



Professional Microsoft SQL Server 2012 Analysis Services with MDX and DAX

Course ISI-1400 5 Days Instructor-led

Discover how to solve real-world BI problems by leveraging a slew of powerful new Analysis Services features and capabilities. These include the new DAX language, which is a more user-friendly version of MDX; PowerPivot, a new tool for performing simplified analysis of data; BISM, Microsoft's new Business Intelligence Semantic Model; and much more.

Course Objectives

This class will teach participants the following skills:

- Learn Microsoft's new SQL Server 2012 Analysis Services BI product
- Covers SQL Server 2012 Analysis Services, a major new release with a host of powerful new features and capabilities
- Learn the new DAX language, a simplified, more user-friendly version of MDX; PowerPivot, a new tool for performing simplified analysis of data; BISM, Microsoft's new Business Intelligence Semantic Model; and a new, yet-to-be-named BI reporting tool
- Explore real-world scenarios to help developers build comprehensive solutions

Course Outline

Module 1: Introduction

- BISM Multidimensional Mode
- A Closer Look at Data Warehousing
- Key Elements of a Data Warehouse
- Fact Tables
- Dimension Tables
- Dimensions
- Cubes
- The Star Schema
- The Snowflake Schema
- Inmon Versus Kimball — Different Approaches
- Business Intelligence Is Data Analysis
- BISM Tabular Mode
- SQL Server Analysis Services 2012
- The Business Intelligence Semantic Model
- Data Model
- Query Language
- Data Access Technology

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Module 2: A FIRST LOOK AT MULTIDIMENSIONAL BISM

- Development, Administrative, and Client Tools
- Upgrading to Analysis Services 2012
- Using SQL Server Data Tools to Build Analysis Services Multidimensional Applications
- Creating a Project Using SQL Server Data Tools
- The Solution Explorer
- The Properties Window
- The Output Window
- Creating an Analysis Services Database Using SQL Server Data Tools
- Creating a Data Source
- Creating a Data Source View (DSV)
- Creating a Cube Using the Cube Wizard
- Deploying and Browsing a Cube
- Using SQL Server Management Studio
- The Object Explorer Pane
- Querying Using the MDX Query Editor

Module 3: UNDERSTANDING MDX

- What Is MDX?
- MDX Concepts
- Measures and Measure Groups
- Hierarchies and Hierarchy Levels
- Members
- Cells
- Tuples
- Sets
- MDX Queries
- SELECT Statement and Axis Specification
- FROM Clause and Cube Specification
- Subselect Clauses
- WHERE Clause and Slicer Specification
- Slicer Dimension
- WITH Clause, Named Sets, and Calculated Members
- Named Sets
- Calculated Members
- Ranking and Sorting
- MDX Expressions
- MDX Operators
- Arithmetic Operators
- Set Operators
- Comparison Operators
- Logical Operators
- Special MDX Operators — Curly Braces, Commas, and Colons
- MDX Functions
- MDX Function Categories
- Set Functions
- Crossjoin
- NONEMPTYCROSSJOIN and NONEMPTY
- Filter and Having

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- Member Functions
- Numeric Functions
- Dimension Functions, Level Functions, and Hierarchy Functions
- String Manipulation Functions
- Other Functions
- MDX Scripts
- MDX Script Execution
- CALCULATE Statement
- Cube Space
- AUTO EXISTS
- Cell Calculations and Assignments
- Recursion
- Freeze Statement
- Restricting Cube Space/Slicing Cube Data
- SCOPE Statement
- CREATE and DROP SUBCUBE
- Using EXISTS
- Using EXISTING
- Using SUBSELECT
- Parameterized MDX Queries
- MDX Comments

Module 4: DATA SOURCES AND DATA SOURCE VIEWS

- Data Sources
- Data Sources Supported by Analysis Services
- .NET Versus OLE DB Data Providers
- .NET Framework Data Providers
- OLE DB Data Providers
- The Trade-Off s
- Data Source Views
- DSV Wizard
- DSV Designer
- Adding/Removing Tables in a DSV
- Specifying Primary Keys and Relationships in the DSV
- Customizing Your Tables in the DSV Designer
- Data Source Views in Depth
- Diagrams
- Data Source View Properties
- Diff erent Layouts in DSVs
- Validating Your DSV and Initial Data Analysis
- Multiple Data Sources Within a DSV

Module 5: DIMENSION DESIGN

- Working with the Dimension Wizard
- Working with the Dimension Designer

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- Attributes
- Attribute Relationships
- User Hierarchies
- Browsing the Dimension
- Sorting Members of a Level
- Optimizing Attributes
- Defining Translations in Dimensions
- Creating a Snowflake Dimension
- Creating a Time Dimension
- Creating a Parent-Child Hierarchy

Module 6: CUBE DESIGN

- The BISM Multidimensional Mode
- Creating a Cube Using the Cube Wizard
- Browsing Cubes
- Cube Dimensions
- Relationship Types
- No Relationship
- Regular Relationships
- Fact Relationships
- Many-to-Many Relationships
- Data Mining Relationships
- Referenced Relationships
- Browsing Reference Dimensions in Excel
- Measures and Measure Groups
- Calculated Members
- Calculated Measures
- Querying Calculated Measures
- Creating Perspectives
- Creating Translations
- Browsing Perspectives and Translations

Module 7: ADMINISTRATION AND MANAGEMENT

- Administration Using SQL Server 2012 Tools
- Managing Analysis Servers
- Managing Analysis Services Objects
- Database Creation
- Processing Analysis Services Database Objects
- Processing a Cube
- Processing a Dimension
- Managing Partitions
- Managing Assemblies
- Backup and Restore
- Detach and Attach
- Synchronization

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- Managing Security
- Server and Database Roles
- Enabling or Disabling Features
- Online Mode
- Programmatic and Advanced Administration
- Analysis Management Objects (AMO)
- Processing Analysis Services Databases
- Back Up and Restore
- Adding Assemblies to Analysis Services
- PowerShell and Analysis Services
- Resource and Activity Monitoring
- HTTP Connectivity to Analysis Services
- Analysis Services and FailOver Clustering

Module 8: ADVANCED DIMENSION DESIGN

- Custom Rollups
- Enhancements to Parent-Child Hierarchies
- Unary Operators
- Specifying Names of Levels in a Parent-Child Hierarchy
- Using Properties to Customize Dimensions
- Ordering Dimension Members
- The All Member, Default Member, and Unknown Member
- Error Configurations for Processing
- Storage Mode
- Grouping Members
- Dimension Intelligence Using the Business Intelligence Wizard
- Account Intelligence
- Time Intelligence
- Dimension Intelligence
- Server Time Dimension
- Dimension Writeback

Module 9: ADVANCED CUBE DESIGN

- Measure Groups and Measures
- Adding and Enhancing Dimensions
- Fact Dimensions
- Many-to-Many Dimensions
- Data Mining Dimensions
- Role-Playing Dimensions
- Adding Calculations to Your Cube
- Key Performance Indicators (KPIs)
- KPI Creation
- KPIs in Depth
- Using ADOXD.NET to Query KPIs
- Drillthrough

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- Actions
- Action Types
- Action Target Types
- URL Action
- Browse URL Action in the Cube Browser
- Report Actions
- Drillthrough Action
- Adding Intelligence to the Cube
- Semiadditive Measures
- Currency Conversion
- Working with Partitions
- Building a Local Partition
- Building a Remote Partition
- Storage Modes and Storage Settings
- Building Aggregations
- Usage-Based Optimization
- Real-Time Cubes
- Long Latency Scenario
- Caching After Data Change
- Caching Using Timed Updates
- Average Latency Scenario
- Caching with MOLAP Storage Option
- No Latency Scenario
- Real-Time ROLAP Storage Option
- Defining Security
- Cell Writeback
- Cell Writeback Prerequisites
- Writeback Statement
- Update Nonleaf Cell Value Using Allocation
- Equal Allocation
- Weighted Allocation
- Incremental Allocation
- Cautions
- AMO Warnings
- Design Experience
- Dismissing Warnings
- Warnings Designer

Module 10: DESIGNING MULTIDIMENSIONAL BISM FOR PERFORMANCE

- Optimizing Multidimensional BISM Design
- Fine-Tuning Your Dimensions
- Choosing the Right Key Attribute
- Avoiding Unnecessary Attributes
- Turning Off Optimization for Rarely Used Attributes
- Turning Off Attribute Hierarchy for Member Properties
- Defining Relationships between Attributes
- Fine-Tuning Your Cube
- Fact Table | Measure Groups or Partitions

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- Optimizing Reference Dimensions
- Many-to-Many Dimensions
- Partitions
- Merging Partitions
- Partition Slices
- Partition Slices and ROLAP
- A Partition Slice Example
- Distinct Count Partitioning
- Optimizing for Processing
- Creating Partitions to Speed Up Processing
- Choosing Small and Appropriate Data Types and Sizes
- SQL Server and Analysis Services Installations
- Optimizing a Relational Data Source
- Avoiding Excessive Aggregation Design
- Using Incremental Processing When Appropriate
- Parallelism during Processing
- Identifying Resource Bottlenecks
- Designing Aggregations
- Understanding Aggregations
- Creating Aggregations
- Applying Aggregation Design
- Usage-Based Aggregation Design
- Aggregation Design Options
- Designing Efficient Aggregations Using Hints
- Relationships between Attributes
- Properties Controlling Attributes and Aggregation Design
- Managing Aggregation Designs
- Scalability Optimizations
- Configuring Server Configuration Properties
- Scaling Out
- Scaling Up
- Handling Large Dimensions

Module 11: OPTIMIZING QUERY PERFORMANCE

- How OLAP Enhances Performance
- The Calculation Model
- MDX Scripts
- Scope and Assignments
- Dimension Attribute Calculations
- Session and Query Calculations
- Query Execution Architecture
- Analysis Services Engine Components
- Stages of Query Execution
- Query Evaluation Modes
- Cell-by-Cell Mode
- Subspace Computation
- Performance Analysis and Tuning Tools
- SQL Server Profiler

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- Analysis Services Trace Events
- Performance Monitor
- Task Manager
- SQL Server Management Studio
- SQL Server Data Tools
- Server Properties
- Analyzing Query Performance Issues
- Common Solutions for Slow Queries
- Large Storage Engine Requests
- Several Storage Engine Requests
- Formula Engine-Intensive Query
- Query Optimization Techniques
- Using NON EMPTY on Axes
- Using Non Empty for Filtering and Sorting
- Using SCOPE Versus IIF and CASE
- Auto Exists Versus Properties
- Member Value Versus Properties
- Move Simple Calculations to Data Source View
- Features Versus MDX Scripts
- Scale Out with Read-Only Database
- Writeback Query Performance

Module 12: DATA MINING, MULTIDIMENSIONAL BISM, AND DATA MINING ADD-INS FOR OFFICE 2010

- The Data Mining Process
- Topic Area Understanding
- Data: Understand It, Configure It
- Choose the Right Algorithm
- Train, Analyze, and Predict
- Real-World Applications
- Increasing Profits in Retail
- Data Mining in the NBA
- Data Mining in Call Centers
- Data Mining Algorithms in SQL Server Analysis Services 2012
- Microsoft Decision Trees
- Microsoft Naïve Bayes
- Microsoft Clustering
- Microsoft Sequence Clustering
- Microsoft Association Rules
- Microsoft Neural Network
- Microsoft Time Series
- Microsoft Linear Regression
- Microsoft Logistic Regression
- Working with Mining Models
- Relational Mining Model
- OLAP Mining Models
- Analyzing the Cube with a Data Mining Dimension
- Using Data Mining with Office 2010

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- Table Analytics
- Analyze Key Influencers
- Detect Categories
- Fill from Example
- Forecast
- Highlight Exceptions
- Shopping Basket Analysis
- Scenario Analysis
- Data Mining Tools
- Explore Data Wizard
- Clean Data: Outliers and Re-label Wizards
- Sample Data Wizard
- Classification Model
- Model Accuracy
- Classification Matrix
- Visio Add-in
- The Decision Tree Shape
- The Cluster Shape Wizard
- The Dependency Shape Wizard

Module 13: SQL INTEGRATION SERVICES AND SQL SERVER REPORTING SERVICES WITH MULTIDIMENSIONAL

- BISM MODELS
- SQL Server Integration Services
- Creating an Integration Services Project
- Creating Integration Services Packages for Analysis Services Operations
- The Execute DDL Task
- Processing an Analysis Services Object
- Loading Data into an Analysis Services Partition
- Deploying the Integration Services Project
- Integration Services Tasks for Data Mining
- Automating Execution of SSIS Packages
- Monitoring SSIS Package Executions
- SQL Server Reporting Services
- Report Designer, Report Builder
- Report Definition Language
- Report Wizard
- Report Server
- Creating a Report on a Relational Database
- Connecting and Deploying to a Report Server
- Creating a Report on a Multidimensional Model
- Designing Your Analysis Services Report
- Enhancing Your Analysis Services Report
- Enhancing Your Report Using Extended Properties
- Custom Aggregates

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Module 14: SECURING MULTIDIMENSIONAL BISM

- Securing Your Source Data
- Securing Your Dimension Data
- A Scenario Using Dimension Security
- The User-Role Approach
- The Access-Role Approach
- The Member Property Approach
- The Security Measure Group Approach
- The External Function Approach
- Securing Your Cube Data
- Scenario Using Cell Security

Module 15: SELF-SERVICE BUSINESS INTELLIGENCE AND INTRODUCTION TO POWERPIVOT

- SQL Server 2012
- Self-Service Business Intelligence
- PowerPivot: Microsoft's Implementation of SSBI
- PowerPivot Applications
- PowerPivot for Excel
- PowerPivot for SharePoint
- The Analysis Services Engine in VertiPaq Mode

Module 16: A FIRST LOOK AT TABULAR BISM

- Tabular Mode Projects in SSDT
- Setting Up a Tabular Instance of Analysis Services 2012
- Creating a Tabular Project Using SQL Server Data Tools
- Workspace Server and Deployment Server
- Importing Data
- The Tabular Designer
- The Model Menu 750
- Working with Tables in the Designer
- Working with Columns in the Designer
- Relationships
- Adding Calculations to Your Tabular Model
- Calculated Columns
- Measures
- Browsing the Model
- Modeling and Deploying \
- Administering Your Tabular Model Using SSMS

Module 17: ENHANCING YOUR TABULAR BISM

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- Sourcing Data for Your Model
- Refining Your Tabular Model
- Changing the Model
- Adding a New Table
- Modifying an Existing Table
- Hiding and Deleting Tables, Columns, and Measures
- Creating a Date Table
- Creating and Managing Relationships
- Column Operations
- Filtering and Sorting
- Configuring for PowerPivot and Power View
- Enhancing Your Model with Hierarchies
- Creating a Date Hierarchy
- Making Use of Time Intelligence Functions
- Creating a Geography Hierarchy
- Creating a Product Hierarchy by Combining Columns from Different Tables
- Creating Parent/Child Hierarchies
- Enhancing Measures
- Building Explicit Measures with DAX
- Implicit Measures
- Change Measure Properties
- Mimicking the Multidimensional Model
- Building Semi-Additive Measures
- Creating KPIs
- Creating Perspectives
- Creating Partitions
- Processing a Tabular Database
- Creating and Applying Security Roles
- Understanding Security Roles
- Row Filter

Module 18: INTRODUCTION TO DAX

- Sample Data
- DAX Fundamental Concepts
- DAX Syntax
- DAX Data Types
- Calculated Columns and Measures
- Row Context and Filter Context
- DAX Operators and Blank Values
- DAX Function Categories with Examples
- Scalar DAX Functions
- Statistical DAX Functions
- Other DAX Functions
- RELATED and RELATEDTABLE
- LOOKUPVALUE
- EARLIER and EARLIEST
- VALUES and DISTINCT
- FILTER

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- CALCULATE, ALL, and ALLSELECTED
- Time Intelligence Functions
- Context Information Functions
- DAX as a Query Language
- DAX and MDX

Module 19: ADVANCED TOPICS IN DAX

- Parent-Child Hierarchies
- Cross-Filtering with Many-to-Many Relationships
- Filtering
- Cross-Filtering
- Cross-Filtering with DAX
- Multiple Relationships Between Tables
- Multiple Instances of the Table
- Multiple Relationships Between Two Tables
- Moving Average
- Opening and Closing Balance
- Non-Aggregatable Columns

Module 20: ANALYZING MULTIDIMENSIONAL AND TABULAR BISMS IN EXCEL

- Analyzing Data in Excel 2010
- Analyzing Data Using Pivot Tables
- Creating a Pivot Table from a Tabular Model Using Analysis Services Data
- Creating a Pivot Table from a Multidimensional Model
- Updating SSAS Connection Information
- Analyzing Data in Pivot Tables
- Filtering in Pivot Tables
- Drilling Down to Detailed Data
- Analyzing Multiple Measures
- Custom Grouping
- Organizing Attributes in the PivotTable Field List
- Number Formatting
- Highlighting Exceptions
- Viewing Member Properties
- Sorting Data
- Filtering Data
- Style and Design
- Excel 2010 Conditional Formatting
- Perspectives and Translations
- Key Performance Indicators
- Named Sets
- Sheet Data Reports
- Cube Functions in Excel 2010
- Pivot Charts
- Local Cubes
- Excel Services

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Module 21: POWERPIVOT FOR SHAREPOINT

- SharePoint 2010
- Excel Services
- Comparing Excel and Excel Services
- Excel Services and PowerPivot
- Key Servers in PowerPivot for SharePoint
- SharePoint Web Front End (WFE)
- SharePoint Application Servers (App Servers)
- SharePoint Content Databases (Content dBs)
- Key Services in PowerPivot for SharePoint
- Analysis Services Engine Service
- PowerPivot Mid-Tier Service
- Connectivity
- Data Refresh
- Services Architecture Workfl ow Scenarios
- Excel Client Upload to SharePoint
- Excel Services Rendering
- Excel Services Server Action
- What's New
- New Administrative Capabilities
- Setup Improvements
- PowerPivot for SharePoint
- Installation and Configuration
- New Server Installation
- Existing Farm Installation
- Scale Out Implementations
- Scale Out SQL
- Homogeneous Scale Out
- Heterogeneous Scale Out
- Verifying Your PowerPivot for SharePoint Setup
- Publishing Your Excel Workbooks
- Viewing Workbooks in PowerPivot Gallery
- Viewing Workbooks in Excel Services
- Optional Setup Steps
- Configuring File Size Limits
- Turning Off the External Data Warning on Data Refresh
- Integrating Reporting Services
- BI Appliances

Module 22: INTRODUCTION AND CONFIGURATION OF POWER VIEW

- Reporting Services Power View
- Power View
- Reporting Services
- Reporting Services Add-in
- Reporting Services Service Application
- PowerPivot for SharePoint
- Installing Reporting Services for SharePoint

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- SharePoint Site Settings
- Preparing Model Connection for Power View Tutorial
- Deploying the FAA Flight Data Model
- Creating SharePoint Image Library for FAA Airline Images
- Publishing FAA Workbook Directly to PowerPivot Gallery
- Creating Data Source Connections for Power View
- BI Semantic Model (BISM) Connection File
- Report Data Source (RSDS) Connection
- Configuring Data Source Connections
- Connecting to PowerPivot Workbooks
- Connecting to a BISM Connection File
- Connecting to an RSDS
- Authentication Scenarios
- Comparison and Trade-offs
- Kerberos Delegation with BISM or RSDS
- BISM Connection and RS Service Account
- RSDS and Stored Windows Credentials
- RSDS with Impersonation and EffectiveUser

Module 23: VISUAL ANALYTICS WITH POWER VIEW

- Introduction to Power View
- Visual Analytics with Power View
- Getting Started with Power View
- Creating a New Power View Report
- Opening an Existing Power View Report
- Introduction to the Power View Design Experience
- Creating a Table Visualization
- Converting Visualizations
- Sorting Inside Charts
- Expanding Visualizations
- Filtering in Views
- Multiple Views
- Saving Reports
- Permissions for Power View
- Visualizations and Interactivity
- Tile Visualizations
- Highlighting in Visualizations
- Matrix
- Slicers
- Filters
- Card, Callout Views
- Zooming in Charts
- Scatter and Bubble
- Animated Timeline Charts
- Refreshing Data in a Power View Report
- Presenting and Exporting in Power View
- Reading and Presentation Mode
- Printing Views
- PowerPoint Export and Interactivity
- Tips and Tricks for Power View

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