



# 2 Power BI Storage Modes, 1 Dataverse: Tips and Tricks to Optimize your Reports

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# Agenda

- The Recipe for a Good Report 🍳 👨‍🍳 🍷
- Dataverse and the Options:
  - 1 Import
  - 2 DirectQuery
  - 3 Composite
- Demo Time! 🎥
- Closing Thoughts 🤔
- Q&A 🙋 🙋



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# What makes for a good report?

It's all in the ingredients... 🍅 🍄 🍫 🥚

- Whip together a good base sauce by choosing the most optimal storage mode.
- Use the right ingredients to create something delicious:
  - Fact tables + Dimension tables = Star Schema 😊
- Don't order off the menu:
  - If real-time access isn't needed, why implement it?
- Cook like Joel Robuchon 🍳, not Ronald McDonald 🍔
  - SELECT \* is the enemy...
  - ...WHERE is your best friend

# Data Modelling Techniques

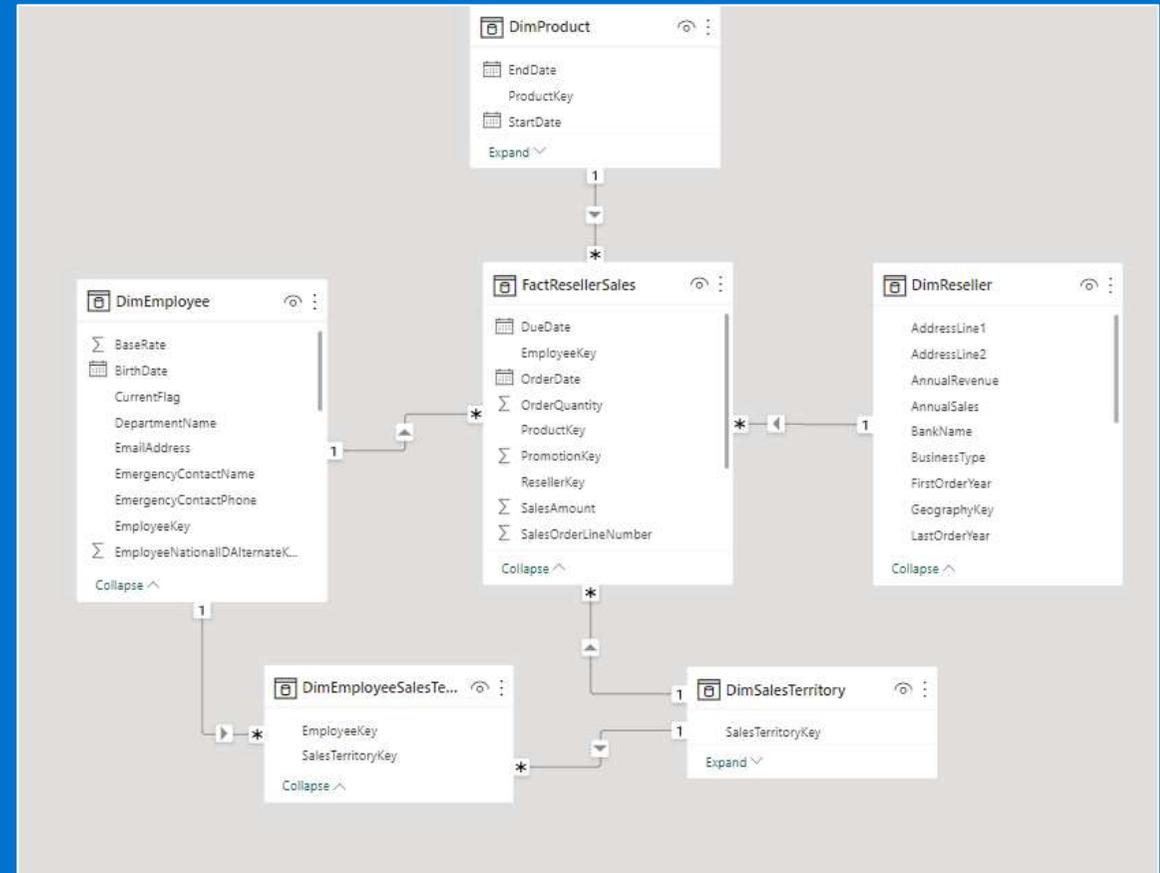
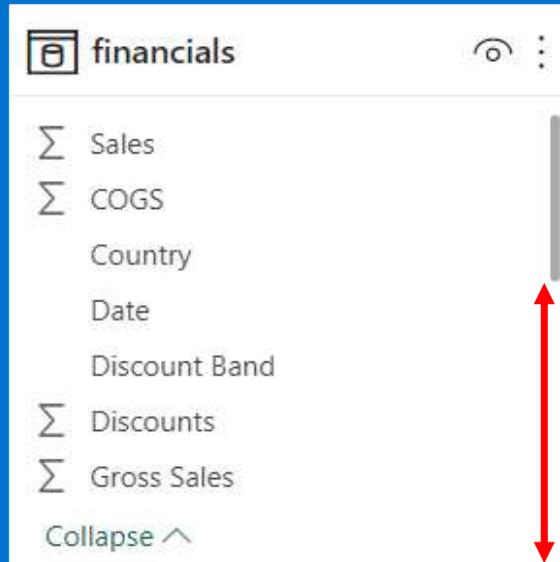
Fact tables are activities or events

Dimension tables provide the details.

Column Name	Data Type	Is Key
DueDate	date	No
EmployeeKey	int	Yes (Foreign Key)
OrderDate	date	No
OrderQuantity	numeric	No
ProductKey	int	Yes (Foreign Key)
PromotionKey	numeric	No
ResellerKey	numeric	No
SalesAmount	numeric	No
SalesOrderLineNumber	numeric	No

Column Name	Data Type	Is Key
BaseRate	numeric	No
BirthDate	date	No
CurrentFlag	numeric	No
DepartmentName	text	No
EmailAddress	text	No
EmergencyContactName	text	No
EmergencyContactPhone	text	No
EmployeeKey	int	Yes (Primary Key)
EmployeeNationalIDAlternateK...	numeric	No

# Understanding star schemas



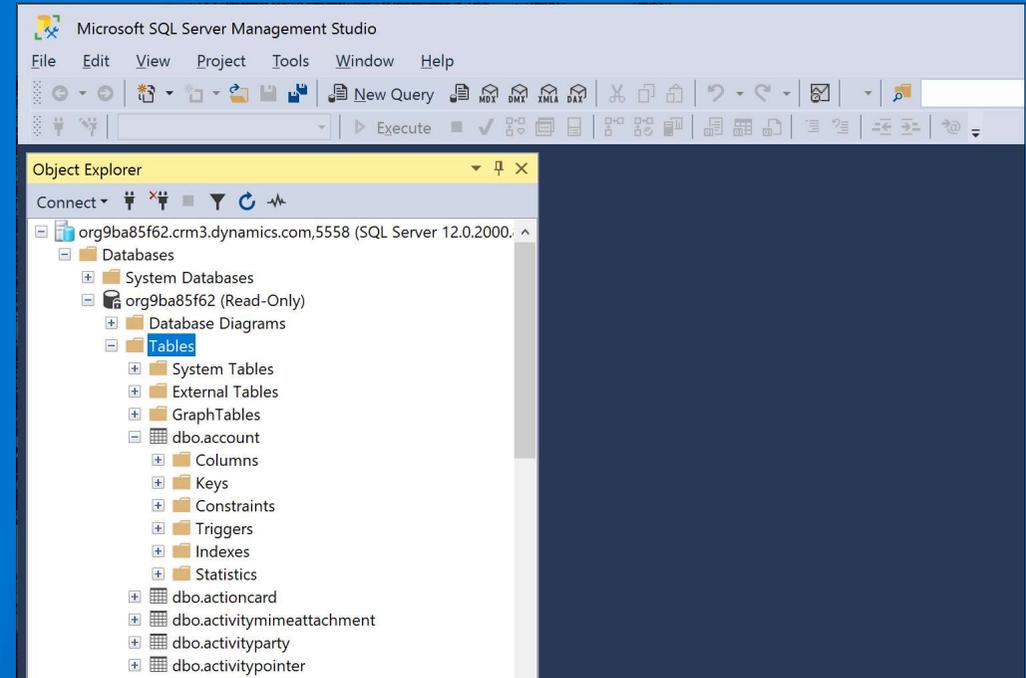
## Resources

<https://www.sqlbi.com/articles/the-importance-of-star-schemas-in-power-bi/>

<https://learn.microsoft.com/en-us/power-bi/guidance/star-schema>

# Tabular Data Stream (TDS) Endpoint for Dataverse

- Allows you to connect to Dataverse and work with T-SQL queries against your data using the following applications:
  - SQL Server Management Studio (SSMS)
  - Power BI (Desktop / Online)
- Looks and feels like a SQL Server, but it *isn't*:
  - No support for UPDATE, DELETE etc. statements
  - No ability to work with stored procedures, functions etc.

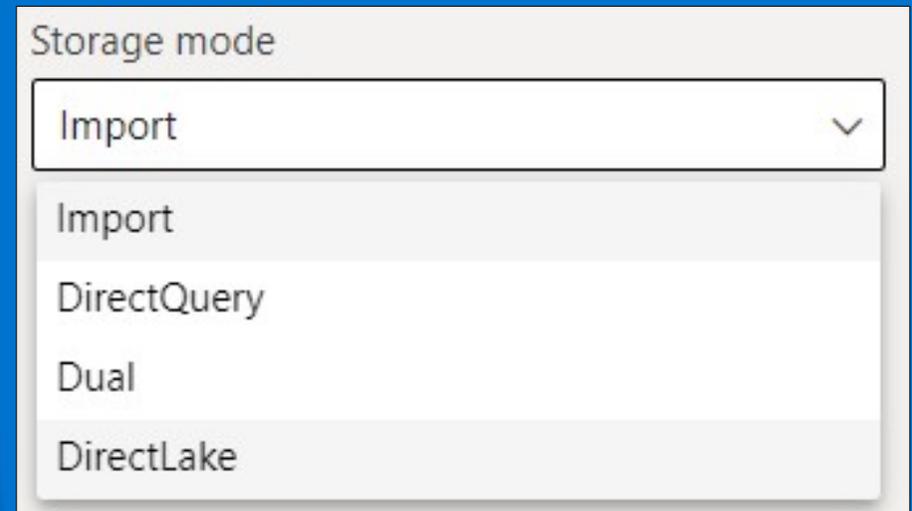


**TDS endpoint**  
Enables connecting from Power BI using Tabular Data Stream(TDS) Protocol. [Learn more](#)

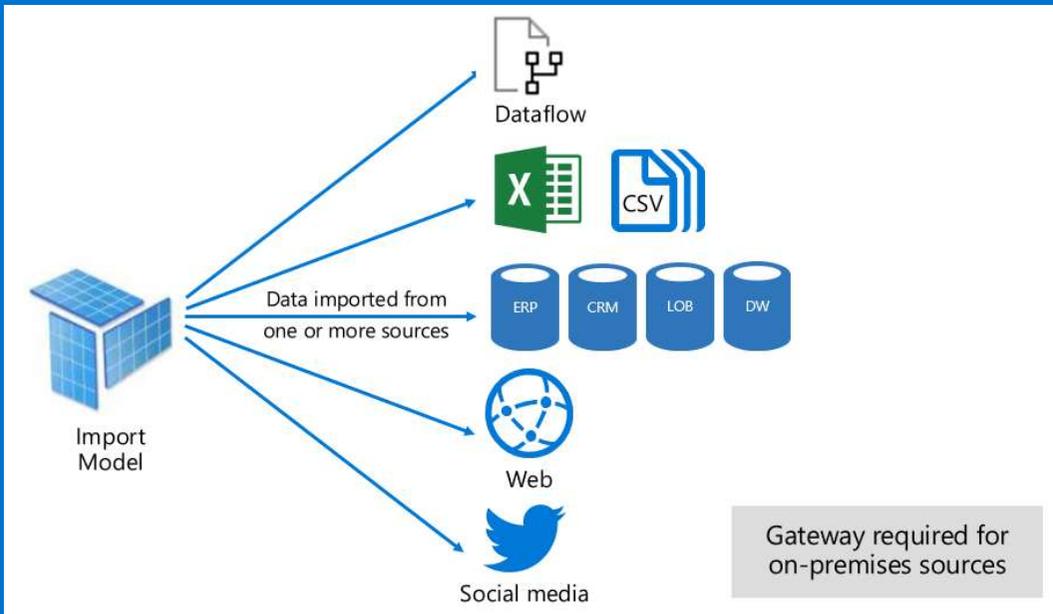
Enable TDS endpoint  
 On

# Choosing a storage mode

- Storage mode affects
  - Available transformations
  - Report performance
- Not all sources support all modes
- Reference
  - <https://learn.microsoft.com/en-us/power-bi/connect-data/service-dataset-modes-understand>



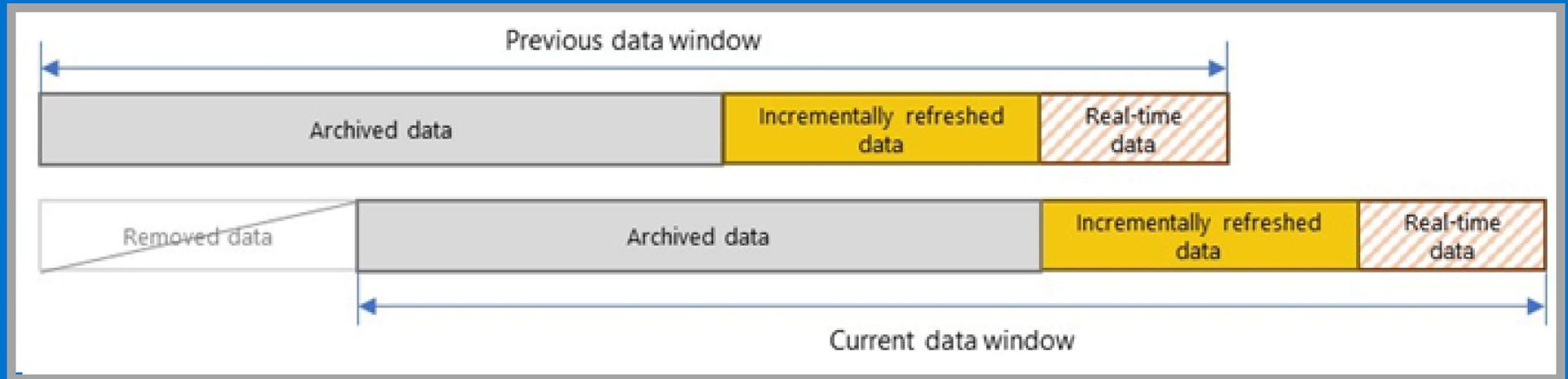
# Introduction to Import mode



- Definition
- In-memory performance
- Default choice
- Stored data
- Design flexibility
- Refresh requirements

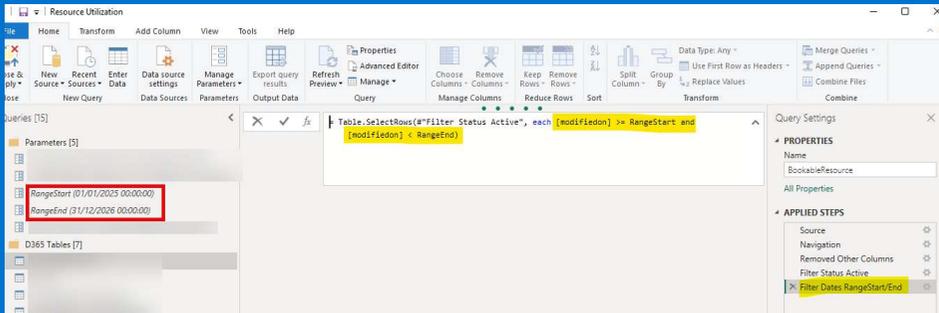
Query happens on the scheduled refresh

# Working with incremental refresh



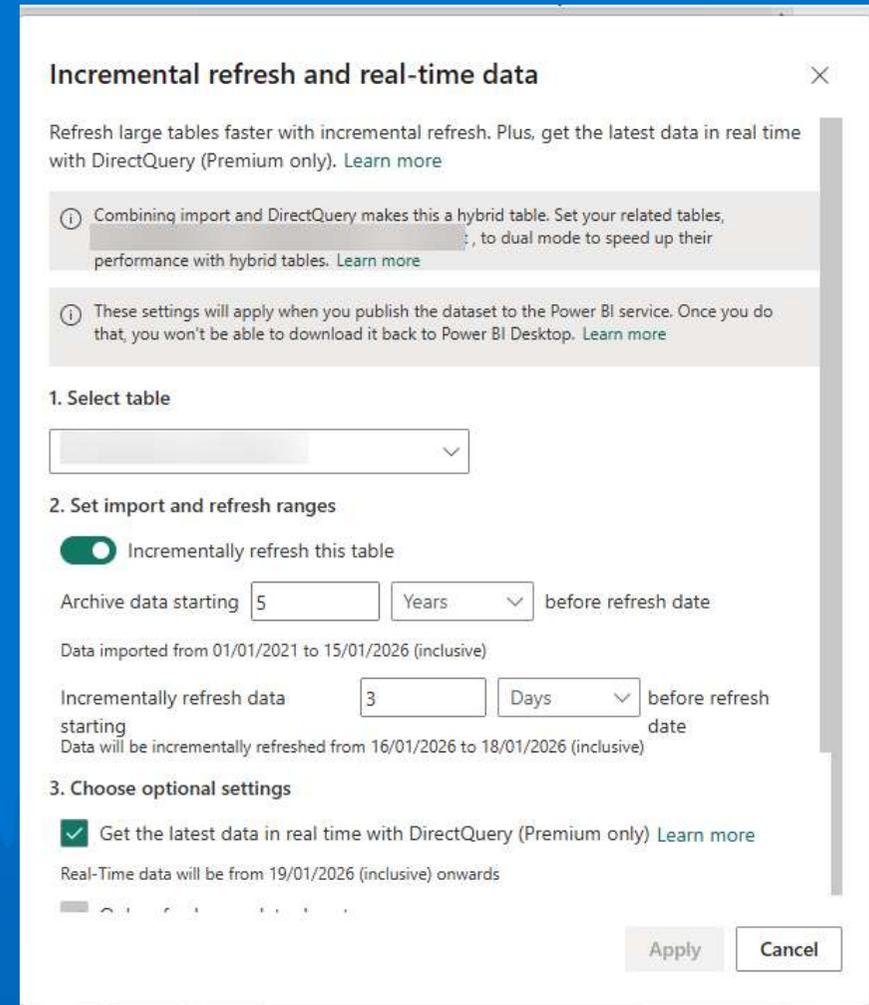
- Refreshes only **new or updated portions** of a dataset
- Use parameters to control the start (RangeStart) and end (RangeEnd)
- Faster refresh time and lower resource consumption? Yes, please! 🙏
- Possible to also retrieve fetch real-time data (Premium only)

# Configuring incremental refresh

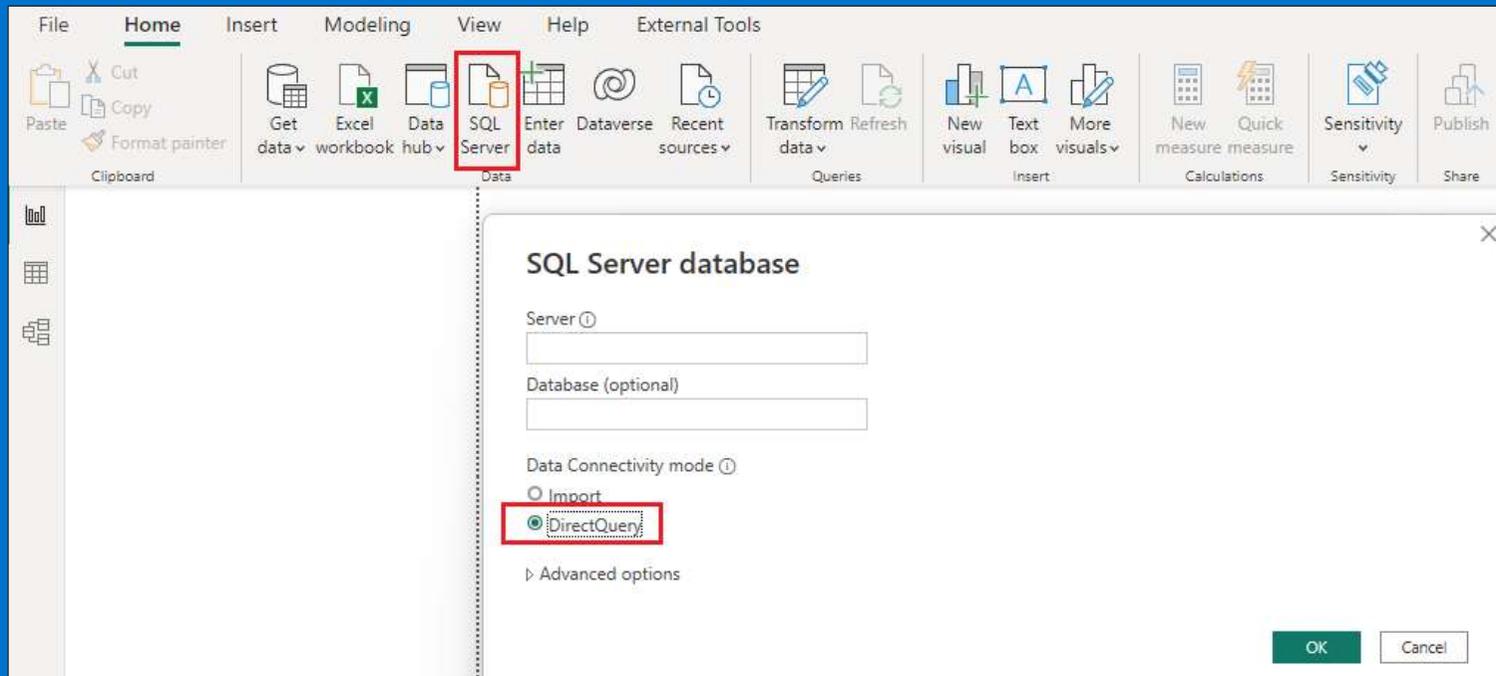


## References

<https://learn.microsoft.com/en-us/power-bi/connect-data/incremental-refresh-overview>



# Introduction to DirectQuery



**Query happens anytime the filter or data requested changes**

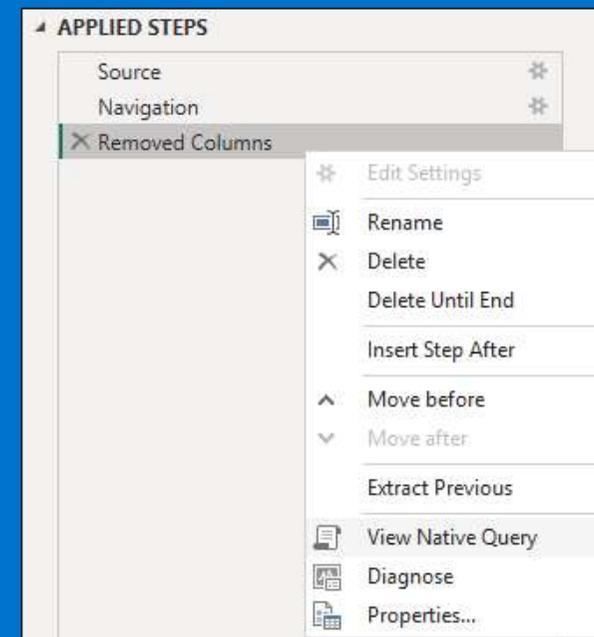
<https://learn.microsoft.com/en-us/power-bi/connect-data/desktop-use-directquery>

# Implications of using DirectQuery

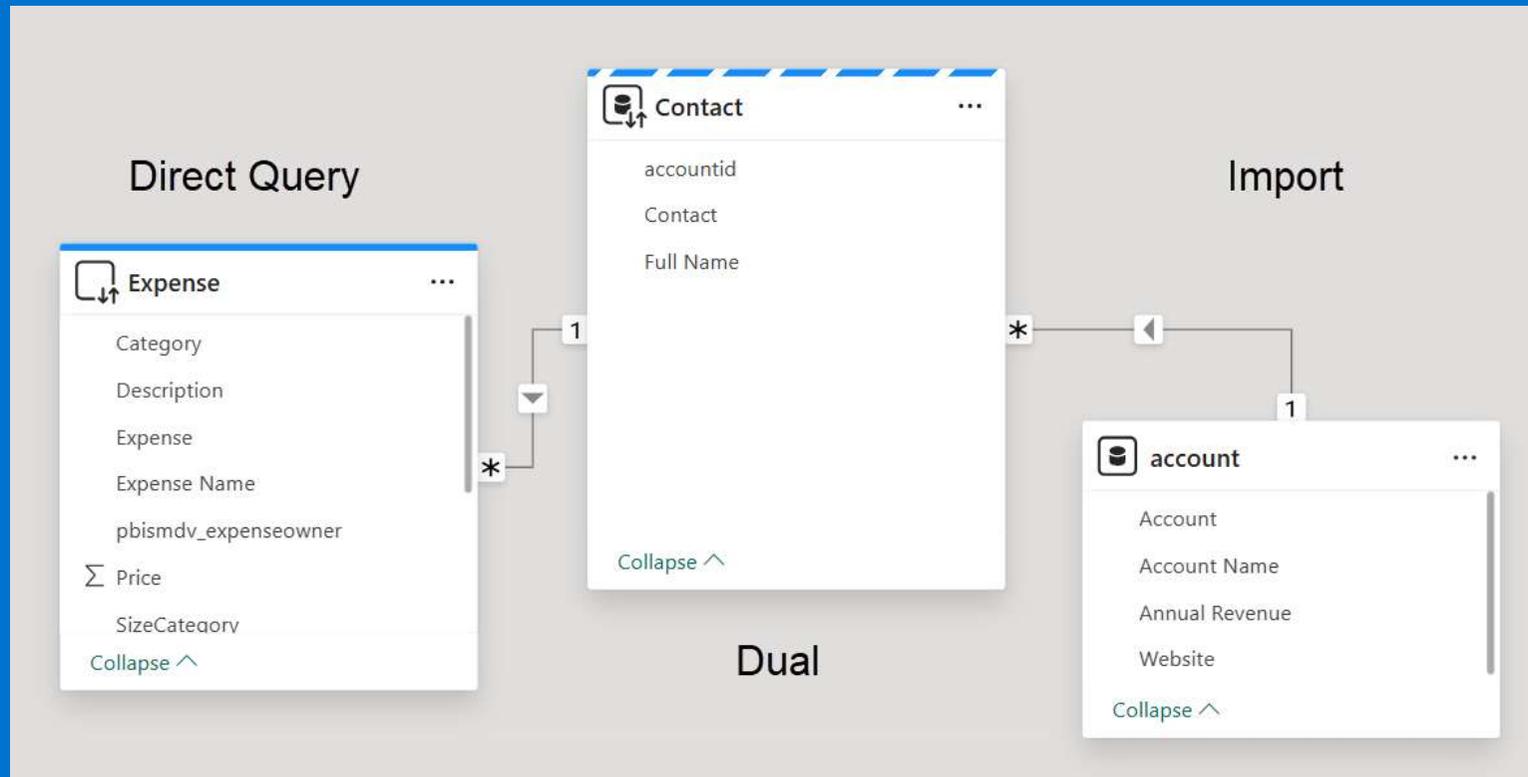
Benefits	Limitations
Frequently changing data	Dependent on data source performance
Need near real-time	Security between source and destination
Large data volumes	Limited modeling capabilities
Multi-dimensional data	Limited transformation features
Permissions	

# Query folding

- Pushes data transformations to the source for better performance and efficiency.
- Supported sources
  - Relational databases
  - OData feeds
  - Active Directory
- Direct Query only works on queries that fold.
- Reference
  - <https://learn.microsoft.com/en-us/power-query/query-folding-basics>



# Introduction to Composite mode



**Query happens depending on storage mode**

<https://learn.microsoft.com/en-us/power-bi/transform-model/desktop-composite-models>

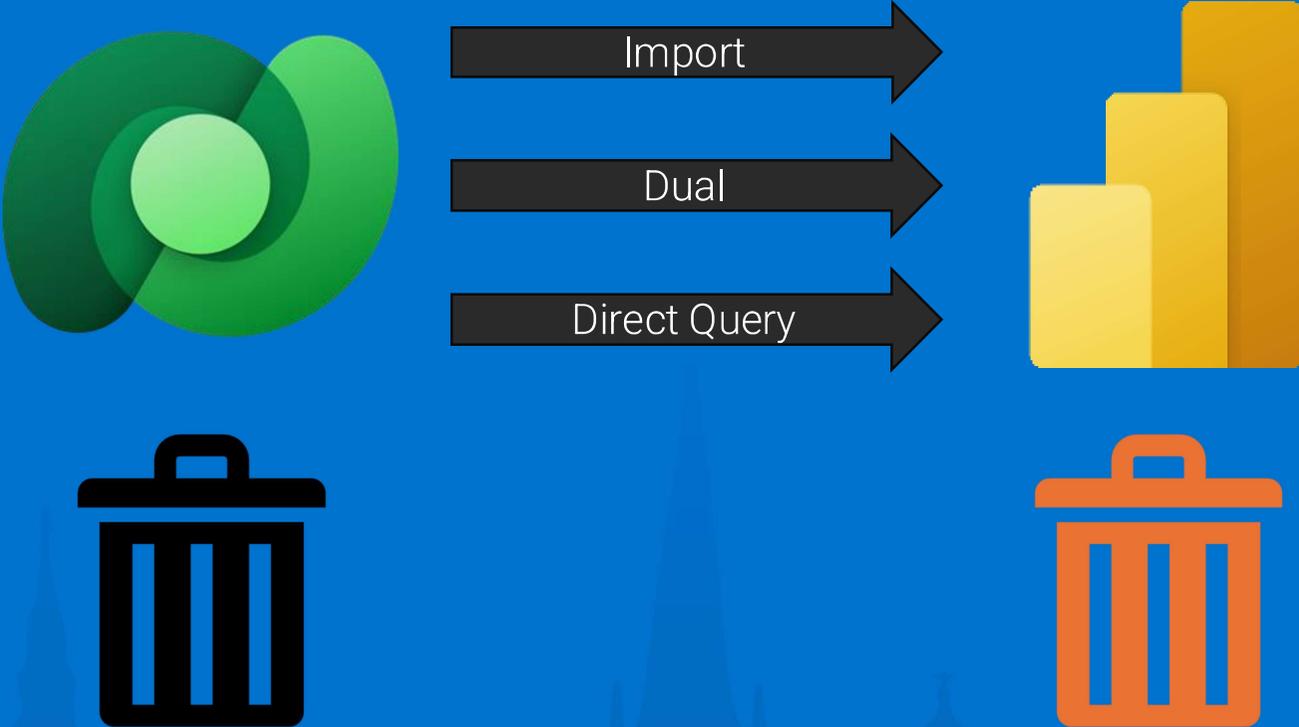
# Key Scenarios

- Balance performance and data freshness
- More complex data blending (multi-source and on-premise)
- Large scale analytics
- Semantic model re-use
- Optimize premium capacity use

# Other Considerations

- Query folding
- Data quality in Direct Query
- Query Analyzer
- Bravo
- DAX Studio
- Generate Dataverse URL column
- Visual interactions
- M:M Relationships (native) and Dataverse

# Data Quality



# DAX Studio

The screenshot displays the DAX Studio application window. The title bar reads "DaxStudio - 2.13.1". The interface includes a menu bar (File, Home, Advanced, Help) and a ribbon with various tool groups: Query (Run, Cancel, Clear Cache, Output), Query Builder, Edit (DAX FORMATTER, Format Query), Format (To Upper, To Lower, Swap Delimiters, Merge XML), Find (Find, Replace), Power BI (Load Perf Data), Traces (All Queries, Query Plan, Server Timings), and Connection (Connect, Refresh Metadata). The main workspace shows a query named "1 EVALUATE Customer" with a cursor. Below the query editor is the "Results" pane, which displays a table with the following data:

CustomerKey	Customer ID	Customer	City	State-Province	Country-Region	Postal Code
11024	AW00011024	Russell Xie	Concord	California	United States	94519
11081	AW00011081	Savannah Baker	Concord	California	United States	94519
11160	AW00011160	Maurice Tang	Concord	California	United States	94519
11161	AW00011161	Emily Wood	Concord	California	United States	94519
11184	AW00011184	Meghan Hernandez	Concord	California	United States	94519
11295	AW00011295	Taylor Lewis	Concord	California	United States	94519
11329	AW00011329	Andy Alvarez	Concord	California	United States	94519
11499	AW00011499	Pedro Vance	Concord	California	United States	94519
11539	AW00011539	Justin Washington	Concord	California	United States	94519
11655	AW00011655	Tamara Sharma	Concord	California	United States	94519
11733	AW00011733	Kristi Schmidt	Concord	California	United States	94519
11851	AW00011851	Jada Mitchell	Concord	California	United States	94519
11853	AW00011853	Grace Jones	Concord	California	United States	94519
11945	AW00011945	Dennis Huang	Concord	California	United States	94519
12146	AW00012146	Xavier Thomas	Concord	California	United States	94519
12411	AW00012411	Kevin Alexander	Concord	California	United States	94519
12429	AW00012429	Melvin Black	Concord	California	United States	94519
13017	AW00013017	Xavier Alexander	Concord	California	United States	94519

The status bar at the bottom indicates "Ready", "Ln 1, Col 1", "localhost:27137", "15.1.63.25", "78", "18485 rows", and "00:00.0".

<https://daxstudio.org/>



# Demo Time!



# Closing Thoughts

- Just because you CAN do something, doesn't mean you shouldn't 😊
  - Is real-time really required?
  - Consider refresh frequency (esp. for Premium)
  - Performance > real-time access
- DirectQuery for Dataverse, without proper optimization, performs poorly versus import mode
- DirectQuery is great for:
  - Smaller datasets
  - Highly optimized database environments

# Q&A





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- quality improvement

# Thank you!