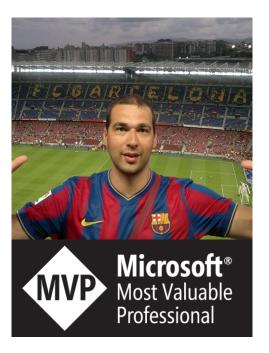
Cracking the Power BI Performance!



Nikola Ilic

Data Mozart, Microsoft Data Platform MVP





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- > I'm making music from the data!
- Power BI and SQL Server addict, Data Platform MVP, MCT, blogger, speaker...
- Father of 2, Barca & Leo Messi fan...





✓ Creating Power BI report is an easy task!











Where do I start?!

- 1. Data Model size
- 2. Data refresh process
- 3. DAX calculations
- 4. Visualization rendering time
- 5. Storage mode choice







- ✓ VertiPaq is a columnar database
- ✓ Data snapshot in memory
- ✓ Periodically refreshed

Formula Engine





Storage Engine











DATA MODEL SIZE BEST PRACTICES

- ✓ Reduce the amount of data for import
- ✓ Reduce the column cardinality
- ✓ Avoid using calculated columns
- ✓ Disable Auto Date/Time







Cardinality ~ 8.8 Million Column size ~ 455 MB

Cardinality ~ 1.300 Column size ~ 7 MB

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						subject		48	1,084,136	17,728	1,066,008	400	HASH	String



DATA REFRESH PROCESS



DATA REFRESH PROCESS

✓ Data transformations – currency conversion, filtering, calculations...

✓ Where do you shape the data?

✓ **QUERY FOLDING** = Ability to generate single SQL query to be executed on the data source side

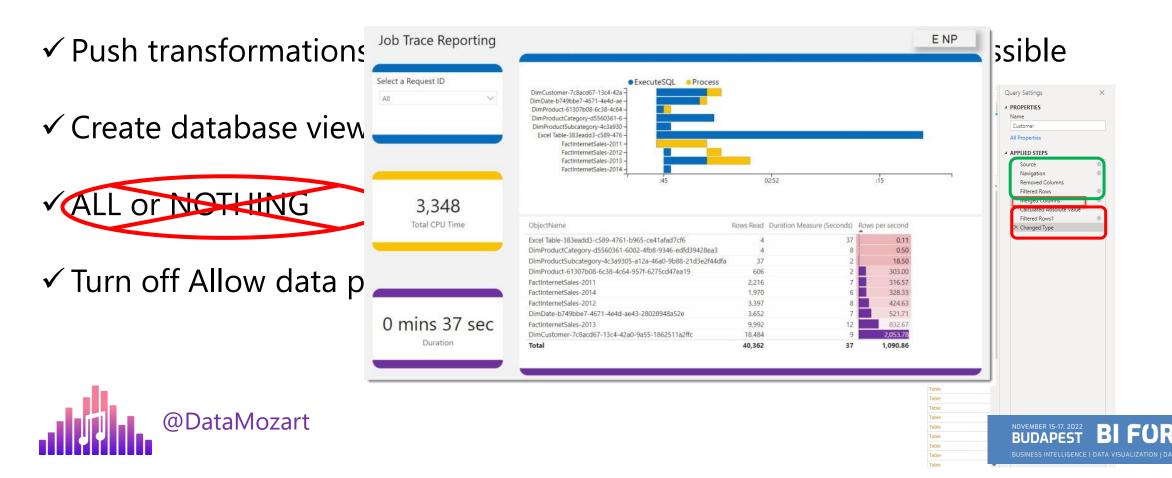






DATA REFRESH BEST PRACTICES

✓ https://dax.tips/2021/02/15/visualise-your-power-bi-refresh/



DATA REFRESH PROCESS GOLDEN RULE



"Push transformations and calculations as upstream as possible,

and as downstream as necessary!"

Matthew Roche







DAX CALCULATIONS



DAX CALCULATIONS

✓ Unique customers, top selling products, running totals...

✓ The "beauty" of DAX – get same result in multiple different ways

✓ Little nuances can make a huge difference!







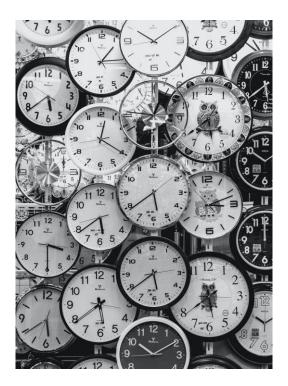
VISUALS RENDERING TIME



VISUALS RENDERING TIME

✓ Performance Analyzer feature in PBI Desktop

✓ The more visuals – the longer time for rendering!







VISUALS RENDERING BEST PRACTICES

- ✓ Reduce the number of visuals!
- ✓ Use PowerPoint to design background of Power BI report page
- ✓ Reduce the number of DAX query generated Card visuals->Matrix
- ✓ Display aggregated data by default, enable Drill-through for details
- ✓ Consider disabling cross-filtering
- ✓ Sync Slicers?



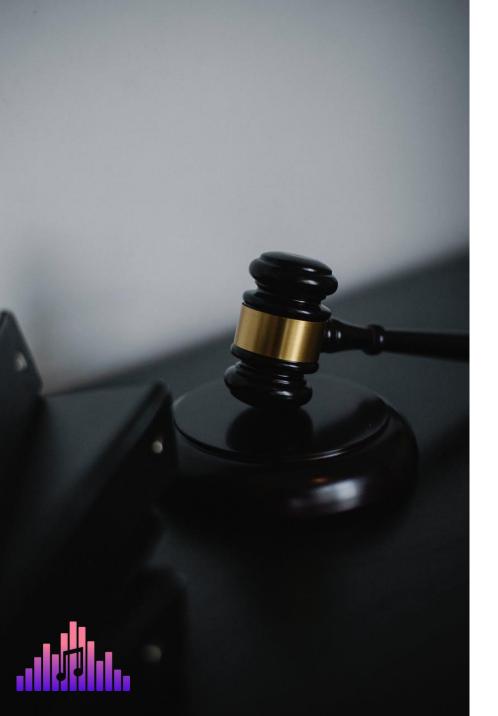


VISUALS RENDERING TIME

10 visuals = 10 queries Other???

2 queries = the same result! Design!

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STORAGE MODE DECISION



WHAT IS A DIRECT QUERY?!

✓ Data is retrieved from the source at the query time!

- ✓ Data resides outside of Power BI before, during, and after the query execution
- ✓ Direct Query will NEVER improve performance of your Power BI report!!!





WHEN TO USE A DIRECT QUERY ?!

- 1. Data is too large for Import mode
- 2. Real-time reporting requirements
 - Is it really necessary?
- 3. Security policies on the data source side



DIRECT QUERY BEST PRACTICES

Permissions on the data source?



- ✓ Create proper indexes
- ✓ Data integrity
- ✓ Persistent data objects



- ✓ Avoid complex PQ transformations
- ✓ Avoid complex DAX measures
- \checkmark Avoid relationship on GUIDs
- ✓ Limit parallelism and apply Query reduction
- ✓ Check Assume referential integrity



DIRECT QUERY BEST PRACTICE!



AVOID DIRECT QUERY IF POSSIBLE!







MONDAY TO-DO LIST

- ✓ Identify the poor performing area(s)
- ✓ Remove unnecessary data
- ✓ Check Query folding
- \checkmark Be mindful when writing DAX
- \checkmark Reduce the number of visuals on the page
- ✓ Stay away from Direct Query!









QUESTIONS



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THANK YOU!





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