

# **Power BI for Beginners: A Step-by-Step Training Guide**

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Using Best Practice Methodologies

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# 01. Introduction

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In this how-to guide, we give you an overview course of Power BI and how it can be used to load, manipulate, model, and report on data to assist with your reporting requirements.

The scenario we'll run through is how to report on internet sales for the fictitious AdventureWorks bicycle company and adding some common time intelligence measures, for example, period to date and period against previous period reporting.

We will take you through the typical process of loading data, modelling data and then visualising the data.

If at any point you are unaware of terminology, refer to the glossary in the appendix.

**When you see the symbol  this is an extra tip or trick you might find useful.**

# 02. Overview of Power BI

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Power BI is a Business Intelligence tool developed by Microsoft. It helps you interactively visualise your data and make intelligence-based business decisions as a result.


Key features of Power BI:

- Quick set up comparative to traditional BI
- Interactive visualisations
- Supports different data sources (Microsoft or otherwise)
- The ability to publish to web (app.powerbi.com)
- Cloud-based, no on-premise infrastructure needed
- Scalable
- Accessibility - view the dashboards/reports on iPad, iPhone, Android, and Windows devices Scheduled data refresh

# 3. Getting Started

## 3.1 Power BI Desktop

Power BI Desktop is used to access data sources, shape, analyse and visualise data, and publish reports to the Power BI service. Once installed on your local computer, it lets you connect to data from different sources, transform, and visualise your data. Power BI Desktop is available for free via a [direct download link here](#).

 *Note that Power BI occasionally updates its user interface, so screenshots in this guide may vary slightly to what you see on your screen.*

## 3.2 Sample Data

You will have received the sample files in your email (alongside this guide).

1. Follow the link “You’ll also need to download these [sample files](#)”.

Your Power BI journey starts here! This guide will take you through the fundamentals for building your first report and will teach you the industry best practices along the way.

Your guide is available when you’re ready.

[DOWNLOAD GUIDE HERE](#)

→ [You'll also need to download these sample files](#) ←

2. Download the sample files (called AdventureWorks DW Scripts).
3. Save the compressed file to your local computer and unzip the content into a folder that can be accessed by Power BI Desktop.

Then

- Browse to the saved data files. DimCustomer, DimDate, DimProduct, DimProductCategory, DimProductSubcategory, FactInternetSales.

## 3.3 Power BI – Phases in Development

Power BI visual design is easy. Once you connect to a data source, you can shape the data (remove columns, change data types, and so on), do data modelling (create relations) and design visuals.

This guide steps you through the following phases:

- Connecting to data sources
- Shape the data
- Model the data
- Report on the data

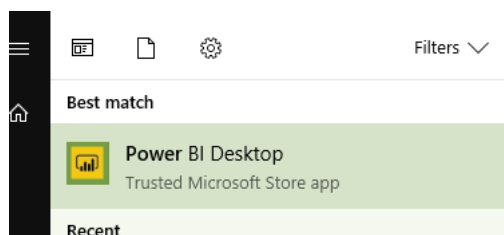
**Now let's get started with the Power BI Desktop tool**

# 4. Connecting to Data Sources

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This process is followed at the start of a new project, to import the data that you'll be working with, and at any point in the future when you need to add new data to the project.

- Open Power BI Desktop application from your local system (Fig 1).



*Fig 1. Power BI Desktop*

- When you launch Power BI Desktop, a welcome splash screen is displayed.
- To connect to the sample data for this exercise, select Get Data on the left-hand menu of the splash screen or from the home ribbon.

💡 *Selecting the down arrow on the **Get Data** button, shows the most common data sources menu. Select **More...** to open the **Get Data** dialog.*

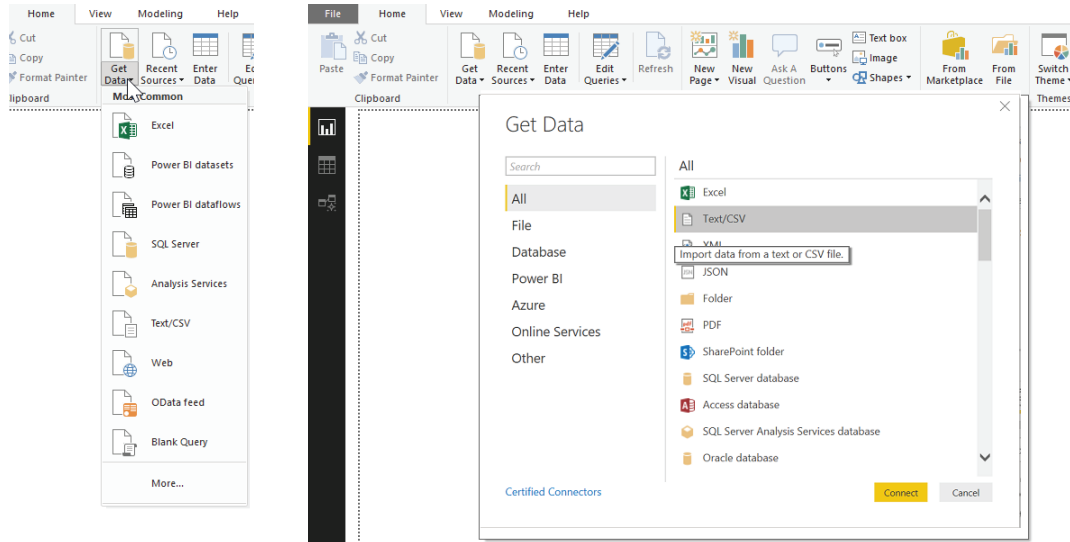


Fig 2. Selecting from the data sources menu

- Select **Text/CSV** from the list and click **Connect**.
- Browse to the unzipped data files you saved in step 3.2, select the first file **DimCustomer.csv**, and click **Open**.

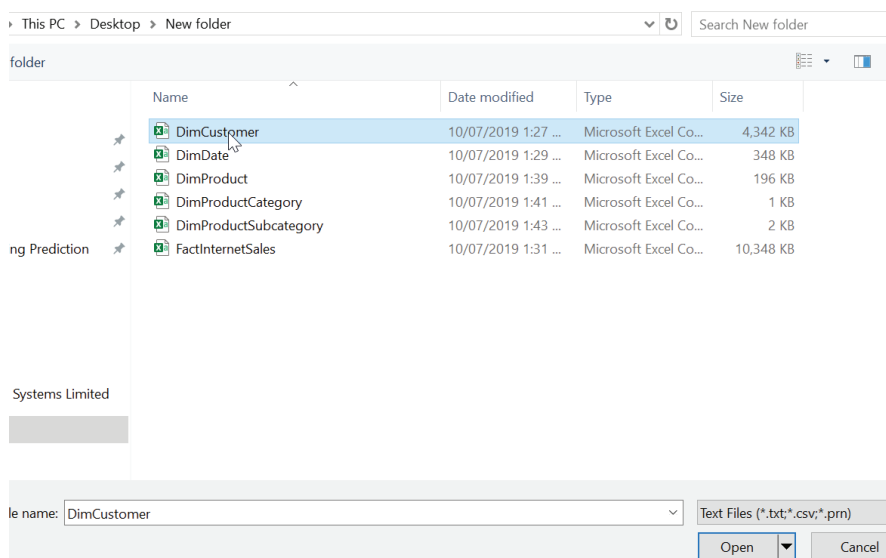


Fig 3. List of the sample files to be loaded into Power BI

- When you click **Open**, the below window appears, displaying sample data from the selected file.

DimCustomer.csv

File Origin: 1252: Western European (Windows) | Delimiter: Comma | Data Type Detection: Based on first 200 rows

CustomerKey	GeographyKey	CustomerAlternateKey	Title	FirstName	MiddleName	LastName	NameStyle	BirthDate	Marit
11000	26	AW00011000		Jon	V	Yang	FALSE	6/10/1971	M
11001	37	AW00011001		Eugene	L	Huang	FALSE	10/05/1976	S
11002	31	AW00011002		Ruben		Torres	FALSE	9/02/1971	M
11003	11	AW00011003		Christy		Zhu	FALSE	14/08/1973	S
11004	19	AW00011004		Elizabeth		Johnson	FALSE	5/08/1979	S
11005	22	AW00011005		Julio		Ruiz	FALSE	1/08/1976	S
11006	8	AW00011006		Janet	G	Alvarez	FALSE	2/12/1976	S
11007	40	AW00011007		Marco		Mehta	FALSE	6/11/1969	M
11008	32	AW00011008		Rob		Verhoff	FALSE	4/07/1975	S
11009	25	AW00011009		Shannon	C	Carlson	FALSE	29/09/1969	S
11010	22	AW00011010		Jacquelyn	C	Suarez	FALSE	5/08/1969	S
11011	22	AW00011011		Curtis		Lu	FALSE	3/05/1969	M
11012	611	AW00011012		Lauren	M	Walker	FALSE	14/01/1979	M
11013	543	AW00011013		Ian	M	Jenkins	FALSE	3/08/1979	M
11014	634	AW00011014		Sydney		Bennett	FALSE	6/11/1973	S
11015	301	AW00011015		Chloe		Young	FALSE	26/08/1984	S
11016	329	AW00011016		Wyatt	L	Hill	FALSE	25/10/1984	M
11017	39	AW00011017		Shannon		Wang	FALSE	24/12/1949	S
11018	32	AW00011018		Clarence	D	Rai	FALSE	6/10/1955	S
11019	52	AW00011019		Luke	L	Lal	FALSE	4/09/1983	S

Buttons: Load, Transform Data, Cancel

Fig 4. Loading the data to be used

- In Fig 4, you can see the options **Load** and **Transform Data**. For now, click **Load** to import the data directly into Power BI. This imports the data as it is, and loads it into Power BI Desktop.

 *Clicking **Transform Data** will take you to Power Query Editor. This allows you to perform any required changes on the file before importing into Power BI. You can change the table name, column name, data type of a column, remove data or delete columns, and so on, in this Editor.*

- Repeat the same process and load all other sample files (DimDate, FactInternetSales, DimProduct, DimProductCategory, and DimProductSubCategory). Note that you will have to load these one at a time.
- At this point it would be useful to **Save** the Power BI Desktop model.

The data has now been loaded into the Power BI model and you have a blank canvas to start working with.

Let's take a moment to explore this report canvas, the Power BI Desktop application:

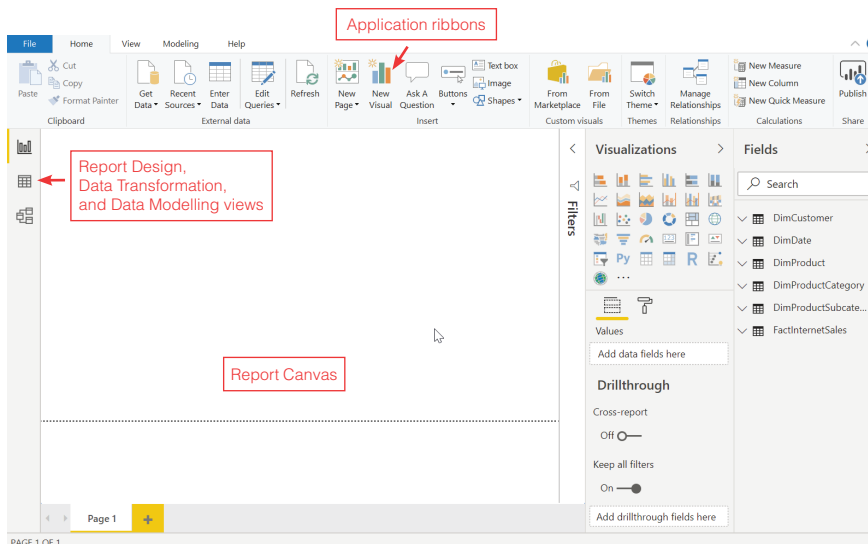


Fig 5. The Power BI Desktop application interface.


1. The left menu is used to switch between, **Report Design, Data Transformations** and **Data Modelling** (creating relationships within your data).
2. The **Report Canvas** is for Visual Design and Layout.
3. The **Application ribbons** contain all options and settings, visual or page level properties, and other settings configuration.
4. The report building panes contain all the components that may be added to a report. You can:
  - a. Select fields and data from imported tables on the **Fields** pane.
  - b. Select different ways to display this data from the **Visualizations** pane.
  - c. Apply filtering to the data in the **Filters** pane.



# 5. Modelling the Data

## – Creating Relationships

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 Once the required data is loaded, there may be a need to use Power Query Editor to shape the data by removing unnecessary columns, changing data types, adding new calculated columns, and so on. Power Query Editor is not covered further in this document.

Relationships between tables are necessary to accurately calculate results and display the correct information in the reports. In this next section, we will use the data that has been loaded to find and create these relationships between the tables.

### 5.1 Building Relationships

- Select the **Data Modeling** view, as indicated in Fig 6:

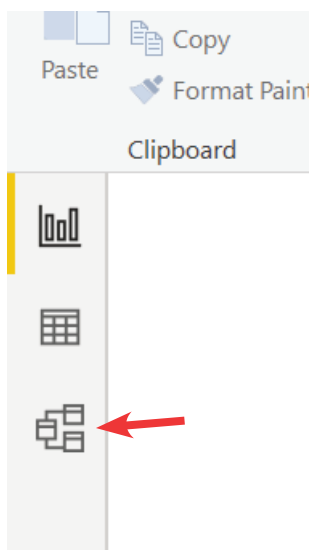



Fig 6. Data Modeling view

 Power BI Desktop makes creating relationships easy through an Auto Detect feature. When the data is loaded, Power BI Desktop will attempt to find and create relationships for you based on column names in the tables. If there are matching column names, these relationships are created automatically.

You will notice some relationships have been automatically created between a few of the tables:

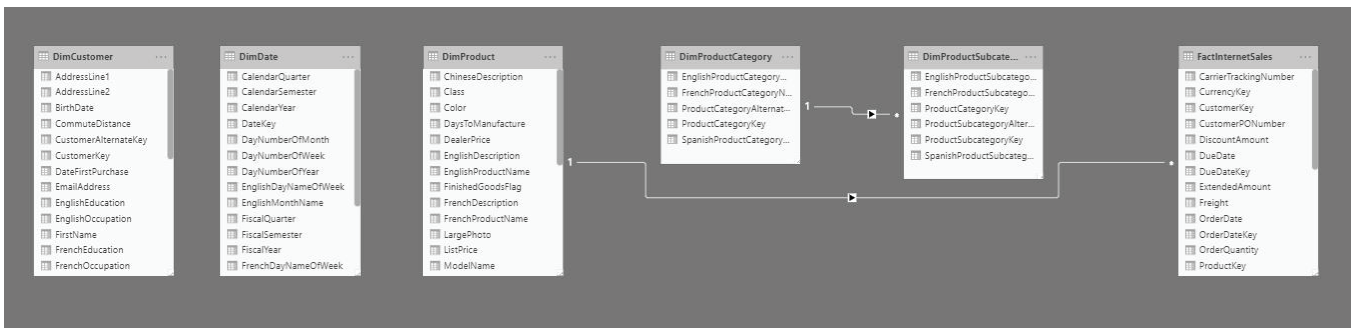


Fig 7. The relationships between the loaded data

It is worth noting the following details about relationships:

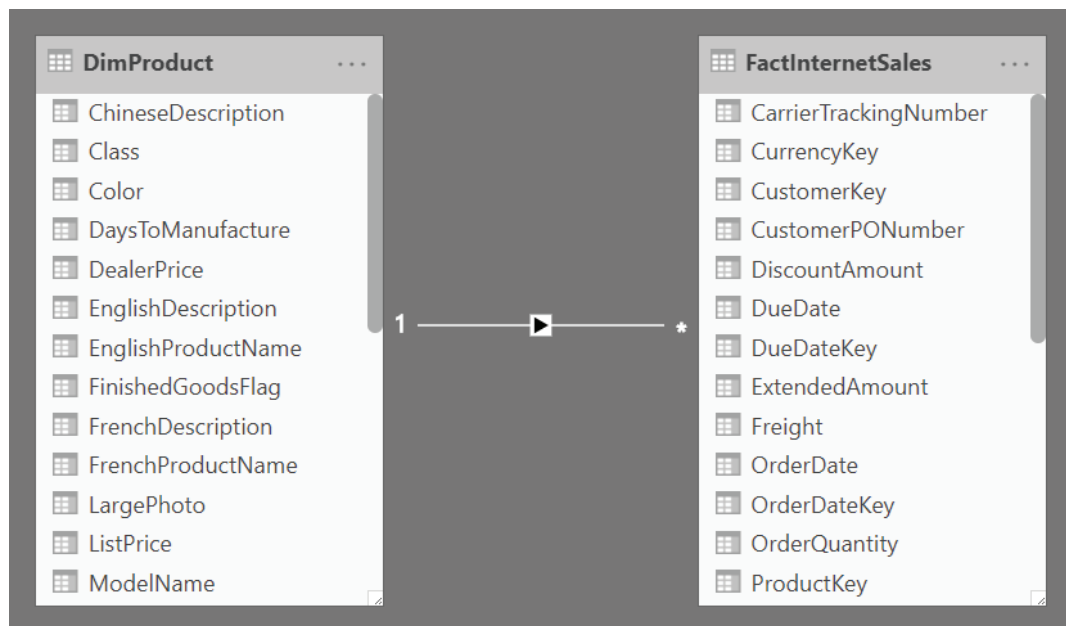



Fig 8. Relationships

- 1. Relationship:** The line between two tables represents that a relationship exists.
- 2. Direction:** The arrow indicates which direction filtering will occur. In this example: If DimProduct is filtered on a particular value, FactInternetSales will also be filtered to only show records related to the selected value.
- 3. “One” side:** The 1 indicates that the relationship works off a single unique record on the DimProduct table.
- 4. “Many” side:** The \* indicates that the relationship links to many records on the FactInternetSales table.

 The “One-to-Many” configuration is closely tied to the direction of the relationship. It refers to the relationship between two entities A and B in which an element of A may be linked to many elements of B, but a member of B is linked to only one element of A. For instance, think of A as a book, and B as pages.

As not all relationships have been auto detected, we will need create the rest of them manually.

The next section explains how we will do this.

## 5.2 Creating Relationships

- Select **Modeling** from the top menu. Then select **Manage Relationships**.

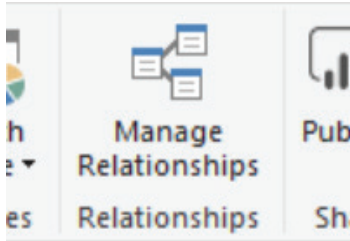


Fig 9. Modeling -> Manage Relationships

- Select **New...**
- Select **DimProduct** from the first dropdown box
- Highlight the column **ProductSubCategoryKey**
- Select **DimProductSubCategory** from the second dropdown box
- Highlight the column **ProductSubCategoryKey**

Create relationship

Select tables and columns that are related.

DimProduct

ProductKey	ProductAlternateKey	ProductSubcategoryKey	WeightUnitMeasureCode	SizeUnitMeasureCode
1	AR-5381			
2	BA-8327			
12	CR-9981			

1. Select the first table in the relationship, from the list

2. Highlight the relevant column

DimProductSubcategory

ProductSubcategoryKey	ProductSubcategoryAlternateKey	EnglishProductSubcategoryName	SpanishProductSubcategoryName
1		Mountain Bikes	Bicicleta de montaña
2			Bicicleta de carretera
3			Bicicleta de paseo

3. Select the second table in the relationship, from the list

4. Highlight the relevant column

Cardinality: Many to one (\*:1)  
Cross filter direction: Single

Make this relationship active  
 Assume referential integrity  
 Apply security filter in both directions

Fig 10. Create relationship

- Ensure the **Cardinality** is set to Many to One (\*:1), **Cross filter direction** is set to single and "**Make this relationship active**" is ticked.
- Click Ok.



You may see a warning saying that “There’s already a relationship between these two columns.” If this is the case, it simply means that Power BI Desktop has already created the relationship for you. Click Cancel and continue creating other new relationships.

1. Follow steps 2 to 4 above to create the rest of the relationships displayed in Fig 11, below:

## Manage relationships

Active	From: Table (Column)	To: Table (Column)
<input checked="" type="checkbox"/>	FactInternetSales (ProductKey)	DimProduct (ProductKey)
<input checked="" type="checkbox"/>	FactInternetSales (OrderDateKey)	DimDate (DateKey)
<input checked="" type="checkbox"/>	FactInternetSales (CustomerKey)	DimCustomer (CustomerKey)
<input checked="" type="checkbox"/>	DimProductSubcategory (ProductCategoryKey)	DimProductCategory (ProductCategoryKey)
<input checked="" type="checkbox"/>	DimProduct (ProductSubcategoryKey)	DimProductSubcategory (ProductSubcategoryKey)

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

Fig 11. Manage relationships. This is the view once all relationships have been created.

2. Click **Close** to save the relationships.
3. **Save** the model.

At this point you are able to begin creating visuals on the reporting canvas.




# 6. Reporting on the Data

## – Creating Visualisations


Now that the data has all been uploaded and modelled, we can begin reporting on that data.

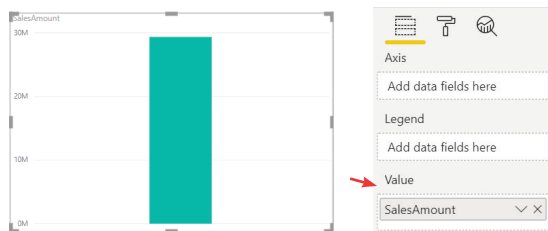
### 6.1 Building Basic Visualisations

Let's start with a graph to support a simple business case: Our Sales Manager would like to track the value of our website bike sales over the last few years.


- Switch to the **Report Design** view 
- Select the Stacked Column Chart visual from the **Visualization** pane 
  - This will add a grey “place holder” graphic to the Report Canvas. 
- Using the **Fields** pane on the right of the screen, complete the following steps:

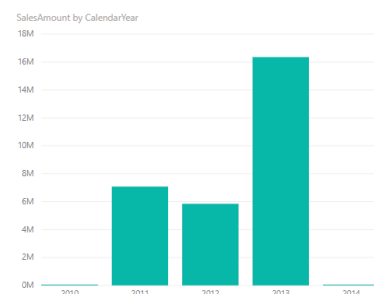
i) Go to **FactInternetSales:**

- (1) Click the down arrow  to expand the list.
- (2) Click and drag the **SalesAmount** to the grey “place holder” graph on the Report Canvas.
- (3) You will notice that **SalesAmount** now appears in the Value field of the Visualizations pane.







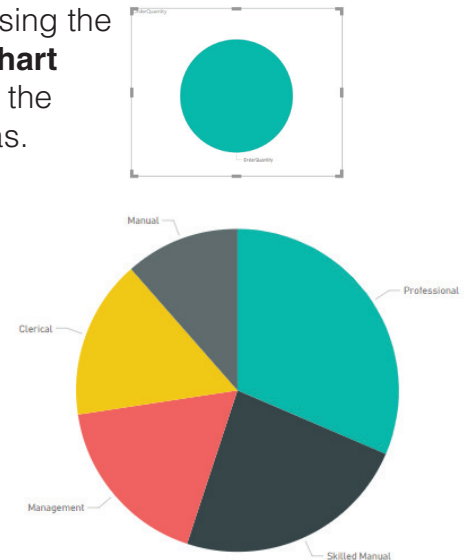
ii) Go to **DimDate:**

- (1) Click the down arrow  to expand the list.
- (2) Click and drag the **CalendarYear** attribute to the **Axis** field on the Visualization pane.
- (3) You can now see the value of *internet sales* (SalesAmount) over time
  - Click **Save**



Next, our Marketing Manager would like to know the occupation of the customers who order the most stock, to target with a new campaign. We'll follow a slightly different approach to build this visualisation:

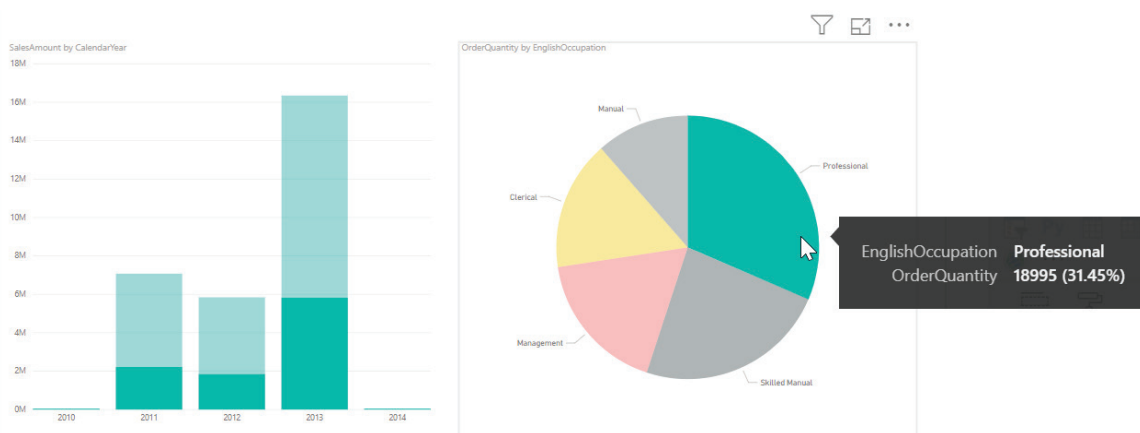
- Switch to the **Report Design** view 
- Using the **Fields** pane on the right of the screen:
  - i) Go to **FactInternetSales**:
    - (1) Click the down arrow  to expand the list.
    - (2) Click and drag the **OrderQuantity** onto a blank area of the Report Canvas.
    - (3) Power BI Desktop creates a new Visualisation using the default Stacked Column Chart. Select the **Pie Chart** visual  from the **Visualization** pane and note the change in the Visualisation on the Report Canvas.
  - ii) Go to **DimCustomer**
    - (1) Click the down arrow  to expand the list.
    - (2) Select the **EnglishOccupation** field by clicking the checkbox to the left of the field name.  EnglishOccupation
    - (3) You can now see the breakdown of **OrderQuantity** by Customer **Occupation**.
      - Click **Save**



## 6.2 Visualisation Interactivity

With multiple visualisations visible on a page, Power BI Desktop allows you to cross-highlight data between visualisations. You would do this to further drill down into your data.

- In the **Report Design** view, looking at the two visualisations created above, click on the **Professional** slice of the Pie Chart.
- Not only is this slice highlighted, but the portion of **InternetSales** related to **Professionals** is also highlighted on the Stacked Column Chart.



## 6.3 Date Dimension – Time Intelligence

We'll now create a table that displays sales amount and sales amount YTD.

Time intelligence provides richer analytics by providing measures that simplify time-based reporting, for example, time-based calculations for Year-to-Date (YTD), Month-to-Date (MTD), and Previous Period comparisons. The Date dimension (**DimDate**) is the basis for time intelligence reporting in this example.

### Initial Configuration

- Switch to the **Data Transformation** view.
- Select the **DimDate** table from the **Fields** pane on the right.
- Check that the **FullDateAlternateKey** column has its **Data Type** set to **Date**.

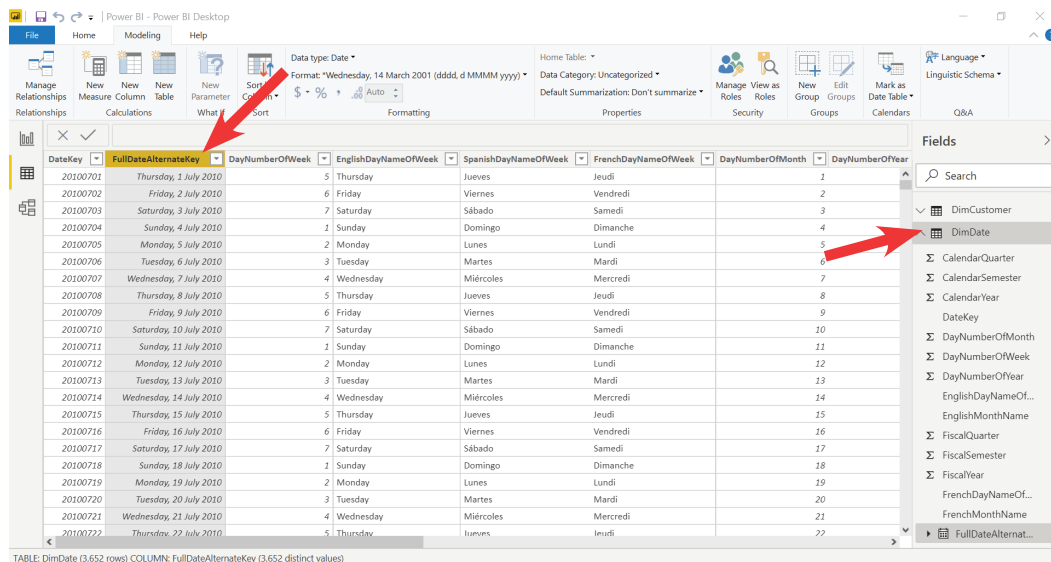


Fig 13. Highlighting the FullDateAlternateKey column and checking the Data Type



*It's best practice to make sure that the Data Type is set to Date to facilitate the Time Intelligence functionality of Power BI Desktop.*

*You can check this on the **Modeling** ribbon, as indicated above.*

## Adding a Time Intelligence Quick Measure

Power BI Quick Measures are pre-defined calculations provided by Microsoft and can be created on the fly.

- In the **Data Transformation** view, select the **FactInternetSales** table in the **Fields** pane.
- On the **Home** ribbon, click **Quick Measure**.

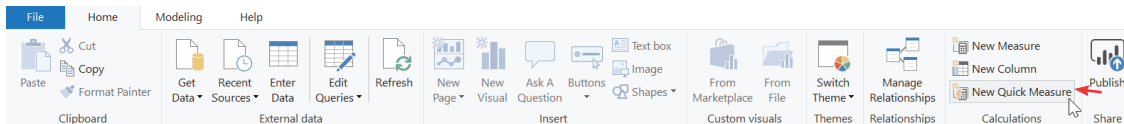


Fig 14. Quick Measure option on the Home tab

- In the **Quick Measures** dialog, go to the **Calculation** drop-down box, select **Time intelligence** and then select the **Year-to-date total**

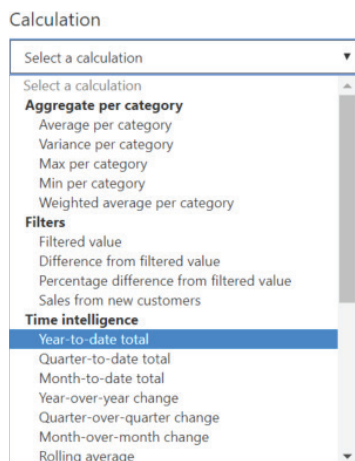


Fig 15. Selecting Time intelligence measures

- From **Fields** on the right
  - o Go to **FactInternetSales** table and then drag **SalesAmount** into the **Base value** box.
  - o Go to DimDate table and then drag **FullDateAlternateKey** into the **Date** box.



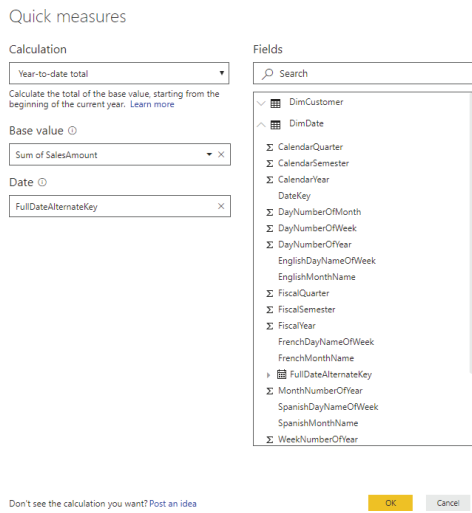


Fig 16. Adding the Time intelligence measures to the Base value and Date fields

- Click **OK**.
- Power BI Desktop adds your new measure to the Fields pane and displays the DAX code that was generated.

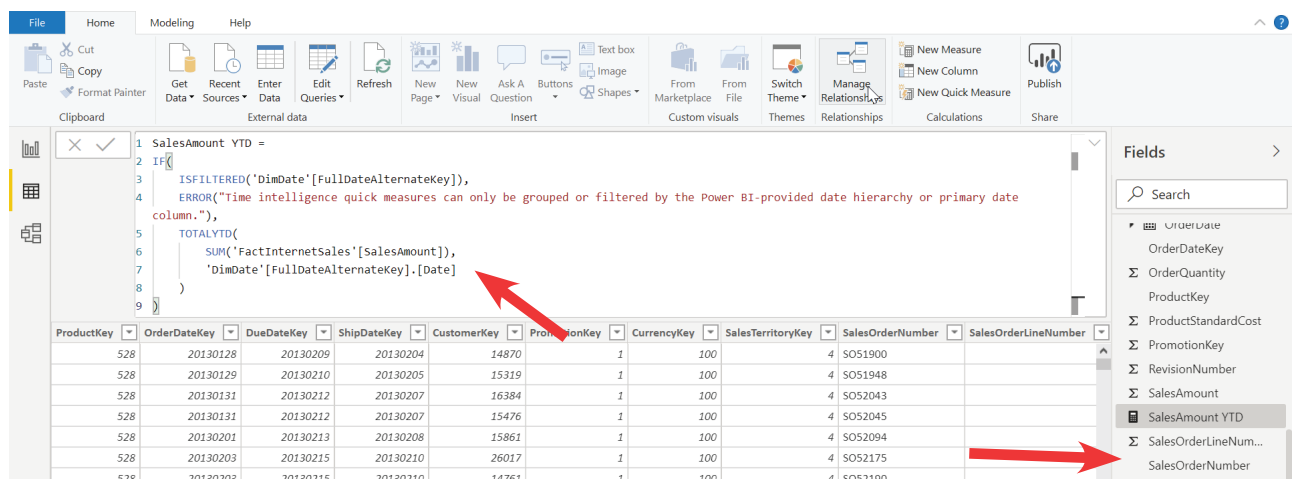




Fig 17. DAX code and SalesAmount YTD measure

 The generated DAX code is fully functional and requires no further changing. You may wish to experiment with the DAX code, but it is strongly advised that only qualified BI technicians edit or create DAX code for business-critical systems.

## Using the new measure:

- Switch to the **Report Design** view 
- Select the **Table** visual from the **Visualization** pane 
- Using the **Fields** pane on the right of the screen, complete the following steps:
  - i) From **DimDate** expand **FullDateAlternateKey** and tick **Date Hierarchy, Year** and **Quarter**.
  - ii) From **FactInternetSales**, tick **SalesAmount** and **SalesAmount YTD**.
- Click **Save**

The Report Canvas now shows a table of Sales values, by Quarter, with the accumulated Year to Date values alongside.

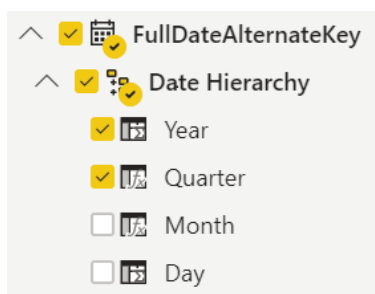


Fig 18. Table displaying SalesAmount by Quarter and Year and the YTD running total

Year	Quarter	SalesAmount	SalesAmount YTD
2010	Qtr 4	43,421.04	43,421.04
2011	Qtr 1	1,421,357.48	1,421,357.48
2011	Qtr 2	1,801,595.14	3,222,952.62
2011	Qtr 3	1,814,387.99	5,037,340.61
2011	Qtr 4	2,038,185.32	7,075,525.93
2012	Qtr 1	1,375,841.32	1,375,841.32
2012	Qtr 2	1,314,373.65	2,690,214.97
2012	Qtr 3	1,454,653.06	4,144,868.03
2012	Qtr 4	1,697,617.17	5,842,485.20
2013	Qtr 1	2,678,946.04	2,678,946.04
2013	Qtr 2	3,973,793.48	6,652,739.52
2013	Qtr 3	4,370,237.06	11,022,976.58
2013	Qtr 4	5,328,573.76	16,351,550.34
2014	Qtr 1	45,694.72	45,694.72
2014	Qtr 2		45,694.72
2014	Qtr 3		45,694.72
2014	Qtr 4		45,694.72
<b>Total</b>		<b>29,358,677.22</b>	<b>45,694.72</b>

# 7. Conclusion

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We have taken you through how to import data from multiple Excel files and join related data to build up a meaningful data model that you can use to visualise and interact with. By using the Quick Measures feature you have been able to extend measures with time intelligence to enhance analysis without writing any code and to provide meaningful insights.

If you would like further training, you can find out more about our training courses or email us [enquiries@theta.co.nz](mailto:enquiries@theta.co.nz).

# 8. Appendix

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## 8.1 Glossary

### **Data transformation**

Converting data from one format/structure to another format/structure

### **Visualise**

Graphical representation of data

### **Shaping/shape**

Also known as wrangling or manipulation. The process of transforming and mapping data from one “raw” data form into another format so that it is more appropriate/valuable for analytical purposes

### **Power Query Editor**

A dedicated window that facilitates and displays your data connections and transformations you apply

### **Report Canvas**

A blank canvas area where visualisations are placed

### **One-to-Many**

A type of cardinality that refers to the relationship between two entities A and B in which an element of A may be linked to many elements of B, but a member of B is linked to only one element of A. For instance, think of A as product, and B as a number of sales of that product

### **Auto detected**

When loading data from different sources, Power BI Desktop will automatically detect or create relationships between two or more tables

### **Quick measures**

Lets you quickly create new measures (calculations) without coding based on measures and numerical columns in your table

### **Dimension**

Descriptive data that adds context to transactional (fact) data e.g. year/month/date, location, customer and product. They are in the filters/columns/rows field.

### **Fact**

Transactional data that is generally aggregated in report visuals, e.g. sum of amount.

### **DAX**

A collection of functions, operators, and constants that can be used in a formula, or expression, to calculate and return one or more values.

