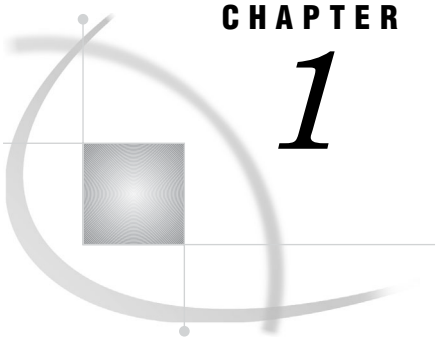

CHAPTER

# 1

# MDX Introduction and Overview



## MDX Overview

Multidimensional Expressions (MDX) is a powerful syntax that enables you to query multidimensional objects and provide commands that retrieve and manipulate multidimensional data from those objects. MDX is designed to ease the process of accessing data from multiple dimensions. It addresses the conceptual differences between two-dimensional and multidimensional querying. MDX provides functionality for creating and querying multidimensional structures called *cubes* with a full and complete language of its own.

MDX is similar to the Structured Query Language (SQL), and MDX provides *Data Definition Language* (DDL) syntax for managing data structures. However, its features can be more complex and robust than SQL's features. The SAS 9.2 OLAP Server technology uses MDX to create OLAP cubes and data queries. MDX is part of the underlying foundation for the SAS 9.2 OLAP Server architecture, and it offers detailed and efficient searches of multidimensional data.

With MDX, specific portions of data from a cube can be extracted and then further manipulated for analysis. This allows for a thorough and flexible examination of SAS OLAP cube data. Users of MDX can take advantage of such features as calculated measures, numeric operations, and axis and slicer dimensions.

# Basic MDX and Cube Concepts

To better understand the MDX language and the OLAP technology it supports, a basic understanding of the OLAP cube components is required.

## Dimensions

*Dimensions* are the top or highest categories of a cube. They contain subcategories of data known as levels and measures. A dimension can have multiple hierarchies and can be used in multiple cubes. A cube can have up to 64 dimensions.

## Hierarchies

A dimension might be categorized into different *hierarchies*. For example, a company might categorize its profit dimension along the verticals of geography, sales territory, or market.

## Levels

*Levels* are categories of organization within a dimension. Levels are hierarchical, and each level descending in a dimension is a component of the previous level. For example, a time dimension could include the following levels: Year, Quarter, Month, Week, and Day.

## Members and Measures

An additional component of a dimension and a level is a *member*. A member is a component of a level and is analogous to the value of a variable on an individual record in a data set. It is the smallest level of data in an OLAP cube. In addition to creating dimension members, a user can create calculated members and named sets that are based on underlying members or on other calculated members and named sets. These user-defined objects are based on evaluated query data from the cube.

Calculated members and named sets can be created in three different ways:

| | |
|---|---|
| Query scope calculated member | is only available during the query that defines it. It is created by using the WITH MEMBER/SET keyword. |
| Session scope calculated member | is available for the user that defines the object for the duration of that session. It is created by using the CREATE SESSION MEMBER/SET keyword. |
| Global scope calculated member | is available for anyone to use and is stored with the cube. It is created by using the CREATE GLOBAL MEMBER/SET keyword. Named sets have the same three scopes. |

Calculated members can be created in the Measures dimension and can include any combination of members. Calculated members can also be created in any other dimension and are known as *nonmeasure-based calculated members*. Examples of measures include sales counts, profit margins, and distribution costs.

# Additional MDX Concepts and Expressions - Tuples and Sets

MDX extracts multidimensional views of data. A *tuple* is a slice of data from a cube. It is a selection of members (or cells) across dimensions in a cube. It can also be viewed as a cross-section or vector of member data in a cube. A tuple can be composed of member(s) from one or more dimensions. However, a tuple cannot be composed of more than one member from the same dimension.

*Sets* are collections of tuples. The order of tuples in a set is important when querying cube data and is known as *dimensionality*. It is important to note that the order of the dimension members in every tuple must be the same. For example, if your first tuple is (time_dimension_member, geography_dimension_member), then every other tuple in that set must also have two members in it, the first from the time dimension and the second from the geography dimension.