



# Fast-track Power BI

Sample manual - first two chapters



**Wise Owl**  
Training

## TABLE OF CONTENTS (1 of 10)

1	IMPORTING DATA	Page
1.1	Our Example	12
1.2	Importing from Different Sources	13
	<i>Re-Using a Data Source</i>	13
1.3	Importing from Excel	14
1.4	Importing CSV or Text Files	15
1.5	Importing from SQL Server	15
	<i>Using Queries and Stored Procedures</i>	17
	<i>Passing Arguments to Stored Procedures</i>	17
1.6	Importing from a Website	18
1.7	Entering Data Manually	19
	<i>Pasting Data</i>	19
	<i>Typing in Data</i>	20

2	DATA MODELS	Page
2.1	Data Models	21
	<i>Viewing a Model</i>	21
	<i>Selecting Single Model Items</i>	22
	<i>Selecting Multiple Items</i>	22
	<i>Searching for Fields</i>	22
2.2	Model Diagrams	23
	<i>Arranging Tables in a Model</i>	23
	<i>Diagram Layouts</i>	23
	<i>Collapsing and Expanding Tables</i>	24
	<i>Controlling Expand/Collapse Field Visibility</i>	24
	<i>Seeing Table Information</i>	24
2.3	Hiding Objects	25
	<i>Why you might Want to Hide Tables and Fields</i>	25
	<i>Hiding Tables</i>	26
	<i>Hiding Fields/Columns</i>	26
2.4	Model Properties	27
	<i>Table Properties</i>	27
	<i>Display Folders</i>	27
	<i>Default Number and Date Formatting</i>	28
	<i>Changing the Default Aggregation for a Field</i>	28
2.5	Relationships	29
	<i>The Need for Relationships</i>	29
	<i>Parent-Child Relationships</i>	29
	<i>Creating a Relationship</i>	30
	<i>Editing Relationships</i>	30
	<i>The Effect of Relationships</i>	31
	<i>Cross-Filter Direction</i>	31

3	VISUALS	Page
3.1	Overview of Visuals	32
3.2	Adding and Changing Visuals	33
	<i>Adding a Visual then Selecting its Data</i>	33
	<i>Data-First Visual Creation</i>	34
	<i>Changing Visual Types</i>	34
3.3	Working with Visuals	35
	<i>The Visual Header</i>	35
	<i>Focus Mode</i>	35
	<i>Spotlight Mode</i>	35
	<i>Resizing a Visual</i>	36
	<i>Selecting Visuals</i>	36
	<i>Moving, Copying and Deleting Visuals</i>	36
	<i>Locking Visuals</i>	37
	<i>Aligning and Distributing Visualisations</i>	37
	<i>Grouping Visualisations</i>	38
	<i>Showing a Visual's Underlying Data</i>	39
3.4	The Selection Pane	40
	<i>Viewing the Selection Pane</i>	40
	<i>Changing the Visual Layer Order</i>	41
	<i>Changing the Tab Order</i>	41
	<i>Hiding Visuals</i>	41

4	VISUAL INTERACTIONS	Page
4.1	Overview	42
4.2	Editing Visual Interactions	43
	<i>What the 3 Symbols Mean</i>	44

5	FORMATTING VISUALS	Page
5.1	Finding Formatting Properties	45
	<i>Searching for a Property</i>	45
	<i>Finding a Property</i>	45
5.2	Common Formats to Apply	46
	<i>Setting Visual Backgrounds</i>	46
	<i>Borders and Shadow Effects</i>	47
	<i>Titles, Subtitles and Dividing Lines</i>	48
5.3	Header Icons	49
5.4	Tooltips	50
5.5	Useful General Formatting Tricks	51
	<i>The Wonderful Format Painter</i>	51
	<i>Expanding and Collapsing Cards</i>	52
	<i>Removing all Formatting</i>	52
5.6	Themes	53

## TABLE OF CONTENTS (2 of 10)

6	TABLES	Page
6.1	Basic Tables	54
6.2	Working with Table Columns	54
	<i>Sorting Tables by Columns</i>	55
	<i>Re-ordering Columns</i>	55
	<i>Changing Column Widths Automatically</i>	55
	<i>Changing Column Widths Manually</i>	56
	<i>Changing Word Wrap Options</i>	56
	<i>Renaming Columns</i>	57
6.3	Aggregating Data	58
6.4	Formatting Numbers	59
	<i>Formatting Numbers within a Single Table</i>	59
	<i>Formatting Numbers for all Visuals</i>	60
	<i>Setting Custom Number Formats</i>	60
6.5	Working with Dates in Tables	61
	<i>Displaying Dates as Dates</i>	61
	<i>Changing the Default Format for a Date</i>	61
	<i>Setting a Custom Date Format</i>	62
6.6	Specific to Formatting Tables	63
	<i>Column Headers</i>	63
	<i>Totals</i>	63
	<i>Font Size and Typeface</i>	64
	<i>Table Padding and Gridlines</i>	64
	<i>Table Styles</i>	65
	<i>Formatting Columns Individually</i>	65

8	MATRICES	Page
8.1	Overview of Matrices	73
8.2	Creating a Matrix	74
	<i>The Sections of a Matrix</i>	74
	<i>Sorting in a Matrix</i>	74
8.3	Multiple Rows, Columns and Values	75
	<i>Multiple Row Fields</i>	75
	<i>Multiple Values Fields</i>	76
	<i>Multiple Column Fields</i>	76

9	TEXT BOXES, IMAGES AND SHAPES	Page
9.1	Overview	77
	<i>Drawing Text Boxes, Images or Shapes</i>	77
9.2	Images	78
	<i>Scaling Images</i>	78
	<i>Adding a Hyperlink to an Image</i>	78
9.3	Text Boxes	79
	<i>Inserting Values</i>	79
9.4	Shapes	79
	<i>Adding a Shape</i>	80

7	CONDITIONAL FORMATTING	Page
7.1	Conditional Formatting	66
7.2	Applying Conditional Formatting	67
	<i>Setting Conditional Formatting</i>	67
	<i>Changing Conditional Formatting</i>	67
7.3	Gradient Effects	68
	<i>Adding a Middle Colour</i>	68
7.4	Rules-Based Conditional Formatting	69
7.5	Formatting Using Field Values	70
7.6	Data Bars	71
7.7	Displaying Icons	72

## TABLE OF CONTENTS (3 of 10)

10	CHART BASICS	Page
10.1	The Parts of a Chart	81
10.2	Types of Chart Available	82
10.3	Working with Charts	83
	<i>Creating a Chart</i>	83
	<i>Suggesting Chart Types</i>	83
	<i>Sorting Charts</i>	84
	<i>Zoom Sliders</i>	85
	<i>Excluding and Including Data</i>	86
10.4	Quick Ways to Format Charts	87
10.5	Chart Legends	88
10.6	Detail Labels	89
	<i>Leader Lines for Data Labels</i>	90
	<i>Total Labels</i>	90
10.7	Background and Gridlines	91
	<i>Plot Area and Background</i>	91
	<i>Gridlines</i>	91
10.8	Axes	92
	<i>Categorical versus Continuous</i>	92
	<i>Formatting</i>	
	<i>Formatting Axes</i>	93
	<i>Scaling Ranges</i>	93
	<i>Spacing Categories</i>	93
10.9	Conditional Formatting	94

11	SMALL MULTIPLES	Page
11.1	Overview of Small Multiples	95
11.2	Creating and Formatting Small Multiples	96
	<i>Setting Grid Width and Height</i>	96
	<i>Formatting Small Multiple Titles</i>	97
	<i>Other Formatting Options</i>	97
	<i>Suppressing Axis Titles</i>	98
	<i>Using Different Axes for Different Charts</i>	98
11.3	Making the Background Colour Dynamic	99

12	MORE ON CHARTS	Page
12.1	Line, Combination and Area Charts	100
	<i>Multiple Fields in Line Charts</i>	100
	<i>Line Formatting</i>	101
	<i>Secondary Axes</i>	102
	<i>Combination Charts</i>	102
	<i>Area Charts</i>	103
12.2	Pie, Donut and Treemap Charts	104
	<i>Formatting Pie and Donut Charts</i>	104
12.3	Scatter and Bubble Charts	105
	<i>Creating Scatter Charts</i>	105
	<i>Making Bubble Charts</i>	105
	<i>Formatting Scatter and Bubble Charts</i>	106
	<i>Animating Bubble Charts</i>	107

13	DRILL-DOWN	Page
13.1	Drill-Down for Charts	108
	<i>What is Drill-Down?</i>	108
	<i>Enabling Drill Down</i>	108
	<i>Drilling Down</i>	109
	<i>Drilling Up</i>	109
	<i>What Happens when you Drill Down</i>	110
	<i>Drill Down and Visual Interactions</i>	110
	<i>Viewing the Next Hierarchy Level</i>	111
	<i>Expanding All Levels in a Hierarchy</i>	111
13.2	Drill-Down in a Matrix	112
	<i>Choosing Row or Column Fields</i>	112

14	GROUPING AND BINNING	Page
14.1	Grouping	113
	<i>Starting a Group</i>	113
	<i>Editing Groups</i>	114
	<i>Using Group Fields</i>	114
14.2	Binning	114

## TABLE OF CONTENTS (4 of 10)

15	QUERYING DATA	Page
15.1	What are Queries?	116
15.2	Working with Queries	117
	<i>Opening the Query Editor</i>	117
	<i>The Query Editor</i>	117
	<i>Default Query Steps</i>	118
	<i>Viewing Data at Different Steps</i>	118
	<i>Editing a Query Step</i>	118
	<i>Renaming Steps</i>	119
	<i>Deleting a Query Step</i>	120
	<i>Deleting Multiple Query Steps</i>	120
	<i>Adding a New Step</i>	120
	<i>Viewing M Formulae</i>	121
	<i>Applying Query Changes</i>	121
15.3	Common Transforms	122
	<i>Changing Data Types</i>	122
	<i>Renaming Columns</i>	122
	<i>Removing Columns</i>	123
	<i>Removing Rows</i>	123
	<i>Sorting Rows</i>	124
	<i>Filtering Rows</i>	124
	<i>Splitting Columns by Delimiter</i>	125
	<i>Splitting Columns by Number of Characters</i>	125
	<i>Extracting Values</i>	126
	<i>Replacing Values</i>	126
	<i>Duplicating Columns</i>	126
15.4	Creating New Columns	127
	<i>Creating a Column by Example</i>	127
	<i>Creating a Formula</i>	127
	<i>Creating Conditional Columns</i>	129

16	COMBINING QUERIES	Page
16.1	Loading Multiple Files from a Folder	130
	<i>Setting the Folder</i>	130
	<i>Combining the Files</i>	131
	<i>Setting the Template for Import</i>	131
	<i>Tidying Up the Results</i>	132
	<i>An Outline of How it Works</i>	132
16.2	Appending Queries	133
	<i>Combining Queries using Append</i>	133
	<i>Tidying up your Results</i>	134
16.3	Merging Data	135
	<i>Loading the Tables to Merge</i>	135
	<i>Merging the Data</i>	136
	<i>Flattening the Combined Table</i>	137
	<i>Final Touches</i>	137
16.4	Fuzzy Merging	137
	<i>Setting a Similarity Threshold</i>	139
	<i>Enforcing Case Sensitivity</i>	139
	<i>Using a Transformation Table</i>	139

17	MANIPULATION TRANSFORMS	Page
17.1	Unpivoting Data	140
	<i>Loading the Original Data</i>	140
	<i>Unpivoting the Data</i>	141
	<i>Renaming your Columns</i>	141
17.2	Grouping Data	142
	<i>Optional Step – Remove Excess Columns</i>	142
	<i>Starting Grouping</i>	143
	<i>Specifying How to Group Data</i>	143
17.3	Pivoting Columns	144
	<i>Remember Matrices</i>	144
	<i>Pivoting: Creating the Necessary New Columns</i>	144
	<i>Pivoting by Columns</i>	145
	<i>Using our Pivoted Columns</i>	145
17.4	Transposing Data: Replacing Text	146
17.5	Transposing Data: Joining Rows Together	147
	<i>Step 1 – Transposing the Data</i>	147
	<i>Step 2 – Reversing your Columns</i>	147
	<i>Step 3 – Merging your Columns</i>	148
	<i>Step 4 – Transposing Back</i>	148

18	MANIPULATING COLUMNS	Page
18.1	Splitting Columns	149
	<i>Accessing Split Column Menu</i>	149
	<i>Splitting by Delimiter</i>	150
	<i>Splitting by Number of Characters</i>	151
	<i>Splitting by Positions</i>	152
	<i>Splitting by Change in Case or Character Type</i>	152
	<i>Splitting into Rows</i>	153
	<i>Retaining Quotation Marks</i>	154
18.2	Merging Columns	155
18.3	Extracting Data	156
	<i>Replacing or Adding Columns</i>	156
	<i>An Example</i>	156
	<i>The Possible Options</i>	157

## TABLE OF CONTENTS (5 of 10)

19	CREATING COLUMNS	Page
19.1	Ways to Create New Columns	158
19.2	Columns from Examples	159
	<i>Step 1 – Start the Feature</i>	159
	<i>Step 2 – Show some Examples</i>	160
	<i>Step 3 – Confirm the Formula</i>	160
	<i>Step 4 – Review your Formula</i>	160
	<i>Step 5 – Understanding your Formula</i>	161
19.3	Built-up Columns	162
19.4	Custom Columns in M	163
	<i>M Prefixes</i>	163
	<i>Our Example – Elapsed Days</i>	163
	<i>Creating a Custom Column</i>	164
19.5	Special Case - Last Refresh Date/Time	165
19.6	Conditional Columns	166
19.7	Indexing Columns	167

20	TOOLTIPS	Page
20.1	Overview	168
20.2	Legacy vs Modern Tooltips	169
20.3	Basic Tooltips	170
	<i>Applying Basic Tooltips</i>	170
	<i>Formatting Tooltips</i>	170
	<i>Standardising Tooltip Formatting</i>	171
	<i>Adding Fields to Tooltips</i>	172
20.4	Static Report Page Tooltips	173
	<i>Step 1 – Create the Tooltip Page</i>	173
	<i>Step 2 – Setting the Page Size</i>	174
	<i>Step 3 – Hiding your Report</i>	174
	<i>Step 4 – Creating the Tooltip Report</i>	174
	<i>Step 5 – Assigning a Report Page to a Tooltip</i>	175
20.5	Dynamic Report Page Tooltips	176
	<i>Step 1 – Creating the Tooltip Page</i>	176
	<i>Step 2 – Adding Content to the Tooltip Page</i>	176
	<i>Step 3 – Assigning Fields to the Tooltip Report Page</i>	177
	<i>Step 4 – Choosing By Category or Summarized</i>	177
	<i>Step 5 – Choosing whether to Keep Filters</i>	178
	<i>Step 6 – Assigning your Tooltip Report Page to a Visual</i>	178
	<i>Step 7 – Customising the Title</i>	179
20.6	Visual Header (Help) Tooltips	180
	<i>Step 1 – Creating the Tooltip Page</i>	180
	<i>Step 2 – Creating the Report Page for the Tooltip</i>	180
	<i>Step 3 – Assigning your Page to the Visual Header</i>	181

21	CARDS	Page
21.1	New Cards	182
21.2	Working with Cards	183
	<i>Creating a New Card</i>	183
	<i>Formatting Card Values and Labels</i>	183
	<i>Formatting the Numbers in Cards</i>	184
	<i>Card Shapes</i>	184
	<i>Formatting the Cards Themselves</i>	185
	<i>Adding Images to Cards</i>	185
21.3	Reference Labels	186
21.4	Multi-row Cards	187

## TABLE OF CONTENTS (6 of 10)

22	GAUGES	Page
22.1	Gauges	188
	<i>Adding a Gauge</i>	188
	<i>Minimum, Maximum and Target Values</i>	189
	<i>Formatting Gauges</i>	189

23	KEY PERFORMANCE INDICATORS (KPIs)	Page
23.1	Overview of KPIs	190
	<i>Creating a KPI</i>	190
23.2	Creating Targets	191
	<i>Formatting KPIs</i>	192

24	CUSTOM VISUALS	Page
24.1	What are Custom Visuals?	193
24.2	Adding Custom Visuals	194
	<i>Pinning Custom Visuals</i>	194
24.3	Working with Custom Visuals	195
	<i>Applying a Custom Visual</i>	195
	<i>Removing Custom Visuals</i>	195

25	INFOGRAPHICS	Page
25.1	Assembling what you Need	196
25.2	Creating a Picture Chart	197
	<i>Step 1 – Creating the Chart</i>	197
	<i>Step 2 – Editing the Chart</i>	197
	<i>Step 3 – Adding your Images</i>	198
	<i>Step 4 – Assigning Pictures to Data Series</i>	199
	<i>Step 5 - Stacking your Pictures</i>	199
	<i>Step 6 – Set your Picture Unit Size</i>	200
	<i>Step 7 - Adding Text Labels</i>	201

26	FILTERING REPORTS	Page
26.1	How Filters Work	202
26.2	Working with Filters	203
	<i>Showing the Filters Pane</i>	203
	<i>Applying a Basic Filter</i>	203
	<i>Adding Fields to the Filters Pane</i>	204
	<i>Removing a Filter</i>	204
	<i>Advanced Text Filters</i>	204
	<i>Advanced Number Filters</i>	205
	<i>Relative Date Filtering</i>	205
	<i>Top and Bottom Filters</i>	206
	<i>Sorting Filters</i>	206
26.3	Formatting Filters	207
26.4	Controlling Filters for End Users	208
	<i>Locking and Hiding Filters</i>	208
	<i>Report Filter Settings</i>	208

27	SLICERS	Page
27.1	Introducing Slicers	209
27.2	Working with Slicers	210
	<i>Creating a Slicer</i>	210
	<i>Selecting and Clearing Items</i>	210
	<i>Changing Selection Behaviour</i>	211
	<i>Searching in Slicers</i>	211
	<i>Dropdown Slicers</i>	211
	<i>Tile Slicers</i>	212
	<i>Customising your Slicer Header</i>	213
27.3	Hierarchical Slicers	214
27.4	Number and Date Slicers	215
	<i>Sliders</i>	215
	<i>Choosing Dates</i>	215
	<i>Picking Relative Dates</i>	216
	<i>Changing the Anchor Date</i>	216

28	NEW SLICERS	Page
28.1	Overview of the New Slicer Visual	217
	<i>Benefits of the New Slicer Visual</i>	217
	<i>Enabling the Visual</i>	217
28.2	Working with the New Slicer	218
	<i>Adding a New Slicer Visual</i>	218
	<i>Basic Configuration</i>	218
	<i>Adding Images and Text</i>	219
	<i>Adding Hover and Selection Effects</i>	220

## TABLE OF CONTENTS (7 of 10)

29	ADVANCED SLICERS	Page
29.1	Sync Slicers	221
	<i>What are Sync Slicers?</i>	221
	<i>Viewing Sync Slicers</i>	221
	<i>What the Symbols Mean</i>	222
	<i>Grouping Slicers</i>	222
29.2	Applying/Clearing All Slicers	223
	<i>How Applying/Clearing Slicers Works</i>	223
	<i>Adding the Buttons</i>	223
	<i>Showing a Pending Icon</i>	224
29.3	Tricks with Slicers	225
	<i>Changing Date and Numeric Slicers</i>	225
	<i>Slicer Interactions</i>	225

30	DRILL-THROUGH FILTERS	Page
30.1	What are Drill-Through Filters?	226
30.2	Creating a Drill-through Filter	227
	<i>Step 1 – Create the Main Report Page</i>	227
	<i>Step 2 – Create the Drill-Through Target Page</i>	227
	<i>Step 3 – Name and Hide your Drill-Through Page</i>	228
	<i>Step 4 – Configuring your Drill-Through Page</i>	228
	<i>Step 5 – Testing your Drill-Through Page</i>	228
30.3	Three Ways to Drill Through	229
	<i>Modern Tooltips (Left Clicking)</i>	229
	<i>Right-Clicking</i>	229
	<i>Using a Drill-Through Button</i>	229
30.4	Adding a Context-Sensitive Title	230
30.5	Extra Drill-through Options	231
	<i>Keeping All Filters</i>	231
	<i>Drill-through from Summarised Fields</i>	231

31	PUBLISHING	Page
31.1	Overview of Publishing	232
31.2	An Infinite Number of Variables	233
	<i>Your Power BI Licence</i>	233
	<i>Linking to Data</i>	233
	<i>Data Sources</i>	234
31.3	Workspaces	235
	<i>Choosing a Workspace</i>	235
31.4	Creating Workspaces	236
31.5	Publishing Reports	237
31.6	Viewing and Editing Reports	238
	<i>Reports and Datasets</i>	238
	<i>Viewing Individual Reports</i>	238
	<i>Editing a Report</i>	239
31.7	Dashboards and Tiles	240
	<i>Adding Tiles to Dashboards</i>	240
	<i>Using Tiles</i>	240
31.8	Lineage View	241
31.9	Refreshing Data	241
	<i>Types of Connection</i>	242
	<i>Types of Refresh</i>	243
	<i>Web Connections: a Warning</i>	243
	<i>Viewing and Managing Connections</i>	244
	<i>Viewing Individual Connections</i>	244
	<i>Scheduling Refreshes</i>	245
31.10	Sharing and Exporting Reports	246
	<i>Creating a PowerPoint Presentation</i>	246
	<i>Exporting to PDF</i>	247
	<i>Generating a Public URL for your Report</i>	247
	<i>Embedding your Report in a Website</i>	248
	<i>Creating a Power BI Report File</i>	248
	<i>Sharing a Report</i>	248

## TABLE OF CONTENTS (8 of 10)

32	CALCULATED COLUMNS	Page
32.1	Introduction to Calculated Columns	249
32.2	Creating Calculated Columns	250
	<i>Starting a New Calculated Column</i>	250
	<i>Typing a Formula</i>	250
	<i>Multi-line Editing</i>	250
	<i>Comments and Indentation</i>	251
	<i>Zooming In and Out</i>	251
	<i>Formatting DAX</i>	251
32.3	Conditional Functions	252
	<i>The IF Function</i>	252
	<i>Operators in DAX</i>	252
	<i>The SWITCH Function</i>	253
32.4	The RELATED Function	254
32.5	Blanks	255
	<i>Testing for Blanks</i>	255
	<i>Creating Blanks</i>	255
	<i>Blank Arithmetic</i>	255
32.6	Testing for Errors	255

33	QUICK MEASURES	Page
33.1	What are Measures?	257
	<i>Ways to Create Measures</i>	257
33.2	Creating Normal Measures	257
	<i>Step 1 - Creating a Measures Table</i>	258
	<i>Step 2 - Adding a Measure</i>	258
33.3	Creating Quick Measures	259
	<i>Step 1 - Adding a Quick Measure</i>	259
	<i>Step 2 - Choosing the Calculation Type and Base Value</i>	259
	<i>Step 3 - Specify any Filtered Value</i>	260
	<i>Step 4 - Viewing and Tidying Up your Quick Measure</i>	260
33.4	Quick Measures using Copilot	261
	<i>Problems with Copilot Quick Measures</i>	261
33.5	Example 1: Listing Selected Items	262
	<i>Creating the Slicer Selection Quick Measure</i>	262
	<i>Displaying the Slicer Selection</i>	263
	<i>Creating a Measure to Show the Visual Title</i>	263
	<i>Showing a Dynamic Title</i>	263
33.6	Example 2: Line Chart Averages	264
	<i>Creating the Base Measures</i>	264
	<i>Reviewing the DAX</i>	265
	<i>Creating the Final Measure</i>	265
	<i>The Final Chart</i>	265
33.7	Example 3: Running Totals	266

34	DYNAMIC FORMATTING	Page
34.1	Our Example	267
34.2	Creating our Example	268
	<i>Creating our Card</i>	268
	<i>Applying Title Dynamically Formatting</i>	269
	<i>Applying Other Dynamic Formatting</i>	270
	<i>Copying our Visual</i>	270

35	MAPS	Page
35.1	Overview of Maps	271
35.2	Choosing a Map Visual	272
35.3	Maps Using Latitude and Longitude	273
	<i>Stopping Aggregation for Simple Maps</i>	273
	<i>Changing the Aggregation Method for Locations</i>	274
35.4	Maps without Latitude and Longitude	275
	<i>Using a Recognised Geographical Entity</i>	275
	<i>Categorising Columns as Places</i>	275
	<i>Fixing Locations to the UK</i>	276
	<i>Converting Postcodes to Latitude/Longitude</i>	276
35.5	General Maps	277
	<i>Treating Maps as Visuals</i>	277
	<i>Changing the Map Style</i>	277
	<i>Conditional Formatting</i>	278
	<i>Manual Zoom Settings</i>	279
	<i>Viewing Controls</i>	280
	<i>Selecting Points on a Map</i>	280
	<i>Selecting within Driving Time/Distance</i>	281
	<i>Drill-Down in Maps</i>	281
35.6	Specific Types of Maps	282
	<i>Bubble Maps</i>	282
	<i>Heat Maps</i>	283
	<i>Cluster Maps</i>	284
35.7	Layers	284
	<i>3D Column Layers</i>	285
	<i>Traffic Layers</i>	285
	<i>Reference Layers</i>	286

## TABLE OF CONTENTS (9 of 10)

36	BOOKMARKS	Page
36.1	Examples of Bookmarks	287
36.2	Our Case Study	288
	<i>Planning the Bookmarks Needed</i>	288
36.3	Creating Bookmarks	289
	<i>Step 1 - Naming your Visuals</i>	289
	<i>Step 2 - Displaying the Bookmarks Pane</i>	290
	<i>Step 3 - Creating Bookmarks</i>	290
36.4	Configuring your Bookmarks	291
	<i>Step 1 – Data Settings</i>	291
	<i>Step 2 – Display Settings</i>	291
	<i>Step 3 – Update the Bookmark</i>	292
	<i>Step 4 - Linking to your Bookmarks</i>	292
36.5	Linking to Pages using Bookmarks	293
	<i>Creating the Home Bookmark</i>	293
36.6	Bookmark Navigators	294
	<i>Assigning Bookmarks to Groups</i>	294
	<i>Adding a Bookmark Navigator</i>	295
	<i>Formatting the Selected Bookmark</i>	295
	<i>Controlling Deselection Behaviour</i>	296

37	BUTTONS AND SHAPES	Page
37.1	Overview	297
	<i>Types of Clickable Objects</i>	297
	<i>Types of Action</i>	297
37.2	Adding Clickable Shapes	298
37.3	Adding Clickable Images	298
37.4	Adding Clickable Buttons	300
	<i>Adding the Button</i>	300
	<i>Setting Default, Hover, Selection and Disabled Effects</i>	300
	<i>Formatting Buttons</i>	301

38	IDEAS FOR BOOKMARKS	Page
38.1	Idea 1 - Default Slicer Values	302
	<i>Creating the Slicers and Action Button</i>	302
	<i>Setting your Default Slicers</i>	303
	<i>Creating and Customising your Bookmark</i>	303
	<i>Attaching the Bookmark to your Action Button</i>	303
38.2	Idea 2 - Pictures to Filter Charts	304
	<i>Setting the Scene</i>	304
	<i>Setting the Bookmarks to Filter</i>	305
	<i>Attaching the Bookmarks to the Images</i>	305
38.3	Idea 3 - Sort Icons	306
	<i>Creating the Buttons</i>	306
	<i>Creating the Bookmarks</i>	307
	<i>Configuring the Bookmarks</i>	307
38.4	Idea 4 - Pop-Up Buttons	308
	<i>Creating Each Help Message</i>	308
	<i>Creating the Bookmarks</i>	309
	<i>Assigning Actions to the Bookmarks</i>	309
38.5	Idea 5 - Slide-out Filters	310
	<i>The Source for this Idea</i>	310
	<i>Creating the Visuals</i>	311
	<i>Creating the Bookmarks</i>	311
	<i>Creating the Action Buttons</i>	311

39	PAGE NAVIGATION	Page
39.1	Overview	312
39.2	Page Navigators	313
	<i>Creating Page Navigators</i>	313
	<i>Formatting Page Navigators</i>	314
	<i>Displaying Page Navigators as Grids</i>	314
39.3	Simple Custom Page Navigators	315
39.4	Dynamic Page Navigation	316
	<i>Step 1 – Creating (and Editing) the Table</i>	316
	<i>Step 2 – Creating the Slicer</i>	317
	<i>Step 3 – Creating the Button</i>	317
	<i>Step 4 – Setting the Button’s Action and Tooltip</i>	317
	<i>Step 5 – Showing your Menu on All Pages</i>	318

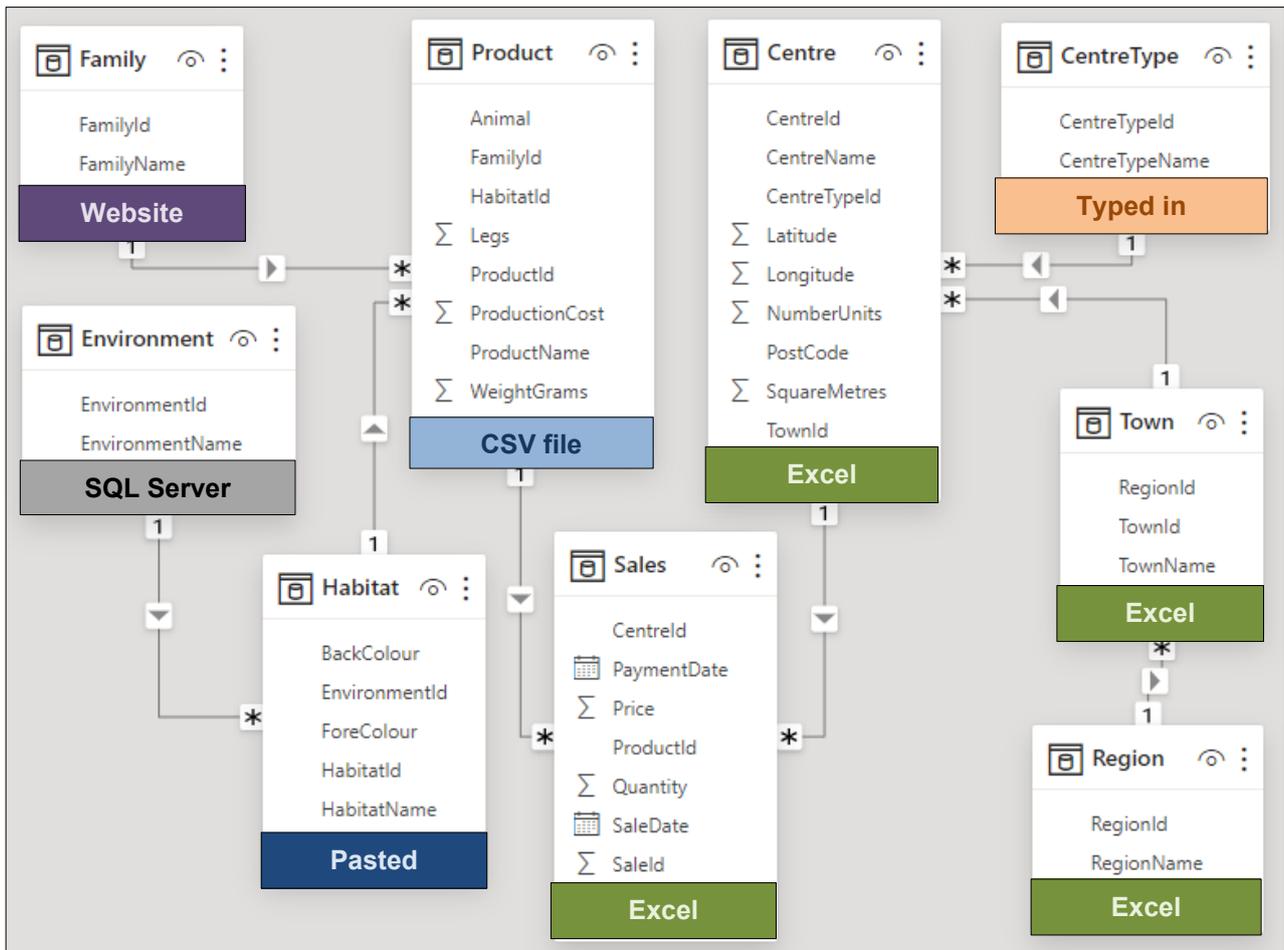
## TABLE OF CONTENTS (10 of 10)

40	DECOMPOSITION TREE	Page
40.1	Overview	319
40.2	Creating and Using	320
	<i>Creating a Decomposition Tree</i>	320
	<i>Using a Decomposition Tree</i>	320
	<i>Removing Unwanted Levels</i>	321
	<i>Expand and Collapse Options</i>	321
	<i>Locking Levels</i>	321
40.3	Formatting Decomposition Trees	323
	<i>Title and Subtitle</i>	323
	<i>Tree Density</i>	323
	<i>Changing the Connectors</i>	323
	<i>Formatting the Data Bars</i>	324
40.4	AI Splits	325
	<i>Turning AI Splits Off</i>	325
	<i>Absolute Splits</i>	325
	<i>Relative Splits</i>	326

## CHAPTER 1 - IMPORTING DATA

### 1.1 Our Example

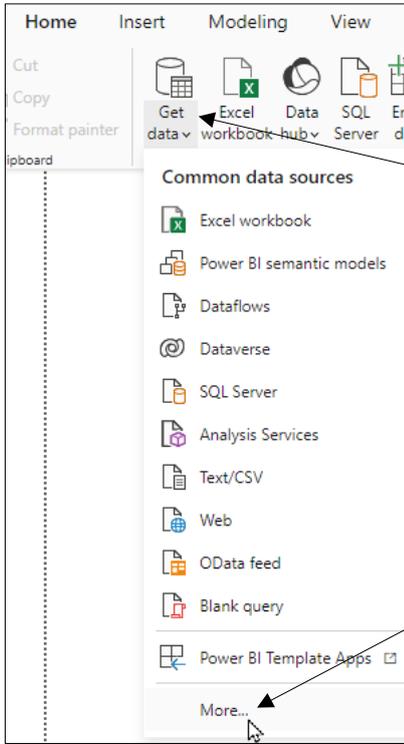
Our example is based on a relational database which keeps track of sales of soft toys. The diagram below shows which type of data source we'll use to import each table:



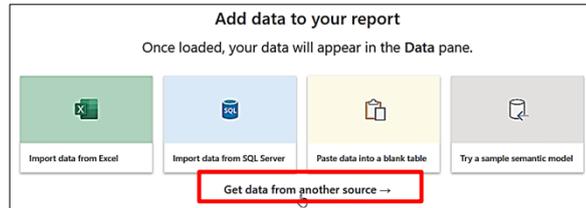
Once you've loaded your data into Power BI from disparate data sources all tables will be treated equally (so for example you can join a table imported from Excel with one imported from a website without any problem).

## 1.2 Importing from Different Sources

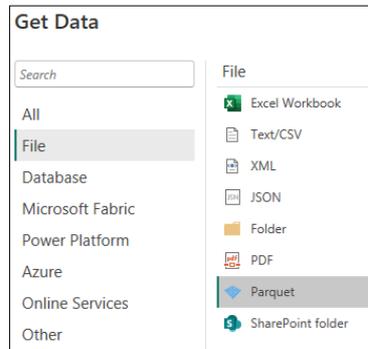
This section shows how to import data into a report from a variety of common data source types. Regardless of which data source type you're using, you can begin the import process as follows:



a) From the ribbon choose **Home | Get Data**. You can also click the top half of the **Get Data** tool to open the dialog box shown below, or click on this link in a new report:



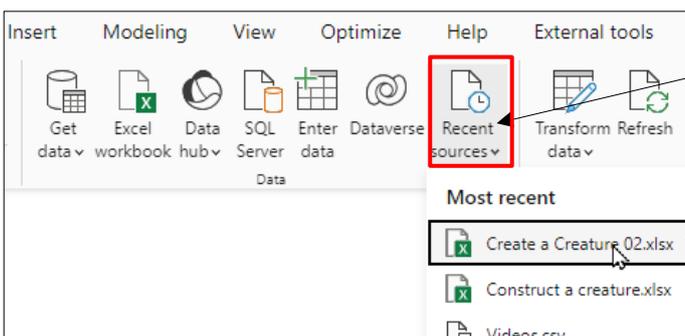
b) Pick a data source type from the **Common data sources** list, or click **More...** to see more choices.



*What happens next depends on which data source type you've chosen, but it inevitably involves launching some type of wizard which will help you import your data.*

## Re-Using a Data Source

You can quickly re-use a recent data source as shown below:

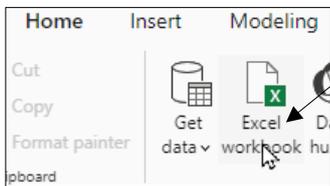


a) From the ribbon choose **Home | Recent Sources**.

b) Pick from the list of databases, workbooks, websites, etc from which you've already imported data.

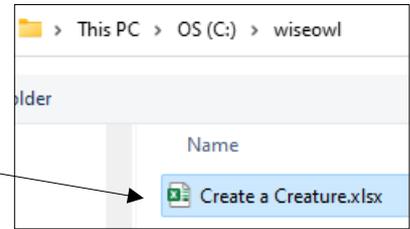
### 1.3 Importing from Excel

To start importing from an Excel workbook, use this short-cut:



Power BI gives you a special Excel tool because it's such a popular choice.

Double-click on a workbook containing one or more worksheets or named ranges that you want to import.



The dialog box which appears lists the contents of the workbook you have selected. You can choose which parts of the workbook you want to import as shown below:

Tick the box next to the name of any item you want to import. Here we've chosen to import the **Centre, Region, Sales and Town** worksheets.

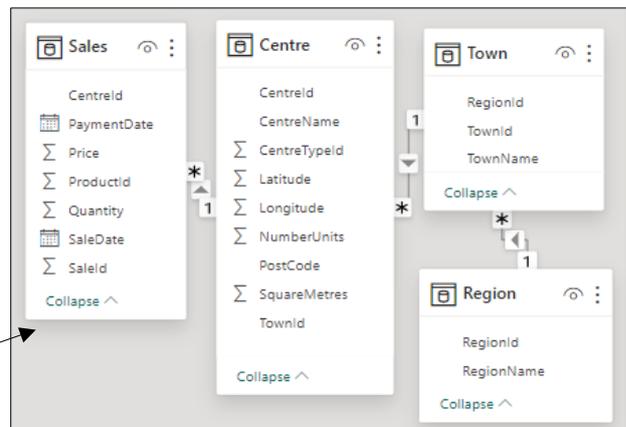
The dialog box will list worksheets in your workbook, but also named ranges in the file such as **RegionList** here. These names ranges have a different icon next to them and appear at the bottom of the list of options.

When you've chosen which worksheets or named ranges you want to import choose either to load them into your model or to go to Query Editor for further processing.

CentreId	CentreName	TownId	CentreType
1	Pavilion Shopping Centre	180	
2	Times Square Shopping Centre	170	
3	North Quay Retail Park	111	
4	Norman Park	9	
5	Crownhill Retail Park	132	
6	Whiteley Village Outlet Mall	68	
7	Cannon Park Shopping Centre	48	
8	Snipe Retail Park	6	
9	Abbey Wood Retail Park	29	
10	Mayflower Retail Park	13	
11	Ocean Park	134	
12	Kingsmead Shopping Centre	69	
13	Market Quay	68	
14	Banbury Cross Retail Park	8	
15	Sundorne Retail Park	152	
16	Wellington Retail Park	183	
17	Morton Park	54	

Note that Power BI Desktop will where possible build relationships between the worksheets you've imported:

Power BI Desktop creates these relationships for this example (we've tidied the diagram up a bit). You'll learn how and why Power BI Desktop creates relationships between pairs of loaded tables in another chapter in this courseware.



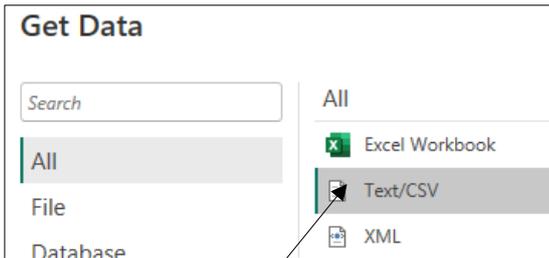
## 1.4 Importing CSV or Text Files

You can import from CSV files as well as a variety of other text file types.

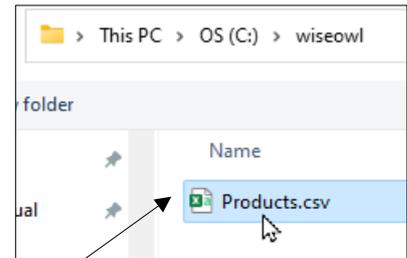
**CSV** stands for **Comma Separated Values**. The value in one column is separated from the next by a comma. Our example file also includes a row of column headers.

```
ProductId,ProductName,Animal,HabitatId,Legs,FamilyId,WeightGrams,ProductionCost
1, Sammy, Snake, 1, 0, 1, 950, 7.19
2, Pokyo, Penguin, 4, 2, 3, 850, 4.5
3, Fenella, Frog, 3, 4, 4, 400, 10.79
4, Layla, Lemur, 2, 2, 5, 550, 4.28
```

To begin importing from a text file like this:



Choose to get data from a **Text/CSV** file ...



... then browse for and double-click the file you want to import.

You can then choose exactly how the text file is configured using the dialog box which appears:

The preview of your data is a good way to check if you've selected the correct options.

If Power BI Desktop hasn't picked the correct delimiter, you can choose a new one.

Power BI Desktop attempts to work out the data type of each column using a sample of rows. You can set the sample size here.

**Products.csv**

File Origin: 65001: Unicode (UTF-8) | Delimiter: Comma | Data Type Detection: Based on first 200 rows

ProductId	ProductName	Animal	HabitatId	Legs	FamilyId	WeightGrams	ProductionCost
1	Sammy	Snake	1	0	1	950	7.19
2	Pokyo	Penguin	4	2	3	850	4.5
3	Fenella	Frog	3	4	4	400	10.79
4	Layla	Lemur	2	2	5	550	4.28
5	Dave	Dachsund	1	4	5	775	5.85
6	Kylie	Camel	5	4	5	1200	3.15
7	Jeremy	Jackdaw	7	2	3	295	7.65
8	Faye	Fox	6	4	5	420	4.95
9	Oliver	Owl	7	2	3	380	6.75
10	Cleopatra	Clownfish	4	0	2	290	2.69
11	Oscar	Otter	3	4	5	340	13.72
12	Bob	Butterfly	7	6	6	450	5.85
13	Englebert	Elephant	1	4	5	1450	3.15
14	Petronella	Parakeet	2	2	3	520	4.05

Buttons: Extract Table Using Examples, Load, Transform Data, Cancel

Optionally you can click on this button to train Power BI on which columns you want to import, although it's usually easier to import everything then remove from the query the columns you don't want.

When you've finished configuring the text file, click the **Load** button to import it into your Power BI report.

## 1.5 Importing from SQL Server

You can import data from a SQL Server database as shown in the diagram below:

a) Like Excel, SQL Server has a dedicated import tool!

b) Enter a server name and, optionally, the name of a database.

c) Choose to **Import** the data and then click **OK** (see the hint below for more on what **DirectQuery** means).

d) If required enter your credentials to connect to the server you have chosen. Click **Connect** when you've done so - you may then have to confirm you're happy to use an unencrypted connection:

Encryption Support

We were unable to connect to the data source using an encrypted connection. To access this data source using an unencrypted connection, click OK.

e) In the next dialog box you can pick from a list of tables to import. Here we've chosen to import the **Environment** table.

EnvironmentId	EnvironmentName
1	Land
2	Air
3	Water

**Wise Owl's Hint**

*If you're wondering, DirectQuery means you don't import the data into your model: you just link to it. On the plus side this means that the data in your visuals is always up to date, but on the downside reports may run more slowly, and there are numerous limitations (for example, you can only use a few types of data source and you can't use something called calculated columns).*

## Using Queries and Stored Procedures

Rather than choosing to import from a list of tables, you can write a *query* to return your data. This is more complicated but provides much more control over which data you get.

```
USE [Create-a-creature]
GO

CREATE PROC splistNorthWestTowns
AS
-- list the towns in the North-West
SELECT
    t.TownName AS Town,
    t.TownId
FROM
    Town AS t
JOIN Region AS r ON t.RegionId = r.RegionId
WHERE
    r.RegionName = 'North West'
```

a) It's much easier to test your query in SQL Server Management Studio than it is to type it into Power BI! When your query or stored procedure is working, copy the query text or the name of the stored procedure to the clipboard.

**SQL Server database**

Server

Database (optional)

Data Connectivity mode  Import  DirectQuery

**Advanced options**

b) While loading SQL Server data, choose to show advanced options.

**SQL Server database**

Server

Database (optional)

Data Connectivity mode  Import  DirectQuery

Advanced options

Command timeout in minutes (optional)

SQL statement (optional, requires database)

EXEC splistNorthWestTowns

Include relationship columns

Navigate using full hierarchy

Enable SQL Server Failover support

**SQL Server database**

Server

Database (optional)

Data Connectivity mode  Import  DirectQuery

Advanced options

Command timeout in minutes (optional)

SQL statement (optional, requires database)

```
SELECT
    t.TownName AS Town,
    t.TownId
FROM
    Town AS t
JOIN Region AS r ON t.RegionId = r.RegionId
```

Include relationship columns

Navigate using full hierarchy

c) Choose either to execute a stored procedure (left) or run a query (right). Either option will then let you load your data:

**.\sql2022: Create-a-creature**

Town	TownId
Aintree	1
Altrincham	3
Ashton Under Lyne	6
Birkenhead	18
Blackburn	20
Bolton	21
Bootle	22

Be careful: Power BI Desktop seems to have a preference for choosing **Direct Query** when you load data from SQL Server like this; be sure to set this back to **Import**.

## Passing Arguments to Stored Procedures

Note that you can now pass arguments to a stored procedure using these advanced options:

Here we have a stored procedure listing out all the towns for any given region. We could load this as follows:

Advanced options

Command timeout in minutes (optional)

SQL statement (optional, requires database)

EXEC splistTowns 'East Anglia'

```
CREATE PROC splistTowns(
    @region varchar(100)
)
AS
-- list the towns in any given region
SELECT
    t.TownName AS Town,
    t.TownId
FROM
    Town AS t
JOIN Region AS r ON t.RegionId = r.RegionId
WHERE
    r.RegionName = @region
```

## 1.6 Importing from a Website

Power BI Desktop makes it easy to grab data from a website, as shown below:

**Table of families**  
Here are the families that you probably want to import!

FamilyId	FamilyName
1	Reptile
2	Fish
3	Bird
4	Amphibian
5	Mammal
6	Insect

a) Find a website which contains a table of data that you want to import (this one is at [wiseowl.co.uk/sundry/pbd1/](https://wiseowl.co.uk/sundry/pbd1/) ).

b) Choose to get data from a **Web** source in the **Other** category.

**Get Data**

Search

Other

- Web
- SharePoint
- OData Feed
- Active Directory
- Microsoft Exchange
- Hadoop File System
- Spark
- Hive LLAP
- Recent

**From Web**

Basic  Advanced

URL

c) Enter the URL of the page containing the table you want to import and click **OK**.

Anonymous

Windows

Basic

Web API

Organizational account

https://wiseowl.co.uk/sundry/pbd1

Use anonymous access for this Web content.

Select which level to apply these settings to

d) If this is the first time you've connected to this page you'll be asked if you want to use any credentials. Here we're opting to connect to the site anonymously.

**Navigator**

Display Options

- HTML Tables [4]
  - Table 1
  - Table 2
  - Table 3
  - Table 4
- Suggested Tables [2]
  - Table 5
  - Table 6
- Text [2]

Table View Web View

Table 1

FamilyId	FamilyName
1	Reptile
2	Fish
3	Bird
4	Amphibian
5	Mammal
6	Insect

e) Tick the box next to any table you want to import.

f) Choose one of these buttons to load the data directly or to further process it before loading:

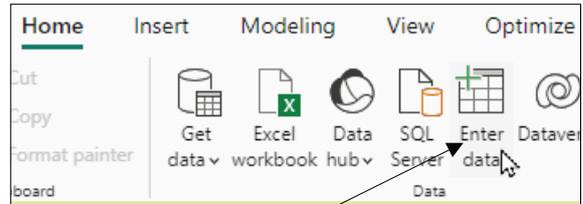
## 1.7 Entering Data Manually

As well as importing existing data, Power BI Desktop allows you to enter data into a model manually.

### Pasting Data

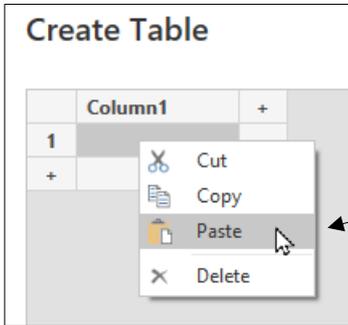
Although you can't import directly from Word, you can copy and paste:

HabitatId	HabitatName	EnvironmentId	BackColour	ForeColour
1	Grasslands	1	Light green	Black
2	Forest	1	Dark green	White
3	Fresh water	3	LightBlue	Dark blue
4	Salt water	3	#78aaf5	White
5	Desert	1	#d6a740	Black



a) In Word, select the table you want to import and copy it.

b) Click on this button to enter data into a new table.



c) Right-click on the empty grid and choose to paste in your data.

d) Power BI Desktop will decide whether the first row of your table should become the header columns.

e) Give your table a better name.

**Create Table**

*The first row of data that you pasted has been promoted to column headers.* Undo Headers

	HabitatId	HabitatName	EnvironmentId	BackColour	ForeColour	
1	1	Grasslands	1	Light green	Black	
2	2	Forest	1	Dark green	White	
3	3	Fresh water	3	LightBlue	Dark blue	
4	4	Salt water	3	#78aaf5	White	
5	5	Desert	1	#d6a740	Black	
6	6	Urban	1	#222	White	
7	7	Sky	2	#0a66f0	White	
+						

Name:

Load Edit

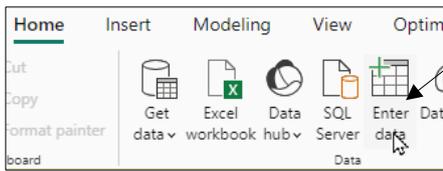
f) Choose to **Load** it into your data model.



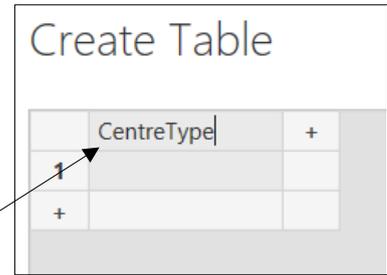
*If you copy and paste data, you obviously won't be able to refresh the resulting table to bring in updates.*

## Typing in Data

The final option for loading data into a model in *Power BI Desktop* is to type it in!



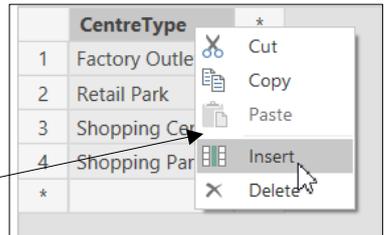
a) From the ribbon select this icon to enter data.



b) You can overwrite any column name to rename it.

	CentreType	*
1	Factory Outlet	
2	Retail Park	
3	Shopping Centre	
4	Shopping Park	
*		

c) Type in the data that you want to store in the table.



d) Right-click to insert any additional columns that you need.

	CentreTypeID	CentreType	*
1	1	Factory Outlet	
2	2	Retail Park	
3	3	Shopping Centre	
4	4	Shopping Park	
*			

e) Type in any data for new columns that you've added.

	CentreTypeID	CentreType
1	1	Factory Outlet
2	2	Retail Park
3	3	Shopping Centre
4	4	Retail Park
*		

Name: CentreType

f) Give the table a name and click **Load** to add it to the report.

# CHAPTER 2 - DATA MODELS

## 2.1 Data Models

Every table that you import into a report belongs to a single *data model* (or *semantic model*). This model holds information on how all the tables you have imported are related.

### Viewing a Model

After you've imported some data you can see your data model in **Model** view:

The screenshot shows a data model interface with several tables and their relationships. The tables include Family, Environment, Habitat, Product, Sales, Centre, CentreType, Town, and Region. Each table is represented by a card showing its fields and a 'Collapse' button. Relationships are indicated by lines with cardinalities (1, \*, etc.).

Callouts and their descriptions:

- Click the third of these buttons to view the model.** (Points to the third icon in the top-left toolbar)
- The main area of the screen shows a diagram of the model. You can move and resize the objects in this area.** (Points to the central diagram area)
- The Properties pane shows attributes of selected model items.** (Points to the Properties pane on the right)
- The Data pane shows a list of tables and fields.** (Points to the Data pane on the right)
- You can create, delete and view different model layouts using the tabs and controls in this section.** (Points to the bottom navigation tabs: All tables, Product details, Locations, +)
- You can use this slider to zoom in and out on the diagram.** (Points to the zoom slider at the bottom right)
- Click the tool on the left to reset the diagram, and the tool on the right to fit the diagram to the screen.** (Points to the reset and fit-to-screen icons at the bottom right)

**Wise Owl's Hint**

You can click the button in the bottom right corner of the screen to see the entire diagram. This is useful when you can't find a table you have imported!

Click this tool to see the whole diagram.

## Selecting Single Model Items

You can manipulate model items in a variety of ways once you've selected them. You can select a single table or field in a model by clicking on it in the diagram or the **Fields** pane.

Click the title of a table in the diagram to select it.

The **Properties** pane will show attributes of the item you have just selected.

Selecting an item in the diagram selects the same item in the **Fields** pane. The reverse is also true.

You can click the name of a field in the diagram to select it. You could also select the field in the **Fields** pane – the same item will be selected in the diagram if you do so.

## Selecting Multiple Items

You can select multiple tables or multiple fields in both the model diagram and **Fields** pane.

Hold **Ctrl** and click on multiple tables in the diagram or the **Fields** pane to select them (they are given green borders).

Hold **Ctrl** and click on multiple fields to select them. Selected fields are highlighted in the diagram and in the **Fields** pane.

## Searching for Fields

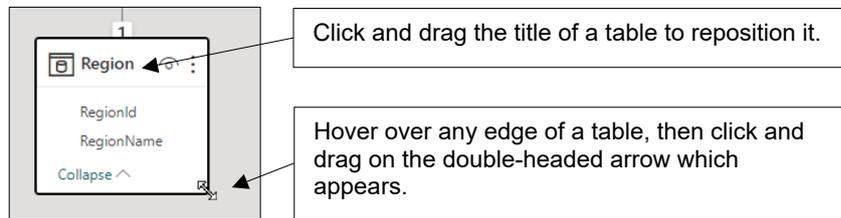
It's useful to be able to search for fields:

Type part of a table or field name in the search box at the top of the **Fields** pane. The list of items will be filtered to show only those which match your search phrase. You can then select the required items as usual.

## 2.2 Model Diagrams

### Arranging Tables in a Model

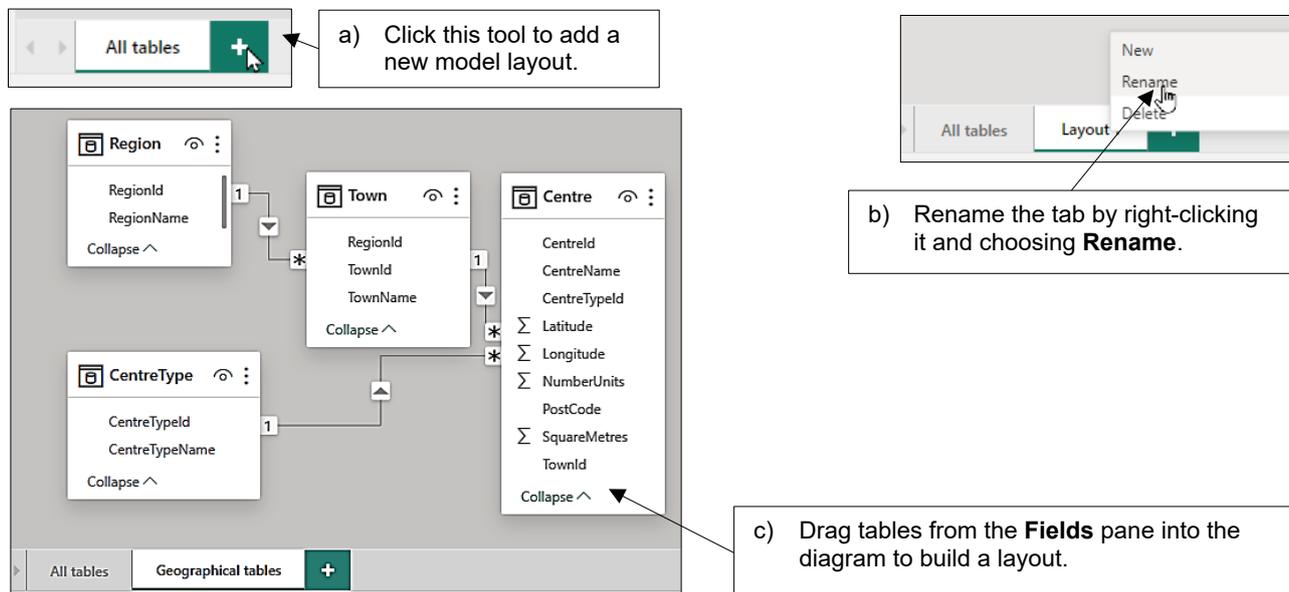
Power BI Desktop adds tables to a diagram in a fairly haphazard way. You can arrange the tables in a diagram by moving and resizing them.



You can resize multiple tables at the same time in this way: select the tables you want to resize, hover over any edge of any table and then click on drag on the double-headed arrow which appears.

### Diagram Layouts

A report has only a single model, but you can create as many model layouts as you like. This is useful if you have a complex model and want a separate diagram to show the detail of part of it.



Note that you can't remove tables from the first **All tables** layout (this will always show every single table that you've loaded into your model).

## Collapsing and Expanding Tables

To avoid tables taking up too much room, you can *collapse* them:

You can click on this link to collapse a table to make it take up less room ...

... although some fields will always remain visible (you can click on this link to expand the table again).

## Controlling Expand/Collapse Field Visibility

You can control which fields you see when you expand or collapse a table by clicking on the background of model view and setting its *properties*:

If you want your collapsed tables to take up less room, unset this option. For the table above this would give the following if unset:

Properties

Cards

Show the database in the header when applicable

No

Show related fields when card is collapsed

Yes

Pin related fields to top of card

No



Presumably the **PaymentDate** and **SaleDate** fields appear as related fields because Power BI sets up a date hierarchy for them, which involves a hidden relationship to a hidden internal calendar table.

## Seeing Table Information

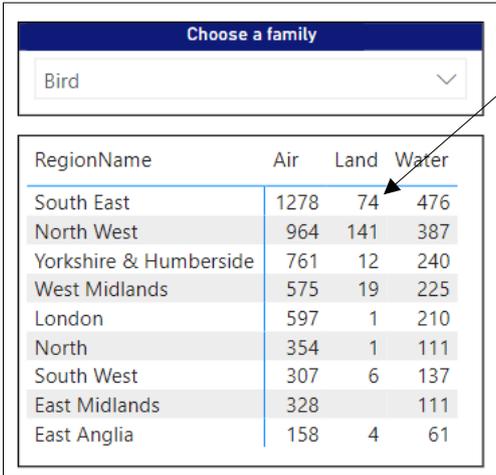
You can hover over any table's header to see when it was last refreshed, and how:

The precision of the time update is a bit more than you'd normally need! This table was imported (rather than being linked to using Direct Query).

## 2.3 Hiding Objects

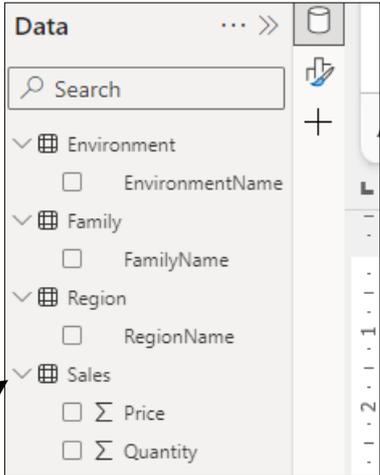
### Why you might Want to Hide Tables and Fields

Often you will want to avoid cluttering up your data pane and confusing your report creator:



RegionName	Air	Land	Water
South East	1278	74	476
North West	964	141	387
Yorkshire & Humberside	761	12	240
West Midlands	575	19	225
London	597	1	210
North	354	1	111
South West	307	6	137
East Midlands	328		111
East Anglia	158	4	61

For this report we only ever want to include certain fields from certain tables ...

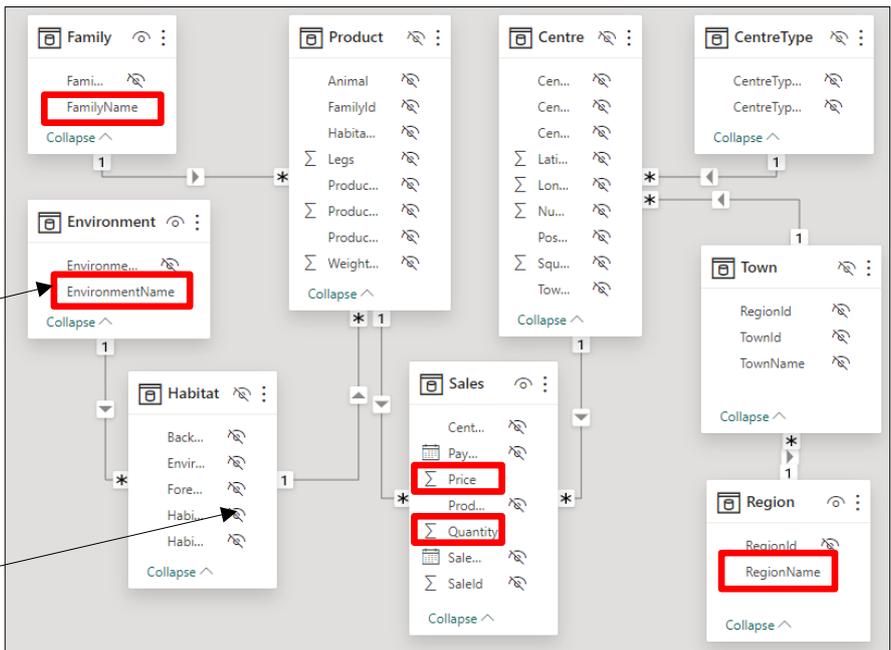


... so you can *hide* all of the other tables and fields so that this is all you see in the data pane.

Here's what the data model might look like for this example:

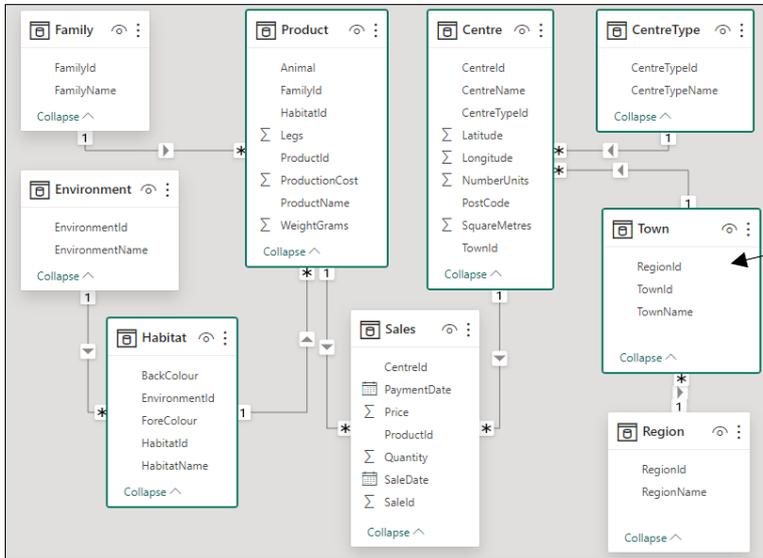
The only fields which we haven't hidden are shown in the red boxes.

The crossed-out eye symbol next to a table or column name shows that it will be hidden when you come to create your report.

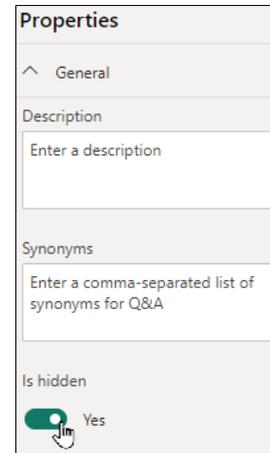


## Hiding Tables

The easiest way to hide multiple tables is as follows:



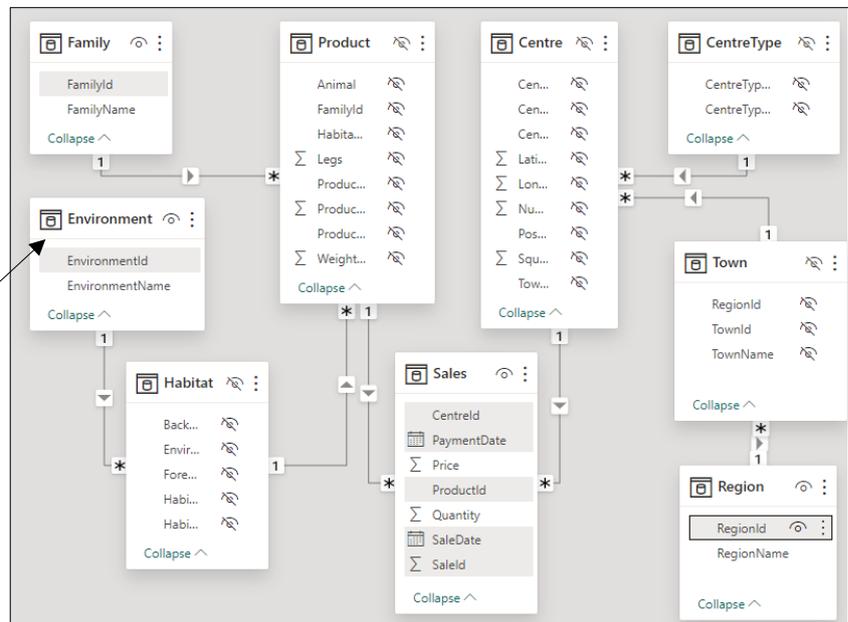
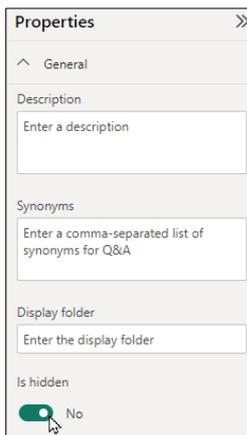
Use the **Ctrl** key to select the **Habitat**, **Product**, **Town**, **Centre** and **CentreType** tables, then change this option in the **Properties** pane:



## Hiding Fields/Columns

You can hide fields in a similar way:

Use the **Ctrl** key to select unwanted fields in the **Family**, **Environment**, **Sales** and **Region** tables then choose to hide the fields you have just selected:



You can also right-click on tables and fields then tick or untick the **Hide in report view** option to hide or display them.

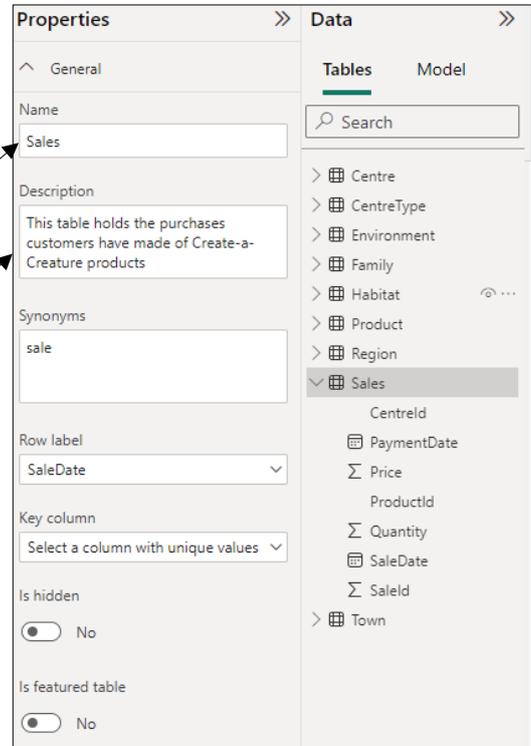
## 2.4 Model Properties

The tables and fields in a model have a variety of *properties*, many of which can be changed to make your model easier to use when creating reports.

### Table Properties

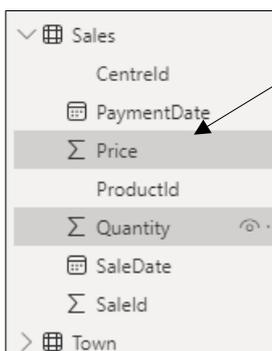
To see the properties of a table, select it in either the diagram or **Fields** list and then look at the **Properties** pane:

- You can change the name of a table using this box.
- You can add a **Description** to the table to help remind you what it's for.
- Most of the rest of the properties are to do with less common features such as Q&A visuals (row labels) or the Excel data types gallery (featured tables). Wise Owl can't see why you would want to set a row label (this allows you to define which field best identifies a single row in a table), or for that matter a key column – surely uniqueness should be applied in Query Editor when loading data?

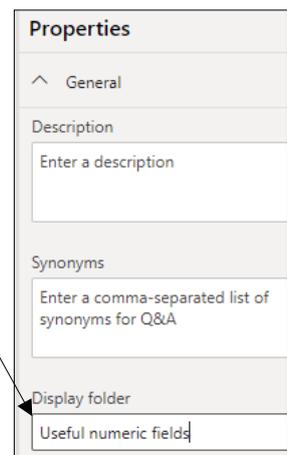
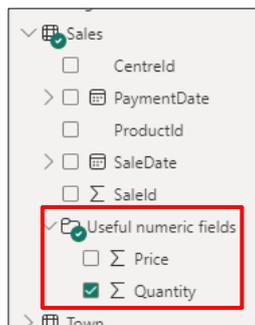


### Display Folders

You can view and alter the properties of a field in the same way as for a table. One useful application for this is to divide fields into different *display folders*:



- a) Use the **Ctrl** key to select the fields which you want to show in a separate display subfolder.
- b) Type in the name of the subfolder that you want to create. When you look at this table in model or report view you'll see your fields suitably subdivided:



## Default Number and Date Formatting

This is probably the best way to set a default format for any field:

You can choose a standard number or data format from the dropdown list (the example shown here would display the selected field, price, with 2 decimal places and a leading £ sign).

RegionName	Average of Price
East Anglia	£6.93
East Midlands	£7.25
London	£7.20
North	£7.02

Format

Custom

Custom format [Learn more](#)

"£"#,0.00;- "£"#,0.00;"£"#,0.00

Example: £123,456.78

Alternatively you can choose **Custom** and type in a number format using almost the same rules as for Excel. Custom formats are particularly useful for dates – for example you could type in a format of **dddd dd mmmm yyyy** to display 9/11 as Tuesday 11 September 2001.

Formatting

Data type

Decimal number

Format

Currency

Percentage format

No

Thousands separator

Yes

Decimal places

2

Currency format

£ Cornish (United Ki...)

## Changing the Default Aggregation for a Field

When you add a price to a visual, you'll usually want to average, not sum it:

By default Power BI will sum numerical fields, but you can change the default aggregation to a different function, as here.

Advanced

Sort by column

Price (Default)

Data category

Uncategorized

Summarize by

Average

Is nullable

Yes

## 2.5 Relationships

### The Need for Relationships

If you are taking fields from more than one table, the tables must be directly or indirectly linked for the answer to make any sense.

RegionName	Count of SaleId
East Anglia	32471
East Midlands	32471
London	32471
North	32471
North West	32471
South East	32471
South West	32471
West Midlands	32471
Yorkshire & Humberside	32471
<b>Total</b>	<b>32471</b>

This table is meant to be showing the number of purchases made for each region, but the answer is 32471 in each case.

The fields included are as follows:

- **SaleId** from the **Sale** table;
- **RegionName** from the **Region** table.

These are shown in the diagram below.

- Region
  - RegionId
  - RegionName
- Sales
  - CentreId
  - PaymentDate
  - Price
  - ProductId
  - Quantity
  - SaleDate
  - SaleId
- Town

The problem is that we haven't told *Power BI Desktop* how the region, town, centre and sales tables link together.

### Parent-Child Relationships

Nearly all relationships are one-to-many, or parent-to-child. Here's what this means:

ProductId	ProductName	Animal	HabitatId	Legs	FamilyId	
1	Sammy	Snake		1	0	7
2	Pokyo	Penguin		4	2	3
3	Fenella	Frog		3	4	4
4	Layla	Lemur		2	2	5
5	Dave	Dachsund		1	4	5
6	Kylie	Camel		5	4	5
7	Jeremy	Jackdaw		7	2	3
8	Faye	Fox		6	4	5
9	Oliver	Owl		7	2	3

FamilyId	FamilyName
1	Reptile
2	Fish
3	Bird
4	Amphibian
5	Mammal
6	Insect

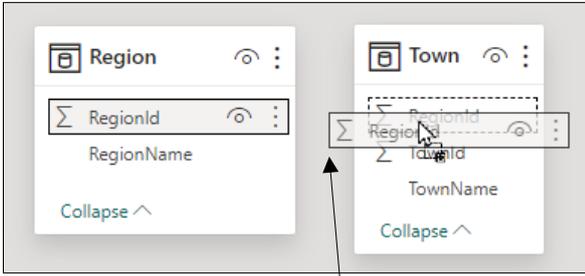
For example, the **FamilyId** is repeated multiple times in the **Product** table (since two or more products can obviously belong to the same family).

However, in the **Family** table the **FamilyId** is unique, since each family appears once and once only.

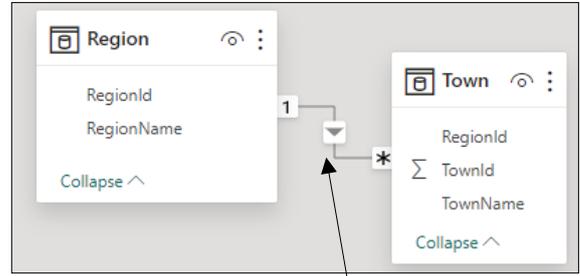
The parent end of the relationship is shown with a 1, and the child end with a \*. For this example, *Power BI Desktop* is showing that each single family can have multiple products within it.

## Creating a Relationship

To link two tables, drag the common field from one to the other:



For example, here we're dragging the **RegionId** field from the **Region** table onto the **RegionId** field in the **Town** table ...



... to create a relationship like this when you release the mouse button.

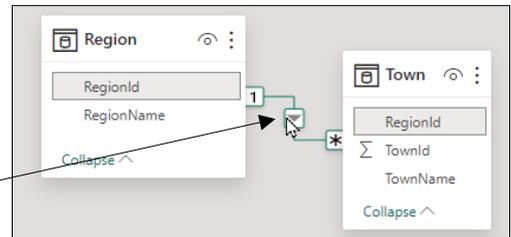


*Note that it usually doesn't matter which way round you drag (Town-to-Region or Region-to-Town), as Power BI will work out from the underlying data which is the parent and which the child.*

## Editing Relationships

Sometimes you'll need to change relationships created (and in any case, it's always nice to have a nosey):

a) Hover over the relationship symbol, and *Power BI* will show you which columns are involved from the two tables. You can then double-click on the symbol to edit the relationship.



b) For some reason the software always shows the child (many) end of the relationship first. Because each region can contain lots of towns, the **Town** table appears first.

### Edit relationship

Select tables and columns that are related.

Town

TownId	TownName	RegionId
1	Aintree	5
2	Aldershot	6
3	Altrincham	5

Region

RegionId	RegionName
1	East Anglia
2	East Midlands
3	London

Cardinality: Many to one (\*:1)

Cross filter direction: Single

Make this relationship active

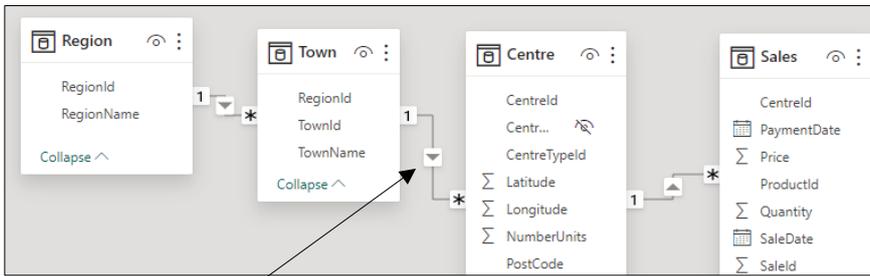
Assume referential integrity

Apply security filter in both directions

c) It is very unlikely that you'll need to change the cardinality. The **Cross filter direction** can be either **Single** or **Both** – see overleaf for more on this.

## The Effect of Relationships

Suppose that for our example you create the extra relationships:



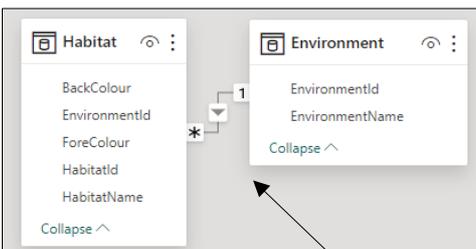
RegionName	Count of SaleId
East Anglia	1074
East Midlands	2050
London	4167
North	2068
North West	5570
South East	8094
South West	1935
West Midlands	3799
Yorkshire & Humberside	3714
<b>Total</b>	<b>32471</b>

As a rule of thumb, you should usually ensure that you link all tables you've loaded into your model.

You can now see for each region how many sales were made within it.

## Cross-Filter Direction

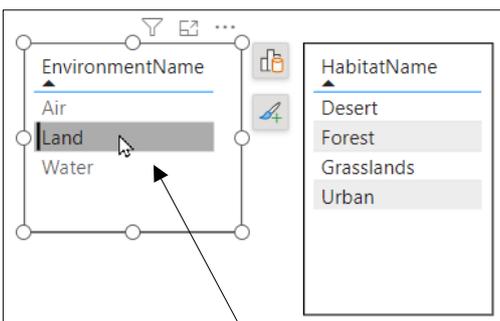
To see how this property works, consider the relationship between environments and habitats:



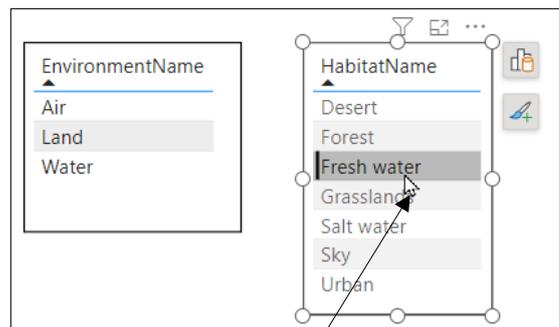
Each environment on the right can have one or more habitats.

You can set this property for a relationship to **Single** or **Both**. By default it will normally be **Single** for a relationship like this.

When you choose an environment, it will affect the list of habitats, but the converse is not true:



If you choose **Land**, for example, the list of habitats will contract from those shown to just the land ones ...



... whereas if you choose **Fresh water**, for example, the environments listed won't change.

However, if you change the cross-filter direction to **Both** the filter will work both ways.





















# What we do!

		Basic training	Advanced training	Systems / consultancy
<b>Office</b>	Microsoft Excel			
	VBA macros			
	Office Scripts			
	Microsoft Access			
<b>Power BI, etc</b>	Power BI and DAX			
	Power Apps			
	Power Automate (both)			
<b>SQL Server</b>	SQL			
	Reporting Services			
	Report Builder			
	Integration Services			
	Analysis Services			
<b>Coding</b>	Visual C#			
	VB programming			
	MySQL			
	Python			



**WiseOwl**  
Training

