Benni De Jagere

No coffee? No Insights!

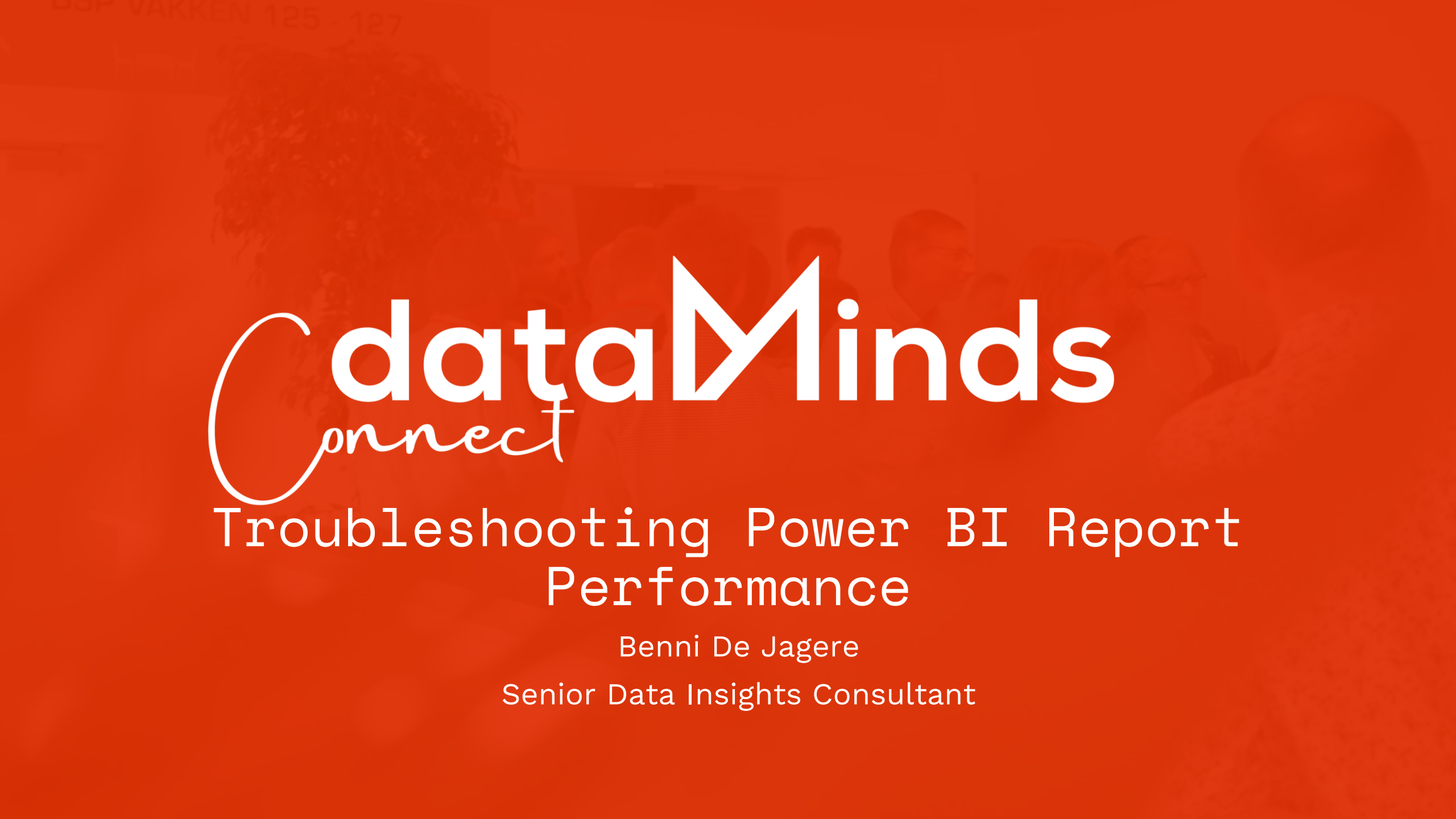
Troubleshooting Power BI Report Performance

So you've built a Power BI report with all the shinies? Good!
After some usage, users have reacted that it's a bit sluggish in usage, and they're not keen on using it anymore.

Starting off with the new Performance Analyzer Pane, we'll demonstrate how you can pinpoint bottlenecks in your report, and take actions on these insights.

With the myriad of root causes that are out there, an elimination approach might suit us very well.
Some of the main causes will be explained, and we'll get you going on how you can fix it for yourselves.

Be it DAX-measures, modelling issues, or an overload of visuals.
Every report can be tuned to handle like a dream, and you can do it too!



Troubleshooting Power BI Report Performance

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Senior Data Insights Consultant

Benni De Jagere?

- Senior Data Insights Consultant
- Realdolmen, a Gfi company
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- #SayNoToPieCharts

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

Why Troubleshoot Report Performance?

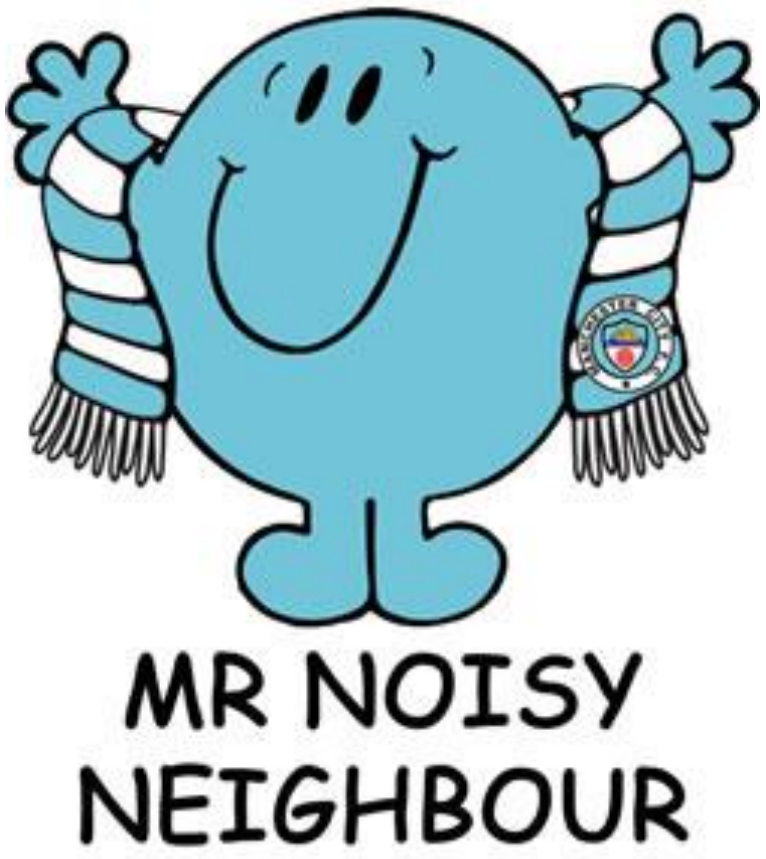
- No one likes to wait
- “Works on my machine” is not a valid reply
- 40% Science, 40% Art, 20% Luck
- Context and Baseline are Key
- Aim for quick wins on heavily used reports
- Avoid long investigations on barely used reports (unless it’s the CFO)

- ***It depends!***

01

Hold on ..

PowerBI.com



http://www.51mon.co.uk/photo/MrNoisyNeighboursMCFC.jpg

PowerBI.com

- Shared Resources, blessing and curse
- Premium Capacity does not automagically solve performance issues
- Beware of Cache mechanisms

02

The Report Case

Use Case

https://elidesc.com/wp-content/uploads/2012/07/Velo_Antwerpen.jpg

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?quality=90&strip=all&ssl=1

03

The Report(s)

04

Inside Power BI Desktop

Inside Power BI Desktop

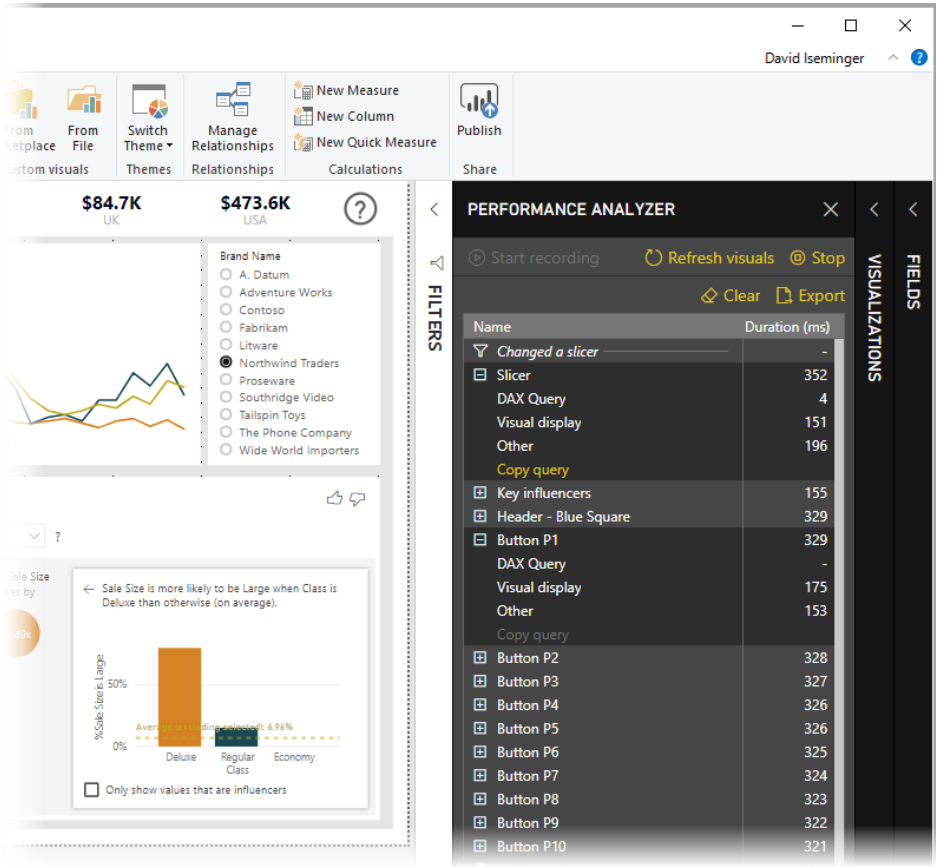
Name	Status	CPU	Memory	Disk	Network	GPU	GPU engine	Power usage	Power usage tr...
Microsoft Power BI Desktop (12)		0,2%	2 351,1 MB	0 MB/s	0 Mbps	0%	GPU 0 - 3D	Very low	Very low
		0%	894,0 MB	0 MB/s	0 Mbps	0%		Very low	Very low
CefSharp.BrowserSubprocess		0,2%	333,1 MB	0 MB/s	0 Mbps	0%		Very low	Very low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

05

Tools for the Trade

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/media/desktop-performance-analyzer/performance-analyzer-01.png

Tools for the Trade

- Performance Analyzer Pane
- DAX Studio (SQLBI.com)
- VertiPaq Analyzer (SQLBI.com)
- Tabular Editor
- Power BI Helper
- Power BI Field Finder
- Power BI Sentinel (€)
- And more ..

05

Tools for the Trade

06

The Tips & Best Practices

The Golden Rule(s)

- Transform early
- Transform once
- Transform smart

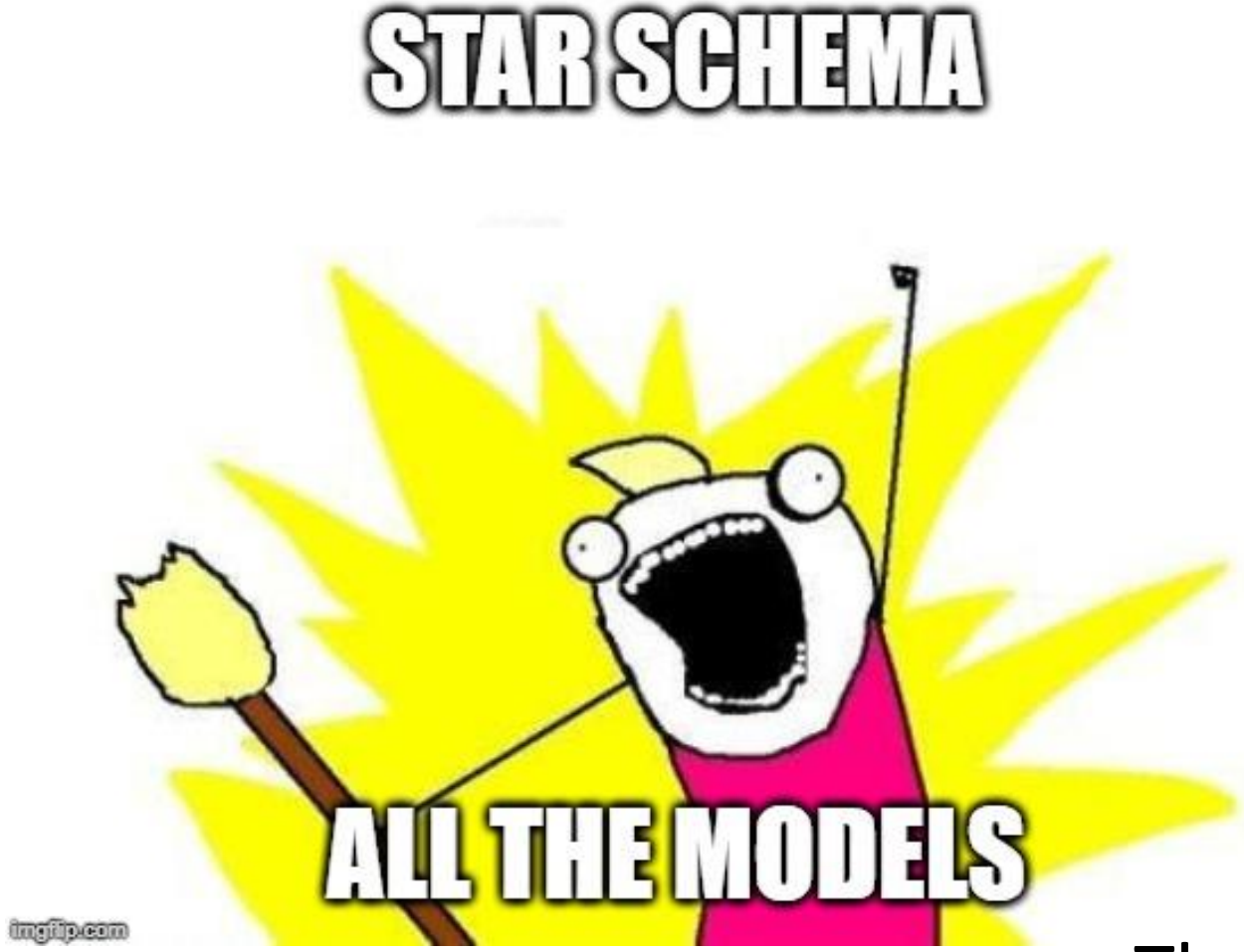
Data Types

Auto Date/Time

Column/Row Usage

Modelling

Modelling Tips



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

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 your source and refresh schedule

Power Query

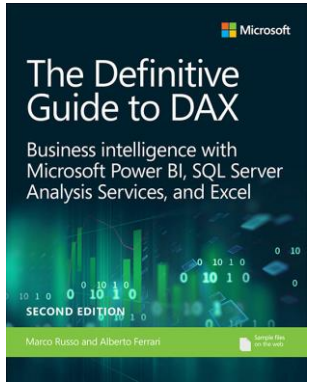
PowerQuery Tips

- Query Folding, when possible
- Don’t repeat tables & fields
- Only load tables that are used in the model
- Specify correct Data Types
- Parameterize ‘fact’ queries (Date or Entity)

DAX

DAX Tips

- Avoid ‘repeater’ functions (SumX, AverageX, ..)
- Avoid calculated columns
- Keep measures simple initially, and add complexity incrementally.
- Use variables
- Solve the model, then solve DAX
- Use Data Categories
- Read the Bible ☺



Reports

Report Page Tips

- Limit visuals on a single pane
- Filtering and slicing before rendering is a valid option (ie. Landing page, Report Filters, ..)
- Avoid having 5+ 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, ..)

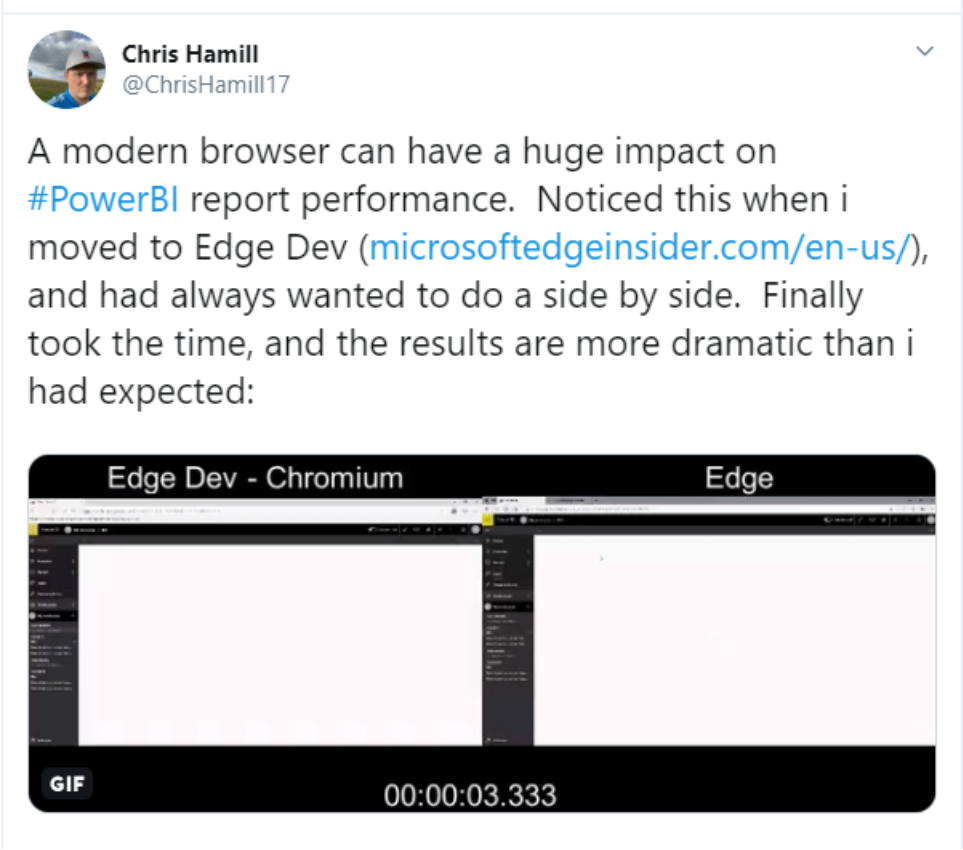
Bonus Round

Composite Models & Aggregations

- Composite models (and DirectQuery) require proper usage of DAX
  - Use these wisely
- Aggregations cost memory, data refresh time
  - Solve specific performance issues

Battle of the Browsers

- https://twitter.com/ChrisHamill17/status/1160242636369694720



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

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/
- 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://powerbihelper.org/
- 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/

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