deerwalk training center

DTA-OMT-103

# Data analysis and visualization with MS Power BI

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# Program Information

**Nature of the Course**
Theory + Practical

**Total Hours per Day**
2 hours

**Course Duration**
30 Days

## Course Summary

Power BI is a quick and intensive data analysis tool. It is an affordable alternative to many BI tools existing in the market for the past years. It offers many features and does most of the job for its user by providing the best of data analysis tools. It does not require any knowledge of coding (maybe a little knowledge of SQL if used as a source to get data).

## Completion Criteria

After fulfilling all of the following criteria, the student will be deemed to have finished the Module:

- Has attended 90% of all classes held
- Has received an average grade of 80% on all assignments
- Has received an average of 60% in assessments
- The tutor believes the student has grasped all of the concepts and is ready to go on to the second module.

## Required Textbooks

- Brett Powell, “Mastering Microsoft Power BI”, Packt.
- Roger F. Silva, “Power BI: Create and Learn”, Business Intelligence Clinic.

## Prerequisites

- Fundamental understanding of basic Mathematical concepts.
- If you are only interested in theory and have no interest/patience in spending at least 10 hours every week throughout the duration of the course, then this course might not be for you.
- Basic understanding of Database and Microsoft Excel will prove helpful.
- A strong will to learn.

# Course Details

Lesson 1

## Power BI Complete Introduction

- Power BI Introduction
- Data Visualization, Reporting
- Business Intelligence (BI), Traditional BI, Self-Serviced BI
- Cloud Based BI, On-Premise BI
- Power BI Products
- Power BI Desktop (Power Query, Power Pivot, Power View)
- Flow of Work in Power BI Desktop
- Power BI Service, Power BI Report Server, Power BI Mobile
- Flow of Work in Power BI / Power BI Architecture
- A Brief History of Power BI

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Lesson 2

## PBI Desktop Installation Power BI Desktop & Power BI Service Overview

### Power BI Desktop Software Installation

- Download & Installation of Power BI Desktop Software
- What are the Prerequisites to Install Power BI Desktop Software

### Power Query Software Overview

- Overview of Power Query / Power Query Editor
- How to Open Power Query / Power Query Editor Software
- Connecting to Data Sources and Extracting the Data
- Establish connection to the Excel source, SQL Server
- Importing Data into Power Query Editor
- Transforming the Data in Power Query Editor using GUI Options
- Loading the Data into Power Pivot
- Understanding the M(Mashup) Language behind the GUI Options

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### Power Pivot Software Overview

- Understanding about Power Pivot – A In Memory Columnar Database
- Advantage of In Memory Columnar Database
- Power Pivot- xVelocity In-memory Analytics Engine (Previously called Vertipaq)
- Overview of Data Modeling – Model View(Previously Relationship View)
- Enhancing the Data Model – DAX(Data Analysis eXpressions) Language – Data View

### Power View Software Overview

- Overview of Visualizations, Fields, Field Wells
- Understanding Dimension Columns & Fact Columns
- Visualizing the Data using Power View and Power Maps – Report View
- Saving Report
- Publishing the Report to Power BI Service

### Power BI Service Overview

- Power BI Service Overview
- Logon to Power BI Service
- Share the Reports with Clients

## Power BI Desktop Software Installation

- Understanding Power BI Desktop User Interface
- Fields Pane, Visualizations Pane, Filters Pane
- Ribbon, Multiple Views (Report View, Data View & Model View)
- Report Canvas, Pages Section

## Building Blocksof Power BI

- Datasets, Visualizations, Reports, Dashboards & Tiles

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Lesson 3

# Power Query

## Introduction to Power Query & Power Query Editor User Interface

- Overview of Power Query /Query Editor
- How to Open Power Query / Query Editor
- Extracting the Data from Data Sources
- Transforming the Data using GUI Options
- Loading the Data in Power Pivot
- Query Editor UI(Queries Pane, Data Pane / Results Pane, Power Query Ribbon)
- Query Settings, Pane Applied Steps, Formula Bar
- Advanced Editor, Query Dependencies
- Understanding Power Query Conceptually

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### Data Processing, Data types and Filters in Power Query

- How Data Processed in Power Query
- Data types, Changing the Datatype of a Column,Detect Data Type
- Filters in Power Query and their Purpose
- Types of Filters in Power Query(Basic Filtering, Advanced Filtering)
- Auto Filter / Basic Filtering
- Filter a Column using Advanced Text Filters, Number Filters, Date Filters
- Filter Multiple Columns

### Inbuilt Column Transformations

- Remove Columns /Remove Other Columns, Choose Columns, Go To Column
- Name or Rename a Column
- Reorder Columns or Sort Columns(Move Left, Right, To Beginning, To End)
- Column from Examples( From All Columns, From Selection)
- Add Column /Custom Column
- Duplicate Column, Split Column, Merge Columns
- PIVOT, UNPIVOT Columns, Transpose Columns
- Replace Values, Remove Empty

### Inbuilt Row Transformations

- Header Row or Use First Row as Headers, Use Headers as First Row
- Keep Top Rows, Keep Bottom Rows, Keep Range of Rows
- Keep Duplicates, Keep Errors
- Remove Top Rows, Remove Bottom Rows, Remove Alternative Rows
- Remove Duplicates, Remove Blank Rows, Remove Errors
- Group Rows / Group By

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Lesson 4

## Combine Queries (Merge Queries & Append Queries) Merge Queries / Join Tables

- Merge Queries, Merge Queries as New
- Need of Merge Queries, Minimum requirements to Perform Merge Queries
- Types of Joins / Join Kinds / Merge Type
  - Left Outer (all from first, matching from second)
  - Right Outer(all from second, matching from first)
  - Full Outer (all rows from both)
  - Inner (only matching rows)
  - Left Anti (rows only in first),Right Anti (rows only in second)
- Cartesian Join or Cross Join, Self-Join
- Merging the Tables using Multiple Join Conditions
- How to Merge 3 Tables
- Use Fuzzy Matching Option

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## Append Queries/ Union ALL Tables

- Append Queries,Append Queries as New
- Minimum requirements to perform AppendQueries
- Append Two Tables , Append Three or More Tables
- Folder as Source
- Appending Multiple Files of same type from a folder using Single Query
- Appending MultipleExcel Files and MultipleSheets using Single Query
- Union All, How to get Union Result

## Query Options

- Copy Query, Paste Query, Delete Query, Rename Query
- Enable Load, Include in report Refresh
- Duplicate Query, Reference Query
- Move to Group, Move Up , Move Down
- Create Function, Convert To Parameter
- Advanced Editor, Properties

## Home Tab Options

- Close &Apply, Apply, Close
- New Source, Recent Sources, Enter Data, Data Source Settings
- Manage Parameters( Manage Parameters, Edit Parameters, New Parameter)
- Suggested Values(Any Value, List of Values, Query),Convert to List
- Query Parameters and Power BI Templates
- .pbix (Power BI File) and .pbit (Power BI Template File)
- Refresh Preview, Refresh All, Cancel Refresh
- Sorting Data

## Transform Tab Options

- Reverse Rows, Count Rows, Replace Values, Replace Errors, Fill Down, Fill Up
- Text Column, Number Column, Date & Time Column Options
- Structured Column(Expand, Aggregate, Extract Values)
- Run R Script, Run PythonScript

## Add Column Tab Options

- Create Custom Function, Invoke Custom Function
- Conditional Column, Index Column, Duplicate Column
- From Text, From Number, From Date & Time Column Options

## View Tab, Tools Tab & Help Tab Options

Lesson 5

# Power Pivot

## Power Pivot Software Overview

- Understanding aboutPower Pivot – A In Memory ColumnarDatabase
- Advantage of In MemoryColumnar Database
- Power Pivot- xVelocity In-memory Analytics Engine (Previously called Vertipaq)
- Overview of Data Modeling – Model View(Previously Relationship View)
- Enhancing the Data Model– DAX(Data Analysis eXpressions) Language – Data View

## Power BI Data Modeling – Model View (Previously Relationship View)

- Data Modeling Introduction
- Relationships, Need of Relationship Between Tables
- Dimension Column, Fact Column, Dimension Table, Fact Table
- Star Schema, Snowflake Schema
- Galaxy Schema or Hybrid Schema or Fact Constellation Schema
- Relationship Types / Cardinality in General
- One-to-One, One-to-Many (or Many-to-One), Many-to-Many
- AutoDetect the relationship, Create a new relationship
- Edit existing relationships, Delete a relationship
- Make Relationship Active or Inactive
- Cross filter direction (Single, Both),Apply Security Filter in Both Directions
- Assume Referential Integrity

## Enhancing the Data Model - DAX

- What is DAX(Data AnalysiseXpressions) Language – Functional Language
- New Column,New Measure / QuickMeasure, New Table
- DAX Table and Column Name Syntax
- Creating New Column, CreatingNew Measure
- Implicit Measures, Explicit Measures
- Difference BetweenNew Columns &New Measures
- DAX Operators, Types of Operators
- Arithmetic Operators, Comparison Operators
- Text Concatenation Operator, Logical Operators

## DAX Functions - Categories

- Text Functions
- Logical Functions
- Date and Time Functions
- Filter Functions
- Math & Statistical Functions
- Time Intelligence Functions

## DAX Text Functions

- LEN, CONCATENATE (&)
- LEFT, RIGHT, MID
- UPPER, LOWER
- TRIM, SUBSTITUTE, REPLACE, BLANK

## DAX Logical Functions

- IF, Nested IF
- TRUE, FALSE,NOT, OR, IN, AND
- IFERROR
- SWITCH

## DAX Date & Time Functions

- Creating Date Dimension Table for performing Time Intelligence Analysis
- YEAR, QUARTER, MONTH, DAY
- WEEKDAY, WEEKNUM
- FORMAT (Text Function)  Month Name, Weekday Name
- DATE, TODAY, NOW
- HOUR, MINUTE,SECOND, TIME
- DATEDIFF, YEARFRAC, CALENDAR, CALENDARAUTO
- EDATE, EOMONTH,DATEVALUE
- Week Number of Month, Fiscal Year, Fiscal Quarter

## DAX Filter Functions

- CALCULATE, CALCULATETABLE
- ALL, ALLSELECTED, ALLEXCEPT
- RELATED, RELATEDTABLE
- LOOKUPVALUE (Information function)
- USERELATIONSHIP
- FILTER, DISTINCT(Column), DISTINCT(Table), VALUES, SELECTEDVALUE

## DAX Math and Statistical Functions

- INT, ROUND,ROUNDUP, ROUNDDOWN
- DIVIDE, EVEN, ODD, POWER, SIGN, SQRT, FACT
- SUM, SUMX, MIN, MINX, MAX, MAXX, COUNT, COUNTX
- AVERAGE, AVERAGEX
- COUNTROWS, COUNTBLANK
- RANKX, SUMMARIZE

### DAX Time Intelligence Functions

- Time Intelligence Introduction
- Date Dimension Table, Mark as Date Table
- TOTALMTD, TOTALQTD,TOTALYTD
- PREVIOUSDAY, PREVIOUSMONTH, PREVIOUSQUARTER, PREVIOUSYEAR
- NEXTDAY, NEXTMONTH, NEXTQUARTER, NEXTYEAR
- SAMEPERIODLASTYEAR
- YOY Growth, QOQ Growth, MOM Growth
- FIRSTDATE, LASTDATE

### Quick Measures

- Creating Measures without writing the DAX Formula using Quick Measures
- Sales YoY%, Sales YTD, Sales MTD

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Lesson 6

## Power View

### Report View /Power View

- Report View User Interface/ Power BI Desktop User Interface
- Fields Pane, Visualizations pane,Filters Pane
- Ribbon, MultipleViews, Report Canvas,Pages Section
- Fields, Filed Wells, Formatting, Analytics

### Visuals Interactions

- Visual Interactions
- Interaction Type (Highlight, Filter, None)
- Visual Interactions Default Behavior
- Changing the Default Interaction Behavior, Edit Interactions

### Filters in Power View

- Filters, Filter Types in Power View
- Filters on this Visual, Filters on this Page, Filters on All Pages
- Drill Through Filters, Cross Report Drill Through, Keep All Filters
- Filter Sub Types - Basic Filtering, Advanced Filtering, Top N, Relative Date Filtering
- Numeric field filters, Text field filters, Date and Time field Filters

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## Hierarchies and Drill-Down Reports

- Hierarchy Introduction, Default Date Hierarchy
- Creating Hierarchy, Creating Custom Date Hierarchy, ChangeHierarchy Levels
- Drill Actions - Drill Down, Drill Up, Show Next Level, Expand Next Level
- Apply Drill Down filters to Selected Visual

## Power BI Visualizations

- Visualizing Data,Why Visualizations
- Visualization types,Field Wells
- Visuals for Filtering, Visualizing Categorical Data, Visualizing Trend Data
- Visualizing KPI Data, Visualizing Tabular Data, Visualizing Geographical Data
- Leveraging Power BICustom Visuals

## Visuals for Filtering

- Slicer Visualization, When to use a Slicer
- Create and format SlicerVisualization
- Hierarchy Slicer(Custom Visualization)
- When to use a Hierarchy Slicer,Create and formatHierarchy Slicer
- Advantages of Hierarchy Slicer
- Play Axis (Dynamic Slicer)- Custom Visualization
- When to use a Play Axis Visual, Create and format Play Axis Visual

## Visualizing Categorical Data

- Purpose of Pie and Donut Charts, Create and Format Pie and Donut Charts
- Purpose of Tree map Visual, Create and Format the Tree Map Visual
- Purpose of Bar & Column Charts
- Create and Format Bar and Column Charts
- Create and Format Stacked Bar Chart, Stacked Column Chart
- Create and Format Clustered Bar Chart, Clustered Column Chart
- Create and Format 100% Stacked Bar Chart, 100% Stacked Column Chart
- Purpose of Scatter Chart, Create and Format Scatter Chart

## Visualizing Trend Data

- Purpose of Line and Area Charts
- Create and Format Line Chart, Area Chart, Stacked Area Chart
- Combo Charts
- Create and Format Line and Stacked Column Chart, Line and Clustered Column Chart
- Create and Format Ribbon Chart, Waterfall Chart

### Visualizing KPI Data

- Create and Format Gauge Visual, KPI Visual
- Create and Format Card Visualization, Multi Row Card
- Create and Format FunnelChart

### Visualizing Tabular Data

- Create and Format Table Visual, MatrixVisualization

### Visualizing Geographical Data

- Create and Format Map Visual, Filled Map Visual

### Grouping, Binning & Sorting

- Grouping and Binning Introduction
- Using grouping, Creating Groups on Text Columns
- Using binning, Creating Bins on Number Column and Date Columns
- Sorting Data in Visuals, Changing the Sort Column, Changing the Sort Order
- Sort using column that is not used in the Visualization
- Sort using the Sort by Column button

### Tooltip Page

- Create a Report Tooltip Page, Configure your Tooltip Report Page
- Manually setting a Report Tooltip

### Bookmarks, Selection Pane & Buttons

- Bookmarks, Selection Pane & Buttons
- Changing the chart type dynamically
- Changing the Axis of Chart Dynamically

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Lesson 7

## Power BI Service

### Power BI Service Introduction

- Power BI Service Introduction, Power BI Cloud Architecture
- Cloud Vs. On Premise
- Creating Power BI ServiceAccount, SIGN IN to Power BI ServiceAccount
- Power BI Pro & Power BI Premium
- My Workspace & Project Workspace

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## Adding Datasetto Power BI Service and Creating Multiple New Reports

- Publishing Reportsto the Power BI service,Import / Gettingthe Report to PBI Service
- Creating MultipleReports using Dataset
- Power BI Datasets Live Connection using Desktop to Create New Report
- Creating New Reports in Cloud using Published Datasets
- Shared and Certified Datasets, Sharing Dataset across Multiple Projects

## Dashboards Development

- Dashboard, CreatingDashboards using MultipleReports
- Pin Visuals and Pin LIVE Report Pages to Dashboard
- Advantages of Dashboards
- Interacting with Dashboards
- Adding Tiles to Dashboards
- Web Content, Image, Text Box, Video
- Formatting Dashboard

## Building Blocks of Power BI

- Datasets, Visualizations, Reports, Dashboards & Tiles

## Data Connectivity Modes in Power BI

- Import, Direct Query &Connect Live / Live

## Installing & Configuring the Data Gateways

- Introduction to Data Gateways,How Data Gatewayswork
- Connect to an on premise Data Source by usinga Data Gateway
- Download Data Gateway, Installing a Data Gateway
- Types of Gateways – Enterprise & Personal Gateway
- Difference BetweenEnterprise & PersonalGateway
- Manage Data Gateway
- Sharing the Gateway, Add and Remove Administrators
- Add Data Source, Add or Remove Users to a Data Source
- Refresh On Premise Data
- Configuring AutomaticRefresh using Schedules
- Full Refresh / Truncate & Load , Incremental Refreshthe Data in Dataset

## Understanding Sub folder in Workspace

- Datasets + Dataflows - Dataflows, Datasets
- Content - Workbooks, Reports & Dashboards
- All - Dataflows, Datasets, Workbooks, Reports &Dashboards

## Dataflows

- Dataflows, Purposeof Dataflows
- Creating and Working with Dataflows
- Using Dataflows to Create a Datasetin Power BI Desktop
- Power BI Architecture with Dataflows

## Dataset Actions

- Refresh, Schedule Refresh, Analyze in Excel, Create Report
- Delete Dataset, Get Quick Insights, Security, Rename, Settings, Download .pbix
- Manage Permissions, View Lineage

## Excel Workbooks

- Import Excel Data into Power BI as Dataset
- Upload your Excel file to Power BI

## Report Actions

- Share, Mark as Favorite, Analyze in Excel, Delete, Quick Insights, Save a Copy, Settings
- View usage Metrics Report, View Lineage

## Dashboard Actions

- Share, Mark as Favorite, Delete, Settings, View usage Metrics Report, View Lineage

## Team Collaboration in Power BI using Workspaces

- Introduction to Workspaces
- Classic Workspaces, Upgraded Workspaces
- Create an Workspace, Add Members to Workspace to Collaborate
- Workspace Access- Admin, Member, Contributor, Viewer Roles

## Sharing Power BI Contentusing Basic Sharing,Content Packs and Apps

- Sharing Reports& Dashboards using Direct Sharing/ Basic Sharing
- Content Pack Introduction
- Create ContentPack, Sharing Content Packs
- Specific Groups, My Entire Organization
- Selecting the Content / Items to Publish or Share
- Introduction to App
- Publish an App, Updatea Published App
- Manage Contentin App, Includein App, Exclude in App
- Sharing App
- Entire Organization, Specific individuals or group
- Un publishing an App

## Row Level Security in Power BI

- Introduction to Row Level Security
- Row Level Security (RLS) with DAX
- Manage Roles, Creating Roles, Testing Roles
- Adding Members to Roles in Power BI Service
- Dynamic Row Level Security
- Creating Users Table and Adding to the Model
- Capturing users using UserName() or UserPrincipalName () DAX Functions

## Syncing Published Power BI Report Files Using OneDrive

- Refresh a Dataset stored on OneDrive
- Schedule Refreshthe Dataset stored on OneDrive

## Deployment Pipelines

- Create a Deployment Pipeline
- Assign a workspace to a Deployment Pipeline

## ADD ON

- Real-time Project

# Labs

Lab assignments will focus on the practice and mastery of contents covered in the lectures, and introduce critical and fundamental problem solving techniques to the students.

## Learning Outcomes

- Understand the syntax, tools, and architecture of the Power BI environment.
- Develop analytical thinking and data transformation skills using Power Query.
- Master data modeling and calculations using DAX in Power Pivot.
- Gain proficiency in creating interactive reports and dashboards in Power BI.
- Apply BI concepts to real-world scenarios through hands-on projects and labs.

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