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Benni De Jagere

Troubleshooting Power BI Report Performance



Benni De Jagere?

- Senior Data Insights Consultant
- Inetum-Realdolmen  Positive digital flow
- **dataMinds** .be, Co-leader
-  @BenniDeJagere
-  /bennidejagere
- #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

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 CFO)
- 40% Science, 40% Art, 20% Luck
- ***It depends!***

01

Hold on . .



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NOISY

faster!

Ohhh~

Ah!

YES!

NEIGHBORS



PowerBI.com

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

02

The Report Case



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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



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The Report(s)



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04

Inside Power BI Desktop



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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

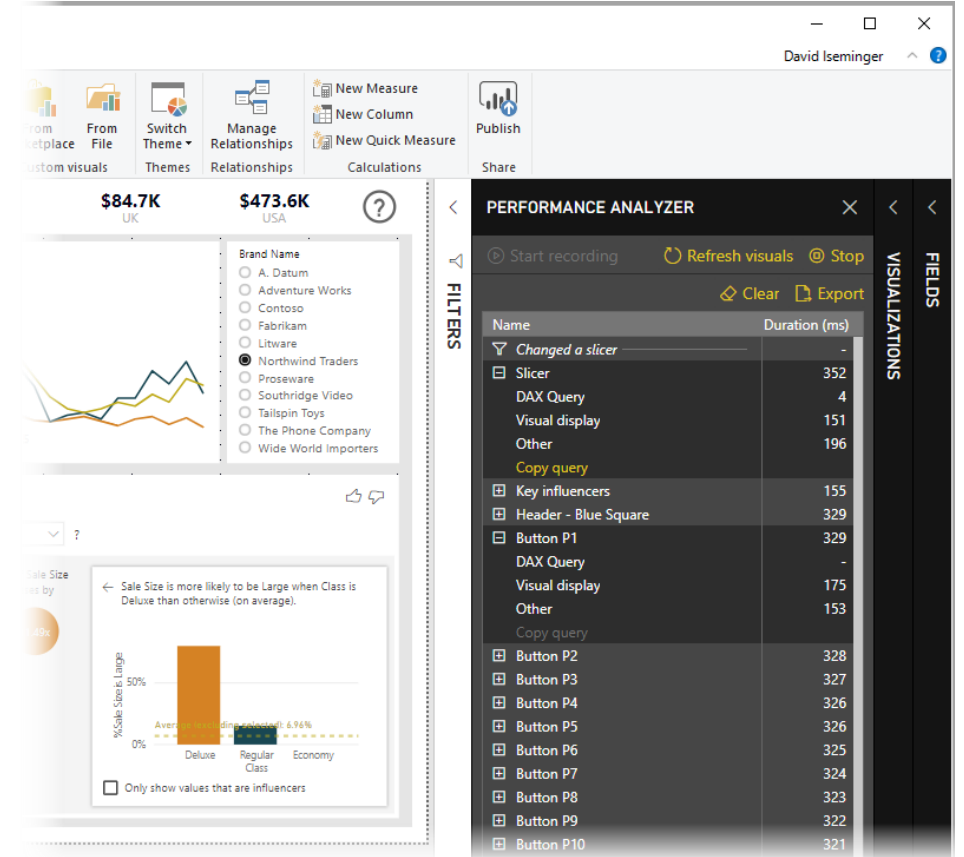
Tools for the Trade



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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
- VertiPaq Analyzer (SQLBI.com)
- Tabular Editor
- Power BI Helper
- External Tools ♥
- Power BI Field Finder v2
- Power BI Cleaner
- Power BI Sentinel (€)
- Power Query Diagnostics Tool
- And more ..

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The Tips & Best Practices



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The Golden Rule(s)

- Transform early
- Transform once
- Transform smart

Data Types

Data Types

- Don't underestimate the impact
- Do you really need date and time combined?
- Think about precision and scale

Auto Date/Time



Column / Row Usage

Modelling



Modelling Tips


STAR SCHEMA



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

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



Power Query

PowerQuery Tips

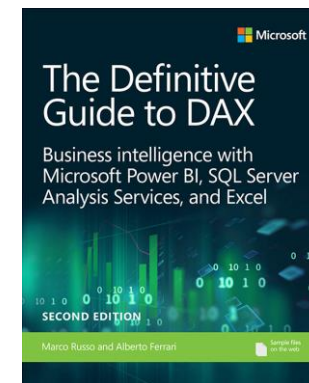
- Query Folding, when possible
- Don't repeat tables & fields
- Only load tables that are used in the model
- Specify correct Data Types
- Parameterize 'fact' queries (Date or Entity)

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 😊



Bonus² Round

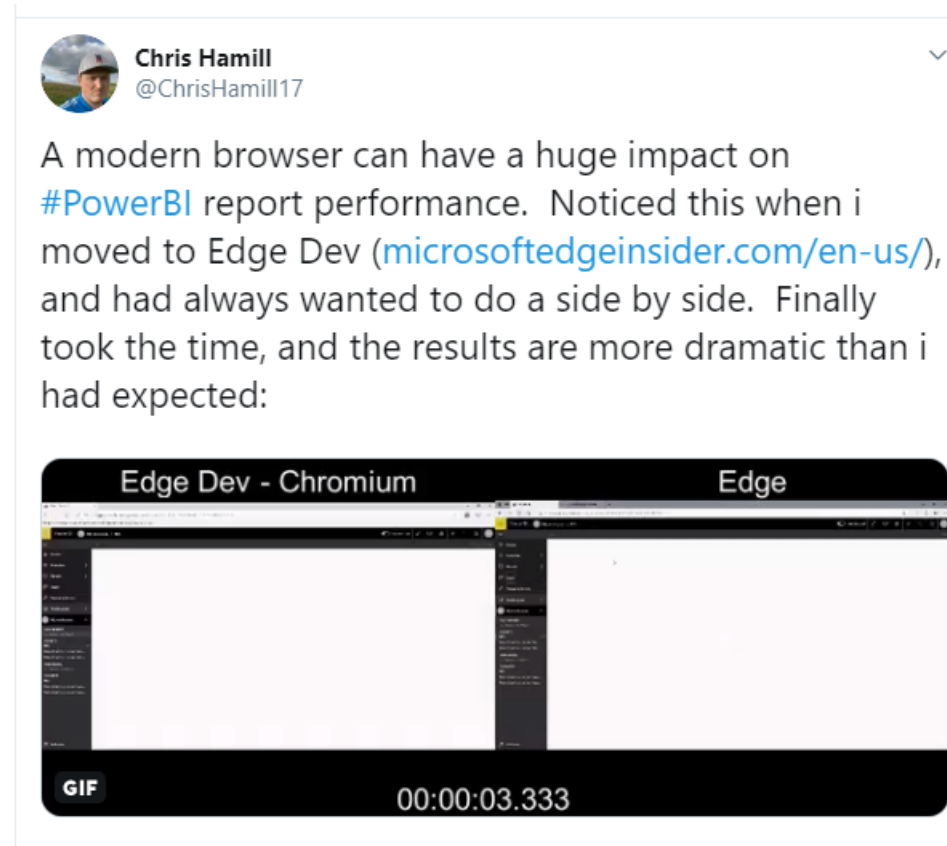


Composite Models & Aggregations

- 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/>

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_aBmgsgbGDZb7ydd8_LS1AfosdRndQ
- <https://powerbihelper.org/>

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/>

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