Let's Go Premium!

The Essentials to Kickstart Your Experience

Power Platform
Summit
EUROPE

🐦 **@DAVERUIJTER | AMSTERDAM | 27 - 29 MARCH**

Agenda

- What is Power BI Premium?
- Under the hood of Power BI Premium
- Power BI Premium management
- Comparison to Azure Analysis Services
- Roadmap

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Download for free!

https://bit.ly/cheatsheetpbi

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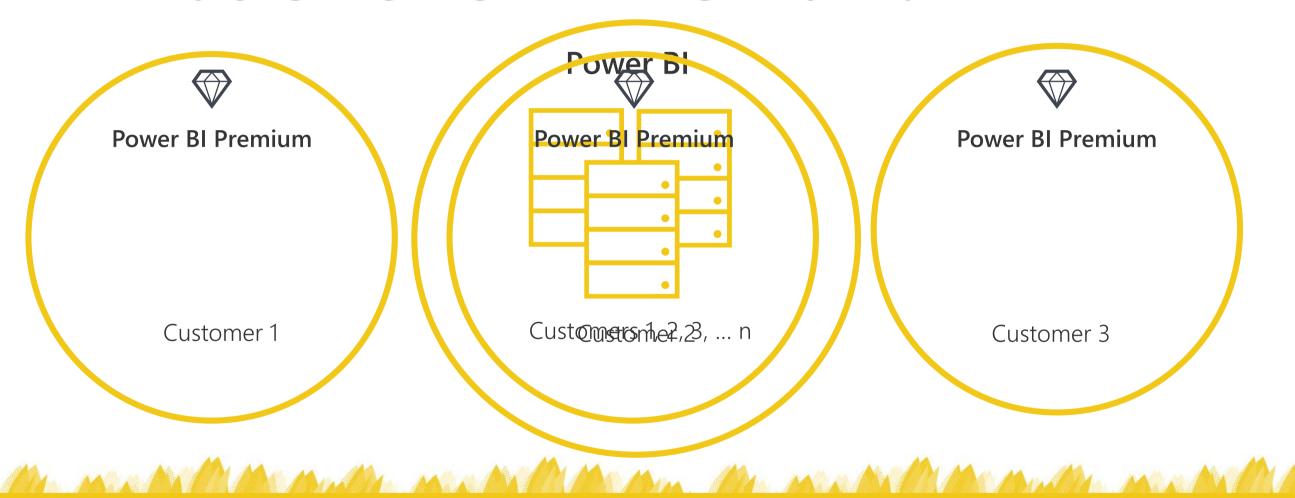🐦 @DaveRuijter

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POWER BI CHEAT SHEET

December 2018
https://bit.ly/cheatsheetpbi

Power Query

Tips & Tricks

- Give every step an explanatory name and merge steps of the same type, for better manageability.
- Give queries and columns user-friendly names (this is also necessary to utilize Q&A).
- Make sure that each column in each table has the correct data type. This will make the data model smaller and (as a result) faster.
- Remove columns you are not going to use in your report. Prefer 'Remove Other Columns' above the 'Remove Columns' option, for lower risk that structure changes in your data source break the query.
- Maximize the use of Query Folding for faster and more efficient queries. With Query Folding, multiple transformations are merged as one query and then send to the source. If 'View Native Query' is not available, Query Folding has stopped before that step.
- Structure your queries in folders. For example: Facts, Dimensions, Functions, Misc.
- You can copy and paste Queries easily between files. Dependencies will be included (parameters/queries/functions), and Data Sources will be automatically listed.
- Turn off 'Enable Load' for queries/tables that you don't need in the Data Model.
- Prefer "reference" over "duplicate" of a query.
- Re-use Power Query code and lower impact on your data source by using Power BI dataflows.
- Turn on the Formula Bar so you get familiar with Power Query (M) code. M is an easy way to quickly make small adjustments.
- In general, prefer "Import" over "DirectQuery". Unless the amount of data is too large to import, or when there are other requirements (like real-time insights).
- Did you know you can transform your data by using Python and R in the Power BI Query Editor?

Code examples (don't forget that Power Query / M is case-sensitive!)

- if T > 0 then A else B
- try A/B otherwise 0
- #table({ "X", "Y" }, { { 1, 2 }, { 3, 4 } })
- DateTime.LocalNow()
- Date.From(DateTime.LocalNow())
- Excel.Workbook(Web.Contents("[url]/[filename].xlsx"), null, true)

Resources

- Power Query M Formula Reference: http://bit.ly/PQMReference.
- Notepad++ Power Query support by Lars Schreiber: http://bit.ly/PQinNotepad.

I'VE GOT THE POWER BI

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Data Model

Tips & Tricks

- Always use a separate Date table in your data model. Mark it as a Date Table.
- Only use DAX Calculated Columns when it's not possible to create it using Power Query. This improves clarity and manageability of your report as transformations are located where you expect them.
- Hide columns that are needed but are irrelevant for the user. Quick Tip: use Relationships view to hide multiple columns: use SHIFT + DOWN ARROW for selection of columns ▶ SHIFT + F10 for menu ▶ Hide.
- Hide the key at the many side of a many-to-one relation (e.g. [OrderDate] in Revenue table).
- Use the new filter pane and hide your filters for end users to make sure your end-users can't change it.
- For each measure column in your data model, make a DAX Calculated Measure instead of using the 'Default Summarization', then hide the original column. This way all measures will have the same icon. And it enables you to easily change the calculation in the future (e.g. adding a filter condition).
- Also, it is easier to reference this measure in other DAX calculations.
- Always use the table name when you refer to a column, for example: 'Product'[Category].
- Use DIVIDE() to prevent division by 0, and to improve the speed of your divisions.
- Use IsInScope to get the right hierarchy level in DAX (read all about it in Kasper de Jonge's blog: https://bit.ly/KasperOnBIInScope.)
- Give measures a prefix (%, #, €).
- Use standard abbreviations like YTD, LY, PY, PP as suffix, to keep the base fields together.
- In DAX: (un)comment DAX lines by pressing Alt + Shift + A or CTRL + /, and Shift + Enter for line breaks.
- Use aggregations to keep your model small and performant, and still have all detailed data available.
- Use Tabular Editor to make changes to your Power BI file (currently unsupported by Microsoft), also check-out the best-practices analyzer.
- Use the new model diagram to break-out complex models by subject area in separate diagrams.
- Bulk edit fields with multi-select in the new model diagram.
- Combine historical data with live data by using composite models, and to group measures in display folders.

Resources

- Increase the readability of your DAX calculations: https://www.daxformatter.com.
- Practical DAX use cases, with incredible explanations: https://www.daxpatterns.com.
- Use DAX Studio to analyze and tune your calculations: https://www.daxstudio.org.
- Find all about DAX expressions: https://dax.guide.
- Download Tabular Editor: https://tabulareditor.github.io/.
- Show the last refresh date of your dataset: https://bit.ly/KasperOnBiRefreshDate.

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What is...
Power BI Premium?

What is Power BI Premium?

Power BI

Power BI Premium

Power BI Premium

Power BI Premium

Customer 1

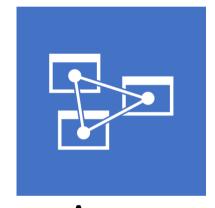Customers 1,2,3, ... n

Customer 4,2,3, ... n

Customer 3

What is Power BI Premium?

Enterprise BI

Self-service BI

All BI users

users

Azure
Analysis Services

Power BI
Premium

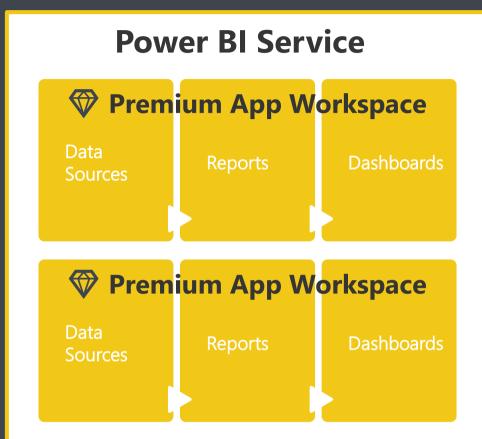Power BI

What is Power BI Premium?

Dedicated resources in the cloud

Power BI Premium

Flexibility to license by capacity

Greater scale and performance

Extending on-premises capabilities

Embedded analytics

Four Power BI Service licenses
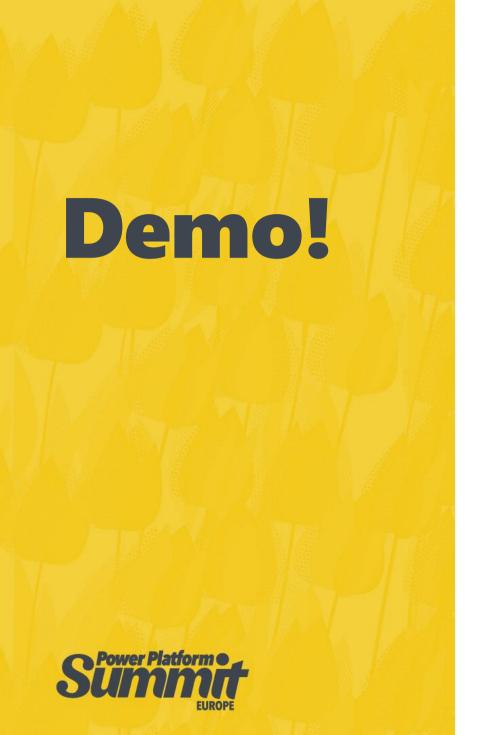
- **Power BI Desktop** for report authoring & data exploration
- **Power BI Free** for personal self-service BI
- **Power BI Pro** for sharing and collaboration
- **Power BI Premium** for large scale deployments

What do you get extra?

- Share with free users (P1+)
- Incremental refresh
- 48x refresh
- Support for larger dataset sizes
- XMLA endpoints **(now in public preview!)**
- Multi-geo
- Extra dataflows features (linked entities, parallel execution of transforms, external CDM Folders)
- Paginated Reports (SSRS reports)
- Ability to embed content in apps on behalf of app users (PaaS)

Specs

Capacity Node	Total v-cores	RAM	DQ/LC (per sec)	Model Refresh Parallelism	Model Size Limit (GB)
EM1 / A1	1	2,5	3,75	1	1
EM2 / A2	2	5	7,5	2	1
EM3 / A3	4	10	15	3	1
P1 / A4	8	25	30	6	3
P2 / A5	16	50	60	12	6
P3 / A6	32	100	120	24	10

Power BI Premium notes

- To leverage distribution to 'Free' users, use Apps
- Access to App Workspaces always require Pro license
- You can use Azure Power BI Embedded Capacity, but there is no sharing to 'Free' users!

Incremental refresh
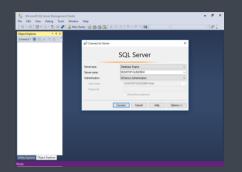
- Enable large models in Power BI
  - Faster refresh
  - More reliable
  - Lower CPU and Memory usage
- Define policy in Power BI Desktop; apply it in the service
- Policy doesn't affect data in Power BI Desktop
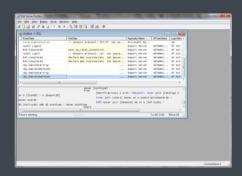
XMLA endpoints
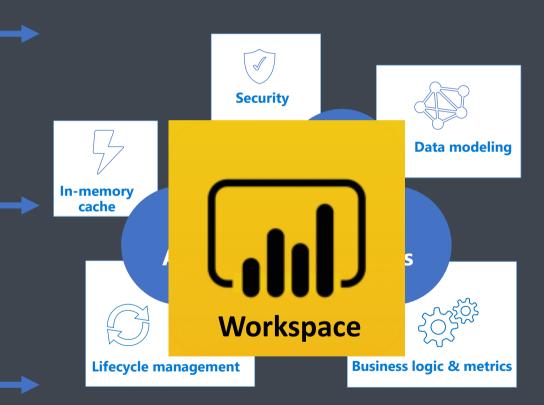
Power Platform
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XMLA endpoints

Security

Data modeling

In-memory cache

Workspace

Lifecycle management

Business logic & metrics

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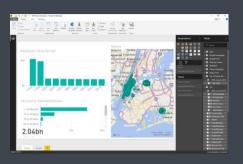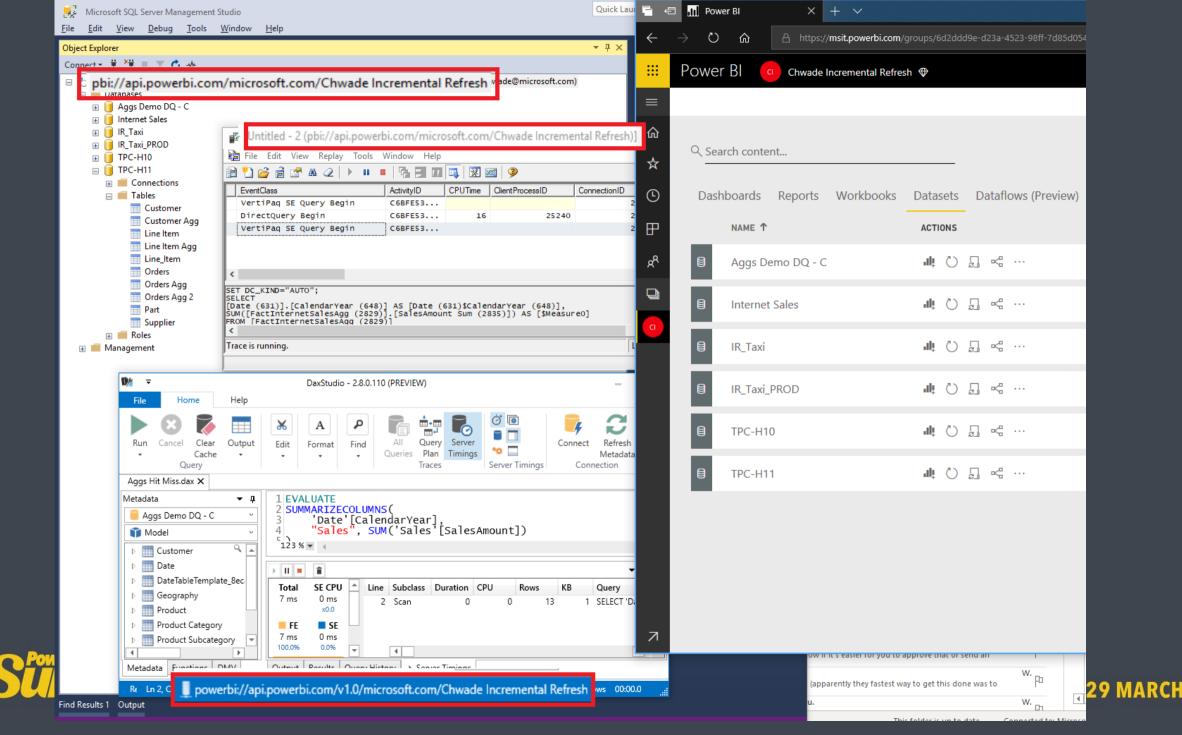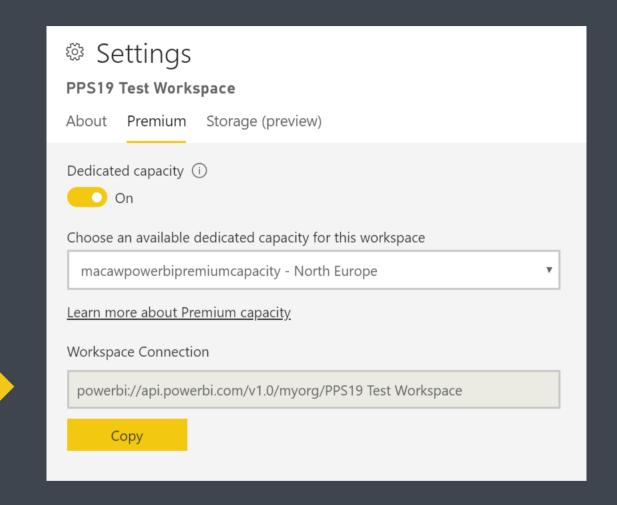
Under the hood of Premium capacity

- Capacity operations are classified as either interactive or background
- Interactive operations include rendering requests and responding to user interactions (filtering, Q&A querying, etc.)
- Imported model querying is generally memory resource-intensive
- Querying LC/DQ models is generally CPU-intensive
- Background operations include dataflow and import model refreshes, and dashboard query caching

Overcommiting the capacity

- Each capacity can store many import models (up to 100TB)
- When their combined disk storage exceeds the supported memory, then they cannot all be loaded into memory at the same time and the capacity is overcommitted

Evictions from memory (1)

- If the capacity is not experiencing any memory pressure, models are simply loaded into memory and remain there
- When insufficient memory is available to load a model, the Power BI service will first need to free up memory
- The removal of a model from memory is known as **eviction**

Evictions from memory (2)

- Power BI will first try to detecting models that have become inactive by seeking models which have not been used in the last three minutes

- If there are no inactive models to evict, the Power BI service seeks to evict models loaded for background operations

- A last resort, after 30 seconds of failed attempts, is to fail the interactive operation of the current user

Evictions from memory (3)

Dataset eviction

= =

normal and expected behavior

Dataset refreshes

- Dataset refreshes are memory intensive and use ±2x RAM
- Scheduled dataset refresh will be queued if there is insufficient memory and all models are active (no evictions possible)
- On-demand refreshes (triggered by a user request or API call) will retry three times, and then fail if there are still not enough resources
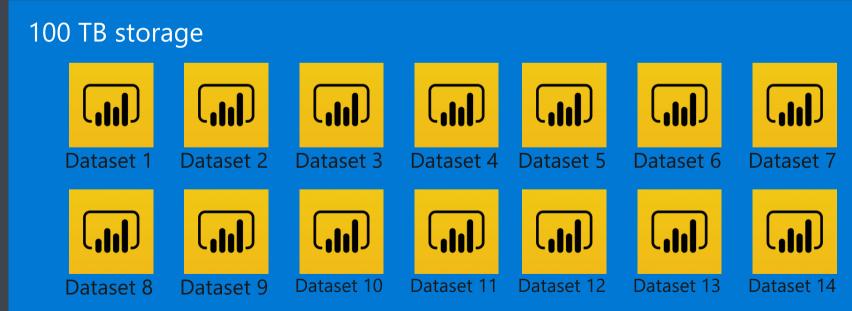
Under the hood of Premium capacity

Capacity: P1
Backend v-cores: 4
Memory: 25 GB
Storage: 100 TB

25 GB Memory

100 TB storage

Dataset 1 Dataset 2 Dataset 3 Dataset 4 Dataset 5 Dataset 6 Dataset 7

Dataset 8 Dataset 9 Dataset 10 Dataset 11 Dataset 12 Dataset 13 Dataset 14
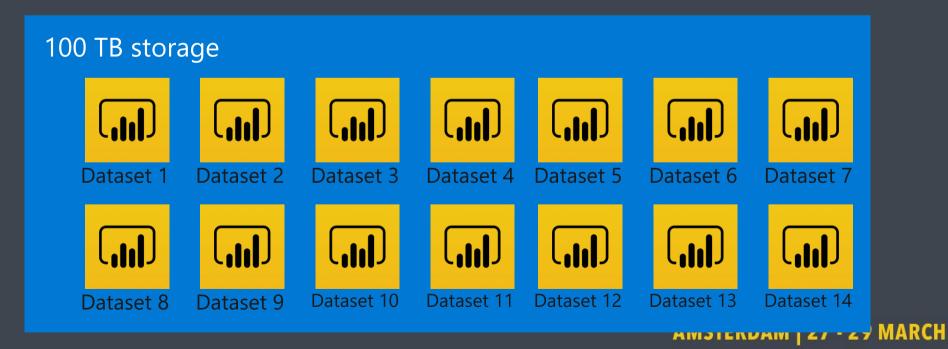
What happens when the capacity is out of resources...
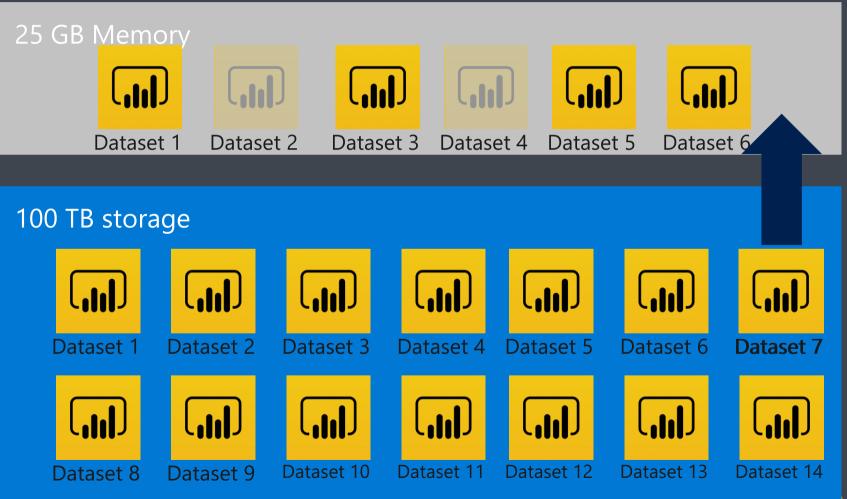
Eviction

Capacity: P1
Backend v-cores: 4
Memory: 25 GB
Storage: 100 TB

Temperature: **Warm**
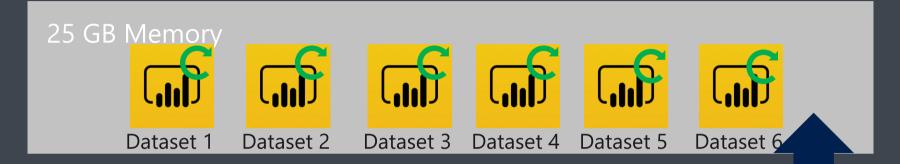
25 GB Memory

Dataset 1 Dataset 2 Dataset 3 Dataset 4 Dataset 5 Dataset 6

100 TB storage

Dataset 1 Dataset 2 Dataset 3 Dataset 4 Dataset 5 Dataset 6 **Dataset 7**

Dataset 8 Dataset 9 Dataset 10 Dataset 11 Dataset 12 Dataset 13 Dataset 14
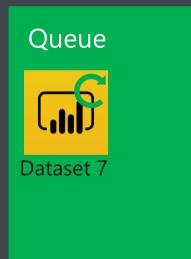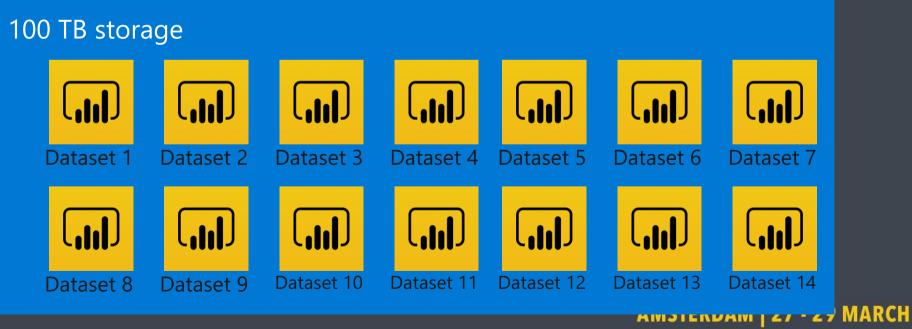
What if my capacity is heavily used…
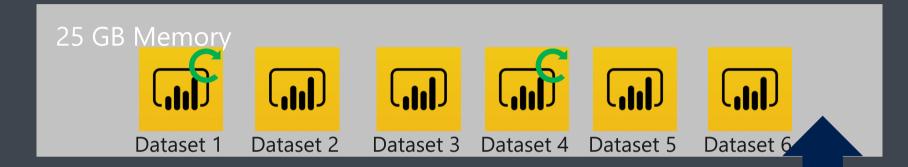
All interactive operations…

Capacity: P1
Backend v-cores: 4
Memory: 25 GB
Storage: 100 TB
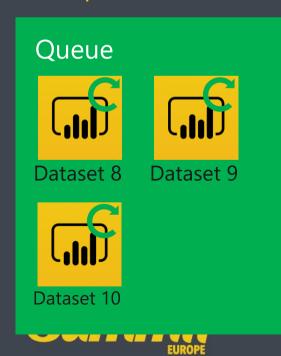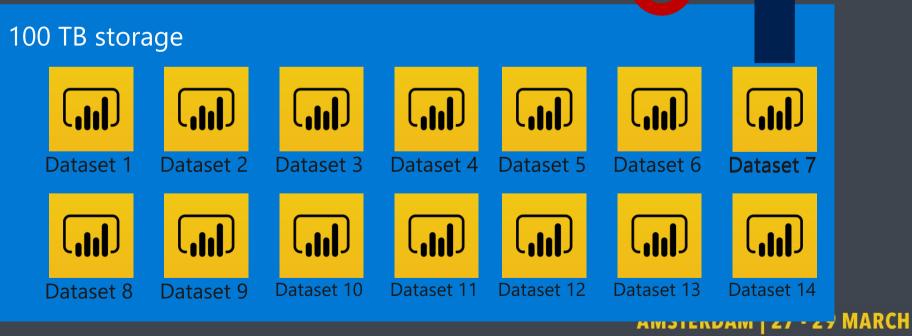
Temperature: **Burning**

25 GB Memory

Dataset 1	Dataset 2	Dataset 3	Dataset 4	Dataset 5	Dataset 6

Queue

Dataset 8	Dataset 9
Dataset 10	

100 TB storage

Dataset 1	Dataset 2	Dataset 3	Dataset 4	Dataset 5	Dataset 6	Dataset 7
Dataset 8	Dataset 9	Dataset 10	Dataset 11	Dataset 12	Dataset 13	Dataset 14

Power BI Premium Management
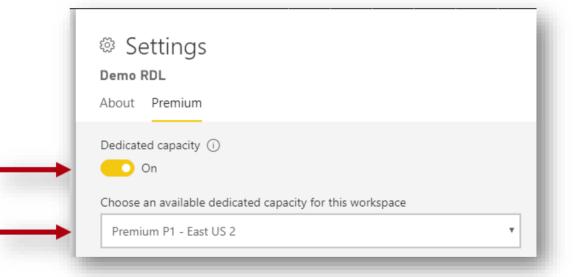
Creating and Managing Capacities

- The Capacity Settings page of the Power BI Admin Portal displays the number of v-cores purchased and available (i.e. yet to be assigned to a capacity)
- Each capacity has its won set of admins
- Capacity Admins cannot access workspace content
- A Premium capacity can be assigned to a region other than the home region of the Power BI tenant (multi-geo)
- You can specify the memory per workload (default stuff, dataflows, paginated reports)

Assigning Workspaces to Capacities

- Assign workspaces manually
- Bulk assign:
  - Workspaces by users
  - Specific workspaces
  - The entire organization's workspaces
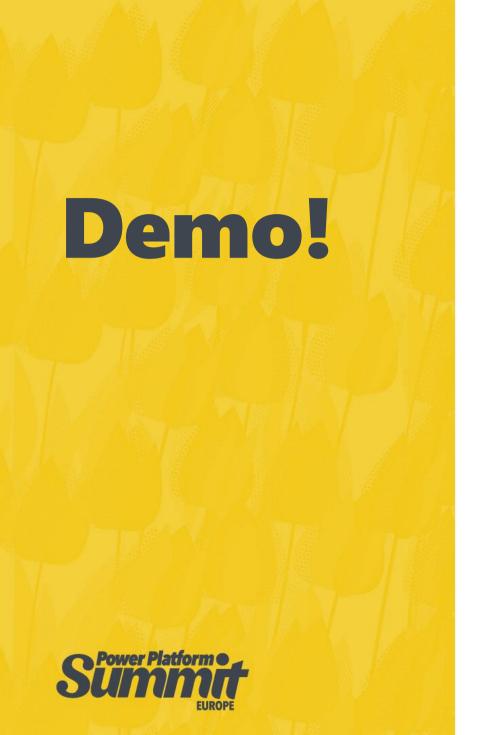
Monitoring Capacities

- Power BI Admin Portal (basic)
- Power BI Premium Capacity Metrics App, including:
  - Average CPU and high utilization count
  - Average Memory and high utilization count, and memory usage for specific datasets, dataflows and paginated reports
  - Active datasets loaded in memory
  - Average and maximum query durations
  - Average query wait times
  - Average dataset and dataflow refresh times

Demo!

Monitoring Premium capacity

Optimizing Premium Capacities

- Separate business critical and Self-Service BI (SSBI) into different capacities
- Check if sharing is only with Power BI Pro users, there may be no need to store content in Premium capacity
- Use Premium when looking to achieve a specific refresh time
- Use Premium when specific features are required, for example large datasets or paginated reporting
- Optimize your Data Models

Sizing your capacities

- Model size and data characteristics
- Concurrent active models
- Import model refresh
- Concurrent queries
- Other workloads: dataflows and paginated reports
- Priority (business-critical vs self-service)
- Generally, for larger models you scale up, for more concurrency you scale out
- Consider splitting a P2, before upgrading to P3
- Test the waters using Azure Power BI Embedded Capacity
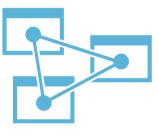
Power BI Premium or Azure Analysis Services
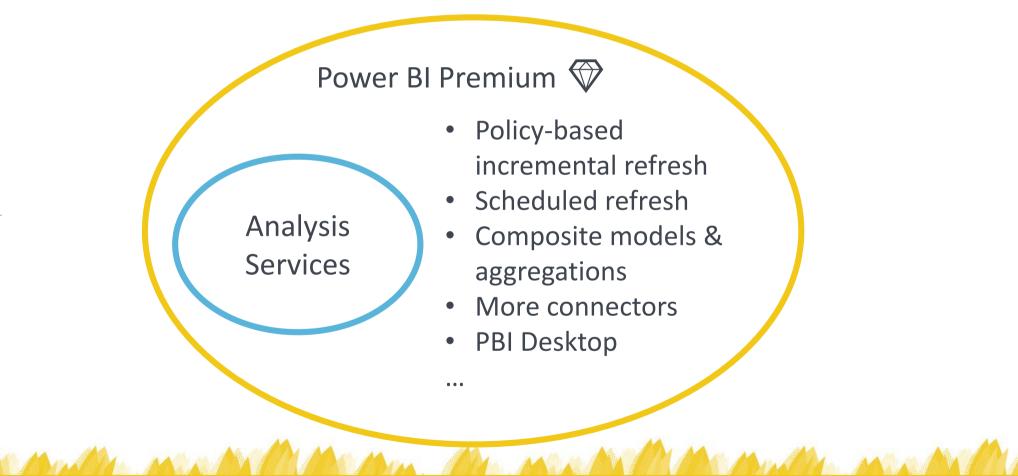
Power BI

Azure Analysis Services

Power BI Premium ◇

Analysis Services

- Policy-based incremental refresh
- Scheduled refresh
- Composite models & aggregations
- More connectors
- PBI Desktop

...

Power BI Premium or Azure Analysis Services

- DevOps experience
- Killer features (Object Level Security / Translations / Composit Model)
- One model "to rule them all"
- Version control
- Data Source Connectivity
- Front-end tooling
- Very large model support
- User group characteristics
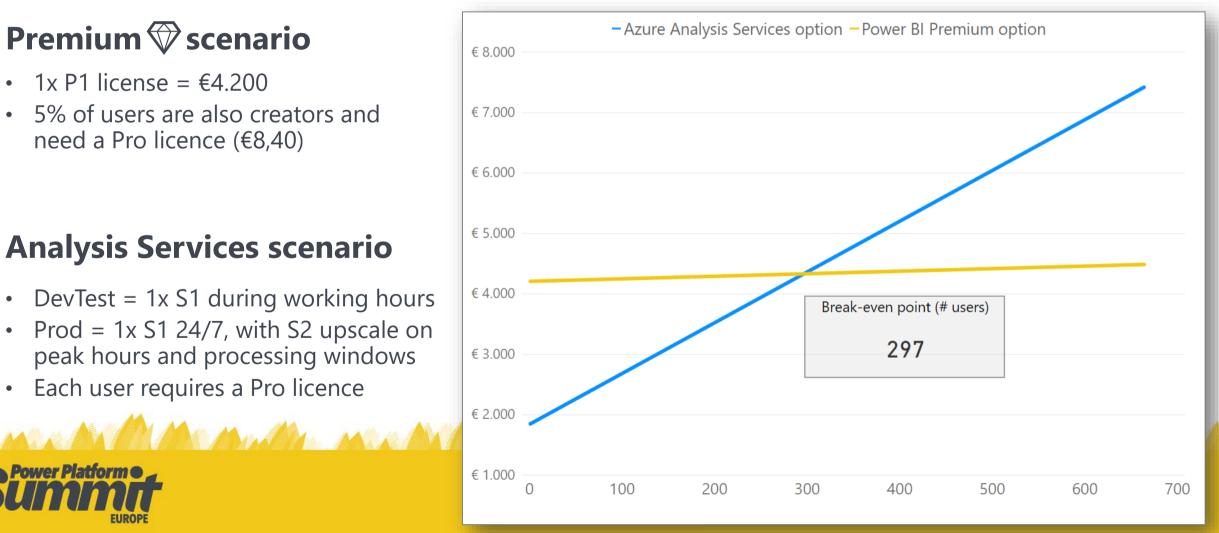
Power BI Premium vs Azure Analysis Services

Premium 💎 scenario

- 1x P1 license = €4.200
- 5% of users are also creators and need a Pro licence (€8,40)

Analysis Services scenario

- DevTest = 1x S1 during working hours
- Prod = 1x S1 24/7, with S2 upscale on peak hours and processing windows
- Each user requires a Pro licence

Break-even point (# users)

297
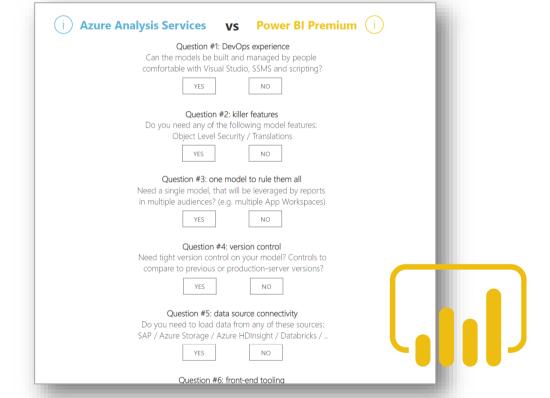
Power BI Premium vs Azure Analysis Services

https://www.moderndata.ai/aasvspbi
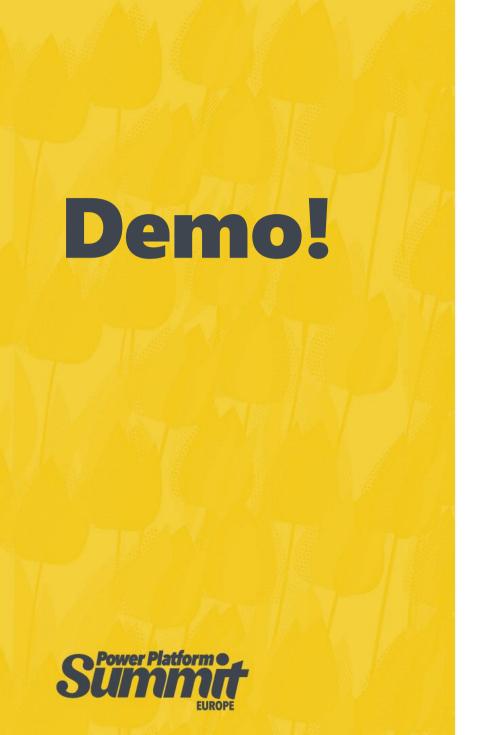
AI features in Power BI Premium

1. Invoke Cognitive Services to enrich your data
2. Create new Machine Learning models with AutoML
3. *Easily invoke your Azure Machine Learning models (premium not required)*

Demo!

Power BI Premium AI features

Roadmap for Power BI Premium

- Calculation Groups
- XMLA endpoints write-enabled
- Paginated Reports GAA

Session resources

- My blog post on selecting between Power BI Premium and Azure Analysis Services:
- Power BI Premium on public Microsoft sites:
  - Premium documentation: https://docs.microsoft.com/en-us/power-bi/service-premium
  - Premium whitepaper: https://docs.microsoft.com/en-us/power-bi/whitepaper-powerbi-premium-deployment
  - Premium roadmap / release notes:
  - Premium on Power BI Ideas: