



# Webcast. Quick Guide: MDX programming basics

Thursday, July 27th, 3pm EET

**Goal:** To learn MDX programming basics so you can write basic and advanced MDX functions.

# We will cover

- Data Types
- CASE statements
- Structure of MDX functions
- Debugging
- Comments
- Making groups
- Formatting

# Data Type

## Aggregate(set, numeric\_expression)



Formula is not valid:

Member expression '[Time].Members' must not be a set



```
1 order(  
2   Filter(  
3     NonEmptyCrossJoin(  
4       [Invoice].[Invoice].members,  
5       [Customer].CurrentMember  
6     ),  
7     [Measures].[Invoice base balance] > 0  
8     AND DateCompare(  
9       now(),  
10      [Invoice].CurrentMember.getProperty('Due date')  
11     ) = 1  
12   ),  
13   [Invoice].CurrentMember.get('Invoice date'),  
14   ASC  
15 ).Item(0).Item(0).get('Invoice date')  
16  
17 -- annotations.group= Unpaid Invoices  
18
```



# Data Type: Hierarchy

▼ Time

▶ Select members

▶ Calculated members

▼ All hierarchy level members

Select all members at level

Year 13 Quarter 43

Month 108 Day 2070

**Weekly** [edit](#)

Year 14 Week 394 Day 2070

**Fiscal** [delete](#)

Year 15 Quarter 45

Month 108 Day 2070

[Add members for date range](#)  
[Delete members for date range](#)

▶ Drill into or expand

▼ Item

▶ Select members

▶ Calculated members

▼ All hierarchy level members

Select all members at level

Group 11 Item 52

**Item Type**

Item Type 4 Item 52

▶ Drill into or expand

[Customer].[CUST].[019 - Pink Snack Bar]

[Time.Weekly].[2015].[W15, Apr 06 2015]

[Time].[2015].[Q2 2015].[Apr 2015]

# Data Type: Dimension\_Level\_Expression

▼ Item

▶ Select members

▶ Calculated members

▼ All hierarchy level members

Select all members at level

Group 15 Item 118

▶ Drill into or expand

▼ Project (Job)

▶ Select members

▶ Calculated members

▼ All hierarchy level members

Select all members at level

Class 4 Project 12

Project Item 9

▶ Drill into or expand

▼ Customer

▶ Select members

▶ Calculated members

▼ All hierarchy level members

Select all members at level

Category 5 Customer 59

▶ Drill into or expand

▼ Person

▶ Select members

▶ Calculated members

▼ All hierarchy level members

Select all members at level

Sales Group 2 Person 13

▶ Drill into or expand

[Item].  
[Group]  
[Item].[Item]

[Project (Job)].[Class]  
[Project (Job)].[Project]  
[Project (Job)].[Project  
Item]

[Customer].[Category]  
[Customer].[Customer]

[Person].[Sales Group]  
[Person].[Person]

# Data Type: Member\_Expression

Pages

- Item
- Time
- Person

Rows

Nonempty

- Customer

Columns

Measures

Table Bar Line Pie Scatter Timeline Map Gantt Gauge

✕ ↺ ↻ 🗨️ 📄 Total ▾

AUDIO - Audio Products ▾ All Times ▾ SJ - Samuel Jackson ▾

	Item base amount	Item quantity	Customer city	Telephone	E-mail	Customer updated date	Customer classification
002 - New World Import/Export Co	1,022.78	40.0	Kowloon	0034 1234 4234	newworld@msn.com	May 02 2017	RET,REF

[Customer].[CUST].[002 - New World Import/Export Co]

[Person].[(none)].[SJ - Samuel Jackson]

[Measures].[Item base amount]



# Data Type: Tuple\_Expression

### Pages

- Person
- Time
- Item

### Columns

▸ Measures

Table
Bar
Line
Pie
Scatter
Timeline
Map
Gantt
Gauge
↺

✕
↺
↻
💬
📄
Item base amount matches .
All others
Total ▾

SJ - Samuel Jackson ▾
Apr 2016 ▾
All Items ▾

	Item base amount	Item quantity	Customer updated date	Customer classification	Invoice due date
002 - New World Import/Export Co	+ #20160299 New World Import/Export Co	505.56	42.0	May 02 2017	RET,REF
					Apr 26 2016

### Rows

Nonempty

- Customer
- Invoice

([Customer].[CUST].[002 - New World Import/Export Co],  
[Invoice].[#20160299 New World Import/Export Co])

([Customer].[CUST].[019 - Pink Snack Bar],  
[Item].[AUDIO - Audio Products].[10106 - CD player],  
[Person].[(none)].[SJ - Samuel Jackson],  
[Measures].[Item base amount])

# Data Type: Set\_Expression

Pages

- Person
- Time
- Item

Rows

Nonempty

- Customer

Columns

Measures

Table Bar Line Pie Scatter Timeline Map Gantt Gauge

Item base amount matches . All others Total Freeze header

SJ - Samuel Jackson Jan 2016 All Items

	Item base amount	Item quantity	Customer city	Customer updated date	Customer classification
045 - Trading best Sundsvall	120.00	12.0		May 10 2017	
046 - Best deals Sundsvall	244.00	31.0		May 10 2017	
001 - Against All Odds Trading Co	808.40	17.0	High Street	May 02 2017	ADV,MAN
002 - New World Import/Export Co	839.60	35.0	Kowloon	May 02 2017	RET,REF
016 - London Pride Ventures	466.00	24.0		May 02 2017	RET,REF
022 - Crusty's Pies & Mash	142.00	28.0		May 02 2017	RET,EXH
023 - Toulouse Petrochemicals (French)	2.01	2.0		May 10 2017	MAN,REF
036 - Miss Fruity	3,232.00	52.0	Oxford Road	May 02 2017	
003 - Schmidt und son GmbH	110.99	20.0	8030 Schindelstein	May 02 2017	RET,EXH
006 - Default Hotel Customer	1,512.00	39.0		May 02 2017	

[Customer].[Customer].Members

Descendants(  
 [Customer].CurrentMember,  
 [Customer].[Customer]  
 )



# Data Type: Set\_Expression 2

## Pages

Person

Time

Item

## Rows

Nonempty

Customer

Invoice

## Columns

Measures

Table Bar Line Pie Scatter Timeline Map Gantt Gauge

Item base amount matches . All others Total Freeze header

SJ - Samuel Jackson Apr 2016 All Items

		Item base amount	Item quantity	Customer updated date	Customer classification	Invoice due date
002 - New World Import/Export Co	+ #20160299 New World Import/Export Co	505.56	42.0	May 02 2017	RET,REF	Apr 26 2016
016 - London Pride Ventures	+ #20160229 London Pride Ventures	2,157.10	45.0	May 02 2017	RET,REF	Apr 01 2016
020 - Safemarkets Plc	+ #20160268 Safemarkets Plc	1,290.00	40.0	May 02 2017	RET,ADV	Apr 16 2016
021 - Spares Suppliers Plc	+ #20160279 Spares Suppliers Plc	118.00	19.0	May 10 2017		Apr 20 2016
023 - Toulouse Petrochemicals (French)	+ #20160300 Toulouse Petrochemicals (French)	157.04	31.0	May 10 2017	MAN,REF	Apr 26 2016
048 - Bring the best Abuja	+ #20160231 BRANCHIDIV	186.00	33.0	May 10 2017		Apr 02 2016
	+ #20160249 BRANCHIDIV	445.00	36.0	May 10 2017		Apr 09 2016
003 - Schmidt und son GmbH	+ #20160254 Schmidt und son GmbH	1,110.02	21.0	May 02 2017	RET,EXH	Apr 10 2016
012 - Flans & Pies Traditional	+ #20160252 Flans & Pies Traditional	76.00	16.0	May 02 2017	MAN,EXH	Apr 10 2016

NonEmptyCrossJoin([Customer].[Customer].Members, [Item].[Item].members)

# Data Type: Numeric\_Expression (Turns into)

▼ Measures

▼ Select members

**Financials measures** [hide](#)

Account Balance Account Debit amount Account Credit amount

**Goods Receipts item measures** [hide](#)

Goods Receipts Quantity Goods Receipts Total cost Goods Receipts Total base cost

**Invoice item measures** [hide](#)

Item amount FIFO Gross profit **Item quantity** Item base amount Gross profit base amount Stock FIFO

Stock Quantity

**Invoice measures** [hide](#)

Invoice amount Discount amount Tax amount Invoice base amount Discount base amount Tax base amount

Invoice count Invoice balance Invoice base balance New customer count Total weight

**Quotation measures** [hide](#)

Quotation amount Open Quotation amount Rejected Quotation amount Accepted Quotation amount

Quotation base amount Open Quotation base amount Rejected Quotation base amount

Accepted Quotation base amount

**Sales Order measures** [hide](#)

Sales Order amount Sales Order base amount Sales Order Item open amount Sales Order Item open base amount

**Stock measures** [hide](#)

In stock Stock on order Stock In Stock Out

► Calculated members

# Data Type: Numeric\_Expression

## Examples:

- [Measures].[Item base amount]
- 345
- 120.34
- Aggregate(set, numeric\_expression)
- Sum(set, numeric\_expression)
- Avg(set, numeric\_expression)
- Count(set)



# String

- A sequence of characters
- Enclosed within quotation marks (“”)

## Examples:

- ‘String’
- ‘123’
- ‘23-25 Creedy Street, Westcourt QLD 4870, Australia’
- ‘31 dec 2016’

# Date / DateTime

## Same as Strings

### Examples:

- 'tomorrow'
- '31 dec 2016'
- 'a year ago'
- '2015-05-27'
- '7 days from now'
- ...

# Logical (condition)

True / False

Examples:

- $X < Y$
- `IsEmpty(Member or Tuple)`
- `DateCompare(Date, Date_to_compare) = 1`
- $1 > 0$
- AND, OR



# Data Type List

- Hierarchy
- Dimension\_Level\_Expression
- Member\_Expression
- Tuple\_Expression
- Set\_Expression
- Numeric\_Expression
- String
- DateTime
- Logical

# CASE Statements

**CASE**

**WHEN** *Logical1*

**THEN** *What to do if Logical1 is True*

**WHEN** *Logical2*

**THEN** *What to do if Logical2 is True*

**ELSE** *What to do if all are False*

**END**

```
CASE
WHEN [Measures].[Item base amount] < 60000
THEN "Small"
WHEN [Measures].[Item base amount] < 80000
THEN "Normal"
ELSE "Big"
END
```

# Use of CASE

- Regular case (big/small customer)
- Dividing by zero (Infinity) - Increase %
- Projection vs. Trend



# Structure of MDX functions

- Functions have specific types they take
- Functions return specific types
- Different brackets:
  - ( ) - Functions and tuples
  - [ ] - Hierarchies, levels and members
  - { } - Sets
- Functions with *.function*

# Debugging

- Break down the problem
- Compare manually with the report
- Use `SetToStr()`
- Use `.name`

# Comments

- Documentation about comments

Examples:

- `--` one line comment
- `expression --` comment until end of line
- `/*` multi line  
comment  
`*/`



# Making groups

## Special comments with annotations

Example:

- `-- annotations.group=...`

# Formatting

## Define calculated member formula

[Measures].[Get customer updated date] =

##### Decimal  
##### Integer  
##.##% Decimal percentage  
##% Integer percentage  
mmm dd yyyy Month Day Year  
mmm yyyy Month Year  
yyyy-mm-dd ISO format date  
yyyy-mm-dd hh:mi:ss Date and time  
##d ##h ##m Days, hours, minutes  
##h ##m Minutes  
custom

Formatting  default

Read [calculated members tutorial](#) to learn about calculated member formulas. You can select members, operators and frequently used functions from sidebar to insert them into calculated member formula.

### Root members

Invoice amount Discount amount  
Tax amount Invoice base amount  
Discount base amount  
Tax base amount Invoice count  
Invoice balance  
Invoice base balance  
New customer count Total weight  
Item amount FIFO Gross profit  
Item quantity Item base amount  
Gross profit base amount  
Stock FIFO Stock Quantity

Update

Delete

cancel

# Questions?

