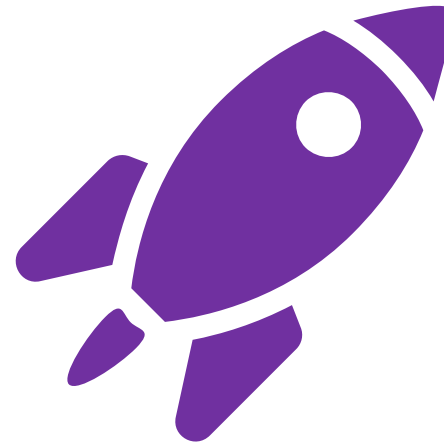


Cracking the Power BI Performance!



Nikola Ilic

Data Mozart, Microsoft Data Platform MVP

NOVEMBER 15-17, 2022

BUDAPEST BI FORUM

BUSINESS INTELLIGENCE | DATA VISUALIZATION | DATA ANALYTICS



Nikola Ilic

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PLURALSIGHT



- *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...

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BUDAPEST BI FORUM

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✓ Creating Power BI report is an easy task!



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Where do I start?!

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



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DATA MODEL SIZE



DATA MODEL SIZE

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

Formula Engine



Storage Engine



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DATA MODEL SIZE



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DATA MODEL SIZE BEST PRACTICES

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



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DATA MODEL SIZE

Cardinality ~ 8.8 Million
Column size ~ 455 MB

Cardinality ~ 1.300
Column size ~ 7 MB

DAX Studio -

1 Enter your DAX query here...

Log Results History **VertiPaq Analyzer**

Tables	Name	Cardinality	Total Size ↓	Data	Dictionary	Hier Size	Encoding	Data Type
Columns	Chats	9,292,338	551,891,644	80,984,232	358,000,596	112,906,816	Many	-
Relationships	datetmStartUTC	8,836,161	454,846,712	26,177,720	357,979,696	70,689,296	HASH	DateTime
Partitions	chatID	9,292,338	64,745,320	27,575,824	136	37,169,360	VALUE	Int64
Summary	customerID	1,261,875	32,195,232	27,147,592	136	5,047,504	VALUE	Int64
	productID	31	67,132	65,416	1,460	256	HASH	Int64
	subject	48	37,112	17,680	19,032	400	HASH	String

DAX Studio

1 Enter your DAX query here...

Log Results History **VertiPaq Analyzer**

Tables	Name	Cardinality	Total Size	Data	Dictionary	Hier Size	Encoding	Data Type
Columns	Chats	9,292,338	106,067,164	62,686,304	1,152,476	42,228,384	Many	-
Relationships	chatID	9,292,338	64,745,320	27,575,824	136	37,169,360	VALUE	Int64
Partitions	customerID	1,261,875	33,458,160	28,410,520	136	5,047,504	VALUE	Int64
Summary	datetmStartUTC	1,356	6,710,736	6,615,272	84,600	10,864	HASH	DateTime
	productID	31	68,676	66,960	1,460	256	HASH	Int64
	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



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DATA REFRESH BEST PRACTICES

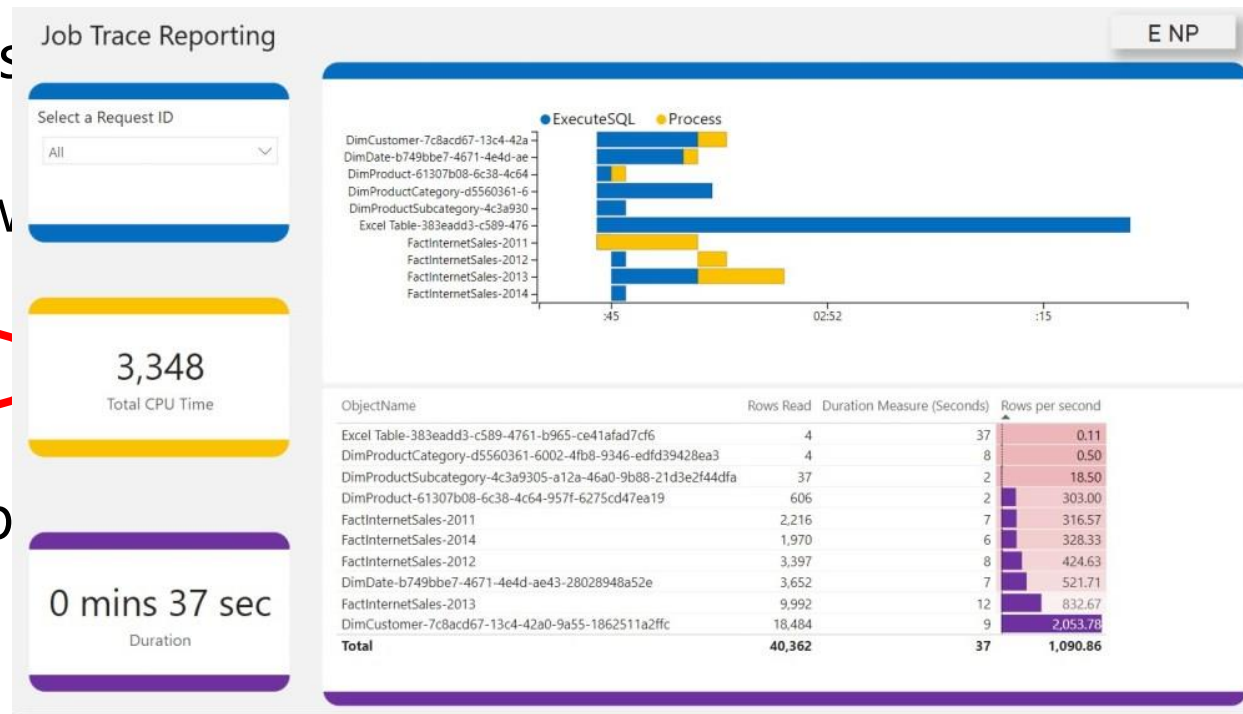
✓ <https://dax.tips/2021/02/15/visualise-your-power-bi-refresh/>

✓ Push transformations

✓ Create database view

✓ ~~ALL or NOTHING~~

✓ Turn off Allow data p



ossible

Query Settings

PROPERTIES

Name: Customer

APPLIED STEPS

- Source
- Navigation
- Removed Columns
- Filtered Rows
- Merged Columns
- Calculated Absolute Value
- Filtered Rows1
- Changed Type



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DATA REFRESH PROCESS GOLDEN RULE



*„Push transformations and calculations as upstream as possible,
and as downstream as necessary!”*

Matthew Roche



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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!



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VISUALS RENDERING TIME

VISUALS RENDERING TIME

- ✓ Performance Analyzer feature in PBI Desktop
- ✓ The more visuals – the longer time for rendering!



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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?

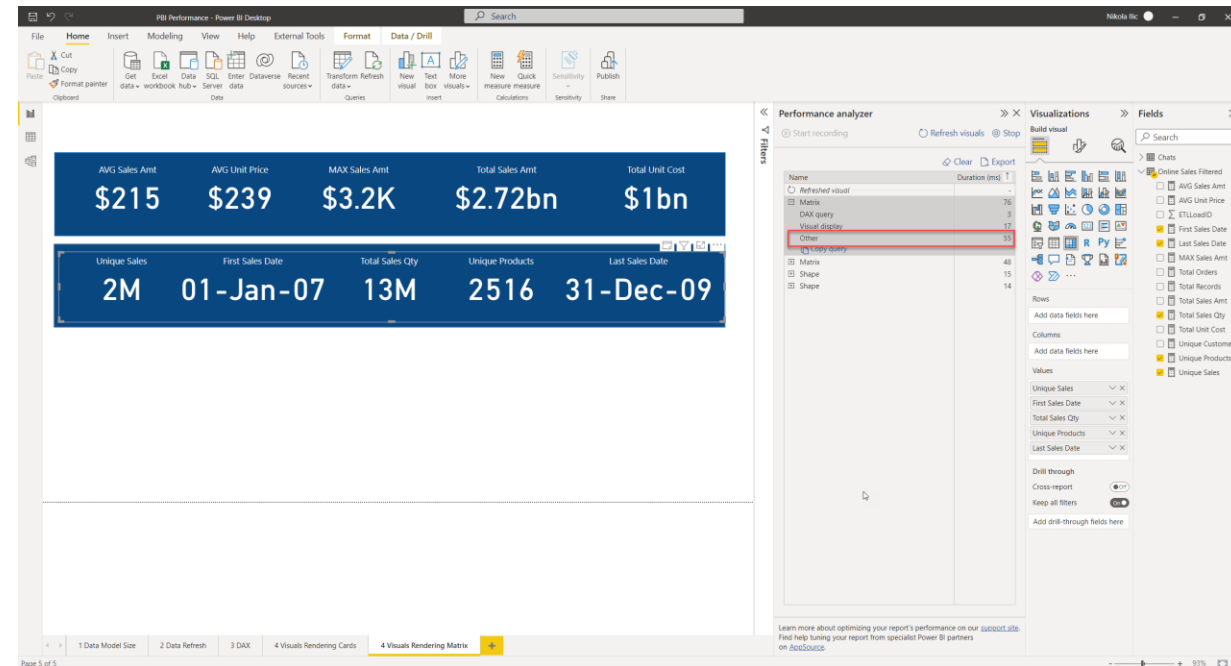
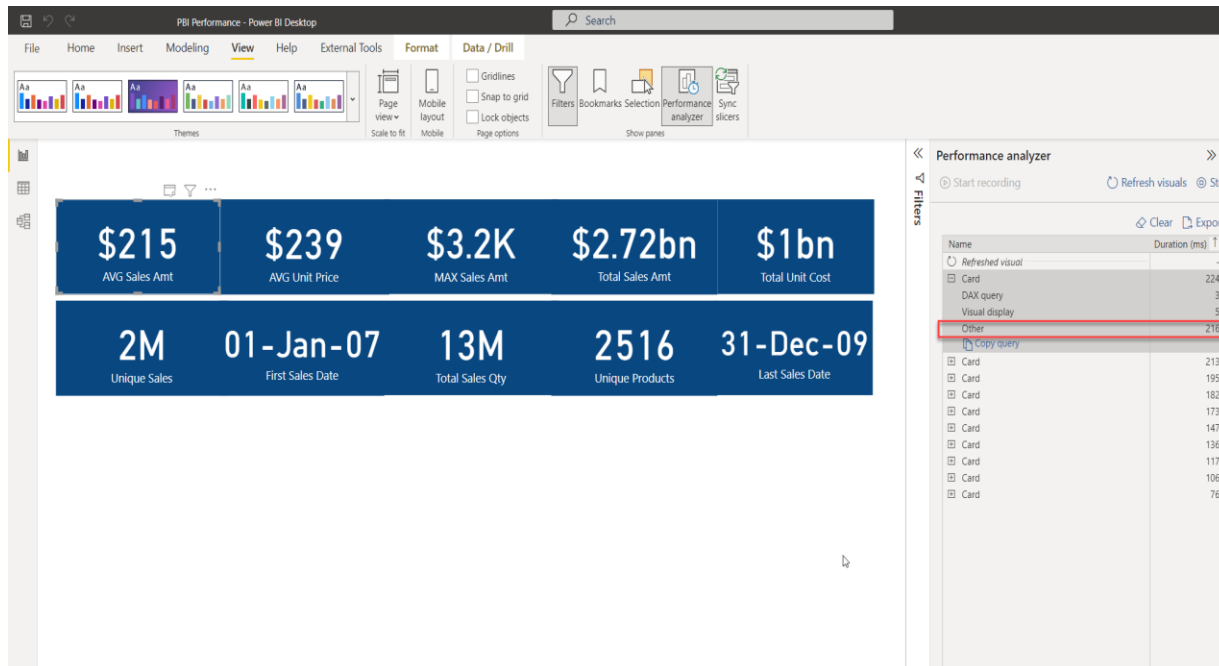


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VISUALS RENDERING TIME

10 visuals = 10 queries
Other???

2 queries = the same result!
Design!





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!!!



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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



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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
- ✓ Avoid relationship on GUIDs
- ✓ Limit parallelism and apply Query reduction
- ✓ Check Assume referential integrity



DIRECT QUERY BEST PRACTICE!



AVOID DIRECT QUERY IF POSSIBLE!



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MONDAY TO-DO LIST

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

Checklist



Yes



No





QUESTIONS



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THANK YOU!



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