



## **Business Intelligence with MDX**

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Forum for it-pro



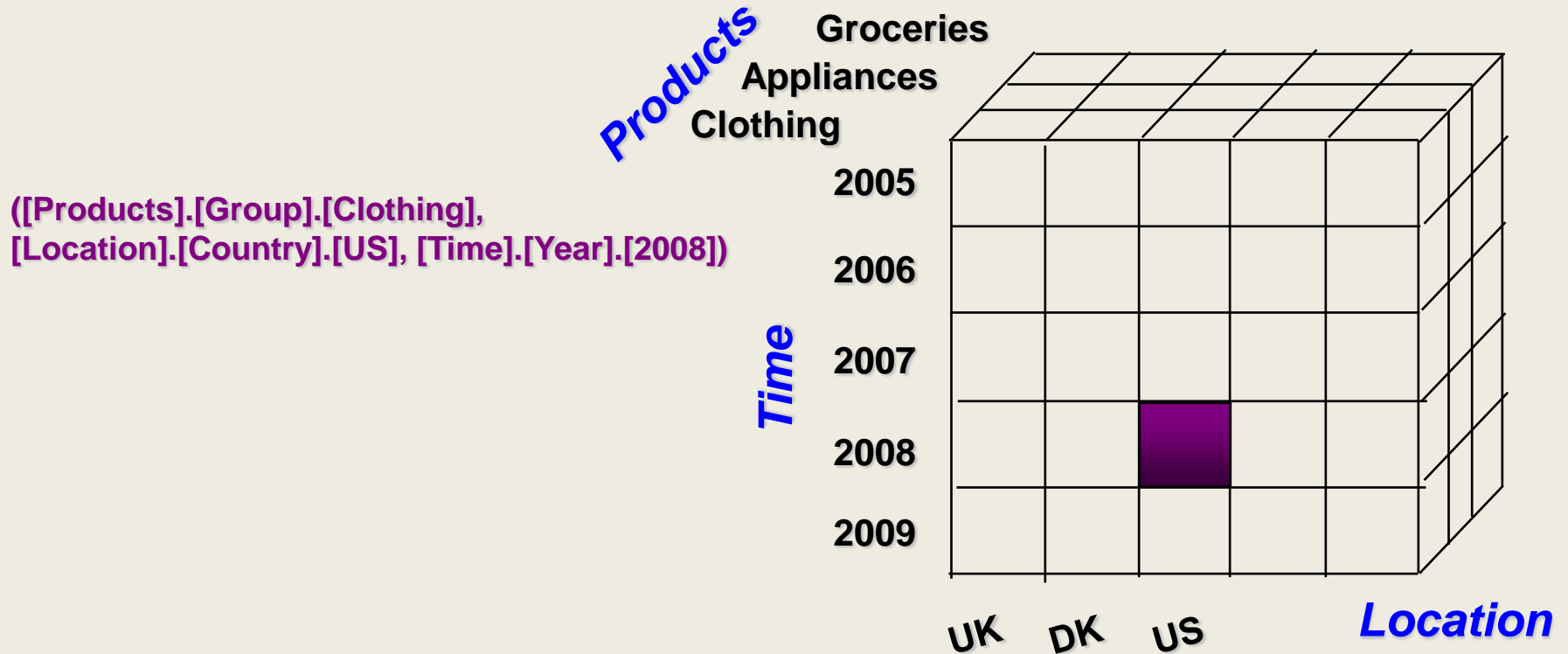
# Agenda

- Introduction to MDX
- Common MDX Challenges
- MDX Studio
- New MDX features in SSAS 2008

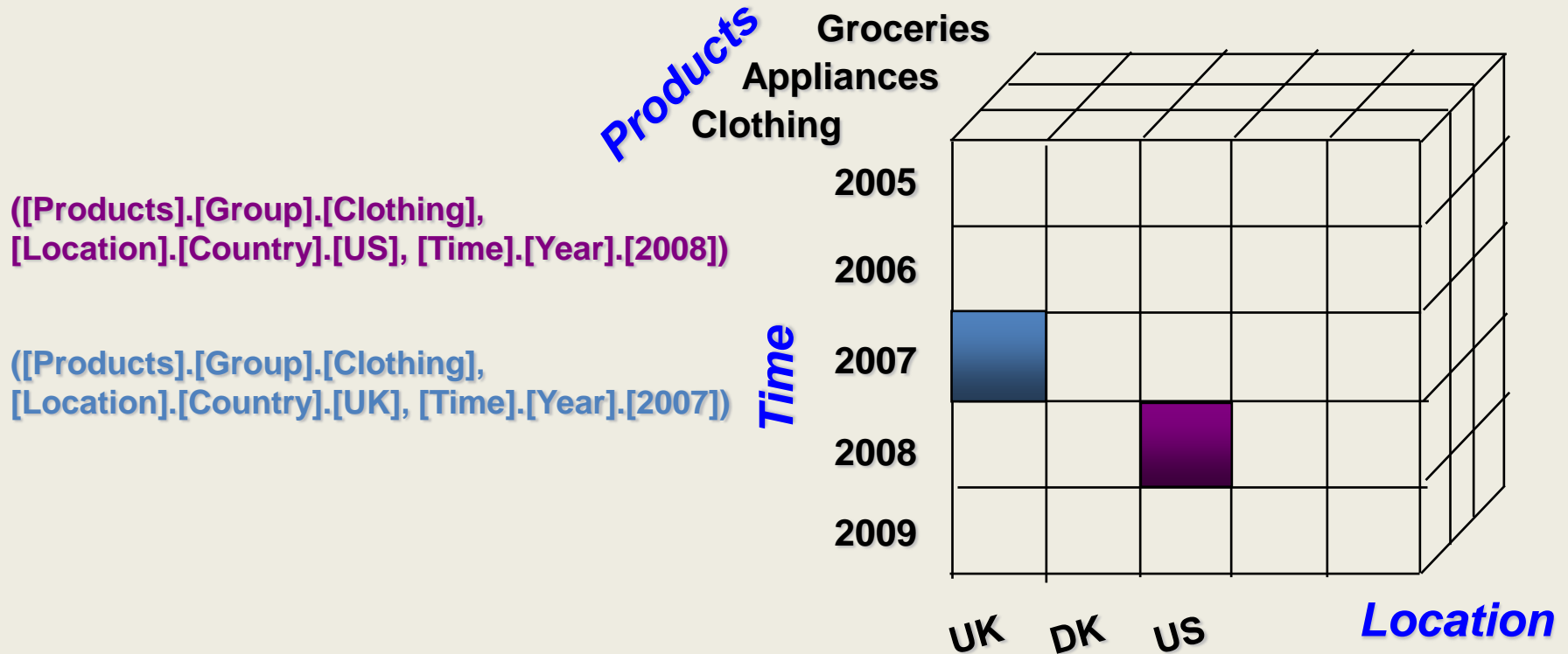
# MDX Basics

- MDX allows easy navigation in the multi-dimensional space
- It “understands” the MD concepts of cube, dimension, level, member and cell
- It is used for
  - Queries – full statements (SELECT...FROM)
  - Business modeling – defining calculated members using MDX Expressions – not a full statement

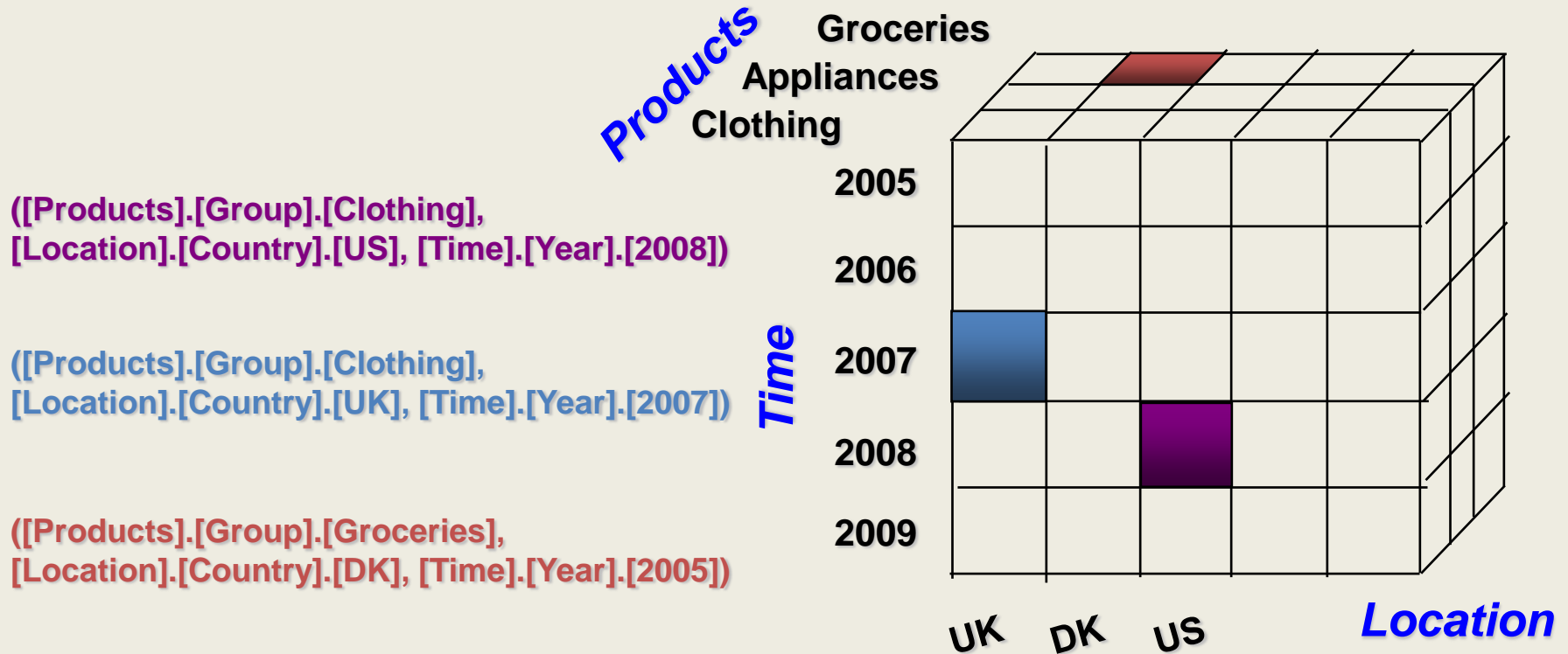
# Every cell has a name...



# Every cell has a name...



# Every cell has a name...



# Tuples – ( )

([Products].[Group].[Clothing],  
[Location].[Country].[US], [Time].[Year].[2008])

([Products].[Group].[Clothing],  
[Location].[Country].[UK], [Time].[Year].[2007])

([Products].[Group].[Groceries],  
[Location].[Country].[DK], [Time].[Year].[2005])

## Definition:

- *A tuple is the intersection of one (and only one) member taken from each of the dimensions in the cube*
- *A tuple identifies a single cell in the multi-dimensional matrix*

## Syntax:

- *Braces ( ) – denotes a tuple*
- *Comma separates members*





# Sets – { }

`([Products].[Group].[Clothing],  
[Location].[Country].[US], [Time].[Year].[2008])`

+

`([Products].[Group].[Clothing],  
[Location].[Country].[UK], [Time].[Year].[2007])`

=

`{([Products].[Group].[Clothing],  
[Location].[Country].[US], [Time].[Year].[2008]),  
([Products].[Group].[Clothing],  
[Location].[Country].[UK], [Time].[Year].[2007])}`

Definition:

- *A set is a collection of tuples with the same dimensionality*
- *It may have more than one tuple, but it can also have one tuple, or even zero tuples, in which case it is an empty set*

Syntax:

- *Curly Braces {} – denotes a set*
- *Comma separates tuples*





# MDX Queries – Basic statement

SELECT            <member selection> on Columns,  
                    <member selection> on Rows,  
FROM              <cube name>  
WHERE             <Where Clause>

SELECT  
    {[Measures].[Store Sales]} on Columns  
    {[Product].[Product Category].Members} on Rows,  
FROM Sales  
WHERE ([Store].[Country].[USA])

# Calculated Members

## - an MDX Expression

- Calculated members add significant power to Analysis cubes
- Pre-define complex business logic
- Usually creates calculated measures
- **Computed at run-time**

Name:

Parent Properties

Parent hierarchy:

Parent member:

Expression

Additional Properties

Format string:

Visible:

Non-empty behavior:

Color Expressions

Font Expressions



# Defining Calculated members in MDX Queries

```
WITH MEMBER [Measures].[Profit] AS  
    [measures].[Sales] – [measures].[Cost]  
SELECT  
    { [Measures].[Sales],  
      [Measures].[Cost],  
      [Measures].[Profit] } on columns,  
    { [Time].[Calendar].[2007] } on rows  
FROM EmployeeCube  
WHERE ( [Stores].[City].[ Troy, Michigan ] )
```

# Common MDX Challenges

- Subselects and WHERE clause
  - With 2005 SP2 they are closer than ever, but still not the same
- Currentmember
- Multiselect

# Subselects, WHERE and multiselect

WITH

MEMBER Measures.[Number Of Days] AS

Count(Descendants([Date].[Calendar Time], [Date].[Calendar Time].[Date]))

MEMBER Measures.SalesPerDay AS

[Measures].[Internet Sales-Sales Amount] / Measures.[Number Of Days]

SELECT

{[Measures].[Internet Sales-Sales Amount], Measures.[Number Of Days], Measures.SalesPerDay}

ON 0

FROM [Adventure Works UDM]

Internet Sales-Sales Amount	Number Of Days	SalesPerDay
\$29.358,677.22	1158	\$25.352,92

# Subselects, WHERE and multiselect

WITH

MEMBER Measures.[Number Of Days] AS

Count(Descendants([Date].[Calendar Time], [Date].[Calendar Time].[Date]))

MEMBER Measures.SalesPerDay AS

[Measures].[Internet Sales-Sales Amount] / Measures.[Number Of Days]

SELECT

{[Measures].[Internet Sales-Sales Amount], Measures.[Number Of Days], Measures.SalesPerDay}

ON 0

FROM [Adventure Works UDM]

WHERE {[Date].[Calendar Time].[Month].&[2003]&[July]}

Internet Sales-Sales Amount	Number Of Days	SalesPerDay
\$886.668,84	31	\$28.602,22

# Subselects, WHERE and multiselect

WITH

MEMBER Measures.[Number Of Days] AS

Count(Descendants([Date].[Calendar Time], [Date].[Calendar Time].[Date]))

MEMBER Measures.SalesPerDay AS

[Measures].[Internet Sales-Sales Amount] / Measures.[Number Of Days]

SELECT

{[Measures].[Internet Sales-Sales Amount], Measures.[Number Of Days], Measures.SalesPerDay}  
ON 0

FROM [Adventure Works UDM]

WHERE {[Date].[Calendar Time].[Month].&[2003]&[July],  
[Date].[Calendar Time].[Month].&[2003]&[August]}

Internet Sales-Sales Amount	Number Of Days	SalesPerDay
\$1.734.082,35	#Error	#Error



# Subselects, WHERE and multiselect

WITH

MEMBER Measures.[Number Of Days] AS

Count(Descendants([Date].[Calendar Time], [Date].[Calendar Time].[Date]))

MEMBER Measures.SalesPerDay AS

[Measures].[Internet Sales-Sales Amount] / Measures.[Number Of Days]

SELECT

{[Measures].[Internet Sales-Sales Amount], Measures.[Number Of Days], Measures.SalesPerDay}  
ON 0

FROM

(SELECT {[Date].[Calendar Time].[Month].&[2003]&[July],[Date].[Calendar Time].[Month].&[2003]&[August]} ON 0 FROM [Adventure Works UDM])

Internet Sales-Sales Amount	Number Of Days	SalesPerDay
\$1.734.082,35	1158	\$1.497,48

# Subselects, WHERE and multiselect

WITH

MEMBER Measures.[Number Of Days] AS

Count(EXISTING [Date].[Calendar Time].[Date])

MEMBER Measures.SalesPerDay AS

[Measures].[Internet Sales-Sales Amount] / Measures.[Number Of Days]

SELECT

{[Measures].[Internet Sales-Sales Amount], Measures.[Number Of Days], Measures.SalesPerDay}  
ON 0

FROM

(SELECT {[Date].[Calendar Time].[Month].&[2003]&[July],[Date].[Calendar Time].[Month].&[2003]&[August]} ON 0 FROM [Adventure Works UDM])

Internet Sales-Sales Amount	Number Of Days	SalesPerDay
\$1.734.082,35	1158	\$1.497,48

# Subselects, WHERE and multiselect

WITH

MEMBER Measures.[Number Of Days] AS

$\text{Count}(\text{EXISTING } [\text{Date}].[ \text{Calendar Time}].[ \text{Date}])$

MEMBER Measures.SalesPerDay AS

$[\text{Measures}].[ \text{Internet Sales-Sales Amount}] / \text{Measures}.[ \text{Number Of Days}]$

SELECT

{[Measures].[Internet Sales-Sales Amount], Measures.[Number Of Days], Measures.SalesPerDay}  
ON 0

FROM [Adventure Works UDM]

WHERE {[Date].[Calendar Time].[Month].&[2003]&[July],  
[Date].[Calendar Time].[Month].&[2003]&[August]}

Internet Sales-Sales Amount	Number Of Days	SalesPerDay
\$1.734.082,35	62	\$27.969,07

# MDX Studio

<b>Development</b> <ul style="list-style-type: none"><li>Intellisense</li><li>Color coding</li><li>Formatting</li><li>Parse tree</li><li>Dependency graph</li></ul>	<b>Debug</b> <ul style="list-style-type: none"><li>Expression debugger</li><li>Coordinate overwrite decoding</li><li>Parametric queries</li><li>In session MDX Script</li></ul>
<b>Profile</b> <ul style="list-style-type: none"><li>Hierarchical trace</li><li>Integrated perfmon</li><li>Automatic cold/warm cache runs</li></ul>	<b>Optimize</b> <ul style="list-style-type: none"><li>Analyze – suggest changes</li></ul>

# MDX Studio

# *demo*

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# Install and use of MDX Studio

- Download link: <http://mdx.mosha.com/>
- v0.4.8.0 Beta
- Use "US" regional settings in windows
- SSAS 2005 or SSAS 2008

# New MDX features in SSAS 2008

- Dynamic named sets - once per query
- CREATE MEMBER statement extension to allow specifying display folder and associated measure group
- CREATE SET statement extension to allow specifying display folder
- New CREATE KPI statement



# Dynamic named sets

```
CREATE DYNAMIC SET [Adventure Works].Days AS [Ship Date].[Calendar].[Date]
```

```
WITH MEMBER Measures.NumberOfDays AS Count(Days)
```

```
SELECT NumberOfDays ON 0
```

```
FROM
```

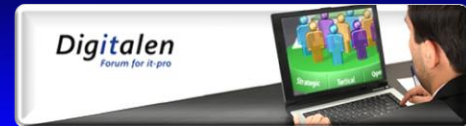
```
    (SELECT [Ship Date].[Calendar].[Month].&[2002]&[1] ON 0 FROM [Adventure Works])
```

```
WITH MEMBER Measures.NumberOfDays AS Count(Days)
```

```
SELECT NumberOfDays ON 0
```

```
FROM
```

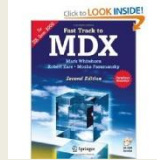
```
    (SELECT {[Ship Date].[Calendar].[Month].&[2002]&[1],[Ship Date].[Calendar].[Month].&[2002]&[2]} ON 0 FROM [Adventure Works])
```



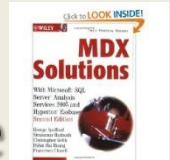
# Resources

## ● Books

- Fast Track to MDX



- MDX Solutions: With Microsoft SQL Server Analysis Services 2005 and Hyperion Essbase



## ● Links

- <http://www.ssas-info.com/analysis-services-faq/27-mdx>
- <http://mdx.mosha.com/>

