

Abstract geometric lines in the top left corner, consisting of several overlapping, tilted rectangles and polygons drawn with thin black lines.

TROUBLESHOOTING POWER BI REPORTS

aka ‘The It Depends Show’

Benni De Jagere

WHO AM I



Power BI CAT

dataMinds.be Member



@BenniDeJagere



/bennidejagere



sessionize

/bennidejagere



/bennidejagere



SESSION OBJECTIVES

SESSION OBJECTIVES

Leverage (external) options to pinpoint common causes

Techniques to avoid, or solve

Usable set of best practices

NOT! A DAX or PowerQuery Performance Deep Dive

It Depends 😊

WHY TROUBLESHOOT?

NO ONE LIKES TO WAIT 😊

BUT ALSO ..

“Works on my machine” is not a valid reply

Context and Baseline are Key

Aim for quick wins on heavily used reports

Avoid long investigations on barely used reports
(unless it's the CxO)

40% Science, 40% Art, 20% Luck

It depends!



HOLD ON ..



Noisy Neighbours

POWERBI.COM (AKA THE SERVICE)

Shared Resources, blessing and curse

Power BI Premium (Gen 1) does not automagically solve performance issues

Power BI Premium (Gen 2) is a great improvement, but is not a one fix for all

Beware of Cache mechanisms (Visual, Query, Result, ..)



THE REPORT CASE

THE USE CASE



NEW YORK CITIBIKES

www.citibikenyc.com/system-data

Public Open Data

Starts June 2013

Information about every trip

Longer than 60 seconds

Starts at public station

Masterdata



<https://i0.wp.com/thenypost.files.wordpress.com/2013/12/citibike1.jpg>



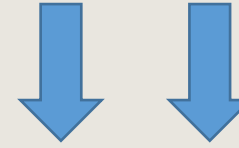
THE REPORT(S)







DEMO



INSIDE POWER BI DESKTOP

INSIDE POWER BI DESKTOP



Name	Status	CPU	Memory	Disk	Network	GPU
Microsoft Power BI Desktop (12)		0,2%	2 351,1 MB	0 MB/s	0 Mbps	0%
		0%	894,0 MB	0 MB/s	0 Mbps	0%
CefSharp.BrowserSubprocess		0,2%	333,1 MB	0 MB/s	0 Mbps	0%
Microsoft Mashup Evaluation ...		0%	244,2 MB	0 MB/s	0 Mbps	0%
Microsoft Mashup Evaluation ...		0%	184,4 MB	0 MB/s	0 Mbps	0%
Microsoft Mashup Evaluation ...		0%	181,1 MB	0 MB/s	0 Mbps	0%
CefSharp.BrowserSubprocess		0%	125,4 MB	0 MB/s	0 Mbps	0%
Microsoft SQL Server Analysis ...		0%	123,7 MB	0 MB/s	0 Mbps	0%
CefSharp.BrowserSubprocess		0%	94,1 MB	0 MB/s	0 Mbps	0%
CefSharp.BrowserSubprocess		0%	93,8 MB	0 MB/s	0 Mbps	0%
CefSharp.BrowserSubprocess		0%	67,7 MB	0 MB/s	0 Mbps	0%
Console Window Host		0%	5,9 MB	0 MB/s	0 Mbps	0%
CefSharp.BrowserSubprocess		0%	3,8 MB	0 MB/s	0 Mbps	0%

INSIDE POWER BI DESKTOP (WEBVIEW2)



Name	Status	29% CPU	67% Memory
Microsoft Power BI Desktop (14)		0.8%	1,751.3 MB
Microsoft Power BI Desktop		0.6%	595.7 MB
Microsoft SQL Server Analysis Services		0%	565.8 MB
Microsoft Power BI Desktop		0%	164.6 MB
Microsoft Power BI Desktop		0.1%	123.8 MB
Microsoft Power BI Desktop		0%	94.6 MB
Microsoft Power BI Desktop		0%	58.7 MB
Microsoft Power BI Desktop		0%	49.3 MB
Microsoft Power BI Desktop		0%	33.8 MB
Microsoft Mashup Evaluation Container		0%	25.5 MB
Microsoft Mashup Evaluation Container		0%	25.2 MB
Microsoft Power BI Desktop		0%	5.5 MB
Console Window Host		0%	4.9 MB
Microsoft Power BI Desktop		0%	2.6 MB
Microsoft Power BI Desktop		0%	1.3 MB



TOOLS FOR THE TRADE



TOOLS FOR THE TRADE

[Performance Analyzer Pane](#)

[Power BI Field Finder](#)

[DAX Studio](#)

[Power BI Sentinel \(€\)](#)

[VertiPaq Analyzer \(SQLBI.com\)](#)

[Power Query Diagnostics Tool](#)

[Tabular Editor](#)

[Power BI Sidetools](#)

[Report Analyzer](#)

[Power BI Cleaner](#)

[Power BI Helper](#)

[PBI Tools](#)

[Bravo](#)

And more ..

[ALM Toolkit](#)

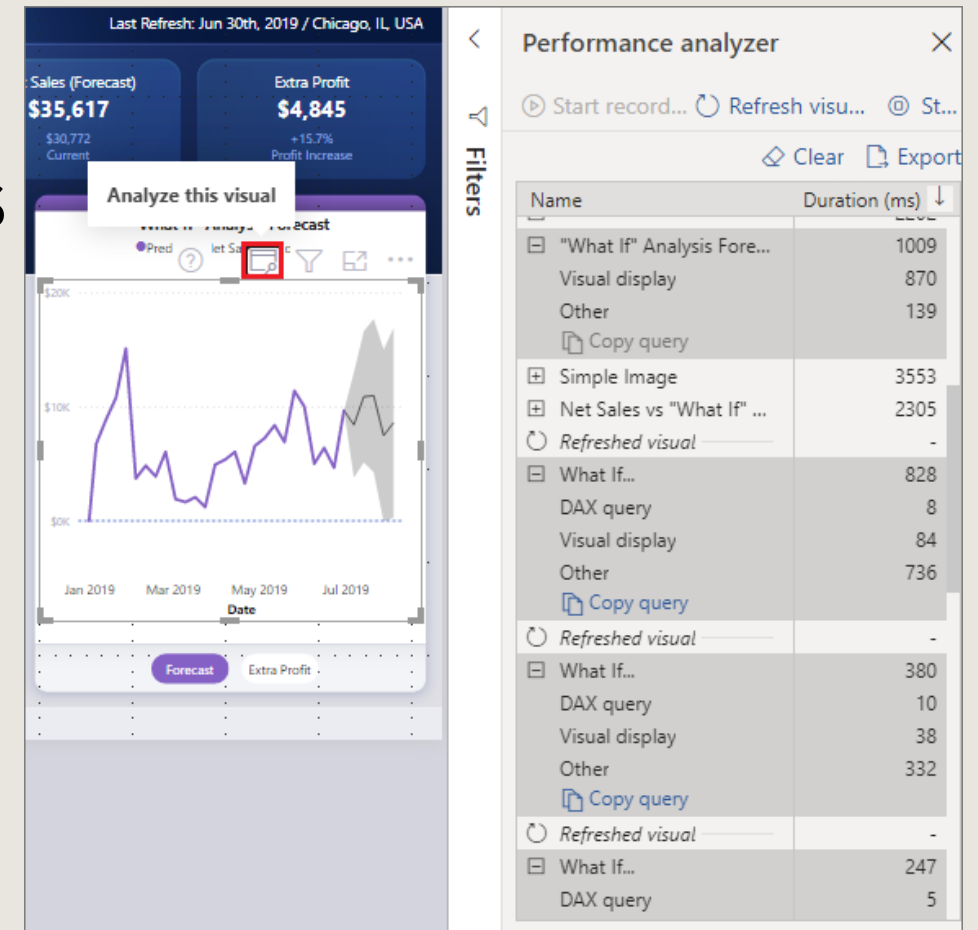
POWER BI PERFORMANCE ANALYZER PANE

Public Release in May 2019

Flight Recorder for all operations

Breaks down execution times

Export results with ease

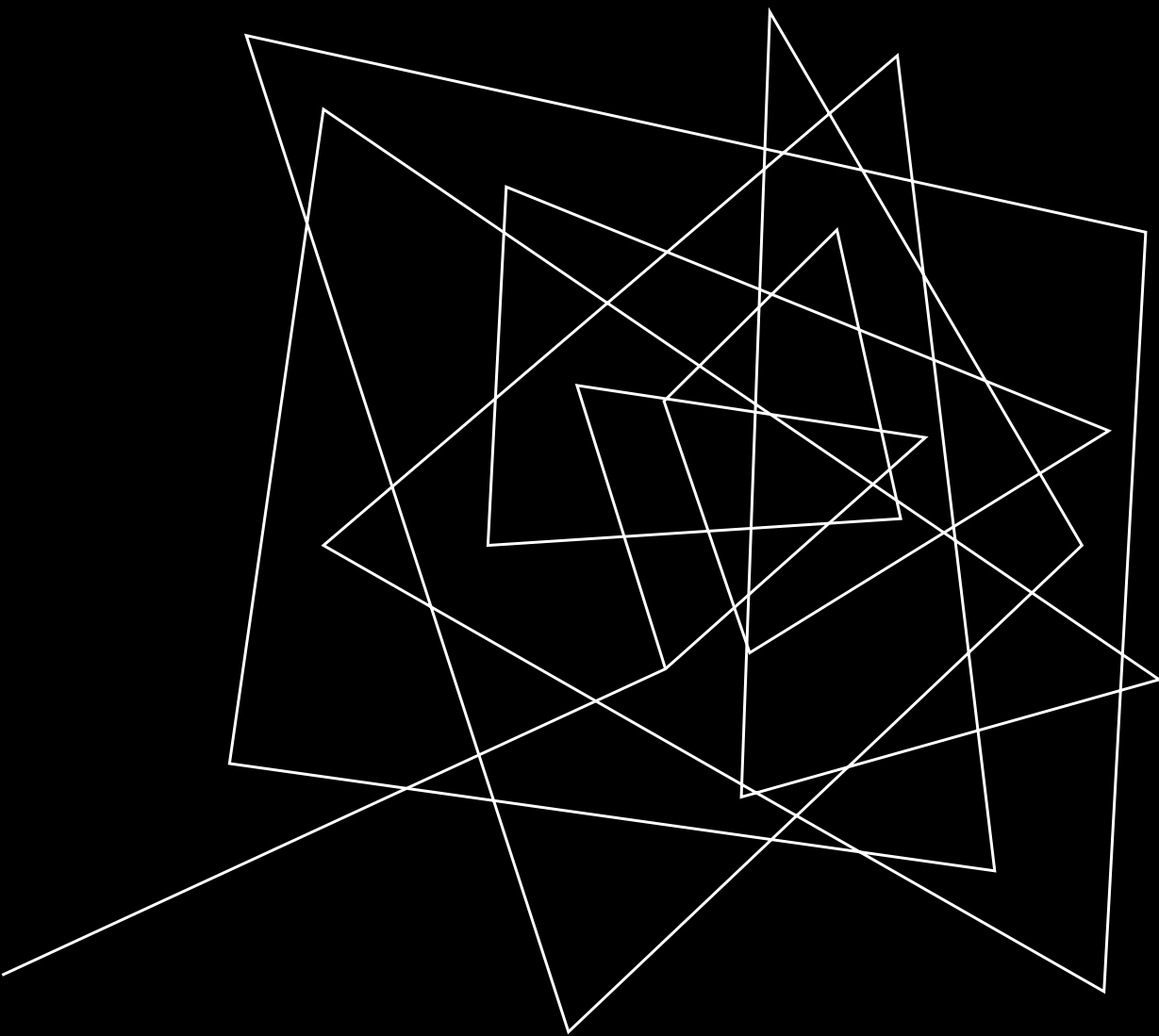


<https://docs.microsoft.com/en-us/power-bi/create-reports/media/desktop-performance-analyzer/performance-analyzer-07.png>



PERFORMANCE ANALYZER PANE

DEMO



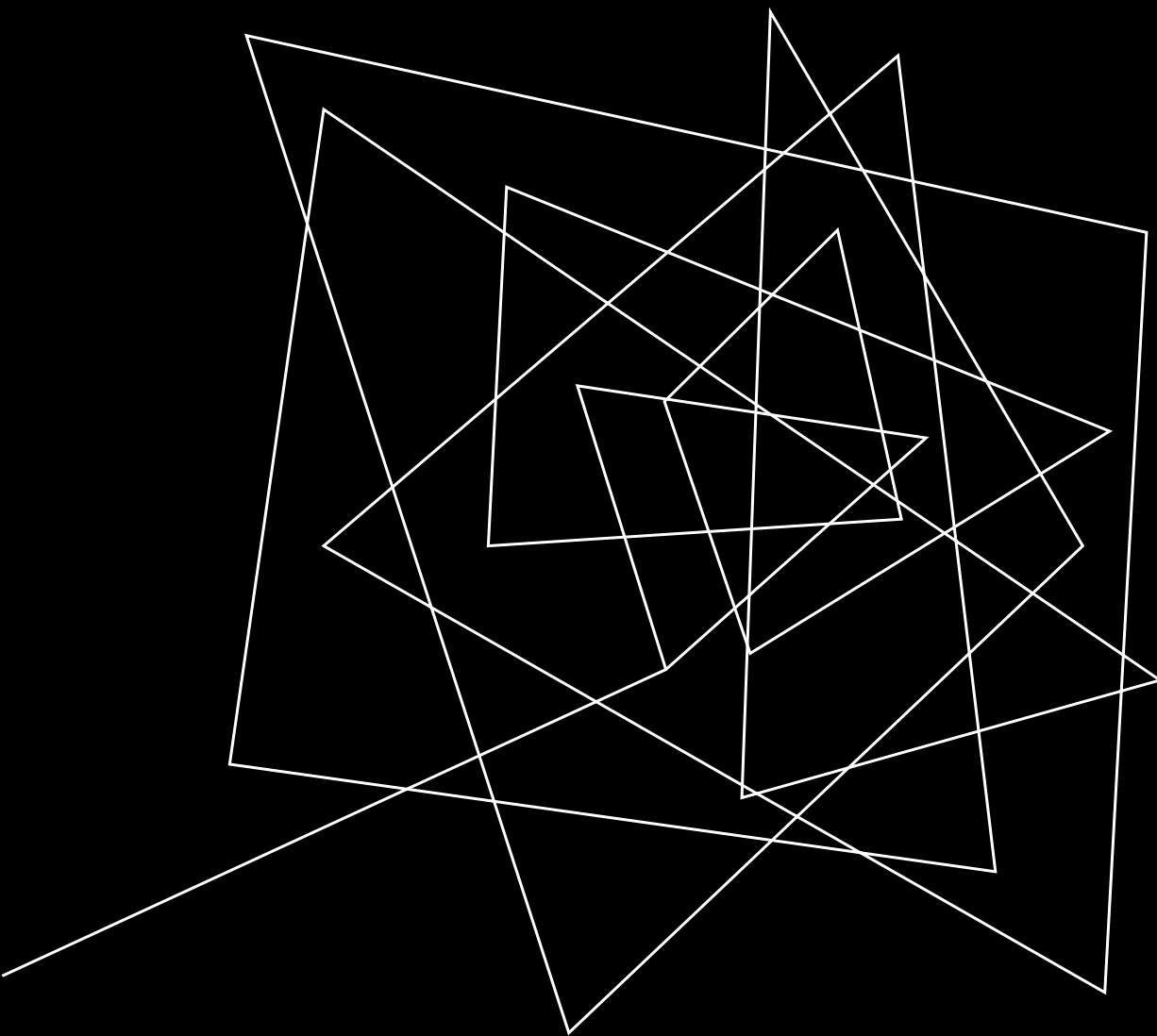
REPORT ANALYZER

DEMO



TABULAR EDITOR (2)

DEMO



DAX STUDIO

VERTIPAQ ANALYZER

DEMO



THE TIPS & BEST PRACTICES

THE GOLDEN RULE(S)

Transform early

Transform once

Transform smart

Or refer to [Roche's Maxim of Data Transformation](#)

*Data should be transformed as far upstream as possible, and
as far downstream as necessary.*



DATA TYPES

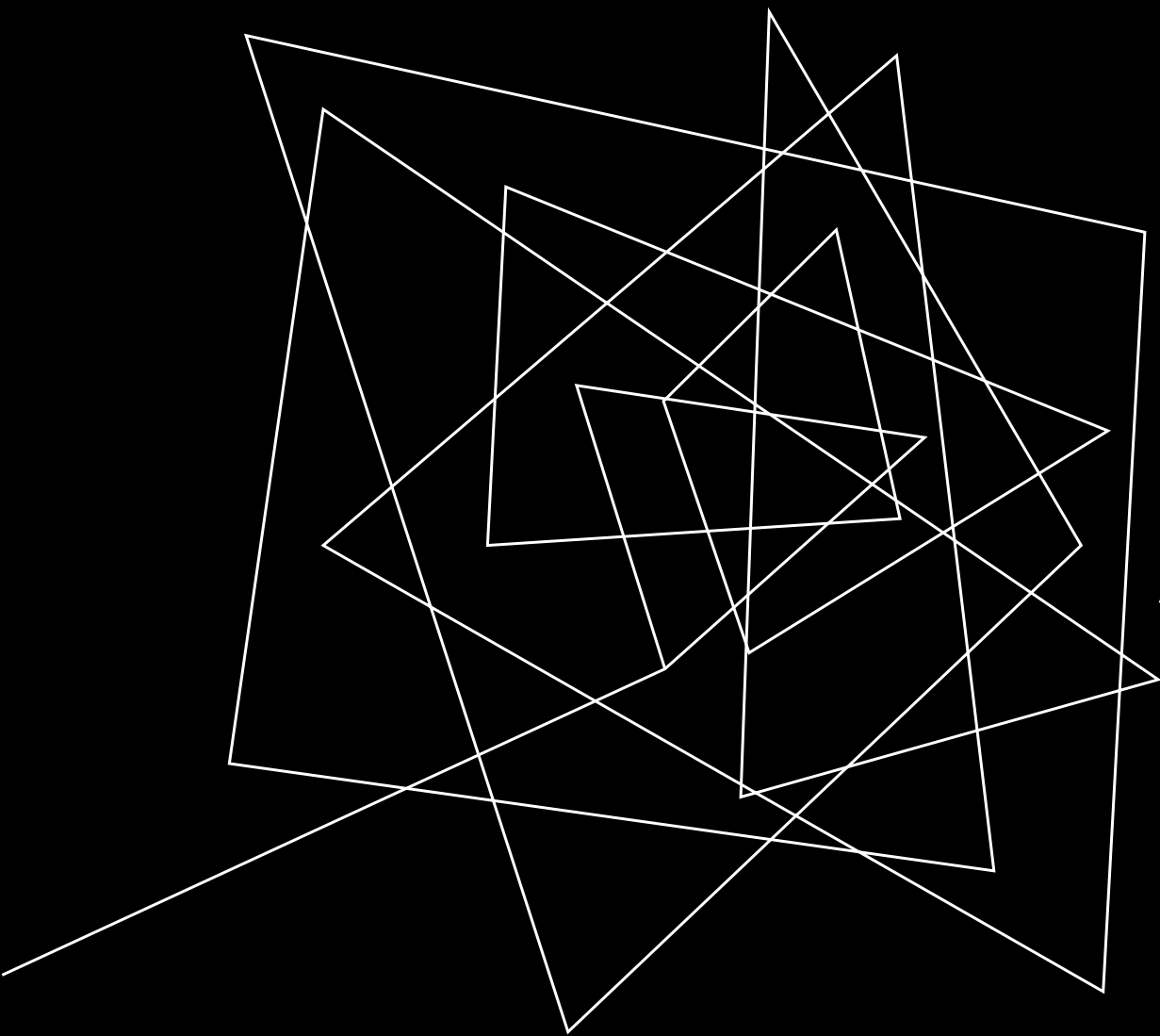
DATA TYPES

Don't underestimate the impact

ie. 'Double' vs. 'Currency'

Think about precision and scale

Do you really need date and time combined?



AUTO DATE/TIME

AUTO DATE/TIME

Enabled by default

Control behaviour in PBI Desktop Settings

Creates a Calculated Table for every date/time

Range is the min to max

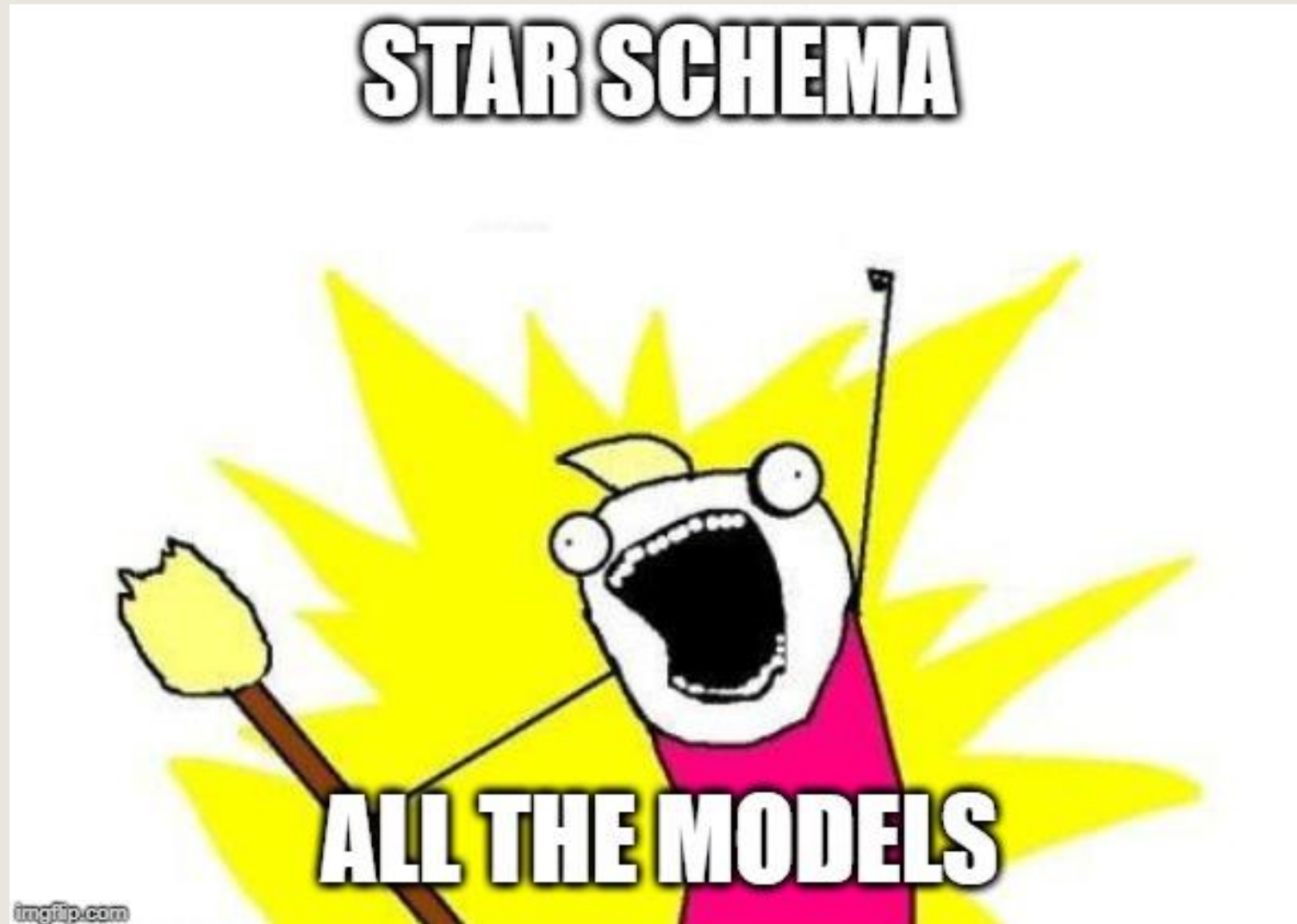


**COLUMN/ROW
USAGE**



DATA MODELLING

DATA MODELLING



Thanks, @KoVer ☺

MODELLING TIPS

Star Schema (all the things!)

Use persisted surrogate keys for relationships

Avoid Bi-Directional filtering (rather DAX Crossfilter)

Disable auto date/time, rather 'Mark as Date Table'

Debate Role-playing dimensions

Optimize Data Types, Precision, and Scale

MODELLING TIPS (CONTINUED)

Avoid wide tables

Remove unused columns **and** rows

Only load queries that are used

Reduce inappropriate summarization

Think about your data granularity

Hide (or remove) Key fields from the model view

Consider 'IsAvailableInMDX'

Benchmark with(out) RLS/OLS applied



REPORTS

REPORT TIPS

Limit visuals on a single pane

Filtering and slicing before rendering is a valid option (ie. Landing page, Report Filters, Query Reduction, ..)

Avoid having 8+ report tabs on a single report

Avoid interaction between visuals when they're not needed

Avoid overly detailed visuals

Be aware of render intensive visuals (ie. Maps, Custom visuals, ..)



POWER QUERY

POWER QUERY TIPS

Consider your source and refresh schedule

Query Folding, when possible

Are you aware of the Gateway role?

Don't repeat tables & fields

Only load tables that are used in the model

Specify correct Data Types

Parameterize 'fact' queries (by Date or Entity)

POWER QUERY TIPS (CONTINUED)

Are you looking at?:

- Incremental Refresh
- Composite Models
- Aggregations
- Partitioning
- Hybrid Tables

[Phil Seamark – Visualise your Power BI Refresh](#)

[Chris Webb – Tuning a dataset refresh](#)



DAX

DAX TIPS

Use variables

Use ‘repeater’ functions (SumX, AverageX, ..) when needed

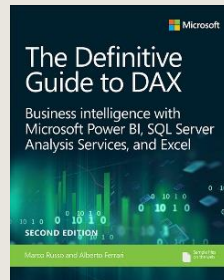
Avoid calculated columns and tables

Keep measures simple initially, add complexity later

Solve the model, then solve DAX

“The best DAX is the one you don’t have to write”

Read [the Bible](#) 😊





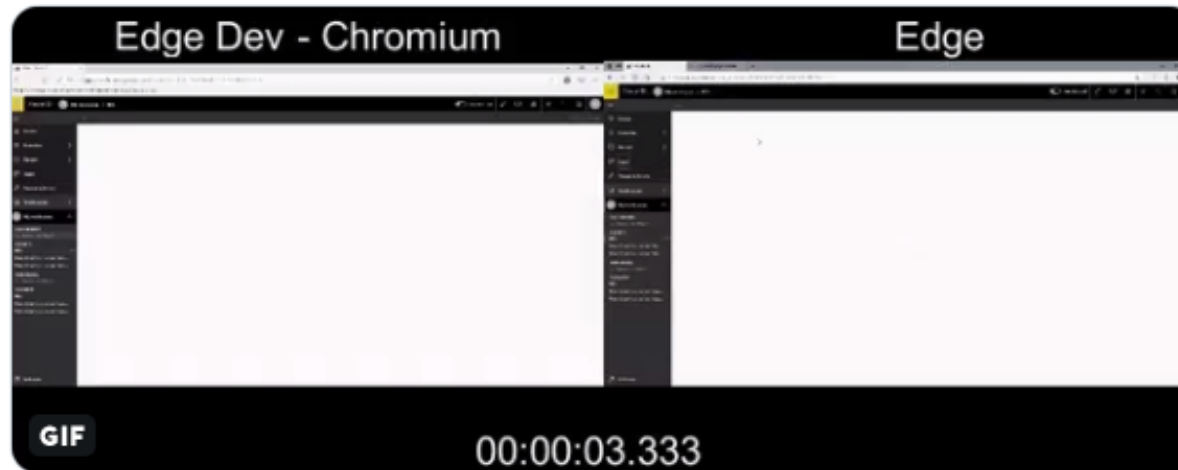
END USERS

BATTLE OF THE BROWSERS



Chris Hamill
@ChrisHamill17

A modern browser can have a huge impact on [#PowerBI](#) report performance. Noticed this when i moved to Edge Dev (microsoftedgeinsider.com/en-us/), and had always wanted to do a side by side. Finally took the time, and the results are more dramatic than i had expected:



<https://twitter.com/ChrisHamill17/status/1160242636369694720>



WRAP UP

TAKEAWAYS

Report performance should be thought of at design time

Think about your transforms

Modelling is key

Choice of browser and hardware matters

Create a personal set of best practices for Tabular Editor

Read public (online) resources

But start with the [Power BI Guidance Docs](#)



RESOURCES

RESOURCES

<https://docs.microsoft.com/en-us/power-bi/power-bi-reports-performance>

<https://docs.microsoft.com/en-us/power-bi/guidance/import-modeling-data-reduction>

<https://docs.microsoft.com/en-us/power-bi/guidance/star-schema>

<https://sqlserverbi.blog/2019/08/24/power-bi-project-good-and-best-practices/>

RESOURCES

<https://docs.microsoft.com/en-us/power-bi/desktop-performance-analyzer>

<https://docs.microsoft.com/en-us/power-bi/visuals/power-bi-visualization-best-practices>

<https://www.sqlbi.com/books/the-definitive-guide-to-dax-2nd-edition/>

RESOURCES

<https://www.sqlbi.com/tools/>

<https://github.com/otykier/TabularEditor>

<https://powerbi.tips/2020/04/tabular-editor-rocks/>

https://www.youtube.com/playlist?list=PLn1m_aBmgsbGDZb7ydd8_LS1AfosdRndQ

<https://alluringbi.com/2020/08/06/consolidating-report-elements-for-improved-performance/>

<https://powerbi.microsoft.com/en-gb/blog/best-practice-rules-to-improve-your-models-performance/>

RESOURCES

<https://github.com/stephbruno/Power-BI-Field-Finder>

<https://www.sqlbi.com/articles/comparing-dax-calculated-columns-with-power-query-computed-columns/>

<https://www.sqlbi.com/tv/my-power-bi-report-is-slow-what-should-i-do-2/>

<https://www.biinsight.com/four-different-ways-to-find-your-power-bi-desktop-local-port-number/>

<https://blog.crossjoin.co.uk/2019/12/02/testing-performance-of-power-bi-reports-in-the-browser-part-1/>