



Power BI Fundamentals

Learning Objectives



Import multiple sources of data into Power BI with the Power Query Editor



Create a report data model using queries as the model tables



Analyze the data model with DAX Measures & Calculated Columns



Build a Power BI report containing a variety of different visuals



Add User Experience elements to make a Power BI report easier and more intuitive to interact with



Explore the Power BI Service – use Power BI online to share reports and interact with other Power BI elements

Power BI Overview

Power BI is an all-encompassing Business Intelligence tool. It is possible to conduct all the main tasks and skills for any data reporting within Power BI:



Data
Transformation

Power Query
Editor



Data Modeling

Power BI
Model View



Data Analysis

Power BI
Model & Data
View



Data
Visualization

Power BI
Report View



User
Experience

Power BI
Report View



Sharing

Power BI
Service

Power BI is more than a data visualization tool. It is a market leading, business intelligence tool - which is why this course covers ALL areas - with a focus on creating visuals and user experience elements.

Data Sets

Retail Sales Fact Table

ID	Store ID	Category ID	Date	Sales \$ USD
105	1	7	01/01/2022	400

Date Dimension

Date	Year	Quarter	Month	Week
01/01/2022	2022	1	1	1

Store Dimension

Store ID	Store Type	Store Size (sqft)	Location
1	CORE	151,315	Kansas

Category Dimension

Category ID	Department	Product Group
7	Clothing	Sports

Retail Cost Fact Table

Store ID	Date	Wages	Rent	Target Sales
7	01/01/2022	#,###.00	#,###.00	#,###.00

Chapter Introduction – Power Query

We will connect to the source data for our Power BI report - importing and transforming it in the Power Query Editor before loading it into our report.



How to connect to different data sources



How to manage our queries in the



How to perform some common data transformations to reshape our source data



Editor - following a few best practices so our work is more organized and easier to follow



How to add additional columns of data



Review a few advanced features
load our queries to the report Data Model



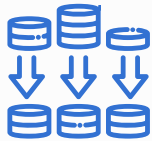
Power Query is a foundational part of Power BI, as it is the Extract, Transform, and Load engine - making it possible to eliminate repetitive and manual data transformations.

Chapter Introduction – Data Modeling

We will take the queries that we created in the Power Query Editor and relate them together to create our report Data Model.



Data Modeling - and why we do it.



Database Normalization - why it's a good practice to structure our data following the database normalization principles.



Fact & Dimension tables - and why we should typically model our data with a **Star Schema**.

DAX

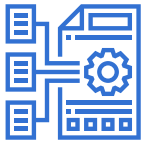
Introduce the **DAX** language and why **DAX Measures** are so important to building visuals in our Power BI report.

Chapter Introduction – Data Modeling

Using Data Model and DAX measures will solve some of the issues we have run into:



Updating the aggregation types across our report



Updating the formatting of aggregations across our report



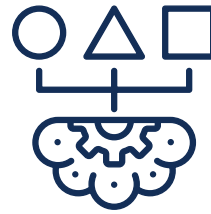
And structuring our data so that it is stored efficiently, with predictable behavior and no errors

Data Modeling

Data modeling is the process of structuring data to optimize it for reporting, business intelligence and analytics.



It transforms data into a form that is easier to understand and quick to answer our reporting questions.



Each data model will be different. It should reflect the state of the business it is analyzing and the report's needs.



However, There are several common aspects across data models.

Database Normalization

Database normalization is a method of storing and structuring data efficiently for storage and analysis.

It has four key benefits:



Protects data integrity



Reduces storage space



Easier to maintain



Improves query speed

Can you see any problems with the layout of the data?

Product #	Product Group	Product Color	01/31/2019	05/14/2019	05/21/2019	07/13/2019
80725	Tools	Chrome	192	0	0	0
80726	Electric Doors	White	0	1,400	0	0
80726	Electric Doors	White	0	0	1,300	0
90724	Radios	Black	0	0	0	57

Database Normalization

- ⚠ All the attributes in this table should describe a sale. They should NOT describe the product.
- ⚠ Rows in the table should be able to be uniquely identified.
- ⚠ Similar data should be in the same column - not spread out across multiple columns.

Product #	Product Group	Product Color	01/31/2019	05/14/2019	05/21/2019	07/13/2019
80725	Tools	Chrome	192	0	0	0
80726	Electric Doors	White	0	1,400	0	0
80726	Electric Doors	White	0	0	1,300	0
90724	Radios	Black	0	0	0	57

Fact & Dimension Tables

A fact table is a table which records a particular event or measurement.

Retail Sales Fact Table

Product #	Store	Date	Sales
80725	307	01/31/2019	192
80726	308	05/14/2019	1,400
80726	309	05/21/2019	1,300
90724	310	07/13/2019	57

Dimension tables add a description to the attributes in fact tables.

Product Dimension Table

Product #	Department	Group	Color
80725	Electronics	Doors	White
80726	Clothing	Accessories	Black
90724	Kitchen	Cutlery	Silver

Date Dimension Table

Date	Year	Month
01/31/2019	20 19	January
05/14/2019	20 19	May
05/21/2019	20 19	May
07/13/2019	20 19	July

Relate Fact & Dimension Tables

Product Dimension Table

Product #	Department	Group
80725	Clothing	Accessories
80726	Electronics	Radios
90724	Kitchen	Cutlery

Store Dimension Table

StoreID	StoreType	Location
307	Core	Vermont
308	Digital	California
309	Local	Alabama

Retail Sales Fact Table

Product #	Store	Date	Sales
80725	307	01/31/2019	192
80726	308	05/14/2019	1,400
80726	309	05/21/2019	1,300
90724	310	07/13/2019	57

Date Dimension Table

Date	Year
01/31/2019	2019
05/14/2019	2019
05/21/2019	2019
07/13/2019	2019

DAX – Measures

Data Analysis eXpressions



DAX is used to write formulas in Power BI.



These formulas can help us create, aggregate or summarize data in our reports.



DAX formulas can be categorized into one of two groups: Calculated Columns and Measures.

DAX – Measures

When we are creating business intelligence reports, there is a need to summarize our data.



Seeing data as a metric.



Define an aggregation type and calculate the Total amount for a specific column.



This single measure can be used to populate visuals and tables with Total Sales.

Retail Sales Table

Product #	Store	Date	Sales
80725	307	01/31/2019	192
80726	308	05/14/2019	1,400
80726	309	05/21/2019	1,300
90724	310	07/13/2019	57

Total Sales = SUM('Retail Sales'[Sales])= 5,916.34

Chapter Introduction – Sales – Visuals & DAX

We will start to visualize our data - leveraging our work importing, transforming, and modeling our data.



Cover the theory of how we can create visuals using DAX measures.



Create a variety of different types of visuals.



See how we can create further DAX measures to fit the need for particular analysis and visualizations.



Filter the data in our report to change the context of our visuals.

How we choose to visualize our data and plan our report pages is crucial to any analyst working in Power BI.

DAX – Visualizing with Context

Sales Fact Table

Date	Department	Group	Store ID	Sales
June 30, 2019	Kitchen	Cutlery	1	1,051.30
March 31, 2019	Kitchen	Cutlery	2	1,091.54
September 1, 2019	Kitchen	Gadgets	2	1,816.00
December 1, 2019	Kitchen	Gadgets	6	1,957.50

Total Sales

5,916.34

“Measures react to the change in context by adding up the corresponding rows in our fact table above.”

Store ID	Total Sales
1	1,051.30
2	2,907.54
6	1,816.00
Total	5,916.34

Group	Total Sales
Cutlery	2,142.84
Gadgets	3,773.50
Total	5,916.34

DAX – Calculated Columns

Sales Fact Table

Date	Department	Group	Sales	Group & Dept
June 30, 2019	Kitchen	Cutlery	1,051.30	Cutlery: Kitchen
March 31, 2019	Kitchen	Cutlery	1,091.54	Cutlery: Kitchen
September 1, 2019	Kitchen	Gadgets	1,816.00	Gadgets: Kitchen
December 1, 2019	Kitchen	Gadgets	1,957.50	Gadgets: Kitchen

Group & Dept = [Group] & ": "& [Department]

Calculated Columns return a result for each individual row in our table.

Date Dimension



Defining our own date dimension can give us more control over our data model.



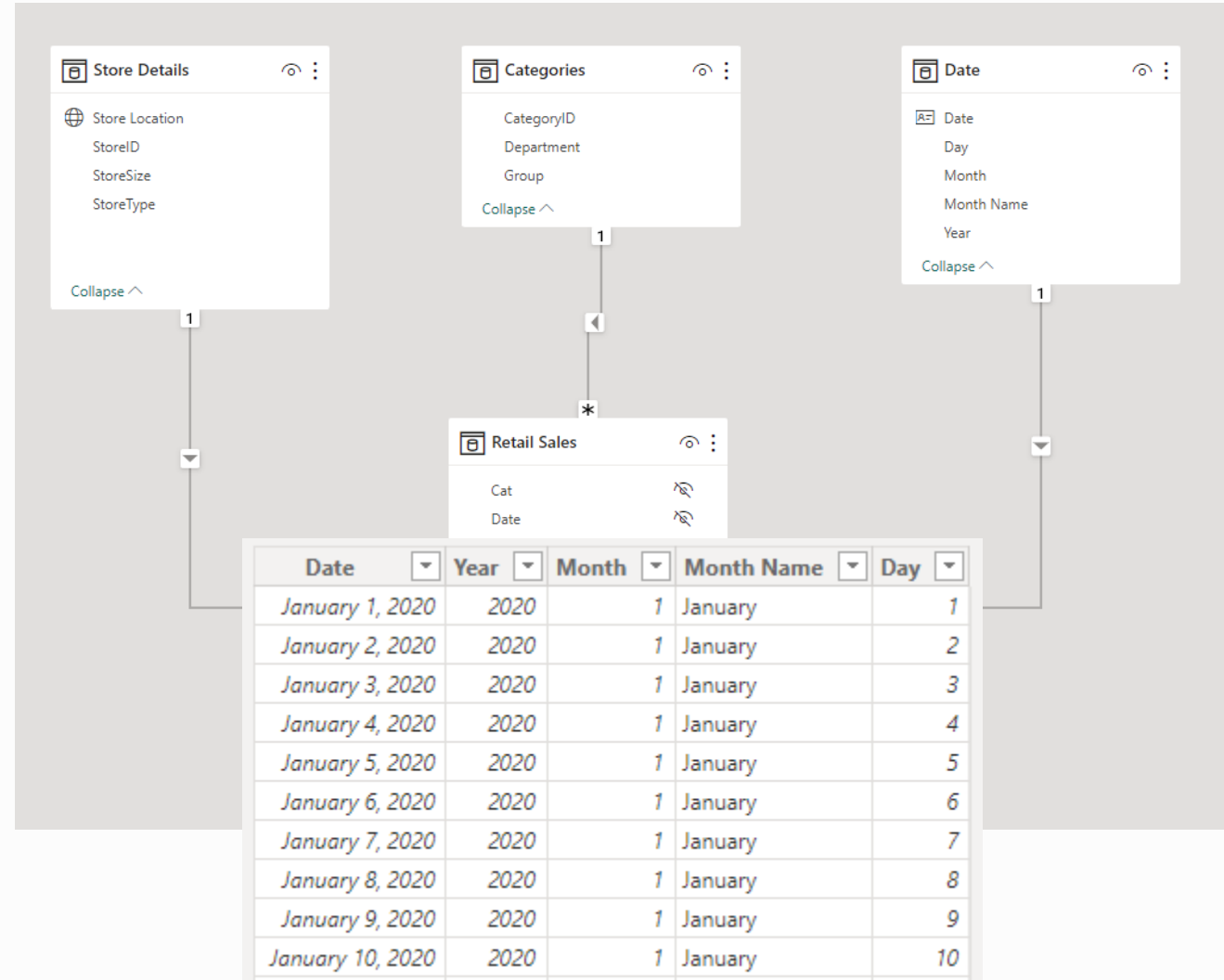
We can ensure that our report performs efficiently and as expected.



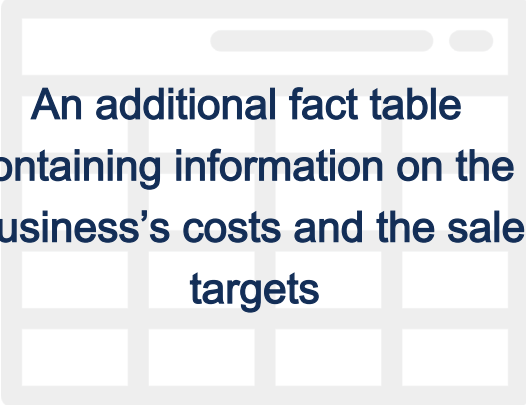
A Date Dimension was added to our data model and marked as a date table.



Dates in a date dimension table must be consecutive.



Chapter Introduction – Cost – Visuals & DAX



An additional fact table
containing information on the
business's costs and the sales
targets



Comparing the sales
to target values



How well the overall
business, as well as individual
stores, are performing

- Analyzing the two main costs (wages and rent) by store
- Tracking a KPI - sales vs target over time



An additional fact table can help demonstrate the possibilities that we have in modeling data and the importance of understanding the data available to us.

Chapter Introduction – User Experience

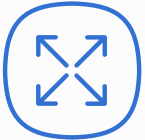
We will enhance the visuals in our Power BI report by adding user experience elements.



Syncing slicers across report pages



Creating bookmarks to reset our report page and highlight insights



Adding zoom sliders to visuals



Setting up drill through from the sales to cost page



Highlight our key messages with conditional formatting



Ensuring our report is on brand with a custom theme



A better user experience will help more people to use our reports and feel comfortable doing so.

Chapter Introduction – Sharing

We can publish our report to our organization's Power BI Service account online. This chapter will cover:



How to log in to the Power BI service



Publishing a report to the Power BI service



The difference between workspaces and apps



How we can view reports and explore datasets online



How to create a dashboard in the Power BI service, with tiles and insight from different Power BI reports



How to set up a scorecard and link it to our Power BI reports



How we can share our Power BI reports publicly