Troubleshooting Power BI Reports

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in /bennidejagere

🐦 @bennidejagere

dataMinds.be
Drinks coffee
Fulltime Weirdo

#TeamOxfordComma
Knows Karate, and 3 other dangerous words

Session Objectives

- Leverage (external) options to pinpoint common causes
- Techniques to avoid, or solve
- Usable set of best practices

- **<u>NOT</u>** a DAX or PowerQuery Performance Deep Dive

Why Troubleshoot 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 CxO)
- 40% Science, 40% Art, 20% Luck
- ***It depends!***

Hold on ..

PowerBI.com

- 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

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New York Citibikes

- www.citibikenyc.com/system-data
- Public Open Data
- Starts June 2013
- Information about every trip
    - Longer than 60 seconds
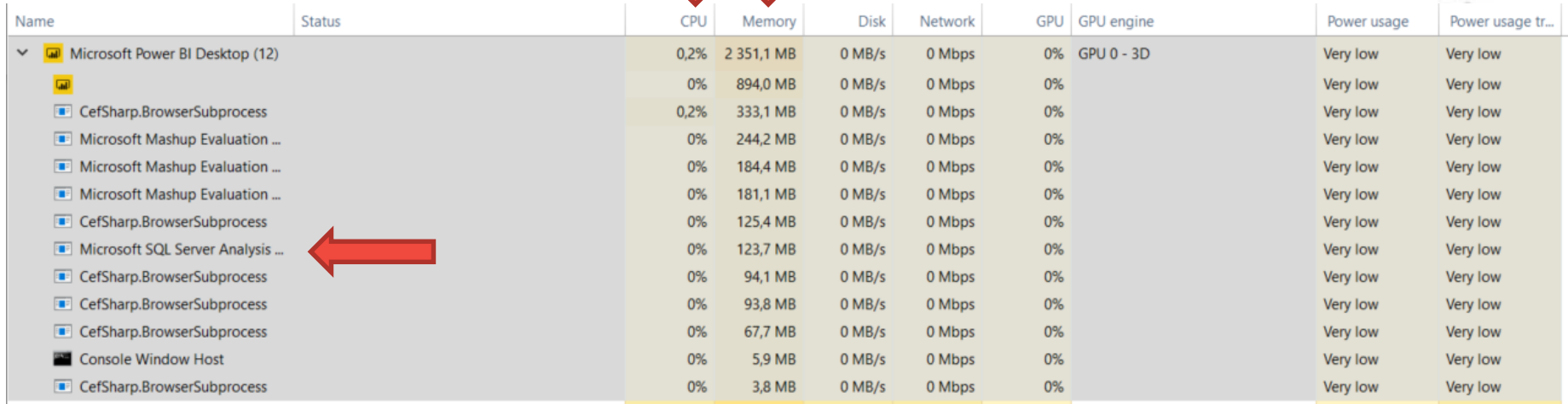   - Starts at public station
- Masterdata

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

DEMO

The Report(s)

Inside Power BI Desktop

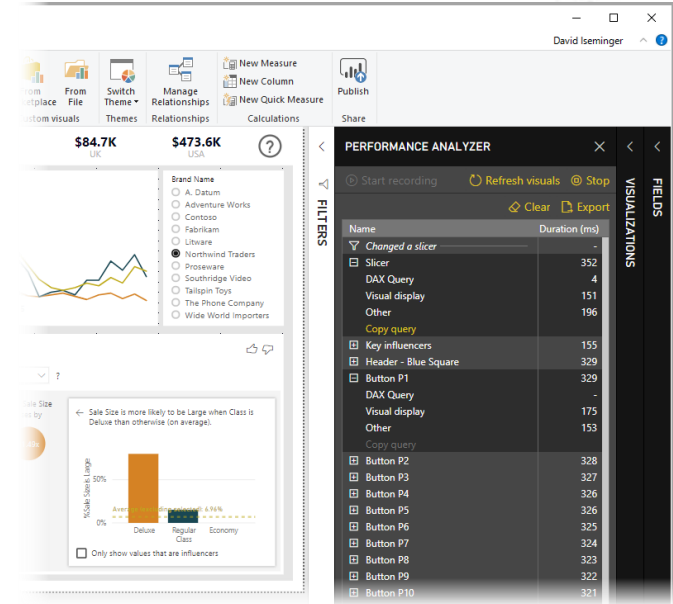| Name	Status	CPU	Memory	Disk	Network	GPU	GPU engine	Power usage	Power usage tr...
⌄ 📊 Microsoft Power BI Desktop (12)		0,2%	2 351,1 MB	0 MB/s	0 Mbps	0%	GPU 0 - 3D	Very low	Very low
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▣ Microsoft Mashup Evaluation ...		0%	184,4 MB	0 MB/s	0 Mbps	0%		Very 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

DEMO

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
- VertiPaq Analyzer (SQLBI.com)
- Tabular Editor
- Power BI Helper

- Power BI Field Finder
- Power BI Sentinel (€)
- Power Query Diagnostics Tool
- And more ..

The Tips & Best Practices

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

Data Types

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 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, ..)

Power Query

Power Query Tips

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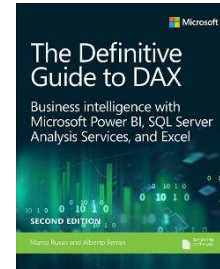- Parameterize 'fact' queries (by Date or Entity)

DAX

DAX Tips

- Avoid 'repeater' functions (SumX, AverageX, ..)
- Avoid calculated columns
- Keep measures simple initially, add complexity later
- Use variables
- Solve the model, then solve DAX
- Use Data Categories
- Read the Bible ☺
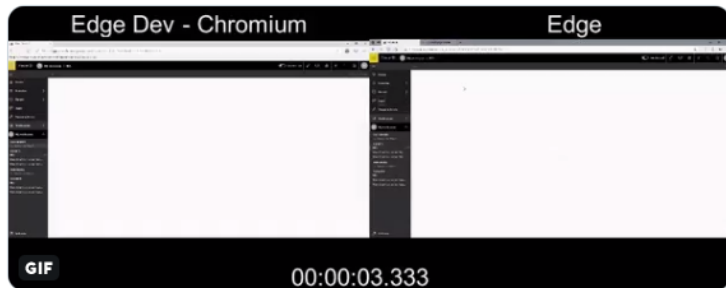
Bonus Round

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

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:

Edge Dev - Chromium   Edge

GIF   00:00:03.333

https://twitter.com/ChrisHamill17/status/116024263636969694720

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

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://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/

Session Evaluation

Submit before Friday, Nov. 20 at 5pm EST to win prizes

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Thank you

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