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Information Systems Program

Module 2
Multidimensional data representation and manipulation
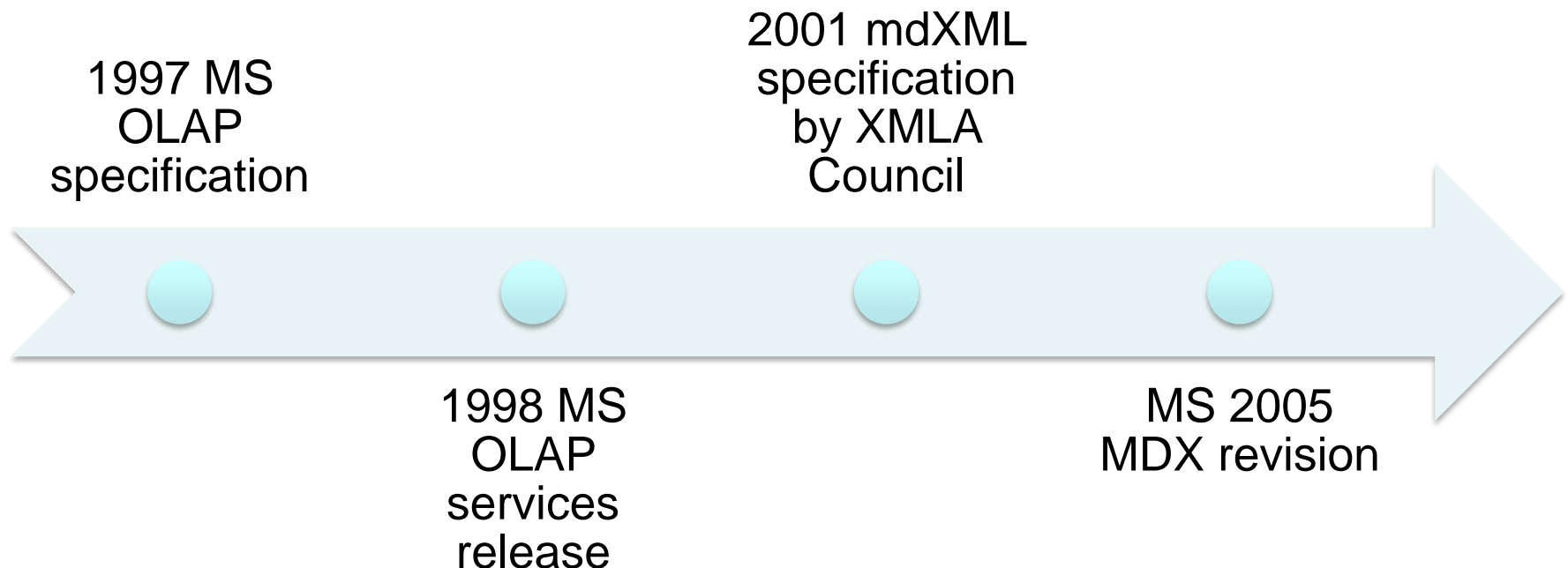
Lesson 3: Overview of Microsoft MDX

Lesson Objectives

- Explain basic MDX terminology
- Reflect on MDX commercial impact

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Multidimensional Expressions (MDX) History

- Defacto standard developed by Microsoft and later by the XMLA Council

2001 mdXML specification by XMLA Council

1997 MS OLAP specification

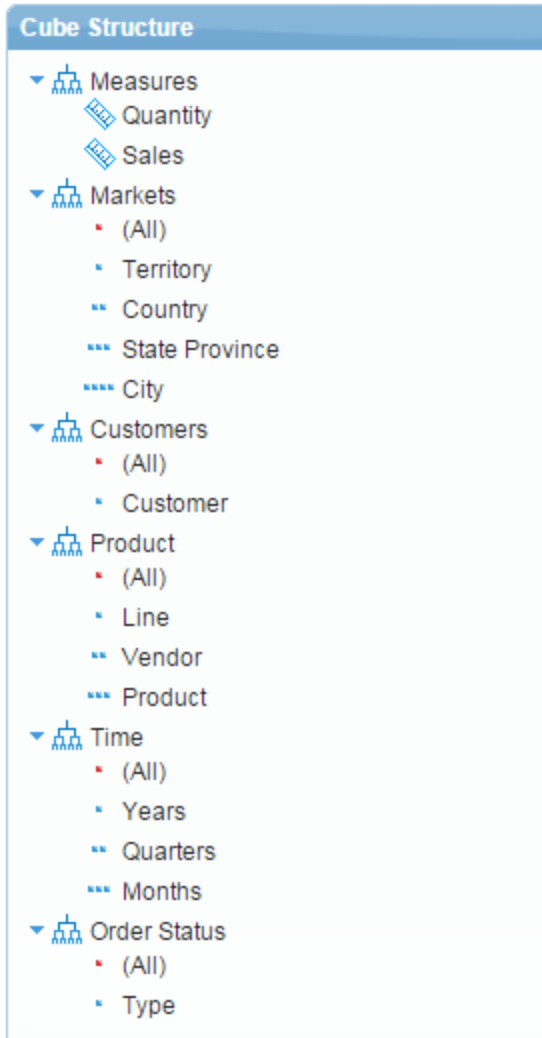1998 MS OLAP services release
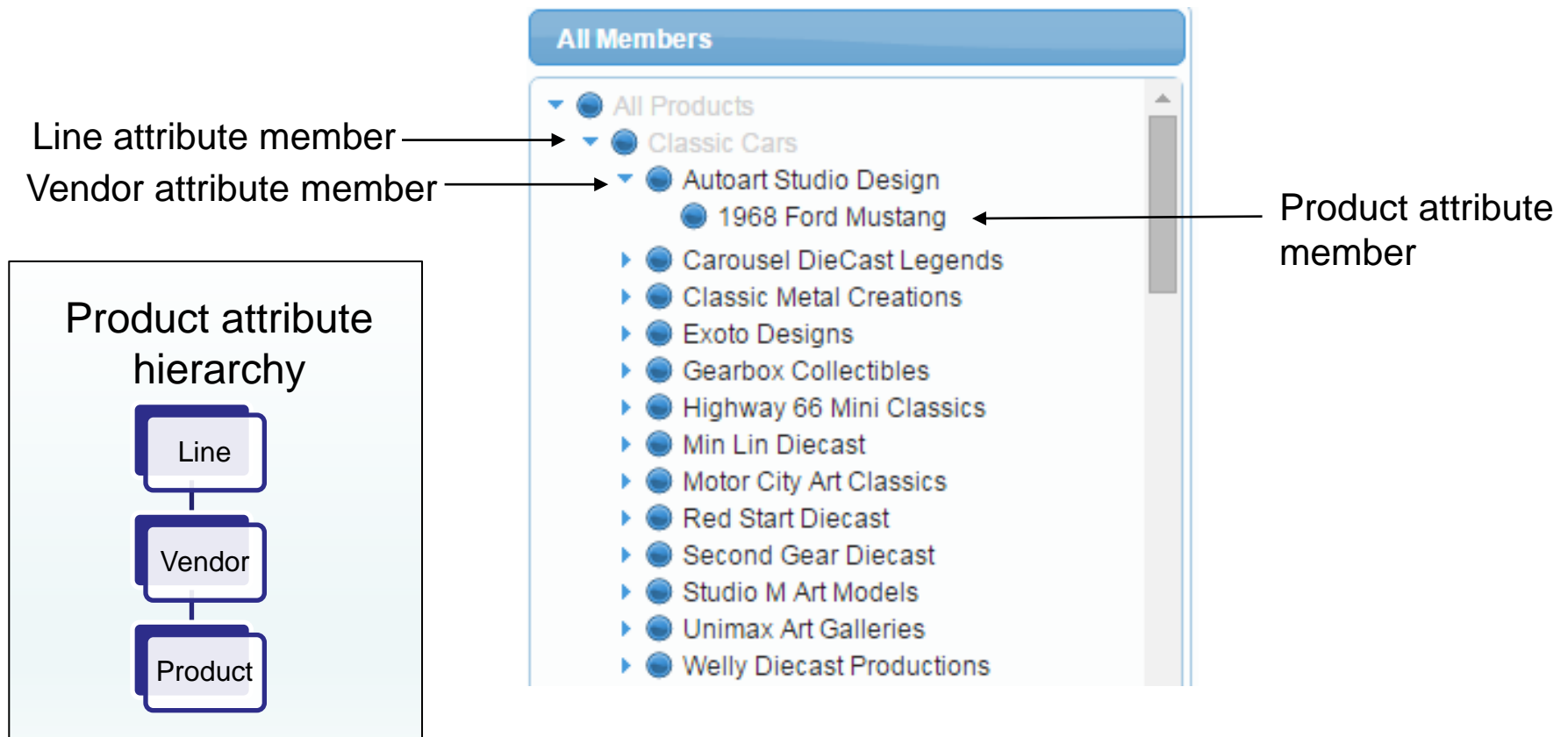
MS 2005 MDX revision

MDX Usage

- Foundation for Microsoft products and open source analytics software

- SQL Server Analysis Services and Excel Pivot Tables

- Hyperion, IBM, SAP, and other vendors

- Foundation for open source projects: JPivot, Pivot4J, and Pentaho

Example MDX Cube Structure

Cube Structure

- Measures
  - Quantity
  - Sales
- Markets
  - (All)
  - Territory
  - Country
  - State Province
  - City
- Customers
  - (All)
  - Customer
- Product
  - (All)
  - Line
  - Vendor
  - Product
- Time
  - (All)
  - Years
  - Quarters
  - Months
- Order Status
  - (All)
  - Type

Attribute Hierarchy and Members

Line attribute member ⟶

Vendor attribute member ⟶

Product attribute member ⟶

All Members

- ▼ ⬤ All Products
  - ▼ ⬤ Classic Cars
    - ▼ ⬤ Autoart Studio Design
      - ⬤ 1968 Ford Mustang
    - ▶ ⬤ Carousel DieCast Legends
    - ▶ ⬤ Classic Metal Creations
    - ▶ ⬤ Exoto Designs
    - ▶ ⬤ Gearbox Collectibles
    - ▶ ⬤ Highway 66 Mini Classics
    - ▶ ⬤ Min Lin Diecast
    - ▶ ⬤ Motor City Art Classics
    - ▶ ⬤ Red Start Diecast
    - ▶ ⬤ Second Gear Diecast
    - ▶ ⬤ Studio M Art Models
    - ▶ ⬤ Unimax Art Galleries
    - ▶ ⬤ Welly Diecast Productions

Product attribute hierarchy

- Line
- Vendor
- Product

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Steel Wheels Cube Display

Product	Time				
	⊖ All Years	⊕ 2003	⊕ 2004	⊕ 2005	Average
	Measures	Measures	Measures	Measures	Measures
	⇕ Sales	⇕ Sales	⇕ Sales	⇕ Sales	Sales
⊕ Classic Cars	4,091,420	1,514,407	1,838,275	738,738	1,363,807
⊕ Motorcycles	1,274,125	397,220	590,580	286,325	424,708
⊕ Planes	1,076,757	347,755	528,928	200,074	358,919
⊖ Ships	748,671	244,821	375,672	128,178	249,557
⊕ Autoart Studio Design	67,592	19,764	36,027	11,801	22,531
⊕ Carousel DieCast Legends	208,583	75,184	102,537	30,862	69,528
⊕ Min Lin Diecast	79,662	29,691	37,098	12,873	26,554
⊕ Red Start Diecast	77,872	25,207	40,948	11,717	25,957
⊕ Studio M Art Models	84,190	27,795	39,390	17,005	28,063
⊕ Unimax Art Galleries	147,078	42,313	73,966	30,799	49,026
⊕ Welly Diecast Productions	83,693	24,867	45,706	13,120	27,898
⊕ Trains	234,469	72,802	124,750	36,917	78,156
⊕ Trucks and Buses	1,154,281	420,430	531,976	201,875	384,760
⊕ Vintage Cars	2,066,226	679,949	997,560	388,718	688,742
Average	818,919	282,876	383,672	152,371	272,973

MDX Terminology Notes

- Tuple
  - Cell identifier
  - One member from each dimension
- Axis: dimension selected in a query (source cube cells)
- Slicer: combination of dimension members (result cube cells)

Summary

- Foundation for several Microsoft products
- Evolved into a de facto standard for data cubes
- Basic data cube features demonstrated

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