The International Edition
#DBCC 2020 Online
DataBlaster
CommunityConference

Power BI Premium
Practical Tips for Making the most of it
Benni De Jagere

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Benni De Jagere?

- Senior Data Insights Consultant
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- @BenniDeJagere
- /bennidejagere
- #SayNoToPieCharts

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Session Objectives

- Set the scene on Power BI Premium
- Usable set of tips to improve
- (Hopefully) Convince you auditing is key
- It's Friday, have a coffee and relax!

- **NOT** A roadmap session on Premium Gen2 or PPU Licensing

Power BI Premium?

- Dedicated Capacity Nodes, containing v-cores and Memory
    - P1 (8 v-cores, 25GB RAM)
    - Scales linear to
    - P5 (128 v-cores, 400GB RAM)
- Provides a richer feature set
    - Some features even released Premium First, Pro later (or not ..)
- Support for data residency by region (Multi-Geo)
- Allows for users to access artefacts without a Power BI Subscription
- **NOT** Easy-mode for performance

Hold on ..

01

Power BI Premium Feature Comparison

	Premium	
	Per User	**Per Capacity**
Model Size Limit	100GB	Up to 400GB
Refresh rate	48/day	48/day
Paginated Reports	✓	✓
AI Capabilities (AutoML, Impact Analysis, Cognitive Services)	✓	✓
Advanced Dataflows Features (Direct Query, etc.)	✓	✓
Usage-based Aggregate Optimization	✓	✓
Application Lifecycle Management (Deployment Pipelines)	✓	✓
XMLA Endpoint Connectivity	✓	✓
Enhanced automatic page refresh	✓	✓
Deployment Pipelines	✓	✓
Multi-Geo Support	✕	✓
Unlimited Distribution	✕	✓
Power BI reports on-premises	✕	✓
Bring Your Own Key	✕	✓

Capacity Settings

02

Capacity Workload Settings

- Check the default capacity workload settings
  - TIP: Don't overcommit the allocated resources
- Are all the workloads needed/used?
- Can we offload some workloads to other capacities?

USER PERMISSIONS

▶ Capacity admins

▶ Contributor permissions
Enabled for a subset of the organization

MORE OPTIONS

▶ Workloads

▶ Advanced options

▶ Workspaces assigned to this capacity

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Demo: Capacity Settings

03

Premium Capacity Metrics App

04

Premium Capacity Metrics App (v2)

- Represents collected metrics for different workloads
- Slice 'n Dice with workspaces, datasets, ..
- Collects 7 days worth of data
- TIP: Set up the template app, and connect to the underlying dataset through XMLA Read/Write
  - Collect and store the data
  - Build up history
  - Build your own report(s) and insights
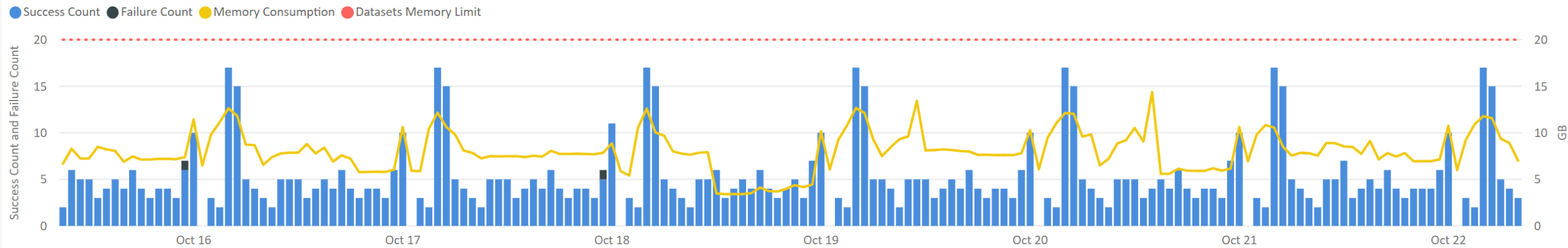 - Correlate metrics over longer periods of time

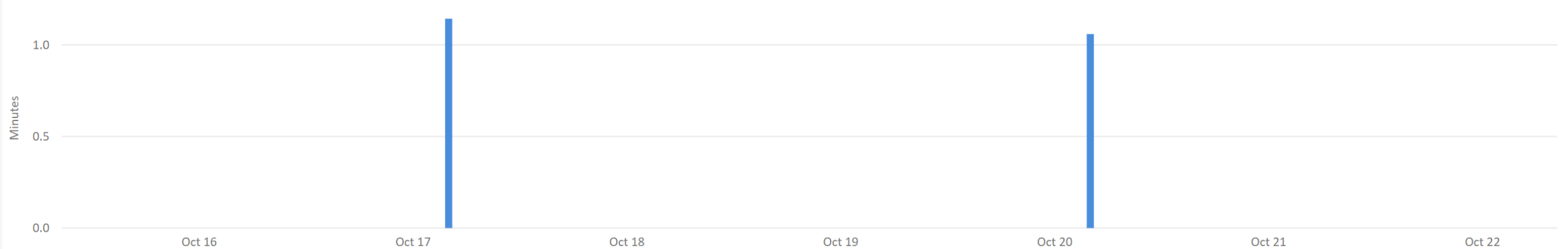# Premium Capacity Metrics App (v2)
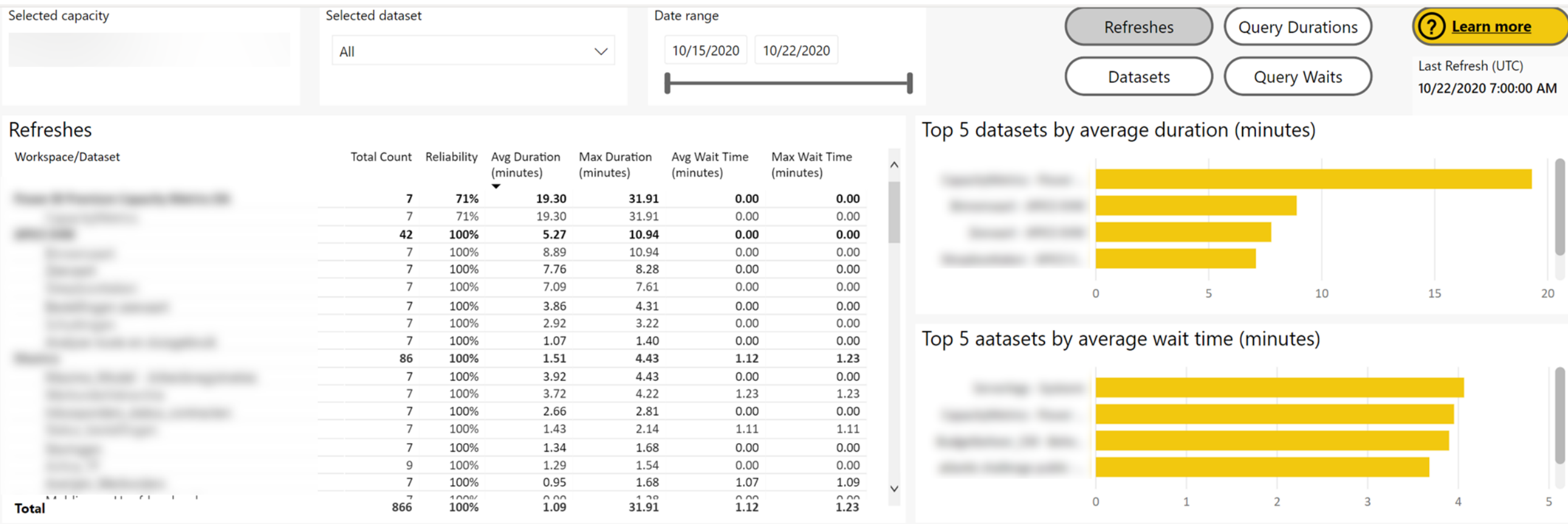
Premium Capacity Metrics App (v2)

Hourly refresh count and memory consumption (GB)

● Success Count ● Failure Count ● Memory Consumption ● Datasets Memory Limit

Hourly average refresh wait times (minutes)

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

Dataset sizes

Workspace/Dataset	Max Size (MB)
	2,267.36
	226.89
	355.57
	2,267.36
	1,056.60
	702.14
	1,493.14
	57.19
	57.19
	728.24
	55.24
	73.57
	116.89
	142.71
	32.62
	64.27
	4.12
	3.16
	29.13
	160.09
	36.47
	231.61
	16.91
	55.52
Total	**2,267.36**

Dataset eviction counts

Capacity Name	Total
	612
Total	**612**

High active memory count (over 80%)

Capacity Name	SKU	Count
	P1	0
Total		**0**

Hourly loaded dataset counts

● Models ● Memory Consumption ● Datasets Memory Limit
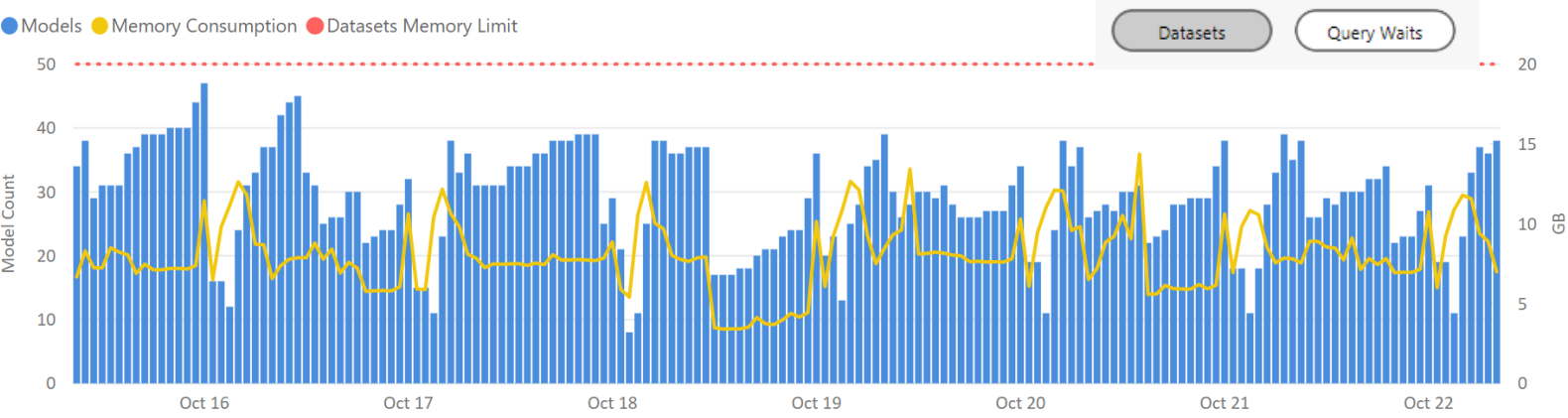
Hourly dataset evictions and memory consumption

● Total evictions ● Memory Consumption ● Datasets Memory Limit
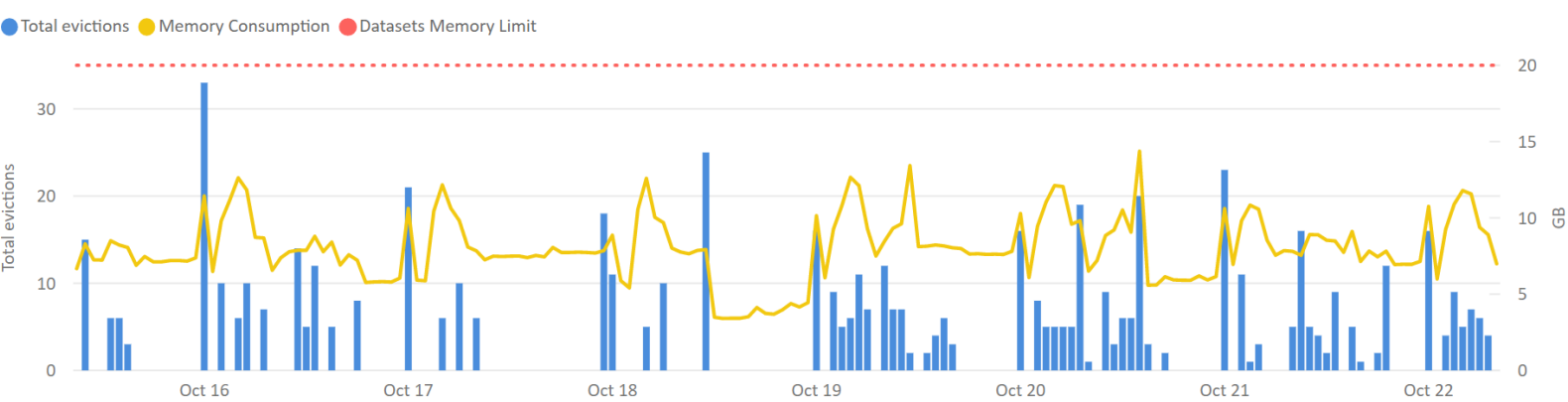
Consumed memory percentages

● Active ● All

Refreshes   Query Durations   Datasets   Query Waits

16
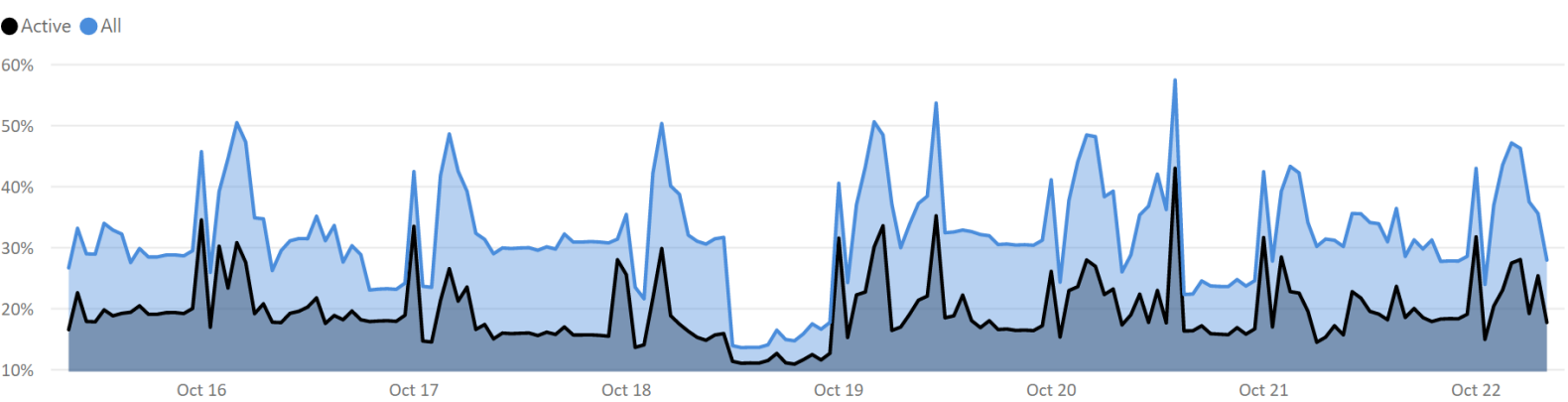
Memory Evictions

- 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 an **eviction**

Memory Evictions

- 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

Query durations

Workspace/Dataset	Total Count	Average Duration (ms)	Max Duration (ms)
ARGS DW	475	80.15	1,418.00
	103	137.70	1,418.00
	372	63.22	1,045.00
BCM processor	218	43.24	90.00
	218	43.24	90.00
Behavcontrols	9,051	31.25	20,536.00
	182	38.58	1,029.00
	81	30.47	355.00
	112	16.30	345.00
	24	14.09	20.00
	875	32.67	173.00
	76	7.26	20.00
	3	10.00	20.00
	230	14.41	40.00
	188	17.20	45.00
	25	130.56	432.00
	34	22.35	40.00
	197	19.76	79.00
	6,921	42.76	20,536.00
Total	**133,750**	**978.44**	**1,686,632.00**

Query duration distribution

Legend: ● <= 30ms ● (30ms, 100ms] ● (100ms, 300ms] ● (300ms, 1s] ● (1s, 3s] ● (3s, 10s] ● (10s, 30s] ● > 30s

84.44% 9.45%

0% 20% 40% 60% 80% 100%
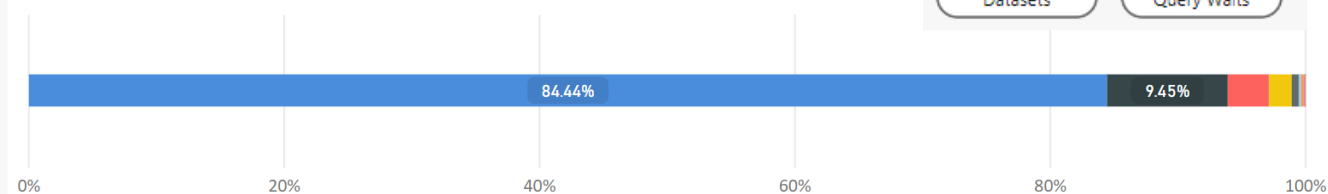
Top 5 datasets by average duration (ms)

0K 1K 2K 3K 4K 5K 6K 7K

Buttons: Refreshes | Query Durations | Datasets | Query Waits

Hourly query duration distributions

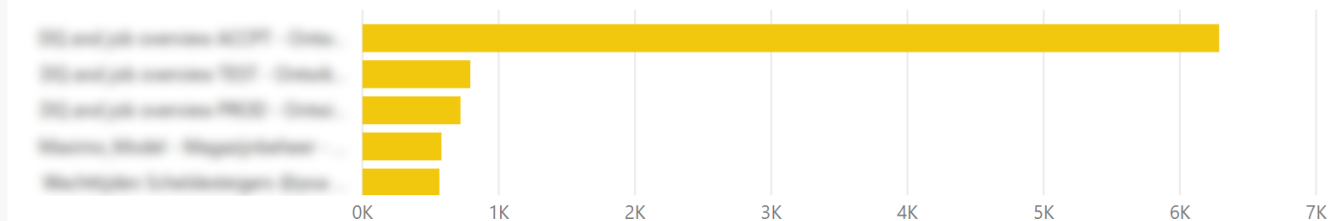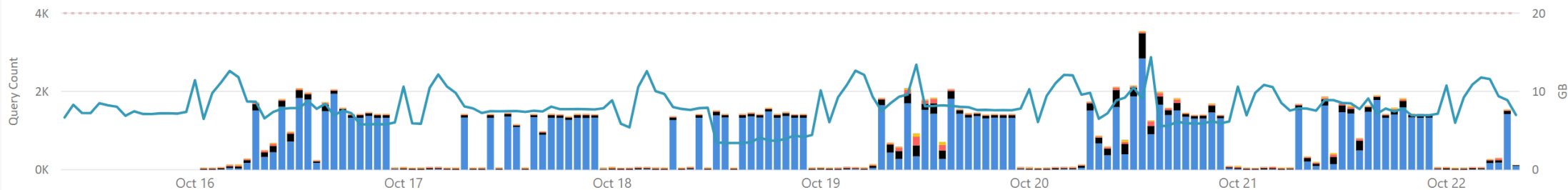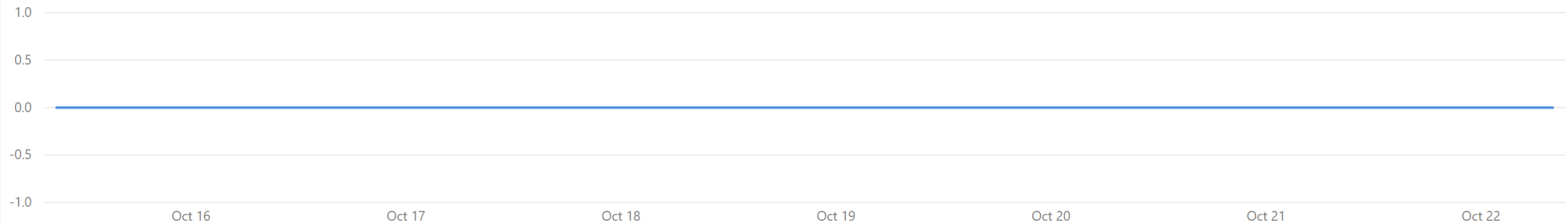Legend: ● <= 30ms ● (30ms, 100ms] ● (100ms, 300ms] ● (300ms, 1s] ● (1s, 3s] ● (3s, 10s] ● (10s, 30s] ● > 30s ● Memory Consumption ● Datasets Memory Limit

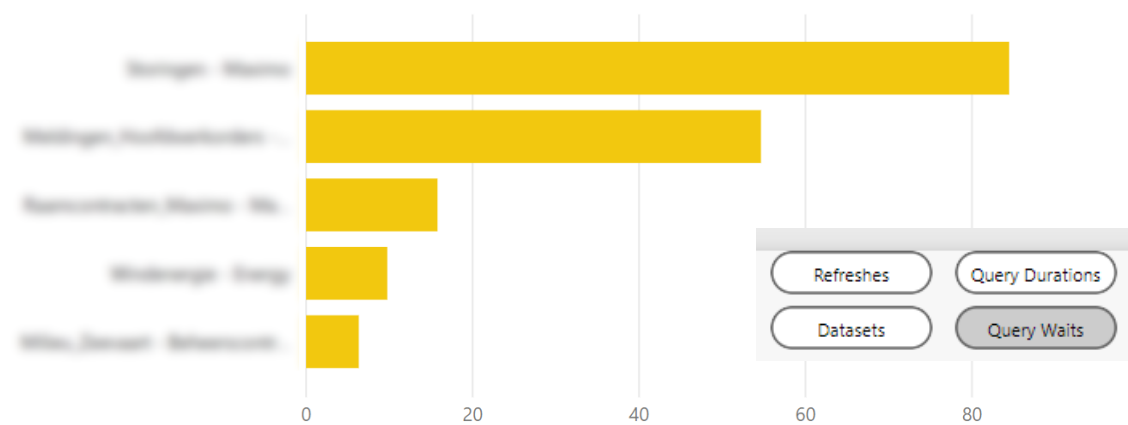Query Count: 4K, 2K, 0K — GB: 20, 10, 0

Oct 16 Oct 17 Oct 18 Oct 19 Oct 20 Oct 21 Oct 22

DirectQuery/live connections - times exceeded 80% utilization

1.0
0.5
0.0
-0.5
-1.0

Oct 16 Oct 17 Oct 18 Oct 19 Oct 20 Oct 21 Oct 22

Query wait times

Workspace/Dataset	Total Count	Wait Count	Wait %	Average (ms)	Max (ms)	Duration
⬛⬛⬛⬛⬛	**475**	**11**	**2.32%**	**0.20**	**28.00**	**80.15**
⬛⬛⬛⬛	103	1	0.97%	0.03	2.00	137.70
⬛⬛⬛	372	10	2.69%	0.25	28.00	63.22
⬛⬛⬛⬛	**218**	**41**	**18.81%**	**1.37**	**15.00**	**43.24**
⬛⬛⬛	218	41	18.81%	1.37	15.00	43.24
⬛⬛⬛⬛	**9,051**	**951**	**10.51%**	**0.57**	**242.00**	**31.25**
⬛⬛⬛	182	23	12.64%	0.35	4.00	38.58
⬛⬛⬛	81	25	30.86%	2.48	13.00	30.47
⬛⬛⬛	112	12	10.71%	0.40	24.00	16.30
⬛⬛⬛	24	0	0.00%	0.00	0.00	14.09
⬛⬛⬛	875	135	15.43%	0.38	21.00	32.67
⬛⬛⬛	76	6	7.89%	0.39	7.00	7.26
⬛⬛⬛	3	0	0.00%	0.00	0.00	10.00
⬛⬛⬛	230	26	11.30%	0.38	8.00	14.41
Total	**133,750**	**10,377**	**7.76%**	**1.78**	**631.00**	**978.44**

Top 5 datasets by average wait time (ms)

Refreshes | Query Durations
Datasets | Query Waits

Wait time distributions

● <= 50ms ● (50ms, 100ms] ● (100ms, 200ms] ● (200ms, 400ms] ● (400ms, 1s] ● (1s, 5s] ● > 5s

98.81%

0%   20%   40%   60%   80%   100%
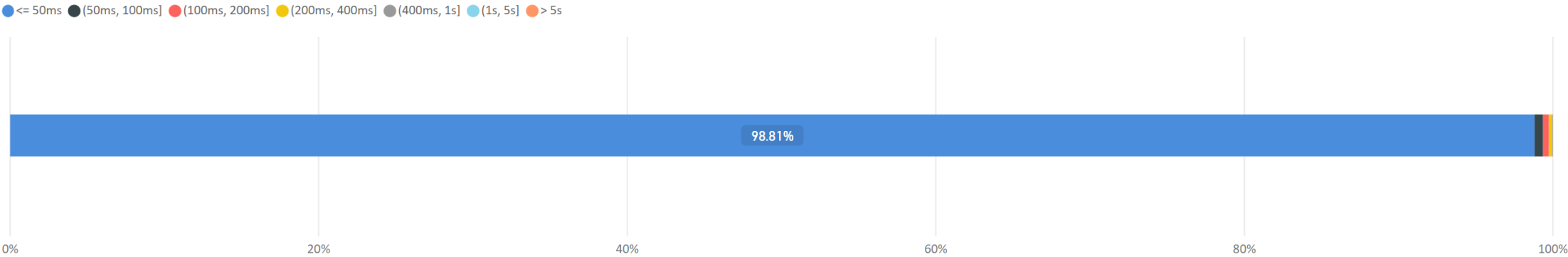
Hourly query wait time distributions

● <= 50ms ● (50ms, 100ms] ● (100ms, 200ms] ● (200ms, 400ms] ● (400ms, 1s] ● (1s, 5s] ● > 5s ● Memory Consumption ● Datasets Memory Limit

Oct 16   Oct 17   Oct 18   Oct 19   Oct 20   Oct 21   Oct 22
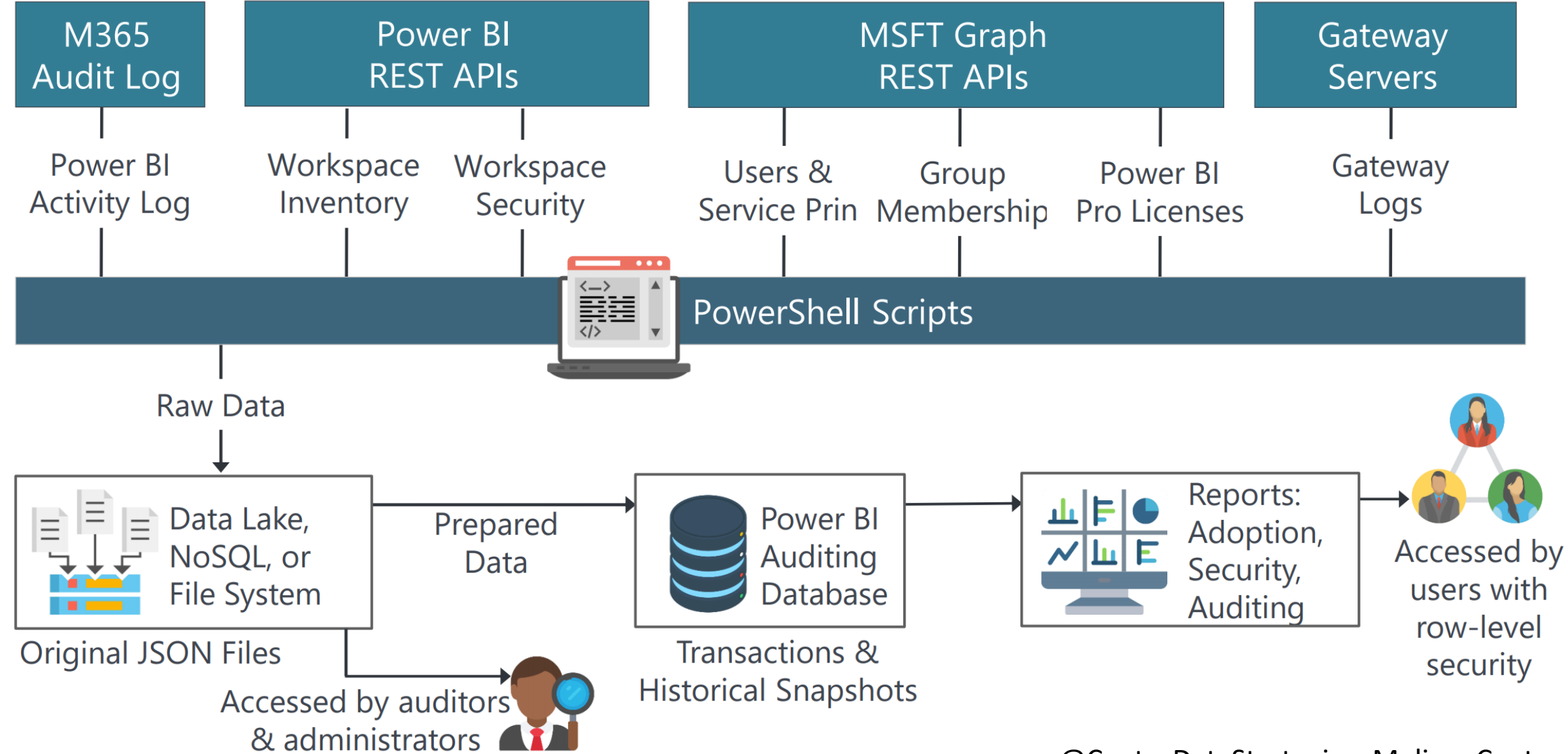
20
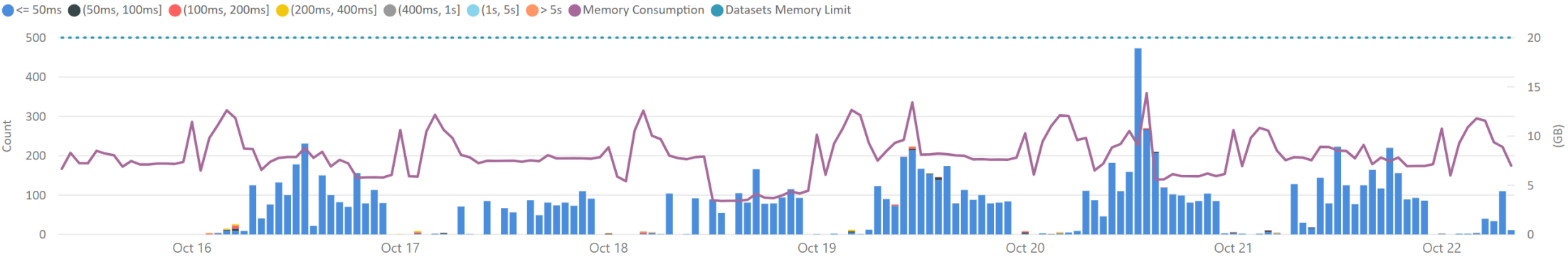
"Demo": XMLA Access

05

What's going on?

06

Power BI Auditing

- Extract information about artefacts, usage, user information

- Correlate these for insights into your capacity usage
  - Are users actively using their Pro Subscription?
  - Are we having usage spikes at certain moments?
  - Are we seeing suspicious behaviour that needs to be looked into?

Typical Power BI Auditing Solution

M365 Audit Log	Power BI REST APIs	MSFT Graph REST APIs	Gateway Servers

Power BI Activity Log | Workspace Inventory | Workspace Security | Users & Service Prin | Group Membership | Power BI Pro Licenses | Gateway Logs

PowerShell Scripts

Raw Data

Data Lake, NoSQL, or File System

Original JSON Files

Accessed by auditors & administrators

Prepared Data

Power BI Auditing Database

Transactions & Historical Snapshots

Reports: Adoption, Security, Auditing

Accessed by users with row-level security

@CoatesDataStrategies, Melissa Coates

It's all about the €€€

07

Power BI Pro Licenses

- TIP : Consumer users don't need Power BI Pro Subscriptions
- User will no longer need a Power BI Pro Subscription when :
  - They are a viewer in an App Workspace (v2)
  - A member of a App Workspace App

Power BI Embedded (A Sku)

- A SKU has close to feature parity
- Billed by the minute to Azure Billing
  - Don't forget to set up Billing Alerts, Policies, and Automation ☺
- TIP: You can spin up A SKU to host certain 'Premium Features' when needed, to reduce usage on the P SKU
  - Ie. Use an A SKU for the 'DEV' and 'ACC' workspace of Deployment Pipelines

Where's the Shinies?

08

Premium Features

- Paginated Reports
- AI Features
- Power BI dataflows enhanced compute engine
- XMLA Read/Write Endpoint
- Deployment Pipelines
- Large Model Support (up to 4TB in Dataset size)
  - TIP: Gives a performance gain on .pbix files > 1GB
- Export to File API
- ..

To conclude

09

Takeaways

- Premium Gen2 and PPU will be yuuuuge
- Check (and adjust) the Capacity Workload Settings
- Premium Capacity Metrics App v2 is your Ops Base
  - Export data to persisted storage
- Evictions are perfectly normal, don't stress
- Set up auditing to have a complete overview of what's happening
- Activate large model support for models > 1GB
- Offload non-critical workloads to A-SKUs

Resources

09

Resources

- https://docs.microsoft.com/en-us/power-bi/admin/service-premium-what-is
- https://docs.microsoft.com/en-us/power-bi/admin/service-premium-faq
- https://docs.microsoft.com/en-us/power-bi/admin/service-premium-large-models
- https://powerbi.microsoft.com/en-us/blog/answering-your-questions-around-the-new-power-bi-premium-per-user-license/
- https://powerbi.microsoft.com/en-us/blog/driving-a-data-culture-in-a-world-of-remote-everything/
- https://powerbi.microsoft.com/en-us/blog/announcing-the-upcoming-evolution-of-power-bi-premium-to-enterprise-markets-and-beyond/

Resources

- https://docs.microsoft.com/en-us/power-bi/create-reports/deployment-pipelines-overview
- https://docs.microsoft.com/en-us/power-bi/transform-model/desktop-ai-insights
- https://ssbipolar.com/2019/06/29/power-bi-dataflows-enhanced-compute-engine/
- https://docs.microsoft.com/en-us/power-bi/paginated-reports/paginated-reports-report-builder-power-bi
- https://docs.microsoft.com/en-us/power-bi/admin/service-premium-connect-tools
- https://docs.microsoft.com/en-us/rest/api/power-bi/reports/exporttofile

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