

# 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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# 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?

- 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!***

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Hold on . .



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# PowerBI.com

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**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 automatically solve performance issues
- Beware of Cache mechanisms



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# The Report Case

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# Use Case

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[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



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# The Report(s)

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# Inside Power BI Desktop

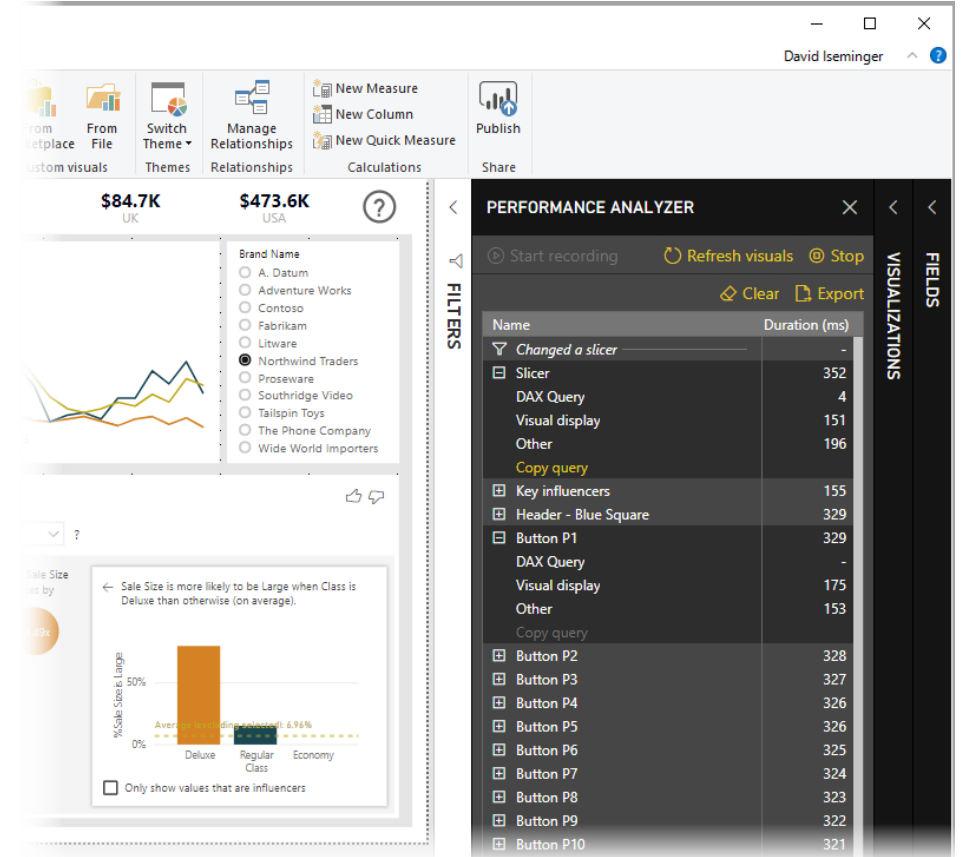
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# Performance Analyzer Pane

- 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>



# 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          |

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# Tools for the Trade

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# 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 ..

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# Tools for the Trade

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# The Tips & Best Practices

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# The Golden Rule(s)

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- Transform early
- Transform once
- Transform smart

# Data Types

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# Auto Date/Time

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# Column / Row Usage

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# Modelling

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# Modelling Tips

**STAR SCHEMA**



# 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

# 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

# Power Query



# 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

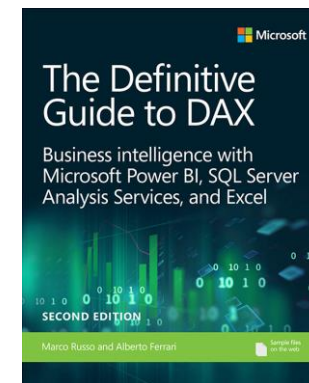
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# DAX Tips

- 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

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# 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

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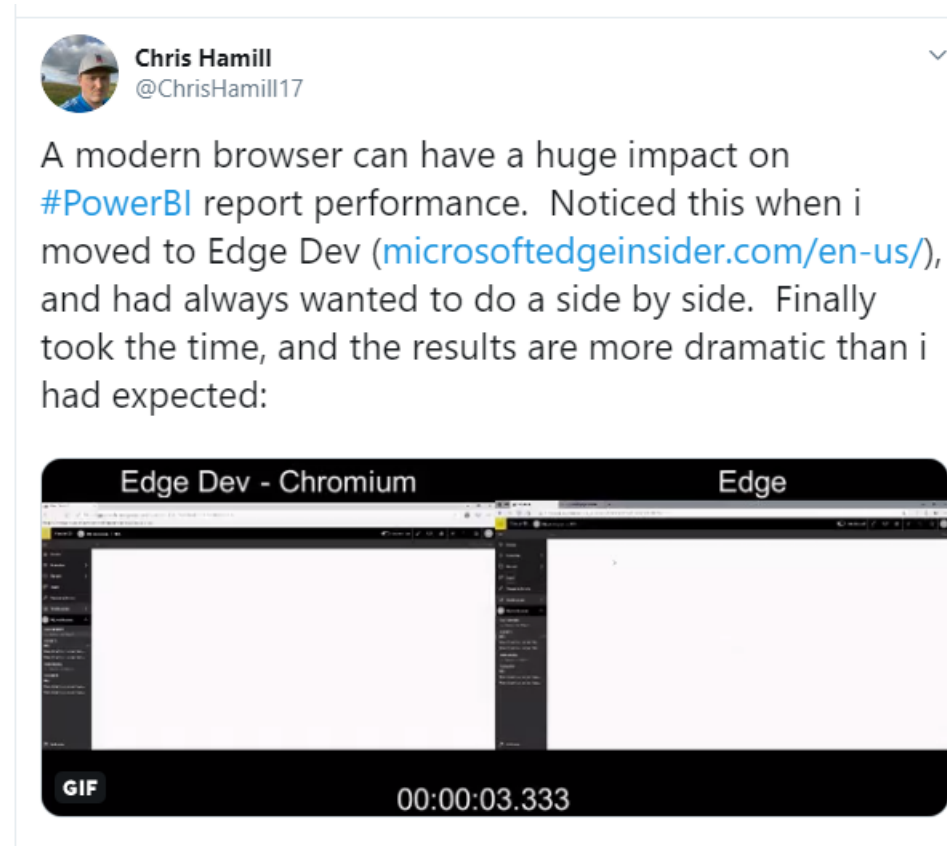
# Composite Models & Aggregations

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