



MDX the Easy Way: Build Your MDX Calculations Gradually

Apr 8, 2022

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Community Day
April 8, 2022

“Hello, world!”

**Let’s build
together!**

**Why does it get
complicated?**



HELLO, WORLD!

**Let's change the approach
and **start** from the opposite -
with a **simple**
communication.**

> Transition Status

> Transition

> Transition Author

> Age interval

> Label

> Week Day

show 4 dimensions

Columns

> Measures

Table

Bar

Line

Pie

Scatter

Timeline

Map

Gantt

Gauge

⌕

↶

↷

💬

⬇

Total ▾

Freeze header

DEMO Beta ▾

	Issues created
– All Issues	610
– DB	610
DB-353	1
DB-378	1
DB-383	1
DB-386	1
DB-391	1
DB-397	1

OUR USE CASE

**Calculate the average time to
start working on the issue**

*** for issues resolved in a particular
time**

My way of thinking

- 1. What do I have?**
- 2. Build a simple issue-level report**
- 3. Calculate duration for issues**
- 4. Add Page filters in report and adjust calculation**
- 5. Calculate average on a project level**
- 6. Optimise calculation**
- 7. Test every step!**

Build-up steps

What do we have?

Duration issue
level

Filter conditions

Average
calculation

Optimise

What do we need?

Time from issue creation to entering “In Progress” status

Check **built-in options** first:

- Average days in status (“To do”)
- The new cycle time option

Imported dates:

- Issue properties
- Measures (e.g. transition dates)
- Other properties (sprint, version dates)

START WITH REPORT!

Start with a report, not coding.

**Elements used in the
calculation and report
behave in the same way!**

Pages

Nonempty

> Project

> Transition Status

Rows

Nonempty

> Issue

Columns

> Measures

Table

Bar

Line

Pie

Scatter

Timeline

Map

Gantt

Gauge



Total ▾

Freeze header

DEMO Beta ▾

In Progress ▾

	Say hello	Issue created date	Transition to status first date
– All Issues	Hello, world!		2020-01-02 14:21:43
– DB	Hello, world!		2020-01-02 14:21:43
DB-1	Hello, world!	Jan 01 2020	2020-01-02 14:21:43
DB-3	Hello, world!	Jan 05 2020	2020-01-13 10:00:43
DB-4	Hello, world!	Jan 06 2020	2020-01-20 13:41:43
DB-5	Hello, world!	Jan 08 2020	2020-01-09 10:58:36
DB-102	Hello, world!	Jan 09 2020	2020-01-27 16:07:03
DB-7	Hello, world!	Jan 12 2020	2020-01-13 10:05:20

Tuple

(
measure,
dimension-1_member,
dimension-2_member,
... ,
dimension-n_member
)

Measure

dimension-1_member

Pages

Nonempty

> Project

> Transition Status

Rows

Nonempty

> Issue

Columns

> Measures

TableBarLinePieScatterTimelineMapGanttGauge

⌕↶↷💬⬇️Total▼Freeze header

DEMO Beta▼In Progress▼

	Say hello	Issue created date	Transition to status first date
– All Issues	Hello, world!		2020-01-02 14:21:43
– DB	Hello, world!		2020-01-02 14:21:43
DB-1	Hello, world!	Jan 01 2020	2020-01-02 14:21:43
DB-3	Hello, world!	Jan 05 2020	2020-01-13 10:00:43
DB-4	Hello, world!	Jan 06 2020	2020-01-20 13:41:43
DB-5	Hello, world!	Jan 08 2020	2020-01-09 10:58:36
DB-102	Hello, world!	Jan 09 2020	2020-01-27 16:07:03
DB-7	Hello, world!	Jan 12 2020	2020-01-13 10:05:20

Report specific

Say hello = [edit](#)

[Define new report specific calculated measure](#)

Table Bar Line Pie Scatter Timeline Map Gantt Gauge



Hide empty ▾

Total ▾

Freeze header

DEMO Beta ▾

In Progress ▾

	Issue created date	Transition to status first date
— All Issues		2020-01-02 14:21:43
— DB		2020-01-02 14:21:43
DB-1	Jan 01 2020	2020-01-02 14:21:43
DB-3	Jan 05 2020	2020-01-13 10:00:43
DB-4	Jan 06 2020	2020-01-20 13:41:43
DB-5	Jan 08 2020	2020-01-09 10:58:36
DB-102	Jan 09 2020	2020-01-27 16:07:03
DB-7	Jan 12 2020	2020-01-13 10:05:20
DB-8	Jan 14 2020	2020-01-30 16:22:13
DB-9	Jan 15 2020	2020-01-30 10:00:01

Build-up steps

What do we have?

**Duration issue
level**

Filter conditions

Average
calculation

Optimise

Use specific **functions** when operate with dates

To calculate **duration**

- DateDiffDays
- DateDiffWorkdays
- DateDiffMinutes
- DateDiffWorkhours (coming)
- ...

DateDiffDays(from_date, to_date)

from_date
to_date

DEMO Beta ▾		
	Issue created date	First transition to In progress
– All Issues		2020-01-02 14:21:43
– DB		2020-01-02 14:21:43
DB-1	Jan 01 2020	2020-01-02 14:21:43
DB-2	Jan 03 2020	
DB-3	Jan 05 2020	2020-01-13 10:00:43
DB-4	Jan 06 2020	2020-01-20 13:41:43

> User defined

▼ Report specific

Say hello = [edit](#)

First transition to In progress = [edit](#)

[Define new report specific calculated measure](#)

Table Bar Line Pie Scatter Timeline Map Gantt Gauge



Hide empty ▼

Total ▼

Freeze header

DEMO Beta ▼

All Transition Statuses ▼

	Issue created date ↑	First transition to In progress
– All Issues		2020-01-02 14:21:43
– DB		2020-01-02 14:21:43
DB-1	Jan 01 2020	2020-01-02 14:21:43
DB-2	Jan 03 2020	
DB-3	Jan 05 2020	2020-01-13 10:00:43
DB-4	Jan 06 2020	2020-01-20 13:41:43
DB-5	Jan 08 2020	2020-01-09 10:58:36
DB-102	Jan 09 2020	2020-01-27 16:07:03

Define report specific calculated member formula

[Measures].[Days until moved In Progress () =

```
1 DateDiffDays(  
2 [Measures].[Issue created date],  
3 [Measures].[First transition to In progress]  
4 )
```

Formatting #,###.## Decimal

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

Issues created

Issues due

Issues resolved

Issues closed

Issues with due date

Issues last updated

Original estimated hours

Remaining estimated hours

Issues created count

Issues due count

Issues resolved count

Issues closed count

Hours spent

Issues with hours spent

Convert to shared user defined.

Update

Delete

cancel

Build-up steps

What do we have?

Duration issue
level

Filter conditions

Average
calculation

Optimise

Filter report by resolution date

By property “**Issue resolution date**” in columns

- Simple
- Works for issue level only

By Time filter in Pages

- Together with measure **Issues resolved**, does not affects properties
- Affects **other measures** in the report / calculation

Filter by resolution date

<div><div><div>✕</div><div>↶</div><div>↷</div><div>💬</div><div>⬇</div></div><div>Issue resolution date between Feb 01 2020 and Feb 29 2020</div><div>All others</div></div>					
DEMO Beta ▾					
	Issue created date	First transition to In progress	Days until moved In Progress	Days until moved In Progress (formatted)	Issue resolution date
DB-5	Jan 08 2020	2020-01-09 10:58:36	0.72	17h 14m	Feb 03 2020
DB-7	Jan 12 2020	2020-01-13 10:05:20	1.08	1d 01h 56m	Feb 03 2020
DB-8	Jan 14 2020	2020-01-30 16:22:13	16.54	16d 13h 01m	Feb 03 2020
DB-9	Jan 15 2020	2020-01-30 16:23:01	14.74	14d 17h 50m	Feb 03 2020
DB-10	Jan 17 2020	2020-01-30 16:26:16	12.95	12d 22h 41m	Feb 10 2020
DB-12	Jan 21 2020	2020-02-03 09:31:34	13.02	13d 00h 22m	Feb 06 2020
DB-13	Jan 23 2020	2020-01-23 07:21:05	0.13	3h 00m	Feb 10 2020
DB-15	Jan 26 2020	2020-02-06 09:53:49	10.63	10d 15h 09m	Feb 10 2020
DB-16	Jan 28 2020	2020-02-10 10:13:44	12.84	12d 20h 17m	Feb 24 2020

Columns

> Measures

Table Bar Line Pie Scatter Timeline Map Gantt Gauge



Issue resolution date between Feb 01 2020 and Feb 28 2020

All others

Total ▾

Freeze header

DEMO Beta ▾

All Times ▾

	Issue created date	First transition to In progress	Days until moved In Progress	Days until moved In Progress (formatted)	Issue resolution date
DB-5	Jan 08 2020	2020-01-09 10:58:36	0.72	17h 14m	Feb 03 2020
DB-7	Jan 12 2020	2020-01-13 10:05:20	1.08	1d 01h 56m	Feb 03 2020
DB-8	Jan 14 2020	2020-01-30 16:22:13	16.54	16d 13h 01m	Feb 03 2020
DB-9	Jan 15 2020	2020-01-30 16:23:01	14.74	14d 17h 50m	Feb 03 2020
DB-10	Jan 17 2020	2020-01-30 16:26:16	12.95	12d 22h 41m	Feb 10 2020
DB-12	Jan 21 2020	2020-02-03 09:31:34	13.02	13d 00h 22m	Feb 06 2020
DB-13	Jan 23 2020	2020-01-23 07:21:05	0.13	3h 00m	Feb 10 2020
DB-15	Jan 26 2020	2020-02-06 09:53:49	10.63	10d 15h 09m	Feb 10 2020
DB-16	Jan 28 2020	2020-02-10 10:13:44	12.84	12d 20h 17m	Feb 24 2020
DB-17	Jan 30 2020	2020-02-10 10:10:53	11.04	11d 01h 02m	Feb 24 2020
DB-18	Feb 01 2020	2020-02-01 07:21:05	0.13	3h 00m	Feb 24 2020

Report specific

Say hello = [edit](#)

First transition to In progress = [edit](#)

Days until moved In Progress = [edit](#)

Days until moved In Progress (formatted) = [edit](#)

[Define new report specific calculated measure](#)

[Table](#) [Bar](#) [Line](#) [Pie](#) [Scatter](#) [Timeline](#) [Map](#) [Gantt](#) [Gauge](#)

[✕](#) [↶](#) [↷](#) [💬](#) [📄](#) [Issue resolution date between Feb 01 2020 and Feb 28 2020](#) [All others](#) [Total ▾](#) [Freeze header](#)

DEMO Beta ▾

Feb 2020 ▾

	Issue created date	First transition to In progress	Days until moved In Progress	Days until moved In Progress (formatted)	Issue resolution date	Issues resolved
DB-5	Jan 08 2020	• • • • • • • • • •	• • • • • • • •	• • • • • • • •	Feb 03 2020	1
DB-7	Jan 12 2020				Feb 03 2020	1
DB-8	Jan 14 2020				Feb 03 2020	1
DB-9	Jan 15 2020				Feb 03 2020	1
DB-10	Jan 17 2020				Feb 10 2020	1
DB-12	Jan 21 2020	2020-02-03 09:31:34	13.02	13d 00h 22m	Feb 06 2020	1
DB-13	Jan 23 2020	2020-02-06 09:54:58	14.23	14d 05h 34m	Feb 10 2020	1
DB-15	Jan 26 2020	2020-02-06 09:53:49	10.63	10d 15h 09m	Feb 10 2020	1

Build-up steps

What do we have?

Duration issue
level

Filter conditions

**Average
calculation**

Optimise

Average calculation

- As a ratio between total value and elements having this value
- Preferred, but not always possible

Function Avg()

- A filtered set (of issues)
- Numerical expression

Create a set

- Descendants() or DescendantsSet() function
- Filter issues by the same conditions as in the table

Apply the numerical expression

- A measure
- A function that returns a numerical value (e.g. duration)

Avg(Set_Expression,
Numeric_Expression)

Set_Expression
Numeric_Expression

<div><div><div>✕</div><div>↶</div><div>↷</div><div>💬</div><div>⬇</div><div>Issues resolved > 0</div><div>All others</div><div>Total ▾</div><div>Freeze header</div></div></div>				
<div>DEMO Beta ▾Feb 2020 ▾</div>				
	Issue created date	First transition to In progress	Days until moved In Progress (formatted)	Issues resolved
— All Issues		2020-01-02 14:21:43		16
— DB		2020-01-02 14:21:43		16
DB-5	Jan 08 2020	2020-01-09 10:58:36	17h 14m	1
DB-7	Jan 12 2020	2020-01-13 10:05:20	1d 01h 56m	1
DB-8	Jan 14 2020	2020-01-30 16:22:13	16d 13h 01m	1
DB-9	Jan 15 2020	2020-01-30 16:23:01	14d 17h 50m	1
DB-10	Jan 17 2020	2020-01-30 16:26:16	12d 22h 41m	1
DB-12	Jan 21 2020	2020-02-03 09:31:34	13d 00h 22m	1
DB-13	Jan 23 2020	2020-01-23 07:21:05	3h 00m	1

> User defined

▼ Report specific

Say hello = [edit](#)

First transition to In progress = [edit](#)

Days until moved In Progress = [edit](#)

Days until moved In Progress (formatted) = [edit](#)

[Define new report specific calculated measure](#)

Table

Bar

Line

Pie

Scatter

Timeline

Map

Gantt

Gauge



Total ▼

Freeze header

DEMO Beta ▼

Feb 2020 ▼

	Issue created date ↑	First transition to In progress	Days until moved In Progress (formatted)	Issues resolved
– All Issues		2020-01-02 14:21:43		16
– DB		2020-01-02 14:21:43		16
DB-5	Jan 08 2020	2020-01-09 10:58:36	17h 14m	1
DB-7	Jan 12 2020	2020-01-13 10:05:20	1d 01h 56m	1
DB-8	Jan 14 2020	2020-01-30 16:22:13	16d 13h 01m	1
DB-9	Jan 15 2020	2020-01-30 16:23:01	14d 17h 50m	1
DB-10	Jan 17 2020	2020-01-30 16:26:16	12d 22h 41m	1

Report specific

Say hello = [edit](#)

First transition to In progress = [edit](#)

Days until moved In Progress = [edit](#)

Days until moved In Progress (formatted) = [edit](#)

Avg days until In Progress = [edit](#)

[Define new report specific calculated measure](#)

Table Bar Line Pie Scatter Timeline Map Gantt Gauge



Total ▾

Freeze header

DEMO Beta ▾

Feb 2020 ▾

	Issue created date ↑	First transition to In progress	Days until moved In Progress (formatted)	Issues resolved	Avg days until In Progress
— All Issues		2020-01-02 14:21:43		16	7d 06h 16m
— DB		2020-01-02 14:21:43		16	7d 06h 16m
DB-5	Jan 08 2020	2020-01-09 10:58:36	17h 14m	1	17h 14m
DB-7	Jan 12 2020	2020-01-13 10:05:20	1d 01h 56m	1	1d 01h 56m
DB-8	Jan 14 2020	2020-01-30 16:22:13	16d 13h 01m	1	16d 13h 01m
DB-9	Jan 15 2020	2020-01-30 16:23:01	14d 17h 50m	1	14d 17h 50m
DB-10	Jan 17 2020	2020-01-30 16:26:16	12d 22h 41m	1	12d 22h 41m

Build-up steps

What do we have?

Duration issue
level

Filter conditions

Average
calculation

Optimise

Optimisation might be critical

- Tune the calculation itself
- Change approaches (tuples, arithmetical solutions, precalculation)

If Time is used in the report

Filter issues by date properties first

Use functions:

- DateInPeriod
- DatesBetween
- DateBeforePeriodEnd
- DateAfterPeriodStart
- ...

Optimisation

`DateInPeriod(date ,
Time_Member_Expression)`

`date`
`Time_Member_Expression`

Issue resolution date between Feb 01 2020 and Feb 28 2020				
DEMO Beta	All Times			
	Issue created date	First transition to In progress	Days until moved In Progress (formatted)	Issue resolution date
DB-5	Jan 08 2020	2020-01-09 10:58:36	17h 14m	Feb 03 2020
DB-7	Jan 12 2020	2020-01-13 10:05:20	1d 01h 56m	Feb 03 2020
DB-8	Jan 14 2020	2020-01-30 16:22:13	16d 13h 01m	Feb 03 2020
DB-9	Jan 15 2020	2020-01-30 16:23:01	14d 17h 50m	Feb 03 2020
DB-10	Jan 17 2020	2020-01-30 16:26:16	12d 22h 41m	Feb 10 2020
DB-12	Jan 21 2020	2020-02-03 09:31:34	13d 00h 22m	Feb 06 2020
DB-13	Jan 23 2020	2020-01-23 07:21:05	3h 00m	Feb 10 2020
DB-15	Jan 26 2020	2020-02-06 09:53:49	10d 15h 09m	Feb 10 2020

> Predefined

> User defined

▼ Report specific

Say hello = [edit](#)

First transition to In progress = [edit](#)

Days until moved In Progress = [edit](#)

Days until moved In Progress (formatted) = [edit](#)

Avg days until In Progress = [edit](#)

test set = [edit](#)

[Define new report specific calculated measure](#)

Table

Bar

Line

Pie

Scatter

Timeline

Map

Gantt

Gauge



Total ▼

Freeze header

DEMO Beta ▼

Feb 2020 ▼

	Issue created date ↑	First transition to In progress	Days until moved In Progress (formatted)	Issues resolved	Avg days until In Progress
– All Issues		2020-01-02 14:21:43		16	7d 06h 16m
– DB		2020-01-02 14:21:43		16	7d 06h 16m
DB-5	Jan 08 2020	2020-01-09 10:58:36	17h 14m	1	17h 14m
DB-7	Jan 12 2020	2020-01-13 10:05:20	1d 01h 56m	1	1d 01h 56m
DB-8	Jan 14 2020	2020-01-30 16:22:13	16d 13h 01m	1	16d 13h 01m

The final report

Pages

Nonempty

> Project

> Time

Rows

Nonempty

> Issue

Columns

> Measures

Table

Bar

Line

Pie

Scatter

Timeline

Map

Gantt

Gauge

Hide empty

Total

Freeze header

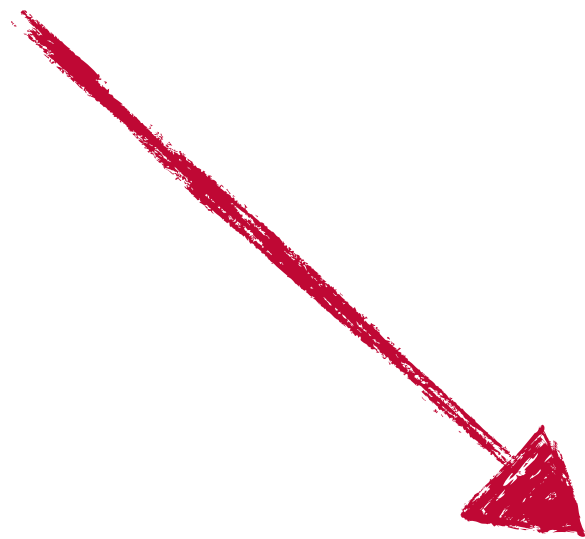
All Projects

Feb 2020

	Avg days until In Progress (optimised)
– All Issues	7d 23h 31m
+ DEMO Alpha	9d 22h 42m
– DEMO Beta	7d 06h 16m
DB-5 Certitude alertness derringer's insularity's forensics	17h 14m
DB-7 Correction's wartime aquaplaning Cotswold's sublimating jeopardized commissariat's	1d 01h 56m
DB-3 / DB-8 Crematorium's née flight's Chirico Antonius snoozing curfew musicologist period's acronyms	16d 13h 01m
DB-3 / DB-9 Taproom outreached depressive alumni Bray's spinner belligerents Giacometti Jinnah sofa	14d 17h 50m
DB-10 Beak's Rosenberg's encompassed fiasco aisling	12d 22h 41m
DB-12 Convulsively coauthors relational Jenna's rushing regally artworks	13d 00h 22m
DB-12 / DB-13 Vandal dachshund Braque's exuding condemned Tenochtitlan foreword's potency's	3h 00m

Avg days until In progress

```
1 --days from created until In Progress
2 DateDiffDays(
3     [Measures].[Issue created date],
4     [Measures].[First transition to In progress]
5 )
```



```
1 --average of days for resolved issues in the selected time period
2 Avg(
3     --filtered set
4     Filter(
5         --set
6         Descendants([Issue].CurrentMember,[Issue].[Issue]),
7         --filter condition by resolution date property
8         DateInPeriod([Issue].CurrentHierarchyMember.get('Resolved at'),
9             [Time].CurrentHierarchyMember)
10    AND
11    --filter condition by measure
12    ([Measures].[Issues resolved],
13        [Time].CurrentHierarchy.DefaultMember)>0),
14    --numerical expression
15    DateDiffMinutes(
16        [Issue].CurrentHierarchyMember.get('Created at'),
17        ([Measures].[Transition to status first date],
18            [Transition Status].[In Progress],
19            [Time].CurrentHierarchy.DefaultMember))
20 )
```


OUR USE CASE

How did it get complicated?

- 1. Not all data are imported by default, they must be calculated first**
- 2. If issue properties are used, for higher level calculations iteration through issues must be done, if there is no other approach**
- 3. Changing report context (e.g. filter by another date than the main measure) complicates calculations**
- 4. Optimisation**

GOOD ENOUGH

Start simple. Build gradually.

Test every step.

Stop when it is good

enough!



Questions?

community.eazybi.com
support@eazybi.com

An aerial photograph of a city at night, showing a dense grid of illuminated buildings and streets. The image is overlaid with a gradient that transitions from a deep red on the left side to a dark blue on the right side. The text "Thank you!" is centered in the middle of the image in a large, white, sans-serif font.

Thank you!