SumProduct director, accountant, author of *Introduction to Financial Modelling* and MVP will be in attendance, waxing lyrical about financial modelling tips, Excel functions and the Power suite of tools for business intelligence.

Oz du Soleil

Based in Chicago, the shy and retiring Oz *(uh oh, sarcasm detector overload – Ed.)* is an Excel trainer, instructor and data management consultant with more than 15 years' experience. He is also the author of the book *Guerrilla Data Analysis*, co-written with fellow MVP Bill Jelen.

Oz is a US Navy Veteran, and graduated with a BA in Philosophy from the University of IL-Chicago and Kennedy School of Government at Harvard University, so don't mess with him.

Tim Heng

With over 15 years' experience in the industry and boasting an actuarial science background, fellow SumProduct director and Excel MVP, Tim specialises in financial modelling, VBA and Power BI.

Tim has consulted on projects around the world from US private equity firms to local major ASX players and education establishments.

Wyn Hopkins

Wyn has been both a Chartered Accountant and a financial analyst in the banking industry before Microsoft awarded him MVP status.

Wyn is an experienced trainer and Excel / Power BI developer and works as a financial modelling consultant in Western Australia.

Ian Huitson

Ian works as a consulting mining engineer in Perth and has been an Excel MVP since 2013.

He is passionate about scheduling, budgeting and simulation analyses, as well as mathematics, particularly in their application to real world problems.

Gašper Kamenšek

A Microsoft MVP since 2015, Gašper is an Excel and Power BI expert, and owner of Excel Olympics. Gašper has been a speaker at more than 50 conferences and events, and a trainer of more than 900 courses and seminars.

When he is not lecturing Excel, Gasper works on various BI projects consisting either of PowerPivot and SQL with Excel or VBA. He's almost as passionate about all of this as he is music and photography.

Micah Myerscough

An accomplished Senior Project Manager with Microsoft, Micah has cross-functional teams and coordinated complex dependencies to deliver high quality software solutions and products.

He is highly experienced in feature design, software project management, data instrumentation and analysis, user experience design, user research, customer outreach and communications suited for all levels of business, with a strong technical background able to bridge the gap between engineering and business requirements.

Boriana Petrova

A past Microsoft MVP and current Microsoft Certified Trainer with 15 years' experience as an IT instructor and consultant, with certifications in a myriad of technical areas in Microsoft Office.

Previously, Boriana has been awarded "Top 25 best instructors in Microsoft – Knowledge Advisors". It is one of the highest accolades for the industry.

Founder and administrator of the Bulgaria Excel Days conference, Boriana is also the owner and CEO of ITraining Ltd.

Echo Swinford

An MVP since 2000, Echo Swinford is the owner of Echosvoice, a consulting firm specialising in custom PowerPoint template development and presentation creation. Echo has been a featured speaker for the Presentation Summit conference since its inception, and she currently teaches a data visualisation class for the American Management Association.

Echo has written several books around data presentation and PowerPoint, and is the founder and President of the Presentation Guild, a trade association established to advocate for the presentation industry.

Mark Traverso

Mark is an analytical marketing manager for Microsoft, with experience using customer insights and competitive analysis to significantly increase adoption of applications by internal partners and consumers.

Currently, he engages with business users in the finance audience to drive their understanding of, and excitement with, Office 365.

Mynda Treacy

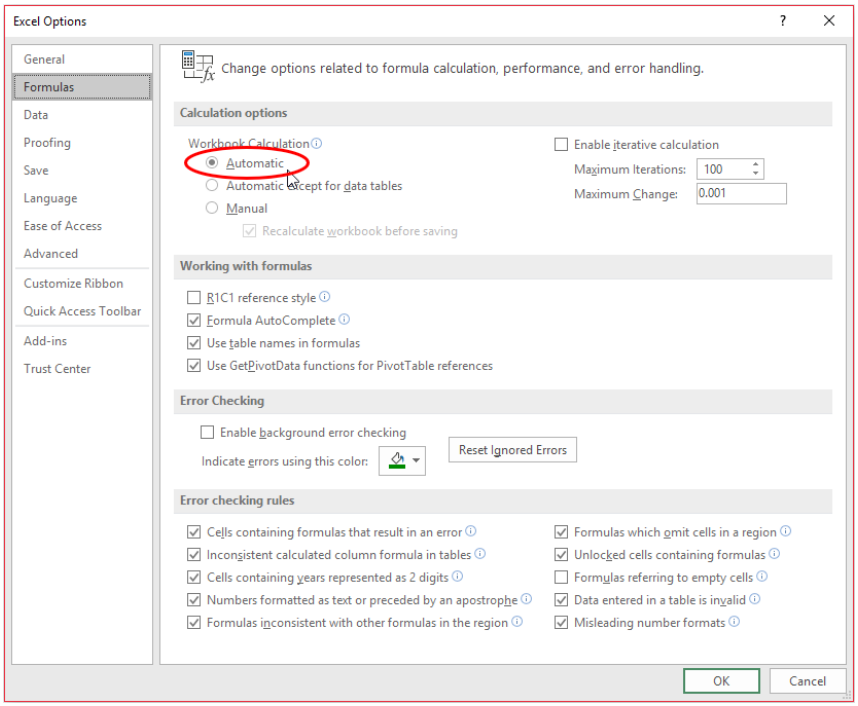
An MVP since 2013, Queenslander Mynda helps users get more out of Excel through her website and blog, and runs online courses in Dashboards, Power Query, Power Pivot and Power BI.

Not everyone will be in every location, but you can check out who's where and what they will be talking about at www.excelsummitsouth.com very soon. You can also find out about pricing (including the current Early Bird and group offerings) as well as register at the website too. Watch this space: we will be going live very soon. Again, if you have any questions, drop us a line at contact@sumproduct.com.

It is confirmed Microsoft will be in attendance as will an array of Excel and Data Platform MVPs. More to come very soon – keep an eye on www.sumproduct.com/news and watch this space in next month's newsletter too!

Volatile Functions

There is nothing worse than seeing "CALCULATE" appear in the bottom left-hand corner of your status bar and the calculation percentage status crawl towards 100% (and why does it always start again when it gets to 99%?). One of the worst things modellers can do to counteract this is to set Workbook Calculation to anything other than 'Automatic' (**ALT + T + O, Formulas**):



The reason for this is very simple. Although it allows modellers to continue spreadsheet construction unencumbered, when was the last time you recall ever checking that a model you received was calculating automatically? Everyone just assumes that this is the case and makes managerial decisions accordingly.

This action only addresses the symptom, not the cause.

Dependency Trees

Obviously, size does have some impact upon calculation speed, but perhaps not as much as you might think. The Excel calculation engine is almost as lazy – sorry, I mean "efficient" – as me.

Rather than recalculate every cell every time any cell is changed, Excel determines which cells are affected by the latest change (known as "dependent cells") and recalculates these dependents and then dependents of these dependents and so on. These long chains are known as **dependency** trees. Depending upon which version of Excel you are using, there may be a limit of how many dependency trees Excel can keep track of (it was 65,536 prior to Excel 2007, with the number debated by experts thereafter) before Excel has to resort to a full (i.e. slower) calculation.

When cells are changed, Microsoft recognises the cells that need recalculating as a consequence. These cells are known as "**dirty**" cells.

Therefore, calculation time is a function of the number of dirty cells and the number of dependency trees, both affected and unaffected.

As a modeller, it is difficult to change the number of dirty cells that genuinely need to be recalculated, short of writing more complex formulae in fewer cells (this is one reason why 'megaformulae' often calculate more quickly, although this increases the risk of modelling errors, etc. instead).

However, modellers can do something about those functions and functionalities that Excel has potentially mistakenly considered to be dirty. More often than not, these instances are caused by **volatile functions** and / or **volatile actions**.

Volatile Functions and Actions

A **volatile function** is one that causes recalculation of the formula in the cell where it resides every time Excel recalculates. This occurs regardless of whether precedent cells / calculations have changed, or whether the formula also contains non-volatile functions. One test to check whether your workbook is volatile is close a file after saving and see if Excel prompts you to save it a second time (this is an indicative test only).

Some functions are obviously volatile, *e.g.* **NOW(), RAND(), TODAY()** and perhaps slightly less obviously **CELL("filename")** (which keeps track of whether the filename has changed).

Others are not so obvious. For example:

- **INDIRECT** has an argument that is typically constructed out of text, ***e.g.*** **INDIRECT("$A$1")** where, in this instance, the function will inspect the contents of cell **A1**. If the content is, say, **B2** (not =**B2**) then **INDIRECT("$A$1")** will return the value in cell **B2**. This might look like a cell reference, but it is not, and needs rebuilding each time; *and*
- **OFFSET** takes numerical arguments, which point to a cell reference, but are still just numbers that need to be calculated each time.

Just because a function is volatile in one version of Excel does not mean it is volatile in all versions. Perhaps the best example of this is **INDEX**, which was volatile prior to Excel 97. Microsoft still states this function is volatile, but this does not appear to be the case except when used as the second part of a range reference, for example **$A$1:INDEX($A$2:A$10,4)**, will also cause the reference to be flagged as dirty when the workbook is opened only.

Another common 'semi-volatile' function is **SUMIF**, which has been so since Excel 2002. This function becomes volatile whenever the size of the first range argument is not the same as the second (**sum_range**) argument, *e.g.* **SUMIF(A1:A4,1,B1)** is volatile whereas **SUMIF(A1:A4,1,B1:B4)** is not.

Indeed, crowd pleasers **VLOOKUP** and **HLOOKUP** could be argued as "kind of volatile" (that's not going to please the readership). These functions require a range (**table_array**) to be specified in the second argument (either **VLOOKUP(lookup_value, table_array, … or VLOOKUP(lookup_value, table_array, …)**. If any values change in this range – even if not referenced in the first row / column or the specified row / column, the formula has to recalculate. That's a form of volatility too.

IF and **CHOOSE** do not calculate all arguments, but if any of the arguments are volatile – regardless of whether they are used – the formula is deemed to be volatile. Therefore, **IF(1>0,1,RAND())** is always volatile, even though the **value_if_false** argument will never be calculated. It is not quite as simple as this though. If the formula in cell **A1 is =NOW()** then this cell will be volatile, but **IF(1>0,1,A1)** will not be.

In essence, direct references or dependents of volatile functions will always be recalculated, whereas indirect ones will only recalculate when activated or in certain other functions that always calculate all arguments such as **AND OR**.

One area that has caught me out on occasion is the use of using formulae in conditional formats. These are always volatile so that the formatting is displayed correctly – not just on calculating but when you change worksheet or scroll up, down, left or right even if the calculation mode is set to 'Manual'!

Volatile actions are those that trigger recalculation. Microsoft has compiled a list of such actions:

- **AutoFilter –** filtering data in a range will make any formulae in this range dirty
- **CSV files –** opening a CSV file will trigger recalculation
- **Double-clicking on row or column dividers –** automatic resizing is a trigger when the model is set to calculate automatically (but not in Manual mode), but bizarrely, manually adjusting row heights or column widths is a non-volatile action

- **Goal Seek –** using this scenario analysis tool results in the model requiring recalculation not just once, but for every iteration (which could be a maximum of 32,767 times)
- **Hiding / unhiding rows –** this was in Excel 2003 only (but hiding / unhiding columns is not a volatile action), but is mentioned for completeness. Some think this is because the properties of **SUBTOTAL** changed in Excel 2003, but this does not explain why this non-volatile in subsequent versions of Excel
- **Inserting, deleting or moving rows, columns or cells**
- **Opening a .csv file –** hard to believe, but true, even if the calculation setting is 'Manual'
- **Range names –** adding, editing or deleting a range name in any way will trigger a calculation event
- **Worksheets –** deleting, renaming or moving a worksheet is a volatile action. Interestingly, adding a worksheet does not trigger recalculation (this may lead to summation inaccuracies though if formulae sum through sheets).

In order to speed up Excel workbooks, modellers should plan to keep the number of volatile functions and range names to a manageable minimum. Where possible, consider using **INDEX** rather than **OFFSET**, specifying **SUMIF** correctly, *etc.*

Designing models efficiently so that formulae are copied as frequently as possible will reduce the number of dependency trees, again shortening the calculation time.

Furthermore, reducing the number of volatile actions will also reduce the number of trigger points. In particular, consider how much you really need to have conditional formatting in your models.

As always, efficient model construction is a delicate balancing act: transparency and versatility may sometimes need to be tempered by the need to have the model calculate before the Sun goes supernova. There is no hard and fast rule: it is a judgment call that gets better with (bitter?) experience.

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 look at the concept of a variable scope at a module level.

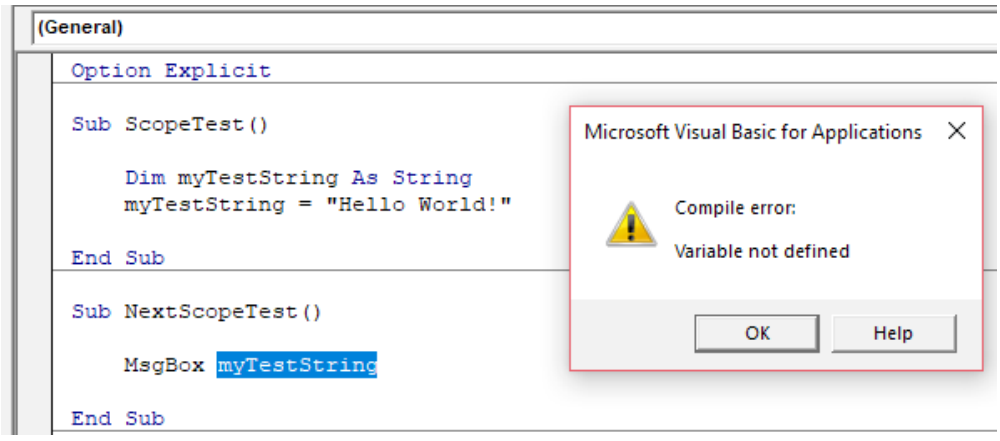
Variables can also be used in different subroutines and functions. If there are items that are known to have constant values throughout the entire workbook, they can be declared explicitly in one place for easy reference.

Module Level

Let's write a new module as follows:

```
Option Explicit

Sub ScopeTest()

    Dim myTestString As String

    myTestString = "Hello World!"

End Sub


Sub NextScopeTest()

    MsgBox myTestString

End Sub
```

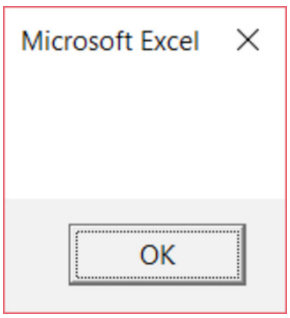
The declaration for the variable is in **ScopeTest** but the subroutine **NextScopeTest** calling it is not the one that defined it. What happens upon execution?



The 'Variable not defined' message pops up again. Let's move the declaration OUTSIDE the subroutine, under the 'Option Explicit' statement as follows:

```
Option Explicit
Dim myTestString As String
Sub ScopeTest()
    myTestString = "Hello World!"
End Sub
Sub NextScopeTest()
    MsgBox myTestString
End Sub
```

When **NextScopeTest** is run the following happens:



This is because though the variable has been declared, it has not been *initialised*. If **ScopeTest** is run prior to **NextScopeTest** then:

These shows that the variable is accessible to the entire module and is changed as required. The **Dim** statement outside any subroutines means the variable is accessible within the module that it is declared in.

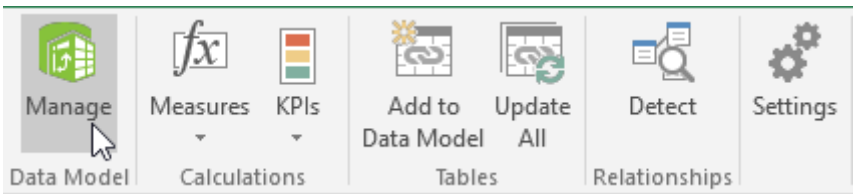
More next month.

Power Pivot Principles

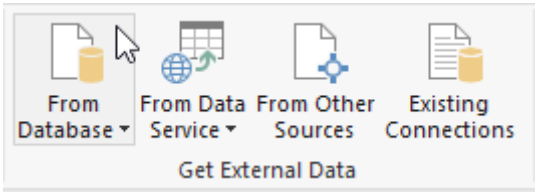
We continue our series on the Excel COM add-in, Power Pivot. This month, we look at how to import data from an Access database.

To begin, open Excel, then select the 'Power Pivot' tab on the Ribbon:

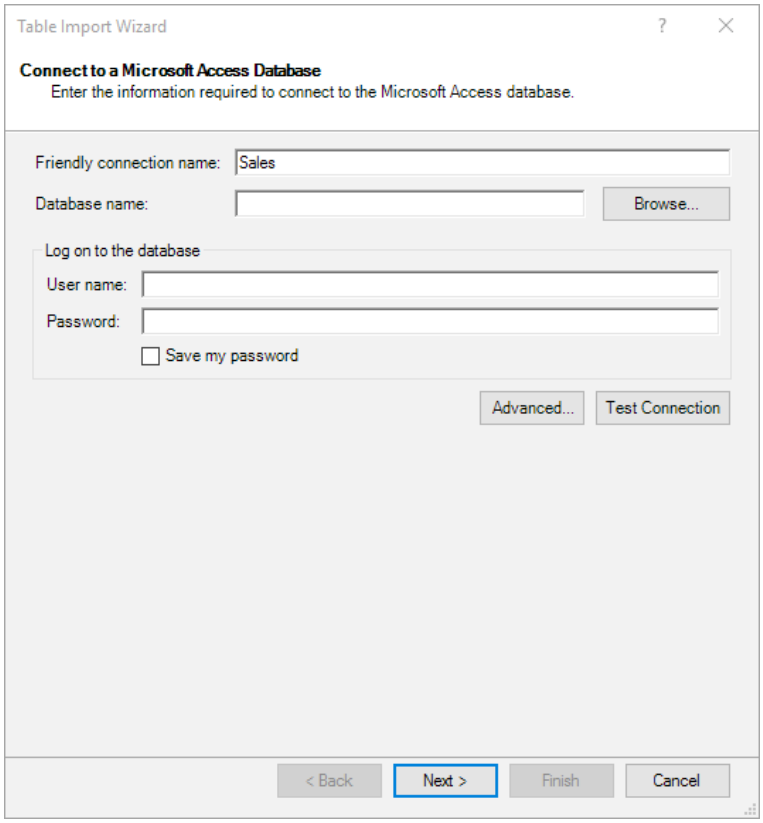
Select the 'Manage' option in the Ribbon:



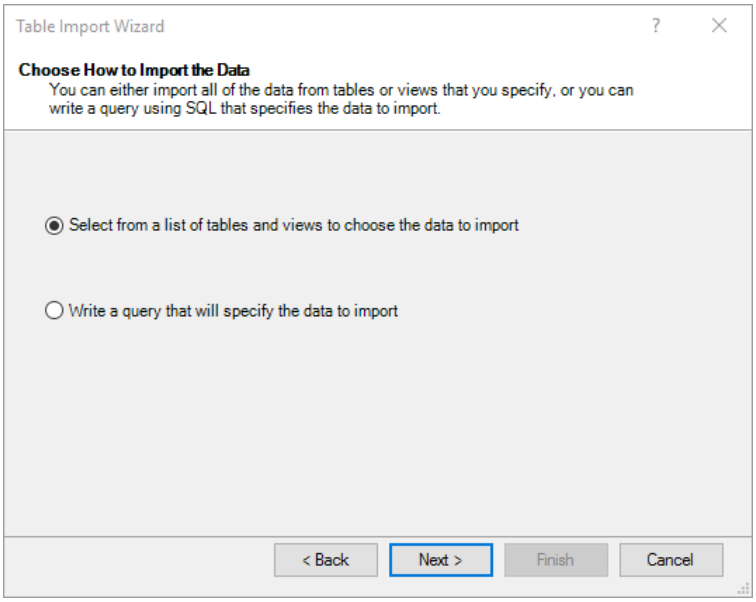
The ‘Power Pivot’ window will popup. We can now select the ‘From Database’ option in the ‘Get External Data’ group.



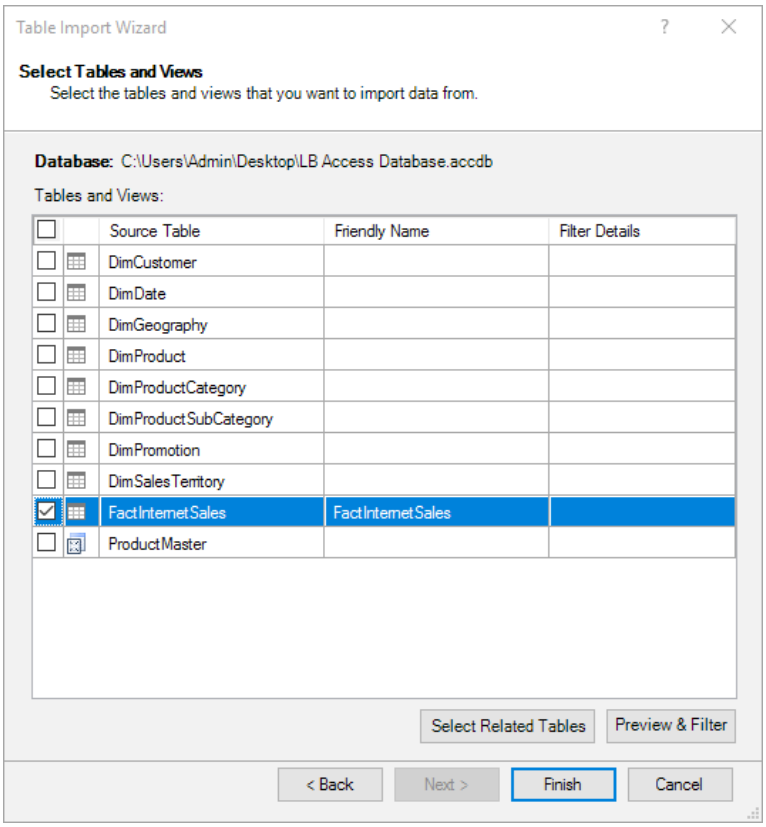
The ‘Table Import Wizard’ dialog box will appear, allowing us to designate a connection name in this case we write ‘Sales’, and provide login details if the database requires. From a security perspective, I do not recommend entering your login details and saving them. If you do this, it will mean anyone who opens this file can access the data in this way.



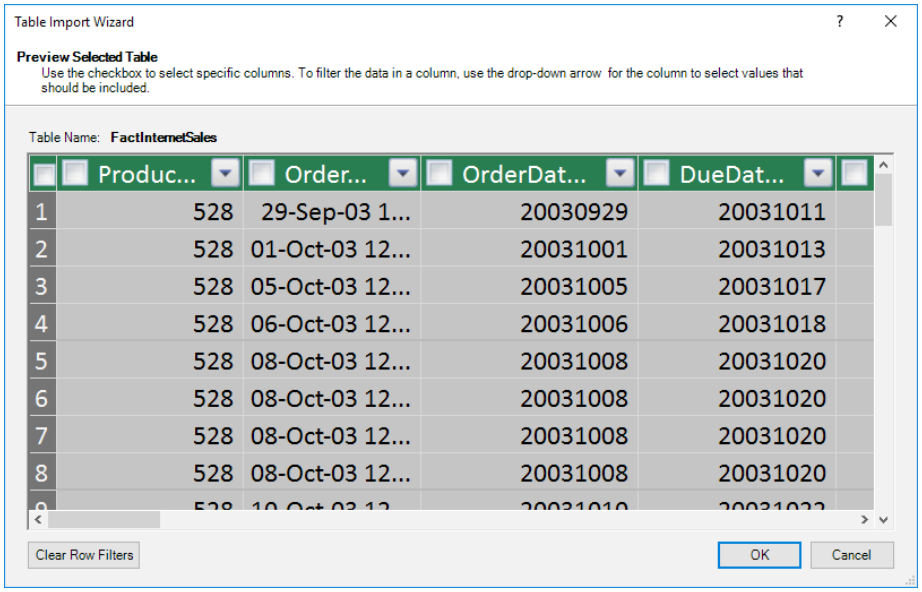
Power Pivot will then prompt us to choose from two methods of importing data. More advanced users (*e.g.* those who have experienced the delights of SQL) may select ‘Write a query that will specify the data to import’. For us lesser mortals, for this example we will pick ‘Select from a list of tables and views to choose the data to import’.



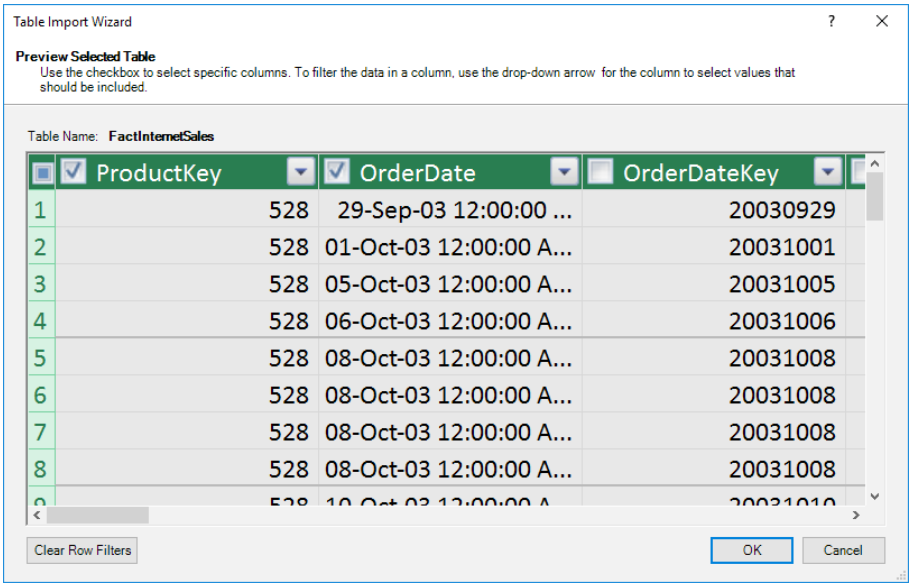
Then *(say)* select the 'FactInternetSales' Table from the Table Import Wizard:



Before we hit 'Finish', it's good practice to 'Preview & Filter' the data. This allows us to unselect any data that isn't needed for the Power Pivot model.



Unselect all of the fields, allowing us to individually select all of the fields that we want to import instead. For this instance, I am going to choose 'Product Key', 'OrderDate', 'CustomerKey', 'OrderQuantity' and 'SalesAmount'.



For better efficiencies, tables should be long and thin, where possible: not too many columns and plenty of rows.

	ProductKey	OrderDate	CustomerKey	OrderQuantity	SalesAmount
1	477	01-Aug-03 1...	16982	1	4.99
2	477	02-Aug-03 1...	16781	1	4.99
3	477	03-Aug-03 1...	21918	1	4.99
4	477	06-Aug-03 1...	16953	1	4.99
5	477	07-Aug-03 1...	17506	1	4.99
6	477	07-Aug-03 1...	16814	1	4.99
7	477	07-Aug-03 1...	18110	1	4.99
8	477	08-Aug-03 1...	23277	1	4.99
9	477	08-Aug-03 1...	17447	1	4.99
10	477	08-Aug-03 1...	18102	1	4.99
11	477	09-Aug-03 1...	18095	1	4.99
12	477	15-Aug-03 1...	17014	1	4.99
13	477	17-Aug-03 1...	17165	1	4.99
14	477	18-Aug-03 1...	19639	1	4.99
15	477	19-Aug-03 1...	18111	1	4.99
16	477	19-Aug-03 1...	18751	1	4.99
17	477	20-Aug-03 1...	17016	1	4.99
18	477	23-Aug-03 1...	18094	1	4.99
19	477	27-Aug-03 1...	18109	1	4.99

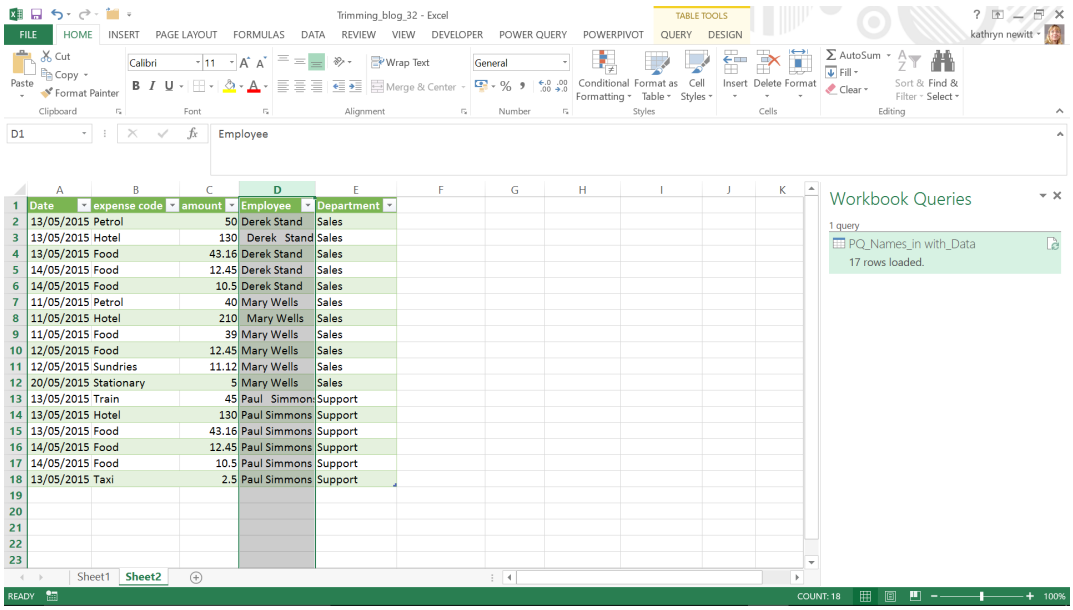
We have now successfully imported a dataset from an Access Database.

We'll continue next month. Stay tuned for our next post on Power Pivot. In the meantime, please remember we have training in Power Pivot which you can find out more about at www.sumproduct.com/courses/power-pivot-power-query-and-power-bi.

Power Query Pointers

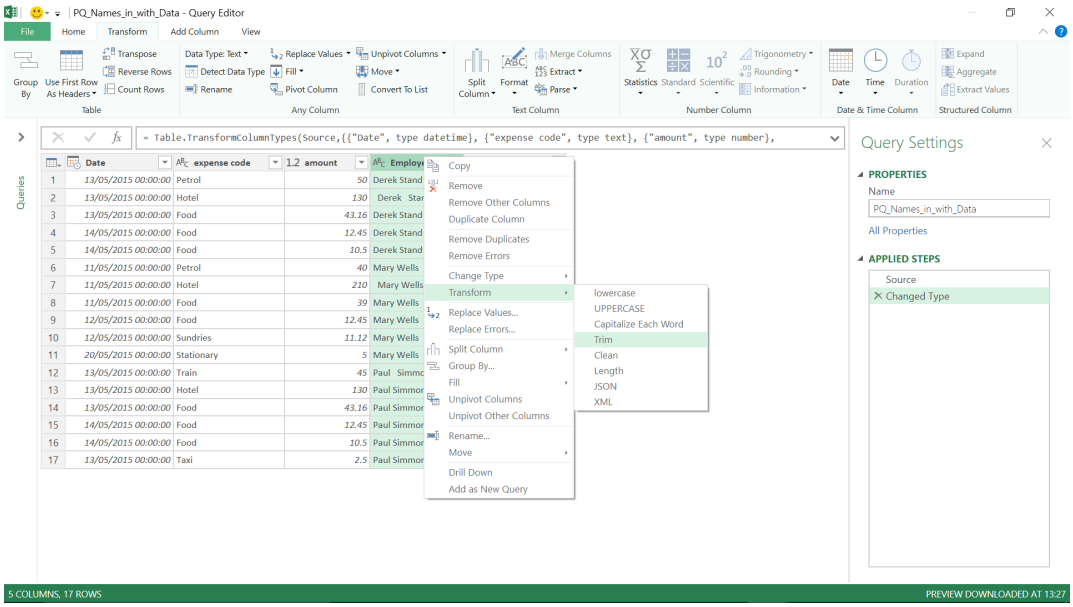
Each month we'll reproduce one of our articles on Power Query (Excel 2010 and 2013) / Get & Transform (Office 365, Excel 2016 and 2019) from www.sumproduct.com/blog. If you wish to read more in the meantime, simply check out our Blog section each Wednesday. This month, we look at how the Trim function works in Power Query – and how to make it better.

Let's have a table of data which includes employees' full names, but a few spaces have been added along the way so that they are no longer nicely aligned:

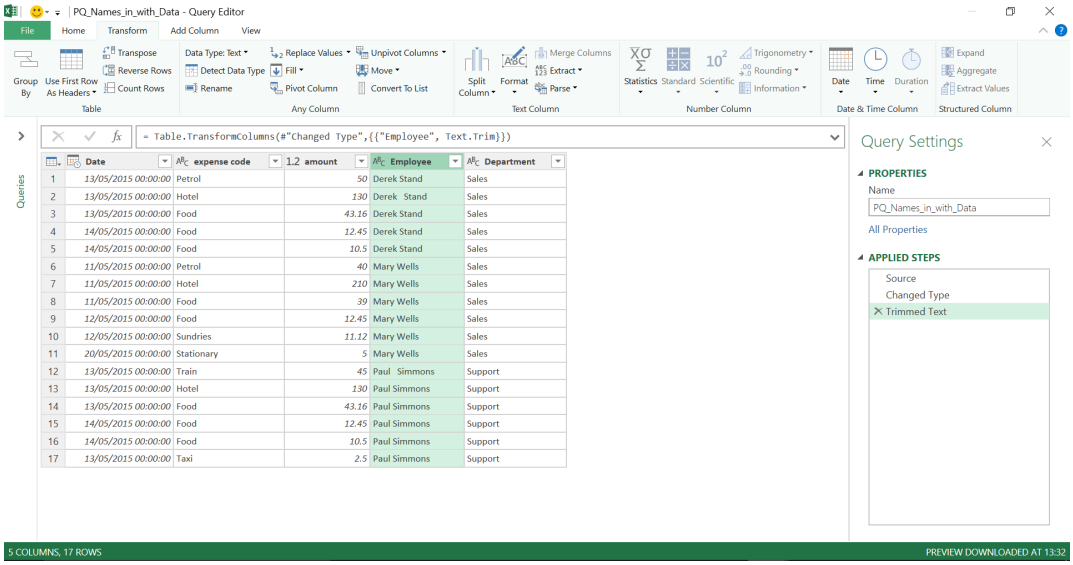


Date	expense code	amount	Employee	Department
13/05/2015	Petrol	50	Derek Stand	Sales
13/05/2015	Hotel	130	Derek Stand	Sales
13/05/2015	Food	43.16	Derek Stand	Sales
14/05/2015	Food	12.45	Derek Stand	Sales
14/05/2015	Food	10.5	Derek Stand	Sales
11/05/2015	Petrol	40	Mary Wells	Sales
11/05/2015	Hotel	210	Mary Wells	Sales
11/05/2015	Food	39	Mary Wells	Sales
12/05/2015	Food	12.45	Mary Wells	Sales
12/05/2015	Sundries	11.12	Mary Wells	Sales
20/05/2015	Stationary	5	Mary Wells	Sales
13/05/2015	Train	45	Paul Simmons	Support
13/05/2015	Hotel	130	Paul Simmons	Support
13/05/2015	Food	43.16	Paul Simmons	Support
14/05/2015	Food	12.45	Paul Simmons	Support
14/05/2015	Food	10.5	Paul Simmons	Support
13/05/2015	Taxi	2.5	Paul Simmons	Support

If we load the data to Power Query using the 'From Excel Range/Table' option then we may clean up the names. Let's select they column and right-click to see the options:



Under the 'Transform' heading, we have the option to 'Trim', so we'll choose this.



It has cleared the spaces to the left of the data but has failed to remove the spaces in the middle of the names. Now, we could replace the double space with a single space until we are happy with the layout but this doesn't seem very satisfying – we want it to work like Excel and remove the extra spaces with one trim command. In the function bar, we can see that the function being used is **Text.Trim**, and Microsoft have provided remarks for this function in Power Query:

Text.Trim(text as nullable text, optional trimChars as any) as nullable text

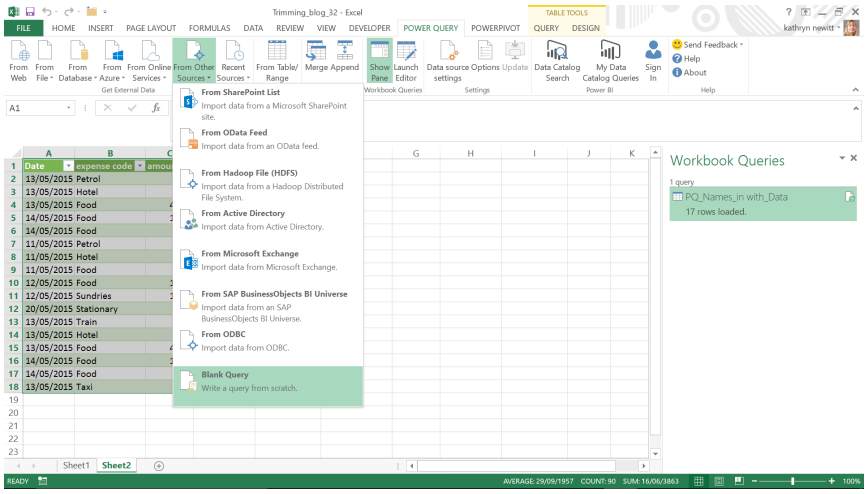
- Characters are removed fro m the beginning and end of the text value
- If **trimChars** is not specified, then whitespace characters are trimmed. Whitespace characters are defined by the Power Query formula language specification document. The argument **trimChars** is either a character value or a list of character values.

Therefore, only the spaces at the beginning and the end will be removed. We aren't the only person who find this annoying. Others do and we have created the following "PowerTrim" function inspired by others' ideas, including fellow MVP Ken Puls.

The **M** code looks like this:

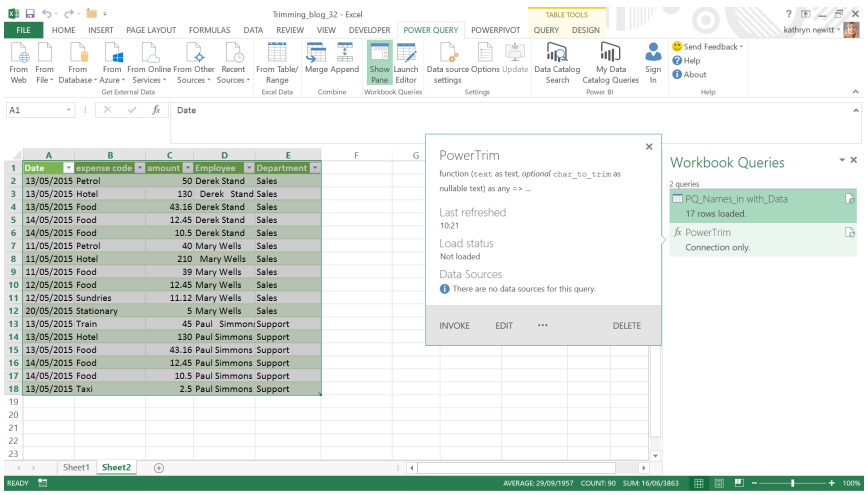
```
(text as text, optional char_to_trim as text) =>
let
  char = if char_to_trim = null then " " else char_to_trim,
  split = Text.Split(text, char),
  removeblanks = List.Select(split, each _ <> ""),
  result=Text.Combine(removeblanks, char)
in
  result
```

Hence, we can create this as a function in the workbook before we use it. To do this, let's start by creating a new Blank Query:

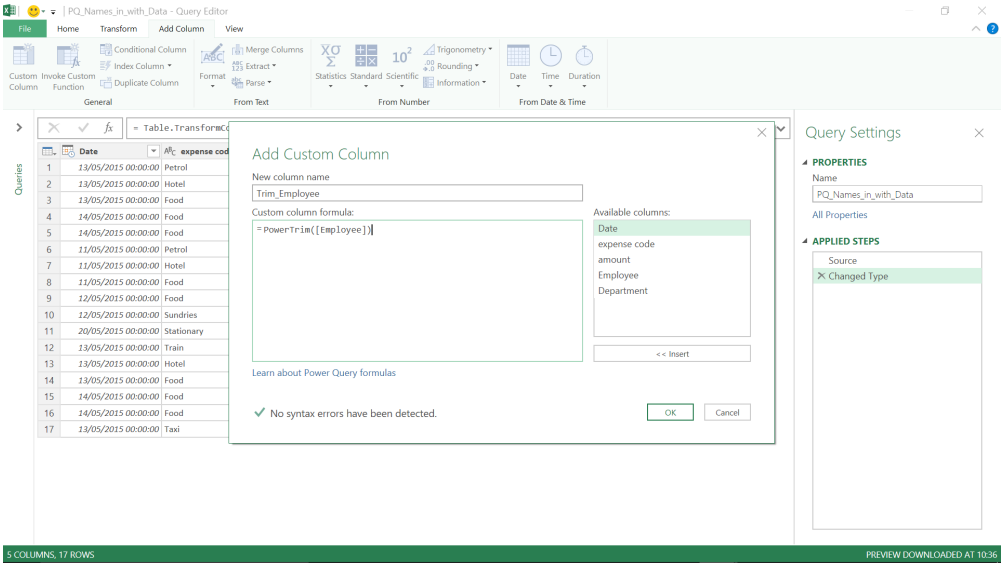


Inspired by Ken's code, we will keep the name he chose for this function by changing the query name to **PowerTrim**. We can then go into the 'Advanced Editor' and enter the **M** code.

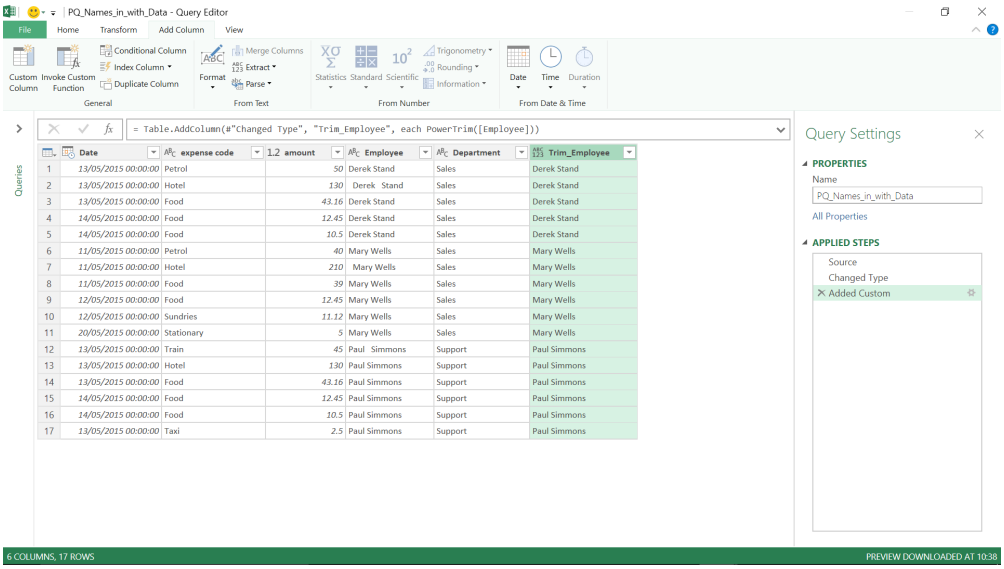
When we 'Close and Load' the query, it is automatically created as a 'Connection Only' query:



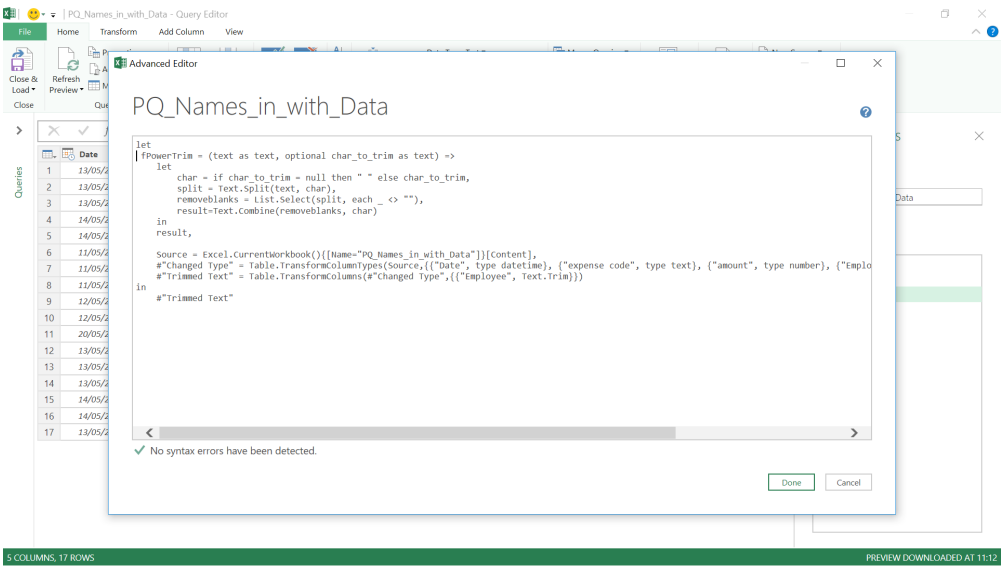
Now we go back to the data that we wish to trim. We can add a custom column which uses the new formula.



This gives me a column which has stripped out the extra spaces – it has trimmed the way we want it to.



If we are being picky though, what we really want is to be able to use the function in the original column. In order to do this, rather than having a separate query as per our function, we need to define it within the current query. In order to do this, we should go back to the point in the query where we applied the 'Trimmed Text' step, and using the 'Advanced Editor', where we will add a function **fPowerTrim** to the **M** code.



```
let
fPowerTrim = (text as text, optional char_to_trim as text) =>
  let
    char = if char_to_trim = null then " " else char_to_trim,
    split = Text.Split(text, char),
    removeblanks = List.Select(split, each _ <> ""),
    result=Text.Combine(removeblanks, char)
  in
    result,
  Source = Excel.CurrentWorkbook(){[Name="PQ_Names_in_with_Data"]}[Content],
 #"Changed Type" = Table.TransformColumnTypes(Source,{{"Date", type datetime}, {"expense code", type text}, {"amount", type number}, {"Employee", type text}, {"Department", type text}}),
#"Trimmed Text" = Table.TransformColumns(#"Changed Type",{{"Employee", Text.Trim}})
in
 #"Trimmed Text"
```

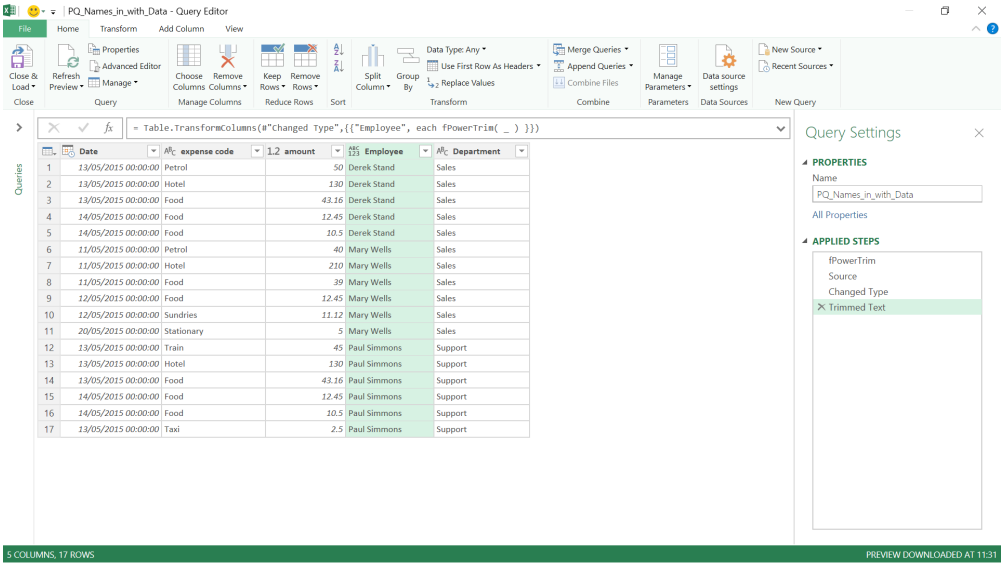
This means, that in our 'Trimmed Text' step, we can change the **M** code from

```
= Table.TransformColumns(#"Changed Type",{{"Employee", Text.Trim}})
```

to

```
= Table.TransformColumns(#"Changed Type",{{"Employee", each fPowerTrim( _ ) }})
```

('**each**' and '_' are used to tell Power Query to apply the formula to each value in the column)



We now have 'Employee' data trimmed in the way we would like.

More next month!

Latest Updates for Power BI Desktop

April's updates are now out and continue to be added at a breathtaking rate of knots. Here's the full list:

Reporting

- Filter pane improvements:
  - Support for full filter pane editing
  - Ability to rename filters
  - Filter pane scales with the report page

    - Restrict ability to change filter type
    - Improved filter pane accessibility
- Conditional formatting for visual titles
- Conditional formatting for web URL actions for buttons, shapes and images

Analytics

- Drillthrough across reports
- Key Influencers Visual now supports continuous analysis for numeric targets
- Python support in Power BI Desktop is now generally available
- Partial synonym matching for terms in Q&A

Modelling

- New DAX function: **ALLCROSSFILTERED**

Visualisations

- rainbowGauge

Data Connectivity

- Power BI dataflows now Generally Available
- Oracle Essbase connector now supports DirectQuery and is generally available
- PDF connector now generally available
- Web By Example connector – automatic table inference
- InterSystems IRIS connector
- Indexima connector
- Luminis InformationGrid
- Solver BI360
- Paxata

Data Preparation

- Data Profiling enhancements and General Availability
- Fuzzy merge performance enhancements and General Availability
- **M** Intellisense supported in formula bar and custom column dialog Generally Available

Other

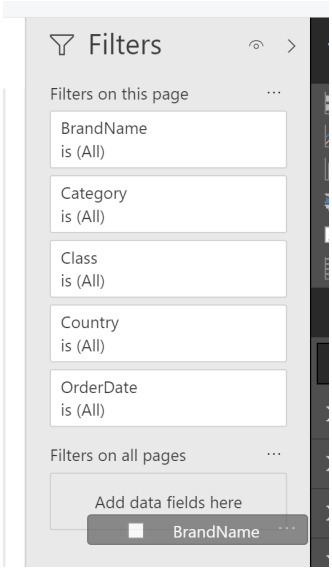
- Power BI Paginated Report Builder.

Let's go through each new feature in turn.

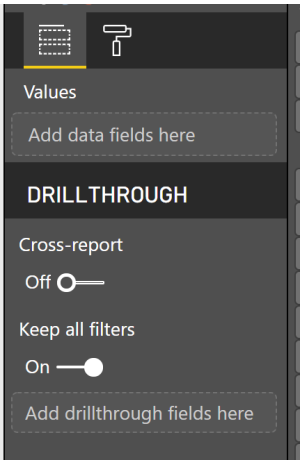
Filter pane improvements

SUPPORT FOR FULL FILTER PANE EDITING

Microsoft has now added support for full editing of the new 'Filter' pane. You can add and remove fields to filter on, change the filter state, control the visibility of the pane and filter cards, and lock filter cards all within the new 'Filter' pane.

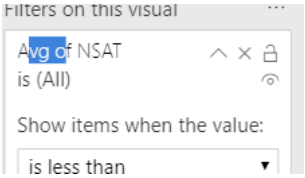


Since the new 'Filter' pane now has full editing ability, when you are using the Preview, you no longer see the old 'Filter' pane at all in the 'Visualization' pane:



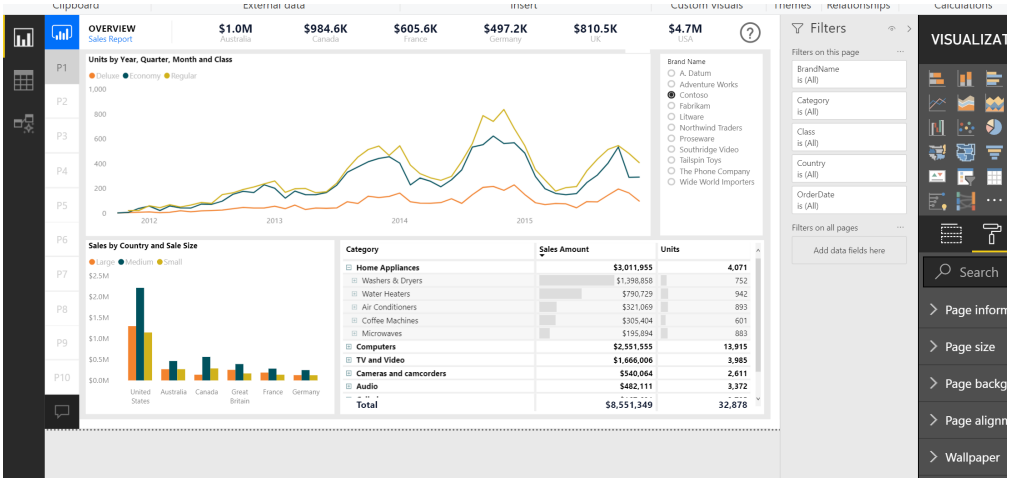
ABILITY TO RENAME FILTERS

When you're editing the filter pane, you can now double click the title to edit it. This is a good way to make the filter card names more understandable.



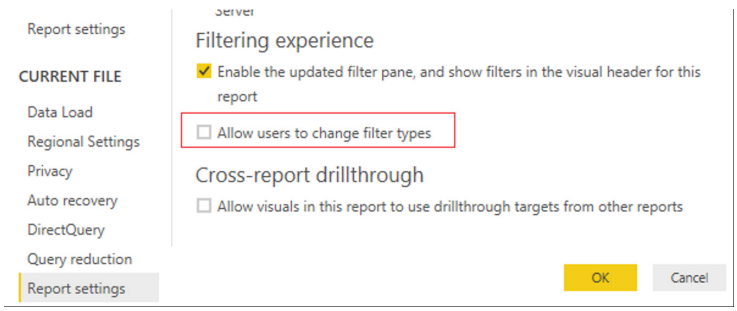
FILTER PANE SCALES WITH THE REPORT PAGE

To maintain proportion between the report page and the 'Filter' pane, the new 'Filter' pane will now scale with the report page and visuals.



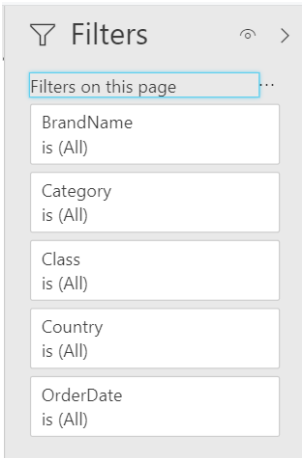
RESTRICT ABILITY TO CHANGE FILTER TYPE

Under the 'Filtering experience' section of the 'Report' settings you now have an option to control if users of your report can change the 'Filter' type. With this setting off, your report consumers won't have access to the dropdown to switch between the basic and advanced types of filters.



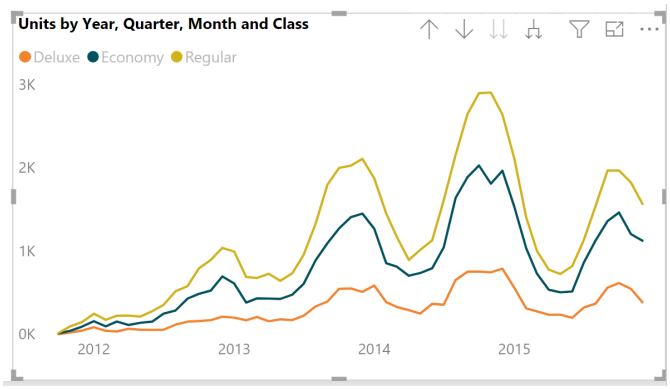
IMPROVED FILTER PANE ACCESSIBILITY

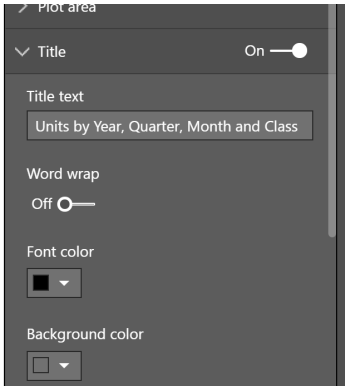
Microsoft has improved the keyboard navigation for the new 'Filter' pane. You can tab through every part of the 'Filter' pane and use the context key on your keyboard or **SHIFT + F10** to open the context menu:



Conditional formatting for visual titles

Since the initial release of Power BI, you've been able to customise the titles of your visuals, but they've always been static text. Not any more.



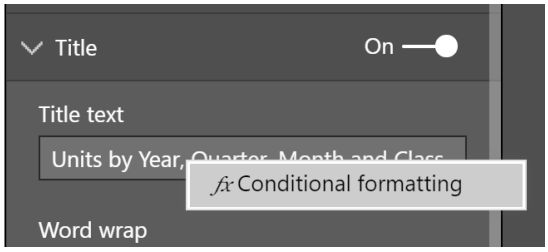


Since Power BI reports are interactive, it makes sense that you may want your titles to be dynamic and reflect the current state of the report. You can now use the conditional formatting dialog to change the text of your report based on a DAX expression in your model.

First, you'll need to create a field in your model to use for your title. For example, here's an expression that will change based on the filter context the visual receives for the product **BrandName** field:

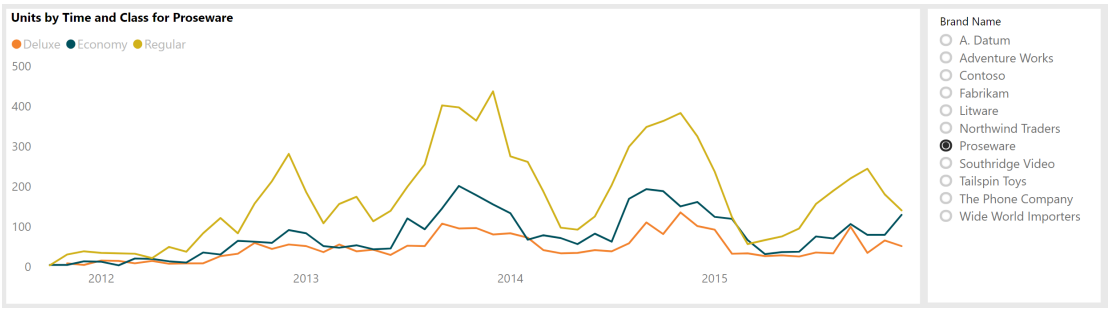
```
1  Line chart title = "Units by Time and Class for " & SELECTEDVALUE(Sales[BrandName])
```

Afterwards, launch the conditional formatting dialog by right-clicking the 'Title text' area in the 'Property' pane card and picking 'Conditional formatting'.

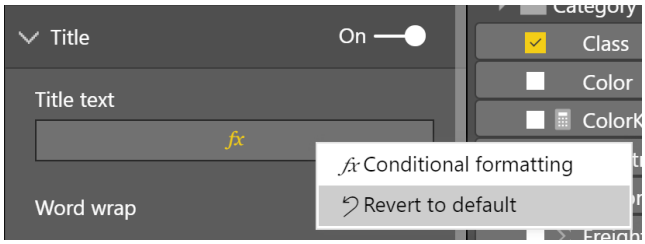


Then in the dialog, select your field:

Now the visual's title will respond to changes in the report.

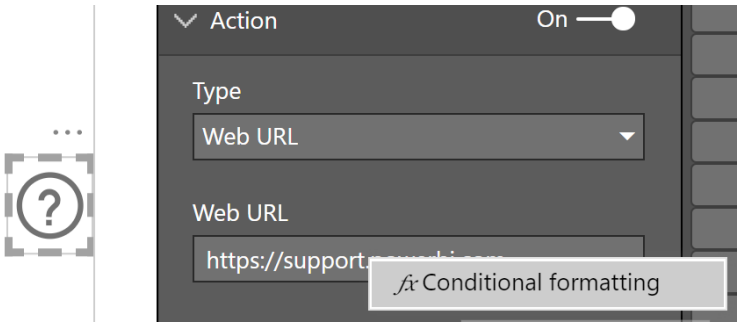


Once such a title is set, you can re-launch the dialog by clicking the fx button in the 'Property' pane or revert to the default using the context menu.



Conditional formatting for web URL actions for buttons, shapes and images

You can also use the same expression-bound formatting to make the URLs of your buttons dynamic. It's set up the same way as titles. This can be very useful if you want users to navigate to other webpages with URL parameters based on their current selection.



Over the coming months Microsoft has announced that they will be rolling these conditional formatting options out to more properties on more visuals to give users more ways to set the expression. The goal is that you'll be able to use rules, a measure or enter an expression directly in the dialog and use the result to format any property.

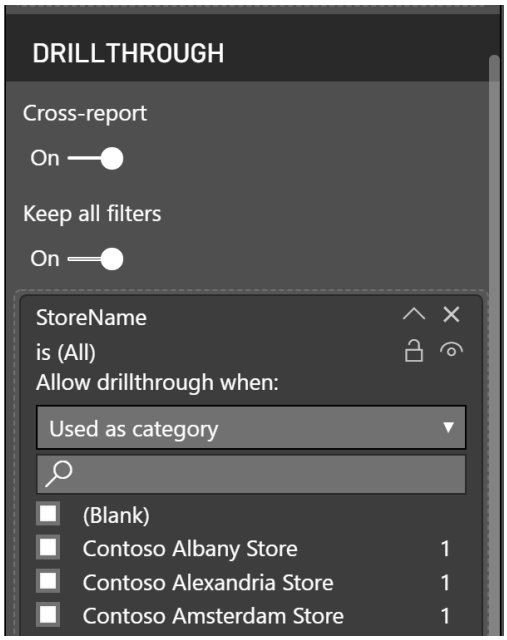
Drillthrough across reports

This update sees Microsoft extending its drillthrough feature, which up until now only worked between pages of a single report, to also reference other reports in a given workspace as well. The power of this feature is that you can now easily link up multiple reports. For example, you could create a summary report connected to a slimmed down dataset and set up drillthrough to deep detailed reports.

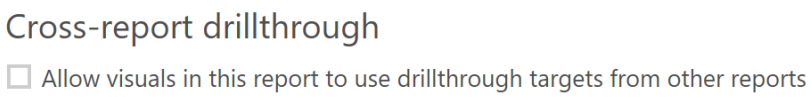
To set up this experience you'll need to:

1. Set up a drillthrough target page to be accessed from other reports within a workspace
2. Allow a report to opt into seeing drillthrough pages outside of the report

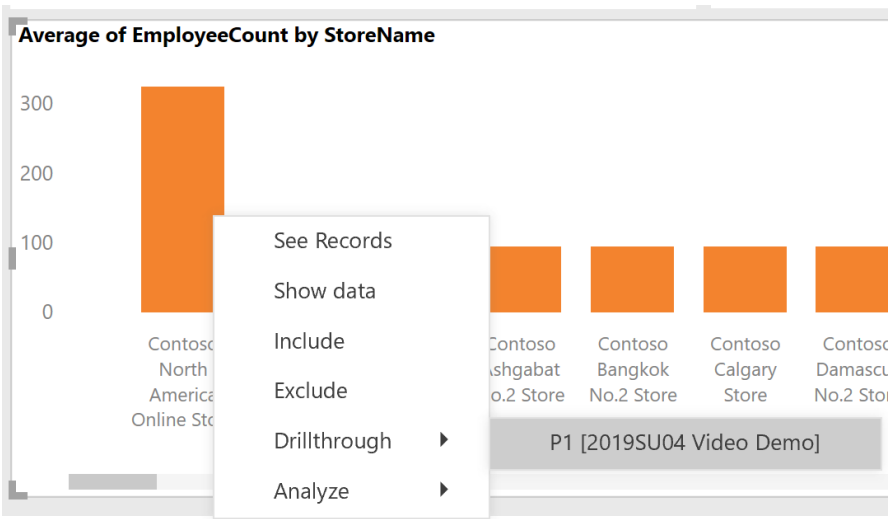
To set up a drillthrough page so it can be accessed from other reports within a workspace, all you need to do is turn on the 'Cross-report toggle' in the 'Drillthrough' section of the 'Visualization' pane.



After that, enable the 'Cross-report drillthrough setting' for all reports within a workspace that you want to point that cross-report drillthrough page. You can find this setting in the 'Report settings' for the current file section of the 'Options' dialog:

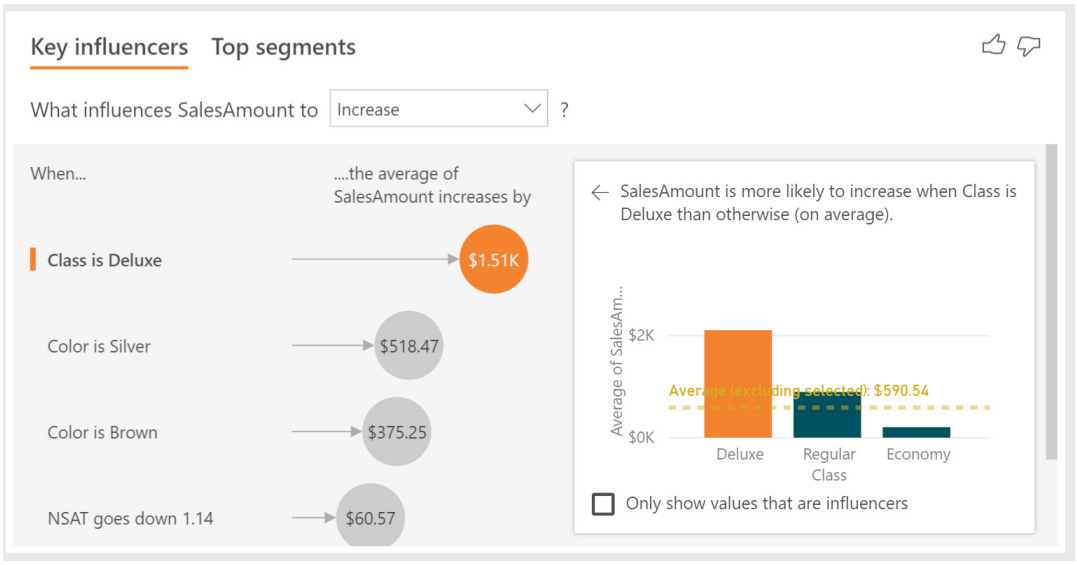


Once you've done that, any report can see the cross-report drillthrough pages within its workspace or app. Right-clicking in a visual in a report will show the drillthrough page from another report if the fields in the visual match the drillthrough fields setup on the target page. The matching needs to be identical by both table name and column name.

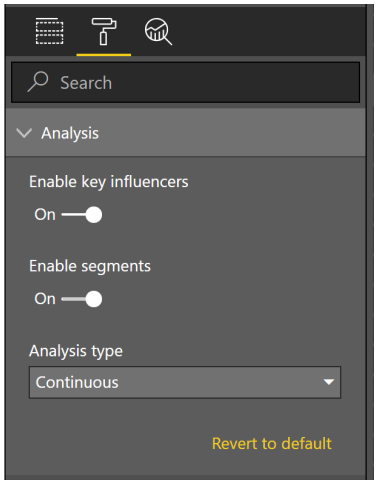


Key Influencers visual now supports continuous analysis for numeric targets

You can now add numeric fields to the 'Analyze' bucket of the field well and run continuous analysis to find key influencers that cause that field to increase or decrease.



Use the analysis type dropdown in the 'Analyze' card of the 'Formatting' pane to switch to 'Continuous' instead of 'Categorical':



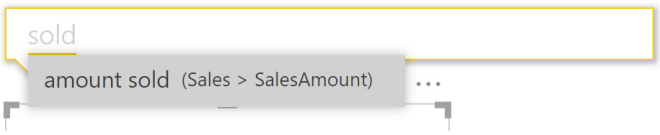
Behind the scenes, the visualisation will run a linear regression and rank all the factors that the user selected as potential influencers. It will give insights about how much an explanatory factor increases or decreases the average of the metric being analysed. In the example above, we can see that when Class is Deluxe, the **SalesAmount** is on average $1.5K higher than when the Class is Regular or Economy.

Python support in Power BI Desktop is now generally available

With this update, Python is now Generally Available, and can be used to create models and visuals without needing to enable any previous options.

Partial synonym matching for terms in Q&A

When using Q&A, you can now complete terms even if you only know part of it. Specifically, if you type a word or phrase that is part of a synonym of a field or table, you'll see the synonym in the list of suggestions:

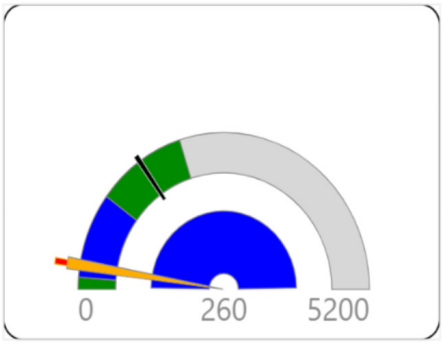


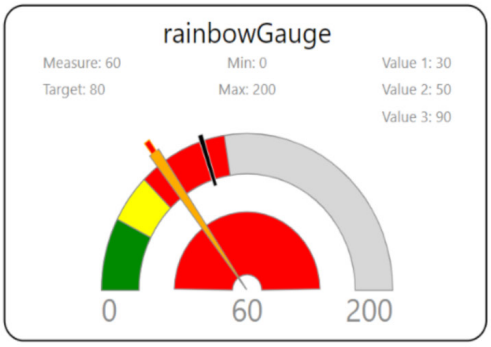
New DAX function – ALLCROSSFILTERED

There's a new DAX function in this update: **ALLCROSSFILTERED**. This function can be used to remove filters on a table from other tables across direct or indirect many-to-many relationships.

rainbowGauge

The rainbowGauge partner-developed visual lets report authors create a three-state gauge with different colours to represent each stage. You can add a minimum, maximum, target, and a value and colour for each stage to the visual:





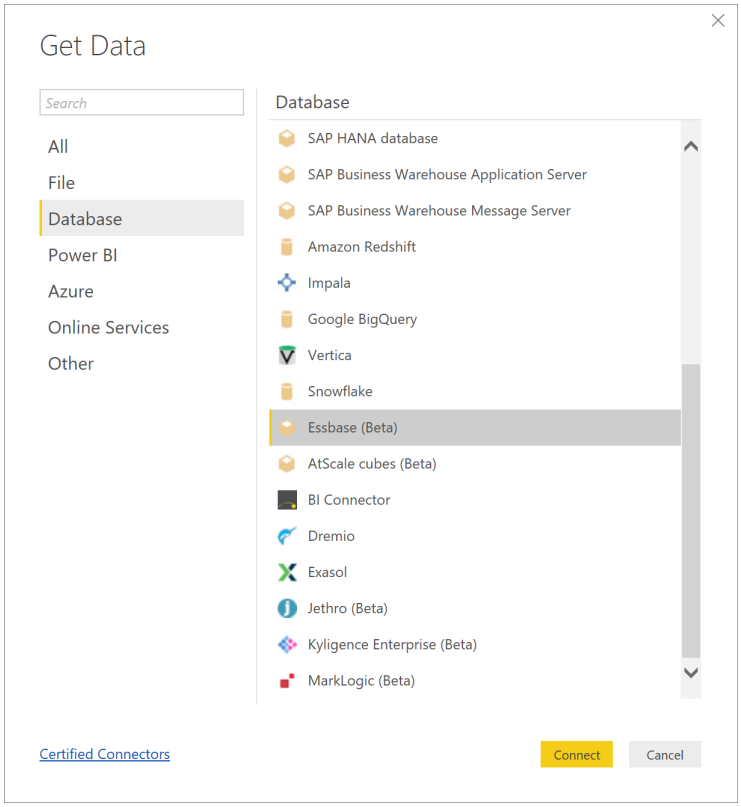
Power BI dataflows connector now Generally Available

Power BI dataflows have recently been declared Generally Available, and with that change, the connector to them in Power BI Desktop is also Generally Available.

Oracle Essbase connector now supports DirectQuery and is Generally Available

The Oracle Essbase connector has been in Beta for the past few months. Over this period, Microsoft has made incremental enhancements to it based on customer feedback.

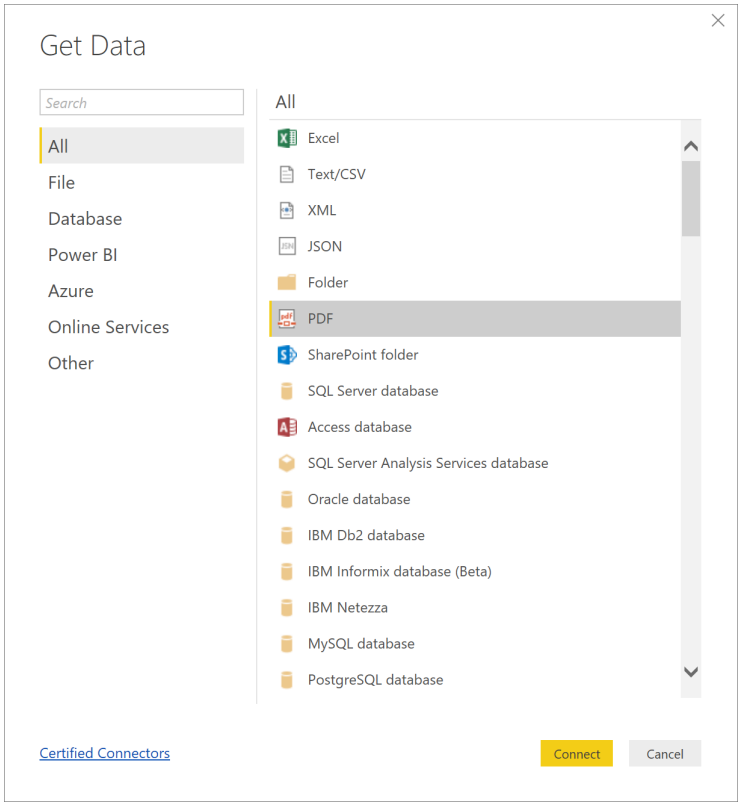
With this release, Power BI Desktop has added DirectQuery Support so you can create DirectQuery-based reports that depend on data coming from Essbase. In addition, the connector has been made Generally Available, which means it is now recommended for use in production scenarios.



Please note that, in order to refresh datasets that use this connector in the Power BI Service, you will need to install the April Update for the On-premises data gateway.

PDF Connector is now Generally Available

Another connector hitting General Availability this month is the long-awaited PDF Files connector. This was the most requested connector in the Power BI Ideas Forum and, after a few months in Beta, it finally becomes Generally Available.



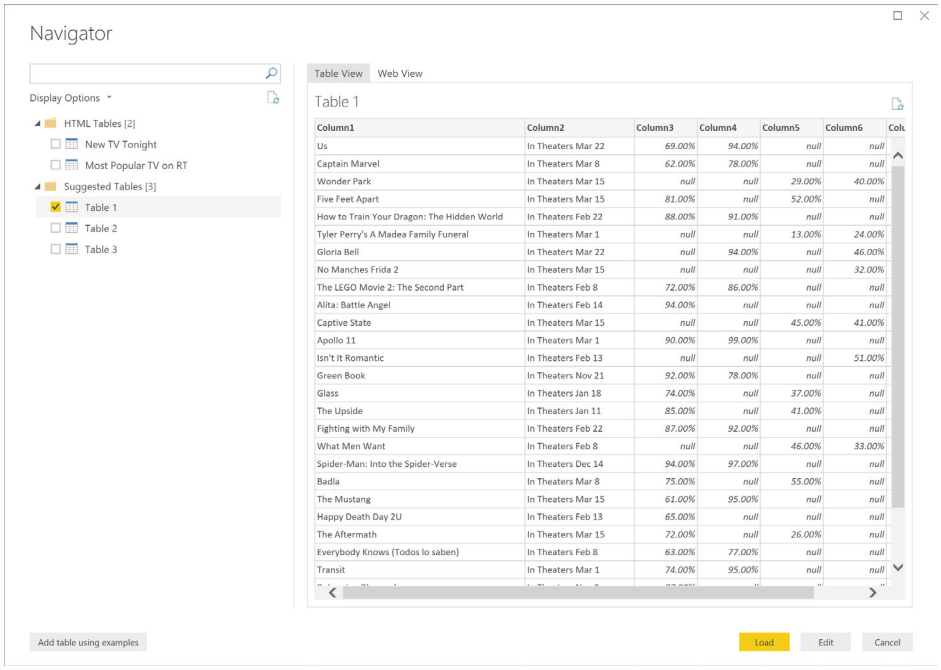
Please note that, in order to refresh datasets that use this connector in the Power BI Service, you will again need to install the April Update for the On-premises data gateway.

Web By Example connector - automatic table inference

One of the most innovative and differentiating features introduced in Power BI over the past year is the Web By Example connector. This connector allows you to scrape data from HTML pages, supporting any data element on the page, beyond HTML tables, by providing sample values for what data would like to be extracted.

This update adds another step to this connector – Microsoft is making the connector's AI algorithm smarter, so that it can now automatically suggest tables based on HTML element repetition patterns.

After enabling the new Preview feature ('New web table inference') from the 'Options' dialog, suggested tables are exposed in a new folder within the 'Navigator' dialog for the Web connector, saving you the need to provide sample output values in many common cases.



InterSystems IRIS connector

The InterSystems IRIS connector offers Power BI users seamless access to the InterSystems IRIS Data Platform. Besides serving up relational tables through the ODBC driver, Power BI users can also tap into InterSystems IRIS BI cubes, leveraging the measures and dimensions defined in the data platform. This allows combining the visualisation capabilities of Power BI with the performance of InterSystems' multidimensional OLAP option.

Indexima connector

Indexima connectors from Power BI make it possible to query all Big Data directly on your data sources, in volumetrics of tens of billions of rows in just a few milliseconds. The patent-pending technology is based on Hyperindex and is a thousand times faster than existing solutions. INDEXIMA scales from 10's GBs to 100's TBs data with a sub-second response time. That's fast.

Luminis InformationGrid

Over the last few years, Luminis has been successful with the InformationGrid, a Low Code Cloud platform for data-intensive applications. The InformationGrid offers you a resilient application platform that combines high developer productivity with fit-for-purpose persistence in an easy to manage, monitor and scalable Cloud infrastructure.

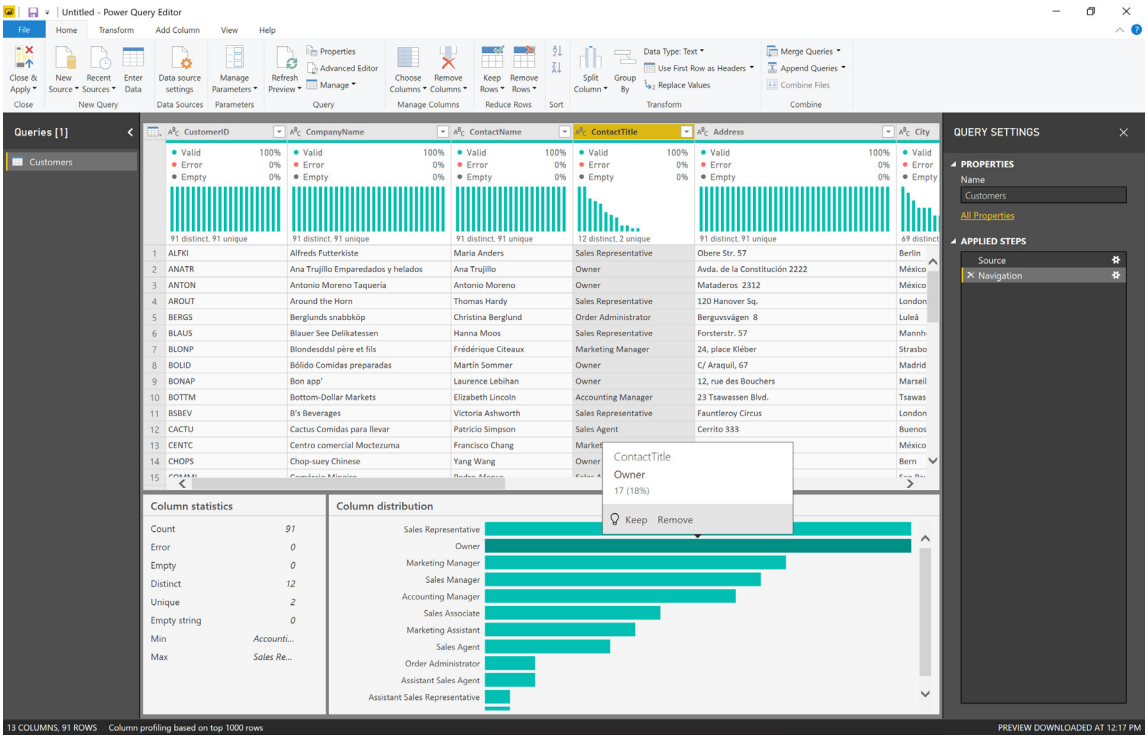
Solver BI360

BI360 provides a user-friendly Azure cloud-based data warehouse, budgeting and reporting solution with an easy integration to Power BI. You may now easily combine your data in the BI360 cloud-based data warehouse, enter budgets, forecasts, and KPIs into cloud-based input forms for your Power BI dashboards, and use BI360's report writer to create highly formatted financial and operational reports, including currency conversion and consolidations.

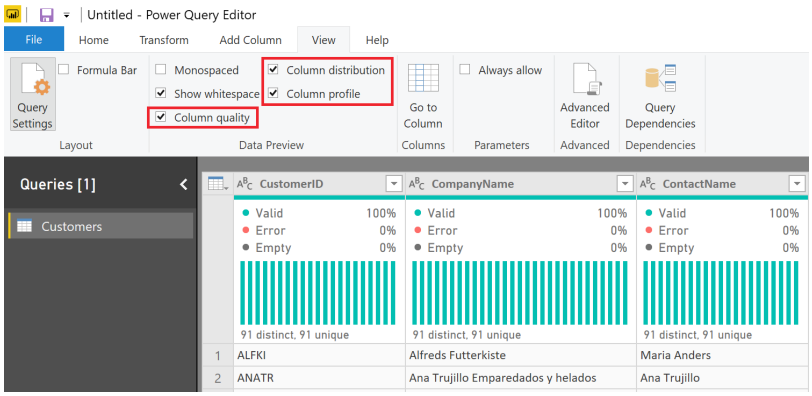
Data Profiling enhancements and General Availability

Data Profiling allows you to easily find issues with your data within the Power Query Editor. In addition to the inline Column Quality bar and Value Distribution histograms, Microsoft has now released the Column Profiles pane. This pane provides deeper profiling capabilities for any given column, including:

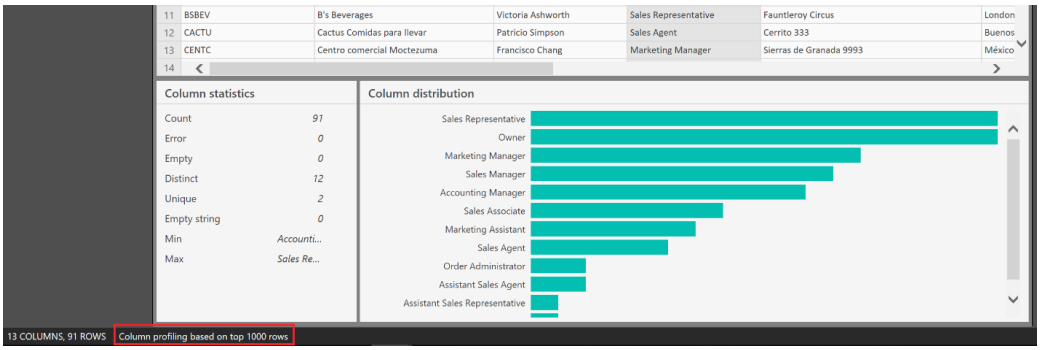
- **Column statistics:** number of errors, empty, valid, duplicated and unique values. Value distribution measures such as Min / Max / Average / Median, *etc.*
- **Column distribution:** Larger size version of the inline value distribution histograms, also including the ability to Keep or Remove values, which will generate the corresponding 'Filter Rows' step in your query ('Equals' / 'Does Not Equal' filters).



Visibility for each of the Data Profiling elements can be controlled from the 'View' tab:



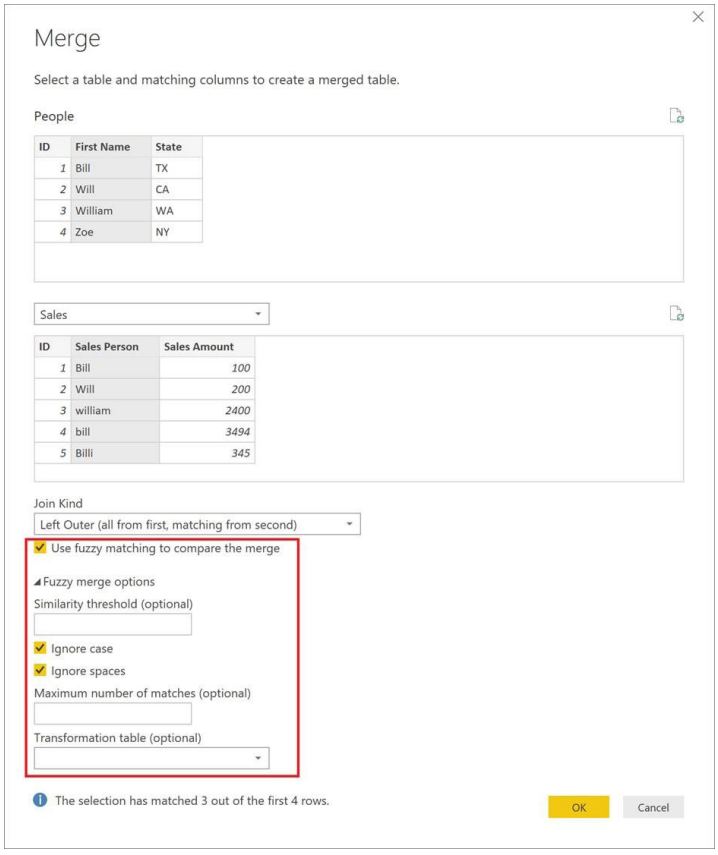
Another feature recently introduced in this area is the ability to switch from Preview-based data profiles to applying profiles over an entire table. This option can be modified from the 'Status Bar' in the bottom left of the 'Power Query Editor' dialog.



This now has General Availability.

Fuzzy Merge performance enhancements and General Availability

Fuzzy Merge is another Smart Data Preparation feature introduced a few months ago. Fuzzy Merge allows you to apply Fuzzy Matching algorithms when comparing columns and try to find matches across tables being merged.

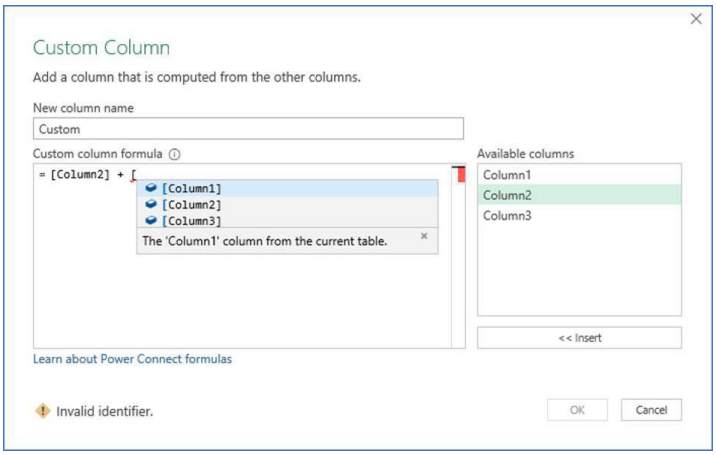


This is now Generally Available. In addition, Microsoft has also made significant performance optimisations to this transformation, reducing both the load times as well as overall CPU memory usage.

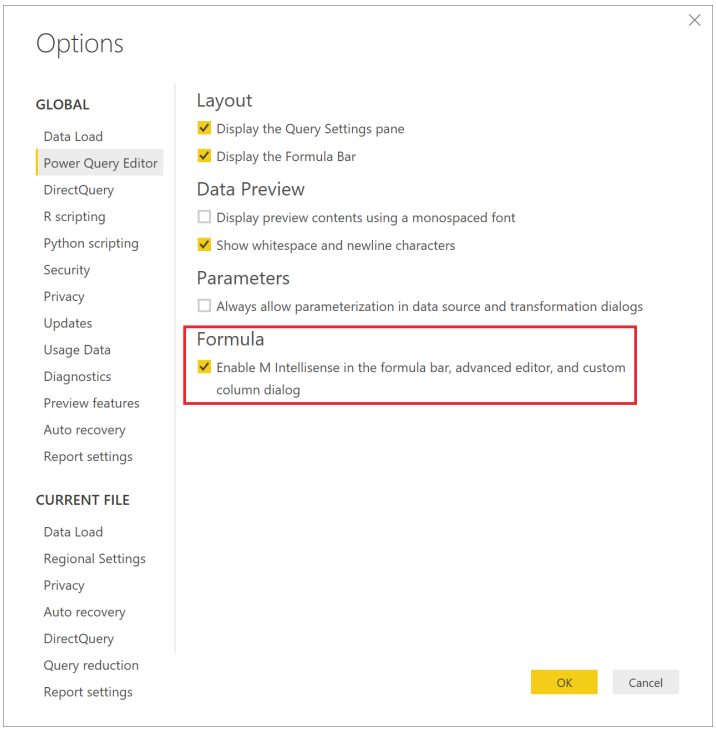
M Intellisense supported in formula bar and custom dialog and is Generally Available

M Intellisense provides you when writing **M** code within the Power Query Editor a seamless experience for discovering function names, function parameters, column names and many other UI enhancements (line numbers, syntax colouring, *etc*.).

With this release, **M** Intellisense support has been added to the Formula Bar and 'Custom Column' dialog, in addition to the previously supported 'Advanced Editor' dialog. Microsoft is also making **M** Intellisense Generally Available and enabled by default within all these UI surfaces in the Power Query Editor.



Note that if you wish to disable **M** Intellisense, you can do so from the 'Options' dialog.



Power BI Paginated Report Builder

This release sees the emanation of the Power BI Report Builder, a companion application for Power BI for Paginated Report authoring. This free Windows desktop app will act as the primary authoring experience for paginated reports in the Power BI service going forward.

That's it until the June newsletter.

Latest Power BI Service and Mobile updates

It's been busy in this arena for some time, and we missed some key updates due to publishing deadlines in our newsletter. No matter, there's a nice long list this time around:

- Updates to the Premium Capacity Metrics app
- Export to PDF and filtered export for Power BI reports
- On-demand email subscriptions
- Bulk operations in the Admin Portal
- Help and support settings for Power BI users
- Data lineage experience for dataflows
- Certified custom visuals settings
- Power BI Premium Deployment and Management Whitepaper
- Premium Multi-Geo General Availability
- Users outside your organization can edit and manage content with Azure AD B2B
- On-premises data gateway update
- Public preview of XMLA endpoint
- Slideshow in presentation mode for Windows Power BI app
- Updates to the Power BI mobile apps
- Roadmap updates.

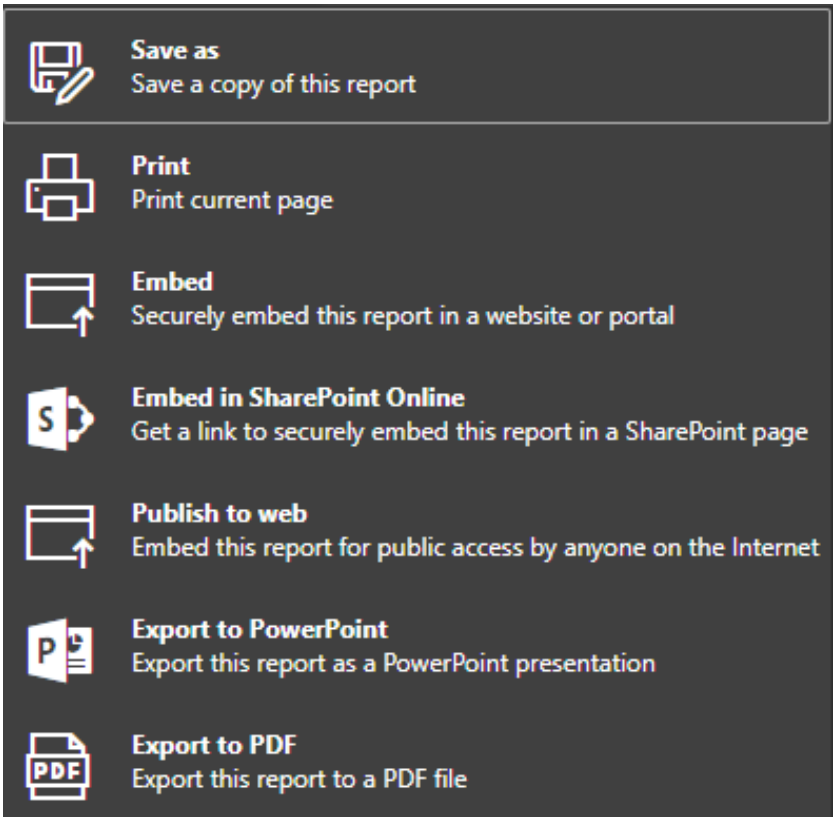
If you are sitting comfortably, let's begin…

Updates to the Premium Capacity Metrics app

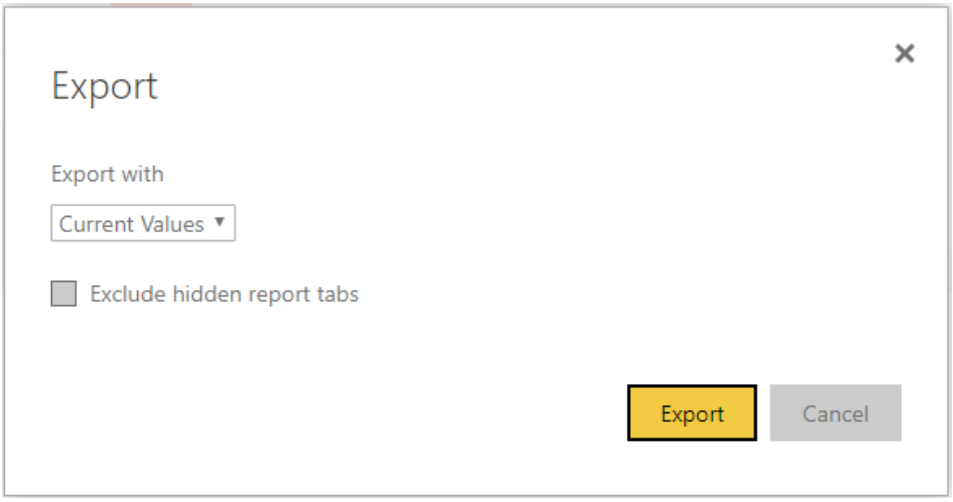
There is a new version of the Power BI Premium Capacity Metrics app released to include new system metrics for workloads and total active dataset size in memory. The latest version (1.10.1.1) of the app provides a comprehensive view of workload operations such as dataset and dataflow refreshes, dataset evictions, dataset queries, paginated report data retrieval / execution, and system metrics in the capacity for the past seven days.

Export to PDF and filtered export for Power BI reports

Another new feature added in the Service, this allows you to export any of your Power BI reports to a PDF document. All you need to do is locate the 'File' menu in the 'report action' bar, open the dropdown, and you'll see the new option to Export to PDF. Once you select it, the PDF will be generated and downloaded for you.



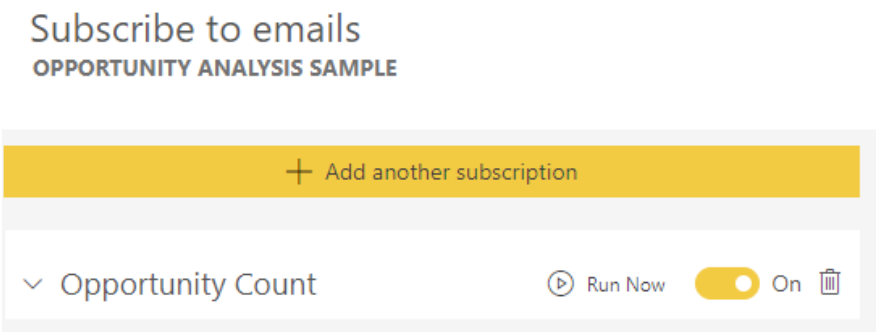
All of the export functionalities in Power BI reports have been improved by providing you with an option to maintain the slicers, filters and other data views selected on the report to be respected in the exported document. Now, when you export to either PDF or PowerPoint, you'll see the following pop-up window:



By default, Microsoft will be exporting the 'Current Values', which is what you see on the screen along with any other changes you've made across the report during that session.

On-demand email subscriptions

Earlier this year, Microsoft announced time-based e-mail subscriptions to help you schedule a time for when you want your subscriptions to run. This has been further enhanced by giving you the ability to run any subscription you want on-demand for both dashboards and reports. If you need to send an e-mail right away, you can now do that by clicking the 'Run now' button that appears next to the name of your subscription. This will immediately trigger an e-mail to be sent to you and / or any other user you've subscribed to that content.

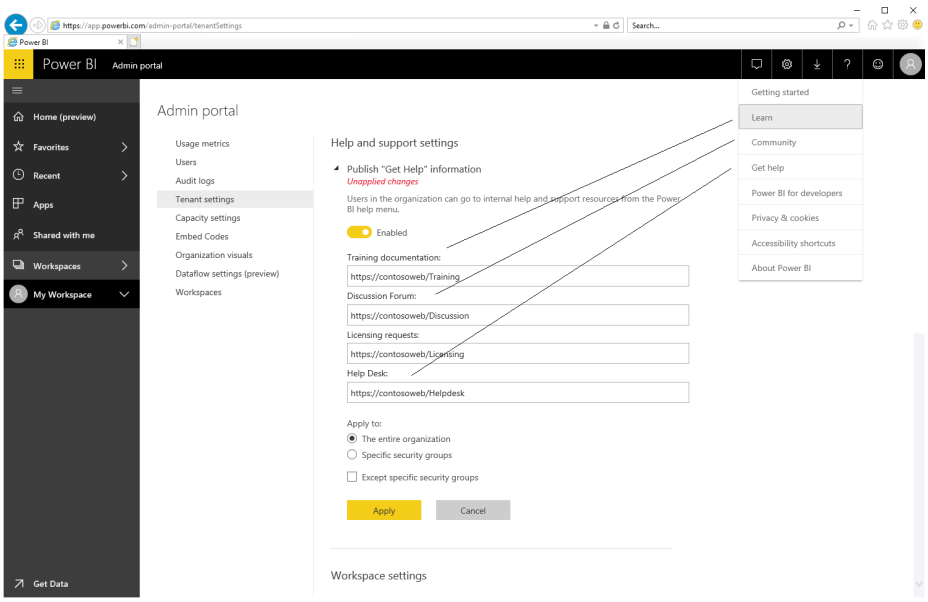


Bulk operations in the Admin Portal

We made it much easier for admins to perform repetitive tasks efficiently. You no longer need to resort to PowerShell scripts to assign a user to multiple workspaces or delete hundreds of infringing embed codes, with the recent improvements in the admin portal, you can perform all of these tasks in a single operation. Check out the announcement blog to walk through an example of how you can use bulk operations for workspaces.

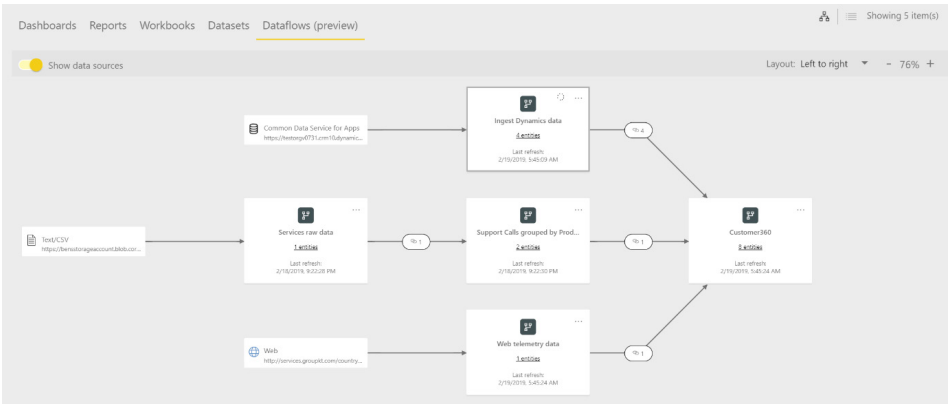
Help and support settings for Power BI users

There is a new setting in the admin portal that allows organisations to customise the help and support link in the Power BI help menu to point users to specific organisational content rather than the default Microsoft sites for Guided Learning, the Power BI community and the Power BI support forum. All you need to do is head over to the admin portal, select the 'Tenant settings' page, and expand the 'Publish "Get Help" information' where you can provide appropriate URLs to your company's sites for training documentation, discussion forums and help desk. These parameters change the behaviour of the 'Learn', 'Community' and 'Get help' menu items in Power BI Service.



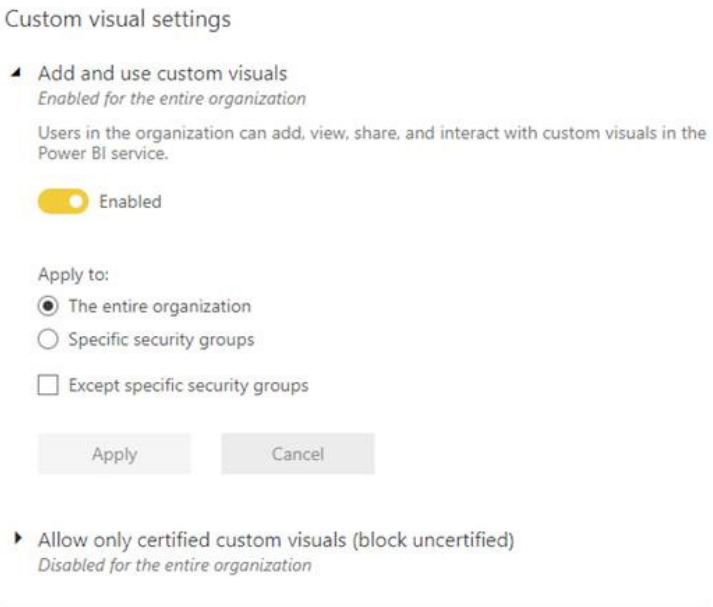
Data lineage experience for dataflows

A new user experience for visualising the data lineage has been provided, starting from the data source down to the dataflows and between the linked dataflows within a workspace. With this experience, you can understand how artefacts relate to each other and to easily manage their BI dataflows projects in their organisation. This release was the first step in Microsoft's larger plans to address more challenges in Power BI lineage in the layer of dataflows, as well as datasets, reports and dashboards.



Certified custom visuals settings

This update adds a new setting in the admin portal to give you more control over the usage of custom visuals within your organisation. With this new setting, users within your organisation can only view and use reports containing certified custom visuals. Visuals that are not certified will not be rendered.



Power BI Premium Deployment and Management Whitepaper

Microsoft has also released a new Power BI Premium Deployment and Management whitepaper (authored by fellow Australian MVP Peter Myers) to help you successfully deploy the described solution within your enterprise. It covers multiple topics such as deploying, scaling, troubleshooting and managing Power BI Premium capacity.

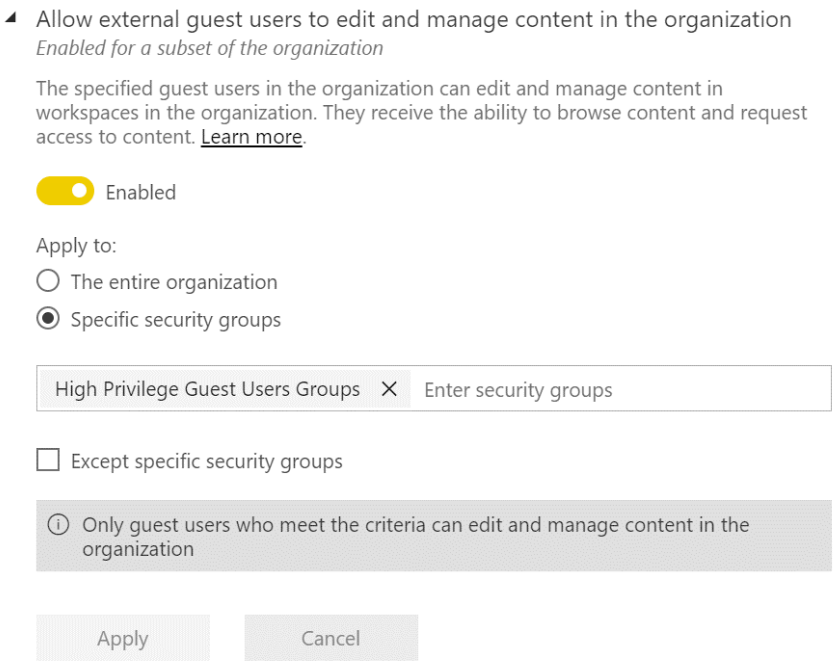
Premium Multi-Geo General Availability

Multi-Geo for Power BI Premium has become Generally Available/ This feature may be used to extend your Power BI tenant to store your users' data in the geographies covered in the Microsoft Trust Center (except for Power BI Germany, Power BI China operated by 21Vianet or Power BI for US Government). Multi-Geo can also be used to improve the performance of a dataset refresh under certain conditions.

Users outside your organization can edit and manage content with Azure AD B2B

It's been made simpler for you to collaborate with individuals outside your organisation by announcing edit and manage content capabilities for Azure AD B2B. The feature allows external guest users to edit and manage content in workspaces, get the full home experience, and partake in many content administration tasks.

To enable this for your organisation, head on over to the admin portal and look for allow external guest users to edit and manage content in the organisation in the tenant settings. Be aware that the external guest user that you have invited to collaborate must have a Power BI Pro license to manage any content within your tenant.

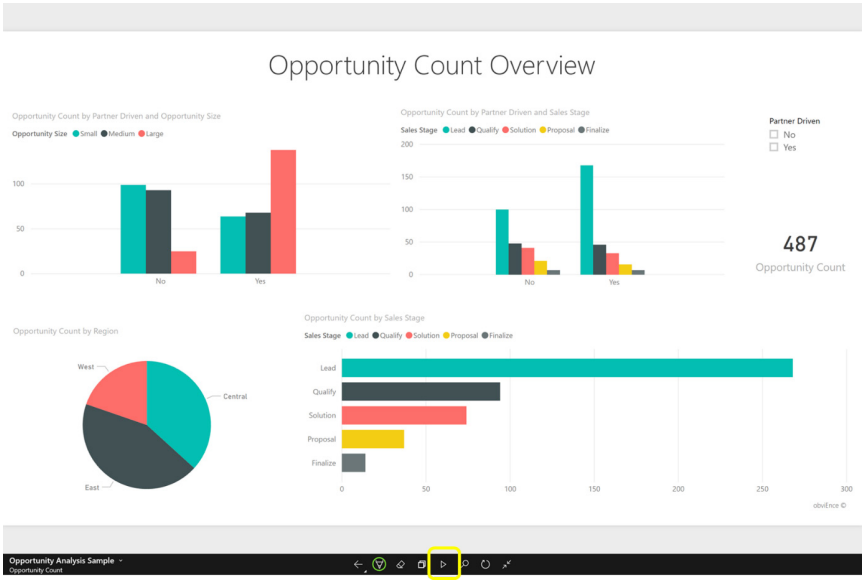


On-premises data gateway update

There's an updated version of Power BI On-premises data gateway with the current update. The latest version has an updated mashup engine and ensures compatibility with the latest update for Power BI Desktop.

Public preview of XMLA endpoint

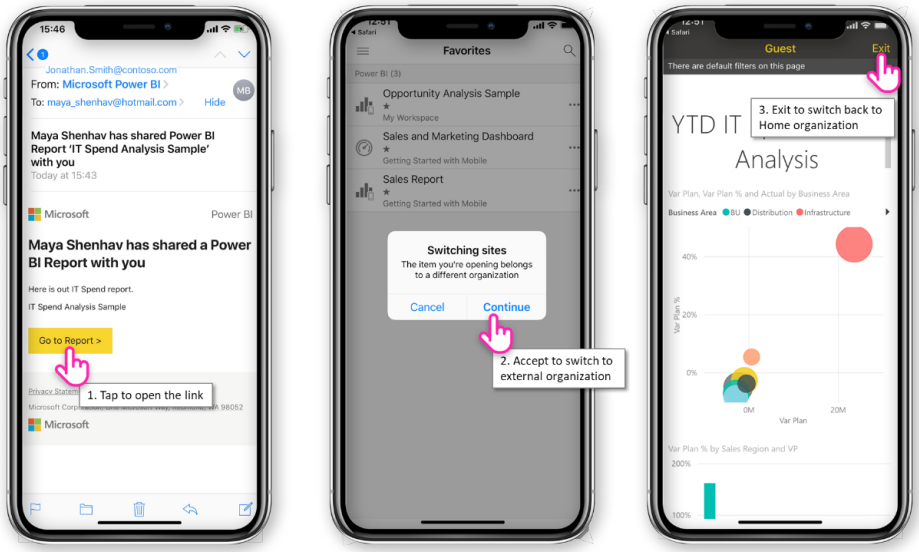
This update also sees open-platform connectivity to Power BI datasets with the public preview announcement of read-only XMLA endpoints in Power BI Premium. With these capabilities, you can leverage a single one-version-of-the-truth semantic model across a range of data-visualization tools from different vendors, including many of those covered by the Gartner Magic Quadrant for Analytics and Business Intelligence Platforms.



Updates to the Power BI mobile apps

There were multiple updates that went out recently for the mobile apps in various platforms. In summary:

- **Visio visuals:** Microsoft has enabled Single Sign On (SSO) in Visio visuals. There are no additional sign-in steps required when viewing report with Visio visual in the mobile apps
- **Dashboard commenting in Power BI Mobile Windows app:** Microsoft has activated the commenting feature on dashboards on the Windows app that allows users to discuss their data directly on dashboards or specific tiles within them
- **Support for new iPad Pro:** The iOS Power BI app has been updated to optimise settings for the newly released iPad Pro, both 11 and 12.9 inch layout
- **Support for Azure AD B2B guest users:** The Azure AD B2B features available elsewhere have now been incorporated into mobile. You can now access all Power BI content shared with you from external organisations on the go



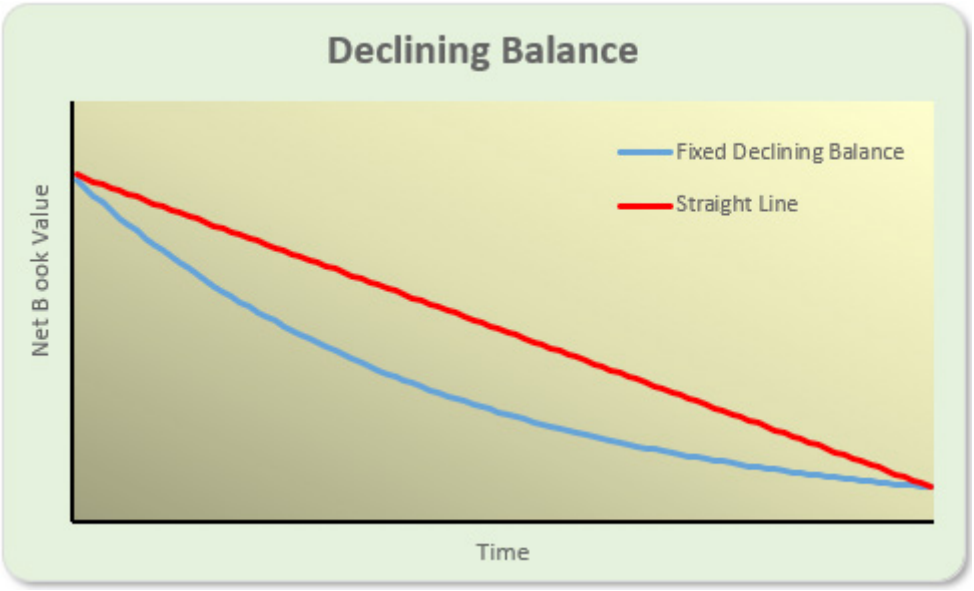
- **Supporting Report Server and ADFS configuration (iOS):** It's now been made it easier for users to access Power BI reports (PBIX) hosted on Report Server configured with ADFS and WAP on iOS devices
- **Single tap on reports:** Microsoft has completely changed the way you interact with reports on your mobile app by releasing single tap. With this feature, you only need a single tap to perform actions on visuals, buttons and slicers.

Roadmap updates

You should remember that Microsoft uses the Power BI section in the Business Application Release Notes to share details on what's coming in the next three to six months. These release notes are updated weekly with details on shipping dates, screenshots, and new announcements.

The A to Z of Excel Functions: DB

Depreciation is a method of allocating costs over the useful economic life of an asset (*e.g.* a building, a car, a computer). This function returns the depreciation of an asset for a specified period using what is known as the fixed-declining balance method (*explained below*).



Declining balance is a form of accelerated depreciation that will depreciate more aggressively than the straight-line method (where the same charge is applied in each period of equal length). This method is appropriate when an asset has higher functionality in the early years of use and becomes obsolete quickly. This method ensures that more depreciation is accounted for in the first few years, as a constant rate is applied to the remaining non-depreciated balance. Fixed assets such as computer equipment are a good example since they are typically only used for a couple of years and then replaced.

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

DB(cost, salvage, life, period, [month])

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

- **cost:** this is required and represents the initial cost of the asset
- **salvage:** this is also required. This is the value at the end of the depreciation (sometimes called the salvage value of the asset)
- **life:** this is required. This is the number of periods over which the asset is being depreciated (sometimes called the useful life of the asset)
- **period:** another variable required. This is the **period** for which you want to calculate the depreciation. The period must use the same units as **life**
- **month:** this argument is optional and represents the number of months in the first year. If month is omitted, it is assumed to be 12 (the number of months in a year).

It should be further noted that:

- the fixed-declining balance method computes depreciation at a fixed (*i.e.* constant) rate. **DB** uses the following formulae to calculate depreciation for a period:

  (cost - total depreciation from prior periods) * rate

  where:

  rate = 1 - ((salvage / cost) ^ (1 / life)), rounded to three decimal places
- Depreciation for the first and last periods is a special case. For the first period, **DB** uses this formula:

  cost * rate * month / 12
- For the last period, DB uses this formula:

  ((cost - total depreciation from prior periods) * rate * (12 - month)) / 12.

Given rounding issues and the method of pro-rating, it should be noted that the depreciation will often not equal the amount to be depreciated at the end of the life (*see the example below*). In financial modelling, you may need to calculate depreciation from first principles instead.

Please see our example below:

	A	B	C
1	Data	Description	
2	$1,000,000	Initial cost	
3	$100,000	Salvage value	
4	6	Lifetime in years	
5			
6			
7	Formula	Description	Result
8	=DB(A2,A3,A4,1,7)	Depreciation in first year, with only seven months calculated	$ 186,083.33
9	=DB(A2,A3,A4,2,7)	Depreciation in second year	$ 259,639.42
10	=DB(A2,A3,A4,3,7)	Depreciation in third year	$ 176,814.44
11	=DB(A2,A3,A4,4,7)	Depreciation in fourth year	$ 120,410.64
12	=DB(A2,A3,A4,5,7)	Depreciation in fifth year	$ 81,999.64
13	=DB(A2,A3,A4,6,7)	Depreciation in sixth year	$ 55,841.76
14	=DB(A2,A3,A4,7,7)	Depreciation in seventh year, with only five months calculated	$ 15,845.10
15			
16	=SUM(C8:C14)	Total depreciation - note it does not equal the total cost less the salvage value ($900,000)	$ 896,634.33
17			

The A to Z of Excel Functions: DBCS

This has nothing to do with the previous function, but has sometimes been confused with it, bizarrely!

A double-byte character set (DBCS) is a character encoding in which either all characters (including control characters) are encoded in two bytes, or merely every graphic character not representable by an accompanying single-byte character set (SBCS) is encoded in two bytes (Han characters would generally comprise most of these two-byte characters). A DBCS supports national languages that contain many unique characters or symbols (the maximum number of characters that can be represented with one byte is 256 characters, while two bytes can represent up to 65,536 characters, i.e. 256^2).

Examples of such languages include Japanese and Chinese. Korean Hangul does not contain as many characters, but KS X 1001 supports both Hangul and Hanja, and uses two bytes per character.

These are single-byte (half-width) characters.
ｱｲｳｴｵｶｷｸｹｺｻｼｽｾｿ

Ｔｈｅｓｅ　ａｒｅ　ｄｏｕｂｌｅ－ｂｙｔｅ　ｃｈａｒａｃｔｅｒｓ．
アイウエオカキクケコサシスセソ
あいうえおかきくけこさしすせそ
一二三四五六七八区十

This function converts half-width (single-byte) letters within a character string to full-width (double-byte) characters. The name of the function (and the characters that it converts) depends upon your language settings.

For Japanese, this function changes half-width (single-byte) English letters or katakana within a character string to full-width (double-byte) characters.

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

DBCS(text)

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

- **text:** this is required and represents the text or a reference to a cell that contains the text you want to change. If **text** does not contain any half-width English letters or katakana, text is not changed.

Please see my example below:

=DBCS("EXCEL") equals "EXCEL"

=DBCS("ｴｸｾﾙ") equals "エクセル"

More Excel Functions next month…

Upcoming SumProduct Training Courses

Location	Course	Date	Duration
Auckland	Financial Modelling	6 - 7 May 2019	2 Days
Wellington	Financial Modelling	9 - 10 May 2019	2 Days
Melbourne	Excel Tips & Tricks	21 May 2019	1 Day
Melbourne	Financial Modelling	22 - 23 May 2019	2 Days
Melbourne	Power Pivot, Power Query and Power BI	28 - 30 May 2019	3 Days
Sydney	Excel Tips & Tricks	3 Jun 2019	1 Day
Sydney	Financial Modelling	4 - 5 Jun 2019	2 Days
Sydney	Power Pivot, Power Query and Power BI	10 - 12 Jun 2019	3 Days
Sydney	Excel Tips and Tricks	15 Jul 2019	1 Day
Sydney	Financial Modelling	16 - 17 Jul 2019	2 Days
Sydney	Power Pivot, Power Query and Power BI	22 - 24 Jul 2019	3 Days
Sydney	Excel Tips and Tricks	19 Aug 2019	1 Day
Melbourne	Financial Modelling	20 - 21 Aug 2019	2 Days
Sydney	Financial Modelling	20 - 21 Aug 2019	2 Days
Melbourne	Power Pivot, Power Query and Power BI	26 - 28 Aug 2019	3 Days
Sydney	Power Pivot, Power Query and Power BI	26 - 28 Aug 2019	3 Days
Melbourne	Excel Tips and Tricks	17 Sep 2019	1 Day
Sydney	Excel Tips and Tricks	23 Sep 2019	1 Day
Sydney	Financial Modelling	24 - 25 Sep 2019	2 Days

Sydney	Power Pivot, Power Query and Power BI	7 - 9 Oct 2019	3 Days
Melbourne	Financial Modelling	14 - 15 Oct 2019	2 Days
Melbourne	Power Pivot, Power Query and Power BI	22 - 24 Oct 2019	3 Days
Sydney	Excel Tips and Tricks	4 Nov 2019	1 Day
Sydney	Financial Modelling	5 - 6 Nov 2019	2 Days
Sydney	Power Pivot, Power Query and Power BI	11 - 13 Nov 2019	3 Days
Melbourne	Excel Tips and Tricks	25 Nov 2019	1 Day
Melbourne	Financial Modelling	26 - 27 Nov 2019	2 Days
Melbourne	Power Pivot, Power Query and Power BI	9 - 11 Dec 2019	3 Days
Sydney	Power Pivot, Power Query and Power BI	9 - 11 Dec 2019	3 Days
Sydney	Excel Tips and Tricks	16 Dec 2019	1 Day
Sydney	Financial Modelling	17 - 18 Dec 2019	2 Days

Key Strokes

Each newsletter, we'd like to introduce you to useful keystrokes you may or may not be aware of. This month, we thought we would continue going through the function keys, this time with the **CTRL + SHIFT** combination:

Keystroke	What it does
CTRL + SHIFT + F3	Create names
CTRL + SHIFT + F4	Find previous (from most recent search)
CTRL + SHIFT + F6	Previous Window / workbook
CTRL + SHIFT + F12	Print

There are over 540 keyboard shortcuts in Excel. For a comprehensive list, please download our Excel file a 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**
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- **Model reviews / audits for internal and external purposes**
- **M&A work**
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- **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.

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

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