



**COMMUNITY
DAYS 2023**

Flexible Custom Formulas: How to Use VisibleRows and VisibleColumns

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Things [were] not evident when writing formulas of report-wide measures

- Report row filter by condition
- Removed members
- Bookmarked members
- Dimension used both in rows/ columns and pages

Outline

- **How to work with visible rows in formulas**
- **Use cases**



Standard calculations from what you see on report

Rows: Nonempty

Table Bar Line Pie Scatter Timeline Map Gantt Gauge

Issues created

- Drill into
- Add calculated
- Select this
- Remove
- Order by
- Top rows
- Bottom rows
- Filter rows
- Cell formatting

Statistical

% of total

Cumulative sum

Linear trend

Time ago

Sparklines

Empty as 0

	Issues created
+ Q1 2020	
+ Q2 2020	
+ Q3 2020	
+ Q4 2020	
+ Q1 2021	
+ Q2 2021	
+ Q3 2021	
+ Q4 2021	

VisibleRowsSet()
VisibleColumnsSet()
CurrentTuple()

Pages: Nonempty

Columns: Measures

Time

Rows: Nonempty

Time

All hierarchy level members

Select all members at level

Year 8 Quarter 21 Month 55

Day 994

Weekly edit

Year 8 Week 188 Day 994

Add custom hierarchy

Add members for date range

	Issues created	Average Issues created
+ Q1 2020	161	158
+ Q2 2020	150	158
+ Q3 2020	166	158
+ Q4 2020	157	158

- Drill into
- Edit calculated
- Select this
- Remove
- Cell formatting

Standard calculations from what you see on report

Pages: Nonempty

Columns: Measures

Table Bar Line Pie Scatter Timeline Map Gantt Gauge

2020

	Issues created	Average Issues created
+ Q1 2020	161	158
+ Q2 2020	150	158
+ Q3 2020	166	158
+ Q4 2020	157	158

Drill into

Edit calculated

Select this

Remove

Cell formatting

Rows: Nonempty

Time

All hierarchy level members

Select all members at level

Year 8 Quarter 21 Month 55

Day 994

Weekly edit

Year 8 Week 188 Day 994

Add custom hierarchy

Add members for date range

Edit standard calculation

[Measures].[Average Issues created] =

```
1 CASE WHEN NOT IsEmpty([Measures].[Issues created]) THEN
2   ConstantColumnValue(CatchException(
3     Avg(VisibleRowsSet(), [Measures].[Issues created])
4   ))
5 END
6
```

How visible rows work?

How to see visible rows?

Pages
Drag here if needed

Columns
Measures

Rows
Nonempty

Issue Type

> Select individual members

All hierarchy level members

Select all members at level

Issue Type 16

By type

Type 2 Issue Type 16

> Drill into or expand

Pages

Table Bar Line Pie Scatter Timeline

Total Freeze head

	Issues created
Bug	564
Change	29
Data task	140
Epic	92
Feature	13
Improvement	5
Incident	44
Problem	21
Risk	8
Service Request	25
Story	796
Sub-task	171
Test	5
Test Execution	5
Test Plan	2
Test task	131

How to see visible rows?

Pages
Drag here if needed

Columns
Measures

Rows
Nonempty

Table Bar Line Pie Scatter Timeline

Issue Type

Select individual members

All hierarchy level members

Select all members at level

Issue Type 16

By type

Type 2 Issue Type 16

Drill into or expand

Pages

	Issues created
Bug	564
Change	29
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Improvement	5
Incident	44
Problem	21
Risk	8
Service Request	25
Story	796
Sub-task	171
Test	5
Test Execution	5
Test Plan	2
Test task	131

```
SetToStr(VisibleRowsSet())
```

```
=
```

```
{[Issue Type].[Bug],  
[Issue Type].[Change],  
[Issue Type].[Data task],  
[Issue Type].[Epic],  
[Issue Type].[Feature],  
[Issue Type].[Improvement],  
[Issue Type].[Incident],  
[Issue Type].[Problem],  
[Issue Type].[Risk],  
[Issue Type].[Service Request],  
[Issue Type].[Story],  
[Issue Type].[Sub-task],  
[Issue Type].[Test],  
[Issue Type].[Test Execution],  
[Issue Type].[Test Plan],  
[Issue Type].[Test task]}
```


How to see visible rows?

Pages Nonempty

> Project

Columns > Measures

Table Bar Line Pie Scatter Timeline

Table icons: Refresh, Undo, Redo, Comment, Download, Total

Rows Nonempty

▼ Issue Type

> Select individual members

▼ All hierarchy level members

Select all members at level

Issue Type 16

	Issues created
Bug	3
Story	18
Sub-task	4

How to see visible rows?

The screenshot shows a BI tool interface with the following components:

- Pages:** Nonempty, Project
- Columns:** Measures
- Rows:** Nonempty, Issue Type (expanded to show 'Select individual members' and 'All hierarchy level members')
- Table View:** A table with the following data:

	Issues created
Bug	3
Story	18
Sub-task	4
- Tools:** A toolbar with icons for refresh, undo, redo, comment, download, and a 'Total' dropdown. A 'Demo' dropdown is highlighted with a red box.

```
SetToStr(VisibleRowsSet())
```

```
=
```

```
{[Issue Type].[Bug],  
 [Issue Type].[Story],  
 [Issue Type].[Sub-task]}
```

Multiple dimensions in rows

Visible rows is the **set of tuples** with crossjoined members

The screenshot shows a BI tool interface with the following components:

- Pages:** A pane containing a 'Project' field and a 'Nonempty' button.
- Rows:** A pane containing 'Issue Type', 'Status', and a 'Nonempty' button.
- Columns:** A pane containing a 'Measures' field.
- Table:** A table visualization showing data for 'Issues created'.

The table data is as follows:

		Issues created
Story	In Progress	1
	To Do	8
	Done	9
Sub-task	In Progress	2
	To Do	2
Bug	To Do	2
	Done	1

Multiple dimensions in rows

Visible rows is the **set of tuples** with crossjoined members

Pages: Nonempty

Columns: Measures

Table | Bar | Line | Pie | Scatter | Timeline

Rows: Nonempty

Issue Type

Status

		Issues created
Story	In Progress	1
	To Do	8
	Done	9
Sub-task	In Progress	2
	To Do	2
Bug	To Do	2
	Done	1

```
SetToStr(VisibleRowsSet()) =
```

```
{([Issue Type].[Story], [Status].[In Progress]),  
([Issue Type].[Story], [Status].[To Do]),  
([Issue Type].[Story], [Status].[Done]),  
([Issue Type].[Sub-task], [Status].[In Progress]),  
([Issue Type].[Sub-task], [Status].[To Do]),  
([Issue Type].[Bug], [Status].[To Do]),  
([Issue Type].[Bug], [Status].[Done])}
```

Multiple dimensions in rows

Visible rows is the **set of tuples** with crossjoined members

The screenshot shows a BI tool interface with the following components:

- Pages:** Nonempty, Project
- Columns:** Measures
- Rows:** Nonempty, Issue Type, Status
- Table View:** Includes filters, refresh, and total buttons.
- Table Data:**

Issue Type	Status	Issues created
Bug	- All Statuses	3
	To Do	2
	Done	1
Story	- All Statuses	18
	To Do	8
	In Progress	1
	Done	9
Sub-task	- All Statuses	4
	To Do	2
	In Progress	2

```
SetToStr(VisibleRowsSet()) =
```

```
{ ([Issue Type].[Bug], [Status].[All Statuses]),  
  ([Issue Type].[Bug], [Status].[To Do]),  
  ([Issue Type].[Bug], [Status].[Done]),  
  ([Issue Type].[Story], [Status].[All Statuses]),  
  ([Issue Type].[Story], [Status].[To Do]),  
  ([Issue Type].[Story], [Status].[In Progress]),  
  ([Issue Type].[Story], [Status].[Done]),  
  ([Issue Type].[Sub-task], [Status].[All Statuses]),  
  ([Issue Type].[Sub-task], [Status].[To Do]),  
  ([Issue Type].[Sub-task], [Status].[In Progress]) }
```

Accessing elements from visible rows

- Access by index
- CurrentTuple ()
- Filter/Generate

Issue Type	Status	Issues created
Bug	– All Statuses	3
	To Do	2
	Done	1
Story	– All Statuses	18
	To Do	8
	In Progress	1
	Done	9
Sub-task	– All Statuses	4
	To Do	2
	In Progress	2

Accessing elements from visible rows

- Access by index in the set

• CurrentTuple ()

• Filter/Generate

```
TupleToStr(  
  VisibleRowsSet().Item(2)  
)  
  
=  
  
([Issue Type].[Bug],[Status].[Done])
```

Issue Type	Status	Issues created
Bug	– All Statuses	3
	To Do	2
	Done	1
Story	– All Statuses	18
	To Do	8
	In Progress	1
	Done	9
Sub-task	– All Statuses	4
	To Do	2
	In Progress	2

Accessing elements from visible rows

- Access by index in the set
- CurrentTuple ()
- Filter/Generate

```
TupleToStr(  
  VisibleRowsSet().Item(2).Item(1)  
)  
  
=  
  
[Status].[Done]
```

Issue Type	Status	Issues created
Bug	– All Statuses	3
	To Do	2
	Done	1
Story	– All Statuses	18
	To Do	8
	In Progress	1
	Done	9
Sub-task	– All Statuses	4
	To Do	2
	In Progress	2

Accessing elements from visible rows

- Access by index in the set
- `CurrentTuple ()`
- `Filter/Generate`

```
TupleToStr(  
    CurrentTuple(  
        VisibleRowsSet()  
    )  
)
```

Issue Type	Status	Issues created	Current Tuple
Bug	– All Statuses	3	[[Issue Type].[Bug], [Status].[All Statuses]]
	To Do	2	[[Issue Type].[Bug], [Status].[To Do]]
	Done	1	[[Issue Type].[Bug], [Status].[Done]]
Story	– All Statuses	18	[[Issue Type].[Story], [Status].[All Statuses]]
	To Do	8	[[Issue Type].[Story], [Status].[To Do]]
	In Progress	1	[[Issue Type].[Story], [Status].[In Progress]]
	Done	9	[[Issue Type].[Story], [Status].[Done]]
Sub-task	– All Statuses	4	[[Issue Type].[Sub-task], [Status].[All Statuses]]
	To Do	2	[[Issue Type].[Sub-task], [Status].[To Do]]
	In Progress	2	[[Issue Type].[Sub-task], [Status].[In Progress]]

Accessing elements from visible rows

- Access by index in the set
- CurrentTuple ()
- Filter/Generate

```
SetToStr(  
  Filter(VisibleRowsSet(),  
    [Status].CurrentHierarchyMember.Level.Name="Status"  
  )  
)  
  
=  
  
{([Issue Type].[Bug], [Status].[To Do]),  
([Issue Type].[Bug], [Status].[Done]),  
([Issue Type].[Story], [Status].[To Do]),  
([Issue Type].[Story], [Status].[In Progress]),  
([Issue Type].[Story], [Status].[Done]),  
([Issue Type].[Sub-task], [Status].[To Do]),  
([Issue Type].[Sub-task], [Status].[In Progress])}
```

		Issues created
Bug	- All Statuses	3
	To Do	2
	Done	1
Story	- All Statuses	18
	To Do	8
	In Progress	1
	Done	9
Sub-task	- All Statuses	4
	To Do	2
	In Progress	2

Accessing elements from visible rows

- Access by index in the set
- CurrentTuple ()
- Filter/Generate

```
SetToStr(  
  Generate(  
    Filter(VisibleRowsSet(),  
          [Status].CurrentHierarchyMember.Level.Name="Status"  
    ),  
  [Status].CurrentHierarchyMember  
)  
)  
  
=  
  
{[Status].[To Do],  
 [Status].[Done],  
 [Status].[In Progress]}
```

		Issues created
Bug	- All Statuses	3
	To Do	2
	Done	1
Story	- All Statuses	18
	To Do	8
	In Progress	1
	Done	9
Sub-task	- All Statuses	4
	To Do	2
	In Progress	2

Some use cases

All properties for any dimension in the rows

Pages
Drag here if needed

Columns > Measures

Rows Nonempty

Table Bar Line Pie Scatter

✕ ↶ ↷ 💬 ⬇ Total ▾

▼ Sprint

> Select individual members

▼ All hierarchy level members

Select all members at level

Board 7 Sprint 123

By status

Status 4 Board 14 Sprint 123

▼ Drill into or expand

	Sprint all properties	Issues created
D1 Sprint 1	KEY: 3 URL_ID: 3 URL_SUB_ID: 13 Closed: true Activated date: 2020-01-13 11:11:43 Start date: 2020-01-13 11:11:43 End date: 2020-02-03 09:11:00 Complete date: 2020-02-03 08:40:04 Goal: Status: Closed	9

[Measures].[Sprint all properties] =

1 [Sprint].CurrentMember.AllProperties

Pages
Drag here if needed

Columns > Measures

Rows Nonempty

Table Bar Line Pie Scatter Timeline Map

✕ ↶ ↷ 💬 ⬇ Hide empty ▾ Total ▾ Fre

▼ Project

▼ Select individual members

All Projects edit

PMO components = edit

demo projects a and b = edit

Some components = edit

	Sprint all properties	Issues created
- All Projects		2,051
+ Demo		25

All properties for any dimension in the rows

[Measures].[Universal All properties] =

```
1 CurrentTuple(VisibleRowsSet()).item(0).AllProperties|
```

The screenshot shows a BI tool interface with a table view. The columns pane shows a measure named "Universal All properties". The rows pane shows a hierarchy for "Project" with levels: "Project", "All hierarchy level members", and "Category". The table view displays three rows: "Demo", "DEMO Alpha", and "Universal All properties".

	Universal All properties
+ Demo	KEY: DEMO DISPLAY_KEY: DEMO Project lead: Adam Mint Project description: Team-managed project:
+ DEMO Alpha	KEY: DA DISPLAY_KEY: DA Project lead: Monica Walker Project description: Team-managed project:
	Universal All properties

The screenshot shows a BI tool interface with a table view. The columns pane shows a measure named "Universal All properties". The rows pane shows a hierarchy for "Sprint" with levels: "Sprint", "Select individual members", "All hierarchy level members", and "Drill into or expand". The table view displays three rows: "D1 Sprint 1", "D1 Sprint 2", and "Universal All properties".

	Universal All properties
D1 Sprint 1	KEY: 3 URL_ID: 3 URL_SUB_ID: 13 Closed: true Activated date: 2020-01-13 11:11:43 Start date: 2020-01-13 11:11:43 End date: 2020-02-03 09:11:00 Complete date: 2020-02-03 08:40:04 Goal: Status: Closed
D1 Sprint 2	KEY: 7 URL_ID: 7 URL_SUB_ID: 13 Closed: true Activated date: 2020-02-03 09:42:21 Start date: 2020-02-03 09:42:21 End date: 2020-02-24 08:42:00 Complete date: 2020-02-24 09:51:01 Goal: Status: Closed
	Universal All properties


Creating sub-totals

Issue Type	Status	Issues created
Bug	– All Statuses	3
	To Do	2
	Done	1
Story	– All Statuses	18
	To Do	8
	In Progress	1
	Done	9
Sub-task	– All Statuses	4
	To Do	2
	In Progress	2

Issue Type	Status	Issues created
Story	In Progress	1
	To Do	8
	Done	9
Sub-task	In Progress	2
	To Do	2
Bug	To Do	2
	Done	1

Creating sub-totals

```
Sum(  
  Generate(  
    VisibleRowsSet(),  
    [Status].CurrentHierarchyMember  
  ),  
  [Measures].[Issues created]  
)
```



```
{[Status].[In Progress],  
[Status].[To Do],  
[Status].[Done]}
```

```
Sum(  
  Generate(  
    VisibleRowsSet(),  
    CurrentTuple(VisibleRowsSet()).Item(1)  
  ),  
  [Measures].[Issues created]  
)
```


Creating sub-totals

```
Sum(  
  Generate(  
    VisibleRowsSet(),  
    [Status].CurrentHierarchyMember  
  ),  
  [Measures].[Issues created]  
)
```

→ { [Status].[In Progress],
[Status].[To Do],
[Status].[Done] }

```
Sum(  
  Generate(  
    VisibleRowsSet(),  
    CurrentTuple(VisibleRowsSet()).Item(1)  
  ),  
  [Measures].[Issues created]  
)
```

Issue Type	Status	Issues created	Sub total by Issue type
Story	In Progress	1	18
	To Do	8	18
	Done	9	18
Sub-task	In Progress	2	4
	To Do	2	4
Bug	To Do	2	3
	Done	1	3

Use of sub-totals

Issue Type	Status	Issues created	Sub total by Issue type	Percentage in status by issue type	Average by issue type
Story	In Progress	1	18	5.56%	6.00
	To Do	8	18	44.44%	6.00
	Done	9	18	50.00%	6.00
Sub-task	In Progress	2	4	50.00%	2.00
	To Do	2	4	50.00%	2.00
Bug	To Do	2	3	66.67%	1.50
	Done	1	3	33.33%	1.50

[Measures].[Percentage in status by issue] =

```
1 [Measures].[Issues created]
2 /
3 Sum(
4   Generate(
5     VisibleRowsSet(),
6     [Status].CurrentHierarchyMember
7   ),
8   [Measures].[Issues created]
9 )
```

[Measures].[Average by issue type] =

```
1 Sum(
2   Generate(
3     VisibleRowsSet(),
4     [Status].CurrentHierarchyMember
5   ),
6   [Measures].[Issues created]
7 )
8 /
9 Count(
10  Exists(VisibleRowsSet(),
11    CurrentTuple(VisibleRowsSet()).item(0)
12  )
13 )
```

Count the number of second level members under the each first level member

Self-adjusting average

Pages: Nonempty

Columns: Measures

Table Bar Line Pie Scatter Timeline M

Hide empty rows

Rows: Nonempty

DEMO Alpha Feb 2022

	Average resolution days
- Feb 2022	114.59
Feb 01 2022	209.93
Feb 02 2022	212.81
Feb 03 2022	101.27
Feb 07 2022	224.38
Feb 09 2022	28.98
Feb 10 2022	128.72
Feb 11 2022	177.80
Feb 14 2022	80.42
Feb 15 2022	57.97
Feb 16 2022	197.82
Feb 17 2022	82.81
Feb 18 2022	35.65

Pages: Nonempty

Columns: Measures

Table Bar Line Pie Scatter T

Hide empty rows

Rows: Nonempty

DEMO Alpha Feb 2022

	Average resolution days
- Feb 2022	114.59
Feb 01 2022	209.93
Feb 02 2022	212.81
Feb 03 2022	101.27
Feb 07 2022	224.38
Feb 09 2022	28.98
Feb 10 2022	128.72
Feb 11 2022	177.80
Feb 14 2022	80.42
Feb 15 2022	57.97

- Drill across
- Select this
- Bookmark
- Remove
- Filter time
- Cell formatting

Pages: Nonempty

Columns: Measures

Table Bar Line Pie Scatter Timeline Map Ga

Hide empty rows Total

Rows: Nonempty

DEMO Alpha Feb 2022

	Average resolution days
- Feb 2022	114.59
Feb 01 2022	209.93
Feb 02 2022	212.81
Feb 03 2022	101.27
Feb 09 2022	28.98
Feb 10 2022	128.72
Feb 11 2022	177.80
Feb 14 2022	80.42
Feb 15 2022	57.97

Self-adjusting average

[Measures].[Self-adjusting average] =

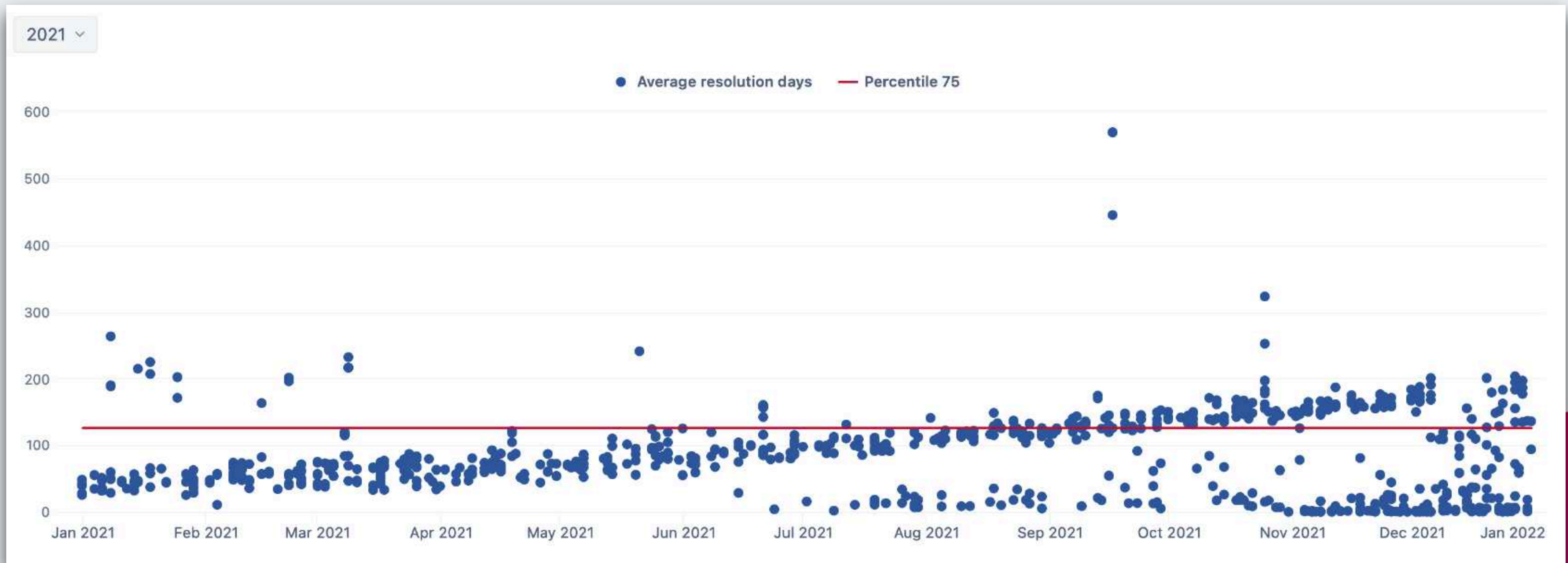
```
1 CASE WHEN
2 [Time].CurrentHierarchyMember.Level.Name='Month '
3 THEN
4 Sum(
5   Filter(
6     VisibleRowsSet(),
7     [Time].CurrentHierarchyMember.Level.Name="Day"
8   ),
9   [Measures].[Total resolution days]
10 )
11 /
12 Sum(
13   Filter(
14     VisibleRowsSet(),
15     [Time].CurrentHierarchyMember.Level.Name="Day"
16   ),
17   [Measures].[Issues resolved]
18 )
19 ELSE
20 [Measures].[Average resolution days]
21 END
```

DEMO Alpha ▾

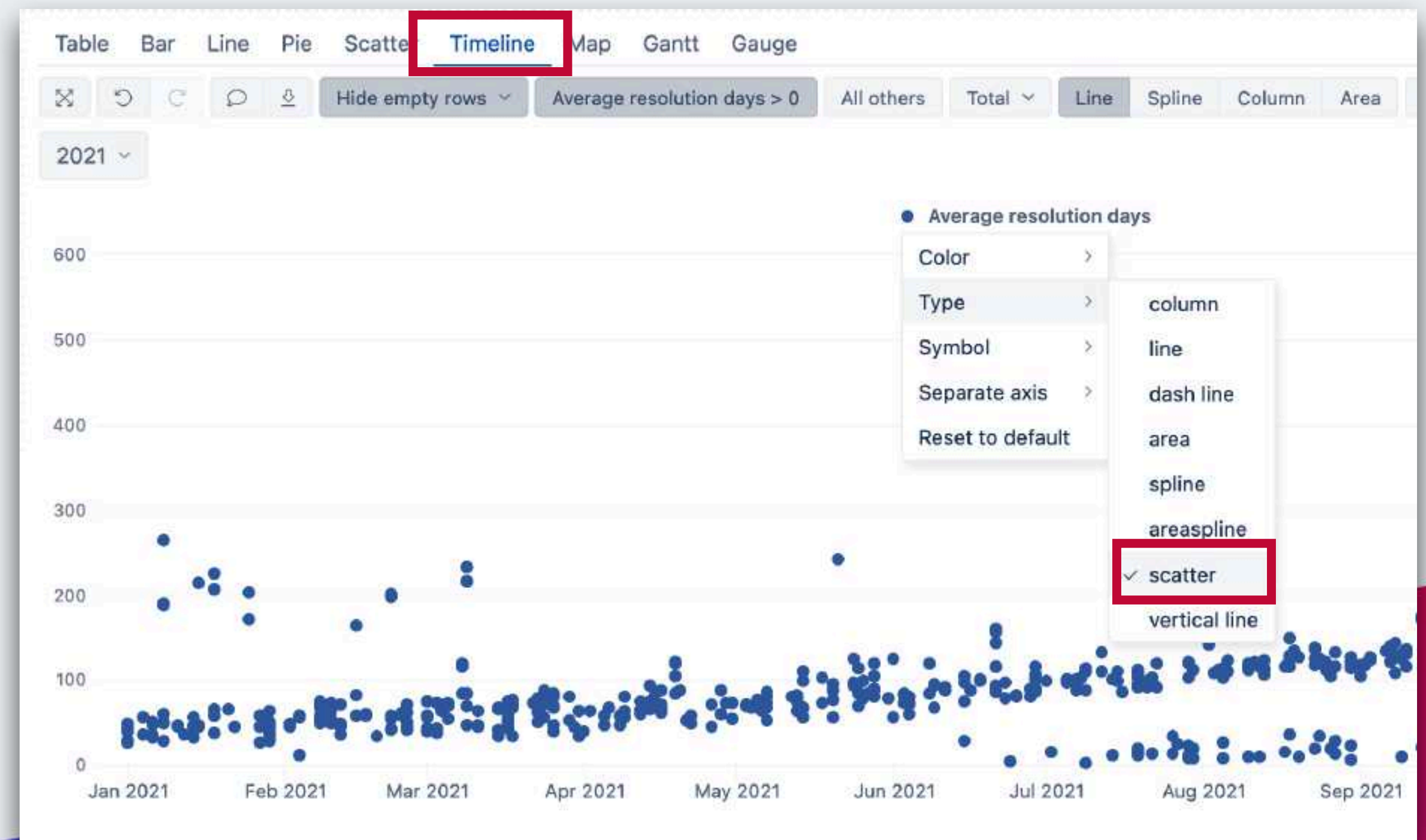
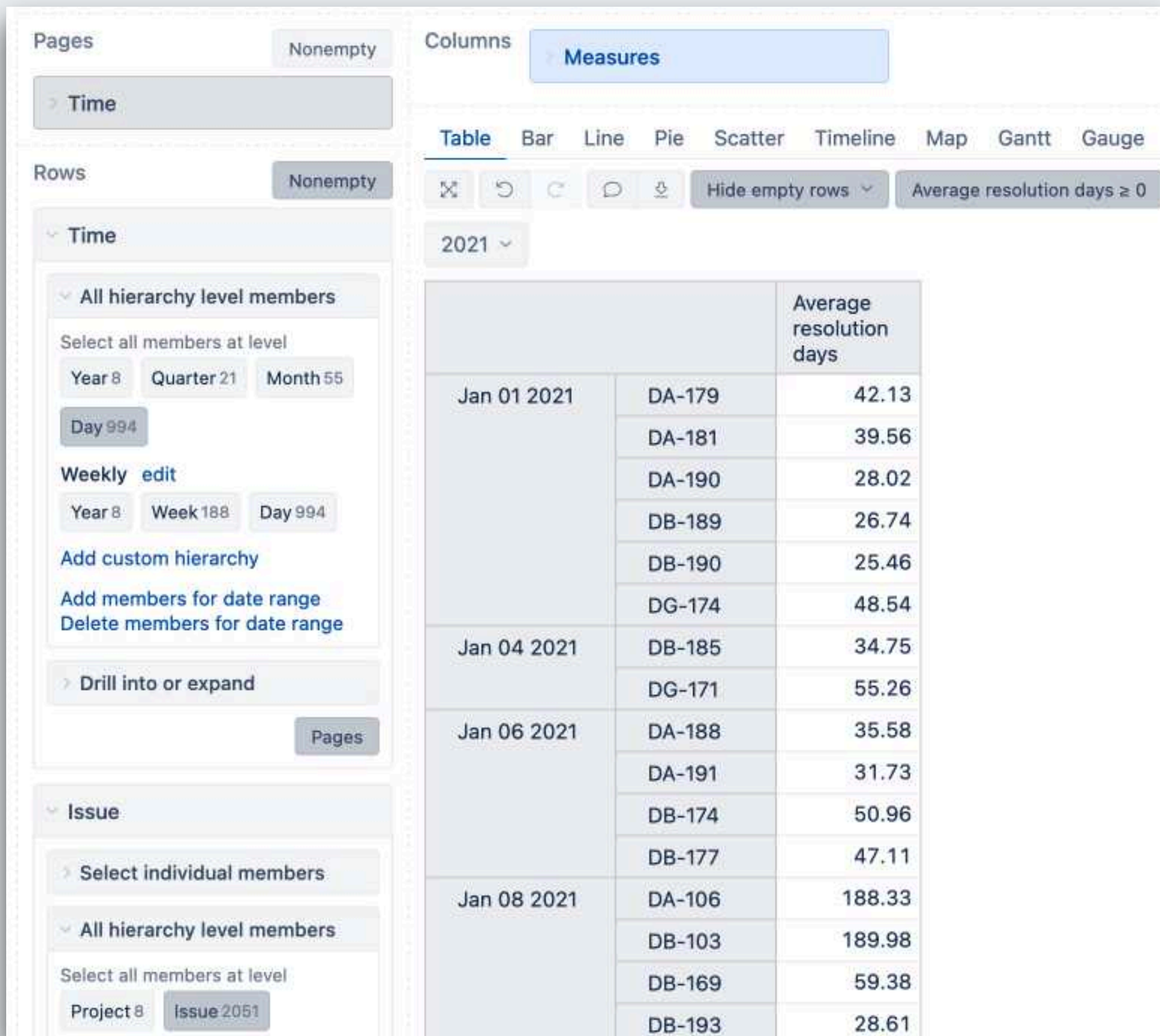
Feb 2022 ▾

	Average resolution days	Self-adjusting average
- Feb 2022	114.59	108.50
Feb 01 2022	209.93	209.93
Feb 02 2022	212.81	212.81
Feb 03 2022	101.27	101.27
Feb 09 2022	28.98	28.98
Feb 10 2022	128.72	128.72
Feb 11 2022	177.80	177.80
Feb 14 2022	80.42	80.42
Feb 15 2022	57.97	57.97
Feb 16 2022	197.82	197.82
Feb 17 2022	82.81	82.81
Feb 18 2022	35.65	35.65

Show visually issues on timeline whose cycle time exceeds the 75th percentile



Show visually issues on timeline whose cycle time exceeds the 75th percentile



Calculate percentile from all issues resolved in period?

[Measures].[Percentile V2] =

```
1 Percentile(  
2   Filter([Issue].[Issue].Members,  
3   DateInPeriod(  
4     [Measures].[Issue resolution date],  
5     Ancestor([Time].CurrentHierarchyMember, [Time].[Year]))  
6   )  
7   ),  
8   ([Measures].[Total resolution days],  
9   [Time].CurrentHierarchy.DefaultMember),  
10  75  
11 )
```

Shortages of the solution:

- 1) Iterates full set of issues, although the calculation is from the rows already filtered in the report
- 2) Relies that page filter is by year

Calculate percentile from all issues resolved in period?

[Measures].[Percentile V2] =

```
1 Percentile(  
2   Filter([Issue].[Issue].Members,  
3   DateInPeriod(  
4     [Measures].[Issue resolution date],  
5     Ancestor([Time].CurrentHierarchyMember,[Time].[Year]))  
6   )  
7 ),  
8 ([Measures].[Total resolution days],  
9   [Time].CurrentHierarchy.DefaultMember),  
10 75  
11 )
```

Shortages of the solution:

- 1) Iterates full set of issues, although the calculation is from the rows already filtered in the report
- 2) Relies that page filter is by year

[Measures].[Percentile 75] =

```
1 Percentile(  
2   VisibleRowsSet(),  
3   [Measures].[Total resolution days],  
4   75  
5 )
```


Avoiding re-calculation

[Measures].[Percentile 75] =

```
1 ConstantValue(  
2   Percentile(  
3     VisibleRowsSet(),  
4     [Measures].[Total resolution days],  
5     75  
6   )  
7 )]
```



Thank you!

Questions?

<https://eazybi.com/accounts/1000/dashboards>

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