

Enterprise BI with Power BI and Microsoft Fabric



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3Cloud

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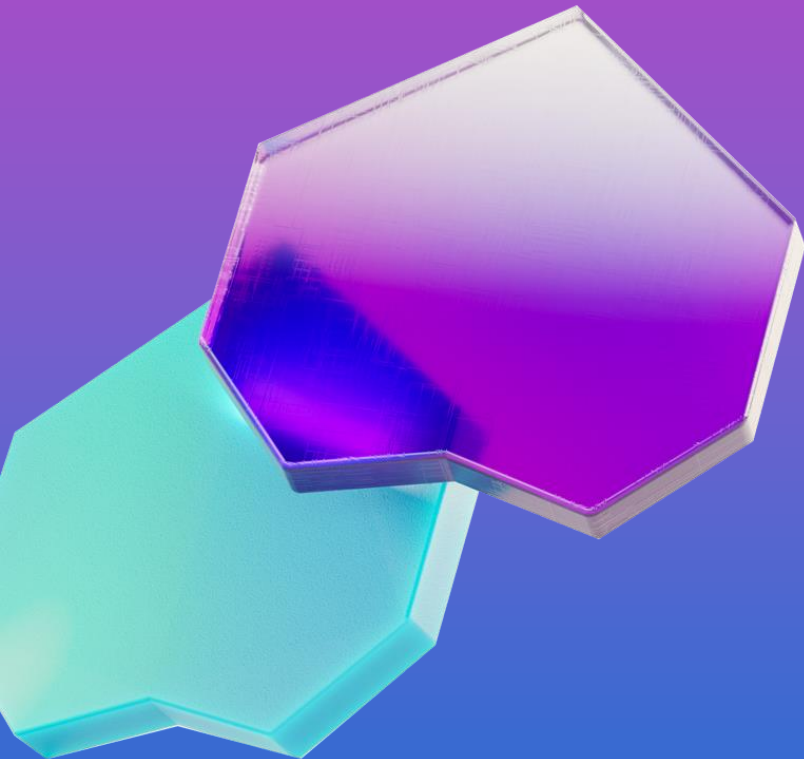
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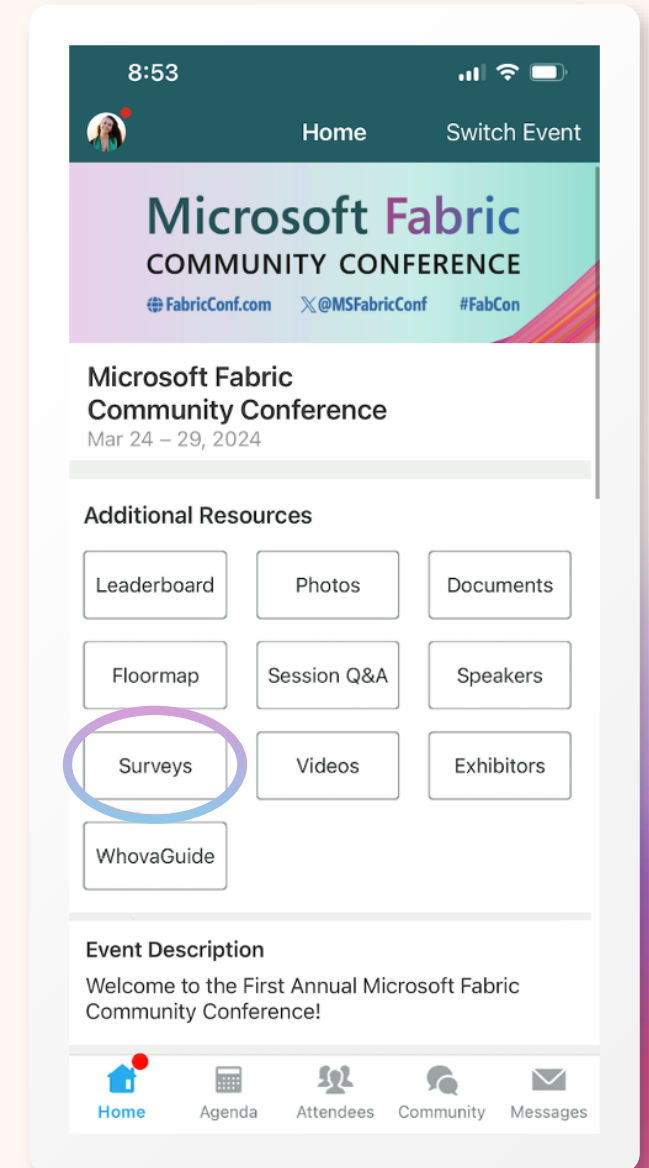
Session feedback surveys

We really want to hear from YOU!

In the pursuit of making next year's Microsoft Fabric Community Conference even better, we want to hear your feedback about this session.

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- 1 Simply go to the **Whova App** on your smartphone
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- 5 Complete the session feedback survey
- 6 Finally, click '**Submit**'



Topics

1

The analytics engine
& enterprise
capabilities

2

How much data?

3

Reducing project
data size

4

Parameters &
incremental refresh

5

DirectQuery for real-
time access

6

Aggregations &
optimization

7

Fabric & Direct Lake
scenarios

8

Multiple report types
& drillthrough
scenarios

What's this about?

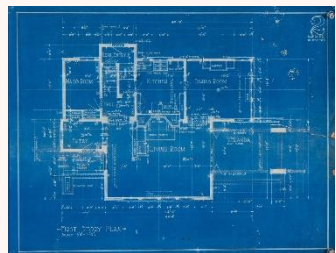
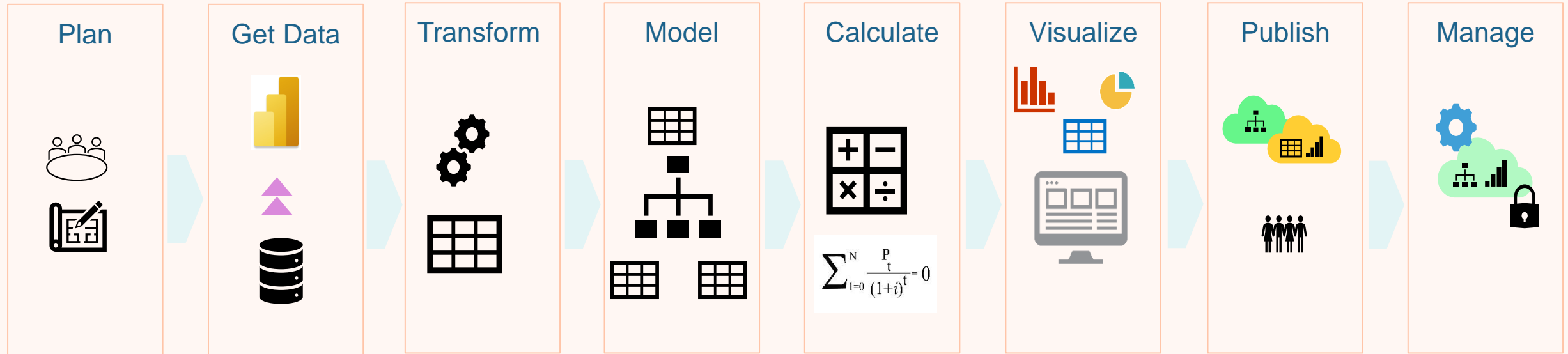
Enterprise BI with Power BI and Microsoft Fabric

Power BI is not just for self-service reporting. It is a highly scalable data analytics platform that can handle large volumes of data at scale to create analytical and operational reports. Fabric takes Power BI next-level with Direct Lake and Gen2 Dataflows. This session will demonstrate Power BI for the enterprise and help you plan and design solutions with interactive, fast data refresh, and even real-time reporting for the entire business. Take a journey and learn to use the Power BI with Fabric to achieve the best of both worlds: performance and scale.

Can we use Power to deal with real-time data sources, very large tables, and transactional details? Yes, but it requires some planning and proper design. Out of the box, Power BI is super-fast with moderate data volumes and data schemas optimized for analytic reporting. How big is your data? Millions or billions of rows? Gigabytes or terabytes? - we can handle that.

Moving beyond the basics, learn to use Direct Lake, and DirectQuery alongside in-memory Import mode in composite models to access very large tables with real-time results; models and reports that combine interactive "dashboard-style" reports and drill-through to transactional details.

The Business Intelligence Process



Reality Check...

EMBRACE THE TECHNOLOGY
USE THE RIGHT TOOL FOR THE JOB



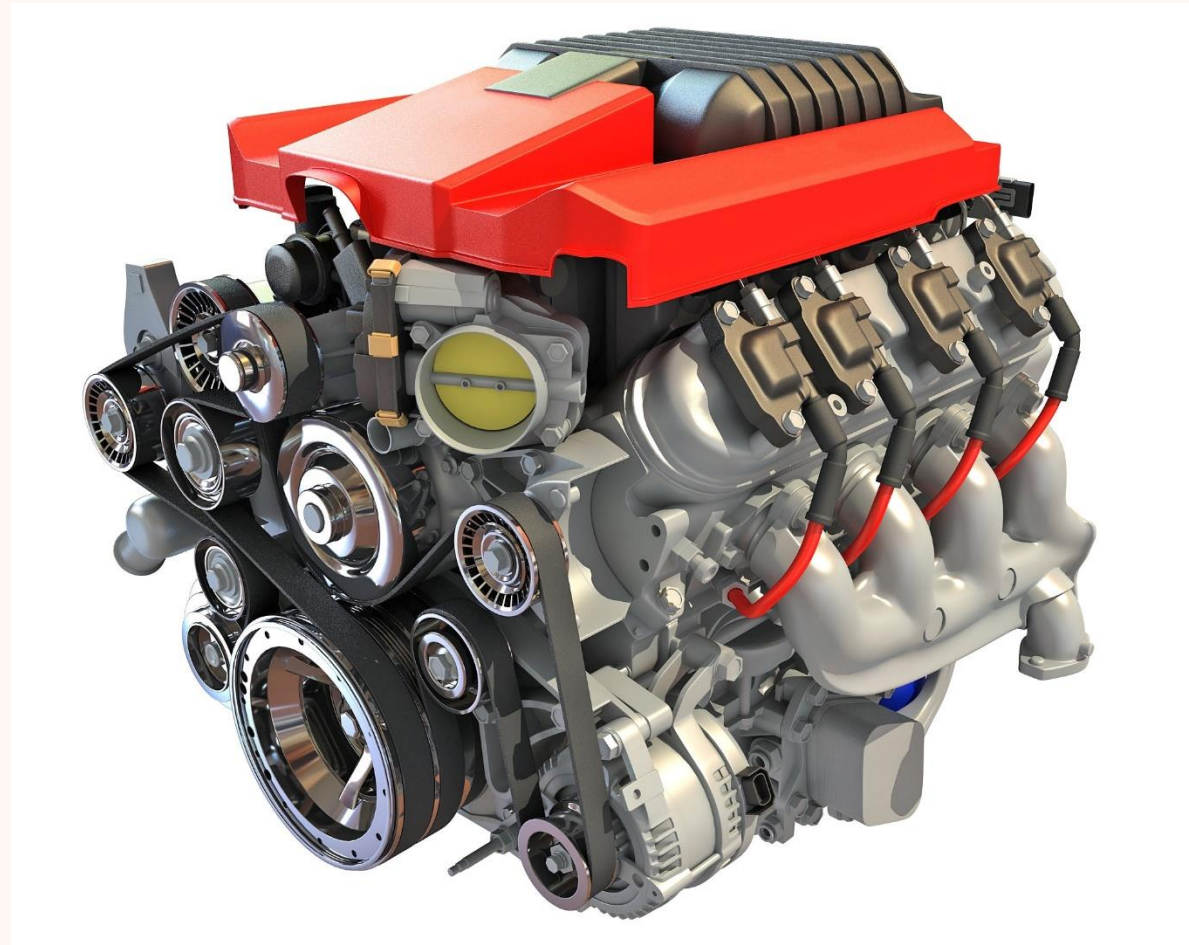
- Power BI natively is optimized for analytical reporting, not for transactional reporting
- ...BUT we CAN manage very large datasets and transactional details using the right features
- Enterprise Power BI = Premium
- Star schema design is nearly always the right solution
- Import mode is nearly always fastest
- DirectQuery mode is typically slower due to query translation & data transfer latency but provides real-time access to source data
- Fabric expands scale & performance boundaries in a unified data platform



Vertipaq

DATA MODEL ENGINE

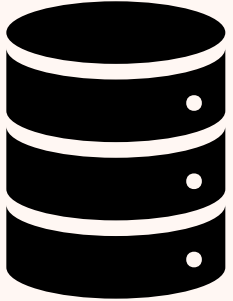
- In-memory cache
- Can be refreshed frequently
- Column store/compression
- Internal storage optimization:
 - Value encoding
 - Hash encoding
 - Run Length encoding
- Storage engine, Formula engine



How Much Data Do You Have?



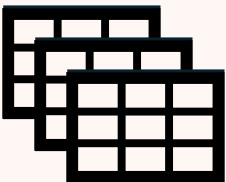
Data sources
Data warehouse
Data lake
Files



1 TB

100 TB

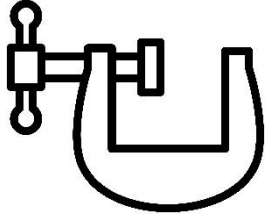
Table & Column
selection



30 GB

300 GB

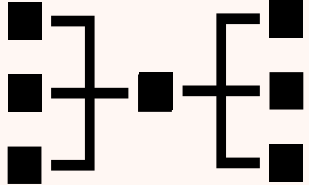
Compression



2 GB

200 GB

Semantic
Model



100 MB (repo)
2 GB (service)

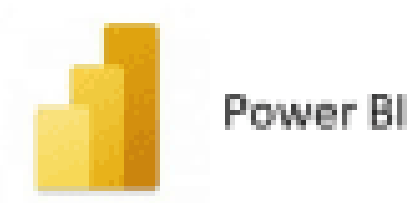
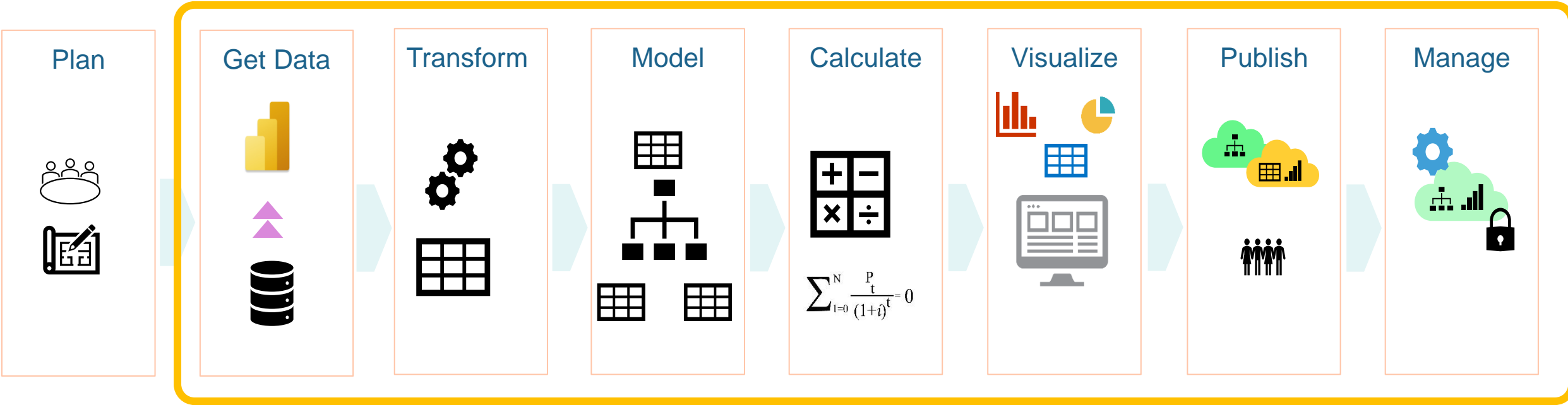
Dedicated Capacity Resource Limits

Fabric Capacity SKUs	Power BI Capacity SKUs	Total v-cores	Backend v-cores	Frontend v-cores	Max memory per dataset (GB)	DirectQuery/Live connection (per second)	Max memory per query (GB)	Model refresh parallelism
F8	EM1/A1	1	0.5	0.5	3	3.75	1	5
F16	EM2/A2	2	1	1	5	7.5	2	10
F32	EM3/A3	4	2	2	10	15	2	20
F64	P1/A4	8	4	4	25	30	6	40
F128	P2/A5	16	8	8	50	60	6	80
F256	P3/A6	32	16	16	100	120	10	160
F512	P4/A7	64	32	32	200	240	10	320
F1024	P5/A8	128	64	64	400	480	10	640
F2048	-	256	128	128	configurable	configurable	configurable	

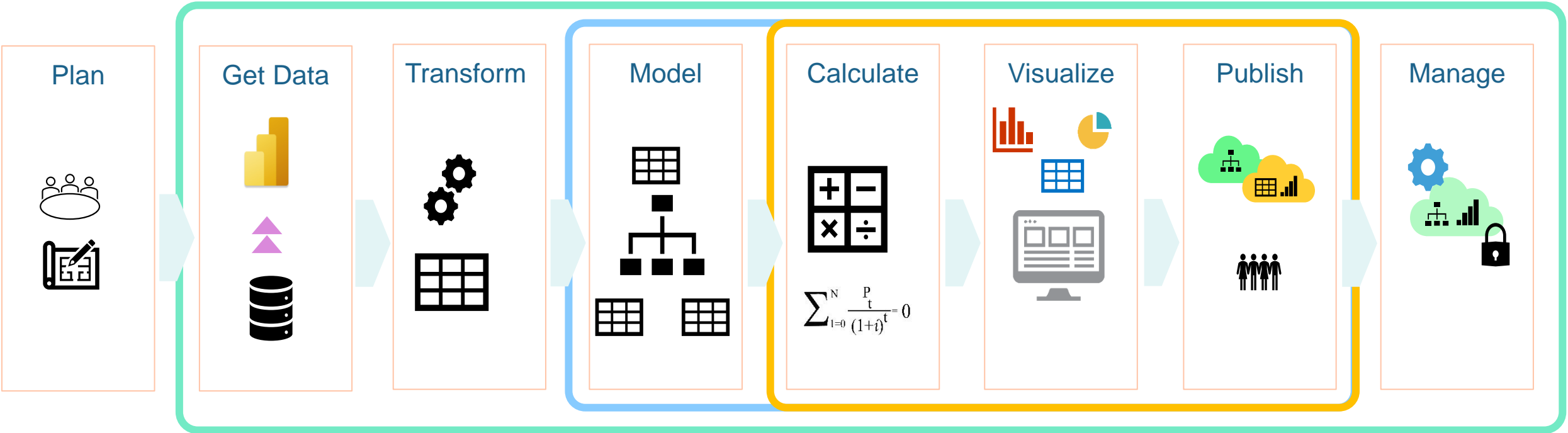
<https://learn.microsoft.com/en-us/power-bi/enterprise/service-premium-gen2-what-is#memory-allocation>



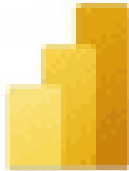
Power BI Solution Architecture – Conventional Power BI



Power BI Solution Architecture – Fabric w/Direct Lake

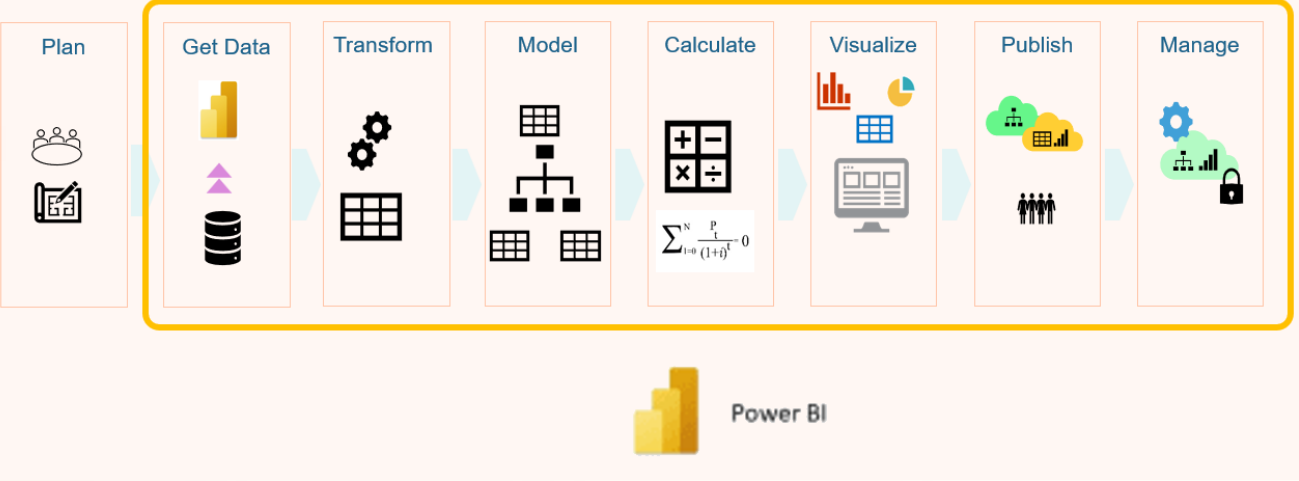


Fabric



Power BI





Conventional Power BI Solution Patterns

Data Source Scale



Queries that do not fold:

- Files (CSV, JSON, CSV...)
- Folder
- Data Lake (files)
- REST APIs
- SharePoint
- OneDrive

Does the data source support query-folding in Power Query and DirectQuery?



Queries that can fold:

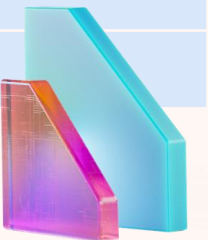
- SQL Server / Azure SQL
- Relational & Spark sources
- Cloud-based data warehouses:
 - Azure SQL, SQL Server
 - Synapse Analytics
 - Snowflake
 - Redshift
 - Delta Lake, SQL Connector



Optimize for Compression

- Eliminate wide text columns
- Store distinct values with low cardinality
- Store numbers as numbers
- Use the most conservative data type

Decimal number	Fixed decimal	Fixed decimal
Precision: 15	Decimal(19,4)	Cleansed: 2 decimals
123.456700000012	123.4567	123.46
123.456700000013	123.4567	123.46
123.456700000015	123.4567	123.46
2345.12000000023	2345.12	2345.12
2345.12000000022	2345.12	2345.12
2345.12000000024	2345.12	2345.12
2345.12000000023	2345.12	2345.12
45.0020525001121	45.002	45
45.0020525001105	45.002	45
45.0020525000026	45.002	45



Developer:

I need a manageable dataset size

- Keep Power BI project files small
- Fast refresh
- Fast deployment
- Manageable version control & CI/CD



Demo 1:

Parameterized date range filters



Demo 1: Parameterized date range filters

The screenshot displays the Microsoft Power BI Enterprise BI Demos workspace. The main area shows a data lineage diagram with the following components:

- ContosoDW**: SQL analytics endpoint, Workshop Data.
- Semantic Models**: Four models are shown, each refreshed on 3/22/24:
 - FabCon-Demo1-LotsOfData-Con... (Refreshed: 3/22/24, 4:16:36 PM)
 - FabCon-Demo2-LotsOfData-Con... (Refreshed: 3/22/24, 4:15:20 PM)
 - FabCon-Demo3-LotsOfData-Con... (Refreshed: 3/22/24, 4:16:33 PM)
 - FabCon-Demo4-LotsOfData-Con... (Refreshed: 3/22/24, 4:22:40 PM)
- Reports**: Four reports are shown, each linked to its corresponding semantic model:
 - FabCon-Demo1-LotsOfData-Con... Report
 - FabCon-Demo2-LotsOfData-Con... Report
 - FabCon-Demo3-LotsOfData-Con... Report
 - FabCon-Demo4-LotsOfData-Con... Report



Data Administrator:

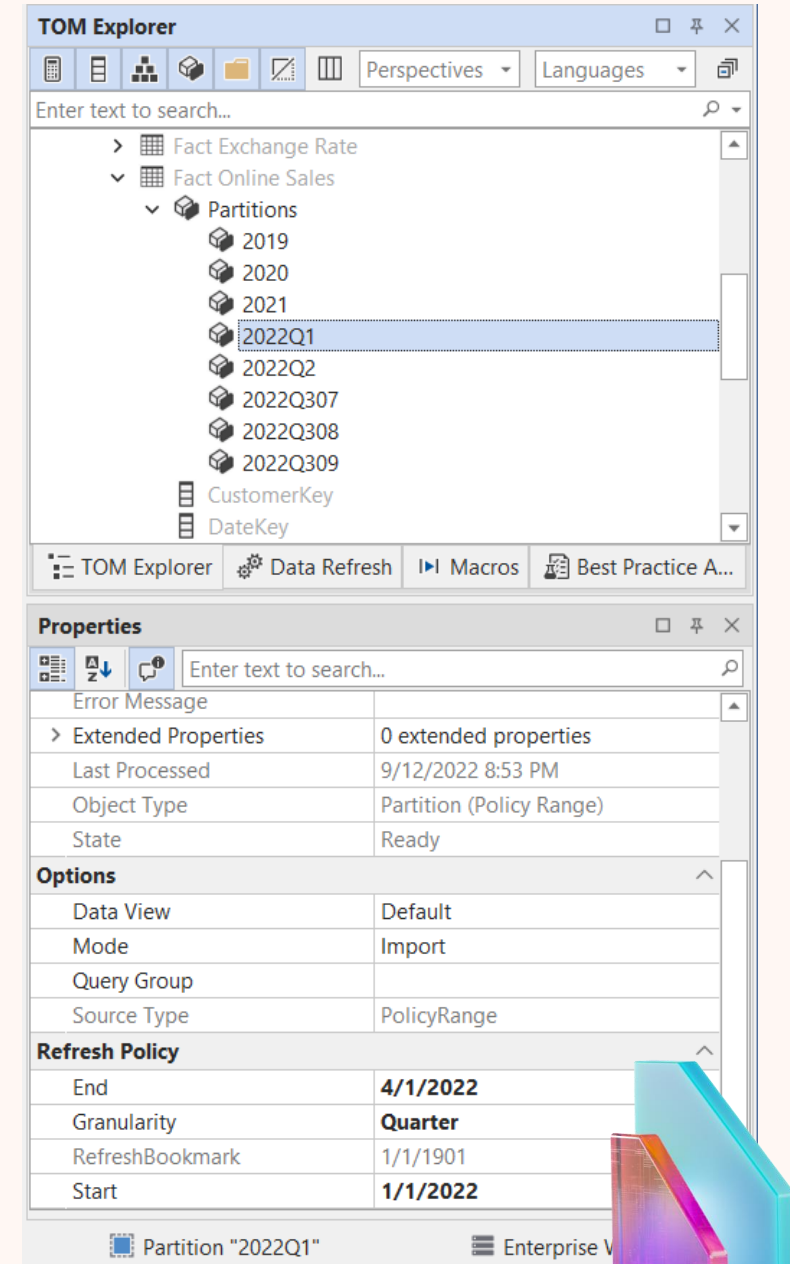
Optimize & partition large tables

- Improve refresh speed
- Prevent reloading history
- Capture updated history
- Reduce database resource load



Partitioning Large Tables

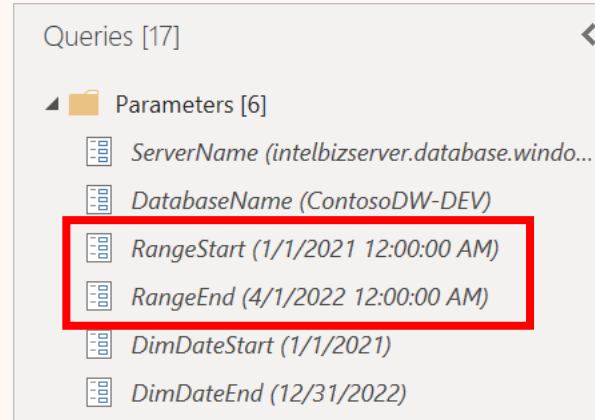
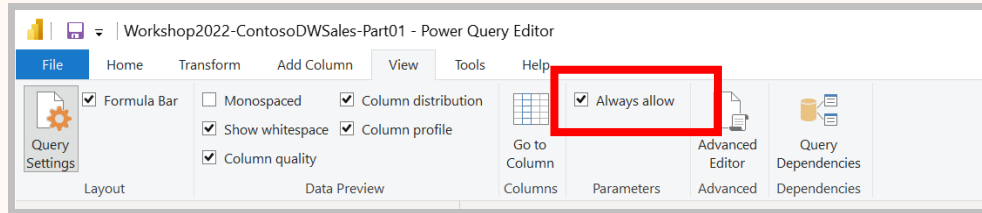
```
{
  "create": {
    "parentObject": {
      "database": "Contoso Sales",
      "table": "Fact Online Sales"
    },
    "partition": {
      "name": "2022Q1",
      "mode": "import",
      "source": {
        "type": "policyRange",
        "start": "2022-01-01T00:00:00",
        "end": "2022-04-01T00:00:00",
        "granularity": "quarter",
        "refreshBookmark": "1/1/1901"
      }
    }
  }
}
```



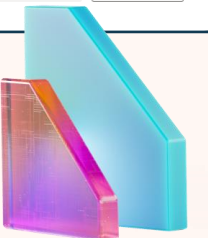
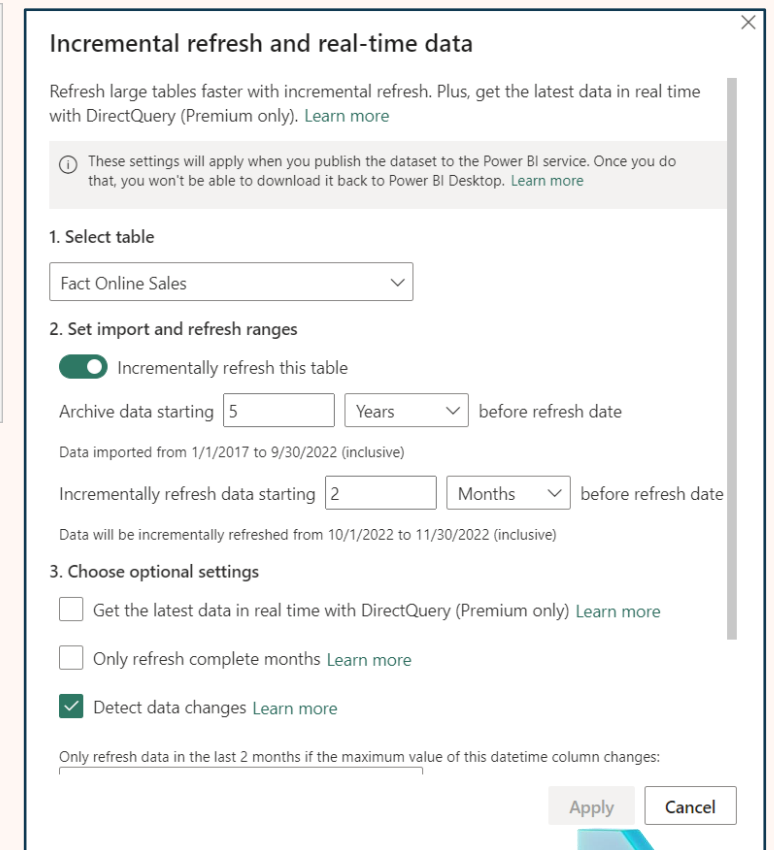
The screenshot displays the TOM Explorer interface. The main pane shows a tree view of the database structure. Under 'Fact Online Sales', the 'Partitions' folder is expanded, showing a list of partitions: 2019, 2020, 2021, 2022Q1 (selected), 2022Q2, 2022Q307, 2022Q308, and 2022Q309. Below the tree, the 'Properties' pane is visible, showing details for the selected '2022Q1' partition.

Properties	
Error Message	
Extended Properties	0 extended properties
Last Processed	9/12/2022 8:53 PM
Object Type	Partition (Policy Range)
State	Ready
Options	
Data View	Default
Mode	Import
Query Group	
Source Type	PolicyRange
Refresh Policy	
End	4/1/2022
Granularity	Quarter
RefreshBookmark	1/1/1901
Start	1/1/2022

Implementing Incremental Refresh



- Allow parameterization
- Create RangeStart & RangeEnd parameters
- Add date range filter to fact table
- Create Incremental Refresh policy



Demo 2:

Incremental Refresh

Table partitions & Hybrid tables



Demo 2:

Incremental Refresh

Table partitions & Hybrid tables

The screenshot displays the Microsoft Power BI Desktop interface. The top window shows a report with three line charts: 'Row Count: Fact Online Sales by Date' (1,071,146), 'Row Count: Fact Store Sales by Date' (4,129), and 'Row Count: Fact Sales Quota by Date' (465,678). The bottom window shows a 'Data / Drill' pane with a table named 'FabCon-Demo2-LotsOfData-Contoso Sales-IR'. The table has columns for Name, Location, Sensitivity, and Save status. The 'Save status' column shows 'Last saved: Today at 4:01 PM' and 'Last uploaded: Today at 4:01 PM'. The table is partitioned into time intervals: Nov 2021, Jan 2022, and Mar 2022. The interface includes a ribbon with tabs for File, Home, Insert, Modeling, View, Optimize, Help, and External tools. The 'Home' tab is active, showing various data and visualization options. The 'Data / Drill' pane is open, showing the table structure and a search bar. The 'Format' pane is also visible, showing options for visual properties, size and style, title, X-axis, Y-axis, and range.



Business Users:

We need to see the details

- Drill-down in context
- Transactions
- Detail records
- See recent data changes

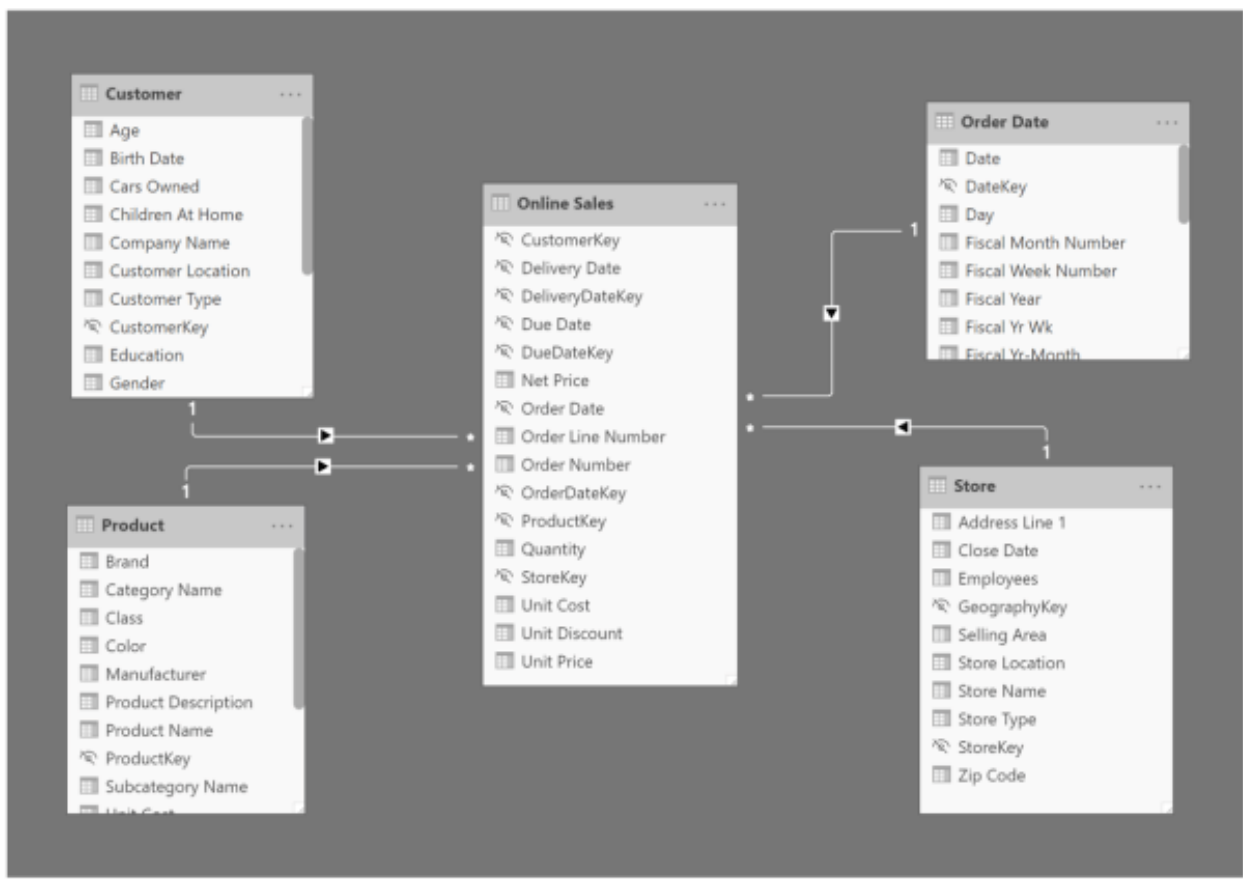


Do you have one of these?

NO

OrderID	CustomerID	ProductID	Quantity	UnitPrice	Discount	OrderDate	ShipDate	Status
1	1	1	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
2	1	2	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
3	1	3	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
4	1	4	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
5	1	5	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
6	1	6	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
7	1	7	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
8	1	8	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
9	1	9	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
10	1	10	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
11	1	11	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
12	1	12	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
13	1	13	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
14	1	14	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
15	1	15	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
16	1	16	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
17	1	17	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
18	1	18	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
19	1	19	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed
20	1	20	1	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	Completed

DB



ProductCategoryID	ProductCategoryName	Community	CommenceDate	OrderLineCount	OrderCount	OrderDate	OrderDateKey	OrderLineCount	OrderCount	OrderDate	OrderDateKey
00	Home Appliances	1	1980-01-01	16	2	2019-01-01 00:00:00	2019-01-01 00:00:00	16	2	2019-01-01 00:00:00	2019-01-01 00:00:00
01	Caribbean	1	1980-01-01	21	1	2019-01-01 00:00:00	2019-01-01 00:00:00	21	1	2019-01-01 00:00:00	2019-01-01 00:00:00
02	Audio	1	1980-01-01	17	1	2019-01-01 00:00:00	2019-01-01 00:00:00	17	1	2019-01-01 00:00:00	2019-01-01 00:00:00
03	Music, Movies and Video Books	1	1980-01-01	21	1	2019-01-01 00:00:00	2019-01-01 00:00:00	21	1	2019-01-01 00:00:00	2019-01-01 00:00:00
04	Home Appliances	1	1980-01-01	46	13	2019-01-01 00:00:00	2019-01-01 00:00:00	46	13	2019-01-01 00:00:00	2019-01-01 00:00:00
05	Cell Phones	1	1980-01-01	9	2	2019-01-01 00:00:00	2019-01-01 00:00:00	9	2	2019-01-01 00:00:00	2019-01-01 00:00:00
06	Home Appliances	1	1980-01-01	16	9	2019-01-01 00:00:00	2019-01-01 00:00:00	16	9	2019-01-01 00:00:00	2019-01-01 00:00:00
07	Cell Phones	1	1980-01-01	9	0	2019-01-01 00:00:00	2019-01-01 00:00:00	9	0	2019-01-01 00:00:00	2019-01-01 00:00:00
08	Cell Phones	1	1980-01-01	9	0	2019-01-01 00:00:00	2019-01-01 00:00:00	9	0	2019-01-01 00:00:00	2019-01-01 00:00:00
09	Cell Phones	1	1980-01-01	7	0	2019-01-01 00:00:00	2019-01-01 00:00:00	7	0	2019-01-01 00:00:00	2019-01-01 00:00:00
10	Home Appliances	1	1980-01-01	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00
11	Home Appliances	1	1980-01-01	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00	10	0	2019-01-01 00:00:00	2019-01-01 00:00:00
12	Cell Phones	1	1980-01-01	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00
13	Cell Phones	1	1980-01-01	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00
14	Cell Phones	1	1980-01-01	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00
15	Cell Phones	1	1980-01-01	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00
16	Cell Phones	1	1980-01-01	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00
17	Cell Phones	1	1980-01-01	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00
18	Cell Phones	1	1980-01-01	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00
19	Cell Phones	1	1980-01-01	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00
20	Cell Phones	1	1980-01-01	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00	27	0	2019-01-01 00:00:00	2019-01-01 00:00:00

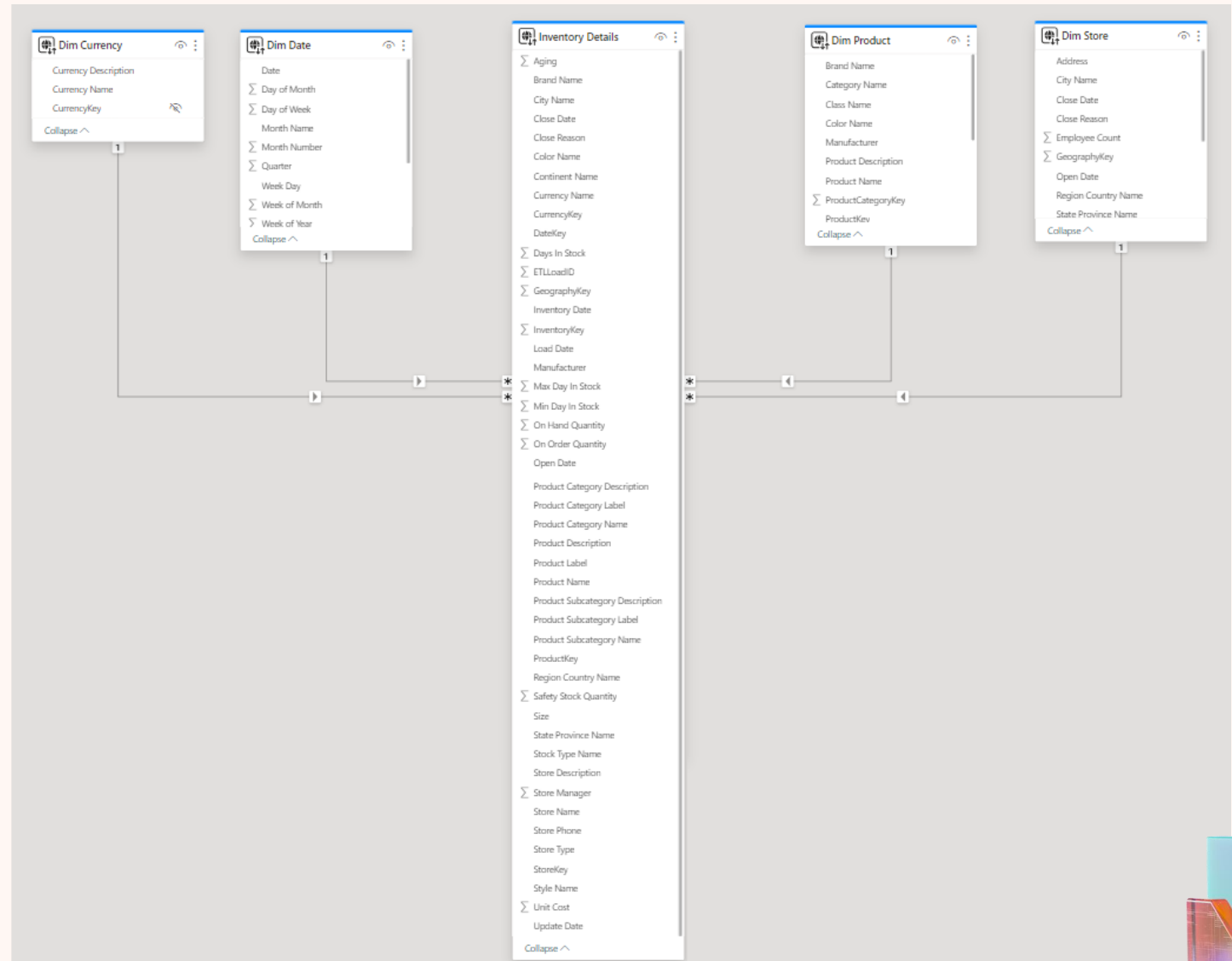
DB

TABLES



Yea, but...

...we still have a big, wide table



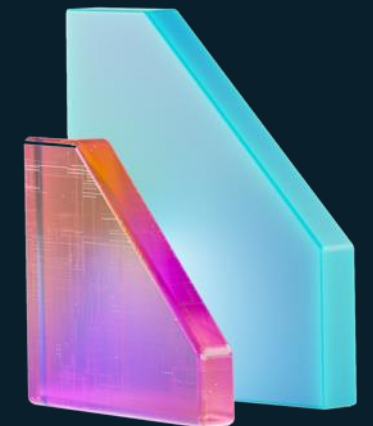
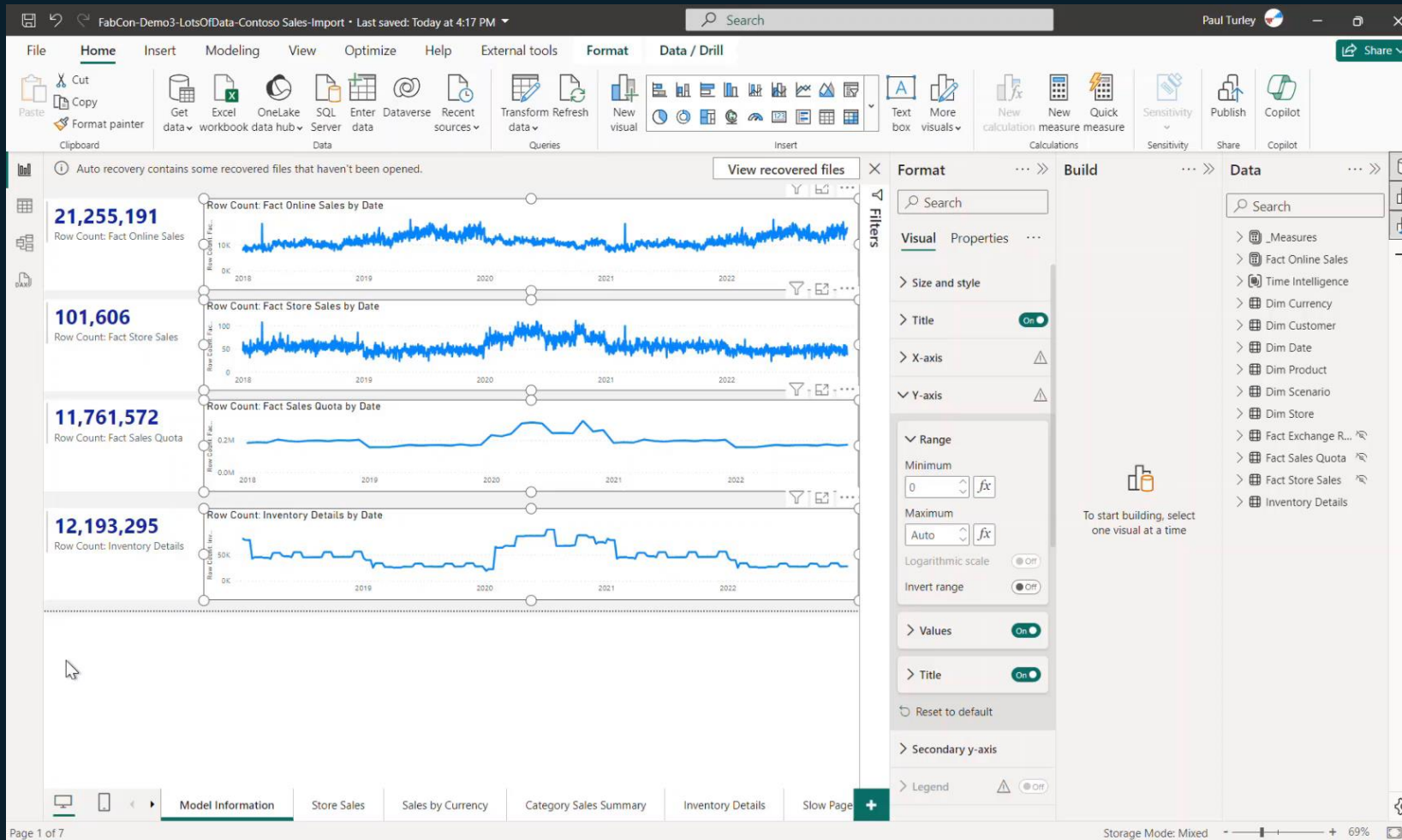
Demo 3:

Impact of importing a big, wide table



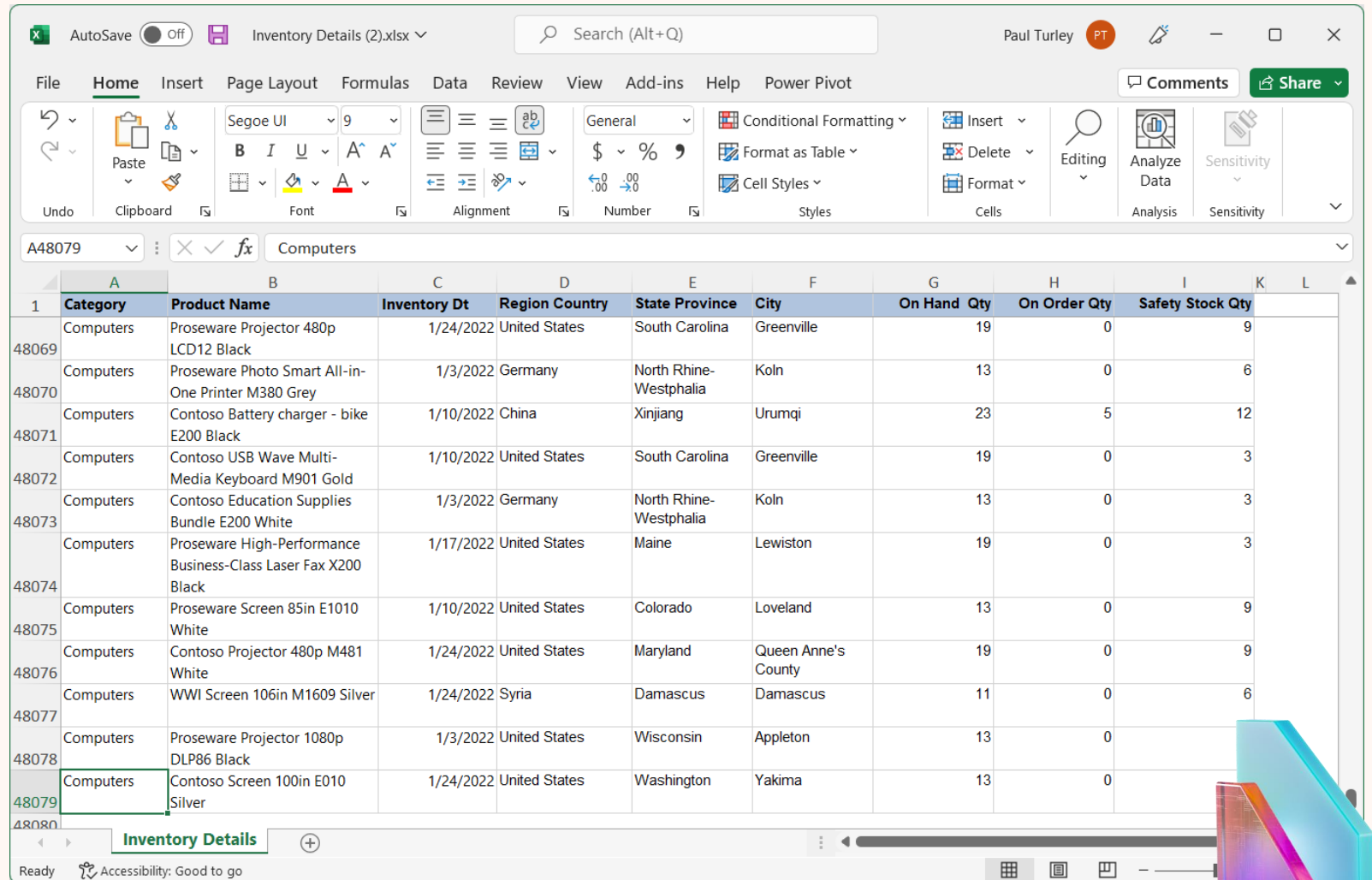
Demo 3:

Impact of importing a big, wide table



DirectQuery Details

- Wide table
- Complex source query
- Frequently changing data



	A	B	C	D	E	F	G	H	I	K	L
1	Category	Product Name	Inventory Dt	Region Country	State Province	City	On Hand Qty	On Order Qty	Safety Stock Qty		
	Computers	Proseware Projector 480p LCD12 Black	1/24/2022	United States	South Carolina	Greenville	19	0	9		
48069	Computers	Proseware Photo Smart All-in-One Printer M380 Grey	1/3/2022	Germany	North Rhine-Westphalia	Koln	13	0	6		
48070	Computers	Contoso Battery charger - bike E200 Black	1/10/2022	China	Xinjiang	Urumqi	23	5	12		
48071	Computers	Contoso USB Wave Multi-Media Keyboard M901 Gold	1/10/2022	United States	South Carolina	Greenville	19	0	3		
48072	Computers	Contoso Education Supplies Bundle E200 White	1/3/2022	Germany	North Rhine-Westphalia	Koln	13	0	3		
48073	Computers	Proseware High-Performance Business-Class Laser Fax X200 Black	1/17/2022	United States	Maine	Lewiston	19	0	3		
48074	Computers	Proseware Screen 85in E1010 White	1/10/2022	United States	Colorado	Loveland	13	0	9		
48075	Computers	Contoso Projector 480p M481 White	1/24/2022	United States	Maryland	Queen Anne's County	19	0	9		
48076	Computers	WWI Screen 106in M1609 Silver	1/24/2022	Syria	Damascus	Damascus	11	0	6		
48077	Computers	Proseware Projector 1080p DLP86 Black	1/3/2022	United States	Wisconsin	Appleton	13	0			
48078	Computers	Contoso Screen 100in E010 Silver	1/24/2022	United States	Washington	Yakima	13	0			
48079											
48080											

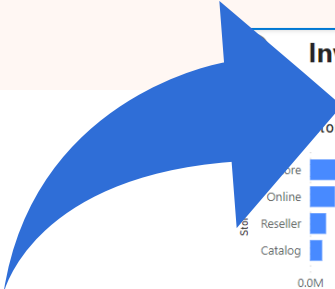


Drill-through to Details with DirectQuery

Computers	\$ 264,760,665.48	\$ 24,148,655.66
2021	\$ 215,329,826.66	\$ 19,541,225.62
2022	\$ 49,430,838.83	\$ 4,607,430.04
January	\$ 15,617,765.00	\$ 1,487,610.40
February	\$ 16,678,813.00	\$ 1,510,000.00
March	\$ 17,134,260.00	\$ 1,609,819.60
Games and Toys	\$ 13,276,900.00	\$ 1,276,900.00
Home Appliances	\$ 408,336,435.00	\$ 39,836,435.00
Music, Movies and Audio Books	\$ 13,797,889.00	\$ 1,379,889.00
TV and Video	\$ 126,109,709.00	\$ 12,610,970.90
Total	\$ 1,124,153,171.00	\$ 112,415,317.10

- Show as a table
- Include
- Exclude
- Drill through >
- Group
- Summarize
- Copy >

Inventory Details



Inventory Details for Computers

Inventory On Hand Qty by Store Type

Total Inventory On Hand Qty by Region Country Name

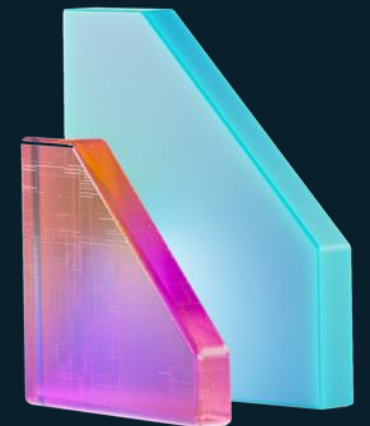
Total Inventory On Hand Qty by Product Subcategory Name

Category	Product Name	Inventory Date	Region Country Name	State Province Name	City Name	On Hand Quantity	On Order Quantity	Max Day In Stock	Min Day In St
Computers	Adventure Works CRT15 E101 Black	1/3/2022	Japan	Hokkaido	Sapporo	10	0	81	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	Syria	Damascus	Damascus	10	0	92	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	India	National Capital Territory of Delhi	New Delhi	10	0	115	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	United States	Washington	Seattle	12	0	92	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	Russia	Moskovskaya oblast	Moscow	13	0	72	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	Canada	British Columbia	Vancouver	15	0	116	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	United States	Virginia	Martinsville	19	0	77	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	United States	Virginia	Norfolk	19	0	90	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	United States	New Jersey	Cape May	19	0	108	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	United States	New Jersey	East Orange	19	0	118	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	China	Beijing	Beijing	20	0	65	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	United States	Maryland	North Harford	20	1	83	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	United States	Wisconsin	Oregon	20	1	112	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	Canada	Alberta	Calgary	21	0	84	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	United States	Wisconsin	Milwaukee	21	0	102	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	United States	Colorado	Greeley	22	3	112	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	United States	Texas	Plano	22	17	64	
Computers	Adventure Works CRT15 E101 Black	1/3/2022	United States	Maryland	Back River	24	5	78	



Demo 4:

Composite model with DirectQuery
Drillthrough



Demo 4:

Composite model with DirectQuery Drillthrough

Power Query Editor

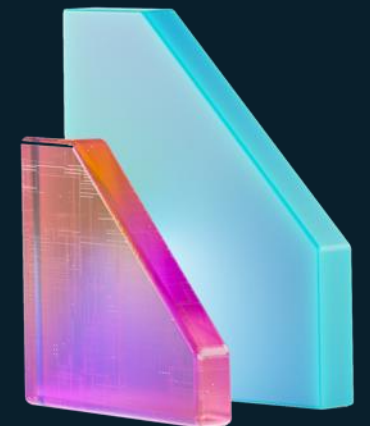
```
1 let  
2 Source = Table.FromRows(Json.Document(Binary.Decompress  
3 (Binary.FromText("144FAA==", BinaryEncoding.Base64),  
4 Compression.Deflate)), let _t = ((type nullable text)  
5 meta [Serialized.Text = true]) in type table [ID = _t],  
6 #"Changed Type" = Table.TransformColumnTypes(Source,{{"ID",  
7 type text}})  
8 in  
9 #"Changed Type"
```

Query settings

Name: _Measures

Applied steps: Source, Changed Type

Running (2.84 s)



Everyone:
How do we speed this up?

We want the best of
both worlds:

- DirectQuery details
- Import aggregates



Aggregations

- Two tables in the model:
- Details: DirectQuery
- Summary: Import
- Aggregations map fields between the tables

Manage aggregations ✕

Aggregations accelerate query performance to unlock big-data sets. [Learn more](#)

Aggregation table: Sales Agg Precedence: 0

AGGREGATION COLUMN	SUMMARIZATION	DETAIL TABLE	DETAIL COLUMN	
OrderDateKey	GroupBy	Sales	OrderDateKey	🗑️
CustomerKey	GroupBy	Sales	CustomerKey	🗑️
ProductSubcategoryKey	GroupBy	Product	ProductSubcategory...	🗑️
SalesAmount_Sum	Sum	Sales	SalesAmount	🗑️
UnitPrice_Sum	Sum	Sales	UnitPrice	🗑️

Apply all Cancel



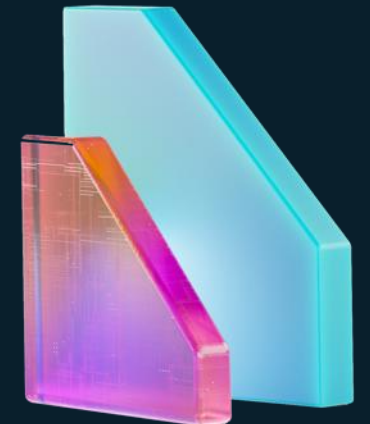
Demo 5:

Aggregations and summary table



Demo 5: Aggregations and summary table

The screenshot displays the Microsoft Power BI Desktop interface. The main window is the Power Query Editor, which is open to a query named '_Measures'. The editor's ribbon includes 'Home', 'Transform', 'Add column', 'View', and 'Help'. The 'Add column' tab is active, showing options like 'Close & Apply', 'Get data', 'Enter data', 'Manage parameters', 'Refresh', 'Advanced editor', 'Choose columns', 'Remove columns', 'Keep rows', 'Remove rows', 'Filter rows', 'Sort', 'Transform', and 'Combine'. The 'Query settings' pane on the right shows the query name '_Measures' and the applied steps: 'Source' and 'Changed Type'. The 'Changed Type' step is selected, and the 'Columns' pane shows a table with one column, 'ID', which is currently empty. The background shows a report page with several data cards, including '4,697,669 Row Count: Fact Online Sales', '24,199 Row Count: Fact Store Sales', '2,787,324 Row Count: Fact Sales Quota', and '12,193,295 Row Count: Inventory Details'. The timeline at the bottom shows data from April 2021 to October 2022. The status bar at the bottom indicates 'Completed (4.29 s)', 'Columns: 1', and 'Rows: 0'. The system tray at the very bottom shows the date and time as 4:47 PM on 3/22/2024.



The art and science of aggregations

- Capture DAX query on Performance Analyzer
- Execute in DAX Studio with Server Timings
- Analyze trace for aggregation hits

The screenshot displays the DAX Studio 3.0.5 interface. The main window shows a DAX query with the following code:

```
10 TREATAS({"January"}, 'Dim Date'[Month Name])
11
12 VAR __DS0Core =
13     SUMMARIZECOLUMNS(
14         ROLLUPADDESSUBTOTAL('Inventory Details'[Region Country Name], "IsGrandTotalRowTotal"),
15         __DS0FilterTable,
16         __DS0FilterTable2,
17         __DS0FilterTable3,
18         "Total_Inventory_On_Hand_Qty", '_Measures'[Total Inventory On Hand Qty],
19         "v_Total_Inventory_On_Hand_Qty_FormatString", IGNORE('Measures'[_Total Inventory On Hand Qty FormatString])
20     )
21
22 VAR __DS0Primarywindowed =
23     TOPN(
24         502,
25         __DS0Core,
26         [IsGrandTotalRowTotal],
27         0,
28         [Total_Inventory_On_Hand_Qty],
29         0,
30         'Inventory Details'[Region Country Name],
31         1
32     )
33
34 VAR __DS0CoreNoInstanceFiltersNoTotals =
35     ETI TEP / KE EDETI T EDC / __DS0Core [IsGrandTotalRowTotal] = FALSE
```

The Server Timings window is open, showing a table of execution metrics:

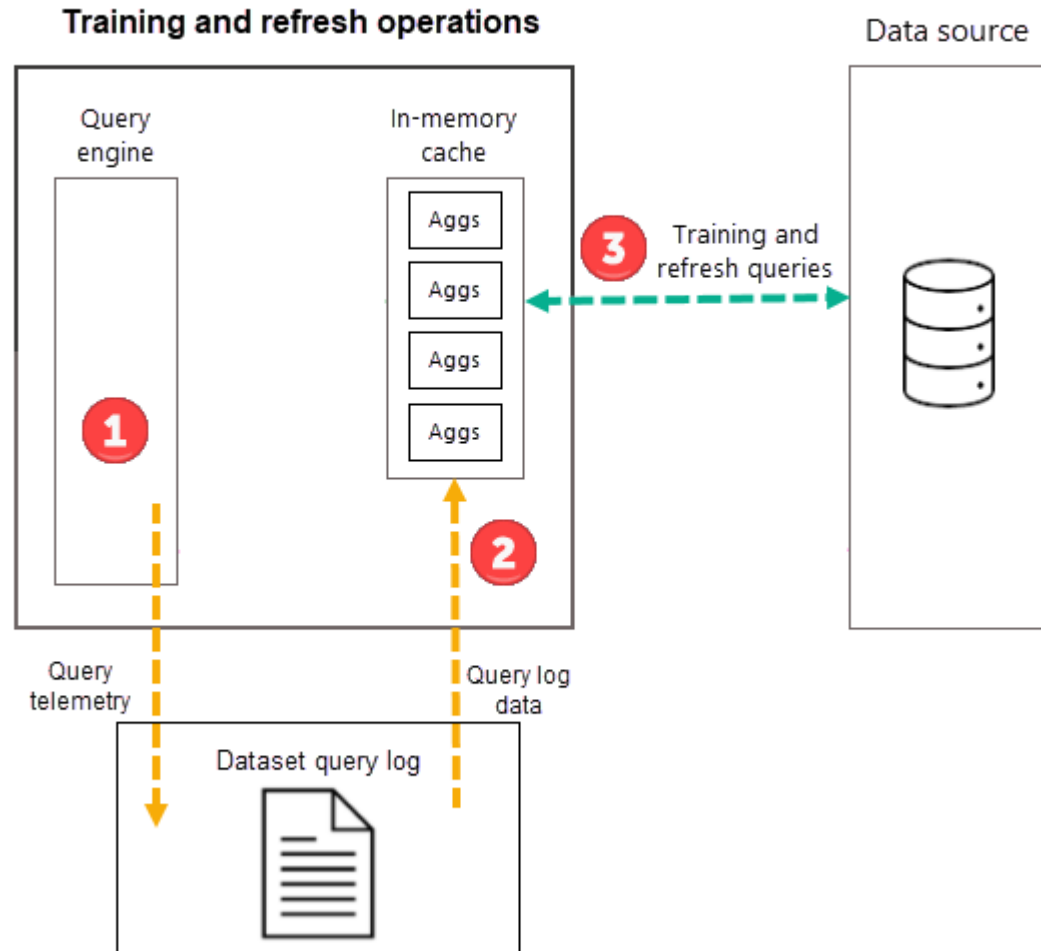
Line	Subclass	Duration	CPU	Par.	Rows	KB	Waterfall	Query
2	Scan	0	0		2,520	20		SELECT 'Dim Product'[Pro
4	Scan	0	0		733	6		SELECT 'Dim Date'[Date] F
5	RewriteAtter	0						<attemptFailed>
6	SQL	23,896	23,896	x1.0				SELECT TOP (1000001) * F

Summary statistics for the query execution:

- Total: 23,914 ms
- SE CPU: 23,896 ms (x1.0)
- FE (Failure Events): 18 ms (0.1%)
- SE (Successful Events): 23,896 ms (99.9%)
- SE Queries: 3
- SE Cache: 0 (0.0%)

The bottom status bar shows the current query execution context: I Ln 52, Col 1 | localhost:55528 | 16.0.53.24 | 722 | 1 row | 00:23.9

Auto Aggregations



Aggregation creation can be automated through usage metrics based on the dataset query log

<https://learn.microsoft.com/en-us/power-bi/enterprise/aggregations-auto>

Composite & Hybrid Models

- **Composite models:**

- Allow you to combine data from multiple sources, like a mix of DirectQuery sources and imported data.
- Enables you to connect to different kinds of data sources within the same semantic model, which can then be used to create reports that integrate all the connected data sources.

- **Hybrid tables** combine Import mode and DirectQuery mode partitions in a single table.

- **Dual mode tables** have the flexibility to operate in both Import and DirectQuery modes simultaneously. The model decides which mode to use based on the query context, aiming to optimize performance.

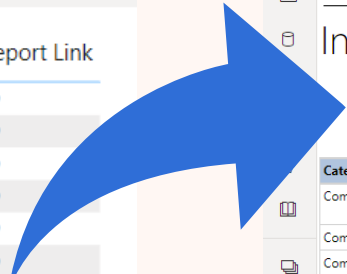


Drill-through to Paginated Report

PASSDC-LotsOfData-Contoso Sales Drillthrough

File Export Share Chat in Teams Get insights Edit

Category Name	Combined Sales Amt	Store Sales Amt	Inventory Report Link
Audio	\$ 14,980,466.13	\$ 1,416,215.21	Link
Cameras and camcorders	\$ 213,059,663.74	\$ 18,204,103.00	Link
Cell phones	\$ 69,831,441.34	\$ 5,836,959.79	Link
Computers	\$ 264,760,665.48	\$ 24,148,655.66	Link
2021	\$ 215,329,826.66	\$ 19,541,225.62	Link
2022	\$ 49,430,838.83	\$ 4,607,430.04	Link
January	\$ 15,617,765.43	\$ 1,537,843.48	Link
February	\$ 16,678,813.21	\$ 1,367,816.25	Link
March	\$ 17,134,260.18	\$ 1,701,770.31	Link
Games and Toys	\$ 13,276,900.61	\$ 1,127,459.23	Link
Home Appliances	\$ 408,336,435.12	\$ 32,975,363.06	Link
Music, Movies and Audio Books	\$ 13,797,889.47	\$ 1,204,159.75	Link
TV and Video	\$ 126,109,709.19	\$ 11,416,870.37	Link
Total	\$ 1,124,153,171.08	\$ 96,329,786.07	Link



Inventory Details - Power BI

https://app.powerbi.com/groups/6658929d-9b68-487b-b370-c7cc6e39ad40...

Power BI Workshop Inventory Details

Product Category: Computers Year: 2022 Month: January

11/1/2022 1:21:08 AM Page 1 of 1,415 pages

Inventory Details

Category: **Computers** For: **January 2022**
Includes: **48,078** inventory records

Category	Product Name	Inventory Dt	Region Country	State Province	City	On Hand Qty	On Order Qty	Safety Stock Qty
Computers	Contoso Battery charger - bike E200 Black	1/17/2022	United States	Washington	Seattle	19	0	9
Computers	WWI LCD20 M220 Black	1/3/2022	United States	Washington	Seattle	17	0	6
Computers	Contoso Smart Battery M901 Blue	1/24/2022	United States	Washington	Seattle	20	1	3
Computers	Proseware LCD17 E200 White	1/3/2022	United States	Washington	Seattle	19	0	3
Computers	Fabrikam Laptop13.3W M3080 Red	1/3/2022	United States	Washington	Seattle	20	1	6
Computers	Contoso Car power adapter M90 Black	1/3/2022	United States	Washington	Seattle	24	5	9
Computers	WWI Projector 1080p DLP86 Silver	1/31/2022	United States	Washington	Seattle	19	0	3
Computers	Proseware LCD15 E103 White	1/3/2022	United States	Washington	Seattle	19	0	9
Computers	Contoso Screen 100in E010 Silver	1/31/2022	United States	Washington	Seattle	15	0	9
Computers	Proseware Laser Jet All in one X300 Black	1/3/2022	United States	Washington	Seattle	21	0	9
Computers	Proseware Photo smart All-in-One Printer M380 Black	1/31/2022	United States	Washington	Seattle	12	0	0
Computers	Adventure Works Laptop8.9 E0890 Silver	1/31/2022	United States	Washington	Seattle	51	0	0
Computers	Contoso Screen 113in M251 Black	1/3/2022	United States	Washington	Seattle	14	0	0
Computers	Contoso Battery charger -	1/10/2022	United States	Washington	Seattle	19	0	0



Demo 6:

Drill-through to Paginated Report



Demo 6: Drill-through to Paginated Report

The screenshot shows the Microsoft Power BI web interface. The main content area displays a list of Enterprise BI Demos. The 'Inventory Details' report is highlighted with a 'Promoted' badge. The table below lists the items:

Name	Type	Owner	Refreshed	Next refresh	Endorsement	Sensitivity
FabCon-Demo4-LotsOfData-Contoso Sales-DQ Drillthrough	Report	Enterprise BI Dem...	3/22/24, 4:22:40 PM	—	—	—
FabCon-Demo4-LotsOfData-Contoso Sales-DQ Drillthrough	Semantic model	Enterprise BI Dem...	3/22/24, 4:22:40 PM	N/A	—	—
FabCon-Demo5-LotsOfData-Contoso Sales-DQ Drillthroug...	Report	Enterprise BI Dem...	3/22/24, 4:24:39 PM	—	—	—
FabCon-Demo5-LotsOfData-Contoso Sales-DQ Drillthroug...	Semantic model	Enterprise BI Dem...	3/22/24, 4:24:39 PM	N/A	—	—
FabCon-Demo6-LotsOfData-Contoso Sales-Paginated Drillt...	Report	Enterprise BI Dem...	3/22/24, 4:23:23 PM	—	—	—
FabCon-Demo6-LotsOfData-Contoso Sales-Paginated Drillt...	Semantic model	Enterprise BI Dem...	3/22/24, 4:23:23 PM	N/A	—	—
FabCon-Demo7-LotsOfData-Contoso Sales-Direct Lake	Report	Enterprise BI Dem...	3/13/24, 11:32:45 AM	—	—	—
Inventory Details	Paginated Report	Enterprise BI Dem...	—	—	Promoted	—
Ih_ContosoDW_Analytics	Lakehouse	Paul Turley	—	—	—	—
Ih_ContosoDW_Analytics	Semantic model (...)	Enterprise BI Dem...	3/12/24, 4:36:49 PM	N/A	—	—
Ih_ContosoDW_Analytics	SQL analytics end...	Enterprise BI Dem...	—	N/A	—	—
Populate Ih_ContosoDW	Dataflow Gen2	Paul Turley	3/21/24, 3:04:56 PM	N/A	—	—
sm_ContosoDW_Analytics	Semantic model	Enterprise BI Dem...	3/13/24, 11:32:45 AM	N/A	—	—



We want it all!

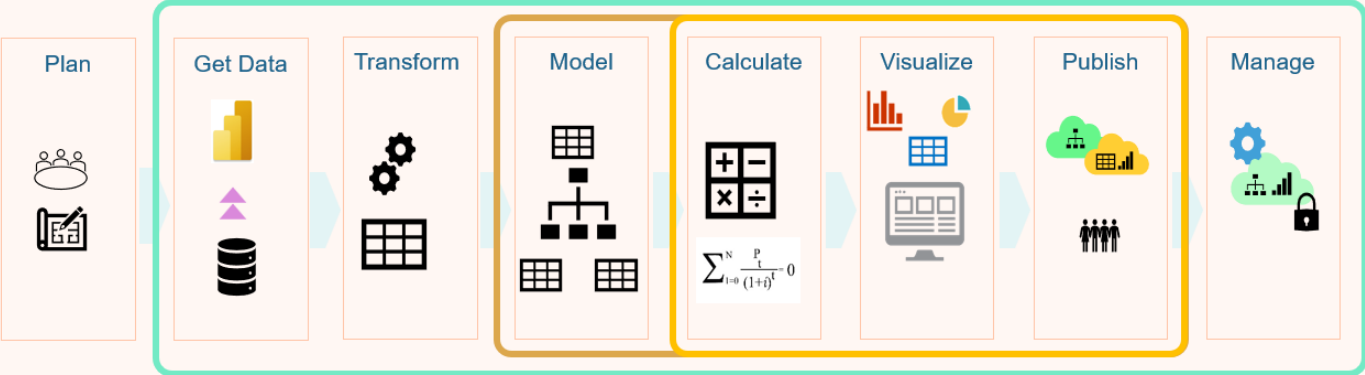
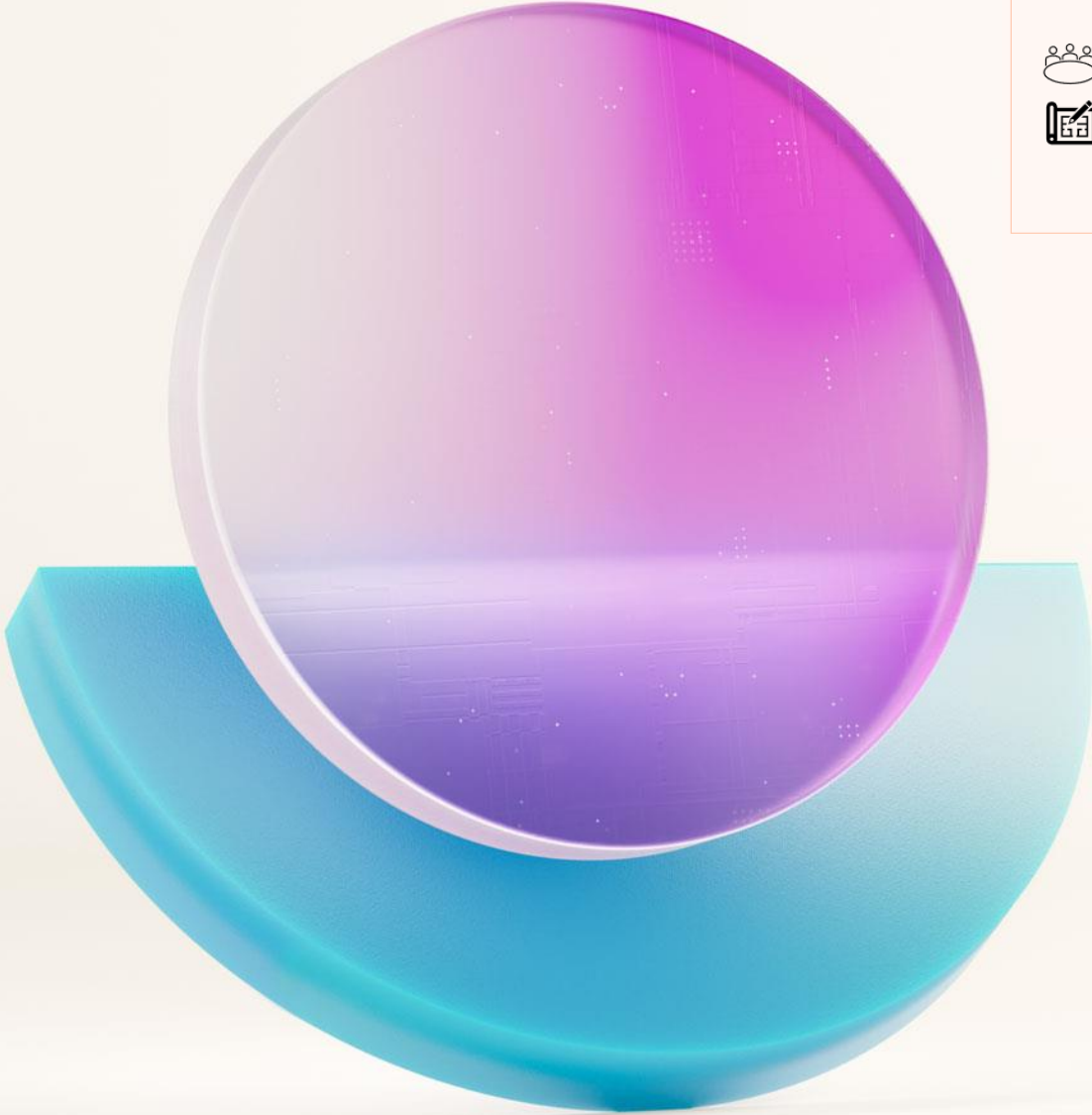
Next-level:

- Large data volume
- Near-real-time reporting
- Enterprise data engineering
- Room to grow



Microsoft Fabric

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Power BI

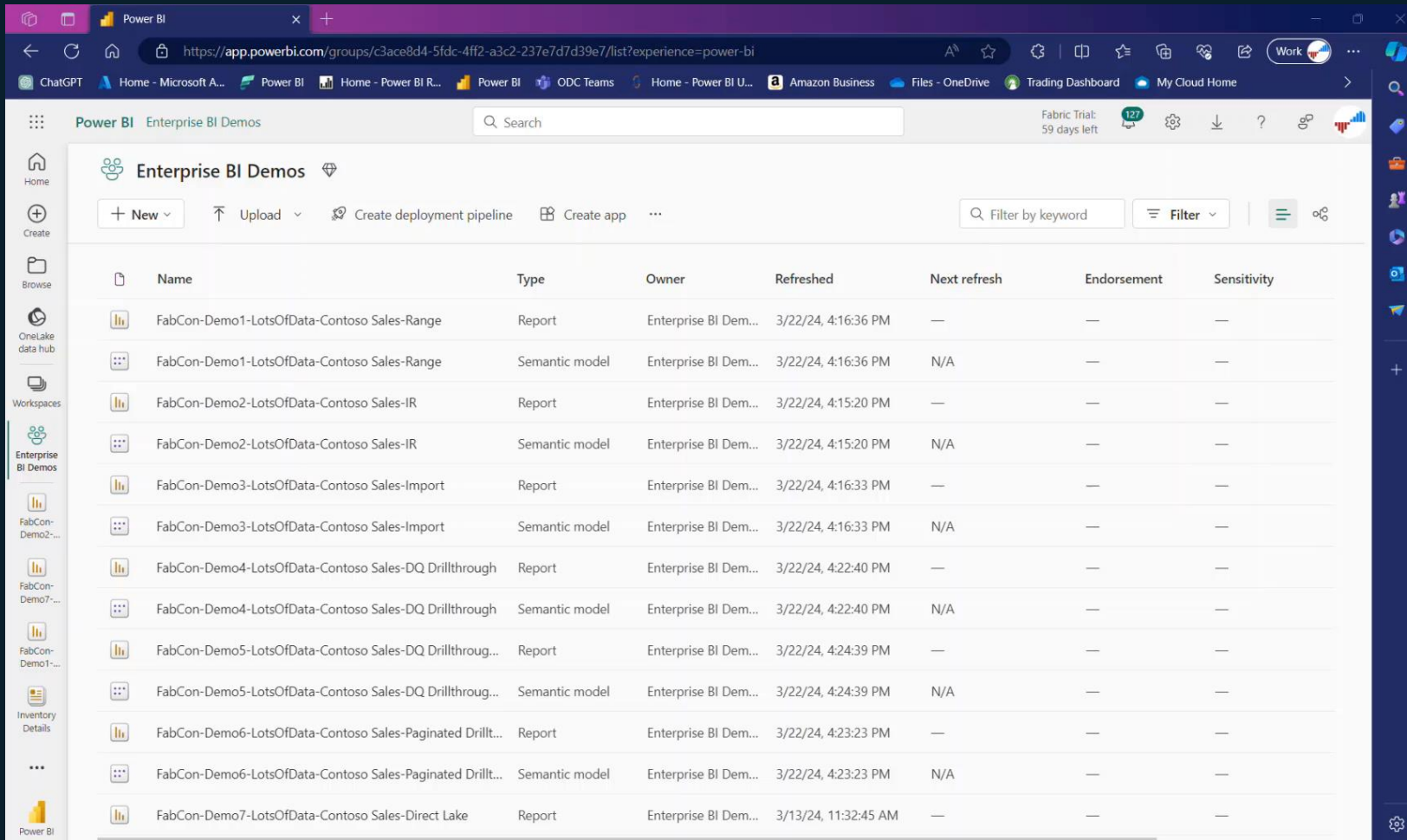
Fabric BI Solution Patterns

Demo 7:

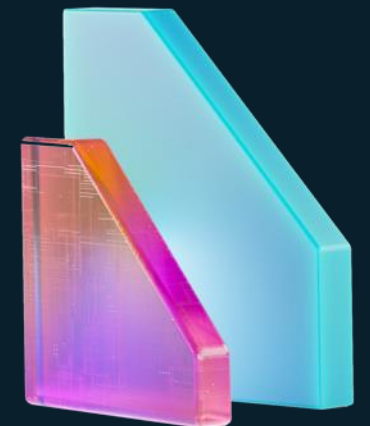
Fabric Direct Lake Semantic model



Demo 7: Fabric Direct Lake Semantic model



Name	Type	Owner	Refreshed	Next refresh	Endorsement	Sensitivity
FabCon-Demo1-LotsOfData-Contoso Sales-Range	Report	Enterprise BI Dem...	3/22/24, 4:16:36 PM	—	—	—
FabCon-Demo1-LotsOfData-Contoso Sales-Range	Semantic model	Enterprise BI Dem...	3/22/24, 4:16:36 PM	N/A	—	—
FabCon-Demo2-LotsOfData-Contoso Sales-IR	Report	Enterprise BI Dem...	3/22/24, 4:15:20 PM	—	—	—
FabCon-Demo2-LotsOfData-Contoso Sales-IR	Semantic model	Enterprise BI Dem...	3/22/24, 4:15:20 PM	N/A	—	—
FabCon-Demo3-LotsOfData-Contoso Sales-Import	Report	Enterprise BI Dem...	3/22/24, 4:16:33 PM	—	—	—
FabCon-Demo3-LotsOfData-Contoso Sales-Import	Semantic model	Enterprise BI Dem...	3/22/24, 4:16:33 PM	N/A	—	—
FabCon-Demo4-LotsOfData-Contoso Sales-DQ Drillthrough	Report	Enterprise BI Dem...	3/22/24, 4:22:40 PM	—	—	—
FabCon-Demo4-LotsOfData-Contoso Sales-DQ Drillthrough	Semantic model	Enterprise BI Dem...	3/22/24, 4:22:40 PM	N/A	—	—
FabCon-Demo5-LotsOfData-Contoso Sales-DQ Drillthroug...	Report	Enterprise BI Dem...	3/22/24, 4:24:39 PM	—	—	—
FabCon-Demo5-LotsOfData-Contoso Sales-DQ Drillthroug...	Semantic model	Enterprise BI Dem...	3/22/24, 4:24:39 PM	N/A	—	—
FabCon-Demo6-LotsOfData-Contoso Sales-Paginated Drillt...	Report	Enterprise BI Dem...	3/22/24, 4:23:23 PM	—	—	—
FabCon-Demo6-LotsOfData-Contoso Sales-Paginated Drillt...	Semantic model	Enterprise BI Dem...	3/22/24, 4:23:23 PM	N/A	—	—
FabCon-Demo7-LotsOfData-Contoso Sales-Direct Lake	Report	Enterprise BI Dem...	3/13/24, 11:32:45 AM	—	—	—



Transition to Direct Lake

Move to Direct Lake when:

- You need enterprise class modeling & analytic reporting.
- You plan to scale to large volume.
- You need improved performance over real-time access to the model data source.
- You want to build an integrated Fabric modern data solution...
 - Realtime analytics
 - Data science
 - Other Fabric workloads & experiences

Before	After
Dataset/model imported from multiple data sources	Data integrate into one lakehouse or warehouse
Power Query transformations	Dataflow Gen2 transformations
Calculated columns (DAX)	Custom columns in lakehouse table (defined in M or notebook code)
Friendly table & column names defined in DW/database or views	Friendly table & column names defined in semantic model
Import semantic model tables from DW views	Generate semantic model tables from lakehouse tables

Don't Freak Out

You don't **have** to change anything!

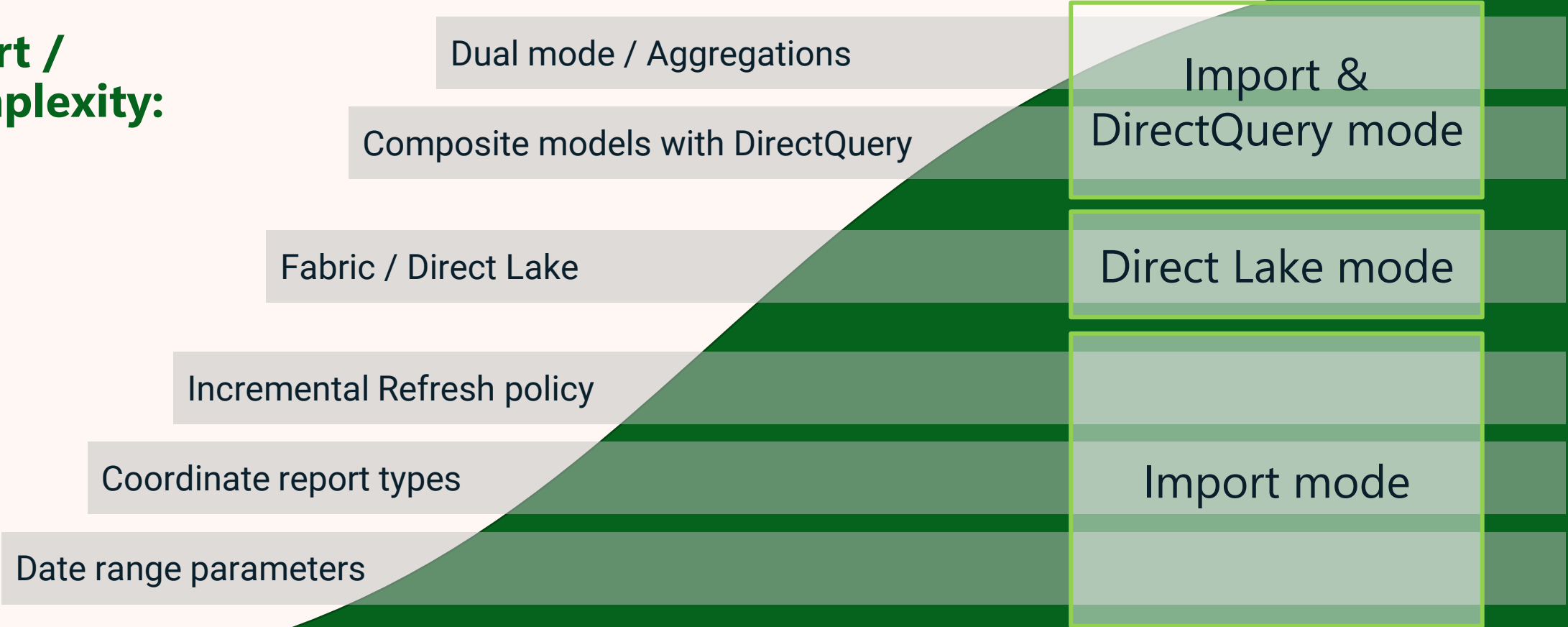
Power BI continues to work as it did before, with or without additional Fabric features

Fabric is the forward direction of Microsoft data platform and analytics and the next generation of Power BI



Summary: Data Scaling Options

**Effort /
Complexity:**





Please
support
your local
data
community

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Paul Turley

[SqlServerBI.blog](https://sqlserverbi.blog)

[Linkedin.com/pturley](https://linkedin.com/pturley)

[@paul_turley](https://twitter.com/paul_turley)



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3RD ANNUAL



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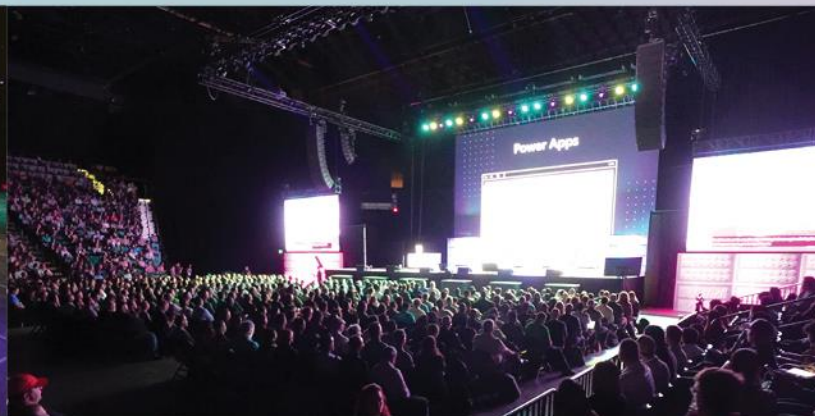
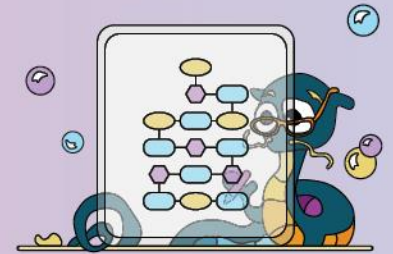
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