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SQLSATURDAY Belgium, Mechelen #SQLSatBe

# Troubleshooting your Power BI Report Performance

Benni De Jagere





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# Benni De Jagere?

- Senior Data Insights Consultant
- Realdolmen, a Gfi company 
- **dataMinds**.be
-  @BenniDeJagere
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# Session Objectives

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- 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?

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- 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!**



# Hold on ..



**MR NOISY  
NEIGHBOUR**

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



# PowerBI.com

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

# The Report Case

# Use Case



[https://elidesc.com/wp-content/uploads/2012/07/Velo\\_Antwerpen.jpg](https://elidesc.com/wp-content/uploads/2012/07/Velo_Antwerpen.jpg)

# New York Citibikes

- [www.citibikenyc.com/system-data](http://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>



# The Report(s)

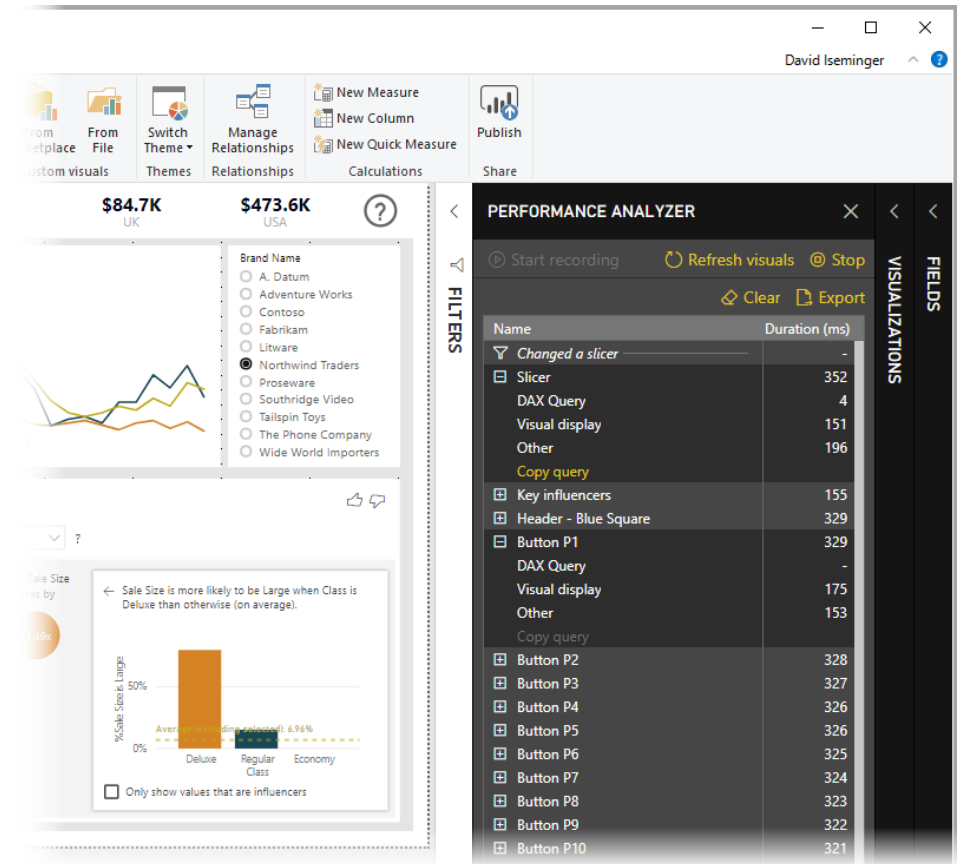
# Inside Power BI Desktop

A grayscale photograph of a large audience seated in a conference hall, facing a stage with presentation screens. The text "Inside Power BI Desktop" is overlaid in the center.



# 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>

# 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



# Tools for the Trade

# Tools for the Trade

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- 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 ..

# The Tips & Best Practices

# The Golden Rule(s)

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- Transform early
- Transform once
- Transform smart



# Data Types

A grayscale photograph of a large audience seated in a conference hall, facing a stage with a presentation screen. The text "Data Types" is overlaid in the center.

# Auto Date/Time

# Column/Row Usage

# Modelling

A grayscale photograph of a large audience seated in a conference hall, facing a stage with presentation screens. The word "Modelling" is overlaid in large black text.

# Modelling Tips

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**STAR SCHEMA**



Thanks, @KoVer ☺

# Modelling Tips

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- 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
- Try setting "Assume Referential Integrity" on relationships – in many cases, this setting significantly improves query performance.



# Modelling Tips (continued)

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- 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

# PowerQuery

A grayscale photograph of a large audience seated in a conference hall, facing a stage with presentation screens. The text "PowerQuery" is overlaid in the center.

# PowerQuery Tips

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- 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)

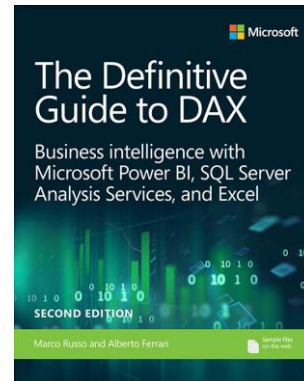
# DAX

A large audience is seated in a conference hall, facing a stage with two large projection screens. The word "DAX" is overlaid in the center of the image. The audience is diverse in age and appearance, and many are looking towards the stage. The room has a high ceiling with recessed lighting and large windows on the right side.

# DAX Tips

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- 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

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- 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

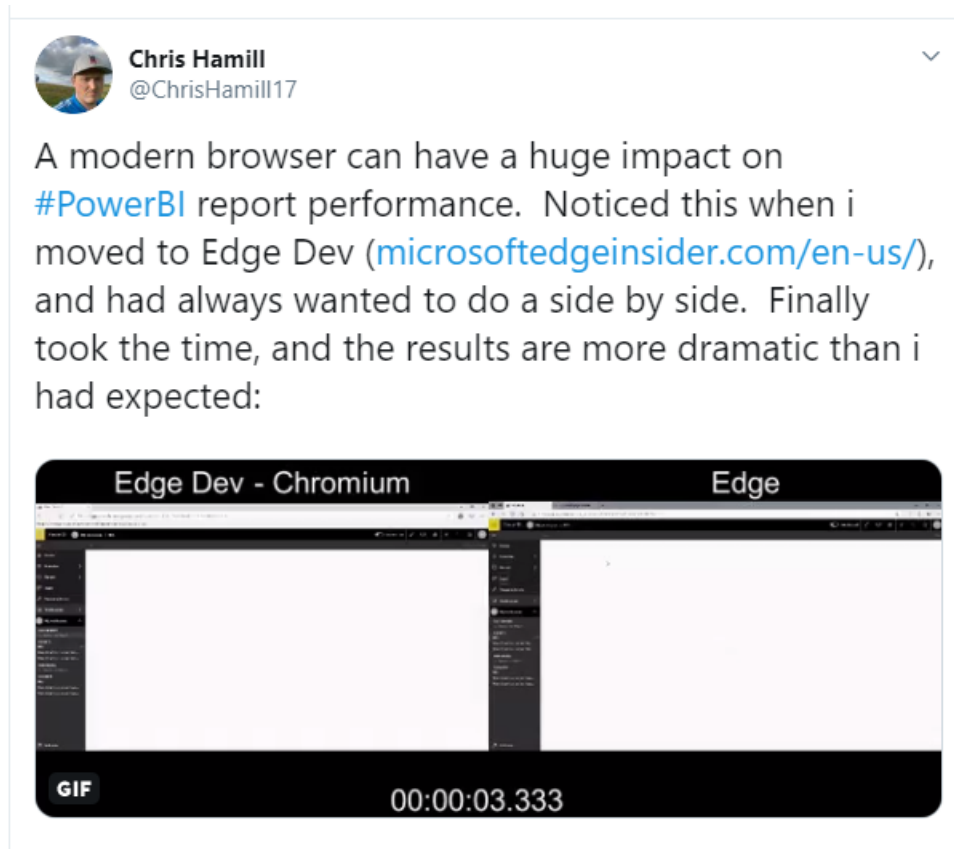
# Composite Models & Aggregations

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- 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

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- 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

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- <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

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- <https://www.sqlbi.com/tools/>
- <https://github.com/otykier/TabularEditor>
- <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.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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- #TeamOxfordComma





Thank you

