



Slides

Keeping the “Direct” in Power BI DirectQuery

When gathering requirements for your new model and reports, you've probably heard it before.. "We want to get real-time results from our source", or "We don't want to store data in Power BI, because it's already in the cloud". Maybe the stakeholders don't want to wait for that model refresh that will take way too long in their opinion. Who knows, plenty of arguments have been raised before, some with more sense than others. Having worked through my fair share of troubleshooting scenarios, I noticed some recurring themes when DirectQuery was at play.

Using a DirectQuery connectivity mode in Power BI allows you to achieve great results, if executed correctly. With less room for error and interpretation, a DirectQuery approach requires the different cogs in the chain to work well together, to ensure a smooth process.

During this session, we'll discuss some of the common patterns that make opting for a DirectQuery approach a valid scenario. Then, we'll make sure we cover the best practices around optimizing the data source, data model, and reports, so we can keep our query performance at an optimal level. Then, we'll discuss how advanced modelling techniques like Hybrid Tables, Composite Models, Aggregation Tables, and Auto Aggregations can make this scenario a bit more robust.

Last but not least, we'll also discuss the practical usage details you have to educate your end users on, as a report in DirectQuery will be more prone to reduced performance by end user interactions.

Keeping the “Direct” in Power BI DirectQuery

Benni De Jagere

De Power BI Gebruikersdagen worden mede mogelijk gemaakt door:



PLATINUM

delaware



ilionx



GOUD



Voorblijven. Niet bijblijven.

KASPAROV
FINANCE & BI

macaw



GET
RESPONSIVE

ZILVER

VICTA
BUSINESS INTELLIGENCE



Motion10
AN HSO COMPANY



VALID
STAY AHEAD



valcon

iqb̄s

Quanto
collective analytics

COMMUNITY



DashData.

volda;
INFORMATIESPECIALISTEN

Power BI
Connector by DAVISTA

AZURROFINANCE



Benni De Jagere

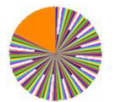
Senior Program Manager | Power BI Customer Advisory Team (PBICAT)



dataMinds



sessionize



Power BI CAT

.be Member

@BenniDeJagere

/bennidejagere

/bennidejagere

/bennidejagere

#SayNoToPieCharts



OUR TEAM activities

We engage with strategic Power BI customers and the sales professionals supporting them to showcase and provide technical guidance, help drive product adoption and consumption and influence our engineering roadmap.

BDM SHOWCASE

We own demo resources for CxO-level conversations

PATTERNS & PRACTICES

We curate content on cross-cutting technology topics

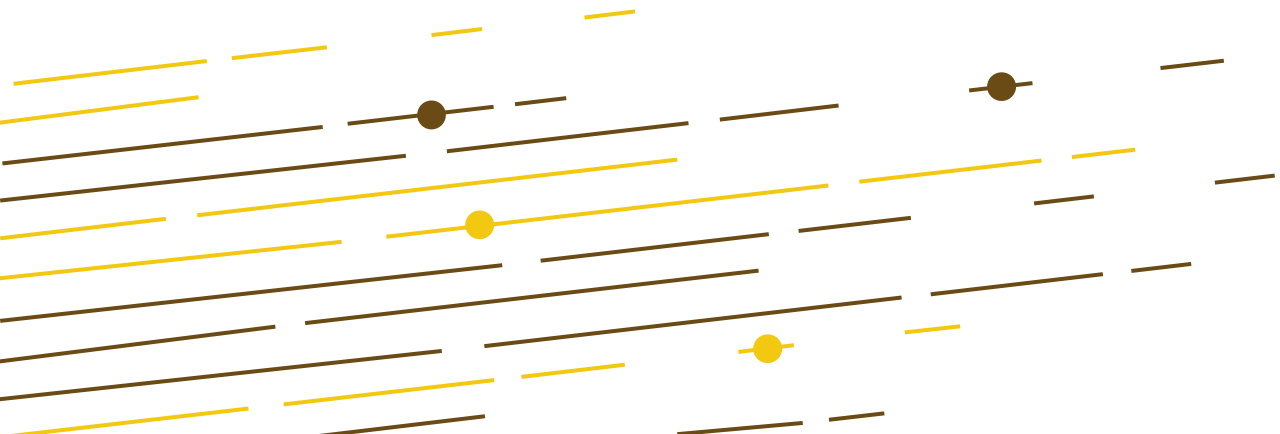
FIELD SUPPORT

We support technical escalations & training opportunities

ENGINEERING FEEDBACK

We influence the products roadmap via feedback rhythms

Session Objectives

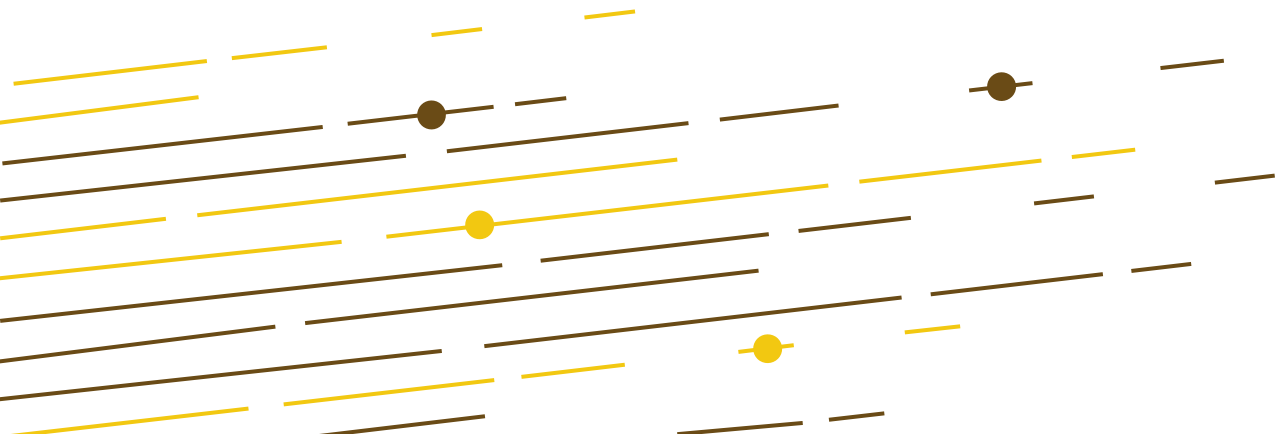


Session Objectives

- Assess problem areas
- Discuss different cogs in the chain
- Help you make better design decisions

Disclaimer: Benchmark your own scenario and results

Where does DirectQuery shine?



Reasons for opting for DirectQuery

Data is too large to import

Data changes too frequently to refresh

Data Sovereignty restrictions apply

Data Source has complex security roles

Data Exploration scenarios

Philosophical reasons..

But what's the catch?

It's not easy

- DirectQuery scenarios are typically harder to investigate
- Schema changes have an immediate impact

Power BI is 'chatty'

- Data Source handles incoming requests
- Response time of 3 seconds or less

Query Folding applies

- All transformations need to be transformed into source appropriate SQL
- Beware of source specific functionalities

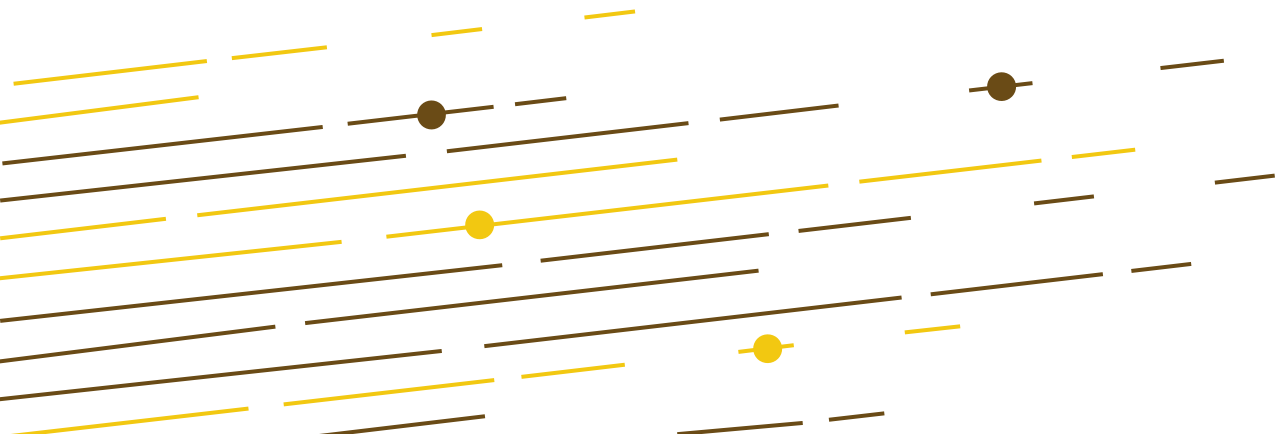
Scoped set of DAX

- Not all transformations are available
- Especially 'Time Intelligence' is more complicated

User Education matters

- End users need to be briefed on the implications for their actions

Where does it hurt?



User inspired quotes

"My report is slow. Fix it."

"Why can't I see anything on my screen?"

"Seriously, is this the best we can do?"

"I could build a faster report in Crystal Reports"

A man with dark, curly hair is sitting at a desk in a cluttered room, talking on a white corded telephone. He is wearing a white t-shirt with red text that partially reads "RT M". He has a watch on his left wrist. The room is filled with various items, including a large cardboard box, a small figurine, and a book titled "Source". The background is a wall with a white flower decoration and a poster.

**HELLO, IT, HAVE YOU TRIED
TURNING IT OFF AND ON AGAIN?**

What's your tool of choice?

[Performance Analyzer Pane](#)

[DAX Studio](#)

[VertiPaq Analyzer \(SQLBI.com\)](#)

[Tabular Editor](#)

[Report Analyzer](#)

[Power BI Helper](#)

[Bravo](#)

[ALM Toolkit](#)

[Power BI Field Finder](#)

[Power BI Sentinel \(€\)](#)

[Power Query Diagnostics Tool](#)

[Power BI Sidetools](#)

[Power BI Cleaner](#)

[PBI Tools](#)

And more ..



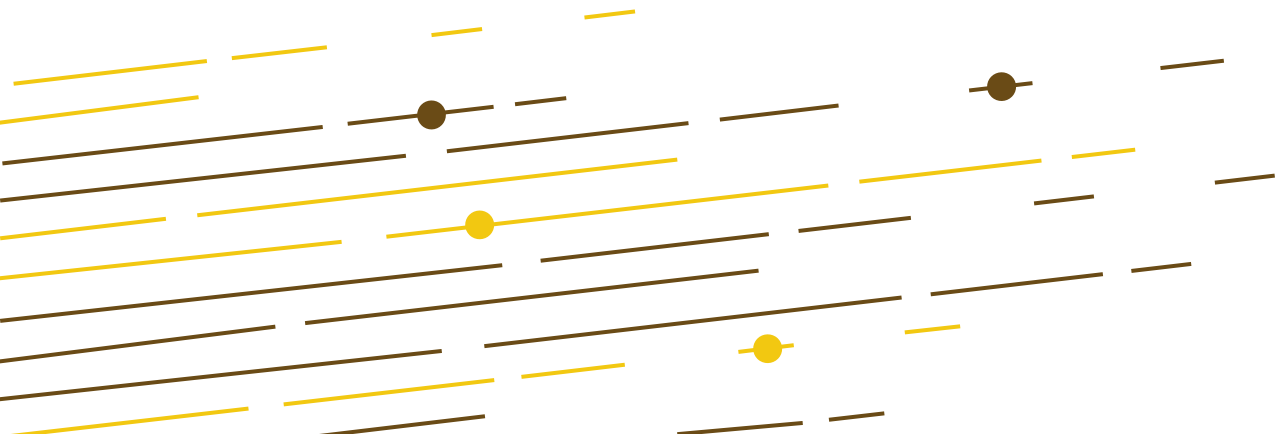
Power BI Performance Analyzer Pane

DAX Studio

SQL Profiler



Data Source



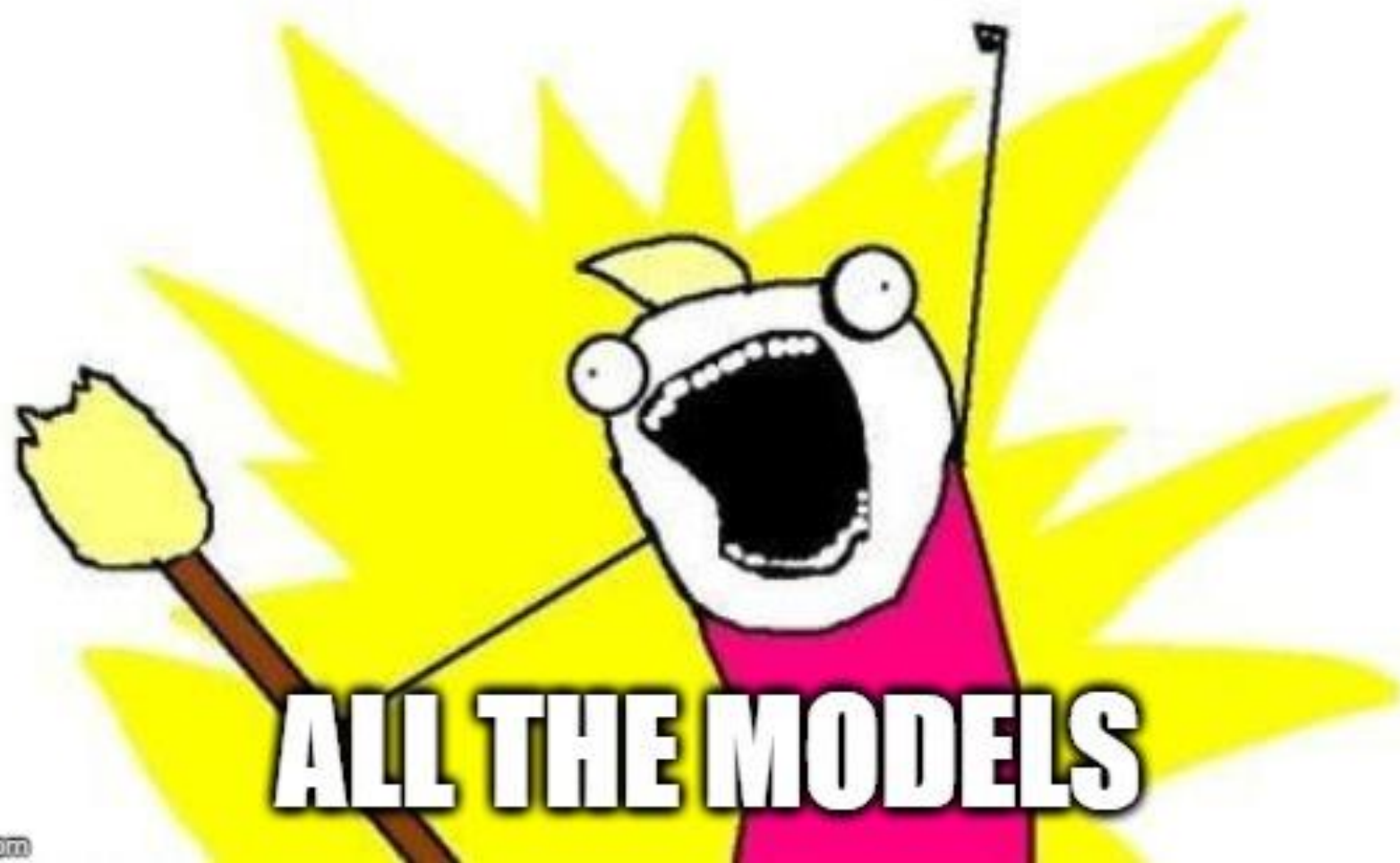
Is your data source ..

Scaled/Sized?	Data Typed?
Modelled?	Caching Results?
Materialized?	Data Integrity?
Indexed?	Limiting access to objects?
Partitioned?	Serverless?

Power BI Dataset (The Model)



STAR SCHEMA



imgflip.com

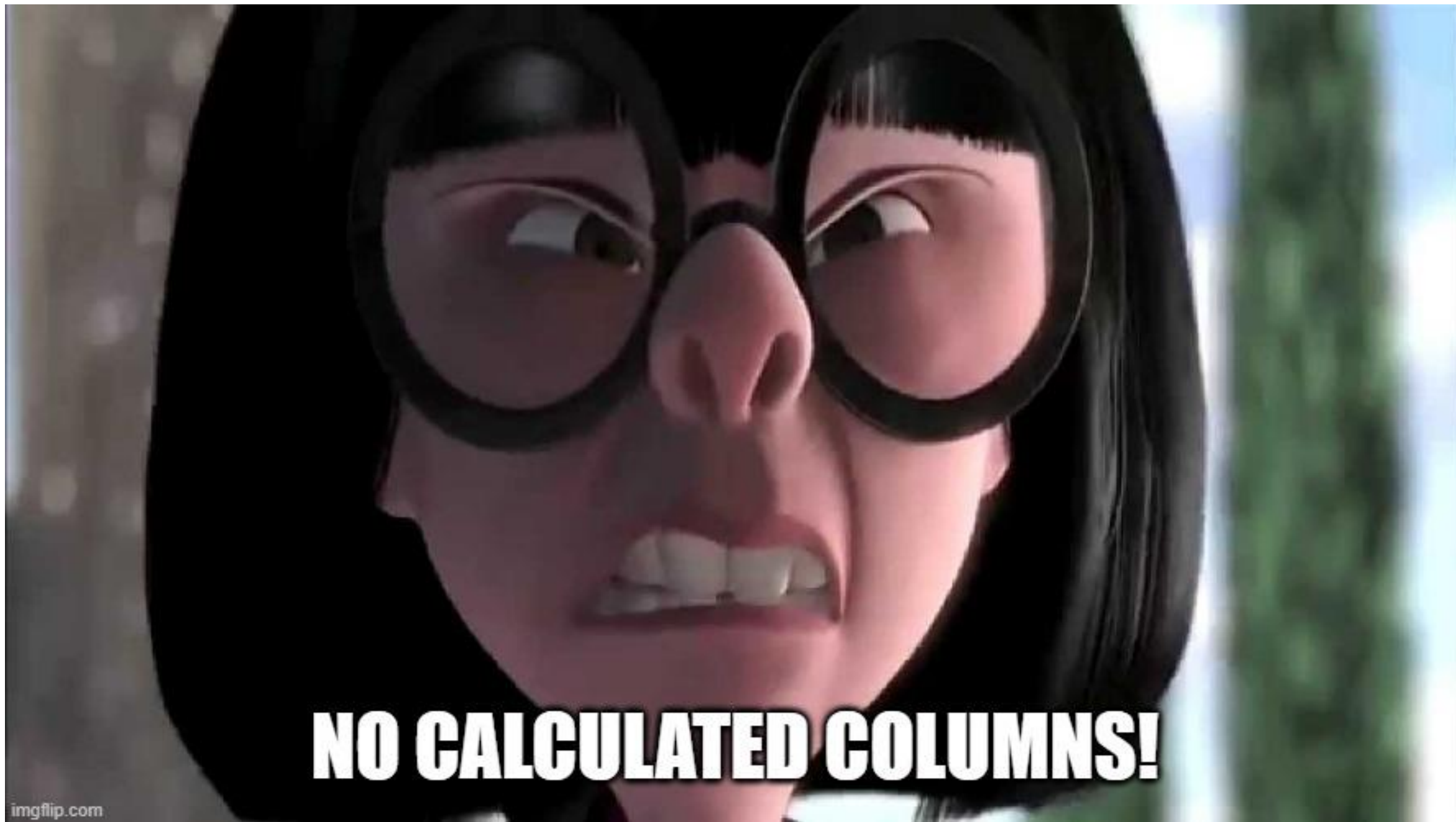
Thanks, @KoVer!

Data should be transformed as far upstream as possible, and as far downstream as necessary.

Matthew Roche, 2021

(The purple haired sword aficionado)

<https://ssbipolar.com/2021/05/31/roches-maxim>



NO CALCULATED COLUMNS!

PowerQuery & Relationships

Push Data Transformations to the source

'Assume Referential Integrity'

Opt for Dual (or Import) mode for dimension tables

Avoid

- bi-directional filtering
- many-to-many relationships
- snowflake dimensions

Model

Keep things simple

Complex DAX is often due to modeling deficiencies


Make your Date dimension ☆ shine ☆

Hide the 'one-side' of the relationship



- Filtering on the fact generates poor queries

Properties

Consider the Maximum Data Connections

- 10 connections by default
- 30 connections when using ()

Advanced:

- Premium Capacity Workload Settings ()
- Analysis Services Server Properties ()

!! Use with caution !!

Capacity – Workload Settings

DATASETS

Observe XMLA-based workspace settings (which may override capacity settings)

☒ On

Query Memory Limit (%)

Query Timeout (seconds)

Max Intermediate Row Count

Max Result Row Count

Max Offline Dataset Size (GB)

Automatic page refresh

☒ On

Minimum refresh interval

Seconds ▾

Change detection measure

☒ On

Minimum execution interval

Seconds ▾

XMLA Endpoint

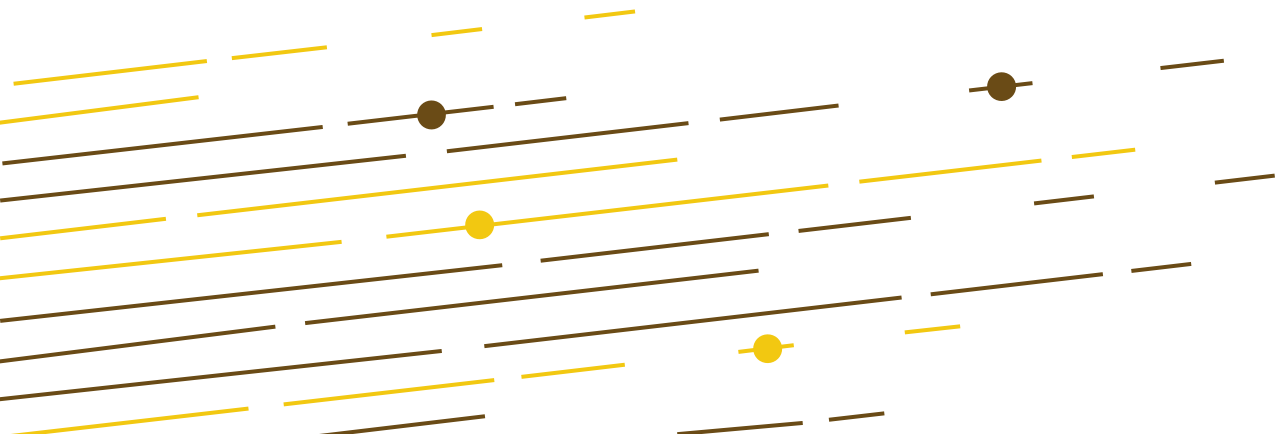
Read Write ▾



PQ & Model



Power BI Reports



Be mindful of your Filters and Visuals

Measure filters

Generates multiple queries

Fact attribute filters

Filters over fact table, when elimination through dimension could be enough

TopN

Generates multiple queries

Median

Not supported as aggregate by sources

Multi-Select

Each new selection launches queries to datasource

Visual Totals

Generates multiple queries

Query Reduction Techniques

Visual Interactions

Apply Filters

Apply Slicers

Where do you filter?

Report Tips

Limit number of visuals (and objects!)

Be mindful of level of detail & granularity

Visible objects get rendered

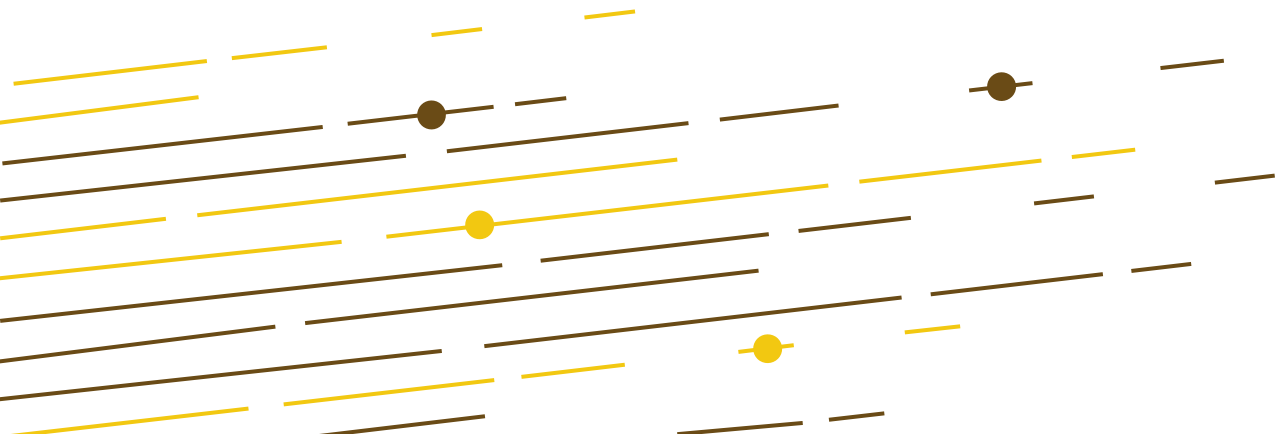
- Bookmarks
- Drill Down
- Drill Through
- Page Navigation



Power BI Report



User Education



User Education

Benchmark, Set expectations

Filter first, details later

Benchmark, Set expectations

"Chatty" users can overload a data source

Analyze in Excel over DirectQuery is killer

Kicking it up a notch



Look into these functionalities

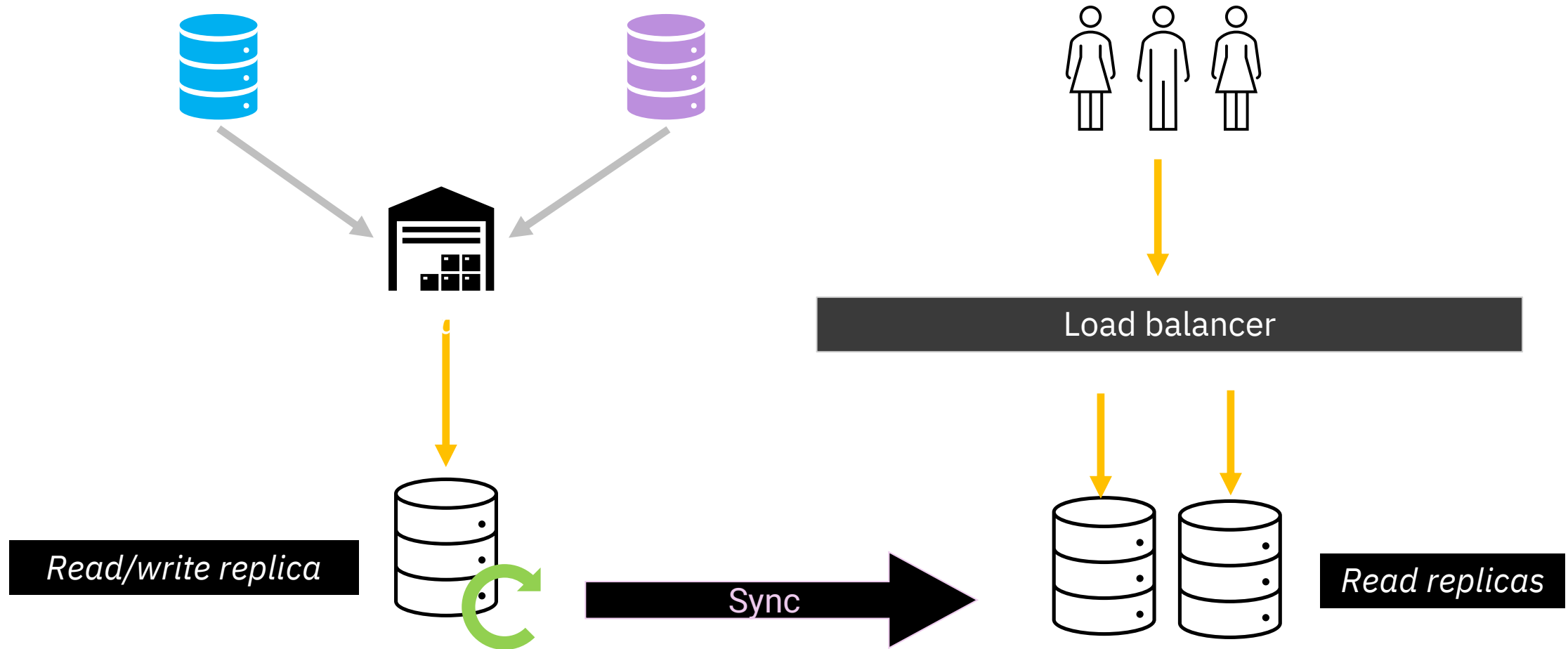
Composite Models

User-Defined Aggregations

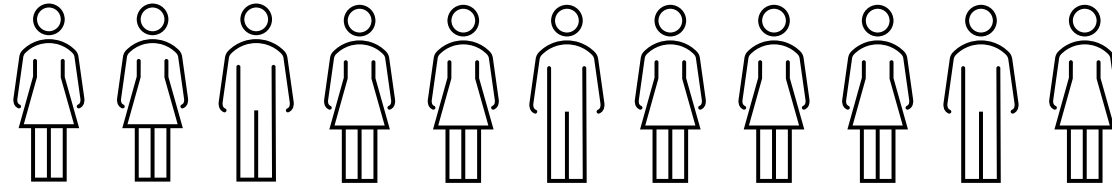
Automatic Aggregations ()

Hybrid Tables

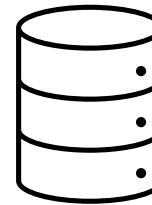
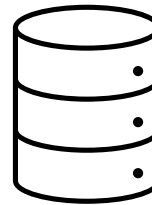
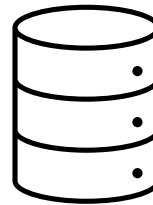
QSO - Refresh isolation



QSO – High Concurrency - *planned by GA*



Load balancer



No need to:

- Analyze usage for optimum scale out design
- Create and manage scripts for scale out

Responds to unforeseen usage patterns

Plan to be on by default!

Resources

- <https://blog.crossjoin.co.uk/2023/01/02/why-dax-window-functions-are-important-for-performance-in-power-bi-directquery-mode/>
- <https://medium.com/snowflake/best-practices-for-using-power-bi-in-directquery-mode-with-snowflake-bfd1312ca7ab>
- <https://learn.microsoft.com/en-us/power-bi/guidance/directquery-model-guidance>
- <https://learn.microsoft.com/en-us/power-bi/guidance/star-schema>
- <https://blog.crossjoin.co.uk/2021/05/02/measuring-directquery-performance-in-power-bi/>



Slides



https://github.com/BenniDeJagere/Presentations/{Year}/{YYYYMMDD}_{Event}





Thank you

