



Power BI Desktop

Introduction

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2 WHAT IS POWER BI?

Power Bi is a Microsoft Business Intelligence Application. It is designed to allow you to import data, analyse and transform this data and create visuals.

Creating clear visuals from your data can help you tell a story, answer a question or identify a risk or opportunity that perhaps wasn't clear from the data itself.

2.1 VISUALS

These are the Charts, Maps, Cards and other visualisations that help you tell a story with your data.

2.2 DATASETS

This is the data you import to create your visualisations. It can come from multiple sources and can be imported ready to use or you can cleanse and transform it in Power BI.

2.3 REPORTS

These are your visualisations brought together on one or multiple pages.

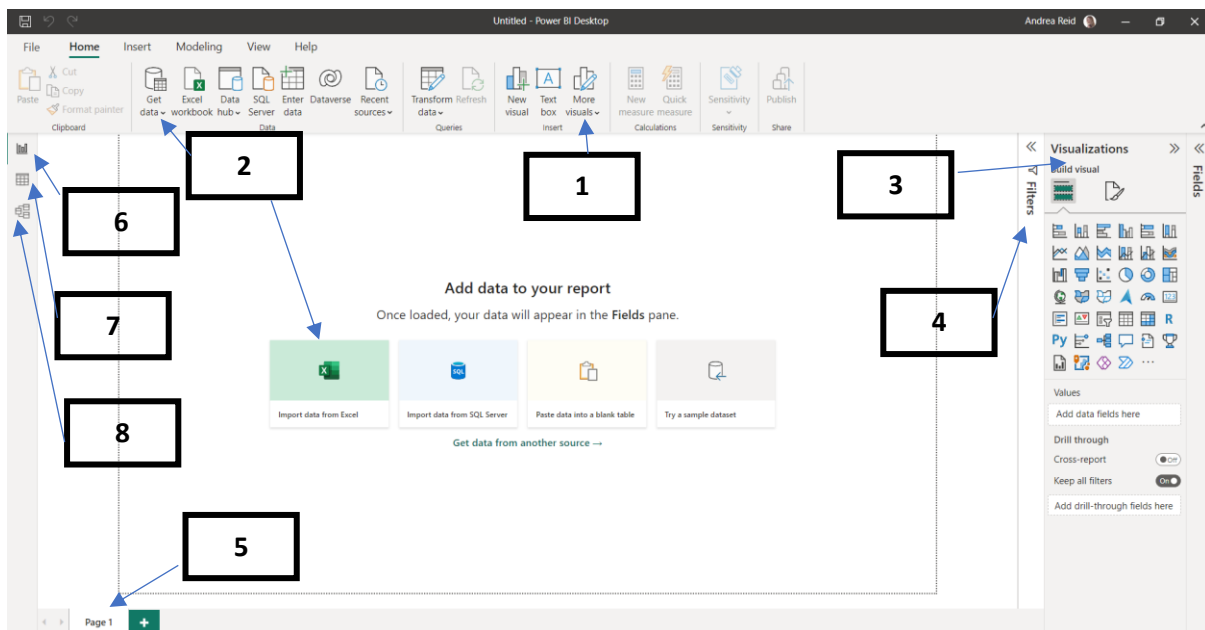
2.4 DASHBOARDS

A dashboard is a single page on which specific visualisations are placed usually giving an overview for others who can then interact with it.

2.5 TILES

Tiles are the single visuals that are pinned onto a dashboard.

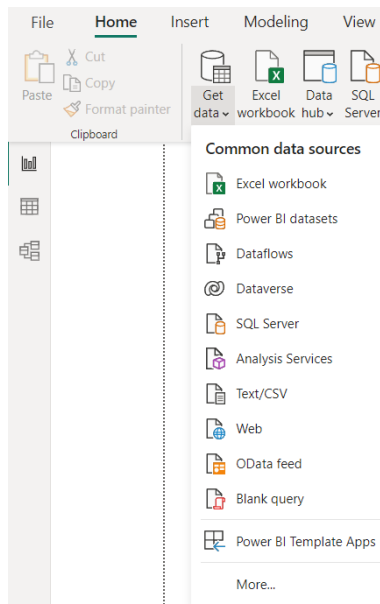
3 NAVIGATING POWER BI DESKTOP



1. Ribbon – contains Home, Insert, Modelling, View and Help tabs
2. Get Data – to import your data into your report
3. Visualisation Pane – contains the different visualisations
4. Filters Pane – for adding filters to visuals and pages
5. Pages of the report the green + will add a new page – you must have at least one page in a report. Double click to rename a page
6. Report View – to build you reports
7. Data View to view data and add calculated columns
8. Report View – to manage your relationships

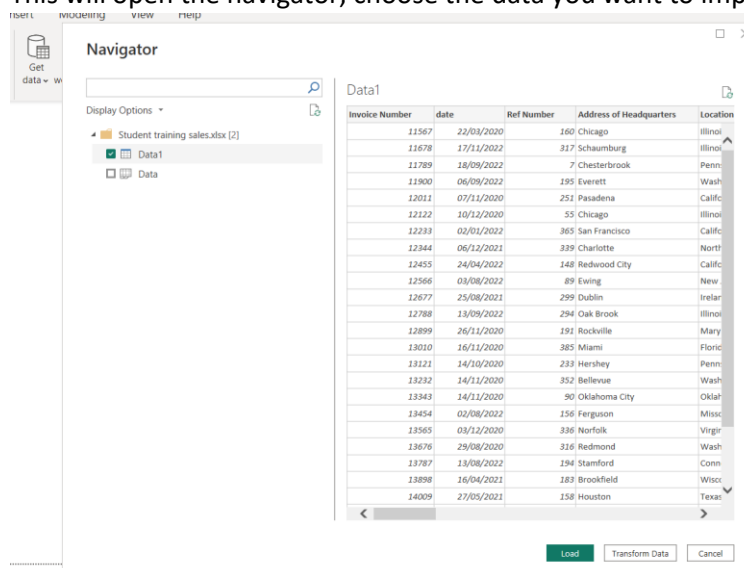
4 GET DATA

In order to create visuals in Power BI you need to get your data into Power BI Desktop

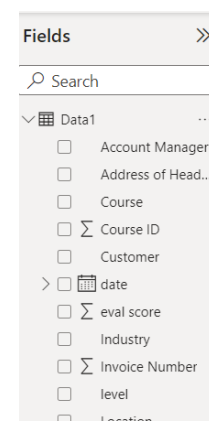


There are many different data sources you can connect to.

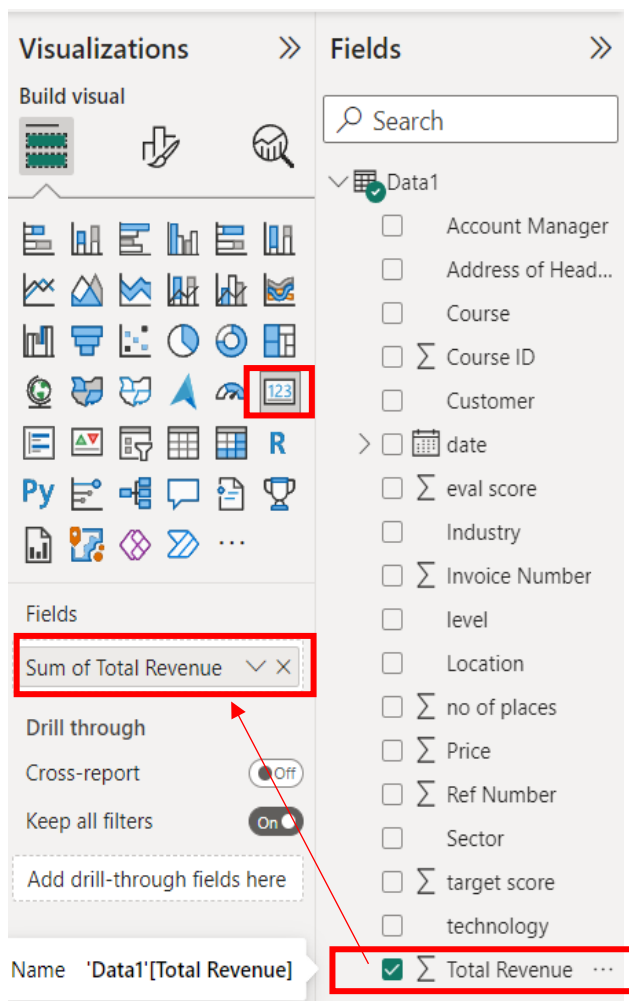
1. Choose get data dropdown menu and select the data source you want to connect to
2. For excel spreadsheets choose excel workbook – navigate to the one you want to use and click open
3. This will open the navigator, choose the data you want to import and click Load



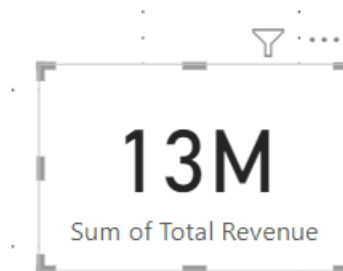
4. All the columns from your data will now appear on the fields pane ready to use



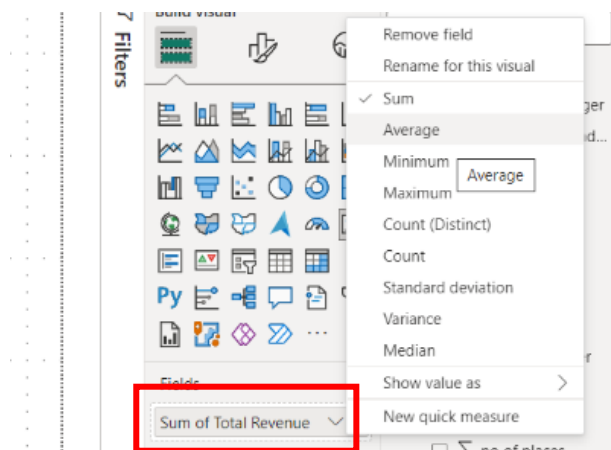
5 CREATE VISUALS



1. Select a visual from the visualisations pane
2. Drag the field you want to use from the fields pane into the fields section
3. This will create the visual

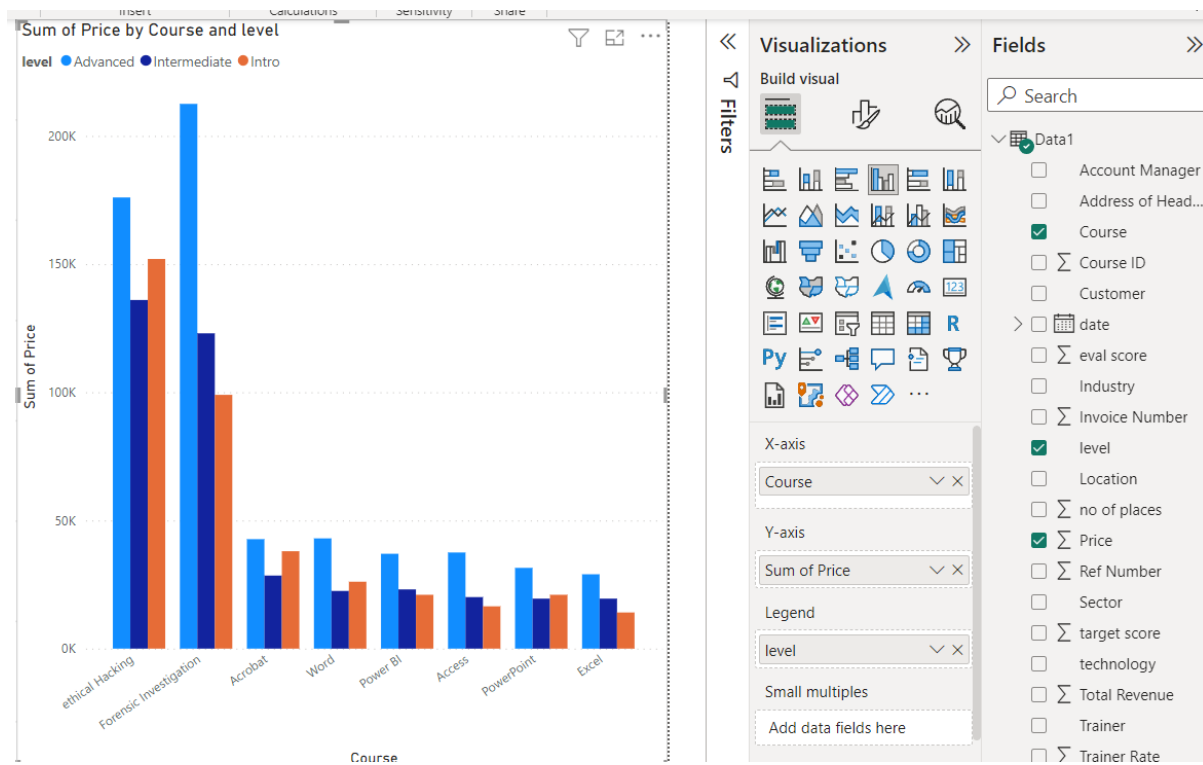


4. To change the field from Sum to Average choose the drop down arrow and select average – this is also where you can rename the visual.
5. To delete a visual select it and hit delete on your keyboard



6 CREATE CHARTS

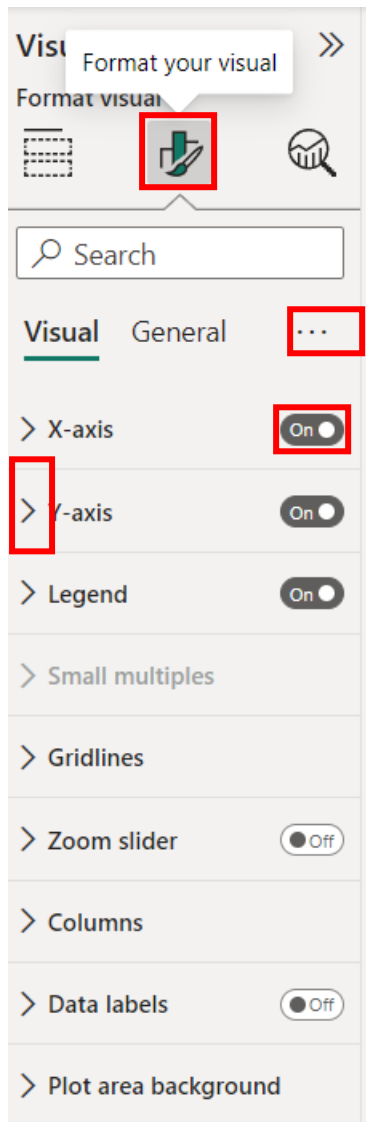
1. Select the chart you want from the visualisations pane
2. Drag the relevant fields into the
 - a. X-axis
 - b. Y-Axis
 - c. Legend



7 FORMATTING

Each Visualisation has its own formatting options

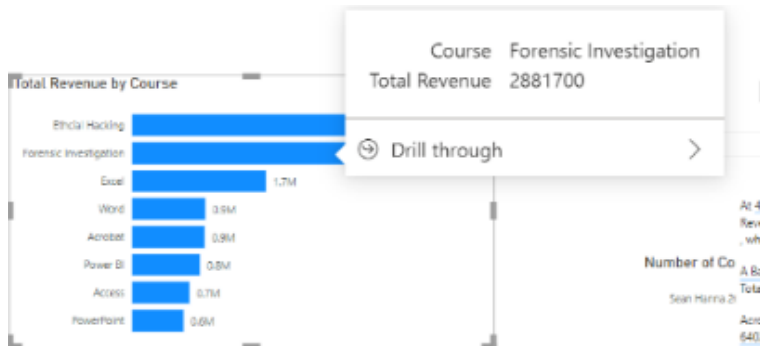
These are found in the paintbrush icon on the visualisations pane



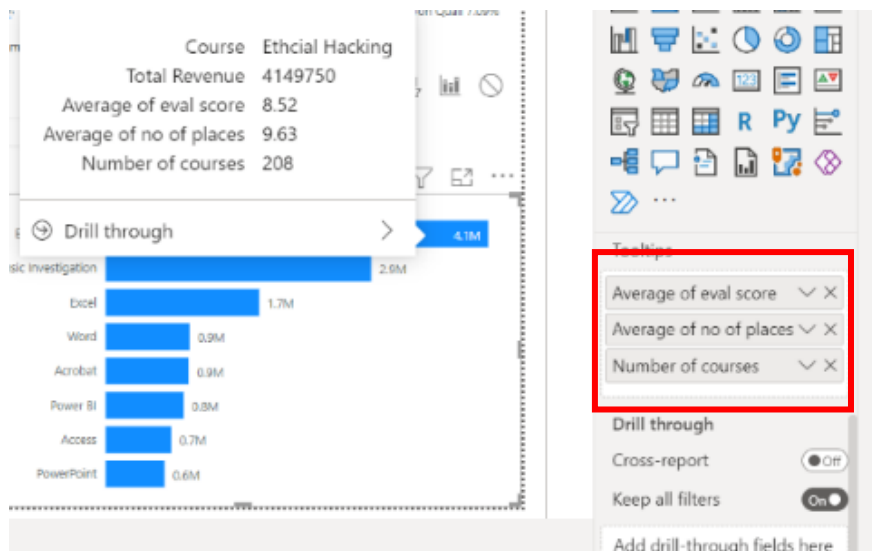
1. The search box lets you search for a particular formatting icon
2. The expand arrow expand each section to show the different formatting options
3. The on off buttons toggle on by clicking them
4. the ... allows you to expand or collapse all settings and also reset them to the default settings

8 TOOLTIPS

When you hover over a visual it give you a tooltip with some information on the data behind it, in the example below the course name and the total revenue figure



You can add more information to the tooltip by dragging the fields into the tooltip section

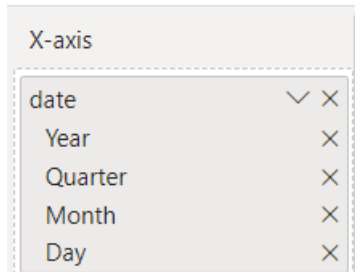


9 LINE CHARTS

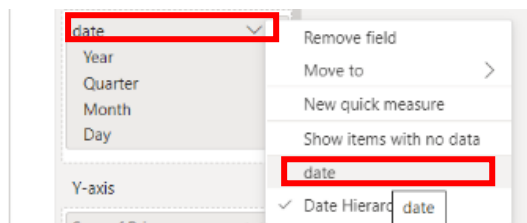
Line charts are used to present data over time

Select your line chart from the visualisations pane

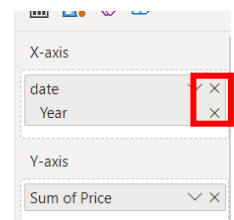
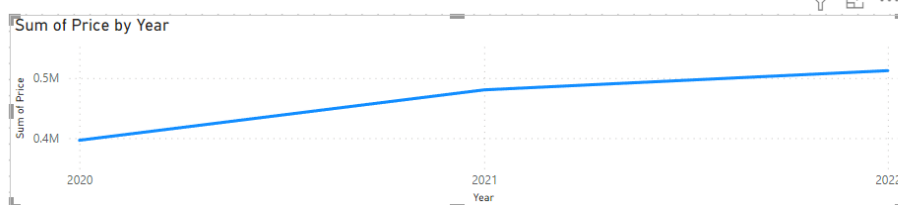
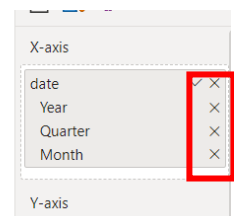
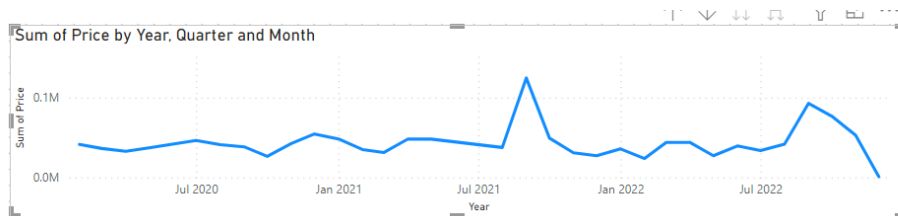
When you add your date field to the X-Axis it will automatically show the date hierarchy



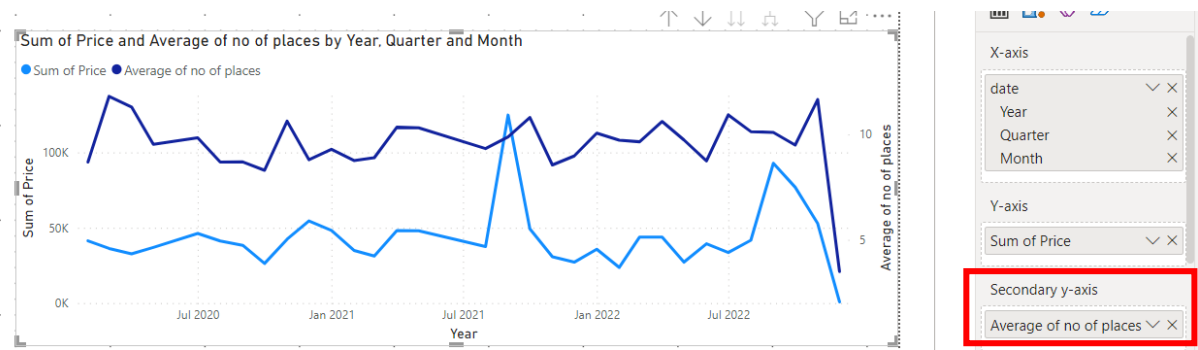
You can remove the hierarchy and keep the date only from the dropdown arrow



Alternatively you can use the X to remove anything from the hierarchy that you don't need



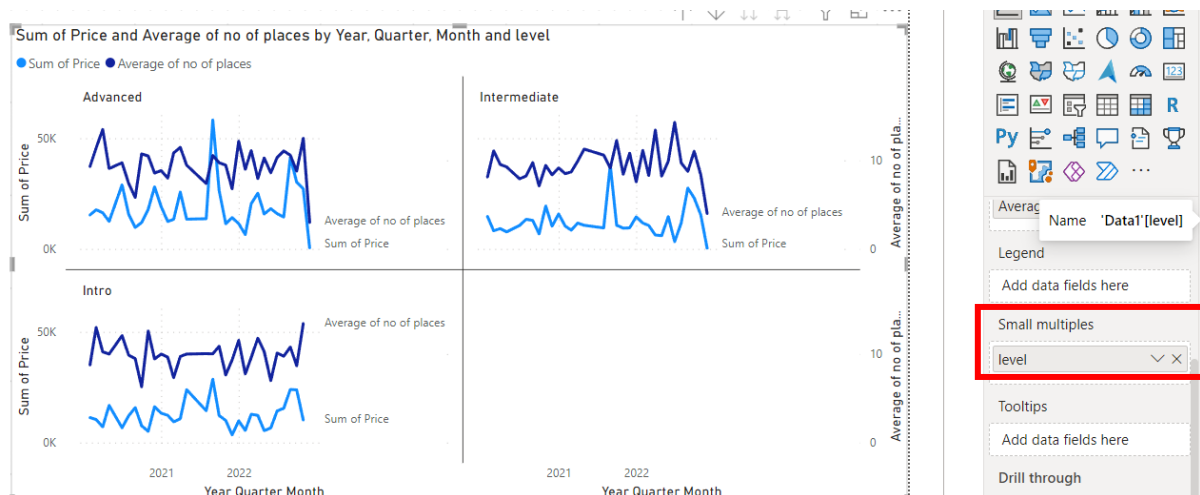
You can also use a secondary axis to display a comparison in trend of figures that are different



Series Labels and Secondary Axis formatting options are found under the format icon



You can also add fields to the small multiples section to split the line charts into the various levels



10 MAP

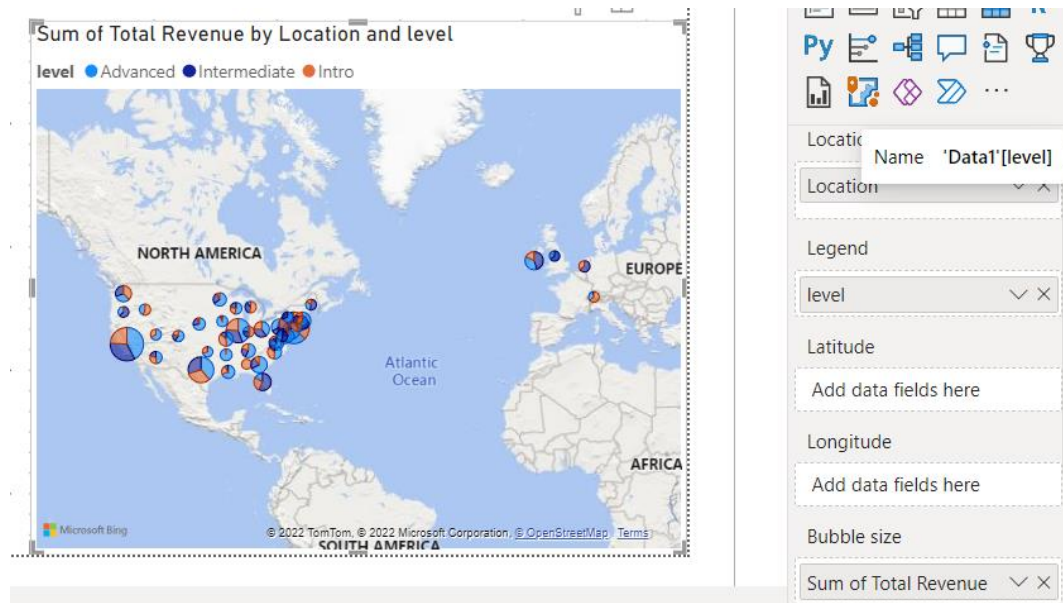
To use maps you must have recognise locations or use specific latitude and longitude field

Select the filled map icon from the visualisations

Move you location field (country, cite, state etc) into the location section

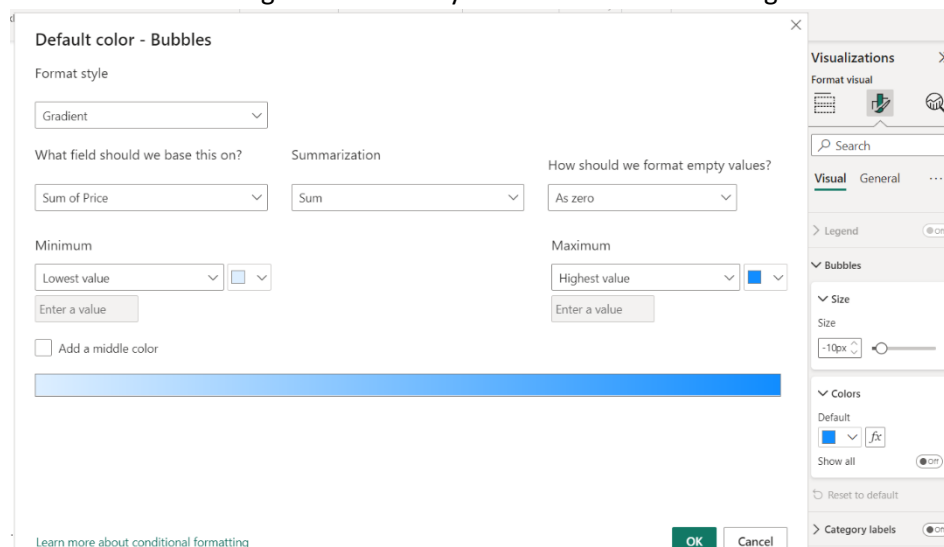
Add a value field to the bubble size

If you add a field to the legend the bubbles will appear as pie charts



10.1 CONDITIONAL FORMATTING MAP

1. Under formatting expand bubbles and colours
2. Select a value field e.g. Price and set your conditional formatting based on this field

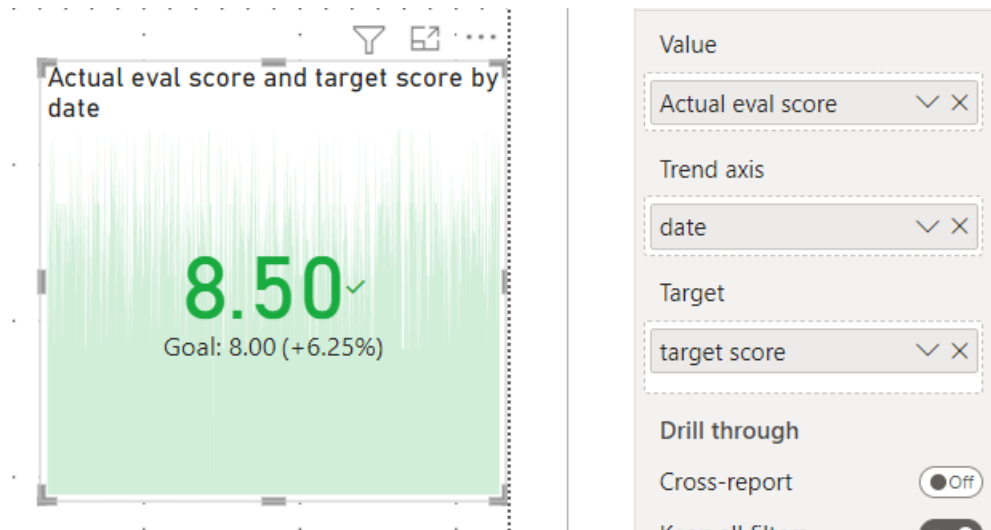


3. You can also change the style of the map under formatting and map settings

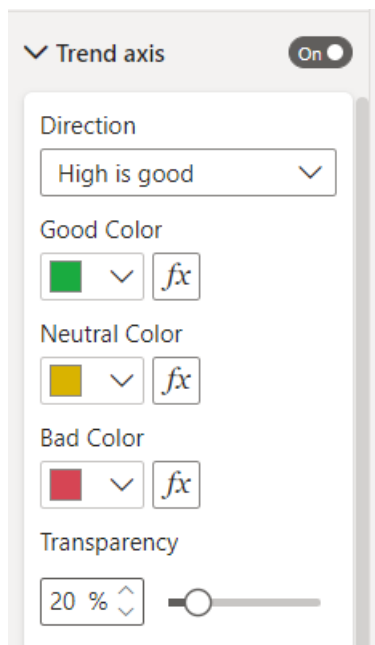
11 KPI

In order to add a KPI (Key Performance Indicator) you need to have an actual value and a target value.

You can then plot this against a trend axis e.g. Date.



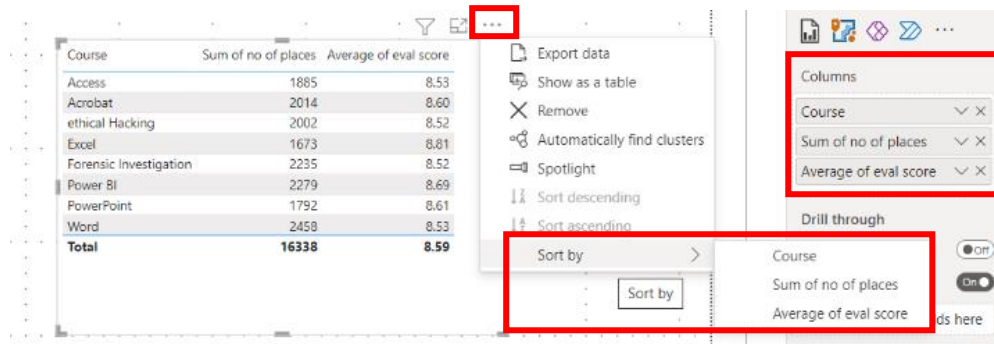
You can change the trend axis and colours depending on whether higher than target is good or less than target is good.



12 TABLES AND MATRIX

Select **the table icon** from the visualisations pane

Add the fields that you want to appear as columns in your table to the columns section.



You can also sort the table in order by clicking the ... at the top righthand side.

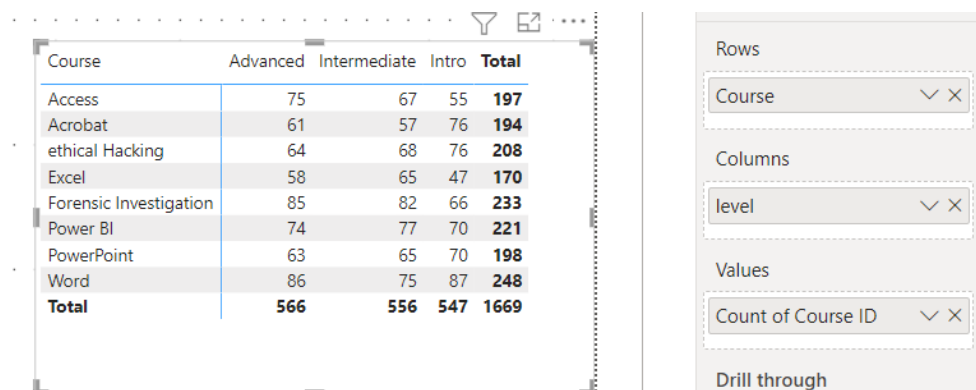
Choose sort by and select the column you want to sort your data by.

Select **the matrix icon** from the visualisations pane

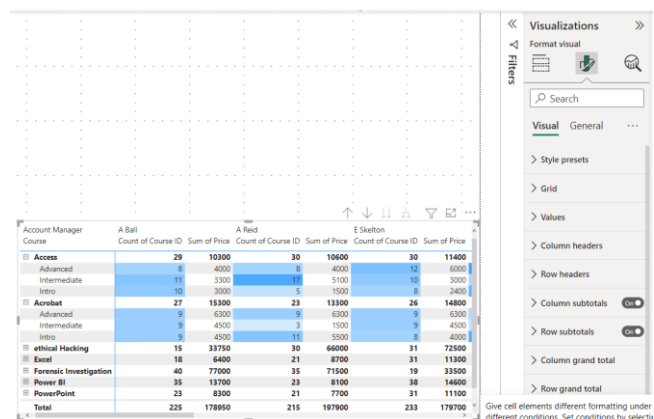
Add the fields you want to appear as rows

Add the fields you want to appear as columns

Add the fields you want to appear as values



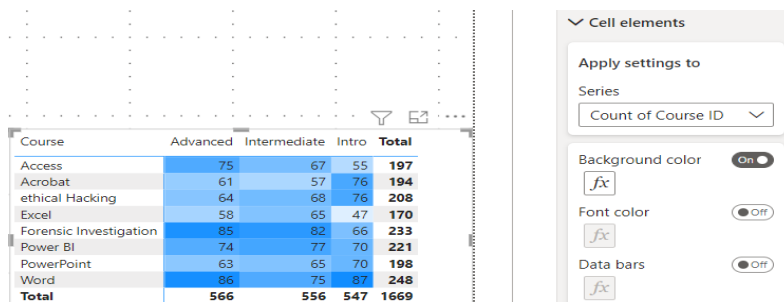
You can remove subtotals, format values and headers and apply different styles using the formatting pane



12.1 CONDITIONAL FORMATTING MATRIX

To apply conditional formatting go to the format paintbrush icon

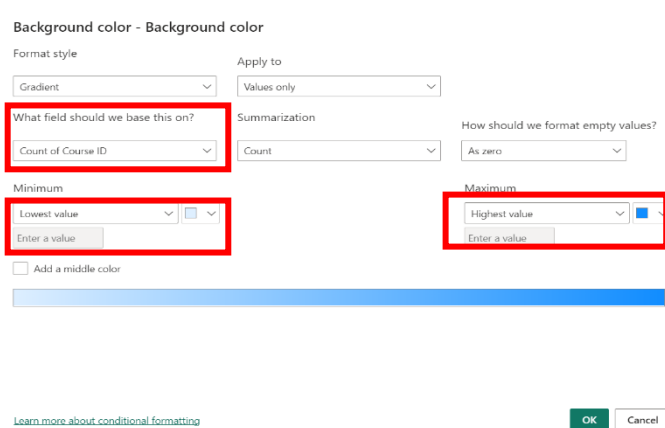
Select cell elements and you can choose which conditional format you would like to apply



The screenshot shows an Excel spreadsheet with a table of course counts. The table has columns for Course, Advanced, Intermediate, Intro, and Total. The rows list various courses: Access, Acrobat, ethical Hacking, Excel, Forensic Investigation, Power BI, PowerPoint, and Word, followed by a Total row. The 'Cell elements' task pane is open on the right, showing settings for 'Count of Course ID'. The 'Background color' option is turned on, and the 'Font color' and 'Data bars' options are turned off.

Course	Advanced	Intermediate	Intro	Total
Access	75	67	55	197
Acrobat	61	57	76	194
ethical Hacking	64	68	76	208
Excel	58	65	47	170
Forensic Investigation	85	82	66	233
Power BI	74	77	70	221
PowerPoint	63	65	70	198
Word	86	75	87	248
Total	566	556	547	1669

Select the field you want to base the conditional formatting on and you can also choose whether it runs from the lowest to highest value or whether you want to set specific value for the colours



The screenshot shows the 'Background color - Background color' dialog box. The 'Format style' is set to 'Gradient'. The 'Apply to' is set to 'Values only'. The 'What field should we base this on?' is set to 'Count of Course ID'. The 'Summarization' is set to 'Count'. The 'How should we format empty values?' is set to 'As zero'. The 'Minimum' is set to 'Lowest value' and the 'Maximum' is set to 'Highest value'. A color gradient bar is shown at the bottom. There are 'OK' and 'Cancel' buttons at the bottom right.

Background color - Background color

Format style: Gradient

Apply to: Values only

What field should we base this on?: Count of Course ID

Summarization: Count

How should we format empty values?: As zero

Minimum: Lowest value

Maximum: Highest value

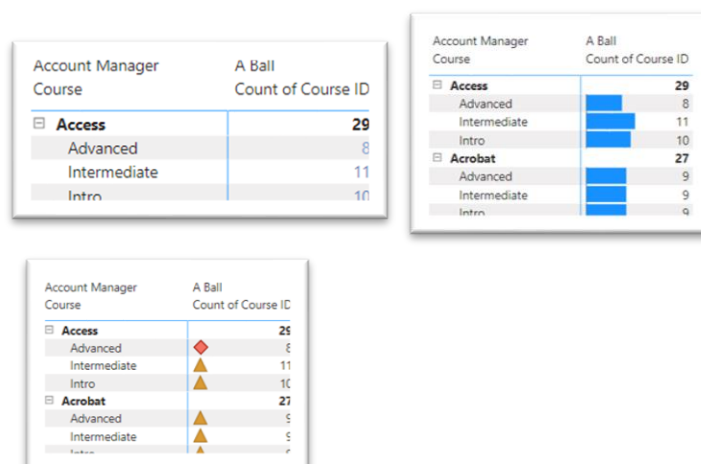
Enter a value

Add a middle color

Learn more about conditional formatting

OK Cancel

You also can choose to change font colour, data bars icons or Web urls



The three screenshots show different conditional formatting styles applied to the same data. The first screenshot shows data bars. The second screenshot shows icons. The third screenshot shows web URLs.

Account Manager Course	A Ball Count of Course ID
Access	29
Advanced	8
Intermediate	11
Intro	10
Acrobat	27
Advanced	9
Intermediate	9
Intro	9

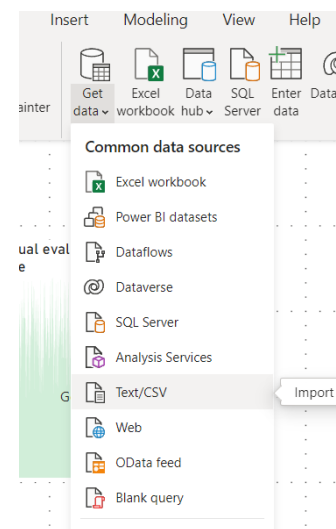
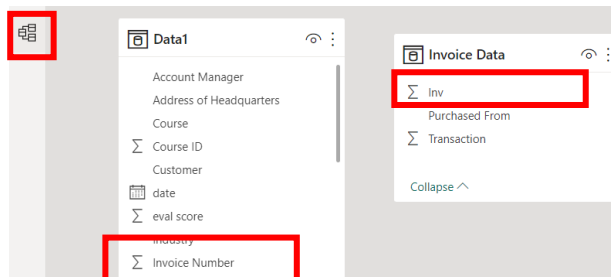
13 DATA MODEL AND RELATIONSHIPS

When importing data into Power BI frequently you will need to use data from other sources. For example, you may have data from an excel worksheet but you have additional data from a CSV file. To enable you to create visuals with information from both data sources you need to have a relationship between two.

Relationships are things that link the two data sources and Power BI identifies relationships automatically where it can. For example, if a column from the excel spreadsheet has the same name as a column from the CSV file it will create a relationship.

If the column you want to link doesn't have the same name you will have to create the relationship manually.

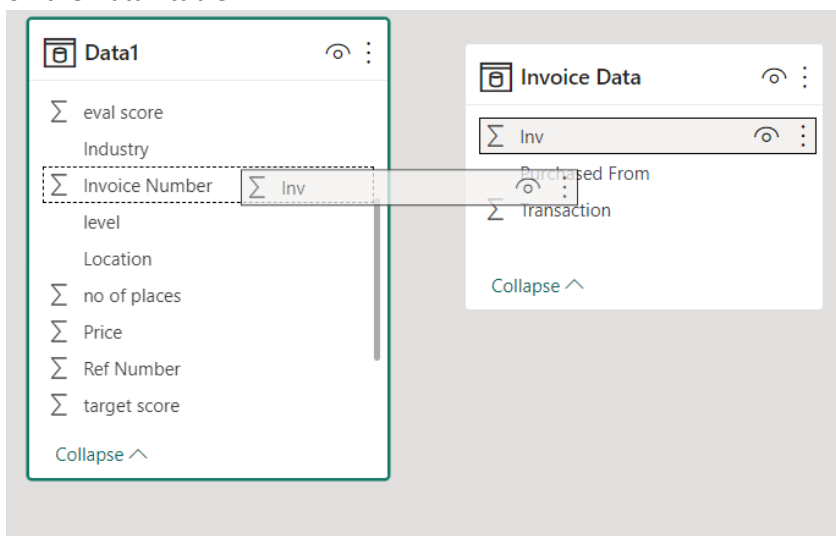
1. Use Get data to get your additional data source e.g. CSV
2. Load it to the report
3. Go to the data model screen



The screen will show both data sources as tables with all the columns as headings

To create the relationship either;

1. Drag **Inv** heading from the invoice data table and drop it onto the **Invoice Number** heading on the Data1 table



2. Go to manage relationships

3. Click new

4. Select the Invoice Number column from Data1 and select Inv column from Invoice Data

Manage relationships

Active

There are no relationships in this model.

Create relationship

Select tables and columns that are related.

Data1

Invoice Number	date	Ref Number	Address of Headquarters	Location	Customer
13676	29 August 2020	316	Redmond	Washington	Microsoft Corp.
14786	1 December 2020	210	Lake Forest	Illinois	Grainger (W.W.) Inc.
15896	5 February 2021	382	Greensboro	North Carolina	Qorvo

Invoice Data

Inv	Transaction	Purchased From
51678	4	Web
51789	4	Web
52677	4	Web

Cardinality: One to one (1:1)

Cross filter direction: Both

☒ Make this relationship active

☐ Assume referential integrity

OK Cancel

5. And click OK

6. Now the tables are related to each other and you will be able to use information from both in your visuals

7. To edit or delete a relationship go to manage relationship select the one you want and choose edit or delete

Manage relationships

Active

	From: Table (Column)	To: Table (Column)
☒	Invoice Data (Inv)	Data1 (Invoice Number)

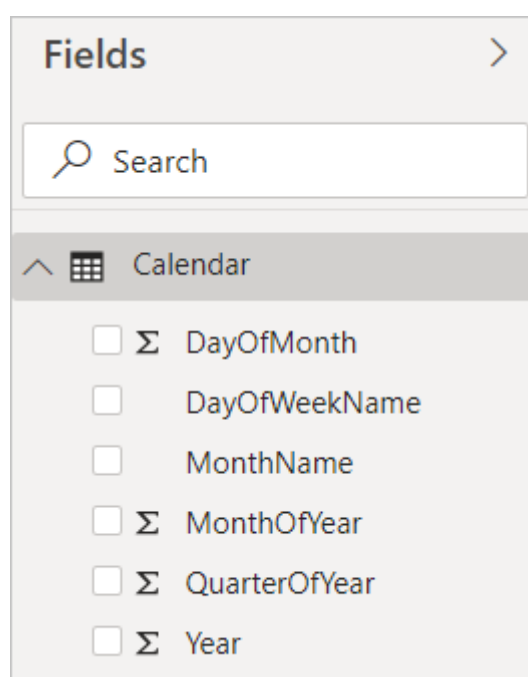
New... Autodetect... Edit... Delete

14 CALCULATED COLUMNS AND MEASURES

Sometimes you will need to create calculated columns as the information you need was not provided in the original file.

With calculated columns, you can add new data to a table already in your model. But instead of querying and loading values into your new column from a data source, you create a Data Analysis Expressions (DAX) formula that defines the column's values. In Power BI Desktop, calculated columns are created by using the new column feature in **Report** view, **Data** view, or **Model** view.

Calculated columns you create appear in the **Fields** list just like any other field, but they'll have a special icon showing its values are the result of a formula. You can name your columns whatever you want, and add them to a report visualization just like other fields.



Calculated columns calculate results by using DAX, a formula language meant to work with relational data like in Power BI Desktop. DAX includes a library of over 200 functions, operators, and constructs.

DAX formulas are similar to Excel formulas. In fact, DAX has many of the same functions as Excel. DAX functions, however, are meant to work over data interactively sliced or filtered in a report, like in Power BI Desktop. In Excel, you can have a different formula for each row in a table. In Power BI, when you create a DAX formula for a new column, it will calculate a result for every row in the table. Column values are recalculated as necessary, like when the underlying data is refreshed and values have changed.

Go to the Data Screen and select new column

File Home Help **Table tools**

Name

Structure

Mark as date table Calendars

Manage relationships Relationships

New measure Calculations

Quick measure Calculations

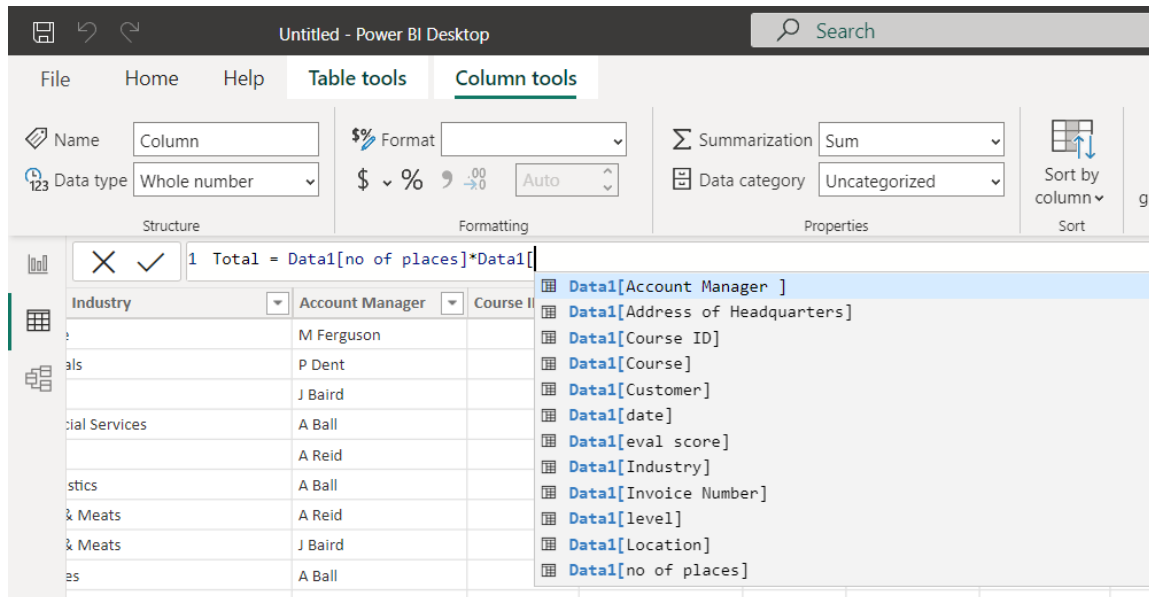
New column Calculations

New table

Industry	Account Manager	Course ID	Course	level
tems Software	M Ferguson	7	Forensic Investigation	Intro
ustrial Materials	P Dent	24	ethical Hacking	Advanced
niconductors	J Baird	8	ethical Hacking	Intro
ersified Financial Services	A Ball	7	Forensic Investigation	Intro
ultiUtilities	A Reid	3	Word	Intro
Freight & Logistics	A Ball	21	Access	Advanced
kgaged Foods & Meats	A Reid	15	Forensic Investigation	Intermediate
kgaged Foods & Meats	J Baird	3	Word	Intro
partment Stores	A Ball	24	ethical Hacking	Advanced
kgaged Foods & Meats	P Dent	15	Forensic Investigation	Intermediate
ernet Software & Services	K McCreery	15	Forensic Investigation	Intermediate
alth Care Facilities	K McCreery	15	Forensic Investigation	Intermediate
tems Software	K McCreery	12	PowerPoint	Intermediate

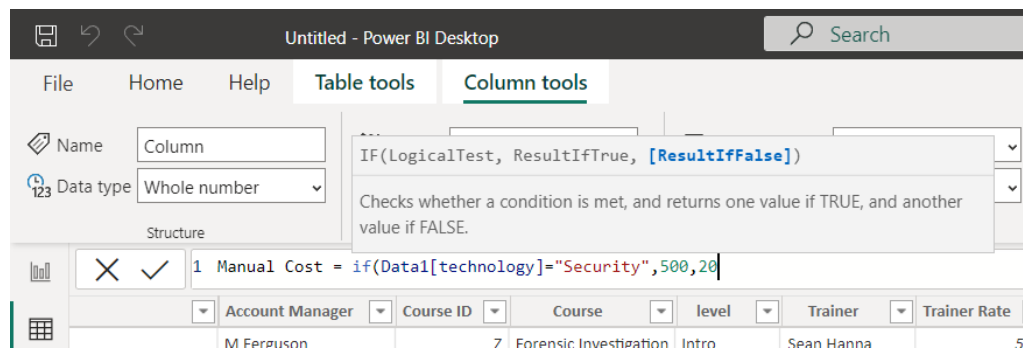
To work out the total we will,

1. Give the column a name
2. Type =
3. To add a column from your data set you need to include the table name and then the column name in square brackets e.g. Data1[no of places]



4. Use the * to multiple this column with another column
5. Final formula will be Total = Data1[no of places]*Data1[Price]
6. Select the ✓ to add the new column
7. The new Total column will be available to use in your visuals

8. You can also enter more complex formula to add an additional column
 - a. If statements IF(Logical test, what to say if true, what to say if false)



To learn more about DAX you can go to [DAX.GUIDE](https://dax.guide)

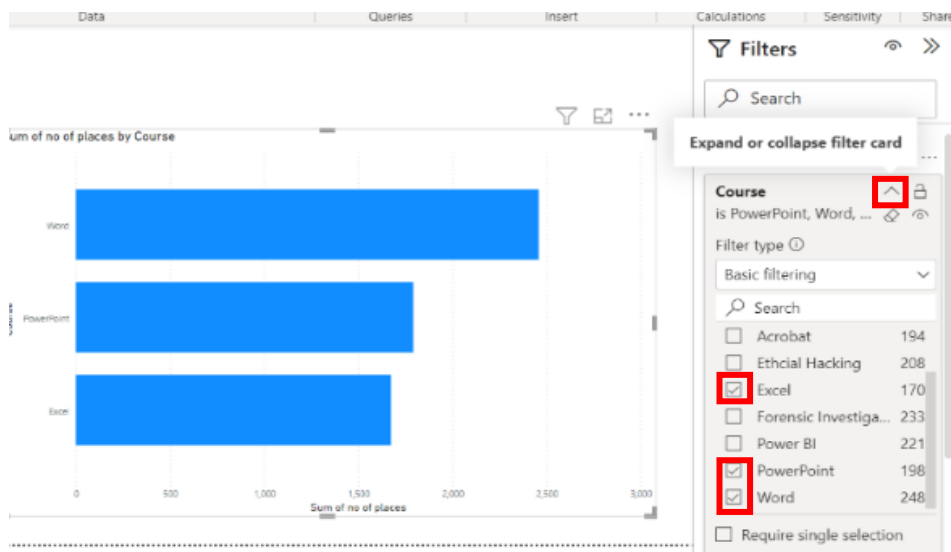
15 FILTERS

There are 4 different ways you can apply filters

- To the visual directly
- To the entire page
- To all pages
- By using slicers

To apply a filter to the visual select the filter pane and choose the filter you want to apply

In the example below we only want to see Excel, Word and PowerPoint courses



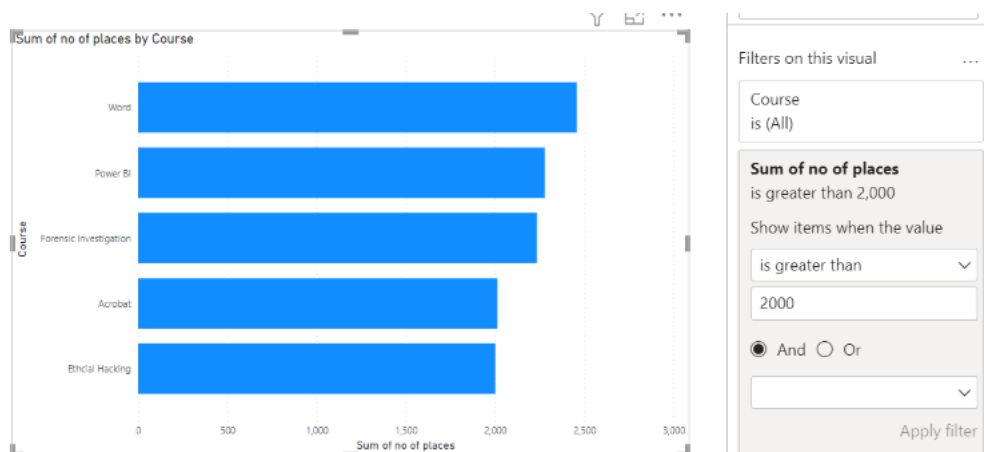
Select the arrow beside course to expand the options and tick the boxes beside the course you want to appear in the visualisation

Click apply filter and the chart will update

In the next example we only want to see the courses where the total number of places is above 2000

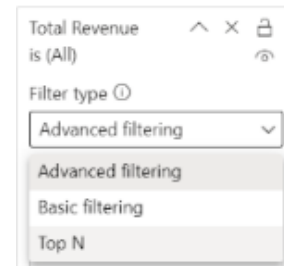
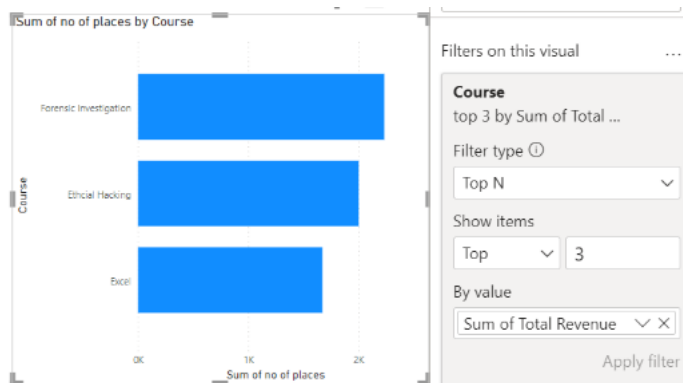
Select the arrow beside sum of no of places to expand the options and select is greater than and type 2000

Click apply filter and the chart will update

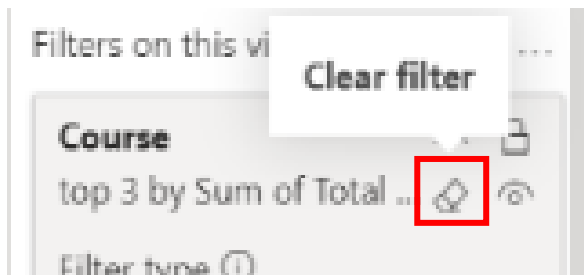


You can also have Top N filters that will show you the top or bottom number of items you choose based on a value field

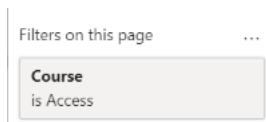
The chart below shows the top 3 courses by Total Revenue



You can remove filters by using the eraser icon



Filters for the whole page work the same way however you can just drag the relevant fields into the Filters on this page pane. This means all the visualisations will be updated based on that filter



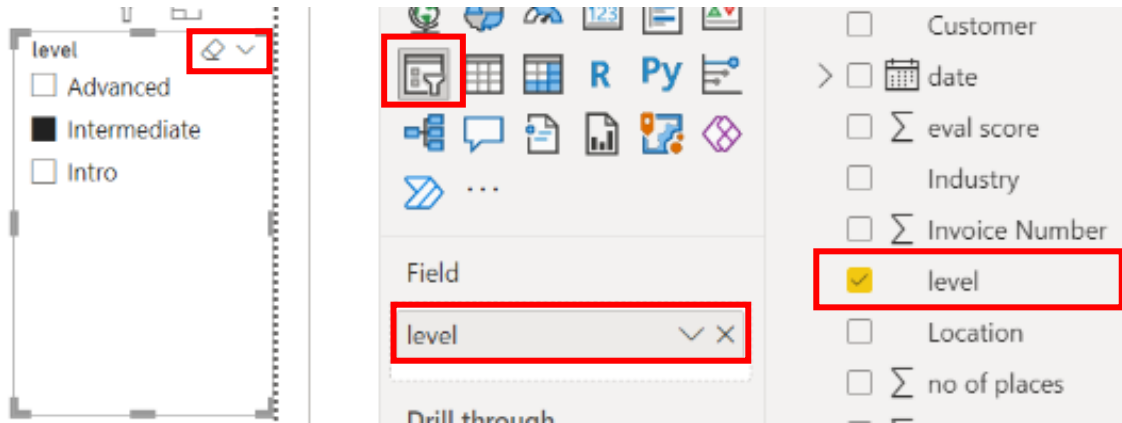
Filters on all pages will apply the selected filters across all pages in your report

15.1 SLICERS

Slicers are visual filters that you can place on your page

They will filter all visualisations on the page however you can use edit interactions to select the way they affect the visualisations or you can stop them from affecting certain visualisations

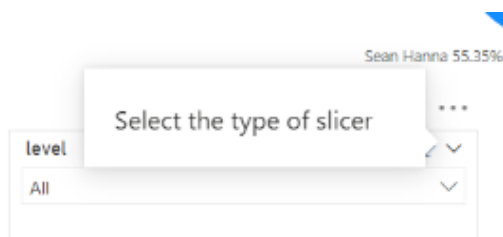
The example below is filtering all the visualisations on the page for only intermediate levels



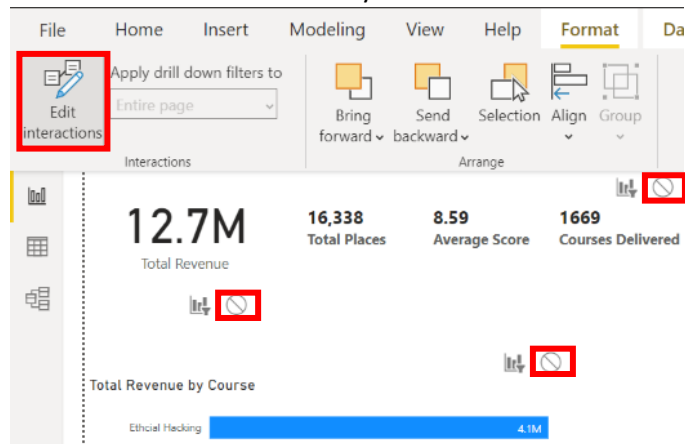
Select the Slicer icon, drag the relevant field into the field section

To clear the slicer choose the eraser icon

You can have a list slicer as shown above or a dropdown slicer as shown below



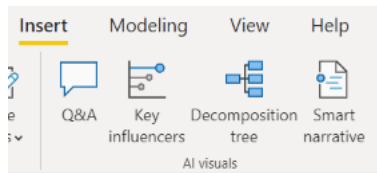
To edit how the slicer affects your visualisations select the slicer and go to Format, Edit Interactions



Then select the stop icon and the slicer will no longer update that particular visual

16 ADDITIONAL TOOLS

You can also insert AI Visuals from the insert menu



16.1 USE THE Q&A VISUAL

The **Q&A** feature in Power BI lets you explore your data in your own words by allowing you to ask natural language questions and then providing you with answers to those questions.

This ability to ask questions is valuable to you, as the report author, and to your report users. It gives you ideas for the type of visuals that you can display in your report and lets you quickly add those visuals. Additionally, it gives your report users an effective tool that they can use to get quick answers to their questions about the data, independently. This self-help aspect to Power BI saves time for everyone involved.

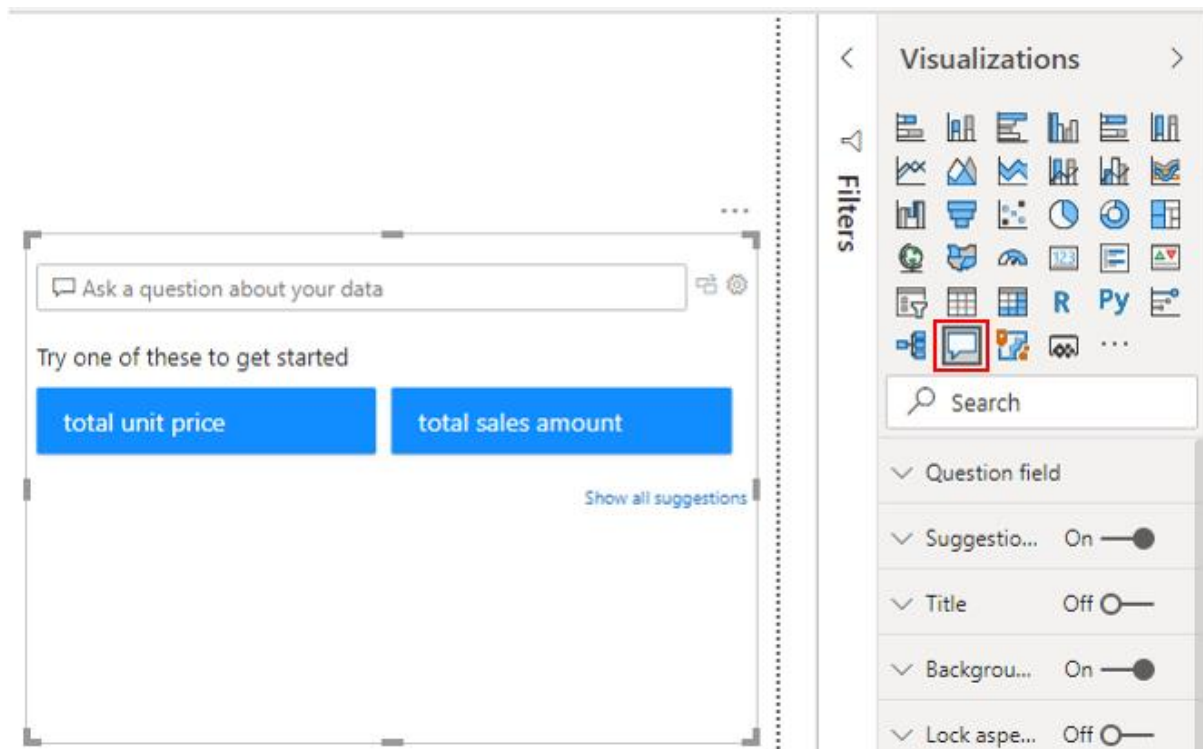
Power BI records all questions that are asked, and you can use this information to set up the **Q&A** feature to be more effective. When the **Q&A** feature answers so many questions, you'll have fewer people turning to you for those answers.

Consider a situation where you've created a report for the Supply Chain team, and now the team members have questions about various views or insights that they are interested in. You have become inundated with questions and don't have time to address each one individually.

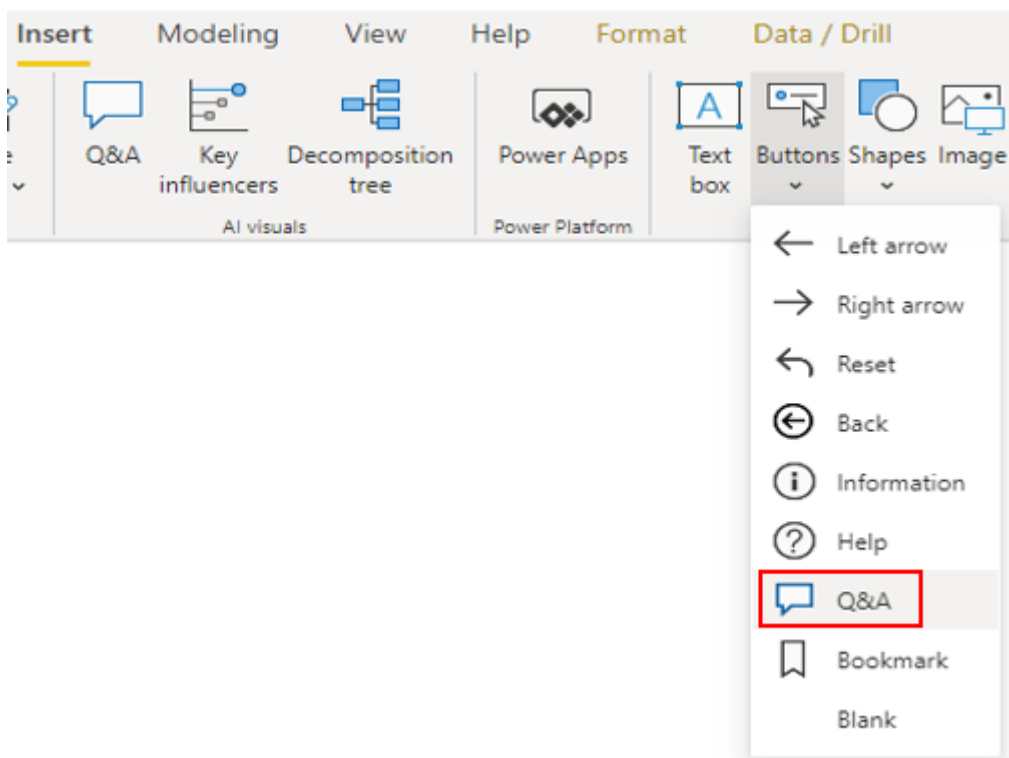
Consequently, you have decided to implement the **Q&A** feature so that users can ask questions and get answers by themselves.

Add the Q&A visual to your report canvas

To get access to the **Q&A** feature, you need to add the **Q&A** visual to your report. You can double-click anywhere on the canvas, and the visual should appear. Alternatively, you can select the **Q&A** icon on the **Visualizations** pane.

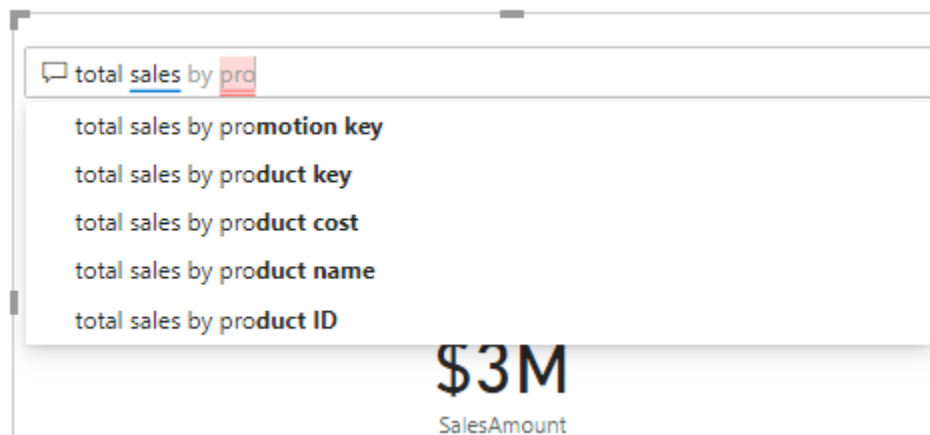


The **Q&A** feature is also available as a button, which is a useful option if you want to save space on your report canvas.



When the **Q&A** visual or button is added to your report, you can reposition and resize it. You can also customize the formatting in the same way that you would for any other type of visual or button.

You can start asking questions immediately by selecting one of the suggested questions or by entering a question into the question box. As you type, Power BI will automatically display suggestions to help you complete your question.



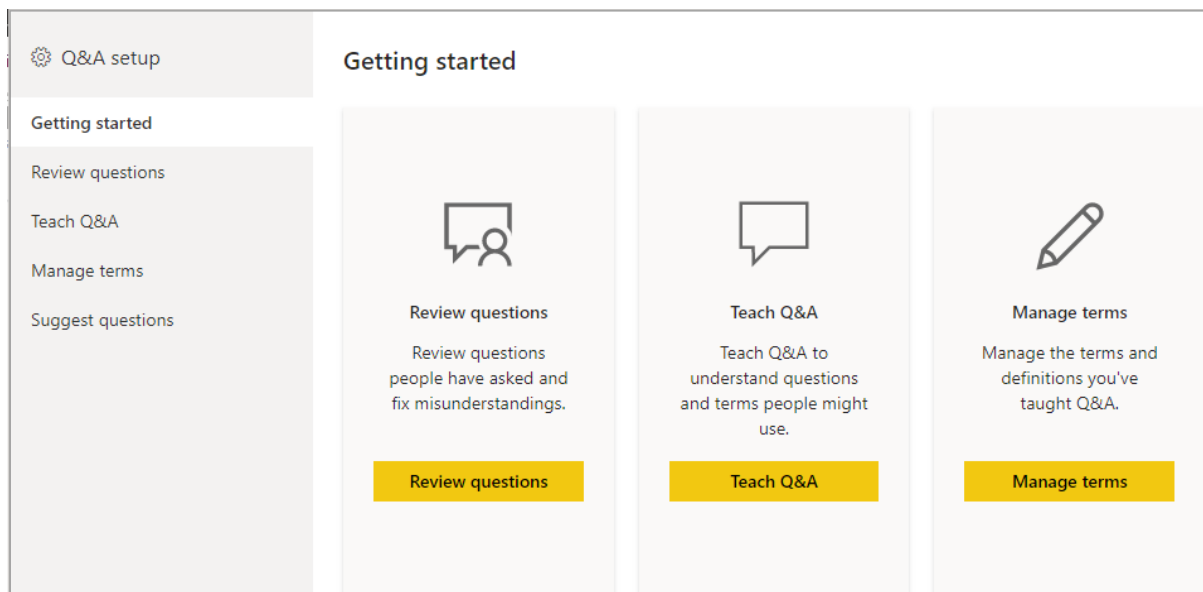
Set up the Q&A feature

When you have added the **Q&A** visual to your report, you can set up the underlying Q&A feature so that it improves in answering questions about your data. Basically, you will teach the **Q&A** feature to better understand people. This setup can be useful from the outset so that you can get the visual ready for active use. However, setup does not stop at that point; you can proactively monitor and review the questions that are coming through from users, and then you can address misunderstandings or common typos. You can also manage the key terms that are associated with your data, so you can add a library of synonyms that might be entered by different users across the organization when they are asking questions about the data. You can constantly calibrate the **Q&A** feature so that it provides better answers to your organization's questions.

In this example, you receive feedback from users saying that they can't get data on sales by country. To assess the problem, you enter **sales by country** into the question box. The visual does not update; it does not answer your question. The following image shows that the word *country* is underlined in red. When a red underline occurs, Power BI is telling you that it does not understand this term. Knowing that the word *country* is not used in your dataset, you decide to use the term *region* instead and ultimately discover why the question is not being answered. Accordingly, you realize that you need to teach Power BI what you mean by adding a new term to its thesaurus.



Select the settings icon to the right of the question box to open the **Q&A setup** window. Then, select the **Teach Q&A** option.



Enter your question again, and then select the **Submit** button. In the **Define the terms Q&A didn't understand** section that displays, enter your alternative term or synonym. In this case, you will enter **region**. The following image shows that Power BI displays a preview result so that you can see if this new term will return the results that you are looking for. If this result is correct, select **Save**.

Teach Q&A

Teach Q&A to understand questions and terms people might use.

Enter a question about your data using everyday language

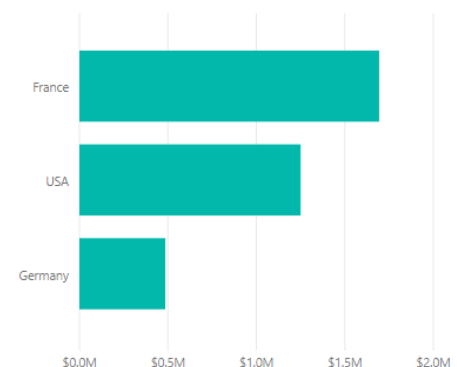
Define the terms Q&A didn't understand ⓘ

Country

Country refers to

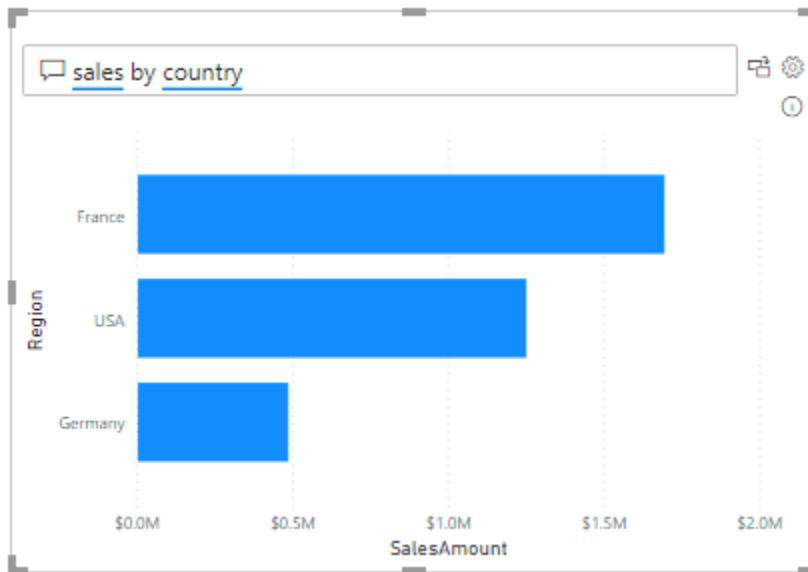
Preview your result

Show region that sale data by region are in and total sales amount



Save

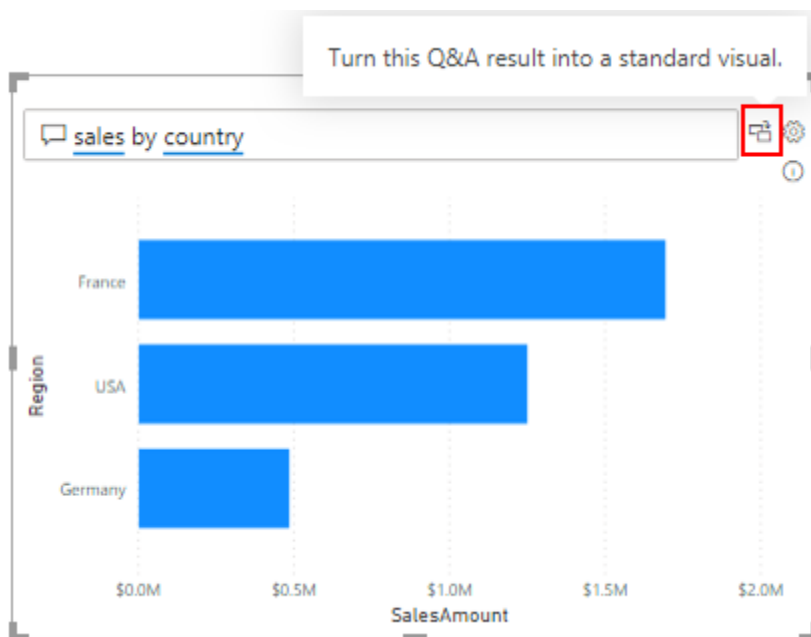
Now, when users search for sales by country, Power BI will know that they really mean sales by region and will automatically display the associated data in the visual.



Use the Q&A feature to build visuals

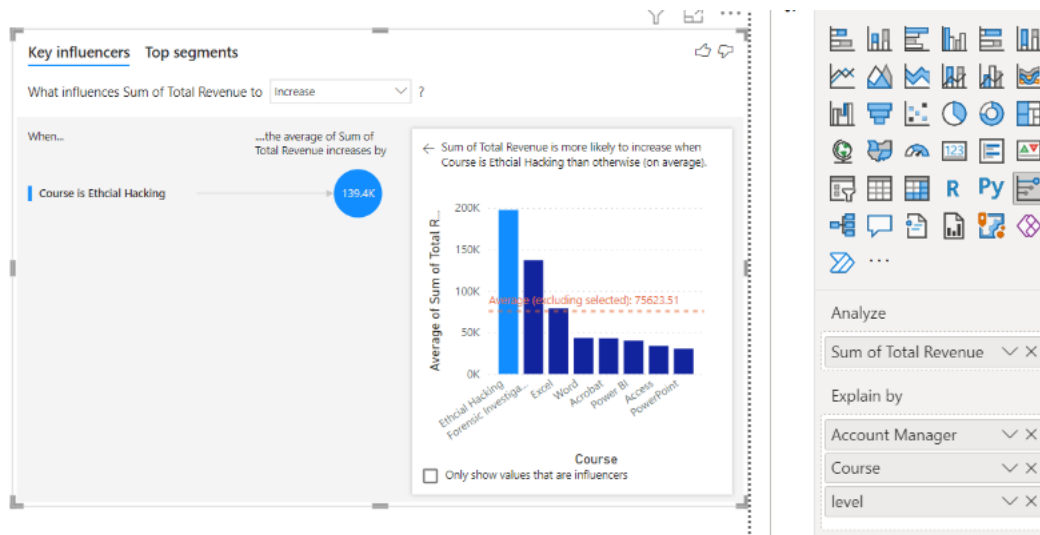
When Power BI answers a question, and you find the visual result to be engaging or helpful, you can add it as a standard visual to your report.

To turn a **Q&A** result into a standard visual, select the icon next to the question box.



16.2 KEY INFLUENCERS VISUAL

The **Key influencers** visual helps you understand the factors that are affecting a specific metric. It analyses your data for you, ranks the factors that matter, and then displays those factors as key influencers. The visual also helps you to contrast the relative importance of these factors, meaning that you can build your visuals while understanding what factors impact those visuals and why the visuals appear the way that they do.

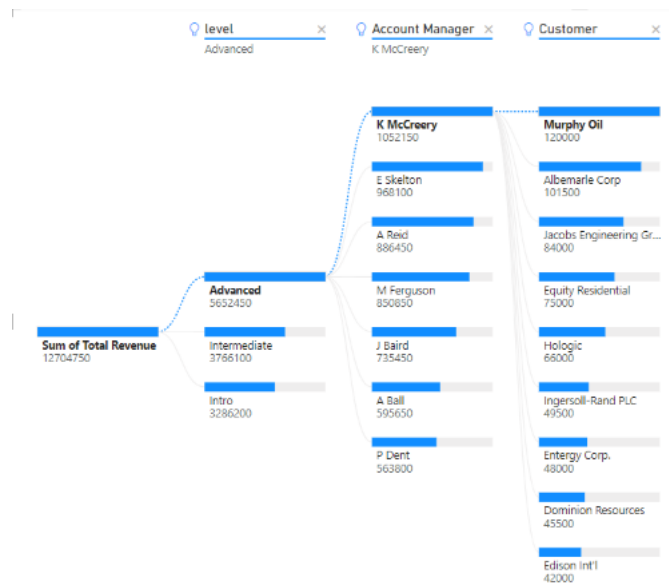


You can now use the **What influences...** drop-down list to see what caused the data to decrease or increase. Ethical hacking courses increase total revenue, PowerPoint courses decrease it

16.3 DECOMPOSITION TREE

The **Decomposition Tree** visual automatically aggregates your data and lets you drill down into your dimensions so that you can view your data across multiple dimensions. Because **Decomposition Tree** is an AI visual, you can use it for improvised exploration and conducting root cause analysis.

In this example we want to see what is affecting our total revenue broken by level, account manager and customer



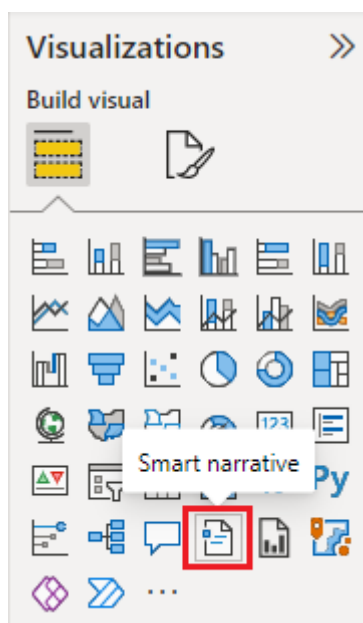
Here we see Revenue is highest when K McCreery is selling Advanced courses to Murphy Oil

16.4 SMART NARRATIVE

the smart narrative visualization helps you quickly summarize visuals and reports. It provides relevant innovative insights that you can customize.

Use smart narrative summaries in your reports to address key takeaways, to point out trends, and to edit the language and format for a specific audience. In PowerPoint, instead of pasting a screenshot of your report's key takeaways, you can add narratives that are updated with every refresh. Your audience can use the summaries to understand the data, get to key points faster, and explain the data to others.

Select the **Smart narrative** icon in the **Visualizations** pane to automatically generate a summary.



The Smart narrative is based on all the visualisations on the page in the example here it shows us Ethical hacking had the highest total revenue

You can also type into the smart narrative and use values that you create from your data

At 4149750, Ethical Hacking had the highest Total Revenue and was 548.20% higher than PowerPoint, which had the lowest Total Revenue at 640200.

Ethical Hacking accounted for 32.66% of Total Revenue.

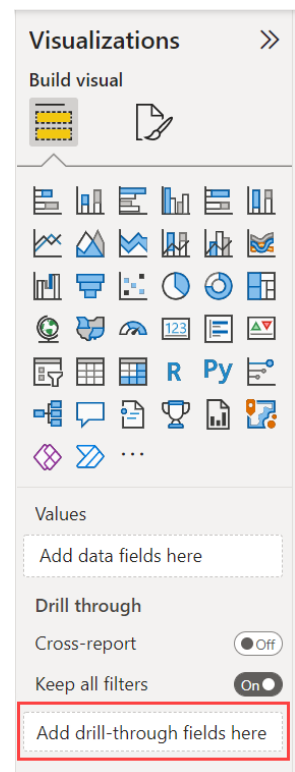
Across all 8 Course, Total Revenue ranged from 640200 to 4149750.

17 DRILL THROUGH

With *drillthrough* in Power BI reports, you can create a destination *target* page in your report that focuses on a specific entity such as a supplier, customer, or manufacturer. When your report readers right-click a data point in other *source* report pages, they drill through to the target page to get details that are filtered to that context. You can set up drillthrough in your reports in Power BI Desktop or the Power BI service.

17.1 SET UP THE DRILLTHROUGH TARGET PAGE

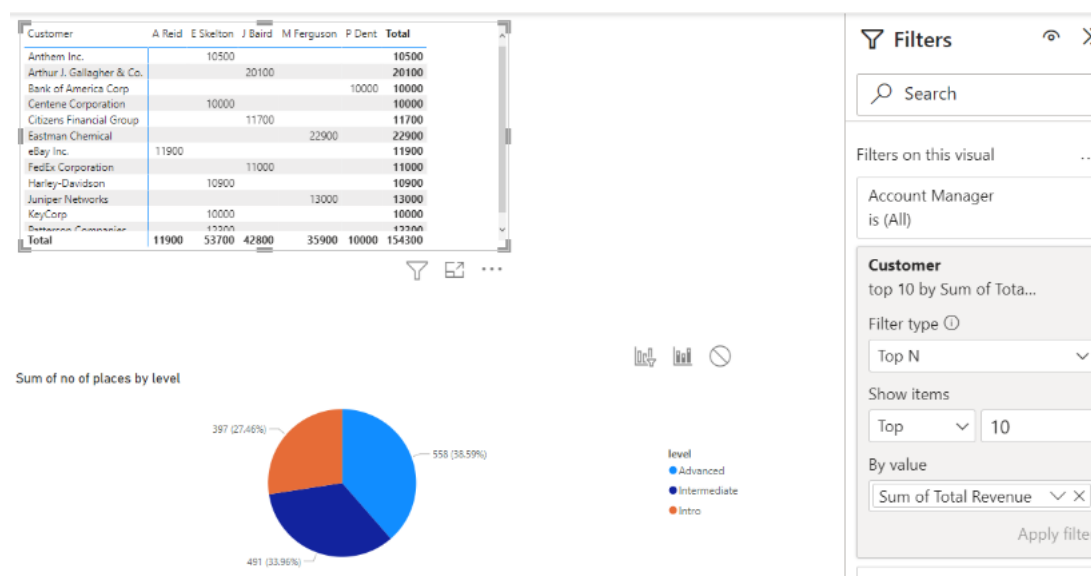
1. To set up drillthrough, create a *target report page* that has the visuals you want for the type of entity that you're going to provide drillthrough for.
2. Then, on that drillthrough target page, in the **Build visual** section of the **Visualizations** pane, drag the field for which you want to enable drillthrough into the **Drill through** well.



When you add a field to the **Drillthrough filters**, Power BI automatically creates a *back* button visual. That visual becomes a button in published reports. Users who view your report in the Power BI service use this button on the target page to get back to the original source report page from which they came.



In the example below we have set up a drill through page to show the top 10 customers by account manager and the revenue they generate along with a breakdown of places by level so that when someone drills through on a course they see this page update for that course



17.2 PASS ALL FILTERS IN DRILLTHROUGH

You can set up drillthrough to pass all applied filters to the drillthrough target page. For example, you can select only a certain category of products and the visuals filtered to that category, and then select drillthrough on a source. You might be interested in what the drillthrough target page would look like with all those filters applied.

To keep all applied filters, go to the destination page. In the **Drillthrough** section of the **Visualizations** pane, set **Keep all filters** to **On**.

When you then drill through on a visual on a source page, the temporary filters that you applied to the source visual are also applied to the drillthrough target page. In the **Drillthrough** section of the **Visualization** pane, those transient filters are shown in italics.

