

Sum Product

NEWSLETTER #112 - March 2022

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At last!! **LAMBDA** finally makes it to Office 365 Current Channel, so those of you on the subscription model can finally see this powerful function in all its glory. It even has a new interface. We detail more inside this month's newsletter.

But that wasn't the only news item this month: we have an update on Excel 4.0 macros, there is now AutoComplete for dynamic data validated dropdown lists, plus we itemise other useful improvements for Excel for the Web.

Also, Power BI returns with a vengeance this month and keeps our regulars company: there is another Beat the Boredom Challenge, plus our usual articles on Charts & Dashboards, Visual Basics, Power Pivot Principles and Power Query Pointers. We also have an **IMAGINARY** A to Z of Excel Functions, we even see what's LEFT in our Keyboard Shortcuts.

Liam Bastick, Managing Director, SumProduct



Announcing LAMBDA to Production and Advanced Formula Environment

At last! **LAMBDA** and the **LAMBDA** helper functions are now Generally Available to anyone using Production: Current Channel builds of Excel. In conjunction with **LAMBDA** going to production, Microsoft has also announced the release of a new add-in, the Advanced Formula

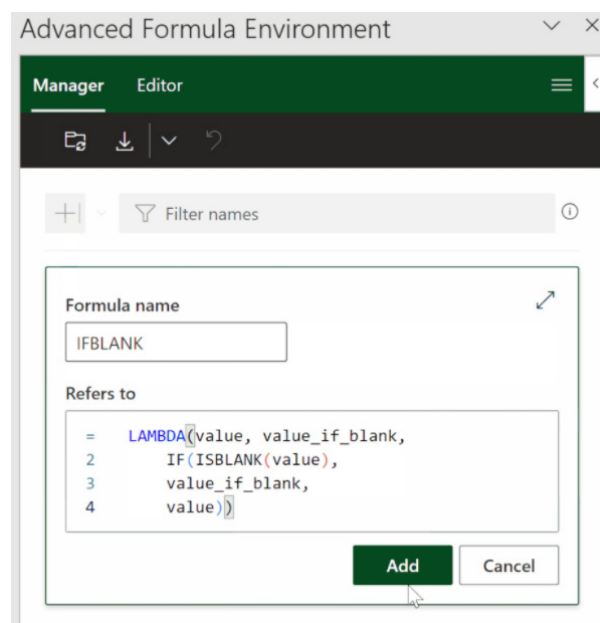
Environment, which allows simpler importing, exporting and authoring of named **LAMBDA**s.

As a reminder, **LAMBDA** allows you to define a custom function in Excel's very own formula language.

To show how **LAMBDA** and the Advanced Formula Environment might work together, let's look at an example that Microsoft use for simplicity: **IFBLANK**.

Now, no such function exists in Excel – but now, it *can*. Many regularly encounter issues replacing certain values in a dataset, such as errors or blanks cells. Excel provides **IFERROR** to replace error values, but there is no function to replace blank cells. However, with **LAMBDA**, you may now build your own **IFBLANK** function.

Now you may author this in a worksheet and then import it into the Name Manager, but you may also create this in the new formula environment and then synchronise it with the Excel workbook to make use of it therein.



Without **IFBLANK**, Excel, by default returns a blank which gets coerced to zero [0] when placed in the cell. Not anymore.

Furthermore, Microsoft has added support for function ToolTips for named **LAMBDA**s in addition to auto-completing the open parentheses character when calling these functions, *i.e.* calling a function defined using a **LAMBDA** is now exactly the same as calling a native function.

Also, Microsoft has increased the limit of recursion by 16 times its

original limit, *i.e.* Microsoft has increased the limit of recursion by 16 times its original limit, *i.e.* Microsoft has increased the limit of recursion by 16 times its original limit...

The way the **LAMBDA** helper functions handle arrays of references differently now too. Previously when a **LAMBDA** helper function returned an array and the associated **LAMBDA** returns a single cell, an **#CALC!** error would be returned. This has now been modified to automatically return the cell value as the output of the **LAMBDA** function.

Advanced Formula Environment

To facilitate the new, improved **LAMBDA** in a Current Channel production environment, a new tool to aid in the authoring of more complex named formulae has been created. The Advanced Formula Environment (AFE) is a space where you may explore new and different methods for authoring formulae with special functionality designed with **LAMBDA**s and **LET** in mind.





This new tool includes the following features:

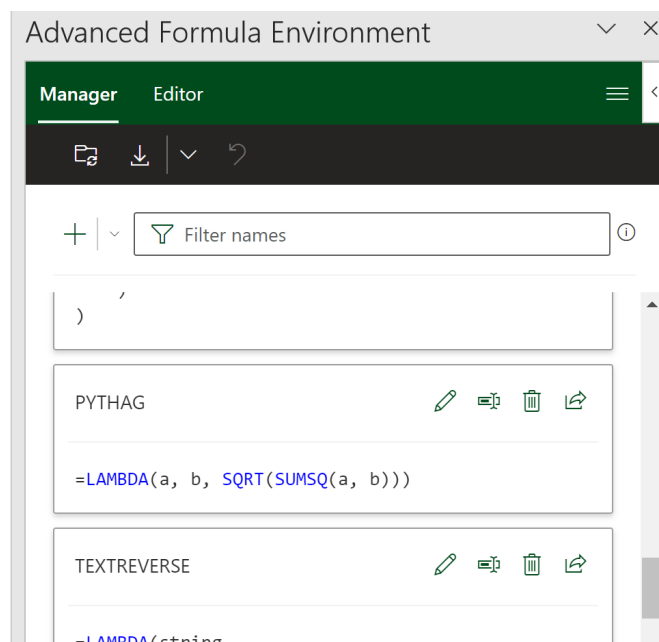
- advanced formula authoring capabilities:
 - o IntellisenseAA
 - o commenting
 - o in-line errors
 - o auto tabulation
 - o code collapse
- undo / redo of formula edits within the manager
- namespaces to allow for groups of named functions
- import and export functionality
- text and GitHub Gist import
- different views to filter your names and edit in a single location.

The environment is available on all platforms where Office Add-ins are available (*i.e.* Mac, Windows and the Web).

There are two views presently in this tool: Manager and Editor views.

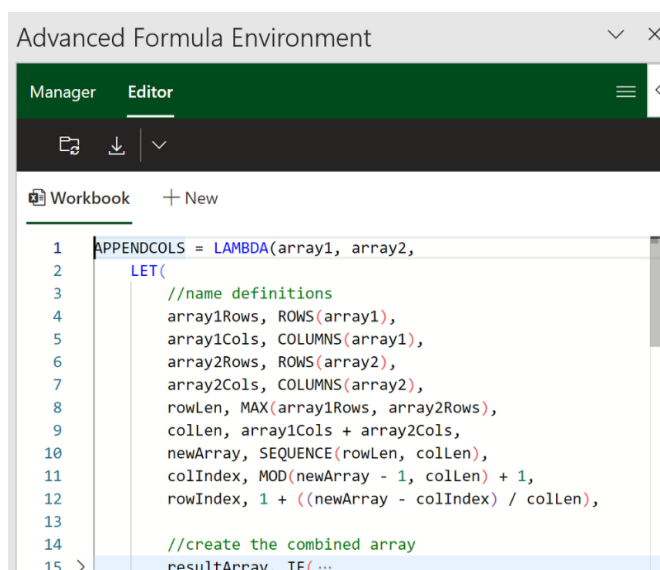
Think of the Manager view as similar to Excel’s Name Manager, but with more functionality. This is where you will see all of your names with their own individual cards and associated quick actions. There are four key actions

Icon	Description
	Edit the name
	Rename the formula
	Delete the entry
	Export the definition for sharing



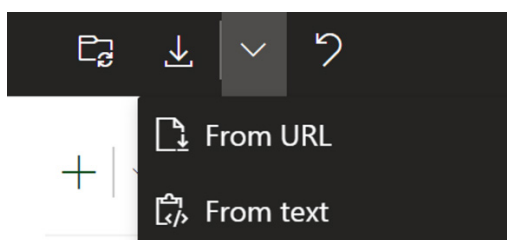
On the other hand, the Editor is where you can go to edit all entries within the workbook or create new namespaces for collections of formulae. This is where you will most likely go to create more complex functions, since you get the full version of the Editor in this view and may create multiple names sequentially.

The workbook section contains all names which are not attached to a given sheet but instead are saved globally in the workbook.



The Advanced Formula Environment can import definitions into the manager. You can import important individual definitions as well as libraries of definitions via text or through GitHub Gists. The main entry point for

importing can be found by selecting the action in the actions bar. The main entry point defaults to "From URL" but the dropdown reveals the "From text" option.



Accessibility

To get access to **LAMBDA** functions, please make sure you have updated to the latest version of Excel. **LAMBDA** is now available to Office 365 Subscribers in Production: Current Channel. Versions must be greater than or equal to:

- Windows: 16.0.14729.20260
- Mac: 16.56 (Build 21121100)
- iOS: 2.56 (Build 21120700)
- Android: 16.0.14729.20176.

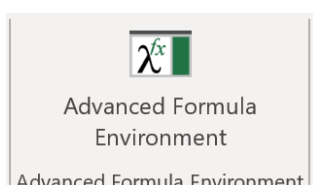
To access the Advanced Formula Environment (AFE), you may use this link or manually install it from the app:

<https://aka.ms/get-afe>

To access the AFE, simply search for the "advanced formula environment" within the built-in add-ins store of Excel and install it like any other Office add-in:

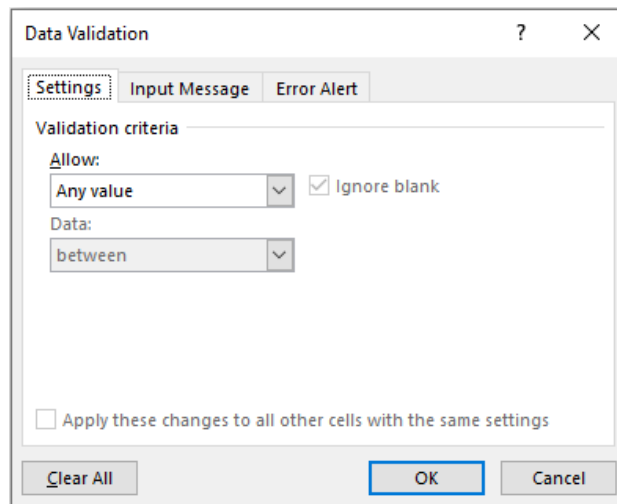
- go to the Insert Tab
- select the 'Get Add-ins' button
- search for "advanced formula environment"
- click the 'Add' button

Once the add-in is installed, you should be able to find it on your Home tab. The Ribbon button appears as follows:

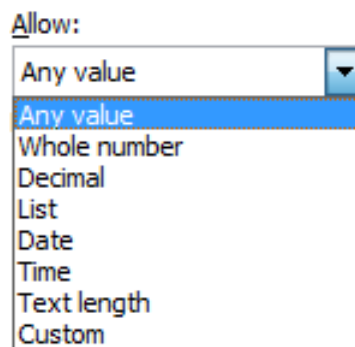


AutoComplete for Dropdown Data Validation Lists in Excel for Windows

Data Validation may be used to control what end users may input into a cell. This may be accessed by going to the Data tab of the Ribbon, then go to the Data Tools group and click the Data Validation icon (**ALT + A + V + V** or **ALT + D + L**), viz.

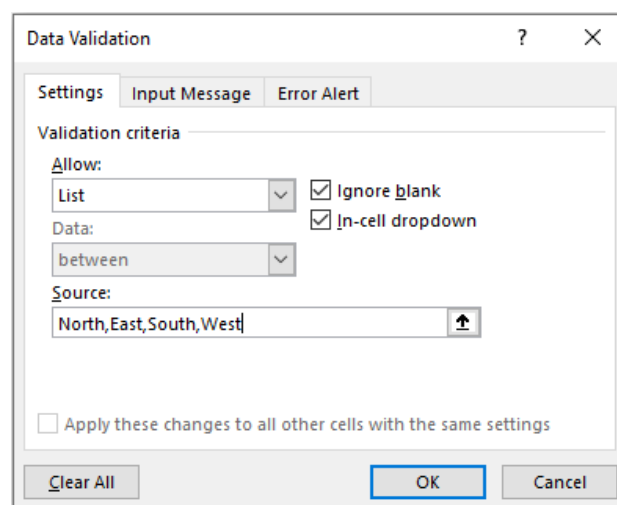


The default setting for all cells in Excel is to allow any value (*pictured*). This can be changed by changing the selection in the 'Allow' drop down box. It may be modified to any of the following:



Most of these criteria do exactly what they say on the tin: *e.g.* by choosing 'Decimal', the input must be a number, whereas 'Whole Number' allows for integers only. However, making a selection from the 'Allow' drop down box is only the first part of the data validation process.

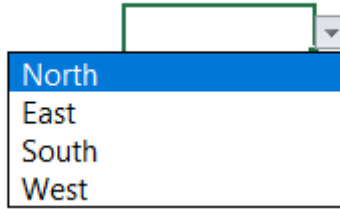
Here, let's focus on list:



Here, typing in

North,South,East,West

will provide an in-cell dropdown box as follows:



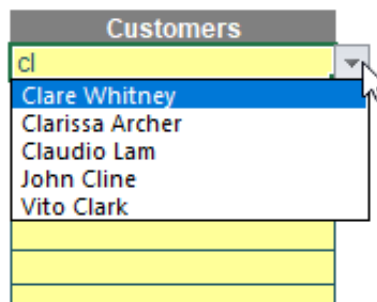
A range may be used instead. We could select a range instead, *e.g.*

Fictitious Data

Names
Claudio Lam
Josefina Dickerson
Britt Vazquez
Hans Patel
Francisco Valenzuela
Marylou Mccarthy
Imelda Lloyd
Carol Stevenson
Stuart Riddle
Ned Lowe
Kim Mccall
Mamie Wong
Eli Galvan
Josie Pineda
Mohamed Allison
Lincoln Bond
Waldo Spencer
Gabriela Moore
Renato Simmons
Malcolm Newman
Max Smith
Edwin Sparks
Chelsea Gilbert

Some time ago, we showed how to create a data validation list that will “narrow down” the list as you type in the cell using dynamic arrays. But now, that’s no longer needed:

Outputs



Microsoft has announced that they are speeding up data entry and validation with AutoComplete for dropdown lists, which is now available for some – alas, not all – users in Excel for Windows in the Beta Channel.

This AutoComplete algorithm for dropdown list matches the string you type in the dropdown list cell with words from items in the dropdown list and then shows only the matching list items. As you type more characters, the dropdown list contracts, and conversely, when you remove characters, it expands. Matching words can be from anywhere in the list item's string – at the start, middle, or end. Also, the dropdown list excludes blank items from the Data Validation dropdown list.

This helps speed-up discovery of the right Data Validation values, and in turn, reduces time spent scrolling through the dropdown list,

dealing with Data Validation errors, or writing complex code to enable it. Furthermore, Microsoft has added that they plan to add excluding duplicates from the dropdown list before it is rolled out into general production.

AutoComplete for Data Validation drop-down list is available in Beta Channel with version 2112, build 16.0.14818.10000 or later. Not everyone will get it immediately though, as Microsoft monitors usage and bugs. But be patient – it's a very cool feature!

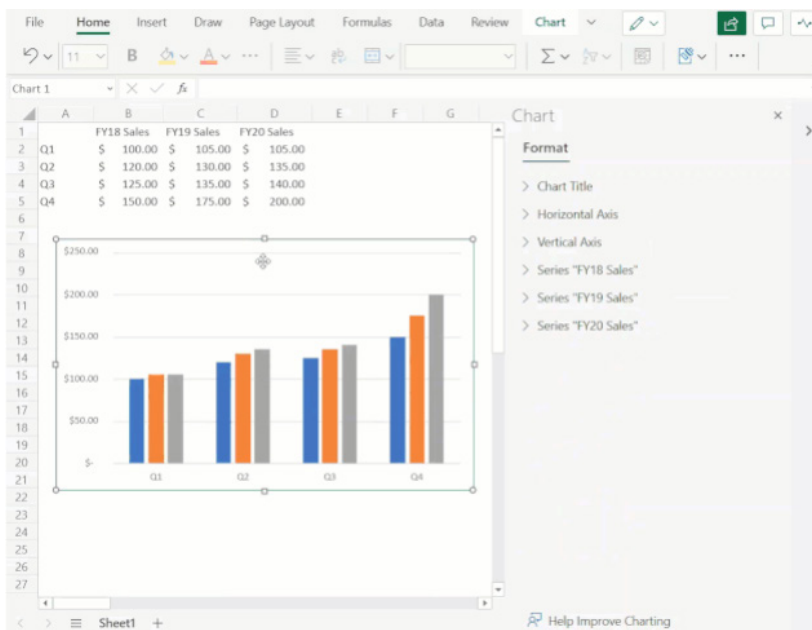
New Features for Charting in Excel for the Web

Until recently, Microsoft (and to be honest, end users too) saw Excel for the Web as a “consumption-based companion app to [the] desktop version” (to quote the software company). This meant that you were limited in viewing, creating and editing charts via this medium. However, it is beginning to improve, which both free and paying customers starting to see noticeable improvements.

For instance, since the beginning of February, you may now leverage the Format task pane and on-chart interactions to format charts in Excel for the Web. The Format pane provides formatting support for critical chart properties (axes, legend, data series, etc.) and makes it easy to view and navigate to each editable chart element. You are now able to make property edits to elements of a chart such as the fill / outline colour, number format, axis bounds, and so forth.

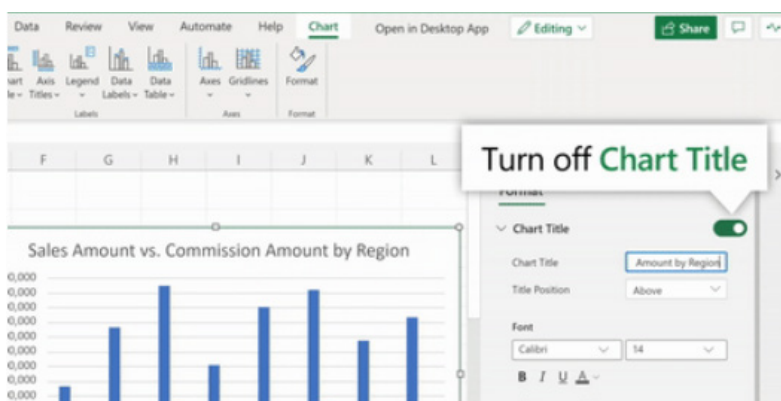
Further, you may now also select the individual elements within a chart directly, in order to launch and navigate to their respective formatting options in the Format pane. Previously, you could only select the entire chart but not any contents within the chart.

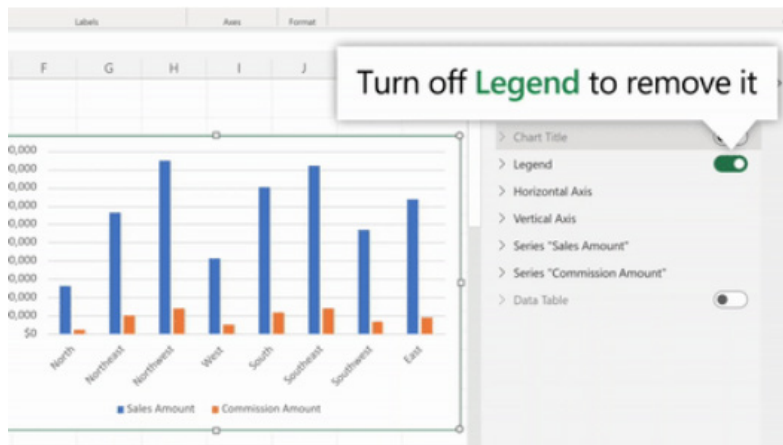
To explore these new capabilities, launch the task pane by double-clicking anywhere on the chart or by right-clicking and selecting 'Format'. From there, you can view each chart element's formatting options by either selecting an element within the chart or expanding the options in the Format pane.



You may now also add and remove chart elements without having to leave the Format pane. Users can leverage the new on / off toggles in the pane to choose whether to include a chart element in the chart.

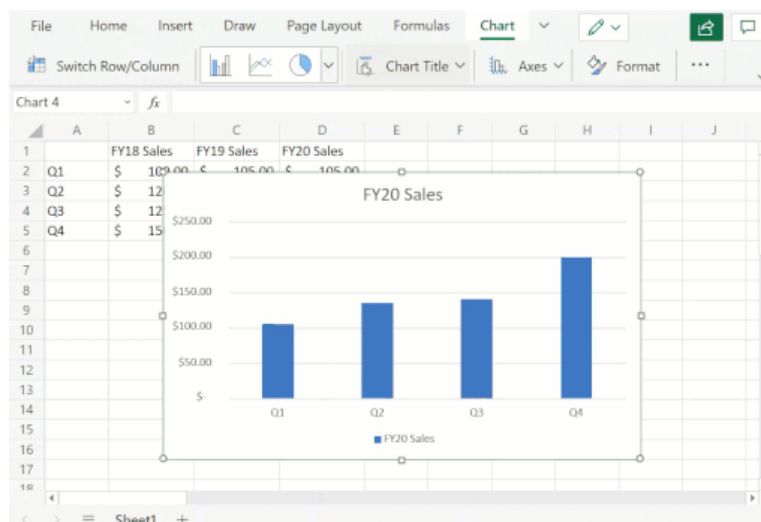
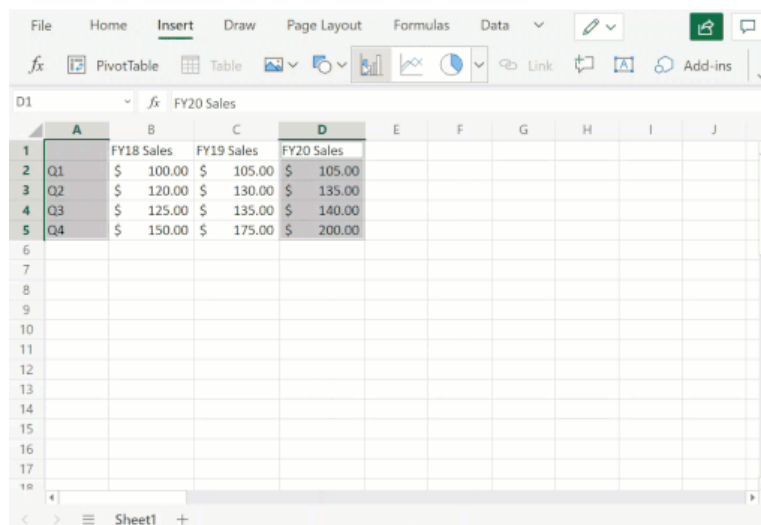
Alternatively, you may use the delete / backspace keys to remove a chart element that is selected. Support has also been added for adding / removing trendlines and error bars.





These are not the only improvements:

- you may now select data from non-adjacent rows to create a chart. Previously, you were limited to creating charts from a continuous range of cells:



- you may now freely change between all different chart types. Previously, some chart type changes were not supported
- undo / redo support has also been added for all chart commands and enabled sheet duplication for worksheets containing any chart type.

More in time, for sure.

New Conditional Formatting Experience in Excel for the Web

There is a new side pane coming to Excel for the Web. Now, you may manage the rules whilst seeing the formatting result on the grid. All you have to do is hover the mouse pointer over a rule to see the range it refers to:

Location	# of Visitors	# of Purchases	Visits per purchase	Busiest time	Follow-up?
Anaheim	611	54	✓ 8.15	Afternoon	FALSE
Atlanta	331	107	⚠ 4.41	Morning	TRUE
Austin	485	108	⚠ 6.47	Afternoon	TRUE
Birmingham	92	50	✗ 1.23	Afternoon	TRUE
Boston	230	80	✗ 3.07	Afternoon	TRUE
Buffalo	431	117	⚠ 5.75	Morning	TRUE
Charleston	639	96	✓ 8.52	Morning	FALSE
Charlotte	117	95	✗ 1.56	Afternoon	TRUE
Chicago	557	70	✓ 7.43	Afternoon	FALSE
Cleveland	163	124	✗ 2.17	Afternoon	TRUE
Columbia	110	67	✗ 1.47	Afternoon	TRUE
Columbus	571	64	✓ 7.61	Afternoon	FALSE
Dallas	757	73	✓ 10.09	Evening	FALSE
Detroit	694	96	✓ 9.25	Afternoon	FALSE
Fort Worth	598	117	✓ 7.97	Afternoon	FALSE
Fresno	345	120	⚠ 4.60	Morning	TRUE
Houston	200	122	✗ 2.67	Evening	TRUE

Conditional Formatting

Manage Rules in **this sheet**

- Cell Value = FALSE (AaBbCc) T1:T44
- Cell Value = TRUE (AaBbCc) T1:T44
- Icon Set (✓, ⚠, ✗) R1:R44

You may manage the rules for the current selection or the entire sheet with a dropdown:

Conditional Formatting

Manage Rules in **this sheet**

Cell Value = FALSE (AaBbCc)

Dropdown: this sheet / selection

In addition to managing rules, you may also edit or add new ones in Excel for the Web. For example, to edit a rule, click on the Edit button in the side pane.

Icon Set (✓, ⚠, ✗) R1:R44

Edit

To add a new rule, click on the 'New Rule' button in the side pane or use the 'Conditional Formatting' menu in the Ribbon.

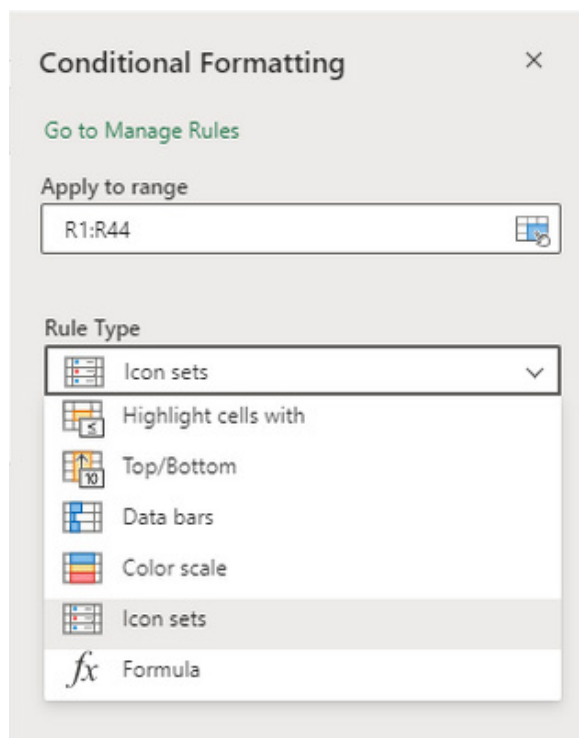
Conditional Formatting

Manage Rules in **this sheet**

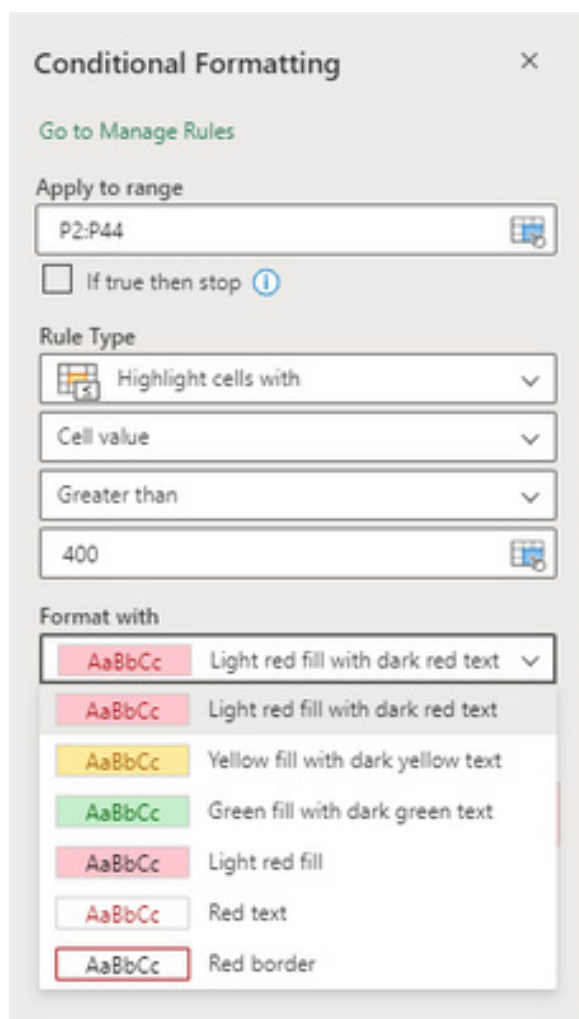
Cell Value = FALSE (AaBbCc)

New Rule

In the new rule editor, you will find the familiar rule types like those in Excel Desktop:

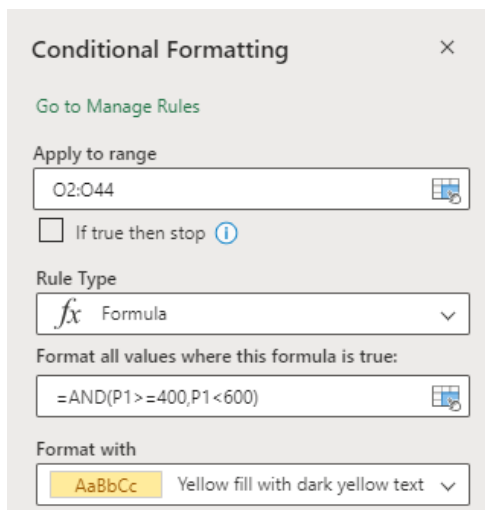


You may use the dropdowns to specify the criteria and choose a format.



New rule types have been added to Excel for the web, thus closing the gap to Desktop just that little bit more:

- Greater than or equal to
- Less than or equal to
- Not containing
- Beginning with
- Ending with
- Blank / No blanks
- Errors / No errors
- Formula: you may now specify the formatting criteria using a logical formula in Excel for the Web. This rule type gives you the added flexibility of formatting a range based on the result of a function or evaluate data in cells outside the selected range.



There is more coming soon to Conditional Formatting in Excel for the Web too:

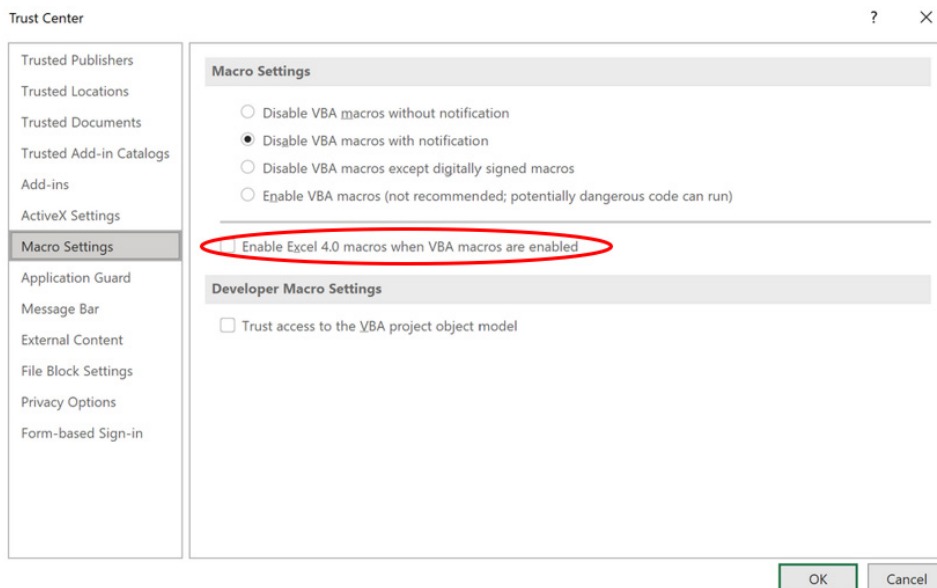
- Reorder rules with drag and drop
- Change the range the rule refers to in the rule manager
- Custom formatting.

Excel 4.0 Macros Now Restricted by Default

July last year saw the release of a new Excel Trust Center (*sic*) setting option to restrict the usage of Excel 4.0 (XLM) macros. From mid-January 2022, this has been made the default setting when opening Excel 4.0 (XLM) macros. This is to assist users in protecting themselves against related security threats.

This setting may be managed by visiting the Excel Trust Center in **File -> Options**, viz.

File -> Options -> Trust Center -> Trust Center Settings -> Macro Settings



This setting now defaults to Excel 4.0 (XLM) macros being disabled in Excel (Build 16.0.14427.10000). It should also be noted that administrators may also use the existing Microsoft 365 applications policy control to configure this setting.

The Group Policy setting 'Macro Notification Settings' for Excel may be found in the following path and registry key:

- **Group Policy Path:** User configuration -> Administrative templates -> Microsoft Excel 2016 -> Excel Options -> Security -> Trust Center
- **Registry Key Path:** Computer\HKEY_CURRENT_USER\SOFTWARE\Policies\Microsoft\Office\16.0\excel\security.

Administrators also have the option to completely block all XLM macro usage (including in new user-created files) by enabling the Group Policy, 'Prevent Excel from running XLM macros', which is configurable via Group Policy Editor or registry key.

XLM is disabled by default in the September fork, version 16.0.14527.20000+

- Current Channel builds 2110 or greater (first released in October 2021)
- Monthly Enterprise Channel builds 2110 or greater (first released in December 2021)
- Semi-Annual Enterprise Channel (Preview) builds 2201 or greater (created in January 2022, but not shipping until March 2022)
- Semi-Annual Enterprise Channel builds 2201 or greater (will ship July 2022).

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...

When building a financial model, time series are important, and most people know how to build them when each column represents a year, a month or any time period with at least a day in length (if you don't, it is highly recommended that you take our [Financial Modelling course](#) 😊). Here is such an example:

		Sep 20	Dec 20	Mar 21	Jun 21	Sep 21
Start Date		21 Aug 20	1 Oct 20	1 Jan 21	1 Apr 21	1 Jul 21
End Date		30 Sep 20	31 Dec 20	31 Mar 21	30 Jun 21	30 Sep 21
Number of Days		41	92	90	91	92
Counter		1	2	3	4	5

Model Start Date	21 Aug 20
Number of Months in a Full Period	3
Example Reporting Month	12 <i>e.g. 31-Dec-20</i>
Reporting Month Factor	3
Months per Year	12

But what do you do when you want a time period that is less than a day, with dynamic blocks of hours, like the one below:

Date	Hour	Today 21/08/2020	22/08/2020	23/08/2020	24/08/2020								
		0	8	16	0	8	16	0	8	16	0	8	16

1. Daily Time Series

Data	
Days	4 <i>Number_of_days</i>
Number of blocks per day	3 <i>Blocks_per_day</i>
Number of hours per day	24 <i>Hours_per_day</i>

When you change the inputs, the time series automatically updates:

Date	Hour	Today 21/08/2020	22/08/2020	23/08/2020	24/08/2020	25/08/2020					
		0	12	0	12	0	12	0	12	0	12

1. Daily Time Series

Data	
Days	5 <i>Number_of_days</i>
Number of blocks per day	2 <i>Blocks_per_day</i>
Number of hours per day	24 <i>Hours_per_day</i>

This month's challenge is to create a formula that will propagate the illustrated **Date** and **Hour** rows, when the number of days and the number of blocks per day may be varied.

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

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 look at Sunburst charts.

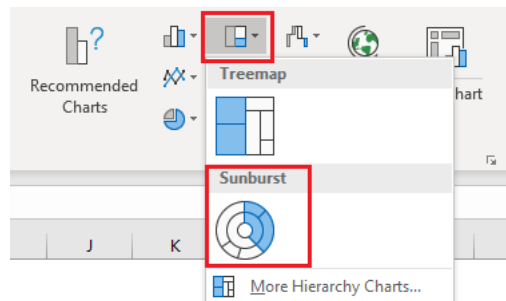
The Sunburst chart is an advanced version of the Doughnut (Donut) chart, which enables the mapping of hierarchical data. The innermost ring of a Sunburst chart represents the data at the top of the hierarchy, and each ring outside of it depicts the next level down and therefore a breakdown of the previous inner ring.

To create a Sunburst chart, the first stage is obviously to organise the source data. The number of columns required is determined by the number of levels in your data hierarchy plus one extra column on the right for the values. If you have three levels of hierarchy, then you will need four columns, as an example below:

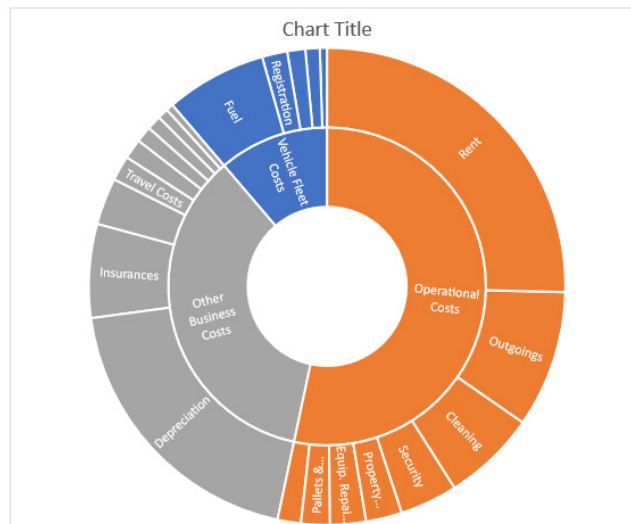
Business Expenses Excluding Payroll for 2018/19			
Expense Group	Expense Account	Amount	
Vehicle Fleet Costs	Fuel	\$ 18,036	
	Registration	\$ 4,512	
	Insurance	\$ 2,568	
	Servicing & Repairs	\$ 3,216	
	Other Vehicle Expenses	\$ 1,296	
Operational Costs	Rent	\$ 66,840	
	Outgoings	\$ 24,432	
	Property Maintenance	\$ 6,456	
	Equip. Repairs & Maint.	\$ 6,408	
	Security	\$ 10,284	
	Cleaning	\$ 16,716	
	Pallets & Cartons	\$ 5,136	
	Packag. & Consum.	\$ 4,176	
	Other Business Costs	Staff Train. & Dev.	\$ 2,568
		Staff Amenities	\$ 1,296
Telephone & Internet		\$ 8,364	
Insurances		\$ 16,716	
Postage & Couriers		\$ 1,932	
Travel Costs		\$ 4,476	
Waste Disposal		\$ 3,564	
Depreciation		\$ 51,420	
	Bank Fees & Interest	\$ 2,892	

With the data table organised, we may then proceed to create the Sunburst chart. As usual, we may select the source data and the column headings, excluding the table heading, and go to the Insert tab. Then, select the Sunburst chart from the small middle icon across the top row

of the Charts section or through the 'Recommended Charts' icon or the small arrow in the bottom right corner or the Charts section. Unlike all the other charts we've reviewed so far, there is only one type of Sunburst chart available in Excel.



The chart initially appears like this:



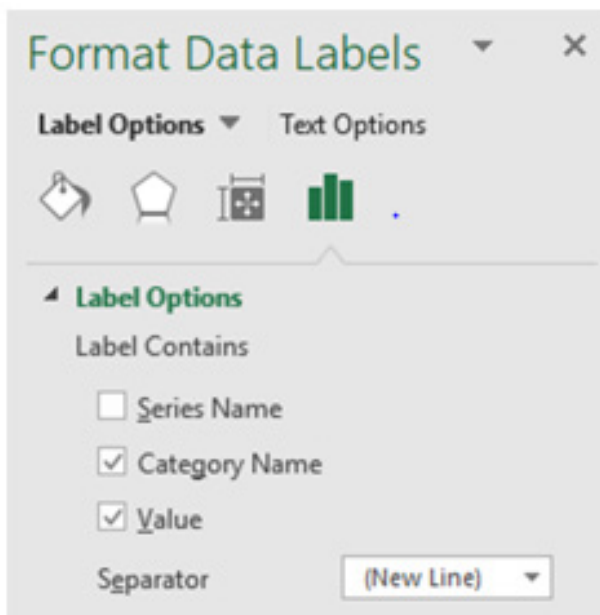
Depending on the physical size of the chart, the size of the segments and the length of the data labels involved, Excel will do its best to fit as many labels as it can onto the chart. As you can see, for the Vehicle Fleet Costs, only the Fuel and Registration are labelled as the other slices are too small and / or the labels are too long for Excel to fit the text inside the segments.

You should also note that Excel automatically ordered the categories and the expense accounts within each category from highest to lowest before plotting the information. Like a Pie Chart, the first segment commences from the highest point of the chart with the segments ordered clockwise. As Operational Costs is the biggest expense group, it was mapped first, followed by the Other Business Costs and lastly the Vehicle Fleet Costs.

Also, looking at the outer ring, Rent was the biggest item in Operational Costs, followed by Outgoings then Cleaning, *etc.*

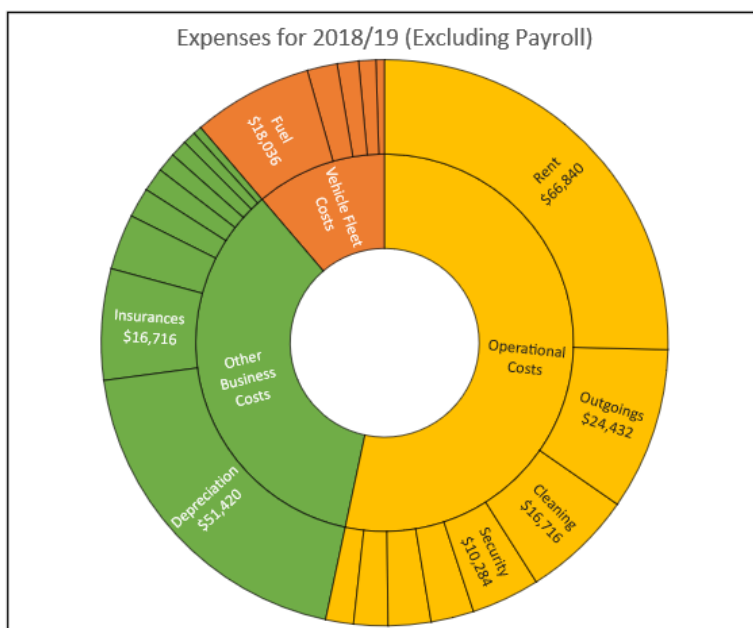
Most of the standard formatting options available in other charts are applicable to Sunburst charts. However, due to Excel automatically sorting categories, the order of the segments in this chart cannot be changed. Also, I cannot choose the angle for the first slice or “explode” out any pieces of the Sunburst chart.

I can add amount labels to the segments by clicking on the data labels, right-clicking and choosing ‘Format Data Labels’, then ticking the Value box and changing the Separator to be ‘New Line’.



Unfortunately, where the data labels do not fit in the chart segments, you won't see the figures associated with them either. Also, only the lowest level of the data hierarchy, being the outermost ring of the chart, will display values. The higher level categories / inner rings do not show sub-totals or totals.

Finally, we may set the fonts and lines to black, enter a Chart Title and format the Chart Area to complete the chart:



More 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 continue looking at using ListObjects to manipulate Tables within an Excel workbook in VBA, this time featuring ListColumns.

The ListColumns property allows us to manipulate columns within a table. Say we have the following table, with the table name of 'Table1':

Column 1	Column 2	Column 3
A	1	11
B	2	12
C	3	13

We can select a specific column in a table using the following code in VBA:

```
Dim Tbl As ListObject
Set Tbl = Range("Table1").ListObject
Tbl.ListColumns(1).Range.Select
```

If we just want the data in a specific column, we may use this VBA code:

```
Set Tbl = Range("Table1").ListObject
Tbl.ListColumns(1).DataBodyRange.Copy
```

From here, we can copy and paste the column with this code.

Column1	Column2	Column3
A	1	11
B	2	12
C	3	13

A
B
C

That's not the only thing we can do with ListColumns; we may also add columns. The following VBA code will insert a column at the end of the table:

```
Set Tbl = Range("Table1").ListObject
Tbl.ListColumns.Add
```

Column 1	Column 2	Column 3	Column 4
A	1	11	
B	2	12	
C	3	13	

Furthermore, we can specify exactly where we want the new column by adding "Position:=2" at the end of the previous code:

```
Tbl.ListColumns.Add Position:=2
```

Our example table now looks like this:

Column 1	Column 1	Column 2	Column 3	Column
A		1	11	
B		2	12	
C		3	13	

More next time.

Power Pivot Principles

We continue our series on the Excel COM add-in, Power Pivot. This month, we consider when to use fully qualified names.

We've touched briefly on fully qualified names or column references before. However, we thought we should take this opportunity to expand on fully qualified names and when they are required.

Just to recap, a fully qualified name of a column is the 'Table Name' followed by the [Column Name] encapsulated by square brackets:

='Product SubCategory'[Standard Cost]

DAX requires a fully qualified name to be used whenever a column reference is used as:

- an argument in the **VALUES** function
- an argument in the **ALL** or **ALLEXCEPT** function
- a filter in the **CALCULATE** function
- an argument in the **RELATEDTABLE** function
- an argument in any time intelligence function (e.g. **DATEADD**, **TOTALYTD**).

Generally, it is always a good idea to use the fully qualified name whenever we are referring to columns, so don't be lazy!

A separate point that we wish to address is the single quotation marks that encapsulate the table name 'Product SubCategory'.

='Product SubCategory'[Standard Cost]

The table name above is enclosed in single quotation marks because the table name contains a space. This referencing convention is also applicable to tables with reserved keywords (such as **DATE_START**), similarities with DAX functions or special characters (.,;'/*|?&%\$!+=(){}<>).

More *Power Pivot Principles* next month.

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, look at how to use the **M** function **List.Accumulate**.

The **List.Accumulate** function can transform data by performing several steps at once. This certainly sounds useful, although the description in the Microsoft help pages sounds a little intimidating:

"...Accumulates a result from the list. Starting from the initial value seed, this function applies the accumulator function and returns the final result..."

List.Accumulate(list as list, seed as any, accumulator as function) as any

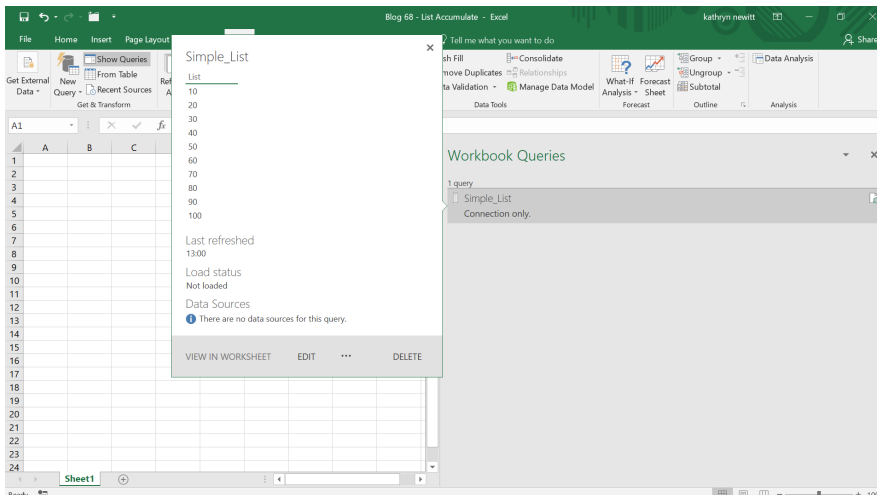
where:

- **list** = the list to check
- **seed** = the initial value seed
- **accumulator** = the value accumulator function.

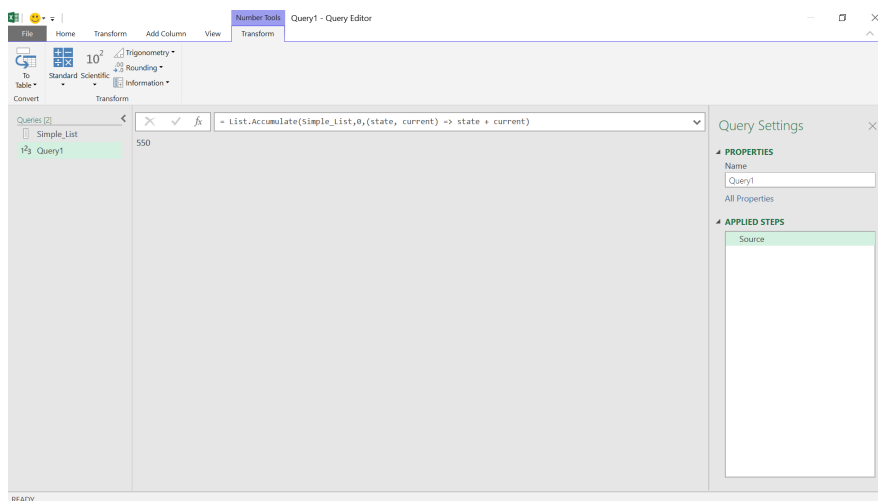
The purpose of this function is to take a list, look at each item in the list and then do something with those items and sew a seed. What I need are examples of how to use this function! This month, we will look at examples where the 'seed' is usually set to zero [0], namely summing (where 'seed' must be zero) and counting. Next newsletter, we'll move onto examples where the 'seed' is not zero.

Summing

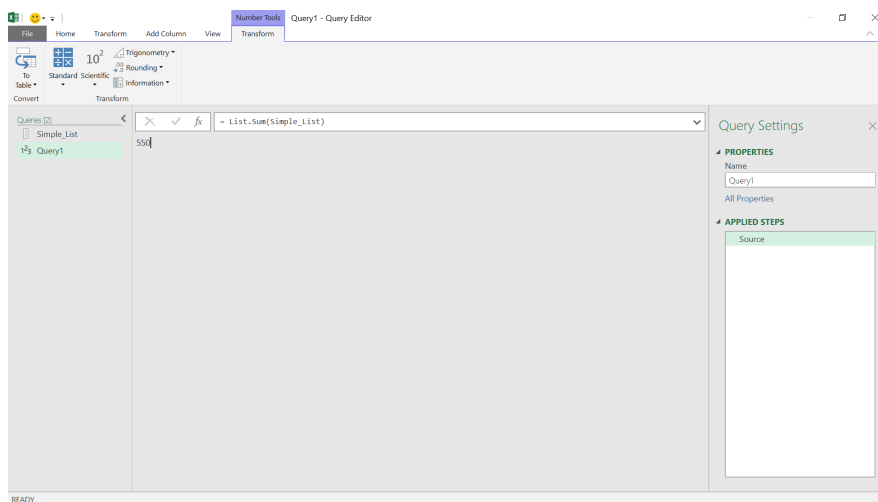
Now we know there is a **List.Sum** function! In fact, that very function is used in **Power Query: One Route to a Running Total**. However, this is another way to sum the items in a list, and it will help to explain how **List.Accumulate** works. Let's start with a simple list:



We are going to create a new blank query from the 'Other Sources' option of 'New Query' in the 'Get and Transform' section on the 'Data' tab. We are simply going to sum the items in this list:



That's just to prove this is the same as **List.Sum** (the purpose-built function)!



The syntax for the **List.Accumulate** sum is:

= List.Accumulate(Simple_List, 0, (state, current) => state + current)

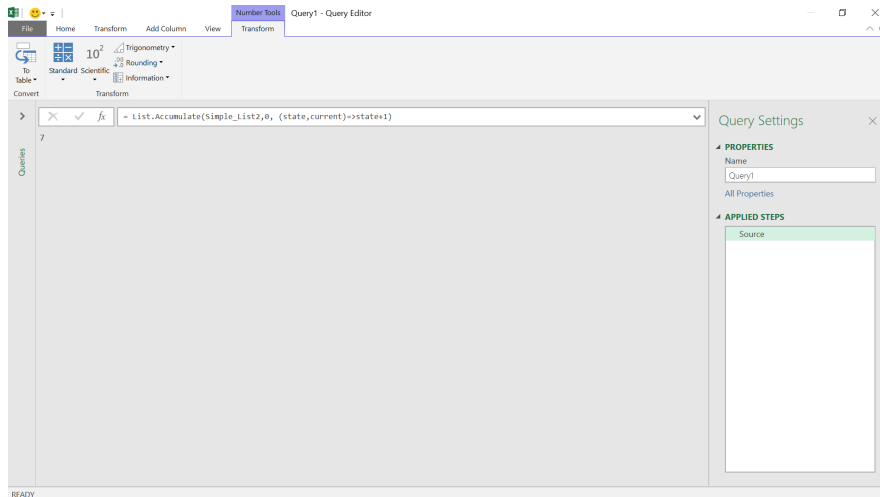
which essentially loops through my list looking at the 'current' value and the 'state' (in this case the value of the total so far):

Current	State	State + Current
10	0	10
20	10	30
30	30	60
40	60	100
50	100	150
60	150	210
70	210	280
80	280	360
90	360	450
100	450	550

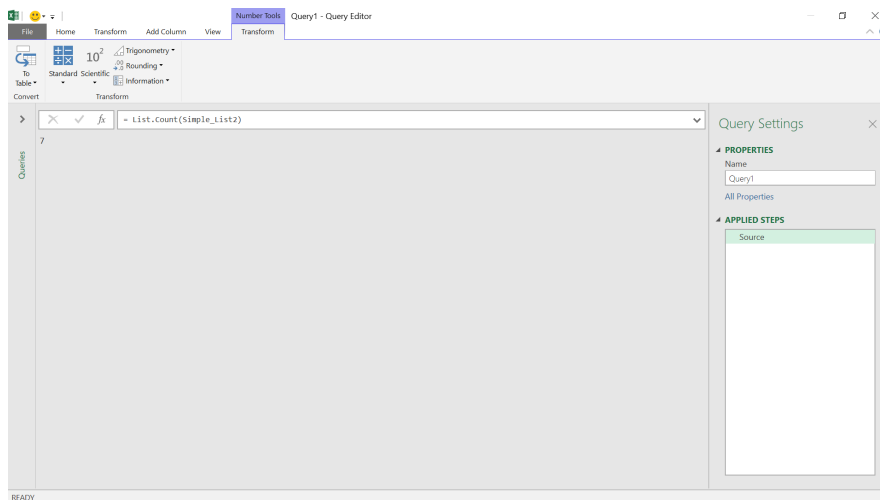
The **accumulator**, or **value accumulator** function is an example of what is known as a **lambda function**. Just like in Excel, lambda is a bit like algebra for programming. The examples used here involve simple lambda functions. The 'seed' is the starting value for the 'state' – which here is zero [0], so that the sum adds up correctly. If we used 'seed' one [1], then the final amount would be 551 instead.

Counting

The simplest count is to count the number of items in a list. We may use our previous list for this. Let's create a new blank query for the **List.Accumulate** function.



We may then compare the results to **List.Count**:



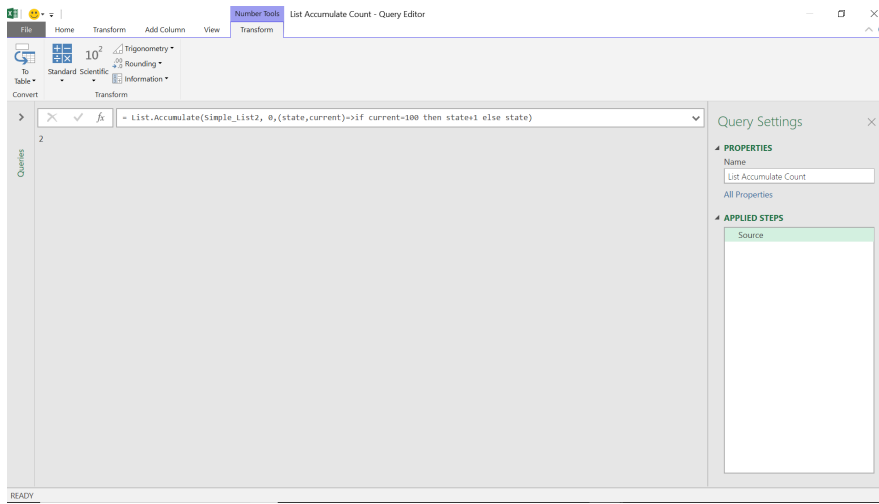
This time the function is simple:

= List.Accumulate(Simple_List2, 0, (state,current) => state+1)

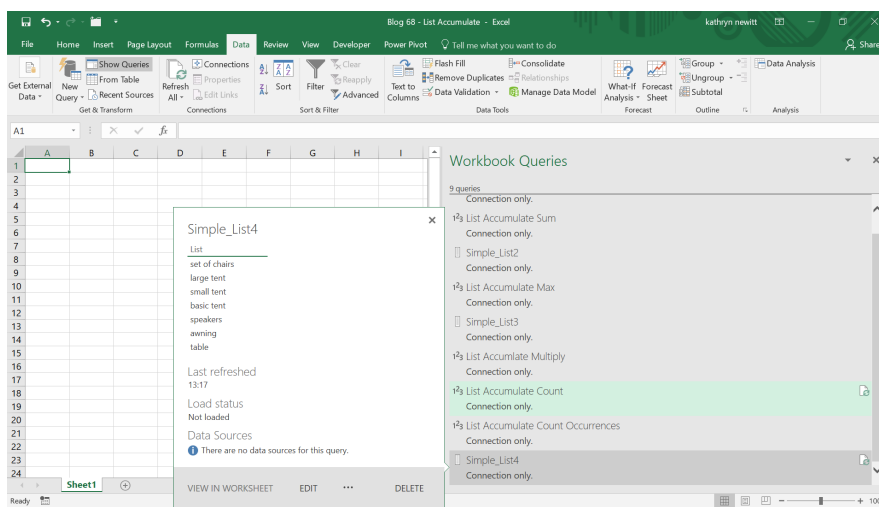
Current	State	State+1
10	0	1
100	1	2
20	2	3
50	3	4
100	4	5
30	5	6
40	6	7

Changing the 'seed' would offset the count by the value in the seed, so we would keep it as zero [0]. However, we could tweak this function to count how many items were 100 (say) quite easily:

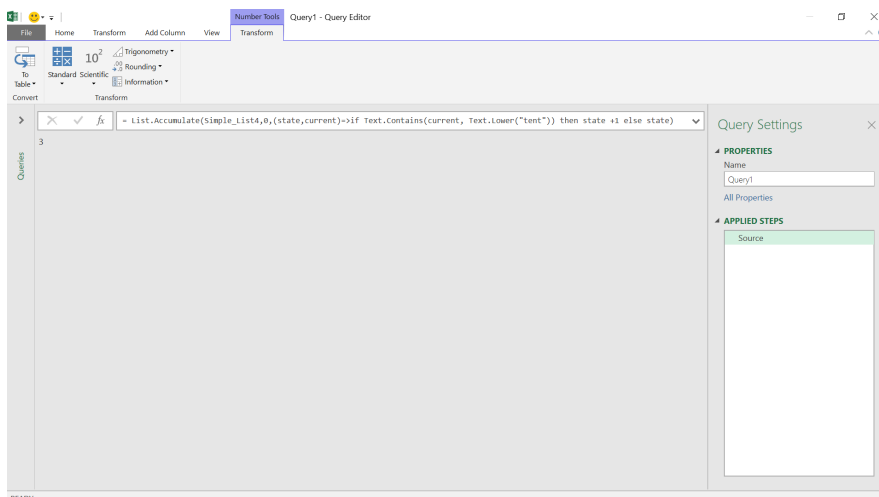
= List.Accumulate(Simple_List2, 0, (state,current) => if current = 100 then state+1 else state)



We could also use similar functionality on a list of text items. Below, we want to count the number of items that have the word 'tent' in them:



Let's use **List.Accumulate** to achieve this:



The functionality we have used is:

= List.Accumulate(Simple_List4, 0, (state,current) => if Text.Contains(current, Text.Lower("tent")) then state +1 else state)

In other words, count if 'tent' is found in the text. Lowercase is not strictly necessary in this example, but it's a good idea to always convert to lowercase when making text comparisons.

This example shows how easy it is to adapt the **List.Accumulate** function to achieve a specific result.

More next month!

Power BI Updates

...And so they are back! The raft of 2022 Power BI updates starts here, with a slew of new features, including new mobile formatting options, Dynamic M Query Parameters support for more data sources, deployment pipeline enhancements and improvements to downloading a PBIX file. But there are of course always more.

The full list is as follows:

Reporting

- New Mobile formatting options in Preview
- Sensitivity labels downstream inheritance now Generally Available
- Default label policies in Power BI now Generally Available
- Mandatory label policy now Generally Available
- New Format Pane, still in Preview, is now on by default
- Multi row card selection

Data Preparation

- Dynamic M Query Parameters now supports SQL Server and more data sources in Preview

Data Connectivity

- Amazon OpenSearch Service (New Connector)
- OpenSearch Project (New Connector)
- Digital Construction Works Insights (New Connector)
- Azure Databricks (Connector Update)
- BQE Core (Connector Update)
- MicroStrategy (Connector Update)
- Starburst Enterprise (Connector Update)

Service

- Power BI Goals
 - Notifications
 - Multiple Owners
 - My Workspace
- Deployment pipelines enhancements
- Download .pbix improvements

Mobile

- Dark mode now available in the Power BI Windows app
- Power BI Windows app new look now Generally Available

New Mobile formatting options in Preview

Over the past several months, Microsoft has been working on making it possible to format visuals in Mobile layout, and to have those formatting changes affect only the Mobile-optimised view. This update announces the public Preview of this major improvement to the Mobile-optimised report authoring experience.

To access this new Mobile formatting experience, switch on the 'Modify visuals settings for Mobile layout' Preview feature (**File -> Options and settings -> Options -> Preview features -> Modify visuals settings for Mobile layout**).

Embedded Analytics

- Support Power BI dataset as a data source for embedding paginated reports
- Azure Power BI Embedded A7 and A8 capacity nodes self-service
- New Dataset Permissions APIs
- Delete Dashboard API
- Access Token Expiry Callback

Developers

- New Power BI visuals' category list in AppSource
- Expand entire level in matrix
- Dynamic format string support

Visualisations

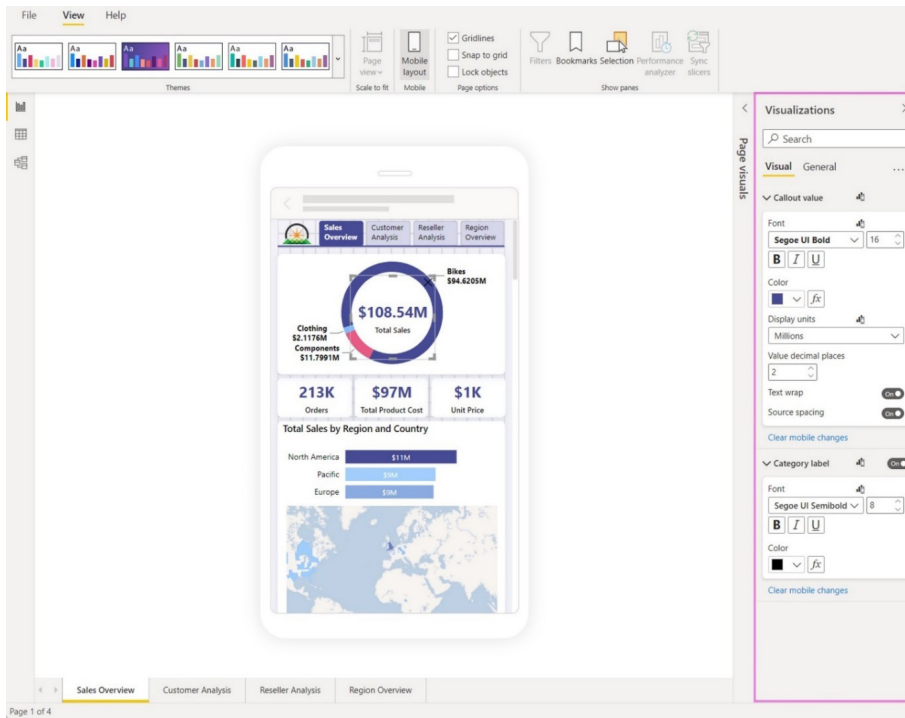
- New visuals in AppSource
- Download visual's sample file from the in-product AppSource
- Drill Down Graph PRO by ZoomCharts
- Plotly.js visual by Akvelon
- HTML Text Styler 2.0 (Microsoft certified)
- Multiple Sparklines by Excelnaccess.com
- Merged Bar Chart by Nova Silva
- Financial Reporting Matrix by Profitbase
- Inforiver premium edition by Lumel
- Zebra BI Tables version 5.2 by Zebra BI

Other

- WebView2 now required
- Find out new features releasing in Power BI by using Power BI Release Plan app
- Optimise your processes and gain deep insights with Process Mining
- New settings to enable or disable Map and Filled Map visuals.

Let's now go through each in turn.

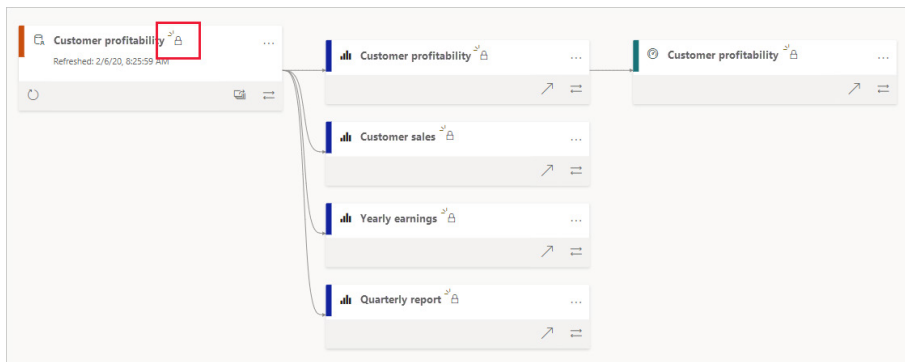
You should note that the Mobile app version that supports the new Mobile formatting feature will be released Microsoft Store only from mid-February (but still before this article was written!), therefore you will be able to create the Mobile layout in Power BI Desktop, but when publishing to the Service, you will not be able to either view the updated layout in the Service or utilise it in the app until the official feature release.



Sensitivity labels downstream inheritance now Generally Available

Downstream inheritance enables you to automatically apply a dataset’s or report’s sensitivity label on all downstream reports and dashboards. When a sensitivity label is applied to a dataset or report in the Power

BI Service, the label will cascade down and be applied to content that is built from that dataset or report as well. Downstream inheritance is now Generally Available.

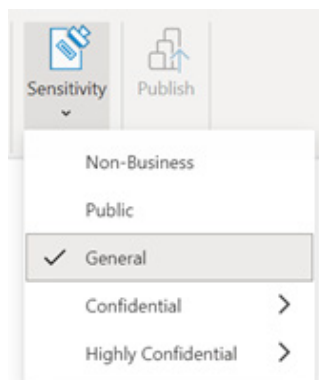


For example, when a label is applied to the dataset ‘Customer profitability’, that label gets applied to the dataset’s downstream content.

Default label policies in Power BI now Generally Available

Default label policies enable you to define a baseline level of protection to be applied to Power BI files and to artifacts in the Power BI Service. This capability is now Generally Available.

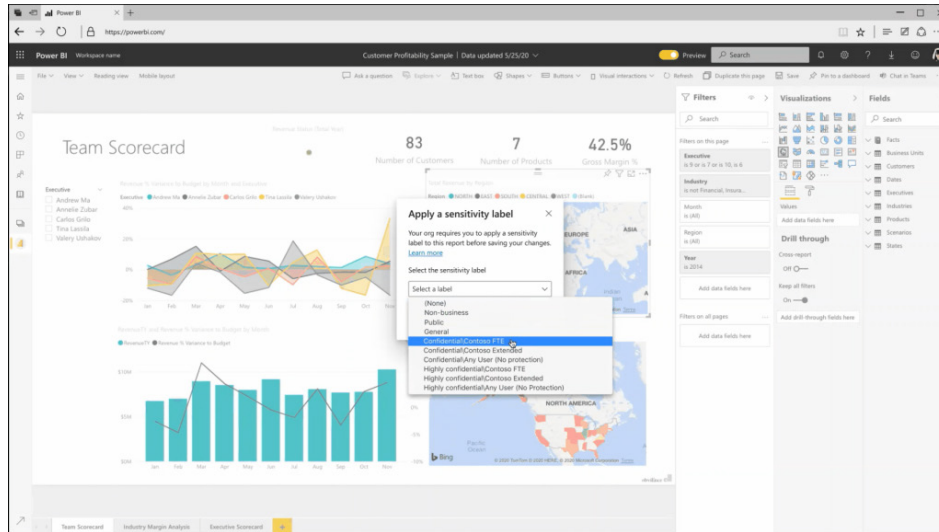
Default labelling applies when you create a new file in Power BI Desktop or a new dataset or report in the Power BI Service. The default label is set automatically on the new file or artifact, without interfering with your workflow.



Mandatory label policy now Generally Available

Mandatory label policies enable organisations to ensure that Microsoft Information Protection (MIP) sensitivity labels will be applied to new content when it is created in or uploaded to Power BI. This capability is now Generally Available. When a user tries to save a PBIX file in Power

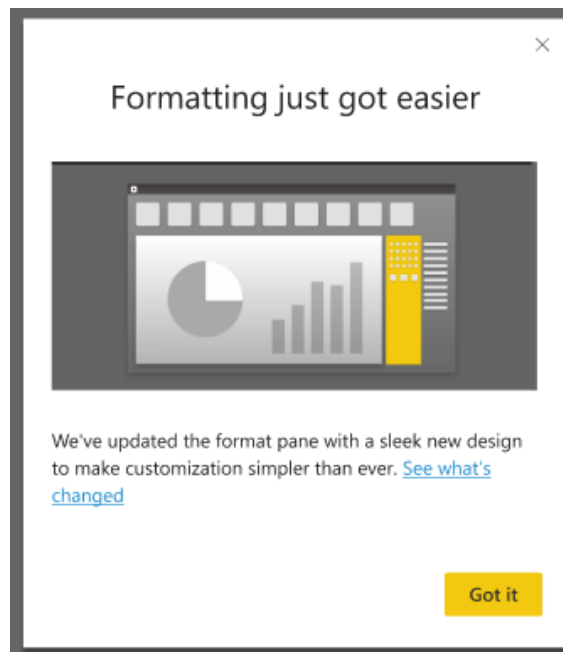
BI Desktop, or a Power BI artifact in the Service, that doesn't have a sensitivity label applied, you will be prompted to choose a label before the item will be saved. Also, the option to remove a label isn't available when a mandatory label policy applies.



New Format Pane, still in Preview, is now on by default

Well this has stuffed up our latest book – re-write underway!! It's time to hunt everything out again: the new Format pane is now on by default for

users upgrading to the latest release. Microsoft has added a notification dialog to call attention to this change.



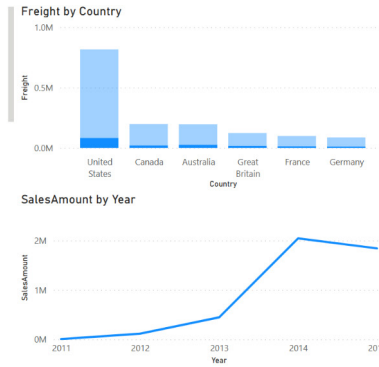
If you need to turn this preview off, you can find the preview switch from: **File -> Options and settings -> Options -> Preview Features -> New format pane.**

Improvements added in this update include:

- outline settings for matrix and table have been re-added, previously missing
- ability to toggle axis title independent of axis has been re-added, previously missing
- ability to add shade area to combo charts has been re-added, previously missing
- ability to customise marker shape by series for scatter charts has been re-added, previously missing
- minor reordering of the field wells within the Build pane to match the order of the new Format pane cards for pie chart, donut chart and scatter chart.

Multi row card selection

Audio Category	Deluxe Class	267,894.43 SalesAmount
Audio Category	Economy Class	207,757.98 SalesAmount
Audio Category	Regular Class	689,535.59 SalesAmount
Cameras and camcorders Category	Deluxe Class	1,085,796.05 SalesAmount
Cameras and camcorders Category	Economy Class	512,946.96 SalesAmount
Cameras and camcorders Category	Regular Class	2,858,289.00 SalesAmount
Cell phones Category	Deluxe Class	403,116.81 SalesAmount
Cell phones Category	Economy Class	87,378.61 SalesAmount



You can now select rows in your multi row card to cross highlight and cross filter the other visuals in your report. Unselected rows will dim to help you identify which rows you have selected, and you can **CTRL** or **SHIFT + Click** to select multiple rows at once. This brings interactivity in multi row cards closer to parity with other visual offerings.

Dynamic M Query Parameters now supports SQL Server and more data sources in Preview

When Dynamic M Query Parameters was released, the feature supported M-based data sources (such as Azure Data Explorer, Databricks, BigQuery, Snowflake and more) but did not support other sources like SQL Server. This month, Dynamic M Query Parameters now supports more DirectQuery data sources including:

- T-SQL based data sources: SQL Server, Azure SQL Database, Synapse SQL pools (such as Azure Synapse Analytics) and Synapse SQL OnDemand pools
- Oracle
- Teradata
- Dataflows (enhanced compute engine enabled)
- SAP Hana Relational.

As a reminder, Dynamic M Query Parameters is the Preview feature that allows report viewers to dynamically set the value(s) for an M Query Parameter using filters or slicers. This feature may be especially useful for query performance optimisations without sacrificing report interactivity.

Amazon OpenSearch Service (New Connector)

The new Amazon OpenSearch Service connector is now available. Amazon OpenSearch Service now supports integrating with Microsoft Power BI. Powered by the OpenSearch ODBC Driver you can now integrate your Microsoft Power BI environment with your Amazon OpenSearch Service domains using the OpenSearch SQL Engine.

The OpenSearch SQL Engine uses Structured Query Language (SQL) to manifest search results in a tabular format. One of the key features of this engine is the Open Database Connectivity (ODBC) driver which

enables you to integrate various business intelligence (BI) and analytics applications with OpenSearch, to create sophisticated, informative data visualisations on top of the search results obtained from Amazon OpenSearch Service by leveraging the Power BI Integration, to provide data insights.

Amazon OpenSearch Service Power BI integration is powered by OpenSearch, an Apache 2.0-licensed project.

OpenSearch Project (New Connector)

That's not all. There is also the new OpenSearch Project connector by Amazon too. The OpenSearch SQL Engine again uses Structured Query Language (SQL) to manifest search results in a tabular format. Similar to the last connector, you may create sophisticated and intelligent data visualisations with this tool too.

And again, OpenSearch project Power BI integration is powered by OpenSearch, an Apache 2.0-licensed project.

Digital Construction Works Insights (New Connector)

Next up is the new Digital Construction Works Insights connector. This connector works with data from your Data Construction Works (DCW) Integrations Platform Organizational (sic) and Project Data Warehouses.

It enables you to query all of your project data via one single source and build impressive visuals and reports.

DCW - Integrations Platform Insights

DCW Integrations Platform Insights API Url [ⓘ](#)

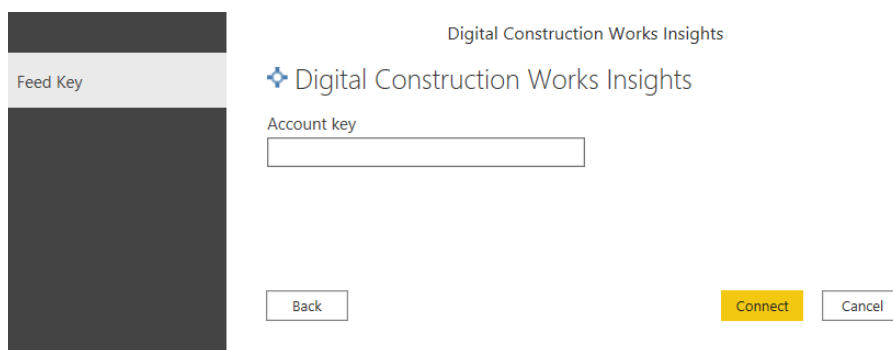
DCW Integrations Platform Insights API Querystring... (optional) [ⓘ](#)

OK

Cancel

The DCW Insights connector works using a standard OData V4 connection to your DCW Platform API subscription. This connector allows you to

query your project data via one single source. Simply enter the project URL in the connectors configuration screen and click OK.



Then, enter in your unique platform project API key to securely connect to your project. Data will be returned, and you will be able to build your visualisations and reports at will. You may refresh your reports automatically, keeping your construction and project scheduling dashboards up to date.

Azure Databricks (Connector Update)

This update of the Azure Databricks connector adds the ability to provide custom SQL queries, by using the Power Query function 'Databricks.Query'.

BQE Core (Connector Update)

The BQE Core connector has been updated. Users now have access to the **budgetId** field in Projects, which allows you to identify the budget linked to a project.

MicroStrategy (Connector Update)

The MicroStrategy connector has been updated. The connector (version 2.4.5) incorporates the following bug fixes / improvements:

- added support for OIDC authentication
- fixed issue with path detection on Power Bi online when "/" was not added at the end of MicroStrategy REST API URL.

Starburst Enterprise (Connector Update)

The Starburst Enterprise connector has been updated. Broken catalogs (*sic*) are ignored when connecting to SEP or Starburst Galaxy; previously, if any catalogs were broken the whole connection would fail.

Power BI Goals

This month, there are updates on Teams notifications integration, plus the ability to add multiple owners to a goal and the ability to create scorecards in My Workspace. Additionally, Goals is now available in all US Government clouds.

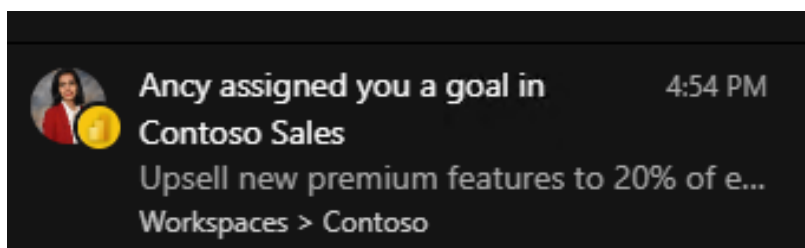
NOTIFICATIONS

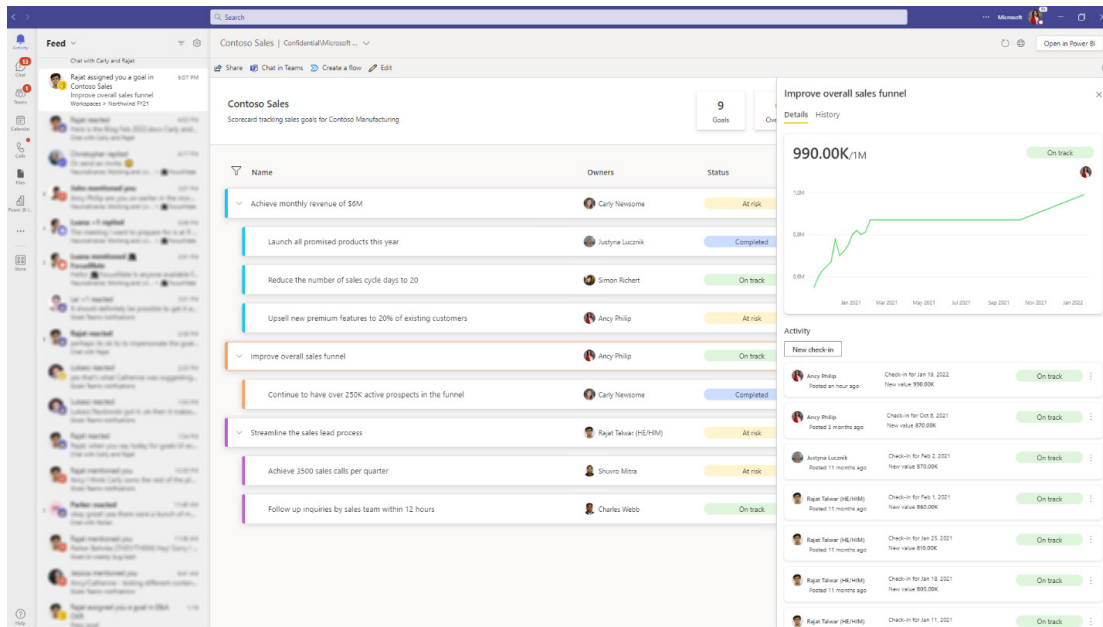
The Power BI Teams notifications integration helps you stay up to date about the goals you're responsible for without having to leave Teams to view the updates to the scorecard. With this release, you'll be notified when someone assigns you a goal, mentions you in a note or when the status of a goal you own gets updated by an automated status rule.

Goal assignment notifications

Goal assignment notifications are sent when an owner is assigned a goal or their goal is changed. The goal owner receives a Teams notification from the user assigning the goal if they have the Power BI app for Teams installed. They will receive a notification in the activity feed and as a banner (known as a 'toast card'). When they click the notification,

the scorecard opens and the Details pane for the goal is shown. This notification will help users be aware of the goals that are assigned to them immediately, without relying on someone to tell them what scorecard their goals are on.

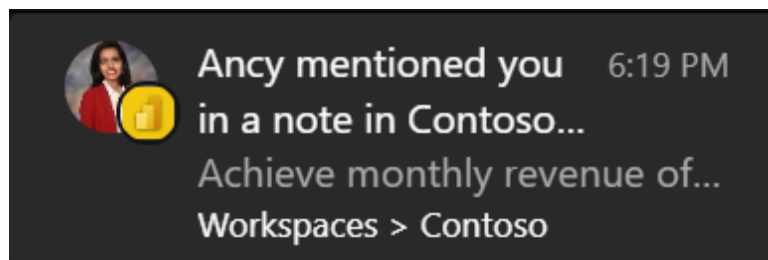




Notifications for mentions

These notifications help users get someone’s attention on a goal without having to leave the scorecard by tagging them in a note. When a user is [@mentioned](#) in a note on a new or existing check-in, they get an activity

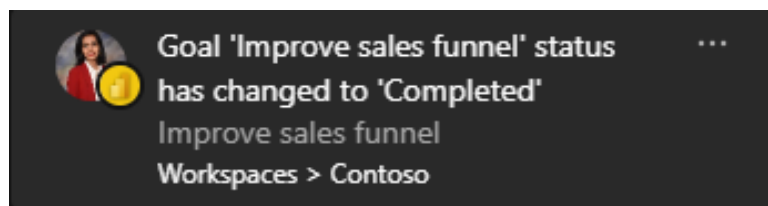
feed notification from the note creator, which opens the Details pane showing the note.



Status update notifications

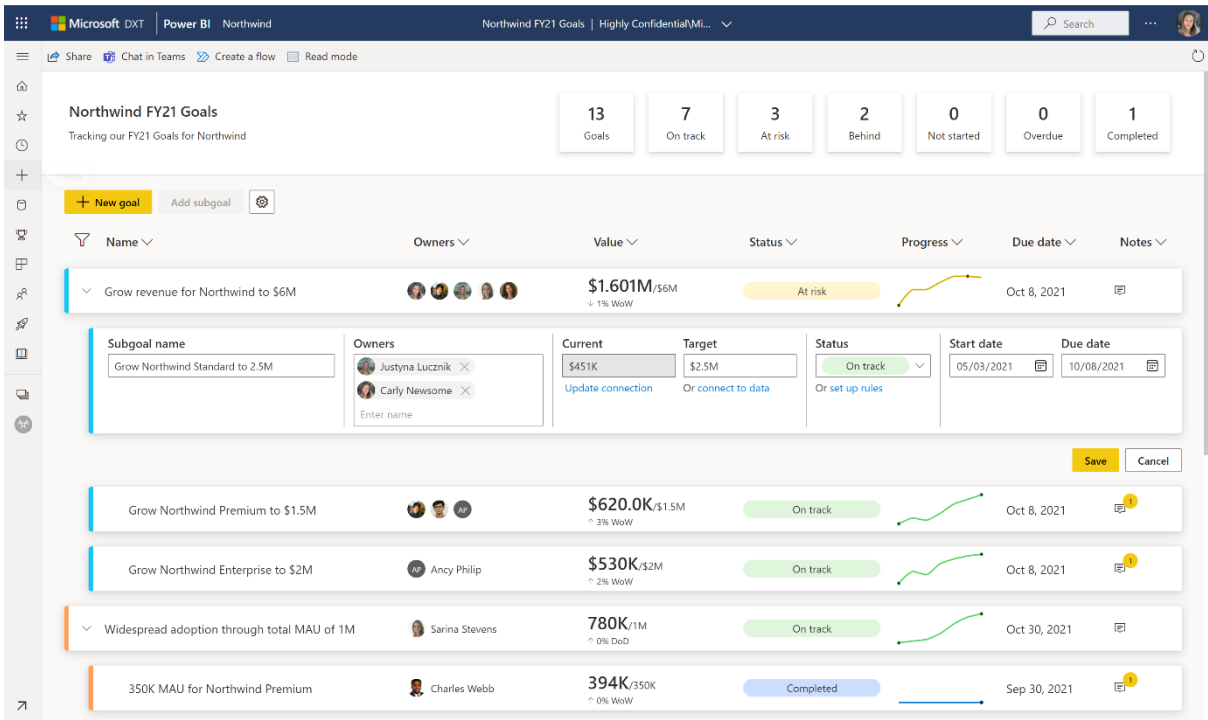
This notification helps users get an immediate notification when the status of the goal gets updated by an automated status rule, so they don’t have to rely on checking their goals in the scorecards. The owner of the

goal gets an activity feed notification from the user who configured the data connection in the case of connected goals or the user who edited the value in the case of manual goals.



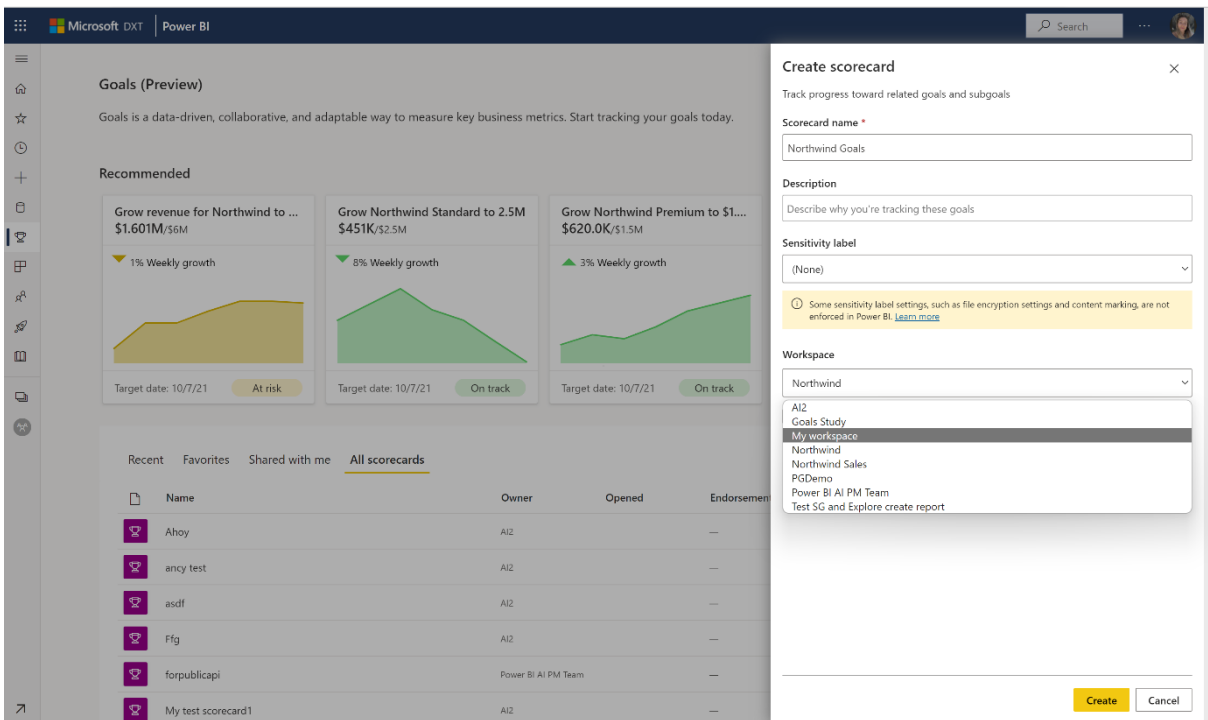
Note that you need to have the Power BI app for Microsoft Teams and the recipient needs to have access to the scorecards to get these notifications.

MULTIPLE OWNERS



Many have asked for the ability to add multiple owners to a single goal. This is now possible simply by typing additional names in the owner field of a goal. Presently, you may add up to five [5] owners. These additional owners may also work with notifications and Power Automate integrations.

MY WORKSPACE



You may now create scorecards in My Workspace in Power BI, making it easier than ever to create and keep personal scorecards and share them out when they are ready. Free users may author scorecards in My workspace, but a Pro license is required to share them (of course!).

Deployment pipelines enhancements

In this update, Microsoft has released the following features for deployment pipelines:

- Azure DevOps extension (Preview): automate your deployments and pipeline creation using Tasks in the Azure pipeline
- multiple pipelines working together: synchronise the connections between items managed in different pipelines
- Dataflows GA and support for linked entities

Download .pbix improvements

Microsoft has turned its attention to enabling the download of a .pbix file in Preview feature for more scenarios. Previously, you were not able to download a .pbix file for reports when the report connected to a single dataset and that dataset was configured for large models, incremental refresh or had been modified by using the XMLA endpoint.

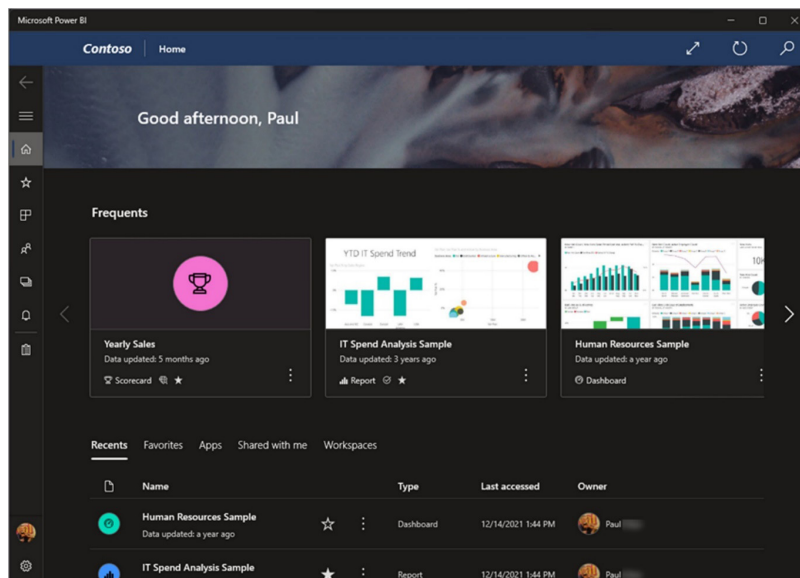
Starting with this release, that limitation has been removed for reports

that are created in Power BI Desktop and published to the Power BI Service, if the report connects in live mode to the dataset that has the properties described as limitations prior to this release. Note that downloading a .pbix for such a dataset itself is not supported, nor can a report be downloaded if it was created on the Power BI Service and connects to such a dataset.

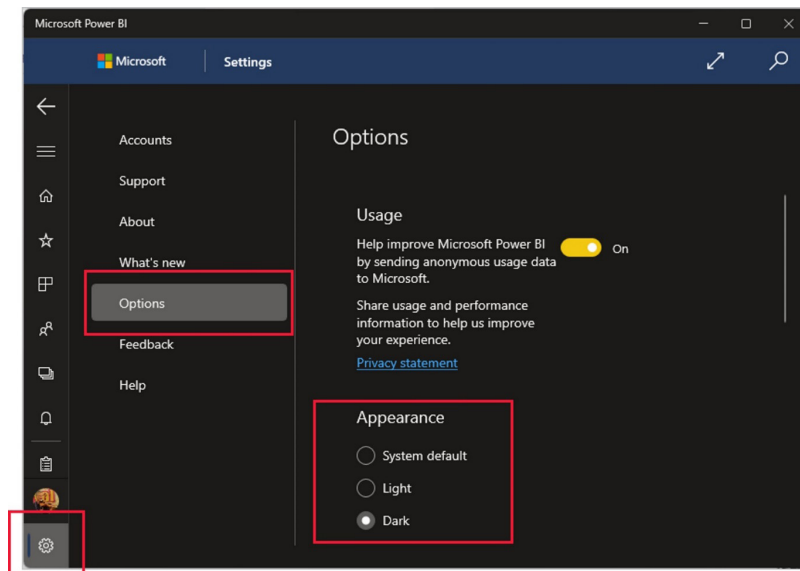
Dark mode now available in the Power BI Windows app

The Power BI app for Windows is designed and optimised for viewing and interacting with Power BI content. In this update, support has been added for dark mode. When the app is in dark mode, all screens and dialogs are presented in a dark theme, reducing the brightness of the screen, and

making it easier to view it. However, the Power BI content itself, such as reports and dashboards, does not change: the colours and themes published by the person who created the content remain the same.

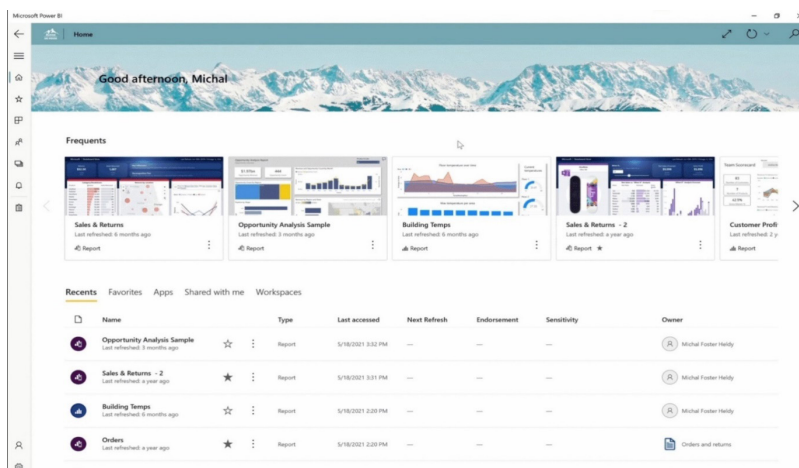


You may choose between the light and dark themes in the app's appearance settings, or you can leave the setting as "System default", in which case the app will use whatever theme your operating system is using.



Power BI Windows app new look now Generally Available

The Power BI Windows app new look has now become standard, and the old look is no longer available. Starting with this update, when you open the Power BI Windows app, it will open directly in the new look, and you'll land on the new home page, where you can easily find and access the most frequent and recent items you usually use in Power BI.



Support Power BI dataset as a data source for embedding paginated reports

With Power BI embedded analytics, independent software vendors (ISVs) and customers may create Power BI content that displays paginated reports in a fully integrated and interactive application. They can embed paginated reports using the solution that works best for end users, embed for customers or embed for your organisation.

Until now, Power BI dataset was not supported as a data source for those scenarios, but now it has been enabled. When embedding a paginated report with a Power BI dataset as a data source for the embedding for

your customer's scenario, you will need a service principal and a multi-resource embed token that contains a new parameter called 'XMLA permissions'. Using this parameter, ISVs and customers may control the access to XMLA endpoints with the embed token. For allowing embedding of paginated report with a Power BI dataset as a data source a 'Read Only' value is required.

Power BI datasets with data sources that require single sign-on (SSO) are not supported yet, but that's coming soon apparently.

Azure Power BI Embedded A7 and A8 capacity nodes self-service

I am going to pretend I know what I'm talking about here. A7 is like P4 capacity node, carrying 64 v-cores and 200GB RAM. A8 is like P5 capacity node, carrying 128 v-cores and 400GB RAM. Both capacity nodes could be purchased by special request only, and now Microsoft has enabled

their purchase in self-service, either through the Azure Portal or using an ARM API.

Self-service purchase of A7 and A8 in sovereign cloud will be enabled later this year.

New Dataset Permissions APIs

The dataset permissions application programming interfaces (APIs) are a set of APIs that allow you to easily manage the permissions of your datasets to allow users to perform read, reshare and explore (build) operations. This lets you manage your datasets not only through the Power BI Service, but also through your application.

The APIs that are currently supported are POST and PUT:

- The **POST** API allows you to grant new permissions to a dataset. It requires having read and reshare permissions for the dataset and all the permissions you wish to grant. Keep in mind that the POST API cannot be used for deleting permissions, and that calling the API with permissions which the target already has will have no effect
- The **PUT** API lets you update the target's permissions to a given dataset. It requires having read, write and reshare permissions for the dataset and all the permissions you wish to update. The PUT API cannot be used for changing write permissions or any folder level inherited permissions. This API also supports removing all permissions for a dataset for a given target.

Delete Dashboard API

You can now programmatically delete dashboards from your workspaces using the `deleteDashboard` and `deleteDashboardInGroup` APIs.

Access Token Expiry Callback

Embedding Power BI artifacts requires the use of access tokens, which have an expiration time and must be refreshed before expiration to allow a continuous embedding experience. When using an Azure AD token for the embed for your organization scenario, this can now be done automatically by setting an event hook in your embedding configuration parameters which will call a function responsible for generating new

tokens and assign the generated token to the embedded artifact before the expiration of the token.

With this new configuration, all you need to do is provide the token generating function, and the rest will be taken care of automatically so that your users will get a fluent and continuous experience.

New Power BI visuals' category list in AppSource

You may now login to Partner Center (*sic*) and retag your visuals with the new categories. The revised category list has more, easier to understand options to help report authors find a suitable visual easily and quickly.

You should note that you can tag a visual with up to two categories from the list. If your visual was previously tagged with a category that has been removed, you should update your visual with a new one.

The new categories are:

- Comparison
- Correlation
- Distribution
- Flow
- Filters
- Infographics
- KPIs
- Narratives
- Maps
- Part-to-Whole
- R visuals
- Change over time
- Other.

Expand entire level in matrix

With the 4.2 API release you may expand / collapse entire level programmatically. You should note that if you need to expand a large number of data points, you can use the 'fetch more data' API with the expand / collapse API.

Dynamic format string support

In order to support dynamic format string in your custom visual, add the following definition to **capabilities.json**:

```
"objects": {
  "general": {
    "properties": {
      "formatString": {
        "type": {
          "formatting": {
            "formatString": true
          }
        }
      }
    }
  }
},
```

It is available from API 4.2.

New visuals in AppSource

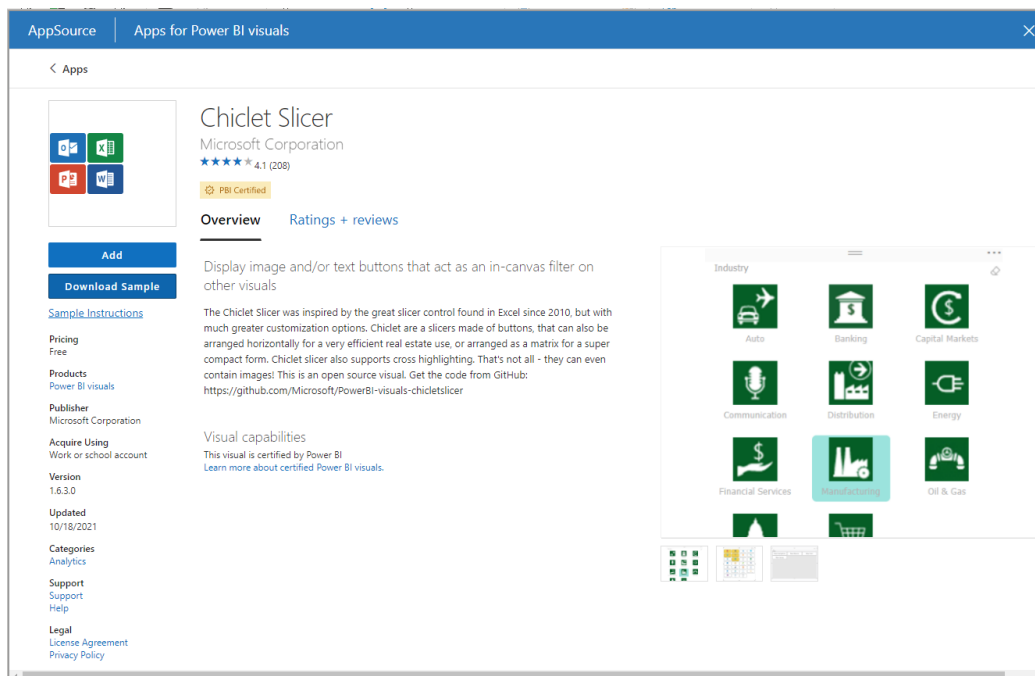
The following are new visuals this update:

- Line with Bubble Chart
- Custom Tree View with Bar Chart
- Custom Slicer
- Bar Chart with Top N Selection
- Merged_Bar_Chart
- Clustered Stack Chart
- 100% Stacked Column chart with value label (Not %)
- Bullet_Chart
- Ultimate Upset Plot
- Lollipop Column Visual
- Line Dot Chart
- Overlapped Bar Chart
- Scatter Plot with Line marks (instead of Dots)
- Power ON Visual Planner Service.

Download visual's sample file from the in-product AppSource

Now you may click on 'Download Sample' from the visual page in the in-product AppSource and download a sample Power BI report created by the visual publisher. The sample report demonstrates what the visual

looks like and how it may be used. It can also include useful comments, tips and tricks from the publisher.



Drill Down Graph PRO by ZoomCharts

Drill Down Graph PRO is a true graph visual for Power BI. Now you can build networks and explore relations among data points, identify outliers and discover patterns, all whilst utilising navigation, cross-chart filtering and various customisation options.

Drill Down Graph PRO is Mobile friendly and supports interactions, selections, custom and native ToolTips, filtering, fetching more data, bookmarks and context menus.

Main features include:

- multiple graph layout options
- on-chart interactions
- focus node support
- Auras
- Cross-Chart Filtering
- multiple node selection.

Plotly.js visual by Akvelon

This visual allows data scientists to create custom sophisticated charts in Power BI. The visual allows users to view their data by using Plotly.js capabilities and provides a chart editor to create and customise more than 40 types of charts in Power BI. Plotly.js community members may start using Plotly.js visual in Power BI with support for new chart types in the Power BI community, such as:

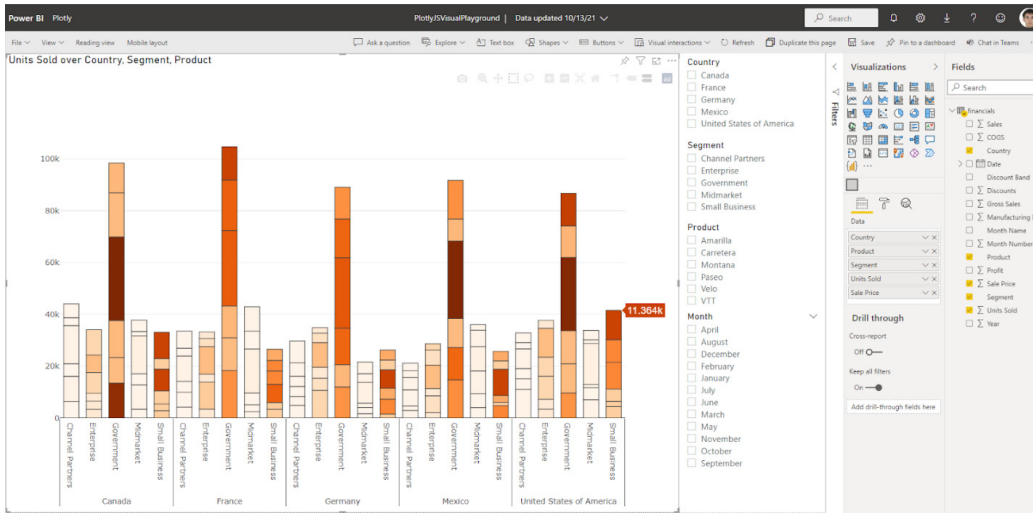
- Contour Plots
- 2d Density Plots
- Ternary Plots
- Ribbon Plots
- 3D Surface Plots
- 3D Scatter Plot
- 3D Mesh Plots
- 3D Line Plots.

3D charts help present complex data, bringing an extra dimension to Power BI's visualisation capabilities.

Most popular use cases include for:

- Banking & Finance: transactional data, AML analysis
- Information Technologies: asset management, IT infrastructure, IoT monitoring
- Cybersecurity & Risk Management: business process analysis, attack vector prevention
- Logistics & Transportation: fleet management, stock management, parcel tracking
- Sales & Marketing: community detection, commercial account management, web analytics and more.

It is available in AppSource.



HTML Text Styler 2.0 (Microsoft certified)

The HTML Text Styler is now Microsoft certified. This means that Microsoft has inspected the source code of the visual and confirms that it is safe to use. For the end-user this means that the visual can now be exported to PDF and PowerPoint from Power BI Service and that it is also displayed in e-mail subscriptions.

With the combination of DAX and HTML, it is possible to create all kind of dynamic and cool elements in Power BI. It may be used for custom KPI cards, fully formatted tables, dynamic text, animated GIFs and much more.

Create fully dynamic tables and style them exactly the way you want. Create a DAX measure and add an additional dimension to the Category to display multiple rows. And of course, you can also define a custom sort order

Canada	-315 ▼ below Budget
France	1363 ▲ above Budget
Germany	5937 ▲ above Budget
Spain	-913 ▼ below Budget
Switzerland	5212 ▲ above Budget

All our custom visuals in one table

HTML Text Styler		kteam.ch/text-styler	Canada -4.1% below Budget
HTML & CSS Viewer		kteam.ch/html-css-viewer/	France 8.6% above Budget
Balance Sheet Visual		kteam.ch/balance-sheet-visual/	Germany 35.5% above Budget
			Spain -8.6% below Budget
			Switzerland 22.1% above Budget

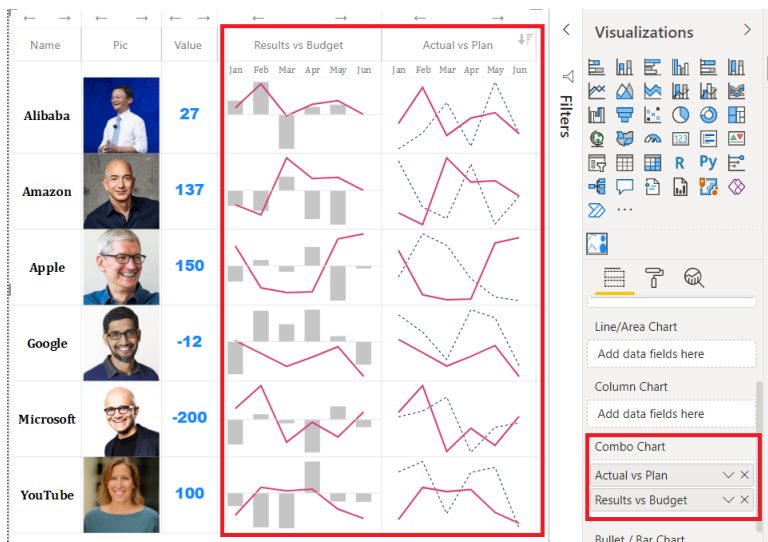
Project	Time	Cost	Workload	Tasks	Progress
Acme Corporation	●	●	●	7	80%
Globex Corporation	●	●	●	5	69%
Soylent Corp	●	●	●	10	75%

Multiple Sparklines by Excelnaccess.com

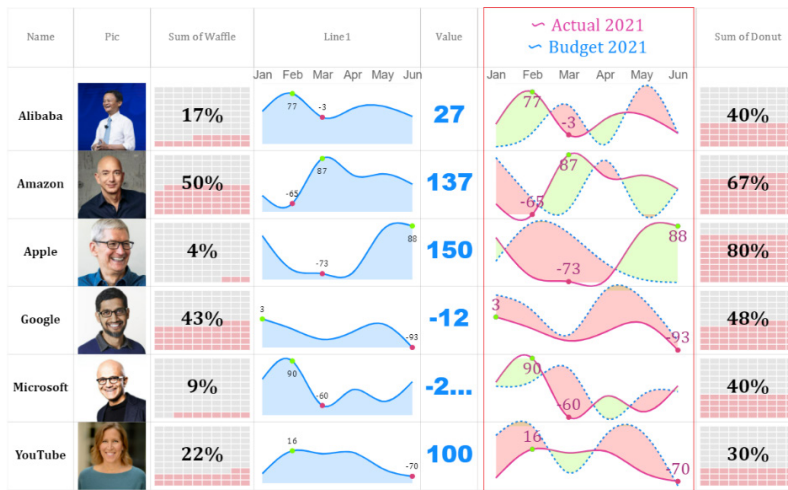
Many new features were added to 'Multiple sparklines' since its initial release last May.

1. COMBO CHART MENU

Now you may add a line plus column chart or a double line chart as a micro chart (sparkline). If you choose 'Chart Type' as 'Double Line', you can also conditionally colour the area between them.



2. CONDITIONAL COLOURING



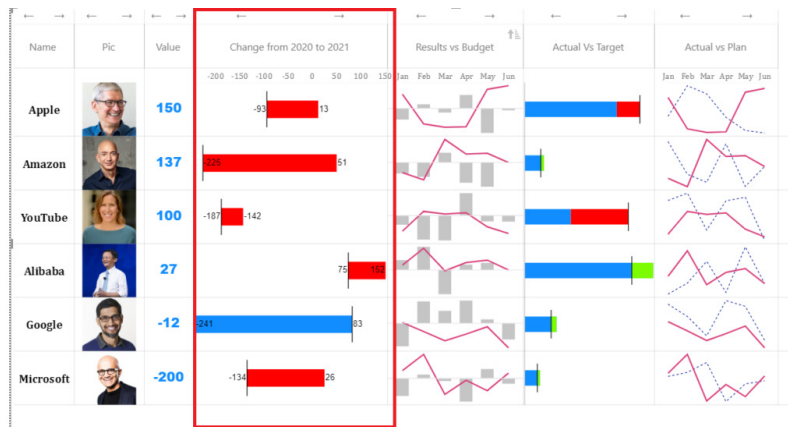
3. WATERFALL CHART

You may insert a vertical waterfall sparkline. You can set a bar as 'pillar' or 'variance' by right-clicking the cell as shown below:

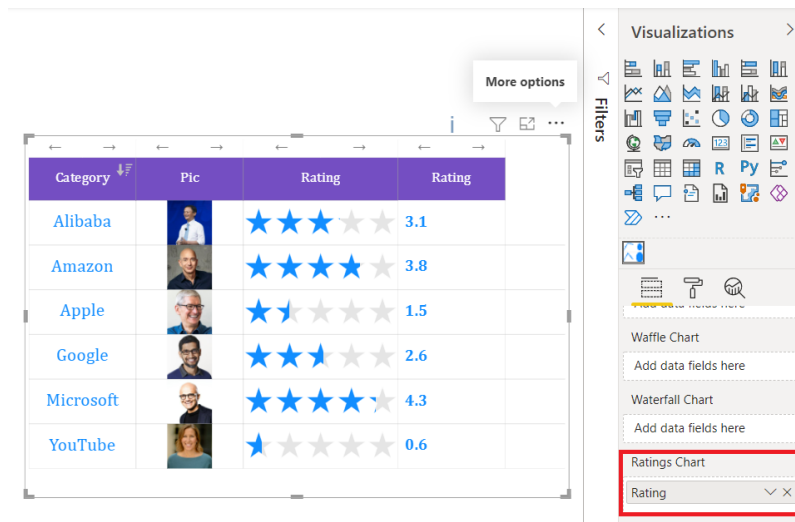


4. DUMBELL CHART

Dumbbell or Range Bar graphs are useful for illustrating change and comparing the distance between two groups of data points. You can create this chart just like a Bullet chart. You need to have two [2] columns (start values and end values) against each category.

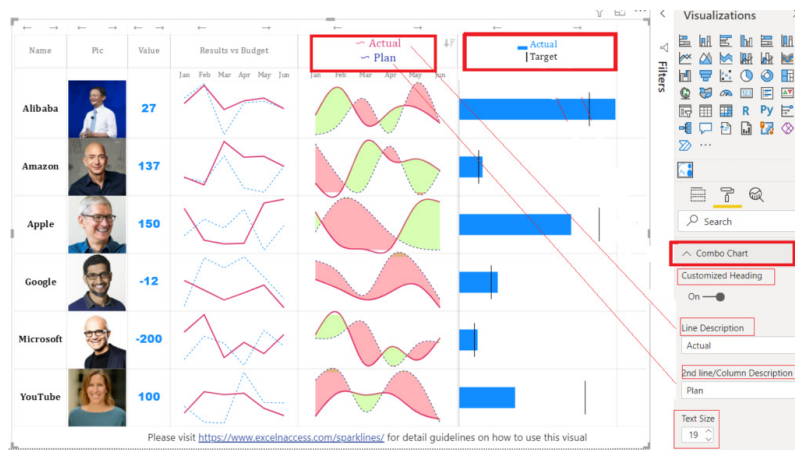


5. WAFFLE CHART AND RATINGS CHART



6. CUSTOMISED HEADINGS

Now you can add customised headings for Combo chart and Bullet charts.

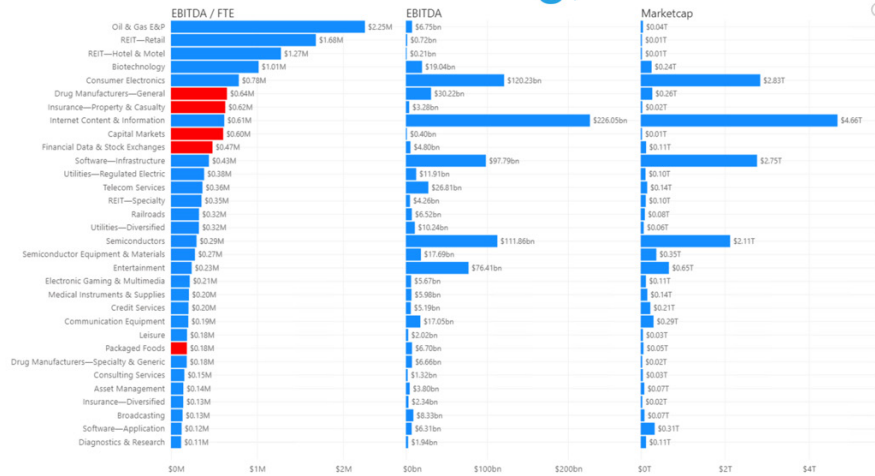


Available in AppSource.

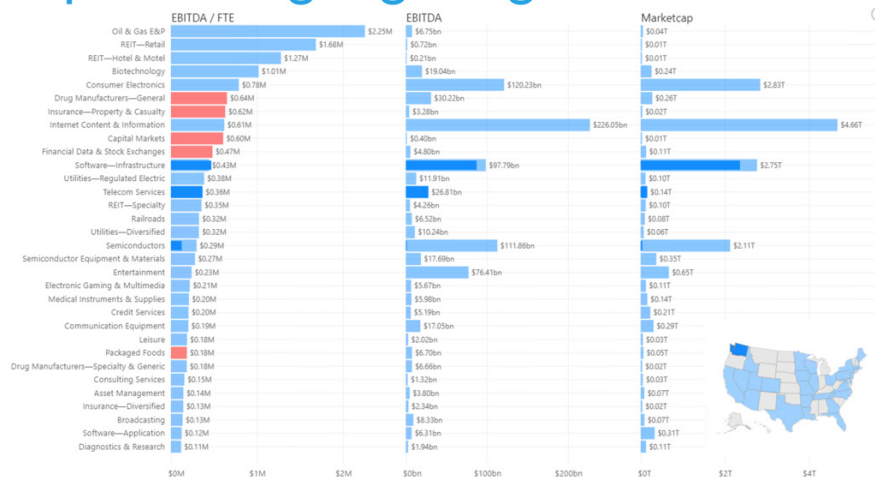
Merged Bar Chart by Nova Silva

On initial inspection, the Merged Bar chart has a lot of similarities with small multiples. The key difference is the way these charts allow you to compare values. The Merged Bar chart focuses on comparing multiple measures (like EBITDA and market capitalisation in the example below) within one specific categorical variable (here, Industries of S&P 500 stocks).

Nova Silva visual - Merged Bar Chart conditional formatting, data labels



& partial highlighting



Based on Power BI user feedback, several new features have been added to this visual:

- **conditional formatting:** bars within a measure can change colour (the example above shows the EBITDA / FTE in red when it concerns a negative revenue growth)
- **data labels:** besides the bar, you can show the data label. You may even change the location of the labels

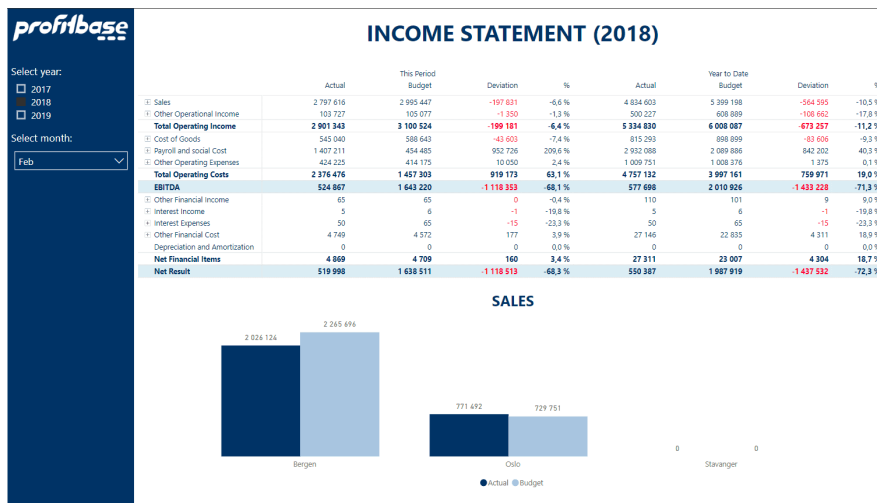
- **partial highlighting:** when your selection results in a partial match (in the example above, this is the selection of Washington State), the partial highlight will display this with the highlighted colour.

You can try the Merged Bar chart now by downloading it from the AppSource. All features are available for free to evaluate within Power BI Desktop.

Financial Reporting Matrix by Profitbase

With the Financial Reporting Matrix, you can develop and maintain your reports in one place using JSON, embed formulas, styling and formatting in a JSON-string, speeding up the process of building your reports, while requiring a minimum of DAX.

This is particularly useful if you want to ensure consistency across multiple reports with the same layout.



JSON allows you to centrally control reports across your organisation such as:

- reports have the same structure
- KPI or ratios calculations are consistent
- correct format strings per row
- highlight important rows using styling.

You may change all reports at once:

- add a new KPI or ratio in the source and it appears in all reports
- change a calculation and the change happens in all reports.

After the groundwork is done using JSON, you are still free to build on top of that using the full flexibility of the Financial Reporting Matrix:

- adding custom rows
- applying company / customer specific themes
- expand / collapse columns
- conditionally hide columns,

Income statement				Parts of JSON-string		
	2017	2018	2019	Style	Format	Formula
Sales	24,902,615	31,746,274	24,773,929		#,0	
Other Operational Revenue	-146,000	802,434	-199,939		#,0	
Total Operating Income	24,756,615	32,548,708	24,573,990	custom2	#,0	IS01B+IS02B
Cost of Goods	3,348,256	4,991,677	3,341,758		#,0	
Change in stock WIP FG	-	-	-		#,0	
Payroll and social Cost	11,072,566	16,865,015	16,675,185		#,0	
Other Operating Expenses	5,653,068	8,163,750	6,056,771		#,0	
Total Operating Expenses	20,073,890	30,020,442	26,073,714	custom2	#,0	IS04+IS05+IS07+IS04B
Operating Profit	4,682,725	2,528,266	-1,499,724	custom2	#,0	IS03-IS08
Operating Margin	18.9%	7.8%	-6.1%	custom3	#,0.0%	IS09/IS03
Earnings from ass.companies	-	-	-		#,0	
Other Financial Income	29,147	107,335	38,351		#,0	
Interest Income	14,398	44,189	-		#,0	
Interest Expenses	-	3,973	3,667		#,0	
Other Financial Cost	169,867	175,065	73,057		#,0	
Net Financial Items	-126,322	-27,514	-38,393	custom2	#,0	IS10+IS11+IS12-IS13-IS14
Depreciation and Amortization	-	-	-		#,0	
Ord.Net Income before Taxes	4,556,403	2,500,752	-1,538,117	custom2	#,0	IS09-IS15
Income Taxes Ordinary	4,556,438	919,975	-		#,0	
Ord.Net Profit/Loss	-35	1,580,777	-1,538,117	custom2	#,0	IS16-IS17
Extraord. Income (Cost)	-	-	-		#,0	
Income Taxes on e.o. items	-	-	-		#,0	
Net Profit/Loss	-35	1,580,777	-1,538,117	custom3	#,0	IS18+IS19-IS20

Again, this is available from AppSource.

Inforiver premium edition by Lumel

Inforiver delivers a quick way to build reports in Power BI. The Inforiver Premium edition includes everything available in Standard and Professional editions (such as number formatting, calculated rows & columns, notes and annotations, conditional formatting and in-cell visualisations), plus new capabilities such as manual data capture /

inputs for budgets / forecasts, advanced what-if simulations, formatted and paginated exports to PDF and Excel, blended measures, and more.

These additional capabilities can assist with sales planning, financial budgeting, operations forecasting and so on.

Zebra BI Tables version 5.2 by Zebra BI

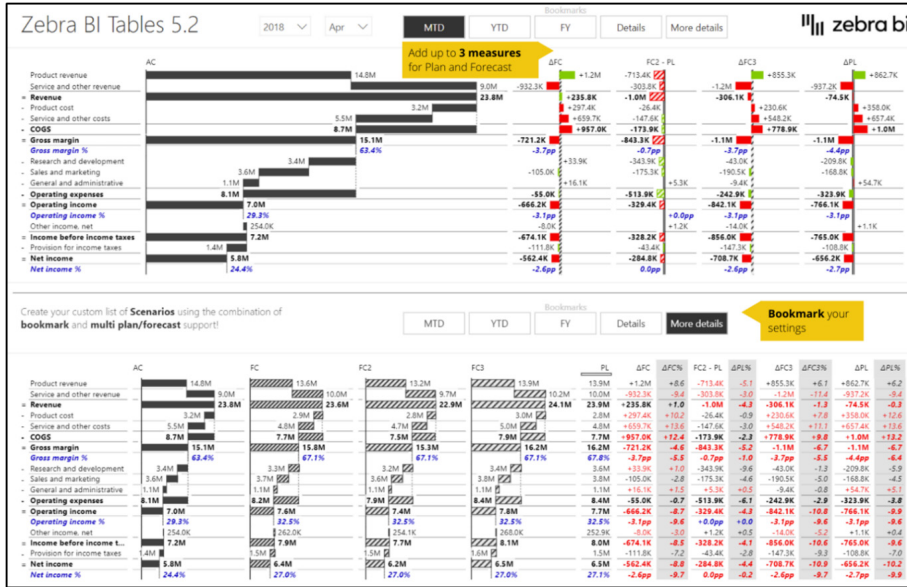
The 5.2 version of Zebra BI Tables visual brings the ability to look at multiple plans and forecasts, bookmark most of the settings, and other improvements that empower you to create actionable and insightful reports.

With Multiforecast and Multiplan functionality of Zebra BI Tables 5.2, you can add up to three [3] measures for Forecast and / or Plan, and compare several values against your performance to always stay flexible and agile:

- Zebra BI automatically adds calculations for absolute and relative variances for each value that you add
- everything remains flexible
- visualise each measure with a different chart type, where Zebra BI distinguishes between the measures with slight moderations of the chart pattern.

BOOKMARKABLE SETTINGS

From now on, you can select the settings you want to bookmark and save the view to make it easier for the report viewers to check the report page most relevant to them. You may apply this to different chart settings, layouts, titles, data labels and design options.



WebView2 now required

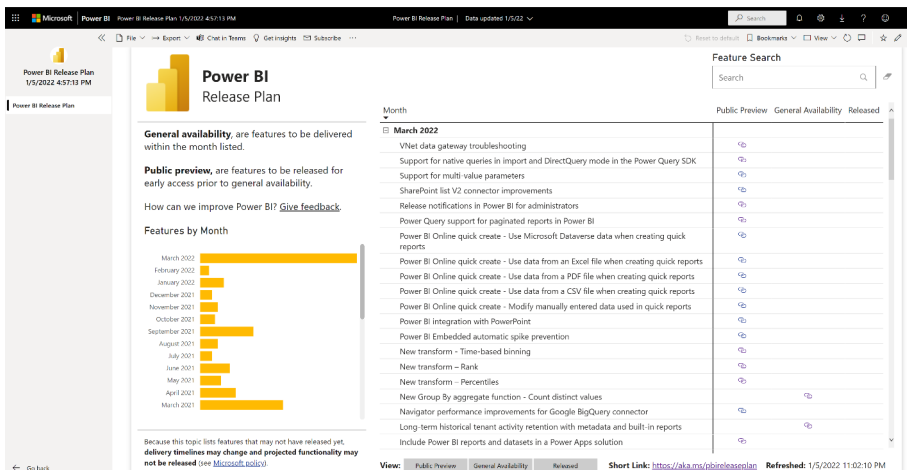
As announced in October, starting with this release, Power BI will now require WebView2 to be installed on your machine.

Find out new features releasing in Power BI by using Power BI Release Plan app

Microsoft has announced a new template app that describes new features releasing in Power BI. That's very useful!

The Power BI Release Plan app visualises features from the Dynamics 365 and Microsoft Power Platform release plans, making it easier for

organisations to track monthly releases and to stay up to date with upcoming features. With searchable text and direct links to feature details, organisations may now plan better for each Power BI release (and we may not get so caught up with our book!).



This Power BI Release Plan app is brought to you by the Power BI team and is available on AppSource.

Optimise your processes and gain deep insights with Process Mining

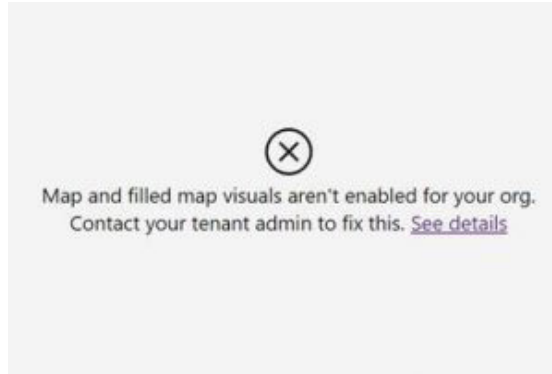
Now with the Preview of process mining in Process Advisor, which leverages Power BI Embedded, you can use your business data to produce analytics and detailed process maps, gleaming new insights into ways to optimise your business processes.

New settings to enable or disable Map and Filled Map visuals

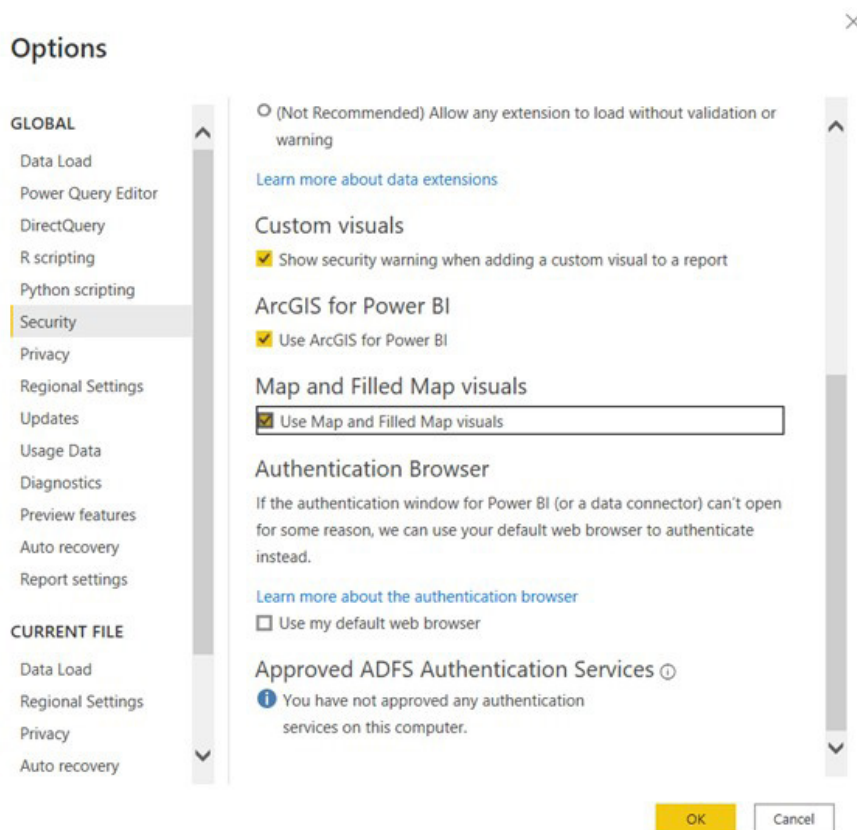
Also back in October, it was also announced that Power BI was introducing a tenant-level setting to enable or disable Bing Maps visuals for all users signed in on that tenant. This setting was made available in the Admin Portal on the Service, and new tenants from then on were required to explicitly opt-in to the Bing Maps service before the Map and Filled Map visuals can be used. Microsoft mentioned that these changes would make their way to Power BI Desktop in a future release, and that until then, report authors may see inconsistencies between what they can see

in Power BI Desktop and what their users can access on the Service.

This release aligns the behaviours between Desktop and Service. When a user is signed in on Power BI Desktop, the Map and Filled Map visuals will be enabled or disabled based upon their organisation's Admin settings. If a user on Power BI Desktop attempts to view a Map visual when their tenant has not enabled the feature, they will be prompted to ask their admin to enable it:



When a user is not signed in, the visuals will be enabled based on a new setting in **File -> Options and Settings -> Options -> Global -> Security** named 'Use Map and Filled Map Visuals'.



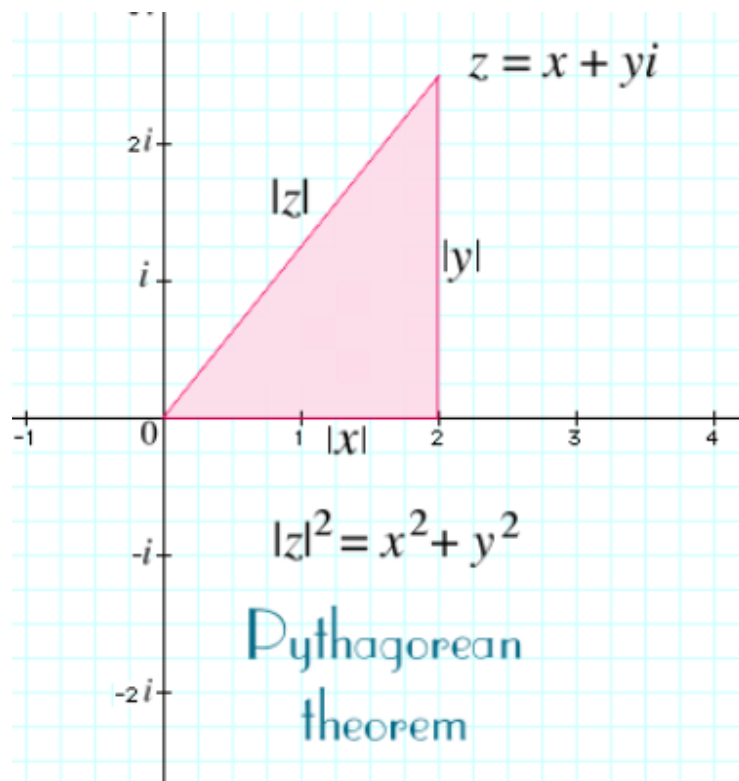
Just like with new tenants, new Power BI users will need to explicitly opt in to using these visuals. Otherwise, attempting to create a map visual will prompt users to enable them in their settings.



Map and filled map visuals are disabled. To enable them, go to File > Options and settings > Options > Global > Security. [See details](#)

Normal service has been resumed. More of the same next month, we're sure!!

The A to Z of Excel Functions: IMABS



An imaginary number is a complex number that can be written as a real number multiplied by the imaginary unit i (sometimes denoted j) which is defined by its property $i^2 = -1$. In general, the square of an imaginary number bi is $-b^2$. For example, $9i$ is an imaginary number, and its square is -81 . Zero is considered to be both real and imaginary.

An **imaginary** number bi can be added to a **real** number a to form a **complex number** of the form $a + bi$, where the real numbers a and b are called, respectively, the **real** part and the **imaginary** part of the **complex number**.

Just like the Excel function **ABS** measures the “distance” between a number and zero (0) (e.g. **ABS(-5)** is five (5) units from zero (0), therefore, **ABS(-5) = 5**), so **IMABS(“a + bi”)** measures the distance from zero (0) to the point $z = a + bi$. As can be clearly seen in the diagram, this distance is given by Pythagoras’ Theorem

$$\text{IMABS}(z) = |z| = \sqrt{x^2 + y^2}$$

Technically, **IMABS** returns the absolute value, or modulus, of a complex number $a + bi$, provided the number has been provided in said text format.

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

IMABS(inumber)

The **IMABS** function has the following argument:

- **inumber**: this is required and represents the complex number for which you want the absolute value.

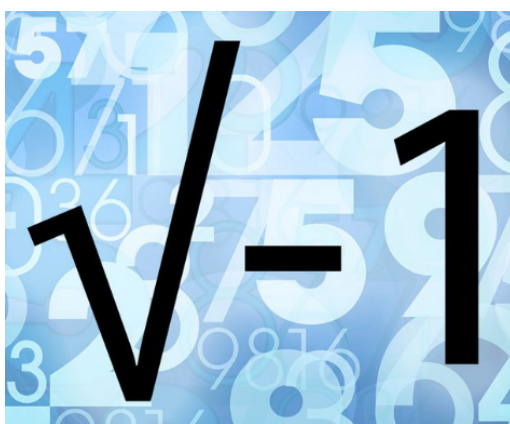
It should be further noted that:

- you should use **COMPLEX** to convert real and imaginary coefficients into a complex number
- **IMABS** recognises either the **i** or **j** notation
- if the complex number ends in **+i** or **-i** (or **j**), *i.e.* there is no coefficient between the operator and the imaginary unit, there must be no space, otherwise **IMABS** will return an **#NUM!** error.

Please see our example below:

	A	B	C
1	Formula	Description	Result
2	=IMABS("3 + 4i")	Absolute value of 3 + 4i	5
3	=IMABS("5 + 12j")	Absolute value of 5 + 12j	13
4			

The A to Z of Excel Functions: IMAGINARY



An **imaginary** number **bi** can be added to a **real** number **a** to form a **complex number** of the form **a + bi**, where the real numbers **a** and **b** are called, respectively, the **real part** and the **imaginary part** of the **complex number**.

The **IMAGINARY** function really does exist, and it returns the imaginary coefficient of a complex number in the form **a + bi**.

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

IMAGINARY(inumber)

The **IMAGINARY** function has the following argument:

- **inumber**: this is required and represents the complex number for which you want the imaginary coefficient.

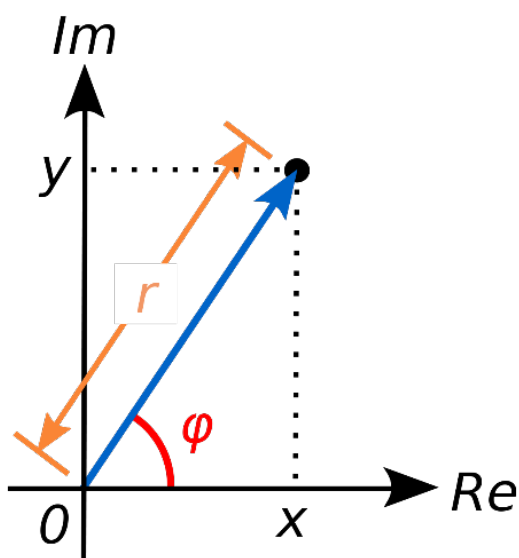
It should be further noted that:

- you should use **COMPLEX** to convert real and imaginary coefficients into a complex number
- **IMAGINARY** recognises either the **i** or **j** notation
- if the complex number ends in **+i** or **-i** (or **j**), *i.e.* there is no coefficient between the operator and the imaginary unit, there must be no space, otherwise **IMAGINARY** will return an **#NUM!** error.

Please see our example below:

	A	B	C
1	Formula	Description	Result
2	=IMAGINARY("3 + 4i")	Imaginary coefficient of the complex number 3 + 4i	4
3	=IMAGINARY("0 - j")	Imaginary coefficient of the complex number 0 - j (causes an error when there is a space between the operator and the imaginary unit)	#NUM!
4	=IMAGINARY("0-j")	Imaginary coefficient of the complex number 0-j (works when there is no space between the operator and the imaginary unit)	-1
5	=IMAGINARY(81)	Imaginary coefficient of the real number 81	0
6			

The A to Z of Excel Functions: IMARGUMENT



The **IMARGUMENT** function returns the argument θ (theta), an angle expressed in radians, such that:

$$x + yi = |x + yi| \times e^{i\theta} = |x + yi| (\cos \theta + i \sin \theta)$$

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

IMARGUMENT(inumber)

The **IMARGUMENT** function has the following argument:

- **inumber**: this is required and represents the complex number for which you want the argument θ .

It should be further noted that:

- you should use **COMPLEX** to convert real and imaginary coefficients into a complex number
- **IMARGUMENT** recognises either the i or j notation
- if the complex number ends in +i or -i (or j), *i.e.* there is no coefficient between the operator and the imaginary unit, there must be no space, otherwise **IMARGUMENT** will return an #NUM! error
- **IMARGUMENT** is calculated as:

$$\text{IMARGUMENT}(z) = \tan^{-1}\left(\frac{y}{x}\right) = \theta$$

where:

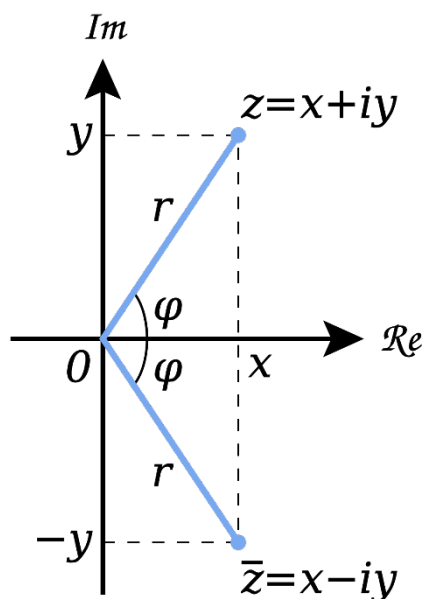
$$\theta \in (-\pi; \pi] \text{ and}$$

$$z = x + yi.$$

Please see our example below:

	A	B	C
1	Formula	Description	Result
2	=IMARGUMENT("3 + 4i")	Theta argument of the complex number 3 + 4i, in radians	0.92729522
3			

The A to Z of Excel Functions: IMCONJUGATE



In mathematics, the **complex conjugate** of a complex number is the number with an equal real part and an imaginary part equal in magnitude but opposite in sign. For example, (if **a** and **b** are real, then) the complex conjugate of **a + bi** is **a - bi**.

The product of a complex number and its conjugate is a real number, $a^2 + b^2$.

Complex conjugates are important for finding the roots of polynomials. According to the complex conjugate root theorem, if a complex number is a root to a polynomial in one variable with real coefficients (such as the quadratic equation or the cubic equation), so must its conjugate.

The **IMCONJUGATE** function returns the complex conjugate of a complex number in **x + yi** or **x + yj** text format.

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

IMCONJUGATE(inumber)

The **IMCONJUGATE** function has the following argument:

- **inumber**: this is required and represents the complex number for which you want to calculate the conjugate.

It should be further noted that:

- you should use **COMPLEX** to convert real and imaginary coefficients into a complex number
- **IMCONJUGATE** recognises either the **i** or **j** notation
- if the complex number ends in **+i** or **-i** (or **j**), *i.e.* there is no coefficient between the operator and the imaginary unit, there must be no space, otherwise **IMCONJUGATE** will return an **#NUM!** error
- the conjugate of a complex number is calculated as

$$\text{IMCONJUGATE}(x + yi) = \bar{z} = (x - yi)$$

Please see our final example for this month below:

	A	B	C
1	Formula	Description	Result
2	=IMCONJUGATE("3 + 4i")	Complex conjugate of the complex number 3 + 4i	3-4i
3			

More Excel Functions next month.

Beat the Boredom Suggested Solution

Earlier, we noted that when building a financial model, time series are important. Most people know how to build a time series when each column represents a year, a quarter, a month, etc.

Here is such an example:

Start Date		Sep 20	Dec 20	Mar 21	Jun 21	Sep 21
End Date		21 Aug 20	1 Oct 20	1 Jan 21	1 Apr 21	1 Jul 21
Number of Days		30 Sep 20	31 Dec 20	31 Mar 21	30 Jun 21	30 Sep 21
Counter		41	92	90	91	92
		1	2	3	4	5
Model Start Date		21 Aug 20				
Number of Months in a Full Period		3				
Example Reporting Month		12	e.g. 31-Dec-20			
Reporting Month Factor		3				
Months per Year		12				

But what do you do when you want a time period that is less than a day, with dynamic blocks in hours, say, like the one below? This was our challenge earlier in the newsletter.

Date	Today																
Hour	21/08/2020	0	8	16	22/08/2020	0	8	16	23/08/2020	0	8	16	24/08/2020	0	8	16	
1. Daily Time Series																	
Data																	
Days		4	Number_of_days														
Number of blocks per day		3	Blocks_per_day														
Number of hours per day		24	Hours_per_day														

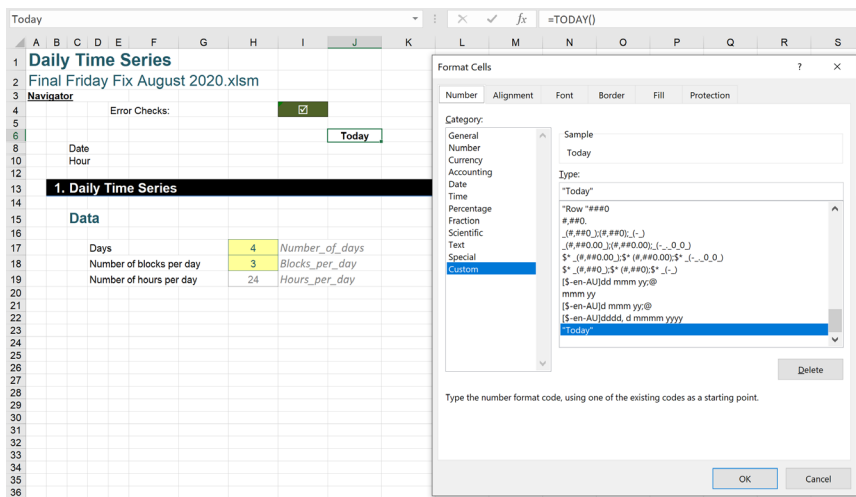
The requirement was that when you change the inputs, the time series automatically updates:

Date	Today														
Hour	21/08/2020	0	12	22/08/2020	0	12	23/08/2020	0	12	24/08/2020	0	12	25/08/2020	0	12
1. Daily Time Series															
Data															
Days		5	Number_of_days												
Number of blocks per day		2	Blocks_per_day												
Number of hours per day		24	Hours_per_day												

Suggested Solution

First, we will prepare our 'Daily Time Series' sheet. In cell J6 in our illustration, we use the TODAY function to get today's date, then format it as a text 'Today' and give it the range name **Today** in the Name Box. We will also need a few inputs, being the number of days in the time

series, the number of blocks of hours per day and the number of hours per day (which should be a constant, rather than a variable, assuming you are a resident of Earth). These input cells are given a corresponding name in the Name Box, viz.



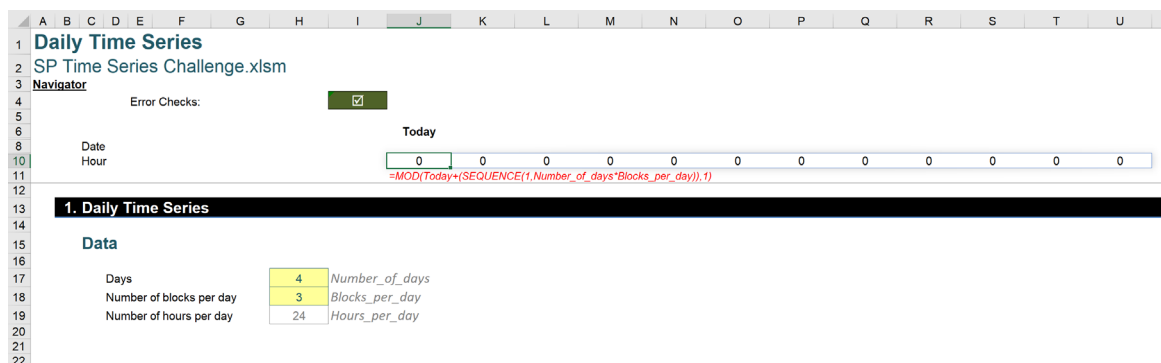
Having all our inputs ready, we will calculate the **Hour** series by using the **MOD** (<https://www.sumproduct.com/thought/a-modicum-of-mod>) and **SEQUENCE** (<https://www.sumproduct.com/thought/getting-arrays-spilling-the-beans-on-seven-new-functions>) functions.

The **MOD** function, **MOD(number, divisor)**, returns the remainder after the **number** (first argument) is divided by the **divisor** (second argument). The result has the same sign as the divisor. Here, the **MOD** function is used to set up the hour block number e.g. 0 / 6 / 12 / 18, if we are breaking the day into quarters.

The **SEQUENCE** function, **SEQUENCE(rows, [columns], [start], [step])**,

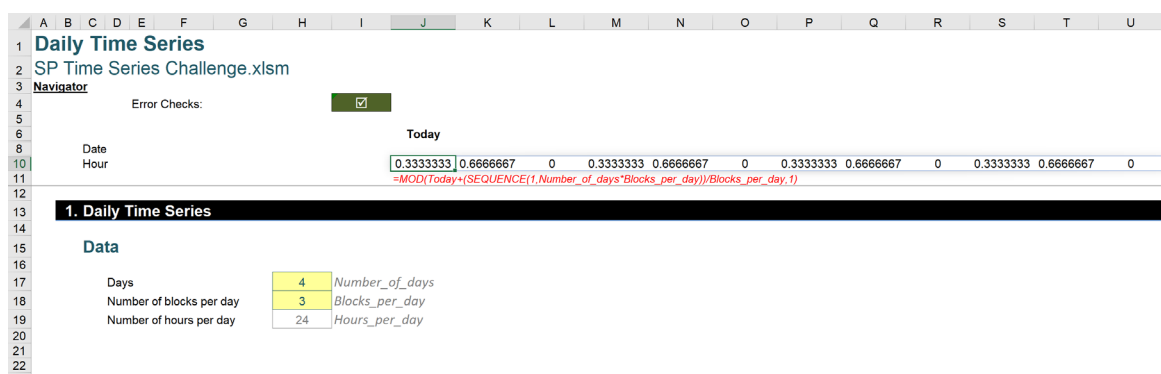
allows you to generate a list of sequential numbers in an array, such as 1, 2, 3, 4. For example, **SEQUENCE(4)** will generate the numbers 1, 2, 3 and 4 down a column, whereas **SEQUENCE(1,4)** will generate the same sequence across a row – which is what we want. In this case, we require a time series which automatically propagates across a row with a width of **Number_of_days*Blocks_per_day**, i.e. 4*3 = 12 columns, in our example above. We will nest this **SEQUENCE** formula inside the **MOD** formula to get the width of the series:

$$=MOD(Today+(SEQUENCE(1,Number_of_days*Blocks_per_day)),1)$$



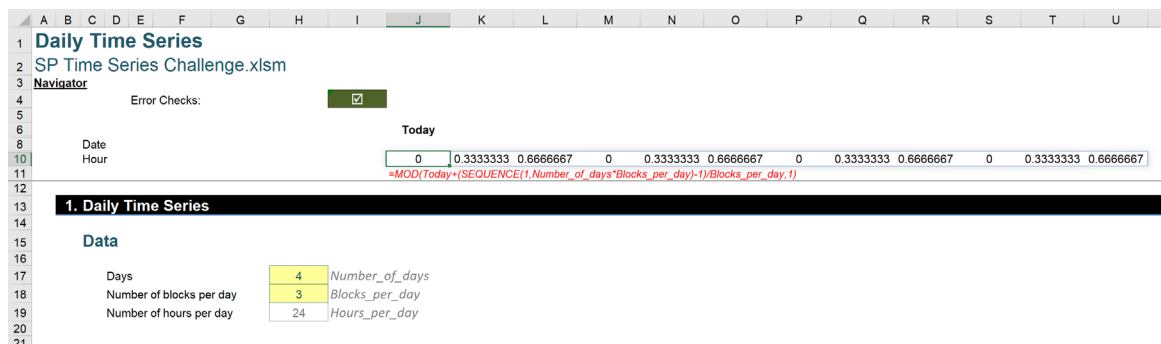
In the first part of the formula, we want to get the block separations in a day unit, hence, we need to divide the numerator by **Blocks_per_day**:

$$=MOD(Today+(SEQUENCE(1,Number_of_days*Blocks_per_day))/Blocks_per_day,1)$$



The series is now not starting from zero but ending at zero, while we want it to count from zero. The trick here is we will subtract one (1) in the numerator part to bring it back to the normal zero starting series. If we have a series that starts from one (1), e.g. counting the month number in a quarter, just add one (1) after the final close bracket.

$$=MOD(Today+(SEQUENCE(1,Number_of_days*Blocks_per_day)-1)/Blocks_per_day,1)$$



We need to multiply the series with the number of hours per day to get the correct hour block:

$$=MOD(Today+(SEQUENCE(1,Number_of_days*Blocks_per_day)-1)/Blocks_per_day,1)*Hours_per_day$$

Daily Time Series
SP Time Series Challenge.xlsm

Navigator

Error Checks:

Today

Date: 21/08/2020

Hour: 0 8 16 0 8 16 0 8 16 0 8 16

$=MOD(Today+(SEQUENCE(1,Number_of_days*Blocks_per_day)-1)/Blocks_per_day,1)*Hours_per_day$

1. Daily Time Series

Data

Days: 4 (Number_of_days)
Number of blocks per day: 3 (Blocks_per_day)
Number of hours per day: 24 (Hours_per_day)

With the **Hour** series ready, we can calculate the **Date** series. The **Date** will be filled only at the zero-hour marks. Similarly, we use the **SEQUENCE** function to work out the actual date series; and we use the **TEXT** function to keep the correct date formatting:

$=IF(J10\#, "", TEXT(Today+(SEQUENCE(1,Number_of_days*Block_per_day)-1)/Block_per_day, "d/mm/yyyy"))$

Daily Time Series
SP Time Series Challenge.xlsm

Navigator

Error Checks:

Today

Date: 21/08/2020 22/08/2020 23/08/2020 24/08/2020

Hour: 0 8 16 0 8 16 0 8 16 0 8 16

$=IF(J10\#, "", TEXT(Today+(SEQUENCE(1,Number_of_days*Blocks_per_day)-1)/Blocks_per_day, "d/mm/yyyy"))$

$=MOD(Today+(SEQUENCE(1,Number_of_days*Blocks_per_day)-1)/Blocks_per_day,1)*Hours_per_day$

1. Daily Time Series

Data

Days: 4 (Number_of_days)
Number of blocks per day: 3 (Blocks_per_day)
Number of hours per day: 24 (Hours_per_day)

It's true this solution requires dynamic arrays to work, but we thought we should look to the future of Excel rather than remain entrenched in the past. Until next time.

Upcoming SumProduct Training Courses - COVID-19 update

Due to the COVID-19 pandemic that is currently spreading around the globe, we are suspending our in-person courses until further notice. However, to accommodate the new working-from-home dynamic, we are switching our public and in-house courses to an online delivery stream, presented via Microsoft Teams, with a live presenter running through the same course material, downloadable workbooks to complete the hands-on exercises during the training session, and a recording of the sessions for

your use within 1 month for you to refer back to in the event of technical difficulties. To assist with the pacing and flow of the course, we will also have a moderator who will help answer questions during the course.

If you're still not sure how this will work, please contact us at training@sumproduct.com and we'll be happy to walk you through the process.

Location	Course	Date	Date	Duration	Duration
Online (Australia)	Financial Modelling	2 - 3 Mar 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	2 Days
Online (Australia)	Excel Tips and Tricks	11 Apr 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	12 - 13 Apr 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	10 - 12 May 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	17 May 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	18 - 19 May 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	19 - 21 Jul 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	26 Jul 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	1 Day
Online (Australia)	Financial Modelling	27 - 28 Jul 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	2 Days
Online (Australia)	Excel Tips and Tricks	29 Aug 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	1 Day

Location	Course	Date	Date	Duration	Duration
Online (Australia)	Financial Modelling	30 - 31 Aug 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	28 -30 Sep 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	5 Oct 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	1 Day
Online (Australia)	Financial Modelling	6 - 7 Oct 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	9 - 11 Nov 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	16 Nov 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	1 Day
Online (Australia)	Financial Modelling	17 - 18 Nov 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	2 Days
Online (Australia)	Power Pivot, Power Query and Power BI	7 - 9 Dec 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	14 Dec 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	1 Day
Online (Australia)	Financial Modelling	15 - 16 Dec 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	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'd see what keyboard shortcuts we have **LEFT** to do:

Keystroke	What it does
LEFT	Move one cell to the left
ALT + LEFT	Back (hyperlink navigation)
CTRL + LEFT	Select the last cell in the area left
SHIFT + LEFT	Extend selection one cell left
ALT + SHIFT + LEFT	Ungroup
CTRL + ALT + LEFT	Intel Chipset: Turn screen +90 degrees; else: move active cell to previous non-adjacent area within selection
CTRL + SHIFT + LEFT	Extend selection down to last cell in area left

There are c.550 keyboard shortcuts in Excel. For a comprehensive list, please download our Excel file at 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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