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About the Tutorial

DAX functions play an important role in the usage of DAX for data modeling and reporting. It is an inbuilt function provided in the DAX language that helps you perform commonly used data calculations on the Data Model.

In this tutorial, you will learn data modeling and analysis using DAX, based on the Power Pivot data model. As you proceed, you will learn about the different facets of Power Pivot, DAX and DAX functions in data modeling and analysis.

By the end of the tutorial, you will be able to perform data modeling and analysis with DAX for any context at hand.

Audience

This tutorial has been designed for all those readers who depend heavily on MS-Excel to prepare charts, tables, and professional reports that involve complex data. It will help all those readers who use MS-Excel regularly to analyze data. Professionals who use data modeling and data analysis for reporting and decision-making purposes will benefit from this.

Prerequisites

To proceed with this tutorial, it is a good idea to first go through the following tutorials –

- Excel PivotTables
- Excel Power Pivot
- DAX
- DAX Functions

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1. Data Modeling with DAX – Overview

The decision makers in all the organizations have identified the need for analyzing the historical data of their organization in specific, and of the industry in general. This is becoming crucial day-by-day in the present competitive world, to meet the ever-changing business challenges.

Big Data and Business Intelligence have become the buzzwords in the business world. Data sources have become huge and data formats have become variant. The need of the hour is to have simple-to-use tools to handle the ever-flowing vast data in less time to gain insight and make relevant decisions at the appropriate time.

Data analysts can no longer wait for the required data to be processed by the IT department. They require a handy tool that enables them to quickly comprehend the required data and make it available in a format that helps the decision makers take required action at the right time.

Microsoft Excel has a powerful tool called as Power Pivot that was available as an add-in in the prior versions of Excel and is built-in feature in Excel 2016. The database of Power Pivot, called the data model and the formula language that works on the data model, called DAX (**D**ata **A**nalysis **E**xpressions) enables an Excel user to perform tasks such as data modeling and analysis in no time.

In this tutorial, you will learn data modeling and analysis using DAX, based on the Power Pivot data model. A sample Profit and Analysis database is used for the illustrations throughout this tutorial.

Data Modeling and Analysis Concepts

The data that you obtain from different variety of sources, termed as raw data, needs processing before you can utilize it for analysis purposes. You will learn about these in the chapter - Data Modeling and Analysis Concepts.

Data Modeling and Analysis with Excel Power Pivot

Since the tool that you will be mastering in this tutorial is Excel Power Pivot, you need to know how the data modeling and analysis steps are carried out in Power Pivot. You will learn these at a broader level in the chapter - Data Modeling and Analysis with Excel Power Pivot.

As you proceed with the subsequent chapters, you will learn about the different facets of Power Pivot, DAX and DAX functions in data modeling and analysis.

By the end of the tutorial, you will be able to perform data modeling and analysis with DAX for any context at hand.

2. Data Modeling with DAX – Concepts

Business Intelligence (BI) is gaining importance in several fields and organizations. Decision making and forecasting based on historical data have become crucial in the ever-growing competitive world. There is huge amount of data available both internally and externally from diversified sources for any type of data analysis.

However, the challenge is to extract the relevant data from the available big data as per the current requirements, and to store it in a way that is amicable for projecting different insights from the data. A data model thus obtained with the usage of key business terms is a valuable communication tool. The data model also needs to provide a quick way of generating reports on an as needed basis.

Data modeling for BI systems enables you to meet many of the data challenges.

Prerequisites for a Data Model for BI

A data model for BI should meet the requirements of the business for which data analysis is being done. Following are the minimum basics that any data model has to meet:

The data model needs to be Business Specific.

A data model that is suitable for one line of business might not be suitable for a different line of business. Hence, the data model must be developed based on the specific business, the business terms used, the data types, and their relationships. It should be based on the objectives and the type of decisions made in the organization.

The data model needs to have built-in Intelligence.

The data model should include built-in intelligence through metadata, hierarchies, and inheritances that facilitate efficient and effective Business Intelligence process. With this, you will be able to provide a common platform for different users, eliminating repetition of the process.

The data model needs to be Robust.

The data model should precisely present the data specific to the business. It should enable effective disk and memory storage so as to facilitate quick processing and reporting.

The data model needs to be Scalable.

The data model should be able to accommodate the changing business scenarios in a quick and efficient way. New data or new data types might have to be included. Data refreshes might have to be handled effectively.

Data Modeling for BI

Data modeling for BI consists of the following steps:

- Shaping the data
- Loading the data
- Defining the relationships between the tables
- Defining data types
- Creating new data insights

Shaping the Data

The data required to build a data model can be from various sources and can be in different formats. You need to determine which portion of the data from each of these data sources is required for specific data analysis. This is called Shaping the Data.

For example, if you are retrieving the data of all the employees in an organization, you need to decide what details of each employee are relevant to the current context. In other words, you need to determine which columns of the employee table are required to be imported. This is because, the lesser the number of columns in a table in the data model, the faster will be the calculations on the table.

Loading the Data

You need to load the identified data – the data tables with the chosen columns in each of the tables.

Defining the Relationships Between Tables

Next, you need to define the logical relationships between the various tables that facilitate combining data from those tables, i.e. if you have a table – Products - containing data about the products and a table - Sales - with the various sales transactions of the products, by defining a relationship between the two tables, you can summarize the sales, product wise.

Defining Data Types

Identifying the appropriate data types for the data in the data model is crucial for the accuracy of calculations. For each column in each table that you have imported, you need to define the data type. For example, text data type, real number data type, integer data type, etc.

Creating New Data Insights

This is a crucial step in data modeling for BI. The data model that is built might have to be shared with several people who need to understand data trends and make the required decisions in a very short time. Hence, creating new data insights from the source data will be effective, avoiding rework on the analysis.

The new data insights can be in the form of metadata that can be easily understood and used by specific business people.

Data Analysis

Once the data model is ready, the data can be analyzed as per the requirement. Presenting the analysis results is also an important step because the decisions will be made based on the reports.

3. Data Modeling using Excel Power Pivot

Microsoft Excel Power Pivot is an excellent tool for data modeling and analysis.

- Data model is the Power Pivot database.
- DAX is the formula language that can be used to create metadata with the data in the data model by means of DAX formulas.
- Power PivotTables in Excel created with the data and metadata in the data model enables you to analyze the data and present the results.

In this tutorial, you will learn data modeling with Power Pivot data model and DAX and data analysis with Power Pivot. If you are new to Power Pivot, please refer to the Excel Power Pivot tutorial.

You have learnt the data modeling process steps in the previous chapter - Data Modeling and Analysis Concepts. In this chapter, you will learn how to execute each of those steps with Power Pivot data model and DAX.

In the following sections, you will learn each of these process steps as applied to Power Pivot data model and how DAX is used.

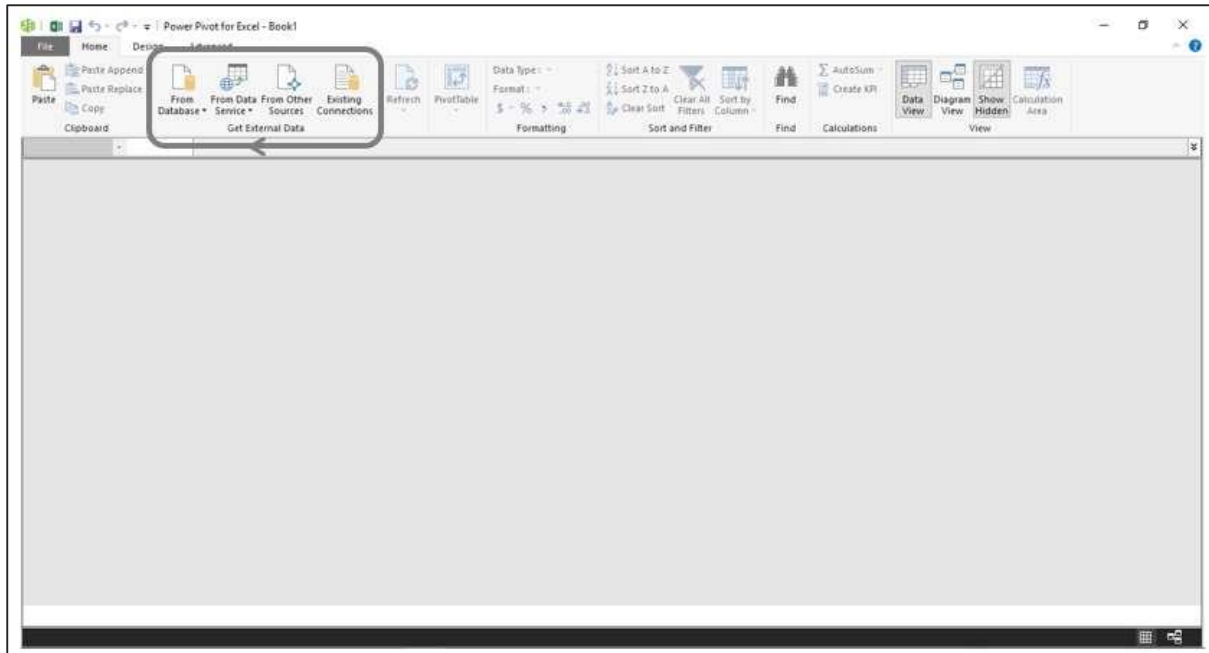
Shaping the Data

In Excel Power Pivot, you can import data from various types of data sources and while importing, you can view and choose the tables and columns that you want to import.

- Identify the data sources.
- Find the data source types. For example, database or data service or any other data source.
- Decide on what data is relevant in the current context.
- Decide on the appropriate data types for the data. In Power Pivot data model, you can have only one data type for the entire column in a table.
- Identify which of the tables are the fact tables and which are the dimensional tables.
- Decide on the relevant logical relationships between the tables.

Loading Data into the Data Model

You can load data into the data model with several options provided in the Power Pivot window on the Ribbon. You can find these options in the group, Get External Data.



You will learn how to load data from an Access database into the data model in the chapter – Loading Data into the Data Model.

For illustration purposes, an Access database with Profit and Loss data is used.

Defining Data Types in the Data Model

The next step in the data modeling process in Power Pivot is defining data types of the columns in the tables that are loaded into the data model.

You will learn how to define data types of the columns in the tables in the chapter – Defining Data Types in the Data Model.

Creating Relationships Between the Tables

The next step in the data modeling process in Power Pivot is creating relationships between the tables in the data model.

You will learn how to create relationships between the tables in the chapter – Extending the Data Model.

Creating New Data Insights

In the data model, you can create metadata necessary for creating new data insights by:

- Creating Calculated Columns
- Creating Date Table
- Creating Measures

You can then analyze the data by creating dynamic Power PivotTables that are based on the columns in the tables and measures that appear as fields in the PivotTable Fields list.

Adding Calculated Columns

Calculated columns in a table are the columns that you add to a table by using DAX formulas.

You will learn how to add calculated columns in a table in the data model in the chapter - Extending the Data Model.

Creating Date Table

To use Time Intelligence Functions in DAX formulas to create metadata, you require a Date table. If you are new to Date tables, please refer to the chapter – Understanding Date Tables.

You will learn how to create a Date table in the data model in the chapter – Extending the Data Model.

Creating Measures

You can create various measures in the Data table by using the DAX functions and DAX formulas for different calculations as required for data analysis in the current context.

This is the crucial step of data modeling with DAX.

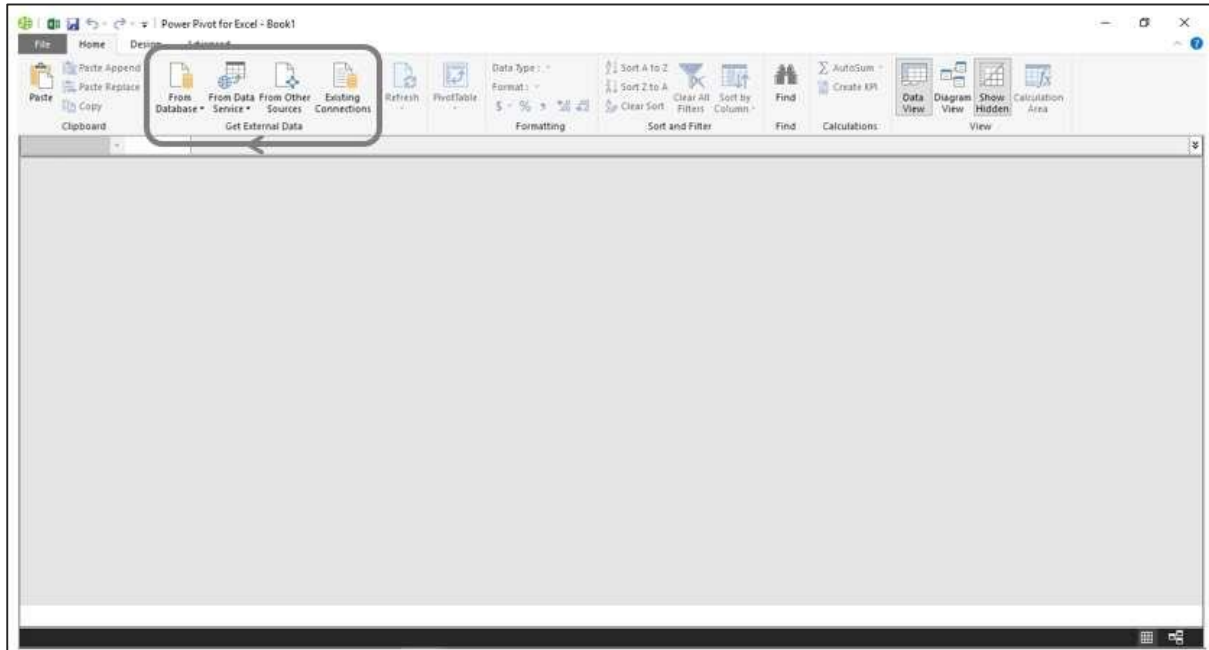
You will learn how to create the measures for various purposes of profit and loss analysis in the subsequent chapters.

Analyzing Data with Power PivotTables

You can create Power PivotTables for each of the facets of profit and loss analysis. As you learn how to create measures using DAX in the subsequent chapters, you will also learn how to analyze data with these measures using Power PivotTables.

4. Loading Data into the Data Model

You can load data from different types of data sources into the data model. For this, you can find various options in the Get External Data group on the Ribbon in the Power Pivot window.



As you can observe, you can load data from databases, or from data services or several other types of data sources.

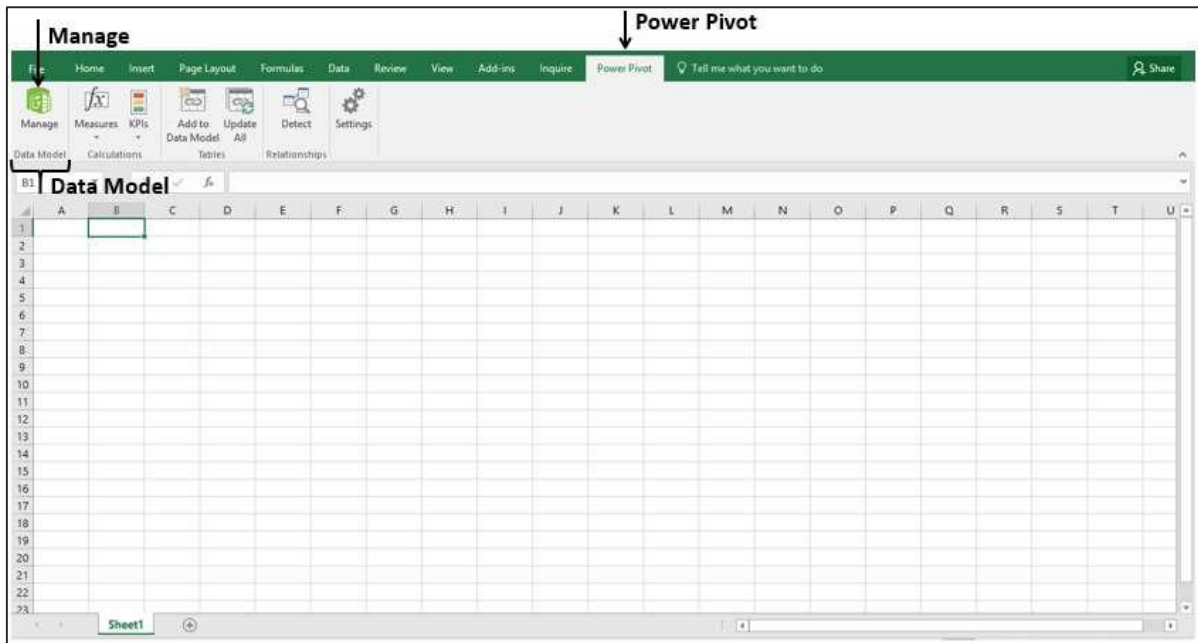
When you load data from a data source into the data model, a connection will be established with the data source. This enables data refresh when the source data changes.

Initiating with a New Data Model

In this section, you will learn how to model the data for profit and loss analysis. The data for analysis is in a Microsoft Access database.

You can initiate a new data model as follows -

- Open a new Excel workbook.
- Click the PowerPivot tab on the Ribbon.
- Click Manage in the Data Model group.



The Power Pivot window appears. The window will be blank as you have not yet loaded any data.

Loading Data from Access Database into the Data Model

To load the data from the Access database, carry out the following steps:

- Click From Database in the Get External Data group on the Ribbon.
- Click From Access in the dropdown list.

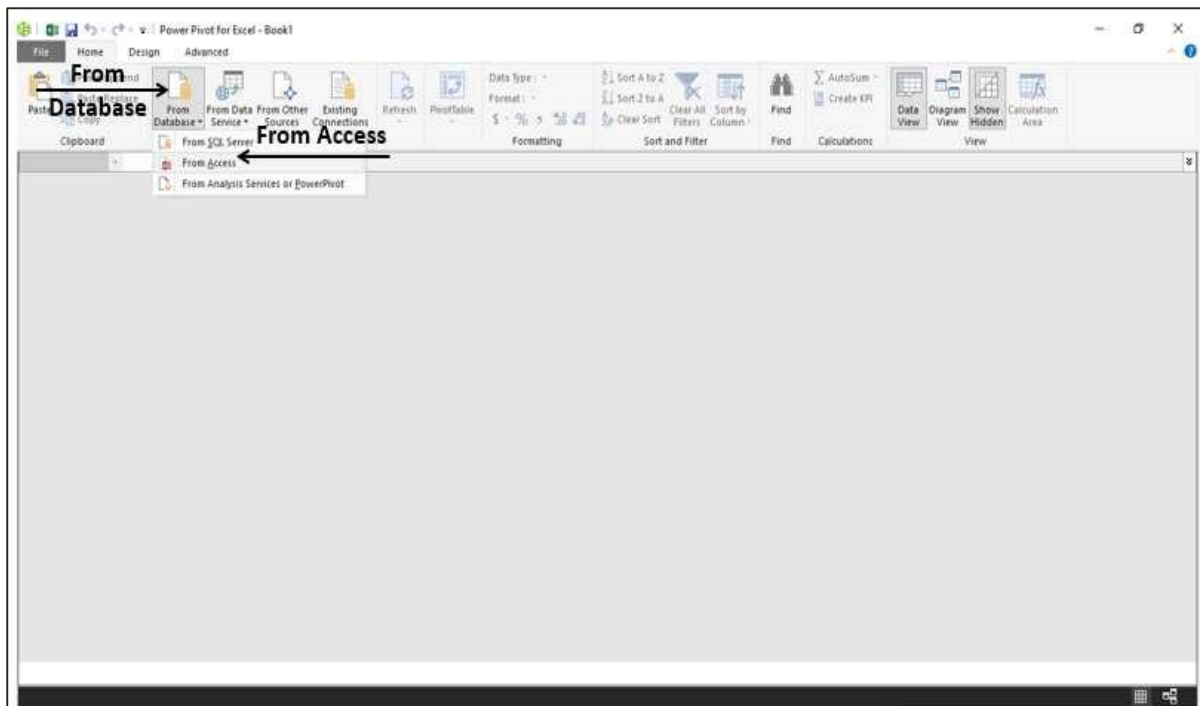
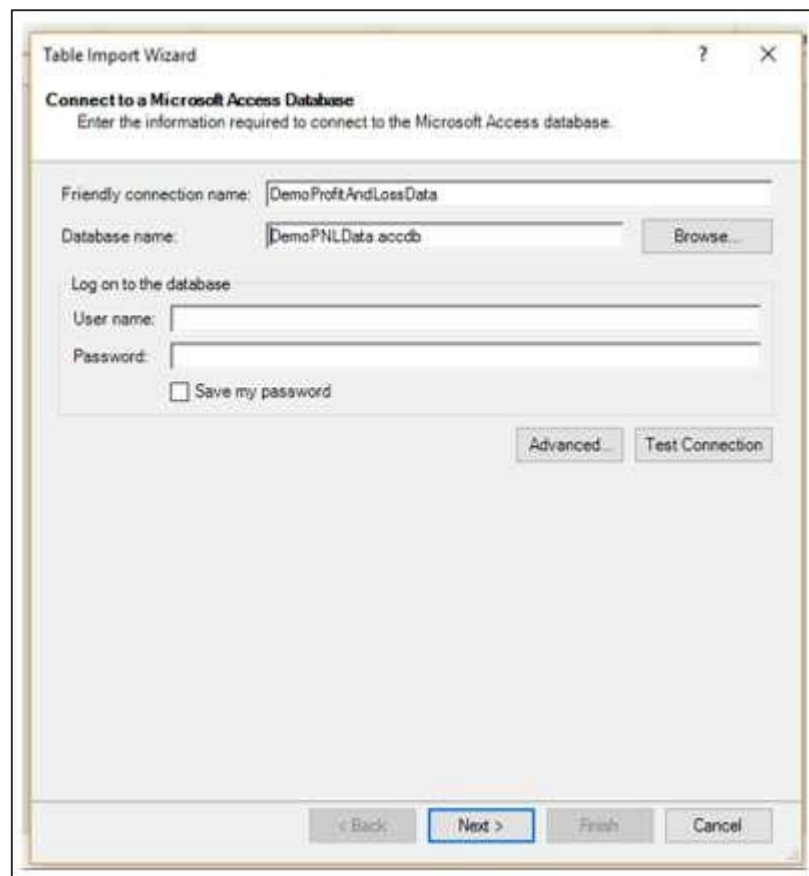


Table Import Wizard dialog box appears.

- Browse to the Access file.
- Give a friendly name for the connection.



The screenshot shows the 'Table Import Wizard' dialog box with the title 'Connect to a Microsoft Access Database'. The instructions state: 'Enter the information required to connect to the Microsoft Access database.' The fields are filled with the following information:

- Friendly connection name: DemoProfitAndLossData
- Database name: DemoPNLData.accdb (with a 'Browse...' button next to it)
- Log on to the database section:
 - User name: (empty)
 - Password: (empty)
 - Save my password

At the bottom right, there are buttons for 'Advanced...', 'Test Connection', '< Back', 'Next >', 'Finish', and 'Cancel'. The 'Next >' button is highlighted with a blue border.

- Click the Next button. The next part of the Table Import Wizard appears.
- In the Table Import Wizard, select the option – Select from a list of tables and views to choose the data to import.

End of ebook preview
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