

Get & Transform Power Query Workshop for Audit, Tax and Advisory Professionals

An Introduction

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Contents

Introduction	5
Power Query: Getting & Transforming Your Data	6
Getting Started: Importing Data	7
Getting Started: Transforming Data	9
Getting Started: Loading Data	13
Appending Files	14
Extracting from a Folder	16
Unpivoting Data	20
Relationship between Power Query and Power Pivot	23
(Data) Model Building	24
Merging Queries	28
Extracting from a Website	34
Introduction to M	20
Creating a Calendar – Step 1: Creating Parameters	
Creating a Calendar – Step 1: Creating Parameters Creating a Calendar – Step 2: Create the fnGetParameter Function	
Creating a Calendar – Step 1: Creating Parameters Creating a Calendar – Step 2: Create the fnGetParameter Function Creating a Calendar – Step 3: Build Framework	
Creating a Calendar – Step 1: Creating Parameters Creating a Calendar – Step 2: Create the fnGetParameter Function Creating a Calendar – Step 3: Build Framework Creating a Calendar – Step 4: Adding More Date Columns	
Creating a Calendar – Step 1: Creating Parameters Creating a Calendar – Step 2: Create the fnGetParameter Function Creating a Calendar – Step 3: Build Framework Creating a Calendar – Step 4: Adding More Date Columns More on Parameters	
Creating a Calendar – Step 1: Creating Parameters Creating a Calendar – Step 2: Create the fnGetParameter Function Creating a Calendar – Step 3: Build Framework Creating a Calendar – Step 4: Adding More Date Columns More on Parameters Conditional Columns	
Creating a Calendar – Step 1: Creating Parameters Creating a Calendar – Step 2: Create the fnGetParameter Function Creating a Calendar – Step 3: Build Framework Creating a Calendar – Step 4: Adding More Date Columns More on Parameters Conditional Columns Power Query Parameters	
Creating a Calendar – Step 1: Creating Parameters Creating a Calendar – Step 2: Create the fnGetParameter Function Creating a Calendar – Step 3: Build Framework Creating a Calendar – Step 3: Build Framework Creating a Calendar – Step 4: Adding More Date Columns More on Parameters. Conditional Columns Power Query Parameters. Using Defined Names as Parameters.	
Creating a Calendar – Step 1: Creating Parameters Creating a Calendar – Step 2: Create the fnGetParameter Function Creating a Calendar – Step 3: Build Framework Creating a Calendar – Step 4: Adding More Date Columns More on Parameters Conditional Columns Power Query Parameters Using Defined Names as Parameters Using Parameters as Locations	
Creating a Calendar – Step 1: Creating Parameters Creating a Calendar – Step 2: Create the fnGetParameter Function Creating a Calendar – Step 3: Build Framework Creating a Calendar – Step 4: Adding More Date Columns More on Parameters More on Parameters Conditional Columns Power Query Parameters Using Defined Names as Parameters Using Parameters as Locations Importing from PDF Files	
Creating a Calendar – Step 1: Creating Parameters Creating a Calendar – Step 2: Create the fnGetParameter Function Creating a Calendar – Step 3: Build Framework Creating a Calendar – Step 4: Adding More Date Columns More on Parameters Conditional Columns Power Query Parameters Using Defined Names as Parameters Using Parameters as Locations Importing from PDF Files Transposing Data	





Introduction

This document supports the 'Get & Transform Power Query Workshop for Audit, Tax and Advisory Professionals'. In particular, this document focuses on the artist formerly known as Power Query, now known as Get & Transform.

This session focuses on said Power Query in its Excel form, where I look at the ease with which I can extract, clean and manipulate data from a variety of sources. It is known as an "Extract, Transform and Load" tool – or "ETL" for short.

Power Query is also available in Power BI. Changes and improvements generally appear in Power BI before Excel, and there are more data connectors available. Since the layout of Power BI is often updated, you may find that some screenshots don't match your screen exactly, but all the functionality described here will be available.

Data is one of the most valuable assets of any business, and Power Query is an invaluable tool to turn your data into information. Let's get started.



Power Query: Getting & Transforming Your Data

Regular users of Excel are well aware of the possibilities to manipulate and present data that has come from a variety of sources. Getting that data ready for each solution can be time consuming: complex solutions can require VBA or SQL expertise, and simple solutions often involve repetitive tasks before the data is ready to be uploaded to PivotTables.

Enter Power Query (alternatively known now as "Get & Transform"), which has been designed for Excel users to enable the rapid uploading and cleaning of data without needing to turn (in)to VBA and SQL experts.

Power Query is a free add-in ETL (Extract, Transform and Load) tool for users of Excel 2010 (Professional Plus with Software Assurance version only) and 2013, where it has its own tab on the Ribbon, and is now fully integrated into Excel 2016 onwards and Office 365, where it may be found on the data tab under 'Get & Transform'.

As shown in Excel 365, Power Query is able to upload from many sources:

File	Home In:	sert Draw	Page Lay	out	Formulas	Data	Review
Get Data ~	From Text/C From Web	SV 🕞 Rece Existi	nt Sources ing Connecti	ions	Refresh All ~	Queries & Properties Edit Links	Connecti
	From <u>File</u>		>		Quer	ies & Conn	ections
	From Databas	e	2		-		2
	From <u>A</u> zure		>		C		D
यी	From Power E	l (sumproduct.	com)				
	From Online S	ervices	>	•••	From <u>T</u> able/	/Range	
	From Other S	ources	>		From <u>W</u> eb		
興	Combine Que	ries	>		From <u>M</u> icro	soft Quer	у
	aunch Power Que Data Source <u>S</u> etti	ery Editor ngs	-	S	From Share	Point <u>L</u> ist	
E 0	Query Options				From <u>O</u> Data	Feed	
10 11				2	From <u>H</u> adoo	op File (H	DFS)
12				RA	From <u>Active</u>	Director	y
13				P	From Micro	soft <u>E</u> xch	ange
14 15				2	From ODBC		
16				2	From OLED	B	
47	, Р Туре he	re to search			Blank Query		



Having extracted the data from the appropriate source (more on the details of this process later), the transformation can take place – cleaning away any unrequired detail, merging where appropriate (all without the erstwhile **VLOOKUP**), and enhancing by calculating and adding new columns. There is even a button to unpivot data!

		Transpose	Data Type: Any 👻	1. 42 R	eplace Values 🕶 🏪 Unpivot Columns 💌
Group By	Use First Row as Headers *	Count Rows	Detect Data Type	1 (1) (1) (1) (1) (1) (1) (1) (1) (1) (1	Unpivot Columns Unpivot Other Columns
	Table	2			Unpivot Only Selected Columns

Whilst the majority of transformations can be done with no formulae or coding, each step is stored in **M**, the language behind Power Query. For the more ambitious user, **M** may be used to refine and build on what Power Query creates automatically.

The final step for the ETL tool is to load - to Excel tables, Power Pivot, Power BI – or else just store a query for use by other queries, *i.e.* a building block that may be re-used. Since everything is recorded in \mathbf{M} , you may simply reload to the same destination – simply refresh.

Please be aware that Microsoft often releases updates, usually on a monthly basis – try searching 'updates for Get & Transform in Excel' to see the latest updates.

Getting Started: Importing Data

The best way to get to grips with a tool like Power Query is to start with a simple task. Excel users may often need to take data from **CSV** (comma separated values) files and transform it ready for analysis. Power Query has been designed to assist with this, so let's see how easy it can be.

Starting with a new workbook, I locate the 'Get & Transform Data' section on the Data tab:



For this example, I am using the 'From File' option, and choosing 'From Text/CSV':





I browse to the location of a simple expense **CSV** file.

	« SUI	MPRODUCT > COLES > Power BI Etc		~	・ ひ P Search Power BI Etc
Irganise 🔹 New	folder	5			
 Downloads Music Pictures Videos 	^	Name Power Pivot Blogs Derek_expenses.csv Mary_Expenses.csv	Status © © ©	^	Name,Date,expense code,amount Derek Stand,13-05-15,Petrol,50.00 ,13-05-15,Hotel,130.00 ,13-05-15,Food,43.16 ,14-05-15,Food,12.45 .14-05-15,Food,10.50
Uindows (C:)	~	< <u> </u>	3		
Fil	e nam	e: Derek expenses.csv			 Text Files (*.prn;*.txt;*.csv)

I select the file using the Import button.

-			Delimiter	Data Type Detection		
65001: Unic	ode (UTF-8)	*	Comma	Based on first 200 rows		
Name	Date	expense code	amount	10.		
Derek Stand	13/05/2015	Petrol	50			
	13/05/2015	Hotel	130			
	13/05/2015	Food	43.16			
	14/05/2015	Food	12.45			
	14/05/2015	Food	10.5			

This screen allows me to specify properties of the **CSV** file that I am importing from. The 'Data Type Detection' allows me to choose whether the algorithms Power Query uses to determine the data types are used, and whether to read the whole dataset. The default is to base the types on the first 200 rows, which is enough for this short example. Whilst I have the option to load from this point, I'd always recommend the 'Transform Data' option to avoid any nasty surprises.

 \Box \times



×	√ fx - Table.Tr	ansformColumnTypes(#"Pro	moted Headers",{{"Name",	<pre>type text}, {"Date", typ</pre>	e date}, {"expense code", type text}, v	Query Settings	×
	A ^B _C Name	🔲 Date 💌	A ^B _C expense code	A ^B _C amount			
1	Derek Stand	13/05/2015	Petrol	50.00		A PROPERTIES	
2		13/05/2015	Hotel	130.00		Darak aveances	
3		13/05/2015	Food	43.16		Derek_expenses	
4		14/05/2015	Food	12.45		All Properties	
5		14/05/2015	Food	10.50		A APPLIED STEPS	
						Source	\$
						Promoted Headers	4
						× Changed Type	

Getting Started: Transforming Data

The Power Query Editor screen shows the table of data as it will be uploaded. In the 'Query Settings', the name of the query appears under PROPERTIES and under 'APPLIED STEPS', where I can see the steps that Power Query has taken automatically. The source has been identified, the header column names have been assumed and the 'Changed Type' step sets the detected type for each column. The **M** code for 'Changed Type' is:

=Table.TransformColumnTypes(#"Promoted Headers",{{"Name", type text}, {"Date", type date}, {"expense code", type text}, {"amount", type number}})

It is essentially a list of column names and their assigned data types based upon the data that Power Query has analysed:

- Name is type text
- **Date** is type date
- expense code is type text
- **amount** is number.

In this case, all the assumptions look good so I may accept Power Query's automatic assignment of data types.

I can make any changes to the data, such as changing column names or removing columns. Selecting a column and viewing the 'Transform' tab reveals buttons for many of the usual transformations.

File Home Transform Ad	dd Column	View							~
Group Use First Row By as Headers + II- Count Rows Table	Data Type: Te Detect Da	xt ▼ ¹ ₄₋₂ Repla ta Type ↓ Fill ▼ ∰ _{co} Pivot Any	ce Values = 🦓 Unpivot Columns 🐺 Move = Column 📋 Convert to List Column	Split Column Format Street Text Column	Trigonometry *	Date Time Duration	Expand Aggregate Extract Values Structured Column		
Queries [1]	<	× v	fx - Table.TransformCo	olumnTypes(#"Promoted Headers",	{{"Name", type text}, {"Date", type d	late}, {"expense code	", type text}, 🗸 🗸	Ouerv Settings	×
Derek_expenses		ABC Name	- Date	▼ A ^B _C expense code	▼ A ^B _C amount ▼				
		1 Derek Star	d	13/05/2015 Petrol	50.00			PROPERTIES	
		2		13/05/2015 Hotel	130.00			Derek evenencer	
		3		13/05/2015 Food	43.16			Derek_expenses	
		4		14/05/2015 Food	12.45			All Properties	
		5		14/05/2015 Food	10.50			▲ APPLIED STEPS	
								Source Promoted Headers	0 0
								➤ Changed Type	



I can double-click on **expense code** and rename it to **Expense Code**. This creates a new step 'Renamed Columns':

X	√ fx = Table	e.RenameColumns(#"Changed Ty	pe",{{"expense code", "E	xpense Code"}})	~	Query Settings	×
	A ^B C Name	💌 🖬 Date 💌	A ^B _C Expense Code ▼	A ^B _C amount ▼			
1	Derek Stand	13/05/2015	Petrol	50.00		Name	
2		13/05/2015	Hotel	130.00		Deale	
3		13/05/2015	Food	43.16		Derek_expenses	
4		14/05/2015	Food	12.45		All Properties	
5		14/05/2015	Food	10.50		APPLIED STEPS	
						Source	\$
						Promoted Headers	4
						Changed Type	
						➤ Renamed Columns	

The **M** code is:

= Table.RenameColumns(#"Changed Type",{{"expense code", "Expense Code"}})

If I rename **amount** to **Amount**, Power Query recognises that I am doing and adds the change to the existing 'Changed Type' step:

= Table.RenameColumns(#"Changed Type",{{"expense code", "Expense Code"}, {"amount", "Amount"}})

A more complex step is to make the **Name** data appear on each row. There is a 'Fill Down' option available if I right-click on the Name column, but it doesn't seem to do anything!



In order to use the 'Fill Down' functionality, the 'empty' **Name** cells that are to be populated must be set to *null*, but currently they are blank. I need to replace the blanks with *null* so that I can fill down. The option to 'Replace Values...' is also on the right-click menu. The ellipsis (...) indicates that a window will appear:



	×
Replace Values	
Replace one value with another in the selected columns.	
Value To Find	
Replace With	
null	
Advanced options	
Match entire cell contents	
Replace using special characters	
Insert special character 💌	
	OK Cancel

I opt to replace blanks (which I just leave empty) with *null*. I don't need the 'Advanced options' here.

🗐 🗸 A ^B C Name	💌 🛅 Date	-	A ^B C Expense Code	A ^B _C Amount		
1 Derek Stand		13/05/2015	Petrol	50.00	PROPERTIES	
2	null	13/05/2015	Hotel	130.00	Name Darak evenesses	
3	null	13/05/2015	Food	43.16	Derek_expenses	
4	null	14/05/2015	Food	12.45	All Properties	
5	null	14/05/2015	Food	10.50	APPLIED STEPS	
					Source	4
					Promoted Headers	rs 🕅
					Changed Type	
					Renamed Column	15
					Elle 4 December 201	
					Filled Down	

The 'Filled Down' step is from my failed attempt before I set the values to *null*. I will delete this shortly, but first I 'Fill Down' again.

The steps are generated in the right-hand pane, and we are ready to load to Excel using the 'Close and Load' button on the 'File' tab. The uploaded table is shown below, and the Workbook query window displays the query that generated the data, so that it can be updated and / or refreshed as required. The 'TABLE TOOLS' tab opens automatically ready for use in the Excel workbook:

×	√ fx = Table.	illDown(#"Replaced Value"	,{ <mark>"Name"</mark> })		~	Query Settings	×
	A ^B C Name	Date 💌	A ^B _C Expense Code	A ^B _C Amount			
1	Derek Stand	13/05/2015	Petrol	50.00		PROPERTIES	
2	Derek Stand	13/05/2015	Hotel	130.00		Derek owneerses	
3	Derek Stand	13/05/2015	Food	43.16		expenses	
4	Derek Stand	14/05/2015	Food	12.45		All Properties	
5	Derek Stand	14/05/2015	Food	10.50		A APPLIED STEPS	
						Source Promoted Headers Changed Type Renamed Columns Filled Down Renalscerd Value	0 0
						Kepiaceu Value	52
						A THICK DOWIT	



This time, the 'Fill Down' is successful. I can delete the first 'Filled Down' step now. I can select or hover over 'Filled Down', and click on the delete cross that appears next to it:

Source	-0
Promoted Headers	-0
Changed Type	
Renamed Columns	
× Filled Down	
Replaced Value	-0
× Filled Down1	

I am prompted to confirm my action:

 \times

Cancel

Delete Step

Are you sure you want to delete this step? Deleting this step may affect subsequent steps, which could cause your query to break.

Delete

Power Query has been improved over time, and copes well with deleting intermediate steps now. Previous versions required me to manually change references to previous steps, but this is now automated. If I am at all concerned, I can take a copy of my query before I proceed (more on this later). In this case, I am happy to proceed:

X	$\sqrt{f_x} = Tab$	le.FillDown(#"Replaced Value"	,{"Name"})		✓ Query Settings	>
	A ^B _C Name	💌 🧰 Date 💌	A ^B C Expense Code	▼ A ^B _C Amount ▼		
1	Derek Stand	13/05/2015	Petrol	50.00	PROPERTIES Name	
2	Derek Stand	13/05/2015	Hotel	130.00	Paraly averages	
3	Derek Stand	13/05/2015	Food	43.16	Delek_expenses	
4	Derek Stand	14/05/2015	Food	12.45	All Properties	
5	Derek Stand	14/05/2015	Food	10.50	4 APPLIED STEPS	
					Source Promoted Headers Changed Type Renamed Columns Replaced Value × Filled Down1	0 0 0



Getting Started: Loading Data

Now I am happy with the data, I can use the 'Close & Load' option on the Home tab to load the data to Excel:

File	Home	Transform
Close & Load •	Refresh Preview •	Properties Advanced Edito Manage •
Close	e & Load e & Load To 	
Save yo close th specify	ur changes to e Query Edito where to load	this query, r window, and the results.

Choosing 'Close & Load' will load my query into Excel as a Table in a new sheet. As the help message implies, choosing 'Close & Load To...' will allow me to add further specifications into a dialog. More on this later.

I am happy to load the data into a new sheet:

File	Home Insert	Draw Page Lay	out Formulas Data Re	eview View De	veloper Add-ins	Help Power Piv	ot Table Design	Query		Comments	음 Share
Table N Derek	ame: Surr expenses Ren size Table Con	narize with PivotTable ove Duplicates ert to Range	Insert Slicer	en in Browser	leader Row First Co otal Row Last Co landed Rows Banded	elumn 🗹 Filter E elumn d Columns	lutton				
Pro	perties	Tools	External lable	Data	Table Style	Options			Table Styles		^
A1	*	$\times \checkmark f_x$	Name								*
	А	В	С	D	E	F	G	Н	1 -	Queries & Connections	* ×
1	Name	. Date	Expense Code	Amount 🗉						Queries Connections	
2	Derek Star	d 13-05-15	Petrol	50.00						1 query	
3	Derek Star	d 13-05-15	i Hotel	130.00						Derek_expenses	B
4	Derek Star	d 13-05-15	Food	43.16						5 rows loaded.	
5	Derek Star	d 14-05-15	i Food	12.45							
6	Derek Star	d 14-05-15	Food	10.50							
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17	Derek_exp	nses Sheet1	(+)			4			•		

The sheet has the same name as the query, and my Table appears, and is given the same name as the query (with any spaces converted to underscores). The query that created the table appears in the 'Queries and Connections' pane. Refreshing this query ensures that it is extracting, transforming and loading the latest data source. The original **CSV** file is not changed by any of the steps I have created.

Let's look at appending more data...



Appending Files

Whilst it is possible to extract multiple **CSV** (comma separated values) files at the same time (more on this later), imagine a scenario where similar files appear at intervals and need to be added to a table.

In the same workbook, I repeat the process to extract data from a **CSV** file, and use the same steps to transform the data. This time I have extracted Mary's data:

Queries [2]	\times \checkmark f_x - Table.F	<pre>illDown(#"Replaced Value",{"Name"})</pre>		~	Query Settings	×
Mary Departures	A ^B _C Name	Date A ^B C Expense Code	✓ A ^B _C Amount			
LIII Waiy_expenses	1 Mary Wells	11/05/2015 Petrol	40.00		* PROPERTIES	
	2 Mary Wells	11/05/2015 Hotel	210.00		Man	
	3 Mary Wells	11/05/2015 Food	39.00		Mary_copenses	
	4 Mary Wells	12/05/2015 Food	12.45		All Properties	
	5 Mary Wells	12/05/2015 Sundries	11.12		A APPLIED STEPS	
	6 Mary Wells	20/05/2015 Stationary	5.00		Course	
					Promoted Headers Changed Type Renamed Columns Replaced Value	0 0 0

I want to add this data to Derek's data. I can do this by appending this query to Derek's query. On the Home tab there is a Combine section where there is an 'Append Queries' dropdown:

ile Home Transform A	dd Column	View										
Refresh Preview - Manage -	Choose R Columns * Co	temove	Keep Remove Rows * Rows *		Split Group	Data Type: Text • Use First Row a 1,2 Replace Values	Appe	Merge	Queries d Queries	Manage Parameters *	Data source settings	New Source *
duely	manage co	AMILIA S	Reduce Rows	3011		A	ppend this qu	ery to anothe	er query	Parameters	Data Sources	rvew Query
			The second se			in	this workhoo	1 C				
Queries [2]	<	×	√ fx = 1	Table.F	illDown(#"Re	placed Value,	this workboo	k.				
Queries [2]	<	×	$\sqrt{f_x} = 1$	Table.F	illDown(#"Re	placed Value,	A ^B c Expense	k. Code	- A	Amount		
Dueres [2] Derek_expenses Mary_Expenses		×	√ f _x = 1 A ^B _C Name	Table.F	illDown(#"Re	placed Value,	A ^B C Expense	k. Code	- A	Amount		
Queries [2] Derek_expenses Mary_Expenses	<	×	√ f _x = 1 A ⁸ c Name Mary Wells	Table.F	illDown(#"Re	11/05/2015	A ^B C Expense Petrol	k. Code	▼ A 4	C Amount	•	
Queries [2] Derek_expenses Mary_Expenses	<	×	√ f _x = 1 A ⁸ _C Name Mary Wells Mary Wells	Table.F	illDown(#"Re	placed Value ,	A ^B C Expense Petrol Hotel	k. Code	• A	C Amount	×	
Queries [2] Derek_expenses Mary_Expenses	<	× 1 2 3	√ fx = 1 Mary Wells Mary Wells Mary Wells Mary Wells	Table.F	illDown(#"Re	placed Value , 11/05/2015 11/05/2015 11/05/2015	A ^B C Expense Petrol Hotel Food	k. Code	▼ A 4 2 3	C Amount 0.00 10.00 9.00	×	
Queres [2] Derek_expenses Mary_Expenses	<	× 1 2 3 4	√ fx = 1 Mary Wells Mary Wells Mary Wells Mary Wells Mary Wells	Table.F	illDown(#"Re	nplaced Value, in 11/05/2015 11/05/2015 11/05/2015 12/05/2015	A ^B C Expense Petrol Hotel Food Food	k. Code	* A 4 2 3 1	2 Amount 0.00 10.00 9.00 2.45	•	
Queries [2] Derek_expenses Mary_Expenses	<	1 2 3 4 5	fx fx = 1 % Name Mary Wells Mary Wells Mary Wells Mary Wells Mary Wells	Table.F	illDown(#"Re	nplaced Value 11/05/2015 11/05/2015 11/05/2015 12/05/2015 12/05/2015	his workboo (Expense Petrol Hotel Food Sundries	k. Code	× A 4 2 3 1	2 Amount 0.00 10.00 9.00 2.45 1.12	*	

As the dropdown shows, I can either 'Append Queries' where I 'Append this query to another query in this workbook' or I can 'Append Queries as New'. Since the expense files are always required to be uploaded together, the 'Append Queries' option is fine here.

		×
Append		
Concatenate rows from two tables int	o a single table.	
Two tables O Three or more tables		
Two tables O Three or more tables Table to append		
Two tables O Three or more tables Fable to append	*	
Two tables Table to append Mary_Expenses (Current)	*	

I don't need to choose the 'Three or more tables' option; I can simply select the other query from the dropdown.



X	√ fx = Table	Combine({#"Filled Down", D	erek_expenses})			~	Querv Settinas	×
	A ^B C Name	💌 🔟 Date 🔍	A ^B C Expense Code	✓ A ^B C Amount	v			
1	Mary Wells	11/05/2015	Petrol	40.00			A PROPERTIES	
2	Mary Wells	11/05/2015	Hotel	210.00			Many Expenses	
3	Mary Wells	11/05/2015	Food	39.00				
4	Mary Wells	12/05/2015	Food	12.45			All Properties	
5	Mary Wells	12/05/2015	Sundries	11.12			A APPLIED STEPS	
6	Mary Wells	20/05/2015	Stationary	5.00			Course	A
7	Derek Stand	13/05/2015	Petrol	50.00			Source	¥
8	Derek Stand	13/05/2015	Hotel	130.00			Changed Tures	Υ.
9	Derek Stand	13/05/2015	Food	43.16			Renamed Columns	
10	Derek Stand	14/05/2015	Food	12.45			Replaced Value	
11	Derek Stand	14/05/2015	Food	10.50			Filled Down	
							× Appended Query	- (†

The data appears in the same query, and a step is created in **M** code combining the data in the current query with the Derek's expense query that already exists. The number of columns remains the same. If any columns had been duplicated, then I should check column names are the same (including the same case and with no extra spaces) in both queries.

File Table N Mary_E Re: Pro	Home Insert I lame: Summar Expenses Remove size Table perties	Draw Page Layo ize with PivotTable Duplicates to Range Tools	Insert Slicer Slicer	eview View De- operties I H een in Browser link I Ba Data	veloper Add-ins He eader Row First Colum otal Row Last Colum anded Rows Banded Col Table Style Opt	p Power Pivot	Table Design Query	Table St	es	남 Share
A1	-	$\times \checkmark f_x$	Name							*
	A	В	С	D	E	F	G H	1 1	Queries & Connections	• ×
1	Name 📮	Date 🗖	Expense Code	Amount 🗗					Queries Connections	
2	Mary Wells	11-05-15	Petrol	40.00					2 queries	
3	Mary Wells	11-05-15	Hotel	210.00					Derek_expenses 5 rows loaded.	
4	Mary Wells	11-05-15	Food	39.00					Mary_Expenses	6
5	Mary Wells	12-05-15	Food	12.45					11 rows loaded.	
6	Mary Wells	12-05-15	Sundries	11.12					-	
7	Mary Wells	20-05-15	Stationary	5.00						
8	Derek Stand	13-05-15	Petrol	50.00						
9	Derek Stand	13-05-15	Hotel	130.00					-	
10	Derek Stand	13-05-15	Food	43.16						
11	Derek Stand	14-05-15	Food	12.45						
12	Derek Stand	14-05-15	Food	10.50						
13										
14										
15										
16										
17	Mary_Expense	Derek_expense	es Sheet1 🕀		: •					

As before, I can 'Close & Load' to see the data in a new Excel sheet:

Further files can be appended using the same method as they arrive.

If I want to extract similar files at the same time, there is another option: extracting from a folder, and that's next...



Extracting from a Folder

In this example I have 10 expense files in a folder called **PQ_StandardExpenses**. In a blank workbook, I choose the 'From File' Option, and drop down to select 'From Folder'.



A simple browse window appears, and having chosen the correct folder, the meta data is displayed:

Content	Name	Extension	Date accessed	Date modified	Date created	Attrik
Binary	PQ_StandardExpense_3_worksheets.xlsm	.xlsm	16-Nov-21 12:05:41 PM	18-Apr-17 12:04:58 PM	03-Feb-21 12:29:51 PM	Recor
Binary	PQ_StandardExpense_3_worksheets_with_query.xlsm	.xlsm	16-Nov-21 12:05:41 PM	18-Apr-17 12:46:05 PM	03-Feb-21 12:29:51 PM	Recor
Binary	PQ_StandardExpense_CSV_1.csv	.CSV	14-Feb-22 7:50:36 PM	25-Jul-16 1:07:44 PM	03-Feb-21 12:29:51 PM	Recor
Binary	PQ_StandardExpense_CSV_10.csv	.CSV	14-Feb-22 7:55:08 PM	25-Jul-16 1:39:59 PM	03-Feb-21 12:29:51 PM	Recor
Binary	PQ_StandardExpense_CSV_2.csv	.CSV	14-Feb-22 7:54:43 PM	25-Jul-16 1:26:37 PM	03-Feb-21 12:29:51 PM	Recor
Binary	PQ_StandardExpense_CSV_3.kat	.kat	16-Nov-21 12:05:41 PM	25-Jul-16 1:27:53 PM	03-Feb-21 12:29:51 PM	Recor
Binary	PQ_StandardExpense_CSV_4.csv	.CSV	14-Feb-22 7:54:59 PM	25-Jul-16 1:29:18 PM	03-Feb-21 12:29:51 PM	Recor
Binary	PQ_StandardExpense_CSV_5.csv	.CSV	14-Feb-22 7:55:59 PM	25-Jul-16 1:30:13 PM	03-Feb-21 12:29:51 PM	Recor
Binary	PQ_StandardExpense_CSV_6.csv	.CSV	14-Feb-22 7:55:51 PM	25-Jul-16 1:31:39 PM	03-Feb-21 12:29:51 PM	Recor
Binary	PQ_StandardExpense_CSV_7.csv	.CSV	14-Feb-22 7:55:43 PM	25-Jul-16 1:33:58 PM	03-Feb-21 12:29:51 PM	Recor
Binary	PQ_StandardExpense_CSV_8.csv	.CSV	14-Feb-22 7:55:32 PM	25-Jul-16 1:36:01 PM	03-Feb-21 12:29:51 PM	Recor
Binary	PQ StandardExpense CSV 9.csv	.CSV	14-Feb-22 7:55:20 PM	25-Jul-16 1:37:21 PM	03-Feb-21 12:29:51 PM	Recor
<						>



At this point, I could choose to combine these files and I'd be done, but editing allows the data to be transformed, and some safety features to be added.

Some kind person has added some excel workbooks in the folder, not to mention a strange file extension 'kat'! I need to make sure nothing added to the folder in the future will mess up my query. I can also allow for users typing in **csv** or **CSV** when they create their files. I opt to 'Transform Data':

	Content 🛨	A ^B _C Name	A ^B _C Extension	💽 Date accessed 💌	🖪 Date modified 💽	Date	
1	Binary	PQ_StandardExpense_3_worksheets.xlsm	.xlsm	16-Nov-21 12:05:41 PM	18-Apr-17 12:04:58 PM	0:	PROPERTIES Name
2	Binary	PQ_StandardExpense_3_worksheets_with_query.xl	.xlsm	16-Nov-21 12:05:41 PM	18-Apr-17 12:46:05 PM	0.	
3	Binary	PQ_StandardExpense_CSV_1.csv	.csv	14-Feb-22 7:50:36 PM	25-Jul-16 1:07:44 PM	0:	PQ_standardexpenses
4	Binary	PQ_StandardExpense_CSV_10.csv	.CSV	14-Feb-22 7:55:08 PM	25-Jul-16 1:39:59 PM	0:	All Properties
5	Binary	PQ_StandardExpense_CSV_2.csv	.CSV	14-Feb-22 7:54:43 PM	25-Jul-16 1:26:37 PM	0:	A APPLIED STEPS
6	Binary	PQ_StandardExpense_CSV_3.kat	.kat	16-Nov-21 12:05:41 PM	25-Jul-16 1:27:53 PM	0:	Course 25
7	Binary	PQ_StandardExpense_CSV_4.csv	.CSV	14-Feb-22 7:54:59 PM	25-Jul-16 1:29:18 PM	0.	source
8	Binary	PQ_StandardExpense_CSV_5.csv	.CSV	14-Feb-22 7:55:59 PM	25-Jul-16 1:30:13 PM	0:	
9	Binary	PQ_StandardExpense_CSV_6.csv	.CSV	14-Feb-22 7:55:51 PM	25-Jul-16 1:31:39 PM	0:	
10	Binary	PQ_StandardExpense_CSV_7.csv	.CSV	14-Feb-22 7:55:43 PM	25-Jul-16 1:33:58 PM	0:	
11	Binary	PQ_StandardExpense_CSV_8.csv	.CSV	14-Feb-22 7:55:32 PM	25-Jul-16 1:36:01 PM	0:	
12	Binary	PQ_StandardExpense_CSV_9.csv	,CSV	14-Feb-22 7:55:20 PM	25-Jul-16 1:37:21 PM	0	

I start by transforming the **Extension** data to lowercase. I select the column and right-click to find the 'Transform' to 'lowercase' option.



Next, I can filter to just get those files with file extension '**csv**'. At the top of the **Extension** column there is a standard filter arrow: clicking on this reveals a number of options to transform the data in the column.



		÷	ABC	Exter	nsion	3
₽↓	Sort Ascending					
Z↓	Sort Descending					
	Clear Sort					
¥,	Clear Filter					
	Remove Empty					
	Text Filters					,
	Search					
	✓ (Select All)					
	.csv					
	🗹 .kat					
	1					

I could use the 'Text Filter', but instead, I will choose '**csv**' from the radio list:

			▼ A ^B C	Extension	
,	L	Sort Ascending			
		Sort Descending			
		Clear Sort			
	ć	Clear Filter			
• 		Remove Empty			
		Text Filters			•
		Search			
		(Select All)			
		.csv			
		🗌 .kat			
		.xlsm			
		 ✓ .csv kat xlsm 			

This generates a step to filter on '.csv':

-	E Content ±	A ^B _C Name	A ^B _C Extension	Date accessed	Date modified	🐻 Date		
1	Binary	PQ_StandardExpense_CSV_1.csv	.CSV	14-Feb-22 7:50:36 PM	25-Jul-16 1:07:44 PM	0:	PROPERTIES	
	Binary	PQ_StandardExpense_CSV_10.csv	.CSV	14-Feb-22 7:55:08 PM	25-Jul-16 1:39:59 PM	0:	DO StandardEunanses	
	Binary	PQ_StandardExpense_CSV_2.csv	.CSV	14-Feb-22 7:54:43 PM	25-Jul-16 1:26:37 PM	0:		
	Binary	PQ_StandardExpense_CSV_4.csv	.CSV	14-Feb-22 7:54:59 PM	25-Jul-16 1:29:18 PM	0.	All Properties	
	Binary	PQ_StandardExpense_CSV_5.csv	.CSV	14-Feb-22 7:55:59 PM	25-Jul-16 1:30:13 PM	0:	A APPLIED STEPS	
	Binary	PQ_StandardExpense_CSV_6.csv	.CSV	14-Feb-22 7:55:51 PM	25-Jul-16 1:31:39 PM	0:	Courses	
	Binary	PQ_StandardExpense_CSV_7.csv	.csv	14-Feb-22 7:55:43 PM	25-Jul-16 1:33:58 PM	0.	Source	
	Binary	PQ_StandardExpense_CSV_8.csv	.CSV	14-Feb-22 7:55:32 PM	25-Jul-16 1:36:01 PM	0.	X Eiltered Rows	
Ĩ	Binary	PQ StandardExpense CSV 9.csv	.CSV	14-Feb-22 7:55:20 PM	25-Jul-16 1:37:21 PM	0:	A THEFEO ROWS	

The query is now protected from stray workbooks and will include files with **.csv** and **.CSV** extensions. Simple!

In order to transform the data in the files, I need to see the table contents, and not just the metadata. Next to the **Content** column header is an icon which appears for binary files, and allows the binary to be combined – the *icon*.



Pressing the button with this icon makes the contents of each table appear under the table headings:

	-						
Sample File:							
FIIST IIIe							
ile Origin			Delimiter		Data Type Detection		
1252: Weste	ern Europe	ean (Windows)	▼ Comma	•	Based on first 200 rows	*	De
Name	Date	expense code	amount				
Derek Stand	13-05-15	Petrol	50.00				
	13-05-15	Hotel	130.00				
	13-05-15	Food	43.16				
	14-05-15	Food	12.45				
	14-05-15	Food	10.50				

This is just showing me the first file, and I am happy with the layout, so I click OK:

		A ^B C Name	Tote	 A^B_C expense code 	 1.2 amount 			
Helper Queries [3]	1	Derek Stand	13/05/20	215 Petrol	50	▲ PROF	PERTIES	
Sample File	2		13/05/20	15 Hotel	130	 Name	2	
Parameter1 (Sample File)	3		13/05/20	15 Food	43.16	PQ	standardExpenses	
Transform File	4		14/05/20	15 Food	12.45	All Pr	operties	
ansform Sample File	5		14/05/20	15 Food	10.5		IFD STEPS	
nsform File from PQ_StandardEx	6	Sarah Boss	10/05/20	15 Petrol	50			
elper Queries [3]	7		10/05/20	15 Hotel	200		owarcared Text	
arameter2 (Sample File (2))	8		10/05/20	715 Food	60	F	iltered Rows	
and the completine (cy)	9		11/05/20	15 Food	12.45	F	iltered Hidden Files1	
ampie File (2)	10		11/05/20	115 Food	10.5		nvoke Custom Function1	
ransform File (2)	11		13/05/20	P15 Petrol	25	F	emoved Other Columns1	
insform Sample File (2)	12		13/05/20	15 Hotel	150	E	xpanded Table Column1	
r Queries [1]	13		13/05/20	215 Food	70	×c	hanged Type	
LStandardExpenses	14		20/05/20	125 Miscellaneous	324			
	15	Mary Wells	11/05/20	215 Petrol	40			
	16		11/05/20	15 Hotel	210			
	17		11/05/20	15 Food	39			
	18		12/05/20	715 Food	12.45			
	19		12/05/20	15 Sundries	11.12			
	20		20/05/20	215 Stationary	5			
	21	Lisa Dodds	13/05/20	15 Train	30			
	22		13/05/20	15 Hotel	135			
	23		13/05/20	15 Food	43.16			
	24		14/05/20	15 Food	12.45			
	25		14/05/20	15 Food	10.5			
	26	Dan Little	13/05/20	15 Stationary	5			
	27	Paula Smith	21/05/20	25 Petrol	33			
	27 28	Paula Smith	21/05/20 21/05/20	125 Petrol 125 Hotel	33 50			

This process has been improved over time, and Power Query creates a 'Helper Queries' folder in the Queries tab to help to transform my data.



In previous versions, I had to promote headings and remove heading rows from each appended file, but all of this has been done for me. I need to do is 'Fill Down' on the **Name** column using the same method as before, by replacing blanks with nulls and right-clicking to 'Fill Down'. I also rename expense code and amount to '**Expense Type**' and '**Amount**', so that I will be able to append to other expense files with no duplication.

My data is now ready for me to 'Close & Load' to the workbook:

File	Home Insert D	raw Page Layou	ut Formulas Data Re	view View Dev	loper Add-ins	Help Power Pin	vot Table Design	Query		Comments 넘 Share	
Table N	ame: Summariz	e with PivotTable		erties 🗹 He	ader Row Eirst C	olumn 🗹 Filter I	Button				
PQ_Sta	ize Table	Range S	nsert Export Refresh	n in Browser 📃 Tot nk 🗹 Bai	ided Rows 📃 Bande	d Columns					
Pro	perties	Tools	External Table D	ata	Table Styl	e Options			Table Styles		~
A1	* 1 3	$\times \checkmark f_x$									*
	А	В	С	D	E	F	G	н	1 -	Queries & Connections • ×	<
1	Name 📮	Date 🗖	Expense Type 🗖	Amount 🗖						Queries Connections	
2	Derek Stand	13-05-15	Petrol	50						9 queries	
3	Derek Stand	13-05-15	Hotel	130						Connection only.	
4	Derek Stand	13-05-15	Food	43.16						Connection only.	
5	Derek Stand	14-05-15	Food	12.45						∫≭ Transform File	
6	Derek Stand	14-05-15	Food	10.5						Connection only.	
7	Sarah Boss	10-05-15	Petrol	50						Connection only.	
8	Sarah Boss	10-05-15	Hotel	200						🔺 🛑 Transform File from PQ_Standard [2]	
9	Sarah Boss	10-05-15	Food	60						 Helper Queries [3] 	
10	Sarah Boss	11-05-15	Food	12.45						Connection only.	
11	Sarah Boss	11-05-15	Food	10.5						Sample File (2)	
12	Sarah Boss	13-05-15	Petrol	25						Connection only.	
13	Sarah Boss	13-05-15	Hotel	150						Connection only.	
14	Sarah Boss	13-05-15	Food	70						Transform Sample File (2)	
15	Sarah Boss	20-05-15	Miscellaneous	324						Connection only.	
16	Mary Wells	11-05-15	Petrol	40						PQ_StandardExpenses	
17	PO StandardEx	enses Sheet1		210		Π.			-	45 rows loaded.	1

Extracting from a folder is an efficient way to upload multiple expense files in a similar format, but what if someone sends in a **CSV** file that has been configured differently? We deal with a simple example of unpivoting data next...

Unpivoting Data

Not everyone sticks to the standard format on their expenses, as that would be far too convenient for data analysts!

Let's imagine **PQ_NonStandardExpense_CSV** has come in, and it is an expense **csv** which is not in the usual format because John has configured his data ready to create a graph of where his expenses go. Convenient for him, but not so great for appending to the existing expense query:

А	В	С	D	E	F
Name	Date	Petrol	Hotel	Food	Personal
John Smith	13-05-15 0:00	50	150	30	12
	14-05-15 0:00	10	0	25	

Luckily, Power Query has a button for this: in order to get this into our required column format I will need to unpivot the data.



The first step is importing the non-standard expense **CSV** as I did for the single **CSV** file earlier:



I browse to the file and select it:

le Origin		D	elimiter				Data Type Detection	1		
1252: Wes	tern European (Windows)	* (omma			τ.	Based on first 200	rows		[
Name	Date	Petrol	Hotel	Food	Personal					
hn Smith	13/05/2015 12:00:00 AM	5	0 150	30	12					
	14/05/2015 12:00:00 AM	1	0 0	25	null					

I will choose 'Transform Data'.

AB _C Name	V Eo Date	123 Petrol	▼ 1 ² 3 Hotel	▼ 1 ² 3 Food	▼ 1 ² 3 Personal			
John Smith	13/05/2015 12:00:00 AM		50	150	30	12	PROPERTIES	
	14/05/2015 12:00:00 AM		10	0	25	null	PQ_NonStandardExpense_CSV	
							All Properties	
							APPLIED STEPS	
							Source	
							Promoted Headers	
							× Changed Type	

The first step for this example is to remove any unnecessary data – in this case John has added a personal expense column which is not required in the model. However, rather than remove the offending **Personal** column, it is safer to keep the columns that I know I need in order to append this query to the other expenses. I hold **CTRL** while I select the columns I want to keep. Then I can right-click and choose 'Remove other Columns'. A tip here is to select and click whilst in the column heading, otherwise Power Query can assume I am selecting a value in the column.



	A ^B C Name	× 1	👌 Date		123 Petrol	-	123 Hotel	▼ 1 ² 3 Fo	1	Copy	1
1	John Smith		13/05/2015 12: 14/05/2015 12:	00:00 AM 00:00 AM		50 10		150 0	-0 	Remove Columns	ĺ
									•	Add Column From Examples	Т
									1 *2	Remove Duplicates Remove Errors Replace Values Fill	,
										Change Type	•
									۲	Merge Columns Create Data Type	
									10 B	Group By Unpivot Columns Unpivot Other Columns Unpivot Only Selected Columns	
										Move	.

Name can then be filled down using the same process that I used earlier: I replace the blank values with *null* and then right-click on the **Name** column and choose to 'Fill Down'.

File	Home Transform A	dd Column	View															~ 🕜
Close & Load •	Refresh Preview • Manage •	Choose I Columns * C	Remove olumns *	Keep Remo Rows * Rows		Split Column *	By Data	a Type: Text * Use First Row as Heade Replace Values	s • Combi	Queries • d Queries • ne Files	Manage Parameters *	Data source settings	New Source •					
Close	Query	Manage C	olumns	Reduce Rows	Sort		Tra	ansform	Con	nbine	Parameters	Data Sources	New Query					
Queries	[1]	<	×	√ f _x	- Table	.FillDown	(#"Repla	aced Value",{"Name	.})						~	0	Juery Settings	×
III PI	Q_NonStandardExpense_CSV		- A	^B c Name		- Da	te	▼ 1 ² ₃ Peti	sl	▼ 1 ² ₃	Hotel	× 1 ²	3 Food	-			coory becange	
			1 1	ohn Smith	_	1	3/05/2015	12:00:00 AM		50		150		30			PROPERTIES	
			2 J	ohn Smith		1	4/05/2015	12:00:00 AM		10		0		25			PO NonStandardExpense CSV	
																	All Properties	
																1	APPLIED STEPS	
																	Source	0
																	Promoted Headers	0
																	Changed Type	
																	Removed Other Columns	0
																	Replaced Value	0
																	➤ Filled Down	

I am ready to unpivot process – I select **Name** and **Date** as I plan to unpivot the other columns. In the 'Any Columns' group on the 'Transform' tab there is an option to 'Unpivot Columns' – there are two options, either unpivot the selected columns, or everything except the selected columns, which can save time depending on the proportion of columns that need to be unpivoted.

File Group Use By as F	Home Transform A B Transpose C Reverse Rows First Row Headers - H Count Rows Table	dd Column Data Type: Ar Detect Da Rename	Viev ny • ita Typ	e J	lace Vali Unpivo Unpivo Unpivo	ues - Unpiv ot Columns ot Other Column ot Only Selected	ot Columns 🔹 s Columns	Split Column Format	ABC Parse * Column	XO Statistics	Standard Nu	10 ² Scientifi mber Co	Trigonometry	- Date	Time & Time	Duration Column
Queries [1]	N 320 01 042 2230	<	×	~	fx	= Table.Fi	11Down(#"R	eplaced Value"	,{"Name"})							
III PQ.	NonStandardExpense_CSV			A ^B _C Nam	e	*	🖳 Date	*	123 Petrol		123 Ho	tel	- 1	2 ₃ Food		
			1	John Smit	th		13/05/	2015 12:00:00 AM		5(2		150			30
			2	John Smi	th		14/05/	2015 12:00:00 AM		10	2		0			25



The unpivot options are also available by right-clicking any of the highlighted columns:



One click and everything is unpivoted as required!

×	(√ <i>f</i> x = 1	Table.UnpivotOtherColumns(#"Fill	ed Down", {"Name", "Date	"}, "Attribute", "Value")	~	Query Settings	×
	A ^B C Name	💌 📴 Date 💌	A ^B _C Attribute	1 ² 3 Value			
1	John Smith	13/05/2015 12:00:00 AM	Petrol	50		A PROPERTIES	
2	John Smith	13/05/2015 12:00:00 AM	Hotel	150		BO NooStandardSvoopra CSV	
3	John Smith	13/05/2015 12:00:00 AM	Food	30			
4	John Smith	14/05/2015 12:00:00 AM	Petrol	10		All Properties	
5	John Smith	14/05/2015 12:00:00 AM	Hotel	0		▲ APPLIED STEPS	
6	John Smith	14/05/2015 12:00:00 AM	Food	25		Source	8
						Promoted Headers Changed Type Removed Other Columns Replaced Value Filled Down X Unpivoted Other Columns	2 2 2 2 2

The small changes left to do are to transform the unpivoted columns to match the other expenses. I rename the headings by double-clicking and editing.

The data is then ready to be uploaded or appended to an existing expenses query as covered earlier.

Relationship between Power Query and Power Pivot

This is relevant to Power BI too. So far, I have concentrated on how to use Power Query as a standalone tool. In a moment, I will look at extracting data from a table and loading to the Excel model. This will allow the data to be manipulated by another Excel Add-in: Power Pivot. Therefore, now I will take a look at the relationship between Power Query and Power Pivot.

I have shown that Power Query is a useful ETL (Extract, Transform and Load) tool. Well thought out features allow data to be filtered, manipulated and merged. In addition to the previous examples where I have loaded data into an Excel worksheet, loading to the Excel model allows further modelling and analysis by Power Pivot.

Power Pivot can fine tune the Excel Model and then perform calculations so that the data is ready to be displayed in PivotTables, charts or grids, or in a visualisation tool like Power View. Power Pivot can create relationships between tables, and create formulas and KPI's (Key Performance Indicators). Power Pivot refines and builds on the Excel model created by Power Query. Next, I will describe how to extract a table from a database, transform the data, and load it into the Excel model ready for further analysis using Power Pivot.



(Data) Model Building

Up until now, I have concentrated on extracting data from files and folders. For this example, I will extract data from a table in a Microsoft Access database. Although I could use this data in an Excel workbook as in the previous examples, this time I will add the table to the Excel data model, so that it can be used by Power Pivot.

A quick glance at the drop down 'From Database' under 'Get Data' on the Data tab reveals a large selection of different kinds of databases that can be accessed in order to extract data:

File Home Insert Draw Page La	yout Formulas Data Review View Developer tions Refresh Properties Organization	Add-ins Help	Power Pivot
	All * Connections Data Ty	Des	Sort & Filter
From Database	From SQL Server Database		C
From Azure	From Microsoft Access Database	.	6
From Power BI (sumproduct.com)	From Analysis Services		
From Online Services	From SQL Server Analysis Services Database (Import)	-	
From Other Sources	From Qracle Database		
Combine Queries >	From IBM Db2 Database		
Launch Power Query Editor	From MySQL Database		
Query Options	From PostgreSQL Database		
10	From Sybase Database		
11 12	From Ieradata Database		
13	From SAP HANA Database		
14			

Choosing the 'From Microsoft Access Database' option allows me to browse for the database that I will use. Having selected my database, the navigator screen lists all the tables in that database. I choose to preview 'ACCT_Order_Charges':



	Q	ACCT_Orc	ler_Charges			Le
Select multiple items		Preview downl	oaded on Tuesday, 16 M	larch 2021		
play Options 👻	[a	Order_Key	Order_Line_Number	Charge_Line_Number	Amount	Discount
Access Database SP.accdb [19]			1 3	1 1	195.00	· · · ·
ACCT_Order_Charges			1 1	2	10.00	
ACCT_Order_Costs			1 2	2 2	10.00	
Another table of Employees			1 3	3 1	50.00	1
T Cities			1 3	3 2	10.00	,
Commodities			1 4	1	20.00	r
Commodity Groups			1 4	1 2	10.00	1
Commodity Sub Groups			2 1	1	120.00	1
			2	2	10.00	
			2 2	2 2	10.00	
III Dates			2 3	3 1	40.00	1
Employees			2 3	3 2	10.00	1
Employees Updated by PQ			2 4	1	25.00	r
Internet_Sales			2 4	1 2	5.00	1
Items			3 1	1 1	170.00	1
Order_Details			3 1	2	10.00	r
Order_Headers			3 2	2 1	50.00	1
Paste Errors			3 2	2	10.00	
Promotions			3 3	2	10.00	~
Sales Territories	~	(>

I choose to 'Transform Data'.

File	Home Transform	Add Column	View												~ 🕜
Close & Load •	Refresh Preview - Manage -	Choose Re Columns - Col	emove lumns •	Keep Remove Rows * Rows *		Data Type: W Data Type: W Use First Int Group By	hole Number * Row as Headers * /alues	Merge Queries	Manage Parameters -	Data source settings	New Source *				
Close	Query	Manage Col	lumns	Reduce Rows	Sort	Transform		Combine	Parameters	Data Sources	New Query				
Queries	10	<	×	√ fx -	Source{[S	chema="",Item="ACCT	Order_Charges	"]}[Data]					~	Query Settings	×
A/	CCT_Order_Charges		Tr 123	Order Key		23 Order Line Number	▼ 1 ² 3 Charge	Line Number	Amount	× 1	23 Discount	▼ 1 ² 3 Item Key		Query securigs	
			1		1		1	1		195.00		null		PROPERTIES	
			2		1		1	2		10.00		null	^	Name	
			3		1		2	1		50.00		null		ACCT_Order_Charges	
			4		1		2	2		10.00		null		All Properties	
			5		1		3	1		50.00		null		A ADDI JED STEPS	
			6		1		3	2		10.00		null	1	- Artucostars	
			7		1		4	1		20.00		null		Source X Navigation	8
			8		1		4	2		10.00		null	- 1	~ Ivavigauon	W
			9		2		1	1		120.00		null			
			10		2		1	2		10.00		null	1		
			11		2		2	1		50.00		null			

I select the columns I want to keep whilst holding **CTRL** and right-click to 'Remove other Columns' as I did for the **CSV** example.

X	✓ fx = Table.SelectColum	~	Query Settings	×				
.	rder_Line_Number 💌 123 Charge_Line	Number 💌 \$ Amount	▼ 1 ² 3 Item_Key	A ^B C Order_Detail_Ke	eγ ▼ A ^B _C Description	-		
1	1	1	195.00	5 1-1	8 x 3 metre marquee	~	A PROPERTIES Name	
2	1	2	10.00	null 1-1	DELIVERY Side Connecting Parch	-	ACCT_Order_Charges	
4	2	2	10.00	null 2-1	DELIVERY		All Properties	
5	3	1	50.00	19 3-1	6 x 4 metre matting		APPLIED STEPS	
6	3	2	10.00	null 3-1	DELIVERY		Source	8
7	4	1	20.00	31 4-1	4 metre width partition wall		Navigation	ŝ
8	4	2	10.00	null 4-1	DELIVERY		× Removed Other Columns	8
9	1	1	120.00	2 1-2	3 x3 metre marquee			



I can then use the 'Close & Load' option from the 'File' tab or the 'Home' tab:

File H	ome Transfor	m A	dd Column	View		
Close & Ref Load • Prev	Properti Advance resh iew Manage	es d Editor	Choose Columns •	Remove Columns •	Keep Rer Rows * Ro	move ws *
Close & L	oad (Manage	Columns	√ f _x	= 1
Save your cha close the Que specify where	nges to this query ry Editor window, to load the result:	and s.		1. rd	er_Line_Num	ber

I must choose 'Close & Load To...', which will allow me to specify how I want to load the data.

Import Data	?	×	
Select how you want to view Date Date DivotTable Rep OrivotChart Only Create C Where do you want to put t Divisting worksheet:	v this data in port onnection the data?	your workbook.	
=\$A\$1 New worksheet Add this data to the Dat Properties	a <u>M</u> odel OK	Cancel	

This gives me the option to 'Add this data to the Data Model'. I also choose the 'Connection Only' option since I don't need to see the table in the workbook. Since I have Power Pivot, I can go to Power Pivot tab and select the Manage (data model) option; 'ACCT_Order_Charges' is visible in the 'Workbook Queries' pane.

File	Home Insert	Draw	Page Layou	it Formulas	Data	Review	View	Developer	Add-ins	Help	Power Pivot			Comments 🖻 Share
Manage Data Mode	Measures KPIs	Add Data M Table	to Dete odel	t Settings										
Go to Go to	the Power Pivot wind he Power Pivot window	ow v to	√ fx											•
load a workir this w	nd prepare data or con g on data already add irkbook.	ed to	В	С		D		E		F	G	Н	Ĺ	Queries & Connections
2														1 query
3														ACCT_Order_Charges
4														
6														

Choosing to 'Manage' allows me to view the 'ACCT_Order_Charges' table in detail, ready to refine the data further by adding calculated columns and creating and managing relationships with other tables in the model.



AutoSar	re 🚥 🖽 🍤	い (? ~ 😵 • 🖾 • 📼		Rec	k1 - Evcel		O Conrob (Alt+O)					k-	those consist	KN G		o ×
File	Home Insert	Draw Page Layout	Formul	File	Home Design	ower Pivot fo Advanced	or Excel - Book1					_	1 X ^ (7		Comments	남 Share
Manage	Measures KPIs	Add to Data Model	Setting:	Paste	Get External Refres Data *	h PivotTable	Data Type : 2 Format : 2 \$ - % 9 20 00 2	Clear All Sort by Filters Column	Find	AutoSum ~ Create KPI Calculations	Data Data View					
A1	* :	$\times \checkmark f_x$		[Ord.	•	fx	romating	Sort and Title	TING	Calculations	4124		×			,
	Δ	B	C	🖌 Or	der_Key	🔽 Or	der_Line_Nu	mber 🔽	Cha	rge_Lir	ne_Number	🖌 🖌	nour^			_ ~
1	~	D	C	1		1		1				1	\$19	ries & Co	nnections	* ^
2				2		6		1				1	\$19	Connection	15	
3				3	2	10		1				1	\$19	CT_Order_C	harges	
4				4		16		1				1	\$19	720 rows load	led.	
5				5		18		1				1	\$19			
6				6		24		1				1	\$19			
7				7		28		1				1	\$19			
8				8		31		1				1	\$19			
9				9		36		1				1	\$19			
10				10		40		1				1	\$19v			
11													^			

If I can edit the table in Power Query and Power Pivot, are there any problems to look out for? The good news for Excel 2016 onwards and Office 365 users is that since Power Query has been fully integrated into the 'Get & Transform' section, there is no choice between using Power Pivot or Power Query. In earlier versions of Excel 2013, and in Excel 2010, it was possible to corrupt the Excel model by making some types of changes in Power Pivot. The current version of Excel 2013 stops me from making these changes in Power Pivot. And that is a *good* thing.

Starting with the Excel model I created above, I've decided to change the table name to make it more user friendly:

File	Home Design Adva	anced							~ @
Paste	Paste Append Paste Replace Copy Database	rom Data From Other Existing Service Sources Connections	Refresh PivotTable S	ta Type : frmat : - % 3 200 400 Clear Sort A to Z Clear All Sort by Pilters Column	Find	AutoSum Create KPI Da Vie	ta Diagram Show View Hidden Area		
[Or	d · f _x	Get External Data		Formatting Sort and Filter	Find	Calculations	View		¥
	Order_Key 🔽	Order_Line_N	lumber 🔽	Charge_Line_Number	An	nount 🔽	ltem_Key 🔽	Order_Detail_Key	💌 Description 🔓
1	1		1	1		\$195.00	5	1-1	8 x 3 metre
2	6		1	1		\$195.00	5	1-6	8 x 3 metre
3	10		1	1		\$195.00	5	1-10	8 x 3 metre
4	16		1	1		\$195.00	5	1-16	8 x 3 metre
5	18		1	Power Pivot for Excel	-		× 5	1-18	8 x 3 metre
6	24		1	This table was created by a query. To	o change	this table, change the q	uery 5	1-24	8 x 3 metre
7	28		1	OK	1		5	1-28	8 x 3 metre
8	31		1		1	9100.00	5	1-31	8 x 3 metre
9	36		1	1		\$195.00	5	1-36	8 x 3 metre
10	40		1	1		\$195.00	5	1-40	8 x 3 metre
11	46		1	1	_	\$195.00	5	1-46	8 x 3 metre ~
< Chang	vd Name	.1							>
	holosophilitation								

Thus, having received the message in the screen shown above, I am directed back to Power Query to rename the table. The reason that I am stopped from changing the name here is that in previous versions of Excel 2013 and 2010 users could change the name in Power Pivot which then broke the link between Power Query and Power Pivot. Therefore, there are some actions to be avoided in Power Pivot if the Excel model has been created in Power Query:



- **do not** change a table name in Power Pivot
- **do not** rename an imported column in Power Pivot
- **do not** delete an imported column in Power Pivot.

Any of these actions could result in a broken link between Power Query and Power Pivot.

It therefore makes sense to clean up data as much as possible in Power Query, renaming and deleting as required. Although merging some tables and queries in Power Query can be useful to avoid having unnecessary tables, don't try to flatten all the data into one huge table. One of the features of Power Pivot is the ability to manage relationships between tables, allowing keys to be constructed as required. This is vital in creating accurate calculations and useful new columns to aid analysis of data. As with most relationships, Power Query and Power Pivot work well together when they are allowed to do what they are best at.

Next, I'll take a look at merging queries in Power Query...

Merging Queries

Power Query allows me to merge tables (known as queries in Power Query), without either the need to be an expert on database structure or without having to learn formulae. I only require two (or more) existing queries.

I have a query **ACCT_Order_Charges** which I have extracted from a Microsoft Access database, and I want to merge data from another table so that I can include a description of the type of items that the charges apply to.

Starting in the workbook containing the **ACCT_Order_Charges** query, I create a new query. Since I have already made the connection to the database, I can use the 'Recent Sources' button on the Data tab.





I select the database, and the Navigator dialog appears:

Select multiple items	Q	Items Preview downl	oaded on Tuesday, 16 March 2021		[
splay Options 👻	23	Item_Key	Item_Name	Item_Group	Dimensions
		1	Side Connecting Porch	Tent	Approx (2m x 2.2m)
Access Database SP.accdb [19]	^	2	3 x3 metre marquee	Tent	Approx (10 x 10ft)
ACCT_Order_Charges		з	4 x 4 metre marquee	Tent	Approx (13 x 13ft)
ACCT_Order_Costs		4	6 x 3 metre marquee	Tent	Approx (10 x 20ft)
Another table of Employees		5	8 x 3 metre marquee	Tent	Approx (10 x 26ft)
III Cities		6	6 x 4 metre marquee	Tent	Approx (13 x 20ft)
Commodities		7	8 x 4 metre marquee	Tent	Approx (26 x 13ft)
		8	10 x 4 metre marquee	Tent	Approx (32 x 13ft)
		9	6 x 6 metre marquee	Tent	Approx (20 x 20ft)
Commodity_Sub_Groups		10	8 x 6 metre marquee	Tent	Approx (26 x 20ft)
E Customers		11	10 x 6 metre marquee	Tent	Approx (32 x 20ft)
Dates		12	12 x 6 metre marquee	Tent	Approx (40 x 20ft)
Employees		13	4x4m/6x3m/6x4m Hardstanding kit	Floor	
Employees Updated by PQ		14	8x4m/10x4m/6x6m Hardstanding kit	Floor	
Internet Sales		15	10x6m/12x6m Hardstanding kit	Floor	
		16	A x 4 metre matting	Floor	-
		17	4 x 4 metre matting	Floor	
Order_Details		10	6 x 4 metre matting	Floor	
Order_Headers		20	8 x 3 metre matting	Floor	
Paste Errors		21	8 x 4 metre matting	Floor	
Promotions		22	10 x 4 metre matting	Floor	
Sales Territories	~	1			~

I select the 'Transform Data' option.

File	Home Transform A	dd Column	View									~ 🕜
Close & Load •	Refresh Preview - Manage -	Choose R Columns • Co	emove Jumns -	Keep Remove Rows * Rows * Cr	Split Group blumn - By to 2 Replace Values	rs • I Append Queries • III Combine Files	Manage Data Parameters * se	a source ettings	New Source *			
Close	Query	Manage Co	lumns	Reduce Rows Sort	Transform	Combine	Parameters Data	a Sources	New Query			
Queries	[2]	<	×	√ fx = Source{	[Schema="",Item="Items"]}[Data]					~	Query Settings	~
	CCT_Order_Charges		1	3 Item Key	A ^B _c Item Name	ABc Item Group	▼ A ^B _C Dimensions		 1.2 Standing Capacity 	▼ 1.2 Seated Capacity	Query settings	
It It	ems				Side Connection Deceb	V _ V	August (200 a)	2	0_ 1 1		PROPERTIES	
			1		side connecting Porch	Tenc	Approx (211 x 2.	.2111)		^	Name	
			2		s xs metre marquee	Tent	Approx (10 x 10	nj o		14	Items	
			3		4 x 4 metre marquee	Tent	Approx (13 x 13t	π)		22	All Properties	
			4		b x 3 metre marquee	Tent	Approx (10 x 20)	rt)		20	and the second se	
			5		5 8 x 3 metre marquee	Tent	Approx (10 x 26f	ft)		35	▲ APPLIED STEPS	
			6		5 6 x 4 metre marquee	Tent	Approx (13 x 20f	ft)		35	Causas	
			7		7 8 x 4 metre marquee	Tent	Approx (26 x 13f	ft)		45	Source	54
			8	1	3 10 x 4 metre marquee	Tent	Approx (32 x 13f	ft)		60	 Navigation 	54
			9		6 x 6 metre marquee	Tent	Approx (20 x 20t	ift)		50		
			10	10	8 x 6 metre marquee	Tent	Approx (26 x 20f	ft)		70		
			11	1.	10 x 6 metre marquee	Tent	Approx (32 x 20f	ft)		90		
			12	11	2 12 x 6 metre marquee	Tent	Approx (40 x 20f	ft)		110		
			13	13	4x4m/6x3m/6x4m Hardstanding kit	Floor		'n	ull	null		
			14	1-	8x4m/10x4m/6x6m Hardstanding kit	Floor		n	ull	null		

I select **Item_Key, Item_Group** and **Item_Name** and right-click to 'Remove other Columns'. These are the fields I will need to merge the data with **ACCT_Order_Charges**.



$\times \sqrt{f_x} =$	<pre>/ fx = Table.SelectColumns(_Items,{"Item_Key", "Item_Name", "Item_Group"})</pre>							
123 Item_Key	A ^B _C Item_Name	▼ A ^B _C Item_Group ▼	. ,	5				
1	1 Side Connecting Porch	Tent	PROPERTIES					
2	2 3 x3 metre marquee	Tent	∧ Name					
3	3 4 x 4 metre marquee	Tent	Litems					
4	4 6 x 3 metre marquee	Tent	All Properties					
5	5 8 x 3 metre marquee	Tent	4 APPLIED STEPS					
6	6 x 4 metre marquee	Tent	- Alteresters					
7	7 8 x 4 metre marquee	Tent	Navigation	×				
8	8 10 x 4 metre marquee	Tent	X Removed Oth	ar Columns A				
9	9 6 x 6 metre marquee	Tent	A Removed Out	er columns m				

I do not wish to make further changes, so from the Home tab I select 'Close & Load to...' from the 'Close & Load' button:

G	Н	I	Queries & Connections × ×
Import Data Select how yo	u want to view this data in Jable PivotTable Report PivotShart Qnly Create Connection u want to put the data? gi worksheet:	? X	Queries Connections 2 queries 30,720 rows loaded. Items
=SA ③ New v ✓ Add this c Properties	S1 worksheet lata to the Data Model OK	1 Cancel	

Note that the Items query appears in the 'Queries & Connections' pane, but is not complete yet. Having made my selections as shown above, I choose to 'Load'.

There are several ways I can access the option to merge my queries. I can double-click on either query to access the Power Query Editor, or I can right-click on one of the queries:

Quer	ies	& Connections	Ŧ	×
Queries	Co	onnections		
2 queries				
				1000
	T_(Order_Charges		La
30,7	睧	Сору	1	
🖽 Iten	節	Paste		
70 r	12	Edit		
	×	Delete		
	∎Įi	Rename		
	B	Refresh		
		Load To		
		Duplicate		
	B	Reference		
	5	Merge		
	T	Append		
	D	Export Connection File		
		Move To Group		
		Move Up		
		Move Down		
		Show the peek		
	Eh	Properties		



The Merge dialog appears where I choose my two queries:

ACCT_Order	Charges	Ŧ					C
Order_Key	Order_Line_Number	Charge_Line	Number	Amount	Item_Key	Order_Detail_Key	Des
1	1	1	1	195.00	5	1-1	8 x 3 me
1	ť.	1	2	10.00	null	1-1	DELIVER
ा <u>ं</u>	1	2	1	50.00	1	2-1	Side Cor
1	E	2	2	10.00	null	2-1	DELIVER
1		-				**	1.5
2	3 x3 metre marquee	Tent					
1	Side Connecting Porch	Tent					
3	4 x 4 metre marquee	Tent					
4	6 x 3 metre marquee	Tent					
5	8 x 3 metre marquee	Tent					
oin Kind							
Left Outer (a	II from first, matching	rom second)	*				
and the second							

The dropdown at the bottom of the screen allows me to choose how to link the tables. In this case, I choose 'Left Outer', as I want all of the **ACCT_Order_Charges** table and matching data from Items (if I had input Items first then I would pick 'Right Outer'). This is the point where some understanding of the data is required; picking 'Full Outer' may lead to duplicates.

The 'OK' button is not enabled yet. This is because I need to pick the columns to join. In this case, I want to join **Item_Key** in both tables, so I select this field on each table. When I select the same number of columns in each table, then 'OK' is enabled, and the number of connections is displayed:

ACCT_Order_	Charges		•					[a
Order_Key	Order_Line_Number	Cł	arge_Line_Num	ber	Amount	Item_Key	Order_Detail_Key	Desc
1		1		1	195.00	5	1-1	8 x 3 me
1		1		2	10.00	null	1-1	DELIVER
1		2		1	50.00	1	2-1	Side Con
1		2		2	10.00	null	2-1	DELIVER
1								- 5
2	3 x3 metre marquee	Tent						
1	Side Connecting Porch	Tent						
2	4 x 4 metre marquee	Tent						
4	6 x 3 metre marquee	Tent						
5	8 x 3 metre marquee	Tent						
oin Kind	I for an first an atabian			-				
Left Outer (al	i from first, matching	froms	econd)	· · · ·				

 \times



I click OK, and am taken into the Power Query Editor:

Queries [3]	< × ~	fx = Table.NestedJoin(ACCT_Order_Charges, {"Item	n_Key"}, Items, {"Item_Key	"}, "Items", JoinKind.LeftOuter)		~	Query Settings	×
ACCI_Order_Charges	- harge_Lin	ne_Number 💌 \$ Amount	▼ 1 ² 3 Item_Key	A ^B C Order_Detail_K	ey 💌 A ^B C Description	💌 📰 Items	419		
In Manual	1	1	195.00	5 1.1	8 x 3 metre marquee	Table		A PROPERTIES	
LIII merger	2	2	10.00	null 1-1	DELIVERY	Table	^	Mercel	
	3	1	50.00	1 2-1	Side Connecting Porch	Table		mergei	
	4	2	10.00	null 2-1	DELIVERY	Table		All Properties	
	5	1	50.00	19 3-1	6 x 4 metre matting	Table		APPLIED STEPS	
	6	2	10.00	null 3-1	DELIVERY	Table		Source	8
	7	1	20.00	31 4-1	4 metre width partition wall	Table		bource	
	8	2	10.00	null 4-1	DELIVERY	Table			
	9	1	120.00	2 1-2	3 x3 metre marquee	Table			
	10	2	10.00	null 1-2	DELIVERY	Table			
	11	1	50.00	1 2-2	Side Connecting Porch	Table			

Merge1 contains the columns from *ACCT_Order_Charges*, and a new column called **Items**. Note the icon next to it with two arrows pointing away from each other: this will expand to show the new columns available:

🛛 🗸 ge_Line_	Number 💌	\$ Amount 💌	1 ² 3 Item_Key 💌	A ^B C Order_Detail_Key	A ^B _C Description The Items
1	1	195.00	5	1-1	21
2	2	10.00	null	1-1	Arco di Mongodi
3	1	50.00	1	2-1	Expand Aggregate
4	2	10.00	null	2-1	
5	1	50.00	19	3-1	✓ (Select All Columns)
6	2	10.00	null	3-1	✓ Item_Key
7	1	20.00	31	4-1	
8	2	10.00	null	4-1	Tem_Group
9	1	120.00	2	1-2	
10	2	10.00	null	1-2	 Use original column name as prefix
11	1	50.00	1	2-2	
12	2	10.00	null	2-2	OK Cancel
2		10.00	16	2.2	2 V2 meter method

I can uncheck columns that are already in the first table to prevent duplication. In this case description is very similar to **Item_Name** so I uncheck **Item_Name** and **Item_Key** (since I only included the key to enable me to link the table data).

X	√ fx	= T	able.NestedJoin(ACCT_C	rder_Charges, {"Item_Key"}	<pre>, Items, {"Item_Key"},</pre>	"Items", JoinKind.LeftOuter) 🗸 🗸
	ge_Line_Number	•	\$ Amount	▼ 1 ² 3 Item_Key ▼	A ^B C Order_Detail_Key	▼ A ^B _C Description ▼ 📰 Items 🗤
1		1	195	00 5	1-1	Search Columns to Expand
2		2	10	00 nul	1-1	
3		1	50	00 1	2-1	Expand Aggregate
4		2	10	00 nul	2-1	
5		1	50	00 19	3-1	Select All Columns)
6		2	10	00 nul	3-1	Litem Name
7		1	20	00 31	4-1	
8		2	10	00 nul	4-1	ie nem_didup
9		1	120	00 2	1-2	
10		2	10	00 nul	1-2	Use original column name as prefix
11		1	50	00 1	2-2	
12		2	10	00 nul	2-2	OK Cancel
13		1	40	00 16	3-2	3 X3 metre matting Table

I unselect 'Use original column name as prefix'. I would only need to choose this option if the table already contained a column with the same name.



\times	/ $f_{\rm X}$ = Table	.ExpandTableColumn(Sou	<pre>urce, "Items", {"Item_Group"}, {"Item_G</pre>	roup"})		~	Query Settings	×
🔲 🖉 ge_Lir	ne_Number 💌 💲 /	Amount 💌 1	² 3 Item_Key A ^B C Order_Detail_K	ey A ^B _C Description	A ^B _C Item_Group	Ŧ	, ,	
1	1	50.00	1 2-1	Side Connecting Porch	Tent		A PROPERTIES	
2	1	50.00	1 2-2	Side Connecting Porch	Tent	^	Morgel	
3	1	50.00	1 2-3	Side Connecting Porch	Tent		Merger	
4	1	50.00	1 2-31	Side Connecting Porch	Tent		All Properties	
5	1	50.00	1 2-32	Side Connecting Porch	Tent		▲ APPLIED STEPS	
6	1	50.00	1 2-33	Side Connecting Porch	Tent		Course	
7	1	120.00	2 1-2	3 x3 metre marquee	Tent		X Expanded Items	54 (5)
8	1	120.00	2 1-15	3 x3 metre marquee	Tent		r copunded items	H
9	1	120.00	2 1-17	3 x3 metre marquee	Tent			
10	1	120.00	2 1.26	3 v3 metre marquee	Tent			

Note that the order of the rows has changed because the non-linked rows which had no item key have moved to the bottom.

×	✓ fx = Table.ExpandTabl	eColumn(So	ource, "Items", {"Item_G	roup"}, {"Item_Group"})		~	Query Settings	×
□, ge_	Line_Number 💌 \$ Amount	-	1 ² 3 Item_Key 👻	A ^B _C Order_Detail_Key	A ^B _C Description	A ^B _C Item_Group		
230	1	6.00	51	4-29	4ft round table	Furniture	PROPERTIES Name	
231	1	6.00	51	4-44	4ft round table	Furniture	Merge1	
232	1	6.00	51	4-59	4ft round table	Furniture	All Droportion	
233	1	150.00	54	4-7	Headphone Disco 25 Headsets	Music	Air Properties	
234	1	150.00	54	4-25	Headphone Disco 25 Headsets	Music	APPLIED STEPS	
235	1	150.00	54	4-37	Headphone Disco 25 Headsets	Music	Source	8
236	1	150.00	54	4-55	Headphone Disco 25 Headsets	Music	× Expanded Items	4
237	1	170.00	55	4-10	Headphone Disco 50 Headsets	Music		
238	1	170.00	55	4-40	Headphone Disco 50 Headsets	Music		
239	1	280.00	56	4-18	Headphone Disco 100 Headsets	Music		
240	1	280.00	56	4-48	Headphone Disco 100 Headsets	Music		
241	2	10.00	null	1-1	DELIVERY	null		
242	2	10.00	null	1-2	DELIVERY	null		
243	2	10.00	null	1-3	DELIVERY	null		
244	2	10.00	null	1-4	DELIVERY	null		
245	2	10.00	null	1-5	DELIVERY	null		
246	2	10.00	null	1-6	DELIVERY	null		
3.47	2	10.00			DELINICOV			

I can fix this by sorting on **Order_Key** and **Order_Line_Number**. There is a downward arrow icon next to each column heading which I can click and then choose to sort in ascending order.



Having done this for both columns, Power Query combines these sorts into one step. I also choose to rename the table to something more meaningful than **Merge1**.

\times	√ fx = Table.S	ort(#"Expanded Items",{{"Or	<pre>der_Key", Order.Ascending}, {</pre>	"Order_Line_Number", Order.Ascen	ding}})	~	Query Settings	×
	e_Line_Number 💌 \$ An	nount 💌 1 ² 3 Item_H	ey A ^B _C Order_Detail	_Key A ^B _C Description	A ^B _C Item_Group	Ŧ	, ,	
1	1	195.00	5 1-1	8 x 3 metre marquee	Tent		A PROPERTIES	
2	2	10.00	null 1-1	DELIVERY		null	ACCT Order Charges with Cr	000
3	1	50.00	1 2-1	Side Connecting Porch	Tent		Acci_ordel_charges_witt_on	oop
4	2	10.00	null 2-1	DELIVERY		null	All Properties	
5	2	10.00	null 3-1	DELIVERY		null	APPLIED STEPS	
6	1	50.00	19 3-1	6 x 4 metre matting	Floor		Course	
7	1	20.00	31 4-1	4 metre width partition wall	Wall		Expanded Items	ä
8	2	10.00	null 4-1	DELIVERY		null	× Sorted Rows	
9	1	120.00	2 1-2	3 x3 metre marquee	Tent		in solice hous	



I can now 'Close & Load' to create a new merged table, which can be used in Excel workbooks and the Excel data model. When merging queries do keep in mind the warnings above; if the queries are for use by Power Pivot only, then consider whether it would be more useful to load one merged table or separate tables that may be managed in Power Pivot. However, for creating Excel workbooks, merging is a useful way of pulling in data from many tables in order to view the data in a single table. Data may of course come from other external sources.

Next, I will look at extracting data from a website...

Extracting from a Website

Whilst Power Query will allow data to be extracted from the web, for many webpages, some knowledge of HTML is needed, and even then, a great deal of transformation is often required to get the data into a tabular form. However, if the page uses tables, then the data can be much easier to extract. Today, I show how to extract data from a webpage that holds information in a table.

For my example, I will use an excellent webpage which provides a list of training events by Excel specialists: perhaps it looks familiar?





On this page, there is a table of upcoming courses:

Upcoming Co	urses				
Search	SORT				
Location	Course	Course Date	Local Time	GMT	Duration
Online (Australia)	Power Pivot, Power Query and Power Bl	16 - 18 Feb 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	3 Days
Online (Australia)	Excel Tips and Tricks	23 Feb 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	1 Day
Online (Australia)	Einancial Modelling	24 - 25 Feb 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 Bl	10 - 12 May 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	3 Days

I start in the 'Get & Transform Data' section on the Data tab, by choosing to get my data 'From Web'.

File	Home Insert	Draw	Page Layout	Formulas	Data	Review
Get Data *	From Text/CSV	Recei	nt Sources ng Connections	Refresh All *	Queries & Properties Edit Links	Connections
	Get & Transt	orm Data		Quer	ies & Conn	ections
A1	From Web Import data from a	web page.	f_x			

The window that pops up gives me a choice of 'Basic' or 'Advanced' options. I could have used the basic option since my full web page is fairly short, but I have chosen the advanced option to show how webpage addresses may be built.

Basic Advanced	
JRL parts ①	
https://www.sumproduct.com	
/courses	
Add part	
URL preview	
https://www.sumproduct.com/courses	
Command timeout in minutes (optional)	
command timeout in minutes (optional)	
HTTP request header parameters (optional)	
Enter or select a value	
Add header	

I have chosen to access <u>https://www.sumproduct.com/courses</u>; I can opt to set timeouts if I find I am having problems with a particular website, but I will choose not to set any in this example (since I know how great this website is!).



If I were accessing <u>www.sumproduct.com</u> for the first time, then I would be prompted to confirm the authentication options, which default to 'Anonymous'. It is possible to see the same authentication options from 'Data Source Settings' at the bottom of the 'Get Data' dropdown:

File Home Insert Draw Page L	ayout Formulas	Data Review
Get Data ~ Errom Text/CSV Constraints Recent Sources From Web Existing Conner Existing Conner	s Refresh All ~	Queries & Connections Properties Edit Links
From File >	Qu	eries & Connections
From Database		
From Azure >	С	D
From Power <u>B</u> I (sumproduct.com)		
From Online Services		
From Other Sources		
Combine Queries		
Launch Power Query Editor		
Data Source Settings	Data Source Settin	ıgs
E Query Options	Manage settings for your data sources.	
10		

I select the settings for SumProduct:

Data sources in current workh	ook	
earch data source settings https://sumproduct0.sha https://www.sumproduct	Edit Permissions Edit Permissions Credentials Type: Anonymous Edit Delete Privacy Level None OK Cancel	2


I have chosen to use the anonymous setting, since the webpage I am viewing does not require any password or other security information. Future queries accessing the same website will use the existing authentication settings.

Once the authentication method has been defined, Power Query links to the webpage and returns the recognised content.

	P T	ble View	Web Viev	l.				
Select multiple items	0	ocume	nt					D
Display Options 👻	G .	ind	Name	Children	Text			
https://www.sumproduct.com/courses [2]	2] Element		HTML	Table		null		
Document								

The navigator pane shows that Power Query has identified a document and a table. The document highlighted clearly doesn't show any recognisable data about courses. More work would be required in order to obtain useful information from this. The table, however, proves more fruitful, as shown below:

<u>م</u>	Table View Web V	ïew	
Select multiple items	Table 0		Da
Display Options 👻	Location	Course	Course Date
Interpretation of the second secon	Online (Australia)	Power Piyot, Power Query and Power Bl	16 - 18 Feb 2022
Document	Online (Australia)	Excel Tips and Tricks	23 Feb 2022
Table 0	Online (Australia)	Financial Modelling	24 - 25 Feb 2022
III Table 0	Online (Australia)	Excel Tips and Tricks	11 Apr 2022
	Online (Australia)	Financial Modelling	12 - 13 Apr 2022
	Online (Australia)	Power Pivot, Power Query and Power BI	10 - 12 May 2022
	Online (Australia)	Excel Tips and Tricks	17 May 2022
	Online (Australia)	Financial Modelling	18 - 19 May 2022
	Online (Australia)	Power Pivot, Power Query and Power BI	19 - 21 Jul 2022
	Online (Australia)	Excel Tips and Tricks	26 Jul 2022
	Online (Australia)	Financial Modelling	27 - 28 Jul 2022
	Online (Australia)	Excel Tips and Tricks	29 Aug 2022
	Online (Australia)	Financial Modelling	30 - 31 Aug 2022
	Online (Australia)	Power Pivot, Power Query and Power BI	28 -30 Sep 2022
	Online (Australia)	Excel Tips and Tricks	5 Oct 2022
	Online (Australia)	Financial Modelling	6 - 7 Oct 2022
	Online (Australia)	Power Pivot, Power Query and Power BI	9 - 11 Nov 2022
	Online (Australia)	Excel Tips and Tricks	16 Nov 2022
	Online (Australia)	Financial Modelling	17 - 18 Nov 2022
	Online (Australia)	Power Pivot, Power Query and Power BI	7 - 9 Dec 2022
	Online (Australia)	Excel Tips and Tricks	14 Dec 2022
	<		>



I have a list of courses, and I choose to 'Transform Data' ready to load to an Excel workbook.

□ → A ^B _C Location	▼ A ^B _C Course	 A^B_C Course Date 	▼ A ^B _C Local Time	▼ A ^B C GMT	▼ A ^B _C Duration		
1 Online (Australia)	Power Pivot, Power Query and Power BI	16 - 18 Feb 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	3 Days	PROPERTIES	
2 Online (Australia)	Excel Tips and Tricks	23 Feb 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	1 Day	Table 0	
3 Online (Australia)	Financial Modelling	24 - 25 Feb 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	2 Days		
4 Online (Australia)	Excel Tips and Tricks	11 Apr 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	1 Day	All Properties	
5 Online (Australia)	Financial Modelling	12 - 13 Apr 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	2 Days	A APPLIED STEPS	
6 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	Course	
7 Online (Australia)	Excel Tips and Tricks	17 May 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	1 Day	Novigation	И
8 Online (Australia)	Financial Modelling	18 - 19 May 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	2 Days	X Changed Type	w
9 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	A changed type	
10 Online (Australia)	Excel Tips and Tricks	26 Jul 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	1 Day		
11 Online (Australia)	Financial Modelling	27 - 28 Jul 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	2 Days		
12 Online (Australia)	Excel Tips and Tricks	29 Aug 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	1 Day		
13 Online (Australia)	Financial Modelling	30 - 31 Aug 2022	09:00-17:00 AEST	(-1 day) 23:00-07:00 GMT	2 Days		
14 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		
15 Online (Australia)	Excel Tips and Tricks	5 Oct 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	1 Day		
16 Online (Australia)	Financial Modelling	6 - 7 Oct 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	2 Days		
17 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		
18 Online (Australia)	Excel Tips and Tricks	16 Nov 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	1 Day		
19 Online (Australia)	Financial Modelling	17 - 18 Nov 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	2 Days		
20 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		
21 Online (Australia)	Excel Tips and Tricks	14 Dec 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	1 Day		
22 Online (Australia)	Financial Modelling	15 - 16 Dec 2022	09:00-17:00 AEDT	(-1 day) 22:00-06:00 GMT	2 Days		

It all looks good, so I rename the query SumProduct Courses and 'Close & Load'.

_											
File	Home Insert Draw P	age Layout For	mulas Data Review View	Developer Add-ins	Help Power Pivot	able Design Query			Comments	🖻 Sha	are
Table N SumPro	ame: Summarize with Piv oduct_Cou Remove Duplicates ize Table & Convert to Range	notTable Insert Slicer	Export Refresh Solution Solution	Header Row First Total Row Last Sanded Rows Bane	Column 🗹 Filter Button Column ded Columns						
Pro	perties Tools		External Table Data	Table S	tyle Options		Table Styles				~
<mark>A1</mark>	• I × 🗸	fx									*
	А		В		С	D		A Queri	es & Connections	-	×
1	Location	Course		- C	ourse Date	Local Time	GMT	Queries	Connections		
2	Online (Australia)	Power Piv	vot, Power Query ar	d Power BI 1	6 - 18 Feb 2022	09:00-17:00	AEDT (-1 day)	2 1 query			
3	Online (Australia)	Excel Tips	s and Tricks	2	3 Feb 2022	09:00-17:00	AEDT (-1 day)	2 🔲 Suml	Product Courses		6
4	Online (Australia)	Financial	Modelling	2	4 - 25 Feb 2022	09:00-17:00	AEDT (-1 day)	22 10	ws loaded.		
5	Online (Australia)	Excel Tips	s and Tricks	1	1 Apr 2022	09:00-17:00	AEST (-1 day)	2			
6	Online (Australia)	Financial	Modelling	1	2 - 13 Apr 2022	09:00-17:00	AEST (-1 day)	2			
7	Online (Australia)	Power Piv	vot, Power Query ar	d Power BI 1	0 - 12 May 2022	09:00-17:00	AEST (-1 day)	2			
8	Online (Australia)	Excel Tips	s and Tricks	1	7 May 2022	09:00-17:00	AEST (-1 day)	2			
9	Online (Australia)	Financial	Modelling	1	8 - 19 May 2022	09:00-17:00	AEST (-1 day)	2			
10	Online (Australia)	Power Piv	vot, Power Query ar	d Power BI 1	9 - 21 Jul 2022	09:00-17:00	AEST (-1 day)	2			
11	Online (Australia)	Excel Tips	s and Tricks	2	6 Jul 2022	09:00-17:00	AEST (-1 day)	2			
12	Online (Australia)	Financial	Modelling	2	7 - 28 Jul 2022	09:00-17:00	AEST (-1 day)	2			
13	Online (Australia)	Excel Tips	s and Tricks	2	9 Aug 2022	09:00-17:00	AEST (-1 day)	2			
14	Online (Australia)	Financial	Modelling	3	0 - 31 Aug 2022	09:00-17:00	AEST (-1 day)	2			
15	Online (Australia)	Power Piv	vot, Power Query ar	d Power BI 2	8 -30 Sep 2022	09:00-17:00	AEST (-1 day)	2			

The link to the webpage may be refreshed in the same way as other data sources. A word of caution, however: in this case, I have used a reliable source, which I know will be well maintained, and which will not be subject to abrupt format changes without warning. Using content which I have no control over is risky and can lead to bad decisions being taken as a result of using out of date or erroneous data.



Introduction to M

For users already familiar with Power Pivot and Data Analysis eXpressions (DAX, the associated programming language), it might seem logical that Power Query would use a similar language and perhaps even the same formulae. Not so. Power Query has its own language, **M**, and its own formula syntax. So, having abandoned any expectation of familiarity, I need a good place to start looking at **M** language. I will create a custom column and look at a formula that can be associated with that new column.

I start out in the worksheet for the merged query I created earlier and open

ACCT_Order_Charges_with_Group to access the query editor. On the 'Add Column' tab, I choose to 'Custom Column':



The dialog box has a large section for the formula beneath the name I choose for my new custom column. Available columns in the query are shown and double clicking them adds them to the formula (or I can select and then choose to 'Insert' them).

Notice the option to 'Learn about Power Query formulas' at the bottom of the dialog box. This is the best place to find out what formulae are available in Power Query. Clicking here will take me to the Microsoft help page, which has a links to explain the Power Query **M** language and the functions available.

Having said that the formulae do not tend to match those for Power Pivot, there are some functions that are reassuringly familiar from Excel, as I will show now by concatenating two existing columns.

I decide to create a column that combines **Item_Group** and **Description** by double clicking each column (or using 'Insert'). I type in an '&' between the columns, which is the same as I would do in an Excel formula, and include a '/' to separate the data in the column to make it easier to read:



dd a column that is computed from the other columns.		
ew column name		
Custom		
ustom column formula 🕕	Available columns	
stom column formula 🕜 [Item_Group] & "\" & [Description]	Order_Line_Number Charge_Line_Number Amount Item_Key Order_Detail_Key Description	
	<< Insert	

I click 'OK' and my custom column is generated, ready to be loaded to my worksheet.

				and faces Teresbill a / a f			Query settings ×
	×	1 ² 3 Item_Key	A ^B _C Order_Detail_Key	A ^B C Description	A ^B C Item_Group	ABC 123 Custom	
1	195.00	5	1-1	8 x 3 metre marquee	Tent	Tent\8 x 3 metre marquee	PROPERTIES
2	10.00	null	1-1	DELIVERY	null	null	Name
3	50.00	1	2-1	Side Connecting Porch	Tent	Tent\Side Connecting Porch	ACCI_Order_Charges_with_Group
4	10.00	null	2-1	DELIVERY	null	null	All Properties
5	10.00	null	3-1	DELIVERY	null	null	A APPLIED STEPS
6	50.00	19	3-1	6 x 4 metre matting	Floor	Floor\6 x 4 metre matting	Course 10
7	20.00	31	4-1	4 metre width partition wall	Wall	Wall\4 metre width partition wall	Source SP
8	10.00	null	4-1	DELIVERY	null	null	Sorted Power
9	120.00	2	1-2	3 x3 metre marquee	Tent	Tent\3 x3 metre marquee	X Added Custom
10	10.00	null	1-2	DELIVERY	null	null	

There are other similarities with Excel: the symbols '+', '-', '*' and '/' are used for add, subtract, multiply and divide respectively too.

There are however some points to bear in mind when comparing Power Query formulae with Excel:

- Excel formulae are not case sensitive, but Power Query formulae are (this is a classic gotcha)
- Excel counts using a base of one [1] (*e.g.* the first letter in a string is at position 1), but Power Query uses a base of zero [0] (so the same letter would be at position 0)
- Excel will automatically convert data (*e.g.* concatenating a text column to a numerical column will work as Excel converts them to text automatically); Power Query will not (*e.g.* trying to concatenate text to a value will give errors in the new column the value must be converted to text first). This is why I picked two text columns for my example above.

If I go to the 'Advanced Editor' on the Home tab, I can see all the code for the current query.

File	Home Transform A	dd Column	View			~ 🕜
2	Properties		Lu 👬 📸 21 📋 🖳 Data Type: Any * 💭 Merge Queries * 📳 🗋 New Source *			
Close & Load *	Refresh Preview • III Manage *	Choose Columns •	Advanced Editor	×		
Close	Query	Manage	ACCT_Order_Charges_with_Group	0		
A III	CCT_Order_Charges			-	Query Settings	×
🔲 It	ems		<pre>let Source - Table.NestedJoin(ACCT_Order_Charges, {"Item_Key"}, Items, {"Item_Key"}, "Items", JoinKind.LeftOuter),</pre>		A PROPERTIES	
	CCT_Order_Charges_with_Gro	qu	<pre>#"Expanded Items" - Table.ExpandTableColumn(Source, 'Items", {"Item_Group"), {"Item_Group"}), #"Sorted Rows" - Table.Sort(#"Expanded Items",{{"Order Key", Order.Ascending}, {"Order Line Number", Order.Ascending}}),</pre>		Name	
			<pre>#"Added Custom" - Table.AddColumm(#"Sorted Rows", "Custom", each [Item_Group] & "\" & [Description])</pre>		ACCI_Order_Charges_wth_Group	
			#"Added Custom"		All Properties	
					APPLIED STEPS	
					Source	\$
					Expanded Items	4
					Sorted Rows	
					× Added Custom	\$



This allows me to view a short section of **M** language, which demonstrates some of the **M** language syntax rules:

The first line of every query must begin with 'let':

let

```
Source = Table.NestedJoin(ACCT_Order_Charges, {"Item_Key"}, Items, {"Item_Key"}, "Items", JoinKind.LeftOuter),
```

#"Expanded Items" = Table.ExpandTableColumn(Source, "Items", {"Item_Group"},
{"Item_Group"}),

```
#"Sorted Rows" = Table.Sort(#"Expanded Items",{{"Order_Key", Order.Ascending},
{"Order_Line_Number", Order.Ascending}}),
```

#"Added Custom" = Table.AddColumn(#"Sorted Rows", "Custom", each [Item_Group] & "\" &
[Description])

in

#"Added Custom"

In this case, I have five lines which refer to steps defining the source of the query (which I can see in the 'APPLIED STEPS' section in the Power Query Editor) and data manipulation. Some of the steps in the Advanced Editor are preceded by a '#', but more on this in a moment. The lines are separated by a comma (','). The end of the query is indicated by 'in' and a further step:

in

#"Added Custom"

This tells Power Query which step to return to once the query has been executed, in this case 'Added Custom'. The '#' at the beginning of some of the lines is a message to Power Query to ignore the spaces in the names (*e.g.* in 'Sorted Rows'). This is useful to know when creating steps manually.

The steps are sequential, and need to be linked to the previous step. Hence, the 'Sorted Rows' step refers to the 'Renamed Columns' step and the 'Renamed Columns' step refers to the 'Expanded NewColumn', *etc.* When inserting lines, I must adjust the surrounding lines to make sure the sequence is intact, otherwise I will get an error. Power Query has moved on since it was first created, and now if I am working with the Power Query editor, I can use the GUI interface to insert steps, and Power Query will automatically adjust the step names on the next step as required.



The lines are quite long and can get quite convoluted, so I can edit the format to make it easier to read:

	.naiges_with_oroup	Display Options 👻
let Source = Table.NestedJo: // I can add comments he	<pre>in(ACCT_Order_Charges, {"Item_Key"},</pre>	
#"Expanded Items" = Tabl	<pre>le.ExpandTableColumn(Source, "Items", {"Item_Group"}, {"Item_Group"}),</pre>	
#"Sorted Rows" = Table.9 /* I can add comments or	<pre>Sort(#"Expanded Items",{{"Order_Key", Order.Ascending},</pre>	
more chair one line ;	The state of the stat	
# Added Custom" - Table. in #"Added Custom"	,Audcolumn(# sorred nows , custom , each [item_droup] α (α [bescription])	

I have split the lines up to make them less of a long list of code. This may be useful when trying to keep track of whether all brackets have been closed (and closed in the right place). I have also inserted a single comment by preceding the line with '//', and a section of comments by preceding with '/*' and ending with '*/'. Users of earlier versions of Power Query may notice that the 'token comma' is now not needed after a comment section: do be guided by the syntax checker.

Done Cancel



The checker is at the bottom of the screen which will warn me if the syntax is wrong and allow me to jump to the error.

	Display Options 👻
et	
Source = Table.NestedJoin(ACCT_Order_Charges, {"Item_Key"}, Ttems. {"Item Key"}.	
"Items", JoinKind.LeftOuter),	
// I can add comments here	
<pre>#"Expanded Items" = Table.ExpandTableColumn(Source, "Items", {"Item_Group"}, {"Item_Group"}),</pre>	
<pre>#"Sorted Rows" = Table.Sort(#"Expanded Items",{{"Order Key", Order.Ascending},</pre>	
{"Order_Line_Number", Order.Ascending}}),	
/* I can add comments on more than one line */	
<pre>can make a deliberate error #"Added Custom" = Table.AddColumn(#"Sorted Rows", "Custom", each [Item_Group] & "\" & [Description])</pre>	
II MRAddad Avenue	
#"Added Custom"	

A more recent development in Power Query is to make the comments visible from 'APPLIED STEPS':

								Query settings
D.	*	1 ² 3 Item_Key 💌	A ^B C Order_Detail_Key	A ^B _C Description	A ^B C Item_Group	123 Custom	-	
	195.00	5	1-1	8 x 3 metre marquee	Tent	Tent\8 x 3 metre marquee		* PROPERTIES
	10.00	null	1-1	DELIVERY	null		n^	ACCT Order Charger with Group
	50.00	1	2-1	Side Connecting Porch	Tent	Tent\Side Connecting Porch		Acci_ordel_crarges_wid_calcup
	10.00	null	2-1	DELIVERY	null		n	All Properties
1	10.00	null	3-1	DELIVERY	null		n	A APPLIED STEPS
L	50.00	19	3-1	6 x 4 metre matting	Floor	Floor\6 x 4 metre matting		Source
	20.00	31	4-1	4 metre width partition wall	Wall	Wall\4 metre width partition wall		× Evnanded Items
	10.00	null	4-1	DELIVERY	null		n	Sorted Rows
	120.00	2	1-2	3 x3 metre marquee	Tent	Tent\3 x3 metre marquee		× Add I can add comments here
	10.00	null	1-2	DELIVERY	null		n	
	10.00	null	2-2	DELIVERY	null		E	

The next sections are all about building a Calendar query. The four steps are:

- **Step 1:** Create a table called **Parameters** in an Excel Worksheet to hold the calendar boundaries
- Step 2: Create a function fnGetParameter which uses the calendar boundaries as its parameters
- **Step 3:** Build the basic dynamic calendar framework
- Step 4: Add any required calendar columns.





Creating a Calendar – Step 1: Creating Parameters

In a new blank Excel Worksheet, I create a new table with some specific properties. My table is called **Parameters** and has two columns, **Parameter** and **Value**.

To begin, I will open a new blank Excel worksheet – in the 'Insert' Section, there is an option to 'Insert Table' which brings up a 'Create Table' dialogue box (**CTRL + T** is the shortcut). I choose an area that covers two columns and three rows (I chose **A7:B9** in the example shown below). I check the box 'My Table has Headers' and click OK.

File	Home	Insert	Dra	w Page La	iyout	Formulas	D
Paste	Cut Copy Copy Clipboard	۔ Painter	В	I U → I II Font	11] ~ <u>Ø</u>	- A^ A' - <u>A</u> -	III
A7		- 1	×	\checkmark fx			
	A	В	с	D	E	F	
1							
2							
3							
4							
5				Create Table		? X	
6							
7				Where is the da	ata for you	ur table?	
8				\$A\$7:\$B\$9			t
9				My table ha	as header:	5	
10					OK	Cancel	
11					-		_

Just as an aside, normally here at SumProduct, we will advocate always starting Tables in cell **A1** and calling the worksheet the same name as the Table. I am not going to do that here to show it is not necessary, but there is merit in doing this if data is exported to other programs too. It's best to give data exporting a "helping hand" on occasion.

Returning to my example, the 'Table Name' can be changed in the top left of the screen and must be set to **Parameters**. Clicking on the column names allows me to set them to **Parameter** and **Value**:

- 2	A	В	С
1			
2			
3			
4			
5			
6			
7	Paramete	Value	
8			
9			
10			
11			
12			



The parameters the function will be using are *Start Date* and *End Date*, and these are the entries in my first column. In the second column I enter the date I wish my calendar to begin at, and a formula that will show the last day of the current month.

Parameter	Value
Start Date	1/1/2016
End Date	=EOMONTH(TODAY(),0)

This may look like a long number to begin with: the data format on the column needs to be set to **Short Date** as shown below:

Cut Cut Copy Saste Clipboard	st Painter	alibri BI <u>U</u>	~ 11 ~ 🖽 ~ Font	✓ A [*] A [*] △ ✓ <u>A</u> ✓	= =	E 📰 🌮 - E 🗐 El El El	to an	rap Text erge & Cente	r ~ 151	123	General No specific format
31	•	× ×	fx.							12	Currency
A	В	с	D	E	F	G	н	1	J		Accounting
										÷	Short Date
Paramete *	Value 📔									(internet)	Long Date
Start Date End Date	42370	2									Time

My Parameter table is now ready for the fnGetParameter function:

1	А	В
1		
2		
3		
4		
5		
6		
7	Paramete 💌	Value 💽
8	Start Date	01-01-16
9	End Date	28-02-22



Creating a Calendar – Step 2: Create the fnGetParameter Function

I choose to create a new blank query by going to the 'From Other Sources' section of the 'Get Data' dropdown and choosing 'Blank Query' from the dropdown:

File Home Insert [From Text/CSV [From Web [From Table/Range	Draw Page Layo	ns Refres	ulas Data Queries h Propert Edit Lin	Review & Connectio	View ons Orga	Develope anization	er Add-ins
From Eile	>		Queries & Co	nnections		Data 1	ypes
From Database	>	E	F	G	н	1	J
From Azure	>						
From Power BI (sump	roduct.com)						
From Online Services	>	From	Table/Range				
From Other Sources	>	From	Web				
	>	From	<u>M</u> icrosoft Qu	lery			
Launch Power Query Editor Data Source Settings	f	From	SharePoint L	ist			
E Query Options		From	<u>O</u> Data Feed				
18 19 20		From	<u>H</u> adoop File ((HDFS)			
21 22 23		R From	Active Direct	ory			
24 25		From	Microsoft <u>E</u> x	change			
26 27 28		From	ODBC				
29 30		From	OLEDB				
Ready 🐼 Accessibility: Inve	et2 🕀	Blank	Query		Blank Quer Write a que	r y ery from scra	itch.

In the 'Query Editor' screen, I choose the 'Advanced Editor' from the 'Home' tab.

I enter the following **M** language:

```
in
```



Value

I then rename the query fnGetParameter.

Display Options *	
<pre>sterName as text) -> ramSource = cl.CurrentWorkbook()([Name="Parameters"]) [Content], ramRow = Table.SelectRows(ParamSource, each ([Parameter]=ParameterName)), lue = Table.IsEmpty(ParamRow) = true then null else Record.Field(ParamRow(0), "Value") lue</pre>	

When I choose to 'Close and Load' from the 'Home' tab the new query automatically saves as connection only. Double-clicking on it invokes the function:

	<i>f</i> x fnGetParameter	
	Connection only.	
ParameterName		

Now I have my parameters and a function which will read them, so that I may create my calendar framework and add columns to create a useful calendar.

Creating a Calendar – Step 3: Build Framework

Now I have set up my parameters and created a function to extract the values, I can begin to build my calendar. In the worksheet I created last time, I will start by creating another blank query, following the same procedure as before, and this time I will call it **Calendar**. The process I follow to create my calendar framework is to build a list of dates between the two parameters that I have specified.



I begin by entering a simple list in the formula bar:

= {1..10}



This gives a column of 10 numbers, which I can prepare for calendar format by transforming. Notice that Power Query automatically presents me with options for transforming a list.

In the 'Convert' section I choose to convert my list 'to Table', and take the default options:

File	Home Transform Add Column View Transform	
To Table Convert	Keep Remove Statistics Items * Items * Sort Numeric List	
>	× √ fx = {110}	
Queries	List 1 I 2 I 3 I 4 I 5 I 6 I 7 I 7 I 8 I 9 I 10 I	X To Table Create a table from a list of values. Select or enter delimiter None • How to handle extra columns Show as errors • OK Cancel



In the resulting table I right click my column and 'Change Type' to 'Date', and then rename my column **Date.**

File	Home Transform A	dd Column View										~ (
Close & Load *	Refresh Preview • Manage •	Chaose Remove Columns * Columns *	Keep Remove Rows * Rows *	ŽJ ZJ Split Column	Group Late Type: Date * Group Late Type: Date * By Late First Row as Headers * By Late First Row as Headers *	Merge Queries • Append Queries • Combine Files	Manage Parameters *	Data source settings	New Source *			
Close	Query	Manage Columns	Reduce Rows	Sort	Transform	Combine	Parameters	Data Sources	New Query			
>	$\times \sqrt{f_x}$ = Table	e.TransformColumnT	ypes(#"Renamed	Columns",	{"Date", type date}})					~	Query Settings	×
Queries	Image: Date 1 31-De 2 01-Ja 3 02-Ja 4 03-Ja 5 04-Ja	 -59 n-00 n-00 n-00 									PROPERTIES Name Cuery2 All Properties APPLIED STEPS	
	6 05-Jan 7 06-Jan 8 07-Jan 9 08-Jan 10 09-Jan	n-00 n-00 n-00 n-00									Source Converted to Table Renamed Columns X Changed Type	٥

They may not be current, but they are dates! Now I need my parameters.

I choose the 'Advanced Editor' from the 'Home' section. The editor shows the lines already created as a result of the transforming I have done. The 'Source' step currently shows my original list of 10 numbers: I need to change the source to look at my parameters instead of 1 and 10. Therefore, after 'let' and before the 'Source' line, I need to add my parameters, which I will call **startdate** and **enddate** thus:

```
startdate = fnGetParameter("Start Date"),
enddate = fnGetParameter("End Date"),
```



However, if I try this, I get the following error:



This is because I started with a list of numbers and *then* I tried to use dates instead. I need to express the dates as numbers, so I need to use the **Number.From** function:

startdate = Number.From(fnGetParameter("Start Date")), enddate = Number.From(fnGetParameter("End Date")),



When I use these definitions instead, my query returns a column of dates:

File	Home Transform A	Add Column View										~
Close & Load •	Refresh Preview * Manage * Query	Choose Remove Columns * Columns *	Keep Remove Rows * Rows * Reduce Rows	Â↓ Ă↓ CÎI Split Colum	Data Type: Date *	Merge Queries • Append Queries • Combine Files Combine	Manage Parameters • Parameters	Data source settings Data Sources	Recent Source •			
>	× √ fx = Table	.e.RenameColumns(#	"Changed Type"	,{{"Column]	L", "Date"}})					~	Query Settings	×
Queries	Date 1 01-Ja 2 02-Ja 3 03-Ja 4 04-Ja 5 05-Ja 6 05-Ja	v 7n-16 7n-16 7n-16 7n-16 7n-16								^	PROPERTIES Name Query1 All Properties APPLIED STEPS	
	7 07-Ja 8 08-Ja 9 09-Ja 10 10-Ja 11 11-Ja	n-16 n-16 n-16 n-16 n-16									startdate enddate Source Converted to Table Changed Type X Renamed Columns	¢

Creating a Calendar – Step 4: Adding More Date Columns

Although I have a calendar, it is a very basic calendar. A few more columns would be useful. For this, I am going to repeatedly use the 'Date' section of the 'Add Column' tab and use the options that are shown on the dropdown below:

FI	le Home	Transform Add Column Vie	ew						\sim
Colu	mn From Custom mples • Column	Index Column Function	ABC ABC ABC Events	XO 10 ² Statistics Standard Scientific	Trigonometry *	Time Duration			
		General	From Text	From	Age) Date & Time			
>	XV	fx = Table.RenameColumn	s(#"Changed Type",{{"Co	lumn1", "Date"}})	Date Only Parse		~	Query Settings	×
Queries	1 2 3 4 5	ate			Year Month Quarter Week Day Subtract Days		^	PROPERTIES Name Query1 All Properties APPLIED STEPS	
	6 7 8	06-Jan-16 07-Jan-16 08-Jan-16			Combine Date and Time Earliest Latest			startdate enddate Source	
	10 11	10-Jan-16 11-Jan-16						Converted to Table 4 Changed Type X Renamed Columns	E.

I choose to add the 'Year', 'Month', 'Day' and 'Quarter (of Year)' options. It doesn't matter what order I create them in as I can drag the columns to change the order:

File	Hon	me Transform Add Column Vi	ew.						~ 1
Colun Exan	in From Cus uples * Col	stom Invoke Custom Function General	Format Street	tigics Standard Scientific From Number	Date Time Durat) ion			
>	X	√ fx = Table.ReorderColum	ns(#"Inserted Day",{"Date"	, "Day", "Month", "Quarter", "Yea	})		~	Ouerv Settings	×
S		Date 💌 123 Day	12 Month	✓ 1.2 Quarter	▼ 1.2 Year	-			
ueri	1	01-Jan-16	I	1	1	2016		* PROPERTIES	
a	2	02-Jan-16	2	1	1	2016	<u>^</u>	, Name	
	3	03-Jan-16	3	1	1	2016		Coberys	
	4	04-Jan-16	4	1	1	2016		All Properties	
	5	05-Jan-16	5	1	1	2016		A APPLIED STEPS	
	6	06-Jan-16	6	1	1	2016		startidate	
	7	07-Jan-16	7	1	1	2016		anddate	
	8	08-Jan-16	8	I	1	2016		Source	
	9	09-Jan-16	9	1	1	2016		Converted to Table	8
	10	10-Jan-16	10	1	1	2016		Changed Type	
	11	11-Jan-16	21	1	. 1	2016		Renamed Columns	
	12	12-Jan-16	12	1	1	2016		Inserted Quarter	0
	13	13-Jan-16	13	1	1	2016		Inserted Month	0
	14	14-Jan-16	14	1	1	2016		Inserted Year	4
	15	15-Jan-16	15	1	1	2016		Inserted Day	0
	16	16-Jan-16	16	1	1	2016		➤ Reordered Columns	



On the 'Home' tab, I then choose to 'Close and Load' to see that all the Calendar entries have been created as I expected. The entries automatically appear in a separate sheet to my **Parameters** table:

Fi	e Hom	e Insert	Draw	Page L	ayout	Formulas	Data	Review	View	Developer	Add-in:	s Help	Power P	ivot T	able Design	Query				모 Comments 넘	Share
Tab	e Name:	Sur	nmarize with	PivotTab	le 🚍			Properties		✓ Header Ro	v 🗌 Firs	t Column	✓ Filter	r Button				88888			
Qu	nd	Rer	nove Duplic	ates	E7	H H	LOF	Open in Re		Total Row	Las	t Column					22222	=====	Ξ		
m	Desire Table		nore o opne		Insert	Export	Refresh	tinen.		Randed Ro	Ars Ran	ded Colum	ns						-		
÷.	Wesize Japle	Galcor	iven to hang	le.	Slicer		*	Onlink		builded ito		aca colum									
_	Properties		To	ols			External	Table Data			Table :	Style Options						Table Style	25		^
A	1	•	1 ×	$\sqrt{-f_x}$																	٣
1	A	в	с	D	E	F	G	н	1	1 1	к	L I	м	N	0	Р	Q	R			
1	Date 💌 I	ay 🝷 Mo	nth 👻 Qua	rter 💌 Y	'ear 💌															Queries & Connections *	×
2	01-01-16	1	1	1	2016															entre l'entretter	
3	02-01-16	2	1	1	2016															Queries Connections	
4	03-01-16	3	1	1	2016															2 queries	
5	04-01-16	4	1	1	2016																
6	05-01-16	5	1	1	2016															Jx InGetParameter	
7	06-01-16	6	1	1	2016															Connection only.	
8	07-01-16	7	1	1	2016															Ouerv1	D
9	08-01-16	8	1	1	2016															2 251 rows loaded	
10	09-01-16	9	1	1	2016															Lico i fono logocol	
11	10-01-16	10	1	1	2016																
12	11-01-16	11	1	1	2016																
13	12-01-16	12	1	1	2016																
14	13-01-16	13	1	1	2016																
15	14-01-16	14	1	1	2016																
16	15-01-16	15	1	1	2016																
17	16-01-16	16	1	1	2016																
18	17-01-16	17	1	1	2016																
19	18-01-16	18	1	1	2016																
20	19-01-16	19	1	1	2016																
21	20-01-16	20	1	1	2016																
22	21-01-16	21	1	1	2016																
23	22-01-16	22	1	1	2016																
24	23-01-16	23	1	1	2016																
25	24-01-16	24	1	1	2016																
26	25-01-16	25	1	1	2016																
27	26-01-16	26	1	1	2016																
28	27-01-16	27	1	1	2016																
29	28-01-16	28	1	1	2016																
30	29-01-16	29	1	1	2016																

My calendar is ready for use.

More on Parameters

Parameters are not just useful for creating Calendars. In this extended section I look at some other uses:

I am looking at some exam results:

	A	В
1	Name 📮	Result 🚽
2	Amy	96
3	Bob	46
4	Claire	90
5	Dave	28
6	Eric	81
7	Fatima	52
8	Georges	78
9	Hal	96
10	lan	24
11	Jan	65
12	Kit	87
13	Liam	86
14	Mick	29
15	NI -	20



I will be grading the results and I will be using this example to explore parameters. I'll start by extracting my data into Power Query, where I will create the grade column. To extract my data, I choose 'From Table/Range' from the 'Get & Transform' section of the Data tab.

×	√ fx = Table.Tr	ansformColumnTypes(Source,	<pre>{{"Name", type text}, {"Result", Int64.Type}})</pre>	~	Query Settings
	A ^B _C Name	1 ² 3 Result			+ DRODERTIES
1	Amy	96			* PROPERTIES
2	Bob	46			Name
3	Claire	90			Exam Results
4	Dave	28			All Properties
5	Eric	81			
6	Fatima	52			
7	Georges	78			Source
8	Hal	96			× Changed Type
9	lan	24			
10	Jan	65			
11	V It	07			

Conditional Columns

I have called my query **Exam Results**. I will begin by creating a Conditional Column from the 'Add Column' tab:

File	Home	Transform	Add Column	View
-	*	*	Conditional Co	lumn
Column Fro Examples	om Custom I Column	Invoke Custom Function General	Index Column	mn
Condition	al Column		<	\sim
Create a condition currently	new column ally adds the selected colu	that values in the umn.		

I call the new column **Grade**, and create the grade bands for the results. Each Clause will look at whether the Result 'is greater than' a Value, and I will start with the highest grade.

ew column name				
irade				
Column Name	Operator Value 🛈		Output 🕕	
Result	▼ is greater than ▼ ABC ▼	Then	ABC -	
	equals			
dd Clause	does not equal			
	is greater than			
	is greater than or coulton			
e ()	is less than			
3	is less than or equal to			

For now, I will be entering values, but I plan to replace this with parameters later.

×



ridd conditional column

Add a conditional column that is computed from the other columns or values.

New co Grade	olumn name						
	Column Name	Operator	Valu	e 🛈		Output ①	
lf	Result *	is greater than 🔹	ABC 123	•	Then	ABC -	
Add C	lause		ABC 123	Enter a value Select a column Parameter			
Else () ABC 123 *						ок	Cancel

I create a Clause for each band.

Ъ	
	۰.

 \times

Add Conditional Column

Add a conditional column that is computed from the other columns or values.

orado		-							
	Column Name		Operator	Value	0		Outpu	t 🕕	
f	Result	Ŧ	is greater than 🔹	ABC +	90	Then	ABC 123 -	9	
lse If	Result	•	is greater than 🔹	ABC +	80	Then	ABC 123 *	8	
lse lf	Result	Ŧ	is greater than 🔹	ABC +	70	Then	ABC +	7	
lse lf	Result	•	is greater than 🔹	ABC +	60	Then	ABC -	6	
lse lf	Result	•	is greater than 🔹	ABC +	50	Then	ABC +	5	
lse lf	Result	•	is greater than 🔹	ABC +	40	Then	ABC 123 *	4	,
	r	1		ARC	٦٢		ARC	II	
Add Cla	ause								
se ()	Ungraded								

Note that, if I miss one, I can add it later and then change the order using the menu next to each Clause.



w col	umn name							
rade								
	Column Name	Operator	Value	0		Output		
	Result	 is greater than 	▼ ABC 123 ▼	90	Then	ABC - 9		~
e If	Result	 is greater than 	▼ ABC ▼	80	Then	ABC - 8		
e If	Result	• is greater than	* ABC *	70	Then	ABC - 7		
e If	Result	▼ is greater than	✓ ABC 123 ▼	60	Then	ABC ▼ 6	<u>.</u>	·
e If	Result	▼ is greater than	▼ ABC ▼	50	Then	ABC 123 ▼ 5		Delete Move Up
e If	Result	▼ is greater than	- ABC -	40	Then	ABC ▼ 4		Move Down
	· .	1	ARC	1	1	ARC .	1	
dd Cl	ause							
• @								
-	Ungraded							

I click OK to see the new column:

\times	√ fx = Table.A	ddColumn(#"Changed Type",	"Grade", each if [Result	t] > 90 then 9 else if [Result] > 80 then 8 else if [Result] > 70 $\qquad \checkmark$	Query Settings
	A ^B _C Name	12 ₃ Result	ABC Grade		(DRODEDTIES
1	Amy	96	9		A PROPERTIES
2	Bob	46	4		Evam Peruite
3	Claire	90	8		Likeningsons
4	Dave	28	Ungraded		All Properties
5	Eric	81	8		APPLIED STEPS
6	Fatima	52	5		C
7	Georges	78	7		Chapped Turpe
8	Hal	96	9		X Added Conditional Column
9	lan	24	Ungraded		Added Conditional Column
10	Jan	65	6		
11	Kit	87	8		
12	Liam	86	8		

The **M** code generated for this step is as follows:

Table.AddColumn(#"Changed Type", "Grade", each if [Result] > 90 then 9 else if [Result] > 80 then 8 else if [Result] > 70 then 7 else if [Result] > 60 then 6 else if [Result] > 50 then 5 else if [Result] > 40 then 4 else if [Result] > 30 then 3 else "Ungraded")

I can change this in the Advanced Editor, which I access from the Home tab. I want to format it so that the boundaries are easier to see. I can split each step over any number of lines, a comma (,) or (as in this case) the 'in' statement indicates when the step is complete.



	Display Options 💌
let	
<pre>Source = Excel.CurrentWorkbook(){[Name="Table1"]}[Content], #"Changed Type" = Table.TransformColumnTypes(Source,{{"Name", type text}, {"Result", Int64.Type}}),</pre>	
#"Added Conditional Caluma" =	
Table (ddGlum(#"Changed Type" "Grade" each	
if [Result] > 90 then 9	
else if Result > 80 then 8	
else if [Result] > 70 then 7	
else if [Result] > 60 then 6	
else if [Result] > 50 then 5	
else if [Result] > 40 then 4	
else if [Result] > 30 then 3	
else "Ungraded")	
#"Added Conditional Column"	

Power Query Parameters

I am now ready to create some parameters to decide the grades.

To begin with, I will enter these parameters from the 'Manage Parameter' option on the Home tab:





I opt to create a 'New Parameter'. This brings up a dialog:

	New	Name
Parameter1	×	Parameter1
		Description
		☑ Required Type
		Any *
		Any value +
		Current Value

 \times



I am going to enter a parameter for each grade. I call my first parameter **P_Grade_9**:

	New	Name
BC P_Grade_9	×	P_Grade_9
		Description
		Percentage required to achieve grade 9.
		Required
		Туре
		Any -
		Any
		Decimal Number
		Date/Time
		Date
		Time
		Date/Time/Timezone
		Duration
		Text
		True/False
		Binary
		Binary

OK

Cancel

×



The '**P_'** is to indicate it is a **p**arameter. This will make it easy to spot in the list of queries. I also enter a description. When I choose the Type, there is no option for percentage, so I make it a 'Decimal Number' instead.

	New	Name
P_Grade_9	×	P_Grade_9
		Description
		Percentage required to achieve grade 9.
		✓ Required Type
		Decimal Number 👻
		Suggested Values
		Any value 👻
		Any value
		List of values
		Query

OK

Cancel

 \times



For now, I will allow 'Any value'. I will be revisiting the 'Suggested Values' dropdown for this example later.

×	P_Grade_9
	Description
	Description
	Percentage required to achieve grade 9.
	Required
	Decimal Number
	Suggested Values
	Any value
	Current Value
	90

To complete this parameter, I enter a 'Current Value' of 90. If I were to click 'OK' at this point, the parameter would be created, and I would automatically exit the dialog:

File	Home Tra	insform Add C	Column View								
Close & Load •	Refresh Preview - Ma	vanced Editor nage • Co	Choose Remove	Keep Remove Rows * Rows *	2↓ Z↓	Split Group Column * By	Data Type: Any * Use First Row as Headers * 1 ₉₂ Replace Values	Merge Queries * Append Queries * Combine Files	Manage Parameters •	Data source settings	New Source Recent Sources Enter Data
Close	Quer	y M	Manage Columns	Reduce Rows	Sort		Transform	Combine	Parameters	Data Sources	New Query
Queries E: P	[2] kam Results _Grade_9 (90)		Cur 90	ent Value							
			M	anage Parameter							

I can see the parameter in the Queries panel. If the parameter is selected, then I can edit the 'Current Value' if I wish. The 'Current Value' also appears next to the parameter in brackets '(90)' so that I can always see what it is set to in the Queries panel.

Х



If I want to create multiple parameters, then I can stay in the 'Manage Parameter' dialog by clicking 'New' instead of 'OK' when I have finished each parameter:

Ма	nage Parame	eters	
		New	Name
123	P_Grade_9	×	P_Grade_9

Note that since my parameters are similar, I can also copy and paste or create Duplicates:

Exam Res	ults	Current Value 80		
P_Grade_	9 (90)			
P_Grade_	8 (80)	Manage Parameter		
	Paste			
	➤ Delete ■ Rename			
	Duplicate			
	Reference			

This is fine, as long as I remember to change the name, description and 'Current Value'. Do not create a 'Reference'. This would return the 'Current Value' of the parameter:

Queries [4			~	fx	= P Grade 8
Exa	m Results			-	
🗐 P_G	rade_9 (90)	80	80		
🗐 P_G	rade_8 (80)				
1 ² 3 P_G	rade_8 (2)				

The icon next to **P_Grade_8 (2)** indicates a number. Note also that the '(2)' in this case is created because there is already a **P_Grade_8** and is not the value!



I now have all my parameters ready for the next step:

Queries [8]	
Exam Results	
P_Grade_9 (90)	
📱 P_Grade_8 (80)	Manage Parameter
P_Grade_7 (70)	Manage Parameter
P_Grade_6 (60)	
P_Grade_5 (50)	
P_Grade_4 (40)	
P_Grade_3 (30)	

I can now edit the original query using the Advanced Editor, which I access from the Home tab:



I change the **M** code in the 'Added Conditional Column' step from:

```
Table.AddColumn(#"Changed Type", "Grade", each
        if
                [Result] > 90 then 9
        else if [Result] > 80 then 8
        else if [Result] > 70 then 7
        else if [Result] > 60 then 6
        else if [Result] > 50 then 5
        else if [Result] > 40 then 4
        else if [Result] > 30 then 3
        else "Ungraded")
to
Table.AddColumn(#"Changed Type", "Grade", each
        if [Result] > P_Grade_9 then 9
        else if [Result] > P_Grade_8 then 8
        else if [Result] > P_Grade_7 then 7
        else if [Result] > P_Grade_6 then 6
        else if [Result] > P_Grade_5 then 5
        else if [Result] > P_Grade_4 then 4
        else if [Result] > P_Grade_3 then 3
        else "Ungraded")
```

I can use the Intellisense to make sure I enter the correct name for each parameter:

<pre>let Source = Excel.CurrentWk #"Changed Type" = Table. #"Added Conditional Colt Table.AddColumn(#"Change</pre>	<pre>brkbook(){[Name="Table1"]}[Content], TransformColumnTypes(Source,{{"Name", type text}, {"Result", Int64.Type}}), mm" = d Type", "Grade", each</pre>	
if [Result] > F	then 9	
<pre>else if [Result] > : else "Ungraded") in #"Added Conditional Colu</pre>	(a) P_Grade_3 (b) P_Grade_4 (a) P_Grade_5 (c) P_Grade_7 (a) P_Grade_7 (c) P_Grade_7 (a) P_Grade_8 (c) P_Grade_9 (a) P_Grade_9 (c) Passorod. Type (b) Parcentage.From (c) Percentage.From (c) PercentileMode.ExcelExc (c) PercentileMode.ExcelExc	

Done Cancel



I also rename the step to 'Assigned Grade':

ann Results	Display Options 👻
t a ray management of a source of a source of the source o	
<pre>Source = Excel.CurrentWorkbook(){[Name="Table1"]}[Content], #"Changed Type" = Table.TransformColumnTypes(Source,{{"Name", type text}, {"Result", Int64.Type}}),</pre>	
ANALIZING PAILS	
# ASSIGNED Grade = Table AddColume(#"Changed Tupo", "Grade", carb	
if [Regult] > Grade 9 than 9	
else if [Result] > P Grade 8 then 8	
else if [Result] > P Grade 7 then 7	
else if [Result] > P Grade 6 then 6	
<pre>else if [Result] > P_Grade_5 then 5</pre>	
<pre>else if [Result] > P_Grade_4 then 4</pre>	
<pre>else if [Result] > P_Grade_3 then 3</pre>	
else "Ungraded")	
#"Assigned Grade"	
······································	

I click 'Done' to make sure that the query still works as I expect:

X	√ fx = Table.Ad	Query Settings			
	A ^B C Name	1 ² 3 Result	ABC 123 Grade		
1	Amy	96	9		A PROPERTIES
2	Bob	46	4		Evan Porulte
3	Claire	90	8		Examinesuits
4	Dave	28	Ungraded		All Properties
5	Eric	81	8		A APPLIED STEPS
6	Fatima	52	5		Source
7	Georges	78	7		Changed Type
8	Hal	96	9		X Assigned Grade
9	lan	24	Ungraded		
10	Jan	65	6		



Using Defined Names as Parameters

Whilst I can change these parameters in Power Query, I'd now like to have parameters that I can change from Excel. On a new Excel Sheet, I have some data for the thresholds:

А		В
Grade		Threshold
	9	90
	8	80
	7	70
	6	60
	5	50
	4	40
	3	30

I start by defining a Name for the first threshold. I can do this by selecting the cell and right-clicking:

1	A	E Calibri ~ 20 ~ A^ A* \$ ~ % 9
1	Grade	Thres B I = 💁 - 🛆 - 🖽 - 58 🕺 🗳
2	9	X Cut
3	8	Сэ сору
4	7	Paste Options:
5	6	CD .
6	5	Paste <u>S</u> pecial
7	4	Smart Lookup
8	3	Insert
9		Delete Clear Contents
10		🙆 Quick Analysis
11		Filtgr >
12		S <u>o</u> rt →
13		↓ New Comment
14		D New Note
15		Eormat Cells
16		Pick From Drop-down List
47		

I define the Name to be 'Grade_9':



Grade		Threshold				
	9	90				
	8	80	New Nam	e	?	×
	7	70	Scope:	Grade_9 Workbook	~	
	6	60	C <u>o</u> mment:			^
	5	50				
	4	40	Refers to:			V
	3	30	<u>Refers to:</u>	=Parameters:\$B\$2	Canc	el

I can now see this in Power Query. In the Power Query Editor, I create a new Blank Query. I can do this by right-clicking in the Queries pane (this is one of several methods to create a Blank Query):

File	Home	Transform	Add Column	Viet	W			
Close & Load •	Refresh Preview •	Properties	Choose Columns *	Remov Column	re Keep s Rows S	Remove Rows •	2↓ Z↓ 「 co	Split Group lumn • By
						- 11	WORK .	
Queries	[8]				√ f	x = Ex	cel.Cu	rrentWorkbo
E D	tam Result	ls			ABC Name		*	ABC Result
P_	Grade_9 (90)		1	Amy			
P.	Grade_8 (80)		2	Bob			
📳 P_	Grade_7 (70)		3	Claire			
📳 P.	Grade_6 (60)		4	Dave			
P_	Grade_5 (50)		5	Eric			
P	Grade 4 (40)		6	Fatima			
P P	Grade 3 (30)		7	Georges			
	01000_01	201		8	Hal			
				9	lan			
				10	Jan			
				11	Kit			
				12	Liam			
				13	Mick			
				14	Norris			
				15	Olga			
		Paste		16	Petra			
		New Quer	y + 🗋	File		a)		
		New Grou	p	Datal	base	¥		
		Exmand Al	Δ	Azure				
		Collance /		Onlin	e Services	×		
		- compose a		Other	Sources	• 🕀 W	/eb	
				Comb	oine	, 🚯 S	harePoi	nt lists
			G	Recei	nt Sources	, 🛄 О	Data fe DFS	ed
				25	Yvonne	28 A	ctive D	rectory
				26	Zoe	♦ 0	DBC	
						♦ 0	LE DB	
						L≩ B	lank Qu	ery



In my Blank Query, I enter the following **M** code:

= Excel.CurrentWorkbook()

This will show me what is in the current Excel Workbook:

✓ fx = Excel.CurrentWorkbook()	✓ Query Settings
ABC Content	A DEODEDTIES
Table Table1	Name
2 Table Exam_Results	Quant
3 Table Grade_9	Guery
	All Properties
	▲ APPLIED STEPS
	Source

There is the **Grade_9** I created. The value will be in the 'Table' next to it.

I filter **Name** to get just the 'Grade_9' row:

-	ABC 123 Content	A ^B _C Name	
₽Ļ	Sort Ascending		
Z↓	Sort Descending		
	Clear Sort		
*	Clear Filter		
	Remove Empty		
	Text Filters		•
	Search		
	(Select All)		
	Exam_Results		
	Grade_9		
	Table1		

This gives me just one table:

×	√ fx	= Table.Se	lectRows(Sourc	e, each ([Name] = " <mark>Grade_</mark> 9"))
	ABC 123 Content	¢الې	A ^B C Name		
1	Table		Grade_9		

I click on the green 'Table'.

X √ fx = Table.TransformColumnTypes(Grade_9,{{"Column1", Int64.Type}})	~	Query Settings	×
Image iP3 Column1 Image 1 90		PROPERTIES Name Query1 All Properties APPLIED STEPS	
		Source Filtered Rows Grade_9 ➤ Changed Type	ø



I now have the value of **Grade_9** in the column. I can remove the 'Changed Type' step and right-click and drill down on the value.



This gives me the value, and I now rename my query **DP_Grade_9**:

× ✓ fx = Grade_9{0}[Column1]	✓ Query Settings >>
90	PROPERTIES Name DP_Grade_9 All Properties
	▲ APPLIED STEPS
	Source Filtered Rows & Grade_9 × Column1

Since this query returns a value, the icon next to it indicates a whole number:

123 DP_Grade_9

Note that when I 'Close & Load' my queries to Excel, I should make sure that **DP_Grade_9** is set to 'Connection Only':





This is a default for queries created as Parameters in Power Query, but not for **DP_Grade_9**, as it has been created from a query. This brings me to another point. I right-click on **DP_Grade_9** in the Queries pane. There is an option to 'Convert to Parameter' but it is greyed out.



Whilst the final result of my query is a single value, I am not allowed to convert it. This option is only available if I create a very simple query which equals a value. I can create a new Blank Query to demonstrate this by right-clicking in the Queries pane:

			1.5	0.80		
Ĩb.	Paste		16	Petra		
	New Query >	D	File		-	
	New Group		Database		-	
	Expand All	4	Azure Onlin	e Services	;	
	Conapse An	Ŷ	Other	Sources	•	Web
			Comb	pine	, S	OData feed
		6	Recer	nt Sources	<u>'</u>	HDFS
			25	Yvonne	20	Active Directory
			26	Zoe	2	ODBC
					È	Blank Query

I create a query which is set to a single text value:

\times \checkmark $f_{\rm x}$ This can be converted to a parameter \checkmark	Query Settings ×
This can be converted to a parameter	PROPERTIES Name I am a parameter All Properties APPLIED STEPS Source



The **M** code I used to create this is simply:

= "This can be converted to a parameter"

When I right click on this query in the Queries pane,



I can 'Convert to Parameter' and it looks just like the other '**P_Grade**...' parameters that I created:

Quer	ies [10] <	Connectively
	Exam Results	This can be converted to a parameter
	P_Grade_9 (90)	
	P_Grade_8 (80)	Manage Parameter
	P_Grade_7 (70)	Wonage Parameter
-8	P_Grade_6 (60)	
	P_Grade_5 (50)	
	P_Grade_4 (40)	
	P_Grade_3 (30)	
123	DP_Grade_9	
	I am a parameter (This can be converte	



I would like this to be available for queries like **DP_Grade_9** too, so that I could have the current value in brackets and the ability to select it as a parameter from other functions. However, this is not an option. I suspect this is because the query is converted to Metadata, as indicated by the Advanced Editor view of I am a parameter:

l am a parameter			
	lay Option	15 💌	0
"This can be converted to a parameter" meta [IsParameterQuery=true, Type="Any", IsParameterQueryRequired=true]			

The previous source step is no longer available. This would imply that I can't keep the previous steps of **DP_Grade_9** and convert it to a parameter. I've seen this question on forums, and this is my conclusion!

I now define names for all the cells that I want to use as parameters:

А	В	С	D	E	F	G
Grade	Threshold	Name Manager				? ×
9	90	<u>N</u> ew	Edit	<u>D</u> elete		<u>F</u> ilter ▼
8	80	Name	Value	Refers To	Scope	Comment
7	70	Grade_3	30	=Parameters!\$B\$8	Workbook	
6	60	Grade_5	50	=Parameters!\$B\$6 =Parameters!\$B\$5	Workbook	
5	50	Grade_7	70 80	=Parameters!\$B\$4 =Parameters!\$B\$3	Workbook	
4	40	Grade_9	90 {"Amv"."96":"Bob"."46	=Parameters!\$B\$2 " =Data!\$A\$2:\$B\$27	Workbook Workbook	
3	30	The state of the				
		Refers to:				>
		=Para	ameters!\$B\$8			Ì
		-				Close



If I go to the **DP_Grade_9** query in the Power Query Editor, I can view the Source step:

\geq	√ ƒx = Excel	Query Settings	×		
1 2 3	1 125 Content 1 Table 2 Table 3 Table	Image: State		PROPERTIES Name DP_Grade_9 All Properties APPLIED STEPS	
				Source Filtered Rows Grade_9 Changed Type Column1	\$

I 'Refresh Preview', using the option on the Home tab:

File	Home	Transform
Close & Load •	Refresh Preview	Properties
Close		Query

I notice that the other named cells now appear:

$\times \sqrt{f_x}$ =	Excel.CurrentWorkbook()
ABC 123 Content	∮ir∮ A ^B c Name ▼
1 Table	Table1
2 Table	Exam_Results
3 Table	Grade_3
4 Table	Grade_4
5 Table	Grade_5
6 Table	Grade_6
7 Table	Grade_7
8 Table	Grade_8
9 Table	Grade_9



I can create a duplicate of DP_Grade_9:



I can use this as a template to create the other queries:

X ✓ fx = Table.SelectRows(Source, each ([Name] = "Grade_9"))	Query Settings ×
Imp MB Content MB Y 1 Table Grade_9	PROPERTIES Name DP_Grade_8 All Properties
Filter Rows Apply one or more filter conditions to the rows in this table. ◎ Basic ○ Advanced Keep rows where 'Name' equals • A [®] • Grade_9 • @ And ○ Or • A [®] • Enter or select a value • OK Cancel	APPLIED STEPS Source Filtered Rows Grade 9 Changed Type Column1

I have renamed the duplicate query, and I click on the cog next to 'Filtered Rows' to amend the value of **Name** selected to 'Grade_8'. Note that the step 'Grade_9' will also need to be edited, as I will see as soon as I click OK and move to that step.




This step is trying to expand the **Content** column which corresponds to the **Name** 'Grade_9'. The **M** code is:

```
= #"Filtered Rows"{[Name="Grade_9"]}[Content]
```

I can change this to:

```
= #"Filtered Rows"{[Name="Grade_8"]}[Content]
```



I have the correct result, but I should also right-click on the step and change the name to avoid confusion:





I have completed this query:

X √ fx - #"Changed Type"{0}[Column1]	~	Query Settings	×
80	PROPERTIES Name DP_Grade_8 All Properties APPLIED STEPS		
		Source Filtered Rows Grade_8 Changed Type X Column1	¢

I repeat this process for the other named cells:



I will now apply these parameters to the **Exam Results** query and check that any changes to the Excel cells affect the outcome of the query.

I now return to the Exam Results query.

$\times \sqrt{f_x} = Tabl$	le.AddColumn(#"Changed Type", "Grade",	each	✓ Query Setting
] _↓ A ^B _C Name	▼ 1 ² 3 Result ▼ ^{ABC} Grade	•	
1 Amy	96	9	A PROPERTIES
2 Bob	46	4	Name
3 Claire	90	8	Exam Results
4 Dave	28 Ungraded		All Properties
5 Eric	81	8	A APPLIED STEPS
6 Fatima	52	5	Course
7 Georges	78	7	Channed Type
8 Hal	96	9	× Assigned Grade
lan	24 Ungraded		TTT Bigita of da
0 Jan	65	6	
1 Kit	87	8	
2 Llam	86	8	
3 Mick	29 Ungraded		
4 Norris	26 Ungraded		
5 Olga	67	6	
6 Petra	23 Ungraded		
7 Quentin	63	6	
8 Raoul	29 Ungraded		
9 Sammy	60	5	
0 Tammy	47	4	
1 Una	50	4	
2 Violet	76	7	
3 Wilbur	76	7	
4 Xavier	53	5	
15 Yvonne	24 Ungraded		
.6 Zoe	68	б	



The easiest way to change the query to use the Excel controlled parameters is by editing in the Advanced Editor, which I can access from the Home tab:



Done Cancel

The 'Assigned Grade' step is changed from:

```
#"Assigned Grade" =
    Table.AddColumn(#"Changed Type", "Grade", each
        if
                 [Result] > P_Grade_9 then 9
        else if [Result] > P_Grade_8 then 8
        else if [Result] > P_Grade_7 then 7
        else if [Result] > P_Grade_6 then 6
else if [Result] > P_Grade_5 then 5
        else if [Result] > P_Grade_4 then 4
        else if [Result] > P_Grade_3 then 3
        else "Ungraded")
to
#"Assigned Grade" =
    Table.AddColumn(#"Changed Type", "Grade", each
        if
                 [Result] > DP_Grade_9 then 9
        else if [Result] > DP_Grade_8 then 8
        else if [Result] > DP_Grade_7 then 7
        else if [Result] > DP_Grade_6 then 6
        else if [Result] > DP_Grade_5 then 5
        else if [Result] > DP Grade 4 then 4
        else if [Result] > DP_Grade_3 then 3
        else "Ungraded")
```



This works because each 'DP_' query represents one value:

		Display Options
let		
Source = Excel.Current	<pre>workbook(){[Name="Table1"]}[Content], e.TransformColumnTypes(Source,{{"Name", type text}, {"Result", Int64.Type}}),</pre>	
#"Assigned Grade" =		
Table AddColumn(#"Chan	ted Type" "Grade" each	
if [Result] >	DP Grade 9 then 9	
else if [Result] >	DP Grade 8 then 8	
else if [Result] >	DP_Grade_7 then 7	
else if [Result] >	DP_Grade_6 then 6	
<pre>else if [Result] ></pre>	DP_Grade_5 then 5	
<pre>else if [Result] ></pre>	DP_Grade_4 then 4	
<pre>else if [Result] ></pre>	DP_Grade_3 then 3	
else "Ungraded")		
n		
#"Assigned Grade"		

Done Cancel

X √ fx - Table.AddColumn(#"Changed Type", "Grade", each ✓ Query Settings # # Name 1 Army 1 2 Bob 3 Clairea 4 Dave 5 Erc 6 Fatima 7 Georges 8 Hal 9 Ian 10 Jan 11 Kt 12 Mick 14 Norris 15 Olga 15 Olga 16 Petra 17 Quentin 18 Raoul 19 Sammy 20 Tammy 21 Una 22 Violet 23 Wilbur 24 Xavier 25 Yonne 25 Zon Zone 26 ▼ 1²3 Result ABC Grade ▲ PROPERTIES 96 Name Exam Results 46 90 28 Ungraded All Properties 81 APPLIED STEPS 52 Source Changed Type 78 96 ➤ Assigned Grade 24 Ungraded 65 87 86 29 Ungraded 26 Ungraded 67 23 Ungraded 63 29 Ungraded 60 47 50 76 76 53 24 Ungraded 68

This currently has no effect on the results of the query, since the values are the same:



However, it does have an effect on the screen accessed by clicking on the cog (gear icon) next to the 'Assigned Grade' step:

Grade		1								
	Column Name	O	perator		Value 🕕			Output 🕕		
	Result	• is	greater than	•	•	¥	Then	ABC - 9		~
se If	Result	▼ is	s greater than	*	-	Ŧ	Then	ABC - 8		1
e If	Result	▼ is	s greater than	*		•	Then	ABC - 7		
e If	Result	∗ is	s greater than	*		Ŧ	Then	ABC - 6		
e If	Result	* is	s greater than	•		÷	Then	ABC - 5		
e If	Result	• is	s greater than	•		•	Then	ABC - 4		
	1 <u>-</u>	<u>.</u> .	0.00	1				LARC -	1	

Note that I cannot view the **Value** column now. Any changes must be made directly to the **M** code, either from the Advanced Editor or the Formula Bar:

×	√ fx	- Table.AddColumn(#"Chan if [Result] else if [Result] else if [Result] else if [Result]	<pre>ged Type", "Grade", ea > DP_Grade_9 then 9 > DP_Grade_8 then 8 > DP_Grade_7 then 7 > DP_Grade_6 then 6</pre>	ch	^	Query Settings PROPERTIES Name Exam Results	×
	A ^B C Name	▼ 1 ² 3 Result	▼ ABC 123 Grade	-		All Properties	
1	Amy		96	9			
2	Bob		46	4		APPLIED STEPS	
3	Claire		90	8		Source	
4	Dave		28	3		Changed Type	
5	Eric		81	8		➤ Assigned Grade	4

Back in Excel, if I change the Named cell **Grade_3** from 30 to 20 percent, the outcome will change when I refresh the **Exam Results** query:

Home Insert	Draw Page Layout	Formulas D	ata Review \	/iew Developer	Add-ins Hel	p Pov	wer Pivot					台 Share	Comments
From Text/CSV From Web	Recent Sources	Refresh E Prop	ries & Connections	Organization S	itocks v	Sort	Exam Re	esults	<u>=0 %1 9a</u>	×	i Group ~ +곡 韓日 Ungroup ~ ·곡 聞 Subtotal	Data Analysis	
Get & Transf	orm Data	Queries 8	k Connections	Data Type	IS		Name	Result	Grade		Outline Fs	Analysis	~
•	× × fr						Amy Bob Claire	96 46 90	9 4 8	î			Ť
A	В	С	D	E	F		Dave Eric	28 81	3		Oueries & Co	nnections	* ×
Grade	Threshold						Fatima Georges	52 78	5		Queries Connection	s	
9	90						Hal	96	9		16 queries		
8	80						lan Jan	24 65	3 6	~	Exam Results		6
7	70						Columns				26 rows loaded.		Refresh
6	60						Name, Resu	It, Grade			Connection only		
5	50						5:56 PM	sneu			P_Grade_8 (80)		
1	40						Load stat	us			Connection only		
	40						Loaded to w	rorksheet			P_Grade_7 (70)		
3	20						Data Sou	irces	1.15		Connection only		



-			ABC			
U.,	A ^o C Name	▼ 1 ² 3 Result	▼ 123 Grade	•		PROPERTIE
1	Amy		96	9	1	Name
2	Bob		46	4		Exam Resu
3	Claire		90	8		All Propertie
4	Dave		28	3		
5	Eric		81	8	ز د. ا	APPLIED S
6	Fatima		52	5		Source
7	Georges		78	7		Change
8	Hal		96	9		× Assigne
9	lan		24	3		
10	Jan		65	6		
1	Kit		87	8		
12	Liam		86	8		
13	Mick		29	3		
4	Norris		26	3		
5	Olga		67	6		
6	Petra		23	3		
7	Quentin		63	6		
8	Raoul		29	3		
9	Sammy		60	5		
20	Tammy		47	4		
1	Una		50	4		
2	Violet		76	7		
3	Wilbur		76	7		
4	Xavier		53	5		
5	Yvonne		24	3		

If I go back to **Exam Results** and view all the data, I can see that everyone has passed now!

Using Parameters as Locations

However, I now want to store the grading bands in a separate workbook away from the exam results.

Auto	Save 💽 🎁 🕞) - C - B - 🔀	∽	Exam Grade Bands.xlsm
File	Home Insert	Draw Page Lay	out Formulas	Data Review \
Ĉ	🔏 Cut	Calibri 🗸	20 ~ A^ A~	≡≡ ₩.
Paste	Copy ∽ ✓ Format Painter	B I <u>U</u> ~ ⊞	~ <u>A</u> ~	$\equiv \equiv \equiv \equiv \equiv$
	Clipboard Fa	Font	F9	Alignn
C4	•	$\times \checkmark f_x$		
	Α	В	С	D
1	Grade	Threshold		
2	9	90		
3	8	80		
4	7	70		
5	6	60		
6	5	50		
7	4	40		
8	3	20		

Back in my original workbook, I need to extract the data. I can do this by creating a new query from the 'Get Data' dropdown in the 'Get & Transform' section of the Data tab. Note that to extract data 'From Workbook', the Excel file I am extracting from must **not** be open.





In the dialog, I find the workbook I wish to use:

File name:	Blog 270 Exam Grade Bands.xlsm		\sim	Excel Files (*.xl*;*.	xlsx;*.xlsm;*.xls \vee
		Tools	•	Import	Cancel

I can then choose to 'Import'.

1	Q		
Select multiple items			
Display Options 👻	[à		
🔺 📻 Blog 270 Exam Grade Bands.xlsm [8]			
Darameters			
E Grade_3			
E Grade_4			
E Grade_5			
I Grade_6			
Grade_7			
Grade_8		No item selected for preview	
E Grade_9			



In the Navigator dialog, I can see the Named Cells and the 'Parameters' Sheet. I select Grade_9:

Navigator			
	Q	Grade 9	D.
Select multiple items		Column1	
Display Options 🔹	Da	90	
🔺 💼 Blog 270 Exam Grade Bands.xlsm [8]			
Parameters			
E Grade_3			
Grade_4			
E Grade_5			
Grade_6			
Grade_7			
E Grade_8			
Grade_9			
		Load 🔻	Transform Data Cancel

I plan use to this as my base query. I opt to 'Transform Data':

<pre>/ fx - Table.TransformColumnTypes(Grade_9_DefinedName,{{"Column1", Int64.Type}})</pre>	Query Settings ×
1 90	PROPERTIES Name Grade_9 All Properties
	Source Analysis Source

I am interested in the Source step:

×	√ fx = Excel.Wo true)	rkbook(File.Contents("C:	\Users\kathr\OneDrive\Doo	cuments\SUMPRODUCT\PQ Blc	g\Blog 270 Exam Grade Bands.xlsm"), nul	1, ^	Query Settings PROPERTIES Name Grade_9	×
	A ^B _C Name	🛄 Data 🖣	A ^B _C Item	A ^B _C Kind	🏷 Hidden 🔽		All Properties	
1	Parameters	Table	Parameters	Sheet	FALSE			
2	Grade_3	Table	Grade_3	DefinedName	FALSE		APPLIED STEPS	
3	Grade_4	Table	Grade_4	DefinedName	FALSE		Source	4
4	Grade_5	Table	Grade_5	DefinedName	FALSE		Navigation	4
5	Grade_6	Table	Grade_6	DefinedName	FALSE		Changed Type	
6	Grade_7	Table	Grade_7	DefinedName	FALSE			
7	Grade_8	Table	Grade_8	DefinedName	FALSE			
8	Grade_9	Table	Grade_9	DefinedName	FALSE			

The Source step points at the Excel file I have created. To reduce future maintenance, and to add flexibility I am going to create a base query which only includes the Source step, and then I am going to use a parameter to point to the file location. If I have a base query, then any changes I make to the Source step only need to be made once. I delete the other steps and call the query '**Base Query**':



×	√ fx	<pre>= Excel.Workbook(File.Conten true)</pre>	ts("C:\Users\kathr\OneDu	rive\Documents\SUMPRODUCT	\PQ Blog\Blog 270 Exam Grade Bands.xlsm"), null, 🔺	Query Settings	×
	A ^B C Name	💌 🛄 Data	•n A ^B _C Item	▼ A ^B _C Kind	💌 🏷 Hidden 💌		All Properties	
1	Parameters	Table	Parameters	Sheet	FALSE			
2	Grade_3	Table	Grade_3	DefinedName	FALSE		APPLIED STEPS	
3	Grade_4	Table	Grade_4	DefinedName	FALSE		Source	¢.

I create a new Parameter from the 'Manage Parameters' option on the Home tab:

File	Home Transform	Add Column View											
Close & Load •	Refresh Preview • Manage •	Choose Remove Columns * Columns	Keep Remo Rows * Rows		Split Group	Data Type: Text * Use First Row as Headers * ¹ / ₉₂ Replace Values	Merge	Queries • d Queries • ne Files	Manage Parameters *	Data source settings	New Source *		
Close	Query	Manage Columns	Reduce Row	s Sort		Transform		Manage P	arameters	Data Sources	New Query		
Queries	s [17]	< ×	√ fx	= Excel.W	korkbook(File	e.Contents("C:\Users\kat	hr\Onel	Edit Paran	neters	JCT\PQ Blog\	Blog 270 Exam Grad	e Bands.xlsm"), null,	^
🔲 E	Exam Results			true)				New Para	neter				
[]] P	9_Grade_9 (90)					c	reate a new p	arameter tha	t can				
18 F	P_Grade_8 (80)					b	e referenced is file.	by other que	ries in				
(11) r	Carda 7 (70)						Married						

I call the new Parameter FilePath:

 P_Grade_9 P_Grade_8 		FilePath
3 P_Grade_8		
		Description
3 P_Grade_7		
3 P_Grade_6		
9 P_Grade_5		
3 P_Grade_4		✓ Required
P_Grade_3		Туре
c I am a parameter		Text 💌
c FilePath	×	Suggested Values
		Any value 🔹
		Current Value
		SUMPRODUCT PQ Blog Blog 270 Exam Grade Bands.

I define the type as 'Text' and enter the 'Current Value' as the location of the external workbook that contains the grading bands. Having created the **FilePath** parameter, I return to **Base Query**. For me, the **M** code for the Source step is:

= Excel.Workbook(File.Contents("C:\Users\kathr\OneDrive\Documents\SUMPRODUCT\PQ Blog\Blog
270 Exam Grade Bands.xlsm"), null, true)

X



I am going to replace the path with the **FilePath** parameter:

= Excel.Workbook(File.Contents(FilePath), null, true)

This is easier to read, and now I can change the path by changing the **FilePath** parameter.

×	√ f _x = Excel.Wo	rkbook(File.Contents(Fil	ePath), null, true)			^	Query Settings • PROPERTIES Name Base Query	×
	A ^B C Name	🛄 Data 🖣	A ^B _C Item	A ^B _C Kind	🏷 Hidden 💌		All Properties	
1	Parameters	Table	Parameters	Sheet	FALSE			
2	Grade_3	Table	Grade_3	DefinedName	FALSE		APPLIED STEPS	
3	Grade_4	Table	Grade_4	DefinedName	FALSE		Source	42
4	Grade_5	Table	Grade_5	DefinedName	FALSE			
5	Grade_6	Table	Grade_6	DefinedName	FALSE			
6	Grade_7	Table	Grade_7	DefinedName	FALSE			
7	Grade_8	Table	Grade_8	DefinedName	FALSE			
8	Grade_9	Table	Grade_9	DefinedName	FALSE			

I can now select **Base Query** in the Queries panel and right-click to create reference queries which will become the new grade band **Parameters**:



I rename the first new query **EDP_Grade_9**. The Source step points to **Base Query**. I can click on the 'Table' text next to **Grade_9** to expand the data for that row:

×	√ fx = #"Base (Query"				^	Query Settings > PROPERTIES Name EDP_Grade_9
. ·	A ^B C Name	Data 419	A ^B _C Item	A ^B _C Kind ▼	🏷 Hidden 💌		All Properties
1 1	Parameters	Table	Parameters	Sheet	FALSE		
2 0	Grade_3	Table	Grade_3	DefinedName	FALSE	4	APPLIED STEPS
3 (Grade_4	Table	Grade_4	DefinedName	FALSE		Source
4 0	Grade_5	Table	Grade_5	DefinedName	FALSE		
5 0	Grade_6	Table	Grade_6	DefinedName	FALSE		
6 0	Grade_7	Table	Grade_7	DefinedName	FALSE		
7 0	Grade_8	Table	Grade_8	DefinedName	FALSE		
8 0	Grade_9	Table	Grade_9	DefinedName	FALSE		
7 0	Grade_8 Grade_9	Table Table	Grade_8 Grade_9	DefinedName DefinedName	FALSE FALSE		



This gives me the data for **Grade_9** from the workbook, and I can right-click and drill down to the value:

$\times \checkmark f_x$	= Table.Trans	sformColumnTypes(G	rade_9_DefinedName,{{"Column1", Int64.Type}})
□ 1 ² 3 Column1	-		
1		Сору	
	¥ 1, 22	Number Filters Replace Values	*
		Drill Down	
		Add as New Query	

This gives me the first parameter:

Oueries (19)	X of the approximation of the second se	-
Exam Results	= * changeo type {#][column1]	
P_Grade_9 (90)		
P_Grade_8 (80)		
P_Grade_7 (70)		
P_Grade_6 (60)	90	
P_Grade_5 (50)		
P_Grade_4 (40)		
P_Grade_3 (30)		
I am a parameter (This can be converte		
123 DP_Grade_9		
123 DP_Grade_8		
123 DP_Grade_7		
123 DP_Grade_6		
123 DP_Grade_5		
123 DP_Grade_4		
123 DP_Grade_3		
Base Query		
FilePath (C:\Users\kathr\OneDrive\Doc		
123 EDP_Grade_9		

I can then make more references of **Base Query** and repeat this process to get the other 'EDP_Grade_' parameters.

	Base Query
	FilePath (C:\Users\kathr\OneDrive\Doc
1 ² 3	EDP_Grade_9
1 ² 3	EDP_Grade_8
1 ² 3	EDP_Grade_7
1 ² 3	EDP_Grade_6
1 ² 3	EDP_Grade_5
1 ² 3	EDP_Grade_4
1 ² 3	EDP_Grade_3

I can go back to the **Exam Results** query and use these parameters.



$\times \checkmark f_x$	Table.AddColumn(#"Changed Type", "Gr if [Result] > DP_Grade_9 else if [Result] > DP_Grade_8 else if [Result] > DP_Grade_7 else if [Result] > DP_Grade_6	ade", each then 9 then 8 then 7 then 6	 Query Settings PROPERTIES Name Exam Results
A ^B _C Name	▼ 1 ² 3 Result ▼ ^{ABC} 123	Grade	All Properties
Amy	.96	9	
Bob	46	4	APPLIED STEPS
Claire	90	8	Source
Dave	28	3	Changed Type
Eric	81	8	★ Assigned Grade
Fatima	52	5	

I showed earlier that it is not possible to edit using the cog next to the 'Assigned Grade' step to change the parameters, as they are not shown in the dialog unless they are true Power Query parameters. I also looked at the difference between Power Query parameters and other queries that can be used as parameters.

I use the Advanced Editor, available on the Home tab, to change the **M** code:

	Home Transform Ad	d Column	View	
Close & Load •	Refresh Preview - Manage -	Choose Columns	Advanced Editor	- 0
Close	Query	Manage		
Queries	[25]	<	EXAM RESUITS Display	Options 👻
🖽 E	xam Results			
📳 P	_Grade_9 (90)		<pre>source = Excel CurrentWorkbook(){[Name="Table1"]}[Content].</pre>	
P P	Grade 8 (80)		<pre>#"Changed Type" = Table.TransformColumnTypes(Source;{{"Name", type text}, {"Result", Int64.Type}}),</pre>	
E P	Grade 7 (70)		#"Arcianad Gordo" =	
B P	Grade 6 (60)		# Hosagned Grade − Table.AddColumn(#"Changed Type", "Grade", each	
	Grade_5 (50)		if [Result] > DP_Grade_9 then 9	
	_Grade_5 (50)		else if [Result] > DP_Grade_8 then 8	
-8 P	_Grade_4 (40)		else if [Result] > DP Grade 6 then 6	
B P	_Grade_3 (30)		else if [Result] > DP_Grade_5 then 5	
1	am a parameter (This can be co	onverte	else if [Result] > DP_Grade_4 then 4	
1 ² 3 D	P_Grade_9		else it [Kesult] > DF_urade_s then s else "Ungraded")	
1 ² 3 D	P_Grade_8			
1 ² 3 D	P_Grade_7		in #"Assigned Grade"	

I change the 'Assigned Grade' step from this:

```
#"Assigned Grade" =
    Table.AddColumn(#"Changed Type", "Grade", each
    if [Result] > DP_Grade_9 then 9
    else if [Result] > DP_Grade_8 then 8
    else if [Result] > DP_Grade_7 then 7
    else if [Result] > DP_Grade_6 then 6
    else if [Result] > DP_Grade_5 then 5
    else if [Result] > DP_Grade_4 then 4
    else if [Result] > DP_Grade_3 then 3
    else "Ungraded")
to this:
```

```
#"Assigned Grade" =
Table.AddColumn(#"Changed Type", "Grade", each
if [Result] > EDP_Grade_9 then 9
else if [Result] > EDP_Grade_8 then 8
else if [Result] > EDP_Grade_7 then 7
else if [Result] > EDP_Grade_6 then 6
else if [Result] > EDP_Grade_5 then 5
else if [Result] > EDP_Grade_4 then 4
else if [Result] > EDP_Grade_3 then 3
else "Ungraded")
```

This has no immediate effect on the results of the query:



~	√ fx -	- Table.AddColumn(#"Cha if [Result else if [Result else if [Result else if [Result	anged Type", "Grade" t] > EDP_Grade_9 the t] > EDP_Grade_8 the t] > EDP_Grade_7 the t] > EDP_Grade_6 the	", each en 9 en 8 en 7 en 6
•	A ^B _C Name	▼ 1 ² 3 Result	ABC 123 Grad	le 💌
1	Amy Bob		96 46	9
3	Claire		90	8
4	Dave		28	3
5	Eric		81	8
6	Fatima		52	5
7	Georges		78	7
8	Hal		96	9
9	lan		24	3
10	Jan		65	6
10			00	0

To show how **FilePath** allows me to point to another workbook, I have another workbook where I have the same Named Cells for grading bands set up. You should note that I must *close* the Power Query Editor in the workbook containing **Exam Results** before I can edit another workbook, so I 'Close & Load To' and choose 'Connection Only' for the new '**EDP_Grade_'** queries and **Base Query**:





The new workbook I have created has different values for the grading bands:

Auto:	Save 💽 Off) 🗄 🖉) - C - B - 🔟 ·	✓	0 Exam Grade Bands N	ew Location.xlsm
File Paste	Home Insert	Draw Page Layo Calibri v B I U v E ·	Formulas $20 \rightarrow A^{*} A^{*}$ $\sim 20 \rightarrow A^{*} A^{*}$	Data Review Ξ Ξ Ξ ≫~~ Ξ Ξ Ξ Ξ Ξ Ξ	View Develo 같 ^b Wrap Text 臣 Merge & C
B9	-	$\times \checkmark f_x$	13.	Aigi	iment
	А	В	С	D	E
1	Grade	Threshold			
2	9	85			
3	8	80			
4	7	75			
5	6	70			
6	5	65			
7	4	60			
8	3	50			

The workbook also has a different name and is located in a different folder.

I close the new workbook, and go back to the workbook containing the **Exam Results** query, where I select the **FilePath** parameter in the Queries pane, and use the 'Manage Parameter' button to access the dialog:

alumne T	Pour Y Pour Y		Color	- Dec	Replace Values	4	Combine Files	Data
olumns	Reduce Rows	Sort	CON	Ma	nage Paramete	ers		×
Curre	nt Value			1010	nageraraniere			
C:\U	sers\kathr\One[Drive\D	ocum	.2	0.00100	New	Name	
				1-3	P_Grade_9		Description	- 1
Mar	nage Parameter			143	P_Grade_8		Description	
				143	P_Grade_/			
				143	P_Grade_6			
				143	P_Grade_5			
				123	P_Grade_4		✓ Required	
				123	P_Grade_3		Text	
				A ^B C	l am a parameter		Fuggested Values	
				ABC	FilePath	×	Any value	
							indy route	
							Current Value	
							C:\Users\kathr\OneDrive\Documents\SUMPRODUCT	/PQ E
								_
							OK Car	1081



I change the 'Current Value' to the new workbook name and location:

	New	Name
P_Grade_9		FilePath
P_Grade_8	×	Description
P_Grade_7		
P_Grade_6		
P_Grade_5		
P_Grade_4		Required
P_Grade_3		Туре
C I am a parameter		Text *
c FilePath	×	Suggested Values
		C:\Blog 270 Exam Grade Bands New Location.xlsm

When I go back to the **Exam Results** query, the results have changed:

>	√ fx - Tab	le.AddColumn(#"Changed	d Type",	"Gnade", each	
	A ^B C Name	▼ 1 ² 3 Result		ALC Grade	
1	Amy		96		9
2	Bob		46	Ungraded	
3	Claire		90		9
4	Dave		28	Ungraded	
5	Eric		81		8
6	Fatima		52		3
7	Georges		78		7
8	Hal		96		9
9	lan		24	Ungraded	
10	Jan		65		4
11	Kit		87		9
12	Liam		86		2
13	Mick		29	Ungraded	
14	Norris		26	Ungraded	
15	Olga		67		5
16	Petra		23	Ungraded	
17	Quentin		63		4
18	Raoul		29	Ungraded	
19	Sammy		60		3
20	Tammy		47	Ungraded	
21	Una		50	Ungraded	
22	Violet		76		7
23	Wilbur		76		7
24	Xavier		53		3
25	Yvonne		24	Ungraded	
26	Zoe		68		5

The results have changed, and it's not looking good for the class!

Note that if users of the workbook containing **Exam Results** needed to maintain the **FilePath** parameter without editing in Power Query, I could link **FilePath** to a Named Excel Cell in the workbook as I have done for the '**DP_Grade_**' and '**EDP_Grade_**' parameters.

Х



Importing from PDF Files

This example will allow me to look at both importing PDF files and splitting columns.

Business is doing well, and the UK division of my company has plans to expand the workforce. I have a PDF file, with data for 10 stores. The information could change for any of those stores, and the way that the information is given is similar to the following:

Store 1

Pay Scales	All
Workforce	45%
expansion	

or maybe like this:

Store 4

Pay Scales	A and C
Workforce	50%
expansion	

or even like this:

Store 6

Pay Scales	А	<u>B,C</u>
Workforce	50%	40%
expansion		

My goal is to get all this information into one table.

Somewhere in the middle of my data, I have some text, which although very useful to the company, is no help to me.

'There may be plans to build a further store which would require a new workforce, but planning permission has not been granted. Also, we would like to see the Projected Pay increases on the report.'

This could be added to, reduced or removed.

However, there is also another table, which I do wish to extract, although not in its current form (that would be too easy!).



Pay Increases (Proposed)

Proportion of Standard Increase (20%)					
Pay Scale A £0 - £15,000 1.5					
Pay Scale B £15,0001 - £20,000 1.25					
Pay Scale C £20,0001 and above 1					

This means I don't know how many pages are in the PDF. I would normally expect to see data for 10 stores, and they are all split into three [3] pay scales.

I start in an empty Excel Workbook, in the 'Get and Transform' section of the Data tab, where I will use 'Get Data' and then 'From File', where I may choose 'From PDF'.





This allows me to browse to choose the PDF I want to extract. I am then presented with the following dialog:

	P	Table001 (Page	1)		
Select multiple items		Pay Scales	All		
play Options 👻	-Q	Workforce expansion	45.00%		
Blog 250 sample PDF.pdf [13]					
Table001 (Page 1)					
Table002 (Page 1)					
Table003 (Page 1)					
Table004 (Page 1)					
Table005 (Page 1)					
Table006 (Page 1)					
Table007 (Page 2)					
Table008 (Page 2)					
Table009 (Page 2)					
Table010 (Page 2)					
Table011 (Page 2)					
Page001					
III Page002					

This is my first decision: I need to know whether to pick tables or pages. The best way to decide this is to look at what is in them by selecting one of them for preview.



I skip to the end of the content list, and look at one of the tables:

	2	Table011 (Page a	2)		Ca
Select multiple items		Pay Scales	All		
Display Options 💌	G	Workforce expansion	5.00%		
🔺 💼 Blog 250 sample PDF.pdf [13]					
Table001 (Page 1)					
Table002 (Page 1)					
Table003 (Page 1)					
Table004 (Page 1)					
Table005 (Page 1)					
Table006 (Page 1)					
Table007 (Page 2)					
Table008 (Page 2)					
Table009 (Page 2)					
Table010 (Page 2)					
🔟 Table011 (Page 2)					
Page001					
Page002					

Not much in there, do I really need to get every table? There's not even a way to link this to a store.



I look at what is in the pages:

	Page001	C.
Select multiple items	Column1	Column2
splay Options 👻	Da	Projected Expansion
Blog 250 sample PDF ndf [13]	null	1
Tabla001 (Daga 1)	We have included the details for our 10 stores, which may be changed after	
	Store 1	
Table002 (Page 1)	Pay Scales	All
Table003 (Page 1)	Workforce expansion	45%
Table004 (Page 1)	Store 2	
Table005 (Page 1)	Pay Scales	All
Table006 (Page 1)	Workforce expansion	50%
	Store 3	
Tableoor (Page 2)	Pay Scales	A
Table008 (Page 2)	Workforce expansion	30%
Table009 (Page 2)	Store 4	20
Table010 (Page 2)	Pay Scales	A and C
III Table011 (Page 2)	Workforce expansion	50%
Page001	Store 5	1711.52
	Pay Scales	A,B
Page002	Workforce expansion	40%
	Store 6	12
	Pay Scales	A
	workforce expansion	50%
	Stole 7	
	< x	,

Definitely more data, and stores are also included. I can select multiple items, but do I select all the pages? What if there are more next time?

There is an easier way. If I select the folder icon, I have other options...

Navigator

		Q
Select multiple items		D
Display Options *		Lė
🔺 💼 Blog 250 sample P	Transform Data	1
Table001 (Page 1	Load	
Table002 (Page 1	Load To	
Table003 (Page 1	Refresh	
Table004 (Page 1)		

I can 'Transform Data'. This means all the data in the folder will be loaded into Power Query. This is exactly what I want.

 \square \times



 ,	A ^B _C Id	▼ A ^B _C Name	▼ A ^B _C Kind	💌 🛄 Data	4119
1	Page001	Page001	Page	Table	
2	Table001	Table001 (Page 1)	Table	Table	
3	Table002	Table002 (Page 1)	Table	Table	
4	Table003	Table003 (Page 1)	Table	Table	
5	Table004	Table004 (Page 1)	Table	Table	
6	Table005	Table005 (Page 1)	Table	Table	
7	Page002	Page002	Page	Table	
8	Table006	Table006 (Page 1)	Table	Table	
9	Table007	Table007 (Page 2)	Table	Table	
10	Table008	Table008 (Page 2)	Table	Table	
11	Table009	Table009 (Page 2)	Table	Table	
12	Table010	Table010 (Page 2)	Table	Table	
13	Table011	Table011 (Page 2)	Table	Table	

Here it is. All the tables, and all the pages. The **M** code for this is:

= Pdf.Tables(File.Contents("FileLocation\Blog 250 Sample PDF.pdf"), [Implementation="1.3"])

FileLocation is where I have stored the file on my PC, and 'Blog 250 Sample PDF' is the name of the file.

This is using the **M** function **Pdf.Tables()**:

Pdf.Tables(pdf as binary, optional options as nullable record) as table

This returns any tables found in **pdf**. An optional record parameter, **options**, may be provided to specify additional properties. The record can contain the following fields:

- Implementation: the version of the algorithm to use when identifying tables. Old versions are available only for backwards compatibility, to prevent old queries from being broken by algorithm updates. The newest version should always give the best results. Valid values are "1.3", "1.2", "1.1", or *null*
- **StartPage:** specifies the first page in the range of pages to examine; the default value is one [1]
- **EndPage:** specifies the last page in the range of pages to examine. The default value here is the last page of the document
- **MultiPageTables:** controls whether similar tables on consecutive pages will be automatically combined into a single table. Here, the default value is true
- EnforceBorderLines: controls whether border lines are always enforced as cell boundaries (when true), or simply used as one hint among many for determining cell boundaries (when false). The default value here is false.

This explains where [Implementation="1.3"] comes from. It is the algorithm version, and appears to be the latest version, which is reassuring.



So back to my extracted data; I know I want the page data, so I can filter the **Id** column to get everything beginning with 'Page':

	A ^B _C Id ▼	A ^B C Name	A ^B _C Kind	🛄 Data 👘	
1	Page001	Page001	Page	Table	
2	Table001	Table001 (Page 1)	Table	Table	
3	Table002	Table002 (Page 1)	Table	Table	
4	Table003	Table002 (Bage 1)	Tabla	Tabla	
5	Table004				~
6	Table005 Fi	Iter Rows			
7	Page002 Ap	olv one or more filter condit	tions to the rows in this table	2	
8	Table006				
9	Table007	Basic O Advanced			
10	Table008 Ke	ep rows where 'Id'			
11	Table009	eains with 👻	Page	-	
12	Table010				
13	Table011	And O Or			
		•	Enter or select a value	-	
					OK Cancel

This gives me just the pages. I only need the **Data** column now, so I select it and opt to 'Remove Other Columns'.

	A ^B C Id	.7	A ⁸ _C Name	¥	A ⁸ C Kind	🛄 Data	105	- Comm	
1	Page001		Page001		Page	Table	-13	Remain	
2	Page002		Page002		Page	Table	×	Remove Other Columns	
							-	Duplicate Column Add Column From Examples	
								Remove Errors	
								Replace Errors	
								Create Data Type	
							14	Fill Unpivot Columns Unpivot Other Columns Unpivot Only Selected Columns	,
							≡¶	Rename Move	,
								Drill Down Add as New Query	

I can then expand the data, which extracts to columns 1 to 7:

]+	ABC 2123 Column1	ABC Column2	ABC 2123 Column3	ABC 23 Column4	Column		
	1	null	Projected Expansion	null	null		Name	
2	2	null	null	ll null (UK	_	Source Data	
3	3	We have included the details for our 10 stores, which may be changed	null	ll null	null			
4	4	Store 1	null	ll null	null		All Properties	
-	5	Pay Scales	All	null	null		A APPLIED STEPS	
6	5	Workforce	45%	null	null		Country	
		expansion					Source Filtered Bauer	
7	7	Store 2	null	ll null	null		Permoved Other Columns	X
8	3	Pay Scales	All	null	null		Removed Other Columns	H
							Expanded Data	26.1



The key to making my transformations as immune to change as possible is to keep the data I need rather than delete the data I don't. Looking at the columns, the easiest way to see if there is any useful data in there is to use the filter icon; **Column1** is clearly very useful.

4	Soft Ascending
1	Sort Descending
	Clear Sort
×	Clear Filter
	Remove Empty
	Text Filters
	Search
	☑ (Select All)
	(null)
	Pay Increases (Proposed)
	Pay Scale A
	Pay Scale B
	Pay Scale C
	Pay Scales
	permission has not been granted. Also, we wou
	✓ report.
	✓ smaller.
	Store 1
	Store 10
	Store 2
	Store 3
	Store 4
	Store 5
	Store 6



However, **Column8** is not:

*	ABC Column7	ABC 123 Column8	
₽↓	Sort Ascending		
Z.	Sort Descending		
	Clear Sort		
T _×	Clear Filter Remove Empty Filters		F
	Search		
	✓ (Select All)✓ (null)		
		ОК	Cancel

However, rather than delete **Column8**, I should keep what I need. On the Home tab, there is an option to 'Choose Columns':

File	Home	Transfe	orm	Add Column			
Close & Load •	Refresh Preview	Proper Advanc	ties ed Editor e *	Choose Columns • C			
Close		Qu 📰	Choose	Columns C			
		run.	c				
>	Keep or re table.	Keep or remove columns from this table.					
	11 MOC CO	lumot					

I can use this to specify columns I want to keep. It's much easier than selecting them all for large tables!



×

Choose Columns

Choose the columns to keep

Search Columns		₽↓
(Select All Columns)		
✓ Column1		
Column2		
Column3		
Column4		
✓ Column5		
✓ Column6		212
Column7		
	ОК	Cancel

I choose to select the first seven [7] columns.

\geq	✓ fx = Table.SelectColumns(#"Expanded	Data",{"Column1", "Column	2", "Column3", "Column4", "Column5", "Column6",	"Column7"})		~	Query Settings ×
	ABC 123 Column1	ABC Column2	ABC Column3	ABC 123 Column4	ABC Column5	16	
1	null	Projected Expansion	nuli	null	null		Name
2	null	null	nuñ	UK	null		Content
3	We have included the details for our 10 stores, which may be	null	nuli	null	null		All Descention
4	Store 1	null	nuli	null	null		All Properties
5	Pay Scales	All	nuli	null	null		APPLIED STEPS
6	Workforce	45%	nuli	null	null		Source
	expansion						Filtered Rows
7	Store 2	null	nuli	null	null		Removed Other Columns1
8	Pay Scales	All	nuli	null	null		Expanded Data
9	Workforce	50%	nuli	null	null		× Removed Other Columns

I can see that the heading data from the tables is in **Column1**, which suggests that transposing my data would be useful. I can do this from the Transform tab.

File	Home	Transform
Group By	Use First Row as Headers •	Transpose

This swaps the rows and the columns and is much closer to the format I want to see.



× √ fx = Table.Transpose(#	Query Settings >						
ABC Column1	ABC Column2	-	ABC 123 Column3	ABC 123 Column4	ABC Column5 -	ABC 123 Column6	
1	null	null	We have included the details for our 10 stores, which may be	Store 1	Pay Scales	Workforce	A PROPERTIES Name
2 Projected Expansion		null	null	null	All	45%	Content
3	null	null	null	null	null		All Properties
4	null UK		null	null	null		APPLIED STEPS
5	null	null	null	null	null		Source
6	null	null	null	null	null		Filtered Rows
7	null	null	null	null	null		Removed Other Columns1
							Expanded Data
							Removed Other Columns
							× Transposed Table

I can check the data in my columns again to see which ones I want to keep. However, it is clear that this time the column names will change with the extra text that is present in my source data.

\times	× √ fx = Table.Transpose(#"Removed Other Columns") ∨													
	¥	ABC 123 Column27	ABC Column28	ABC 223 Column29	ABC Column30	ABC Column31								
1		Workforce expansion	There may be plans to build a further store which would require a new	permission has not been granted. Also, we would like to see the Projec	report.	Pay Increases (Proposed)								
2		50%	null	null	null									
3		40%	null	null	null									
4	null	null	null	null	null									
5	null	null	null	null	null									
6	_	30%	null	null	null									
7	null	null	null	null	null									

Before I decide which columns to keep, I need some way of identifying them. I will promote the first column to the column headings, which I can do from the Transform Tab.

File	Home	Transform
Group By	Use First Row as Headers *	記 ^日 Transpose 【書 Reverse Row 記曰 Count Rows
Us	e First Row as	Headers
IIII Ue	n Hearlers as F	irst.Row
Promo into co	te the first row dumn headers.	of this table

I choose 'Use First Row as Headers':

\times	$\sqrt{f_x}$ = Table.TransformColumnTypes(#"Promoted	Headers",{{"Column1", t	<pre>ype text}, {"Column2", type t</pre>	ext}, {"We have included the deta	ils for our 10 stores, w	hich may be 🗸 🗸	Query Settings	×
.	$\frac{c}{3}$ permission has not been granted. Also, we would like to see t 💌 $\frac{A}{1}$	^{DC} report. ▼	ABC Pay Increases (Proposed)	A ^B C Column32	A ^B C Pay Scale A	A ^B C Pay Scale B		
1	null	null	null	null	null		PROPERTIES	
2	null	null	null	Proportion of Standard Increase (20%)	null		Gentert	
3	null	null	null	null	null		Content	
4	null	null	null	null	£0-£15,000	£15,0001 - £20,000	All Properties	
5	null	null	null	null	null		4 APPLIED STEPS	
6	null	null	null	null	1.5	1.25	Course	
							Filtered Rows	8
							Removed Other Columns1	4
							Expanded Data	0
							Removed Other Columns	4
							Transposed Table	
							Promoted Headers	4
							× Changed Type	

Power Query has created a 'Changed Type' step, but this references column names, so I delete it. I can pick the columns I want to keep in the same way as I did earlier.



$\times \sqrt{f_x}$	= Table.SelectColumns(#"P	<pre>Promoted Headers",{"</pre>	Store 1", "Pay Scales", "Work	force#(lf)expansion", "Stor	e 2", "Pay Scales	_1", "Workforce#(lf)expansio	n_2", "Store 3", 🗸	Query Settings	×
ABC 123 Store 1	ABC 123 Pay Scales	▼ ABC 123 Workfor	ce expansion 💌 👫 Store 2	ABC 123 Pay Scales_1	▼ ABC 123 Workfor	ce expansio 💌 👫 123 Store 3	 ABC 123 Pay Scales 		
1	null All	45%		null All	50%		null A	PROPERTIES	
2	null	null	null	null	null	null	null	Content	
3	null	null	null	null	null	null	null	Content	
4	null	null	null	null	null	null	null	All Properties	
5	null	null	null	null	null	null	null	A APPLIED STEPS	
6	null	null	null	null	null	null	null	Source	
								Filtered Rows	8
								Removed Other Columns1	0
								Expanded Data	4
								Removed Other Columns	4
								Transposed Table	
								Promoted Headers	4
								➤ Removed Other Columns2	4

I have the data I want to keep, but there are two tables in here: the store data and the pay scales.

ABC 123 Pay Increases (Proposed)	ABC 123 Pay Scale A	ABC Pay Scale B	ABC Pay Scale C
null	null	null	nul
null	null	null	nul
null	null	null	nul
null	£0-£15,000	£15,0001 - £20,000	£20,0001 and above
null	null	null	nul
null	1.5	1.25	1

I can keep this query, which I will call **All Data**, and make Reference queries: one for the store table and one for the pay scales table. I can create reference queries from the 'Home' tab.

â		Properties
Close & Load •	Refresh Preview	Manage *
Close.	×	Delete
Orieries U	. D	Duplicate
III So	wirce een	Reference
Create a	new quer	y that references

I call this Reference Query Pay Scales.

$\left[\times\right]$	√ fx = #"All Da	ta"				~	Query Settings	×
	ABC Store 1	ABC Pay Scales	ABC 123 Workforce expansion	ABC Store 2	ABC Pay Scales_1	ABC 123 Workforce expansio		
1	null	All	45%	null	All	50%	A PROPERTIES	
2	null	null	null	null	null	null	Pay Scales	
3	null	null	null	null	null	null	() scales	
4	null	null	null	null	null	null	All Properties	
5	null	null	null	null	null	null	A APPLIED STEPS	
6	null	null	null	null	null	null	Source	

I also create another Reference Query, Stores.

I start with Pay Scales.

XV	fx - #"All Data"				~	Query Settings	×
ABC 123 Store	1 ABC Pay Scales	▼ ABC Workforce expansion ▼	ABC 123 Store 2	ABC Pay Scales_1	ABC 123 Workforce expansio		
1	null All	45%	null	All	50%	A PROPERTIES	
2	null n	ıll null	null	null	null	Pay Scaled	
3	null	null null	null	null	null	All Deservation	
4	null n	ıll null	null	null	null	All Properties	
5	null n	ıll null	null	null	null	APPLIED STEPS	
6	null	ıll null	null	null	null	Source	

I start by keeping the columns I will be needing for this table.



×

Choose Columns

Choose the columns to keep

Search Columns	
Workforce expansion_8	
Store 6	\sim
Pay Scales_9	
Workforce expansion_10	
Store 7	
Pay Scales_11	
Workforce expansion_12	
Store 8	
Pay Scales_13	
Workforce expansion_14	
Pay Increases (Proposed)	
Pay Scale A	
Pay Scale B	
Pay Scale C	
Store 9	
Pay Scales_15	
Workforce expansion_16	
Store 10	
Pay Scales_17	
Workforce expansion_18	*

OK	Cancel
----	--------

This means I can concentrate on the data I need to transform for this table.

 *	ABC 123 Pay Increases (Proposed)	ABC Pay Scale A	ABC Pay Scale B	ABC Pay Scale C
1	null	null	null	null
2	null	null	null	null
3	null	null	null	null
4	null	£0-£15,000	£15,0001 - £20,000	£20,0001 and above
5	null	null	null	null
6	null	1.5	1.25	1

Having checked the data, I actually only need the pay scale columns, so I select them whilst holding down the **CRTL** key and click on 'Remove Other Columns'.



+ ABC Pay Increases (Proposed)		ABC Pay Scale A	×	121 Pay Scale B	Ab:	Pay Scale C		12000	
	null	1	null	nu	(I)		m =	Сору	
	null	3	ull	nu	đ			Remove Columns	
	null	3	null	nu	d)		-	Remove Other Columns	-
	null	E0-E15,000		E15,0001 - E20,000	£2	20,0001 and above	113	Add Column From Examples	-11
	null	1	nuill	nu	dl 🛛		no	Remove Duplicates	
1	null	1.5		1.25	1			Remove Errors	
							1.02	Replace Values_	
								Fill	2
								Change Type	· .
								Transform	
								Merge Columns	
							\$	Create Data Type	
							2	Group By_	
							40	Unpivot Columns	
								Unpivot Other Columns	
								Unpivot Only Selected Columns	
								Maue	

Power Query incorporates this into the existing 'Remove Other Columns' step.

× √ fx =	Table.SelectColumns(Sou	urce,{"Pay Scale A",	"Pay Scale B", "Pay Scale C"})	✓ Query Settings
ABC Pay Scale A	ABC Pay Scale B	ABC Pay Scal	e C 💌	(DEDERTIFS
1	null	null	null	Name
2	null	null	null	Pay Scales
3	null	null	null	10) 5005
4 £0-£15,000	£15,0001 - £20,000	£20,0001 an	d above	All Properties
5	null	null	null	A APPLIED STEPS
6 1.5	1.25	1		Source
				× Removed Other Columns

I can remove empty rows from the Home tab.



I can now look at how to transform my data from this into a useful table.

×	√ fx = Table.Se	ABC Pay Scale B	Columns", each not Li	st.IsEmpty(List.RemoveMatchingItems(Record.FieldValues(_), {"", null})) V	Query Settings ×
1	£0 - £15,000	£15,0001 - £20,000	£20,0001 and above		PROPERTIES
2	1.5	1.25	1		Pay Scales
					All Properties
					APPLIED STEPS
					Source
					Removed Other Columns
					× Removed Blank Rows



Transposing Data

I want to transpose the data, but if I do this with some of the data I need in the column headings, I will lose it. First, I need to demote the column headings so that I have the information in a row. I can do this from the Home tab.



This creates a 'Change Type' step which I delete as I am not ready to decide column types yet. I am now ready to transpose my data, using the option on the Transform tab.

File	Home	Transform	Add Column	View	V.						
Group By	Use First Row as Headers • Tabl	* ⁸ Transpose Reverse Rows Count Rows	Data Type: A	ny • ata Typ	1.4.2 Replace Values • e ↓ Fill • Pivot Column Any Column	Unpin Move	rot Columns • • • ert to List	Split Fo	wicj ermat Text	Merge Columns 123 Extract • the Parse • Column	Xσ Σ Statistics
Transpose		<	< × ✓ fx - Table.DemoteHead				s(#"Removed	1 81.	ank Rows")		
Transp as colu	Transpose this table, treating rows as columns and columns as rows.				123 Column1		ABC Column2		•	ABC 123 Column3	٠
	Query1			1	Pay Scale A		Pay Scale B			Pay Scale C	
				2	£0 £15,000		£15,0001 - £2	000,000		£20,0001 and above	
	All Data			3	1.5		1.25			1	

My data is starting to take shape.

\times	√ fx - Table.T	ranspose(#"Demoted He	aders")	✓ Query Settings
	ABC 123 Column1	ABC Column2	▼ A8C Column3 ▼	4 PROPERTIES
1	Pay Scale A	£0-£15,000	1.5	Name
2	Pay Scale B	£15,0001 - £20,000	1.25	Pay Scales
3	Pay Scale C	£20,0001 and above	1	
				APPLIED STEPS
				Source
				Removed Other Columns
				Removed Blank Rows
				Demoted Headers
				X Transported Table

I can rename the headings.

\times	fx = Table.	RenameColumns(#"Transp ABC Salary	oosed Table",{{"Column1", "F	ay Scale"}, {"Column2", "Salary"}, {"Column3", "Percentage Increase"}} 🗸	Query Settings ×
1	Pay Scale A	£0-£15,000	1.5		PROPERTIES
2	Pay Scale B	£15,0001 - £20,000	1.25		Day Scaler
3	Pay Scale C	£20,0001 and above	1		Pay scales
					APPLIED STEPS
					Source
					Removed Other Columns
					Removed Blank Rows
					Demoted Headers
					Transposed Table
					× Renamed Columns



Splitting Columns

I want to show a start and end salary, rather than have the information in one column. I can split the Salary column from the Transform tab.

File	Home	Transform	Add Column	View						
Group By	Use First Row as Headers •	* ^B Transpose Reverse Rows Count Rows	Data Type: A Detect Da Rename	ny • ata Type	t ₊₂ Replace Values →	Unpivot Columns • Move • Convert to List	Split Column *	[Add] Format	ABC 123 Extract • 45 Parse •	XO Statistics Sta
	Tabi	e			Any Column	By Delimiter		Text	Column	
Querier	(5)		<	×	√ fx .	By Number of Charac	ters	sposed	Table",{{"Colum	n1", "Pay
<u> </u>	iource Data			ABC Pay Scale		Bul en en en the service			ABC Percentage Incr	ease 👻
III 5	Stores			CTR IN of some		By Lowercase to Uppercase			123 Contract Contract	
	Query1			1	Pay Scale A	By Uppercase to Low	ercase		1.5	
-				5	Pay Scale B	By Digit to Non-Digit			1.25	
ш. <i>4</i>	wi Data			3	Pay Scale C	By Non-Digit to Digit			1	
panet -	Inter Constant									

From the dropdown, I choose to split 'By Delimiter'; this brings up a dialog.

Split Column by Delimiter		
Specify the delimiter used to split the text column.		
Select or enter delimiter		
Space *		
Split at		
O Left-most delimiter		
O Right-most delimiter		
 Each occurrence of the delimiter 		
Advanced options		
Quote Character		
n 👻		
Split using special characters		
Insert special character 👻		
		_
	C	IK Cancel

I choose to split by space at each occurrence of a space, because this will give me a column with the lower and upper limit.

\times	Query Settings ×						
	123 Pay Scale	✓ A ^B _C Salary.1	▼ A ^B _C Salary.2	▼ A ^B _C Salary.3	ABC Percentage Increase	*	
1	Pay Scale A	£0	-	£15,000	1.5		A PROPERTIES
2	Pay Scale B	£15,0001		£20,000	1.25		Day Scales
3	Pay Scale C	£20,0001	and	above	1		r by Scares
							APPLED 31EF3 Source Removed Other Columns Peroved Blank Rows Demoted Headers Transposed Table Personal Columns
							× Split Column by Delimiter

I delete the automated 'Changed Type' step again. I don't need Salary.2, so I can remove this. As usual, I do this by selecting the columns I want to keep and 'Remove Other Columns'.



	ABC Pay Scale	▼ A ^B _C Salary.1	▼ A ^B _C Salary.3	 ABC 123 Percentage Increase
1	Pay Scale A	£0	£15,000	1.5
2	Pay Scale B	£15,0001	£20,000	1.25
3	Pay Scale C	£20,0001	above	1

I want Salary.1 and Salary.2 to be numeric columns, so I need to remove the \pm signs. I can do this by selecting the columns and replacing \pm with blank. I start by using 'Replace Values' on the Transform tab.

File	Home Transform	Add Column	View								
	2 Data		ata Type: Text * 1. Repla		Values 🕶 🏪 Unpivot Columns 🔹		The rate Columns				
Group 1 By	Jse First Row as Headers • 10 Count Rows	is 💮 Detect Data		a 1.2 Replace Values		Convert to List		Split Format ABC Darse		∑ Statistics	Standard Scientific
	Table		Any Column					Text Column			Number Column
Queries	51	<	×	√ fx -	Table.Se	lectColumn	s(#"Split	t Colu	nn by Delimiter"	{"Pay S	cale", "Salary.1", "Salary
III S	ource Data		nm i	ABC Dave Center		AB. Enland		14	AR. Calancel		All Decenture Increase
🖽 s	tores		TTTA 1	153 Lak reac		in C. Senarder		1.1.1	A C. Sunn Ara		121 Percentage increase
mo	Query1		1	Pay Scale A		£0			£15,000		1.5
			2	Pay Scale B		£15,0001			£20,000		1.25
LE A	li Data		3	Pay Scale C		£20,0001			above		1

This provides a dialog where I can enter the details.

eplace one value with anothe	r in the selected colu	imns.		
/alue To Find				
£				
Replace With				
Advanced options				

This will remove the £ signs.

\sim	√ fx =	Table.ReplaceValue(#"Remo	oved Other Columns1","£",	",Replacer.ReplaceText,{"Salary.1", "Salary.3"	> Query Settings	×
	ABC Pay Scale	✓ A ^B _C Salary.1	✓ A ^B _C Salary.3	▼ ABC Percentage Increase ▼		
1	Pay Scale A	0	15,000	1.5	4 PROPERTIES	
2	Pay Scale B	15,0001	20,000	1.25	Name Day Scales	
3	Pay Scale C	20,0001	above	1	Pay Scales	
					All Properties	
					▲ APPLIED STEPS	
					Source	
					Removed Other Columns	4
					Removed Blank Rows	
					Demoted Headers	
					Transposed Table	
					Renamed Columns	
					Split Column by Delimiter	4
					Removed Other Columns1	4
					× Replaced Value	4

Next, I change both columns to whole numbers. I can do this from the Home tab or the Transform tab, or by using the right-click menu, and changing the data type.



$\times \sqrt{f_x}$	 Table.TransformColumnTypes(#"Rep 	laced Value",{{"Salary.1	", Int64.Type}, {"Salary.3", Int64.Type}})	~	Query Settings	×
1 Pay Scale 1 Pay Scale A 2 Pay Scale B 3 Pay Scale C	v 123 Salary.1 v 0 150001 200001 200001	1 ² 3 Salary.3 15000 20000 Error	1 All All All All All All All All All Al		PROPERTIES Name Pay Scales All Properties APPLIED STEPS	×
					Source Removed Other Columns Removed Blank Rows Demoted Headers Transposed Table Renamed Columns Split Column by Delimiter Removed Other Columns1 Replaced Value X Changed Type	¢ ¢ ¢

I get an error, but I can use 'Replace Values' again; this time, I choose 'Replace Errors'.

Replace Errors		
Enter the value which will replace erro	ors in the selected columns.	
Value		
null		

I want to replace it with null, not zero [0], since zero is the starting point for 'Pay Scale A'.

📉 🗸 🥠 fx 🛛 = Ta	ole.ReplaceErrorValue	es(#"Changed Type", {{	"Salary.1", null}, {"Salary	.3", null}})	~	Query Settings	×
ABC 123 Pay Scale	✓ 1 ² ₃ Salary.1	➡ 1 ² 3 Salary.3	ABC Percentage Inc	rease 💌			
1 Pay Scale A		0	15000 1.5			A PROPERTIES	
2 Pay Scale B		150001	20000 1.25			Name Davi Carlas	
3 Pay Scale C		200001	null 1			Pay Scales	
						All Properties	
						APPLIED STEPS	
						Source	
						Removed Other Columns	\$
						Removed Blank Rows	
						Demoted Headers	
						Transposed Table	
						Renamed Columns	
						Split Column by Delimiter	4
						Removed Other Columns1	4
						Replaced Value	Q.
						Changed Type	
						➤ Replaced Errors	4

Next, I need to transform the Percentage Increase column. If I make it the data type Percentage, I will get values of over 100: I need to divide the values by 100 first, which I can do from the Transform tab, but first I change the data type to 'Decimal Number'. This will allow me to access the 'Standard' dropdown.

File Home Transform Add Image: Strate S	Column ata Type: Deci Detect Data Rename	View mal Number • Type	1 ₄₋₂ Replace Values → ↓ Fill → T _{est} Pivot Column	• 🐜 Unpivot Columns •	Split Column	ASC	XO E Statistics Standard	10 ²	Trigonometry •
Table			Any Column			Text Column	Add Multiply	mber Coli	umn
Queries [5]	<u> </u>	XV	fx - Table.	TransformColumnType	es(#"Repl	laced Errors",{{"Pe	Subtract	, type	number}})
Source Data	1	- 123 Pay!	scale	* 123 Salary.1		123 Salary.3	Divide	Increase	
Stores		1 Pay Scale	A	our occurs	D		Integer-Divide	_	1.5
Query1		2 Pay Scale	8		150001		Modulo		1.25
III All Data		3 Pay Scale	c		200001		Percentage		1
Pay Scales							Percent Of		



I choose 'Divide' and enter 100 in the dialog.

	ABC 123 Pay Scale	1 ² 3 Salary.1	1 ² 3 Salary.3	1.2 Percentage Increase	
1	Pay Scale A	(15000	1.5	
2	Pay Scale B	150001	t 20000	1.25	7
3 Pay Scale C		20000			
	Γ	Divide			
	E	Divide nter a number by which to di alue 100	ivide each value in the colum	n.	

I can now set the correct data types for all of the columns.

	% Percentage Increase	1 ² 3 Salary.3	123 Salary.1	^B C Pay Scale
A PROPERTIES	1.50%	15000	0	ay Scale A
Name Dev Ceales	1.25%	20000	150001	ay Scale B
Pay Scales	1.00%	null	200001	ay Scale C
All Properties				
APPLIED STEPS				
Source				
Removed Other Columns				
Removed Blank Rows				
Demoted Headers				
Transposed Table				
Renamed Columns				
Split Column by Delimiter				
Removed Other Columns1				
Replaced Value				
Changed Type				
Replaced Errors				
Changed Type1				

I rename the salary columns, and my table is ready to 'Close & Load'.

\times	√ <i>fx</i> = Table.Re	nameColumns(#"Changed Ty	pe2",{{"Salary.1", "Mini	num Salary"}, {"Salary.3",	"Maximum Salary"}}) 🗸	Query Settings	×
	Pay Scale 👻	1 ² 3 Minimum Salary	1 ² 3 Maximum Salary	% Percentage Increase			
1 Pay	Scale A	0	15000	1.50%		A PROPERTIES	
2 Pay	Scale B	150001	20000	1.25%		Name Day Caster	
3 Pay	Scale C	200001	null	1.00%		Pay Scales	
						All Properties	
						APPLIED STEPS	
						Source Removed Other Columns Removed Blank Rows Demoted Headers Transposed Table Renamed Columns Split Column by Delimiter	¢ ¢
						Removed Other Columns1	4
						Replaced Value	4
						Changed Type	
						Replaced Errors	\$
						Changed Type1	м
						Divided Column	57
						Changed Type2	
						r inchanned columnist	



Next, I turn to the **Stores** table.

\times	✓ fx = #"All Data"	~	Query Settings	×				
□ - A8 12	Store 1	cales	force expansion V ABC Store 2	ABC Pay Scales	1 ABC WC	orkforce expansio	, ,	
1	null All	45%		null All	50%		PROPERTIES Name	
2	null	null	null	null	null	null	Stores	
3	null	null	null	null	null	null	_ stores	
4	null	null	null	null	null	null	All Properties	
5	null	null	null	null	null	null	APPLIED STEPS	
6	null	null	null	null	null	null	Source	

I have 10 stores in my table, and I need to perform the same transformations for each one. The first step I will take is to merge the columns I need for **Store 1**. I select **Store 1**, **Pay Scales** and **Workforce expansion** whilst holding down the **CTRL** key. When I right-click, I have the option to 'Merge Columns'.

X	√ fx	= #"All Da	ta"					
.	ABC 123 Store 1	*	ABC Pay Scales	٠	ABC Workforce	Pb		Ę
1		null null	All	null	45%	×	Remove Columns Remove Other Columns	
3		null		null		E1	Add Column From Examples	
5		null		null			Remove Errors Fill	,
0		nui		nuu			Change Type	,
						\$	Merge Columns Create Data Type	
						P	Unpivot Columns Unpivot Other Columns Unpivot Only Selected Columns	
							Move	٠

Clicking on this option reveals a dialog:

Merge Columns		
Choose how to merge t	ne selected columns.	
Separator		
None	v	
New column name (option	ial)	

I choose not to use a separator, since I can split by non-numeric and numeric characters later. I want to call my new column **Store 1**, but Power Query won't let me do this as this is one of the names of the original columns, so for now I take the default **Merged**.



×	√ fx	= Table.Co	Table.CombineColumns(Table.TransformColumnTypes(Source, {{"Store 1", type text}}, "en-AU"),{"Store 1", "Pay Scales", "Workforce#(lf)expansion"},CombineTextByDelimiter("", QuoteStyle.None),"Merged")							
	A ^B C Merged	*	ABC Store 2	ABC 123 Pay Scales_1	ABC 123 Workforce expansio	ABC 123 Store 3	ABC Pay Scales_3			
1	All45%		null	All	50%	null	A			
2			null	null	null	null	null			
3			null	null	null	null	null			
4			null	null	null	null	null			
5			null	null	null	null	null			
6			null	null	null	null	null			

I can adjust the step created from:

Table.CombineColumns(Table.TransformColumnTypes(Source, {{"Store 1", type text}}, "en-AU"),{"Store 1", "Pay Scales",

"Workforce#(lf)expansion"},Combiner.CombineTextByDelimiter("", QuoteStyle.None),"Merged")

to:

Table.CombineColumns(Table.TransformColumnTypes(Source, {{"Store 1", type text}}, "en-AU"),{"Store 1", "Pay Scales", "Workforce#(lf)expansion"},CombineTextByDelimiter("", QuoteStyle.None),"Store 1")

This is then accepted with no issues:

×	√ fx	= Table.CombineColumns(Table.TransformColumnTypes(Source, {{"Store 1", type text}}, "en-AU"),{"Store 1", "Pay Scales", "Workforce#(lf)expansion"},CombineTextByDelimiter("", QuoteStyle.None),"Store 1")						
	A ^B _C Store 1	ABC Store 2	ABC Pay Scal	les_1	ABC 123 Workforce expansio 💌	ABC 123 Store 3	ABC Pay Scales_3	
1	All45%		null All		50%	null	A	
2			null	null	null	null	null	
3			null	null	null	null	null	
4			null	null	null	null	null	
5			null	null	null	null	null	
6			null	null	null	null	null	

I repeat this for the other stores.

×	√ fx	= Table.CombineColumns(Tab Scales_17", "Workforce	Query Settings PROPERTIES Name Stores						
	A ^B _C Store 1	▼ A ^B C Store 2	▼ A ^B _C Store 3	▼ A ^B _C Store 4	▼ A ^B _C Store 5	▼ A ^B _C Store 6	-	All Properties	
1	All45%	Al150%	A30%	A and C50%	A,B40%	A50%			
2						B,C40%		APPLIED STEPS	
3								Source	~
4								Merged Columns	
5								Merged Columns1	- O
6								Merged Columns2	4
								Merged Columns3	4
								Merged Columns4	4
								Merged Columns5	- 45 E
								Merged Columns6	4
								Merged Columns7	4
								Merged Columns9	0
								➤ Merged Columns10	45


I could keep working on all the stores together, but it would soon become a large table. Instead, I am going to work on the stores separately. Before I do this, I need to make sure that the store name is included in the data, so I demote headers using the option from the Transform tab:



My data is now safely stored in the rows, and I can create a query from a column. I right-click with **Column1** selected:





This creates a new List Query.

III Data		
Pav Scales		List
Column1	1	Store 1
	2	All45%
	3	
	4	
	5	
	6	
	7	

I will rename my List Query to **Store 1** to reflect the data.

 -		
Store 1		

What I want now, is to create a series of steps that will work on any of the stores. I need a function. I start by taking a reference copy of **Store 1**.

Store 1			1
States	6	Сору	
	ĥ	Paste	
	×	Delete	
)	Rename	
	1	Duplicate	
	ବ	Reference	
		Move To Group	
		Move Up	
		Move Down	
		Create Function	
		Convert To Parameter	
	G	Advanced Editor	
	6	Properties	

I call my new query **fn_store**.

2	√ fx	- #"Store 1"	Query Settings ×
1	List Store 1		PROPERTIES
2	All45%		fn_store
4			All Properties
6			Source



The first step is to convert this list to a table. I can do this from the List tab or I may otherwise rightclick.



A dialog appears where I shall accept the defaults:

To Table

Create a table from a list of values.

Select or enter delimiter	
None	
How to handle extra columns	
Show as errors	-

OK	Cancel
----	--------

×

This gives me access to the other tabs.

File	Home Transform A	dd Column View										~
Close 8 Load	Refresh Preview - Query	Choose Remove Columns * Columns * Manage Columns	Keep Remove Rows * Rows * Reduce Rows	AL Split Column	Group 1 By 4_2 Replace Values Transform	Merge Queries Append Queries Combine Files Combine	Manage Parameters * Parameters	Data source settings Data Sources	Recent Source *			
>	X V fx = Tabl	e.FromList(Source	, Splitter.Spl	itByNothing	(), null, null, ExtraValues.En	rror)				~	Query Settings	×
ies	III. Aoc Column1	<u> </u>									A PROPERTIES	
Quei	1 Store 1										Name	
	2 Al145%										fn_store	
	3										All Properties	
	4											
	5										APPLIED STEPS	
	0										Source	
	1										➤ Converted to Table	4

I start by promoting the first row to headers using the option on the Transform Tab.

Ele Home Transform	Add Column View			~
Group By Use First Row as Headers Count Rows	Data Type: Any * 1,2 Replace Values * * Movie * *	Statistics Standard Scientific Information -	Date & Time Column Date & Time Column	te ppe
Protocols the first root of this table into column heaters gravity of the state of the state gravity of the state of the state gravity of the state of the state gravity of the state of the state of the state gravity of the state of the state of the state of the state of the state of the state of the state of the state of the state of the sta	e.PromoteHeaders(#"Converted to Table", [PromoteAllScalars-true])			Query Settings × PROPERTIES Name f_utore All Properties APPLED STEPS Source Converted to Table P



I am ready to create the transformations required and convert this query. I start by getting rid of any empty rows. I can do this by using 'Remove Blank Rows' from the Home tab:



This simplifies my table: for this store it is one row, but for other stores there may be more.

<pre>X</pre>	Query Settings	×
Image: 1 Alassis	PROPERTIES Name fn_store All Properties APPLIED STEPS	
	Source Converted to Table Promoted Headers X Removed Blank Rows	0 0

I need the store information to be a separate column. I can do this by employing the 'Unpivot Column' feature from the Transform tab.



I now have a column with the store data, and one for the pay scales and percentage increase of workforce. I will rename these columns later.

$\times \checkmark f_x$	= Table.UnpivotOtherColumns(#"Remo	ved Blank Rows", {}, "Attribute", "Value")
	▼ ABC Value ▼	
1 Store 1	All45%	

I need to keep in mind that this function needs to cope with the data for all the stores. This means I need to carry out some replacements:

- 'All' needs to be replaced by 'A,B,C'
- ' and ' needs to be replaced by ','



I can then use comma (,) as my delimiter to split up the pay scales. I begin with 'Replace Values' on the 'Transform' tab, or else by right-clicking:

, AB _C Attribute	 ABC 123 Value 	D ₂	Carry		
1 Store 1	All45%	¥	Remove Remove Other Columns Duplicate Column Add Column From Examples		
			Remove Duplicates Remove Errors		
			Change Type Transform	•	
		1 \$2	Replace Values Replace Errors		
		۲	Create Data Type		
		ch 22	Split Column Group By		
			₩	Unpivot Columns Unpivot Other Columns Unpivot Only Selected Columns	
		=į	Rename Move		
			Drill Down Add as New Query		

First	replace	'All':
-------	---------	--------

	×
Replace Values	
Replace one value with another in the selected columns.	
Value To Find	
All	
Replace With	
A,B,C	
> Advanced options	
Then I replace ' and ':	
	\times

and Replace With	
Replace With	
r	



My data is now ready to be split:

×	√ fx	= Table.Re	placeValue(#"R	eplaced Value",	" and ",",'	',Replacer.Repla	ceText,{"Value"}
	A ^B C Attribute		A ^B _C Value	-			
1	Store 1		A,B,C45%				

I am going to split the column into pay scales and increase percentage. I can do this by right-clicking, and choosing to 'Split Column' 'By Non-Digit to Digit':



This gives me an extra column.

×	√ fx	= Table.Sp	litC <mark>olumn(#</mark> "Rep	laced Value1	", "Value",	Splitter.Sp
	A ^B _C Attribute	-	A ^B _C Value.1	→ A ^B C	Value.2	*
1	Store 1		A,B,C	45	%	



Now I can split up the pay scales: I will do this using Comma as a Delimiter, and I will choose to 'Split into Rows' in the advanced options.

	×
Split Column by Delimiter	
Specify the delimiter used to split the text column.	
· · · · · · · · · · · · · · · · · · ·	
Comma *	
Split at	
O Left-most delimiter	
O Right-most delimiter	
Each occurrence of the delimiter	
Advanced options	
Split into	
O Columns	
Rows	
" +	
Split using special characters	
Insert special character 👻	
	OK Cancel

This gives me more rows:

× √ fx -	Table.TransformColumnT	ypes(#"Split Column H	y Delimiter",{{"\	<pre>value.1", type text}, {"Value.2", Percentage.Type}})</pre>	~	Query Settings	×
A ^B _C Attribute	▼ A ^B _C Value.1	▼ % Value.2				. , .	
1 Store 1	A	n ^a	45.00%			PROPERTIES	
2 Store 1	В		45.00%			iname	
3 Store 1	с		45.00%			In_store	
						All Properties	
						APPLIED STEPS	
						Source	
						Converted to Table	4
						Promoted Headers	\$
						Removed Blank Rows	
						Unpivoted Columns	
						Replaced Value	-0
						Replaced Value1	4
						Split Column by Character Tr	ra
						Split Column by Delimiter	4
						× Changed Type	

I keep the automated 'Changed Type' step and rename the columns.

× ✓ fx	= Table.RenameColumns(#"C	hanged Type",{{"Attribute", "St
■ ₊ A ^B _C Store	▼ A ^B _C Pay Scale	▼ % Workforce Increase
1 Store 1	A	45.
2 Store 1	В	45.
Store 1	C	45.



My query is ready to be converted to a function. I need to parameterise, so I view the **M** code in the Advanced Editor, available from the Home tab.

	Display Options 👻
<pre>let Source = #"Store 1", #"Converted to Table" = Table.FromList(Source, Splitter.SplitByNothing(), null, null, ExtraValues. #"Promoted Headers" = Table.PromteHeaders(#"Converted to Table", [PromoteAllScalarsetrue]), #"Removed Blank Rows" = Table.SelectRows(#"Promoted Headers", each not List.IsEmpty(List.RemoveMau #"Unpivoted Columns" = Table.UnpivotOtherColumns(#"Removed Blank Rows", {}, "Attribute", "Value"), #"Replaced Value" = Table.ReplaceValue(#"Unpivoted Columns", "All", "A,B,C", Replacer.ReplaceText, {"\ #"Replaced Value" = Table.ReplaceValue(#"Replaced Value", "and ", ", ",Replacer.ReplaceText, {"\ #"Split Column by Character Transition" = Table.SplitColumn("Replaced Value1", "Value", Splitter #"Split Column by Delimiter" = Table.ExpandListColumn(Table.TransformColumns(#"Split Column by Chi #"Changed Type" = Table.RenameColumns(#"Changed Type",{"Attribute", "Store"}, {"Value.1", "Pap in #"Renamed Columns"</pre>	<pre>.Error), tchingItems(Record.FieldValues(_), {" , /alue"}), e"}), SplitTextByCharacterTransition((c) = aracter Transition", {{"Value.1", Spl , {"Value.2", Percentage.Type}}), / Scale"}, {"Value.2", "Workforce Inc</pre>

The only line I need to change is the Source step. I am going to introduce a parameter **p_store**, which will receive any of the store columns as a list. The **M** code before the 'let' statement will be:

(p_store as list) =>

and the Source step will change from:

Source = #"Store 1",

to:

Source = p_store,



Advanced Editor			×
fn_store	Display Option	15 *	Ø
<pre>(p_store as list)=> let Source = p_store, #"Converted to Table" = Table.FromList(Source, Splitter.SplitByNothing(), null, null, ExtraValues.Error), #"Promoted Headers" = Table.PromoteHeaders(#"Converted to Table", [PromoteAllScalars=true]), #"Removed Blank Rows" = Table.SelectRows(#"Promoted Headers", each not List.IsEmpty(List.RemoveMatchingItems(Rec #"Unpivoted Columns" = Table.SelectRows(#"Promoted Headers", each not List.IsEmpty(List.RemoveMatchingItems(Rec #"Unpivoted Columns" = Table.ReplaceValue(#"Unpivoted Columns","All","A,B,C",Replacer.ReplaceText,("Value")), #"Replaced Value" = Table.ReplaceValue(#"Replaced Value"," and ",",",Replacer.ReplaceText,("Value")), #"Split Column by Character Transition" = Table.SplitColumn(#"Replaced Value!", "Value", Splitter.SplitTextByCha #"Split Column by Delimiter" = Table.ExpandlistColumn(1#Delimiter", "{("Value.1", type text), {"Value.2", P #"Renamed Columns" = Table.RenameColumns(#"Changed Type",{{"Attribute", "Store"}, {"Value.1", "Pay Scale"}, {"Value.", "Value."]) in #"Renamed Columns"</pre>	ord.FieldValues(_ wracterTransition ion", {{"Value.1" 'ercentage.Type}}) ulue.2", "Workforc	_), {" ((c) = ", Spl), ce Inc	<pre>", r '> nc itte :reas</pre>
✓ No syntax errors have been detected.			

As soon as I click 'Done', Power Query recognises that my query is now a function.

f_x f_x = (p_store as list)=>		~	Query Settings	\times
Enter Parameter p_store Unspecified	Choose Column		PROPERTIES Name fn_store All Properties	
Invoke			APPLIED STEPS fn_store	
function (p_store as list) as any				

It is prompting me for a column (field). This means that this function will now create a table from any of the store columns in the **Stores** query.



$\times \sqrt{f_x} = (p_s)$	tore as lis	st)=>								~
Enter Parameter										
p_store Unspecified				Cho	ose Column					
Invoke Clear	Select (Select a qu	Column lery and a co	blumn							×
function (p_score as	Stores			*						
	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	
	Store 1	Store 2	Store 3	Store 4	Store 5	Store 6	Store 7	Store 8	Pay Increases (P	
	All45%	All50%	A30%	A and C50%	A,B40%	A50%	B33%	A50%		
						B,C40%		B40%		
							A25%			
	<								>	
	Clear							OK	Cancel	

I can test the function on **Column1**:

X / fx = (p_store as list)=>		~
Enter Parameter		
p_store Query: Stores Column: Column1	Choose Column	
Invoke		
Invoke Clear		

Invoking this query will give me a table:

× √ fx	= fn_store(Stores[Column1])		✓ Query Settin
□, A ^B _C Store	AB _C Pay Scale	▼ % Workforce Increase ▼	4 PROPERTIES
1 Store 1	A	45.00%	Name
2 Store 1 3 Store 1	B C	45.00%	Invoked Function
			All Properties
			▲ APPLIED STEPS
			Source

In the Stores query, I need to make sure I only have the columns I need. To do this, I will remove the 'Demote Headers' step. I can reapply it before I invoke the function.



Vame	
Stores	
All Properties	
APPLIED STEPS	
Source	
Merged Columns	4
Merged Columns1	4
Merged Columns2	45
Merged Columns3	4
Merged Columns4	45
Merged Columns5	4
Merged Columns6	4
	4
Merged Columns7	
Merged Columns7 Merged Columns9	42

This means I have the store names in the headings to choose:

- A ^B C Store 5	✓ A ^B _C Store 6	a A ^B C Store 7	▼ A ^B C Store 8	ABC 123 Pay Increases (Proposed)	ABC 123 Pay Scale A
A,B40%		Choose Columns Choose the columns to keep Search Columns © Store 1 © Store 2 © Store 3 © Store 3 © Store 4 © Store 5 © Store 7 © Store 7 © Store 7 © Store 8 Pay Increases (Proposed) Pay Scale A Pay Scale A Pay Scale B Pay Scale C © Store 9 © Store 10 OK			null null null null null null null 1.5

This gives me the store columns, and I can demote the headers again:



	A ^B _C Column5	A ^B C Column6	▼ A ^B _C Column7 ▼	A ^B C Column8	A ^B C Column9	A ^B C Column10
1	Store 5	Store 6	Store 7	Store 8	Store 9	Store 10
2	A,B40%	A50%	B33%	A50%	All5%	All5%
3		B,C40%		B40%		
4			A25%			
5						
6				C30%		
6 7				C30%		

Stores is ready to use as the Source for fn_store. I go back to fn_store:

$\times \sqrt{f_x}$ - (p_store as list)->	~	Query Settings ×
Enter Parameter p_store Unspecified	Choose Column	PROPERTIES Name fn_store All Properties
invoke Clear function (p_store as list) as any		APPLIED STEPS fn_store

I need to provide a column from the **Stores** query.

Enter Parameter	store as li	st)=>										~
Litter Faranieter												
p_store												
				Cho	ose Column							
										~		
										^	2	
Invoke	Select (Column										
function (n. store a	Select a qu	lery and a co	olumn									
runction (p_score as	Stores			*								
										-		
	Column1	Column2	Column3	Column4	Column5	Column6	Column/	Column8	Column9	Ci		
	Store 1	Store 2	Store 3	Store 4	Store 5	Store 6	Store 7	Store 8	Store 9	St		
	All45%	All50%	A30%	A and C50%	A,B40%	A50%	B33%	A50%	All5%	Al		
						B,C40%		B40%				
							A25%					
	<									2		
										_		
	(C)											

I use Column1:

$\times \sqrt{f_x}$ = (p_store as list)=>		~
Enter Parameter		
p_store		
Query: Stores Column: Column1	Choose Column	
Invoke Clear		
function (p_store as list) as any		



Invoking this query will give me a table:

×	√ fx	= fn_store(Stores[Column1])	
	A ^B _C Store	A ^B C Pay Scale	▼ % Workforce Increase ▼
1	Store 1	A	45.00%
2	Store 1	В	45.00%
3	Store 1	C	45.00%

I rename this table **Expansion by Store**. I am going to use the **M** code already generated as a basis for this query.

cpurision by store	Display Option	S ¥
let		
Source = fn_store(Stores[Column1]) In		
Source		



I take the **M** code created for **Column1**, and replicate it for 10 columns. I have renamed the steps to make it clear what I am planning. I will rename the final 'in' statement when I have finished:

kpansion by Store	Display Options
et	
<pre>Store1 = fn_store(Stores[Column1]),</pre>	
<pre>Store2 = fn_store(Stores[Column2]),</pre>	
<pre>Store3 = fn_store(Stores[Column3]),</pre>	
<pre>Store4 = fn_store(Stores[Column4]),</pre>	
<pre>Store5 = fn_store(Stores[Column5]),</pre>	
<pre>Store6 = fn_store(Stores[Column6]),</pre>	
<pre>Store7 = fn_store(Stores[Column7]),</pre>	
Store8 = fn_store(Stores[Column8]),	
Store9 = fn_store(Stores[Column9]),	

Done Cancel



I have created a table for each store; now I just need to append them. The **M** code function to append is:

Table.Combine({table1, table2,....}).

I add this line to the **M** code in the Advanced Editor.

Advanced Editor

Expansion by Store

et	
<pre>Store1 = fn_store(Stores[Column1]),</pre>	
<pre>Store2 = fn store(Stores[Column2]),</pre>	
<pre>Store3 = fn_store(Stores[Column3]),</pre>	
<pre>Store4 = fn_store(Stores[Column4]),</pre>	
<pre>Store5 = fn_store(Stores[Column5]),</pre>	
<pre>Store6 = fn_store(Stores[Column6]),</pre>	
<pre>Store7 = fn_store(Stores[Column7]),</pre>	
<pre>Store8 = fn_store(Stores[Column8]),</pre>	
<pre>Store9 = fn_store(Stores[Column9]),</pre>	
<pre>Store10 = fn_store(Stores[Column10]),</pre>	
All_Stores = Table.Combine({Store1,Store2,Store3,Store4,Store5,Store6,Store7,Store8,Store9,	Store10})
All_Stores	

I click 'Done' to see the results

$\times \sqrt{f_x}$	= Table.Combine({Store1,St	pre2,Store3,Store4,Store5,Store6,Store7,	ore8, Store9, Store10}) V Query Settings	
A ^B _C Store	✓ A ^B _C Pay Scale	▼ % Workforce Increase ▼		
1 Store 1	A	45.00%	A PROPERTIES	
2 Store 1	В	45.00%	Fugarion by Store	
3 Store 1	C	45.00%	Expansion by store	
4 Store 2	A	50.00%	All Properties	
5 Store 2	в	50.00%	4 APPLIED STEPS	
6 Store 2	C.	50.00%	Changel	
7 Store 3	A	30.00%	Store	
8 Store 4	A	50.00%	Store3	
9 Store 4	C	50.00%	Stored	
10 Store 5	A	40.00%	Store5	
11 Store 5	в	40.00%	Store6	
12 Store 6	A	50.00%	Store7	
13 Store 6	в	40.00%	Store8	
14 Store 6	C	40.00%	Store9	
15 Store 7	в	33.00%	Store10	
16 Store 7	A	25.00%	× All_Stores	
17 Store 8	A	50.00%		
18 Store 8	в	40.00%		
19 Store 8	C	30.00%		
20 Store 9	A	5.00%		
21 Store 9	В	5.00%		
22 Store 9	С	5.00%		
23 Store 10	A	5.00%		
24 Store 10	В	5.00%		
25 Store 10	с	5.00%		

– 🗆 X

Display Options 🔹 🕜

Done Cancel



I have the results in the format I wanted for all stores. I can now 'Close & Load'. I will choose 'Close & Load to...' so that I can load to 'Connection Only' to begin with to avoid loading all queries.

	Les .		
Import Data		?	×
Select how you	u want to view this data in y Iable 2ivotTable Report Pivot <u>C</u> hart <u>O</u> nly Create Connection	our workbool	c
Where do you	want to put the data? g worksheet:		
=\$A\$	51	1	Ľ
(New w	vorksheet		

I can then right-click on the queries I want to load, and position them together:

III S	h	Сору	
C	ĥ	Paste	
— c	TZ.	Edit	
	×	Delete	
1	-1	Rename	
🖽 A	B	Refresh	
C	1	Load To	
III P	h	Duplicate	
C	6	Reference	
[] s	1	Merge	
С		Append	
III E		Export Connection File	
С	¢	Move To Group	
		Move Up	
		Move Down	
		Show the peek	
	E)	Properties	

I load the tables onto a worksheet:



E1		I × ✓ .	fx							
	А	В	С	D	E	F	G	H		
1	Store ,	Pay Scale	Workforce Increase 🗖							
2	Store 1	A	0.45							
3	Store 1	В	0.45							
4	Store 1	С	0.45			Import Data ? × Select how you want to view this data in your workbook.				
5	Store 2	A	0.5							
6	Store 2	В	0.5			Image: Image				
7	Store 2	С	0.5			O only Create Connection Where do you want to put the data? Existing worksheet:				
8	Store 3	A	0.3							
9	Store 4	A	0.5			=Sheet11SES1				
10	Store 4	С	0.5			Add this data to the	Data <u>M</u> odel	27		
11	Store 5	A	0.4			P <u>r</u> operties •	ок	Cancel		
12	Store 5	В	0.4							
13	Store 6	A	0.5							
14	Store 6	В	0.4							
15	Store 6	С	0.4							
16	Store 7	В	0.33							

I check the data types and the report is ready.

Α	В	С	D	E		F		G	Н
Store .	Pay Scale	Workforce Increase 🚽		Pay Scale 🗸	Mi	nimum Salary <mark>.</mark>	Max	kimum Salary <mark>.</mark>	Percentage Increase 🗖
Store 1	А	45%		Pay Scale A	\$	-	\$	15,000.00	2%
Store 1	В	45%		Pay Scale B	\$	150,001.00	\$	20,000.00	1%
Store 1	С	45%		Pay Scale C	\$	200,001.00			1%
Store 2	A	50%							
Store 2	В	50%							
Store 2	С	50%							
Store 3	А	30%							
Store 4	Α	50%							
Store 4	С	50%							
Store 5	Α	40%							
Store 5	В	40%							
Store 6	A	50%							
Store 6	В	40%							
Store 6	С	40%							
Store 7	В	33%							



Further Reading

The course may consider topics not covered in this document. Moreover, you may wish to learn more. SumProduct presently has weekly blogs on Power Query which may be found here:

https://www.sumproduct.com/blog

Past articles may be located here:

https://www.sumproduct.com/thought/power-query-blog-series

Find out more at <u>contact@sumproduct.com</u> or <u>training@sumproduct.com</u> as required. We are happy to help!

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