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YOUR COURSE, YOUR WAY - MORE EFFECTIVE IT TRAINING

DAX Introduction

Duration: 3 days

Overview:

DAX is the native language of Power BI, Power Pivot for Excel, and SSAS Tabular models in Microsoft SQL Server Analysis Services. The training is aimed at users of Power BI, Power Pivot, and at Analysis Services developers that want to learn and master the DAX language.

The goal of the course is to teach all the features of the DAX language, providing the knowledge to write formulas for common and advanced business scenarios.

Prerequisites:

You should be a competent Microsoft Excel user. You don't need any experience of using DAX but we recommend that you attend our 3-day Microsoft Power BI course prior to taking this course.

Topics:

1 - What is DAX?

The data model

The direction of a relationship

DAX for Excel users

Cells versus tables

Excel and DAX: Two functional languages

Using iterators

DAX requires some theory

DAX for SQL developers

Relationship handling

DAX is a functional language

DAX as a programming and querying language

Subqueries and conditions in DAX and SQL

Multidimensional vs. Tabular

Hierarchies

Leaf-level calculations

2 - Introducing DAX DAX calculations DAX data types DAX operators Calculated columns Measures Variables Handling errors in DAX expressions Formatting DAX code Common DAX functions Aggregate functions Logical functions Information functions Mathematical functions Trigonometric functions Text functions Conversion functions Date and time functions Relational functions Using basic table functions Introducing table functions EVALUATE syntax Using table expressions **FILTER** ALL, ALLEXCEPT, and ALLNOBLANKROW VALUES and DISTINCT Using VALUES as a scalar value 3 - Evaluation contexts Introduction to evaluation contexts The row context Testing your evaluation context understanding Using SUM in a calculated column Using columns in a measure

Creating a row context with iterators

FILTER, ALL, and context interactions

Using the EARLIER function

Row contexts and relationships Filter context and relationships Introducing VALUES Introducing ISFILTERED, ISCROSSFILTERED Evaluation contexts recap Creating a parameter table 4 - CALCULATE and CALCULATETABLE **CALCULATE** The filter context Introducing CALCULATE Filtering a single column Filtering with complex conditions Using CALCULATETABLE Context transition Context transition with measures How many rows are visible after context transition? Evaluation order of context transition Variables and evaluation contexts Circular dependencies CALCULATE rules Introducing ALLSELECTED USERELATIONSHIP 5 - DAX examples Computing ratios and percentages

Working with many tables

Computing cumulative totals

Using ABC (Pareto) classification

Computing sales per day and working day

Computing differences in working days

Computing static moving averages

6 - Time intelligence calculations

Introduction to time intelligence

Building a Date table

Using CALENDAR and CALENDARAUTO

Working with multiple dates Handling multiple relationships to the Date table Handling multiple Date tables Introduction to time intelligence Using Mark as Date Table Aggregating and comparing over time Year-to-date, quarter-to-date, month-to-date Computing periods from prior periods Computing difference over previous periods Computing the moving annual total Closing balance over time Semi-additive measures OPENINGBALANCE and CLOSINGBALANCE functions Advanced time intelligence periods to date **DATEADD** FIRSTDATE and LASTDATE FIRSTNONBLANK and LASTNONBLANK Using drillthrough with time intelligence Custom calendars Working with weeks Custom year-to-date, quarter-to-date, month-to-date Computing over noncontiguous periods Custom comparison between periods 7 - Statistical functions Using RANKX Common pitfalls using RANKX Using RANK.EQ Computing average and moving average Computing variance and standard deviation Computing median and percentiles Computing interests Alternative implementation of PRODUCT and GEOMEAN Using internal rate of return (XIRR) Using net present value (XNPV) Using Excel statistical functions

Sampling by using the SAMPLE function
Advanced table functions
EVALUATE
filter functions
projection functions
lineage and relationships
grouping/joining functions
set functions
utility functions
8 - Advanced evaluation context
ALLSELECTED
KEEPFILTERS
AutoExists
expanded tables
Difference between table expansion and filtering
Redefining the filter context
filter context intersection
filter context overwrite
arbitrarily shaped filters
the ALL function
lineage
Using advanced SetFilter
Learning and mastering evaluation contexts
9 - Handling hierarchies
Computing percentages over hierarchies
Handling parent-child hierarchies
Handling unary operators

Implementing unary operators by using DAX

10 - Advanced relationships

Using calculated physical relationships

Computing multiple-column relationships

Computing static segmentation

Using virtual relationships

Using dynamic segmentation

Differences between physical and virtual relationships
Finding missing relationships
Computing number of products not sold
Computing new and returning customers
Examples of complex relationships
Performing currency conversion
Frequent itemset search
11 - The VertiPaq engine
database processing
Introduction to columnar databases
VertiPaq compression
value encoding
dictionary encoding
Run Length Encoding (RLE)
re-encoding
Finding the best sort order
hierarchies and relationships
segmentation and partitioning
materialization
Choosing hardware for VertiPaq
Can you choose hardware?
Set hardware priorities
CPU model
Memory speed
Number of cores
Memory size
Disk I/O and paging
12 - Optimizing data models
Gathering information about the data model
Denormalization
Columns cardinality
Handling date and time
Calculated columns
Optimizing complex filters with Boolean calculated columns

Many-to-many relationships

Using relationships with different granularities

Choosing the right columns to store
Optimizing column storage
Column split optimization
Optimizing high cardinality columns
Optimizing drill-through attributes
13 - Analyzing DAX query plans
Introducing the DAX query engine
the formula engine
the storage engine (VertiPaq)
Introducing DAX query plans
Logical query plan
Physical query plan
Storage engine query
Capturing profiling information
Using the SQL Server Profiler
Using DAX Studio
Reading storage engine queries
Introducing xmSQL syntax
scan time
DISTINCTCOUNT internals
parallelism and datacache
the VertiPaq cache
CallbackDataID
Reading query plans
14 - Optimizing DAX
Defining optimization strategy
Identifying a single DAX expression to optimize
Creating a reproduction query
Analyzing server timings and query plan information
Identifying bottlenecks in the storage engine or formula engine
Optimizing bottlenecks in the storage engine
Choosing ADDCOLUMNS vs. SUMMARIZE
Reducing CallbackDataID impact
Optimizing filter conditions
Optimizing IF conditions

Optimizing cardinality

Optimizing nested iterators

Optimizing bottlenecks in the formula engine

Creating repro in MDX

Reducing materialization

Optimizing complex bottlenecks

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