

Power BI Premium: Microsoft's platform for enterprise BI

Vivek Patel

Sr. Director North America, Stridely Solutions
Founder, Insight2Actions Inc.



INSIGHT²
ACTIONS





INSIGHT² ACTIONS



CORPORATE PROFILE



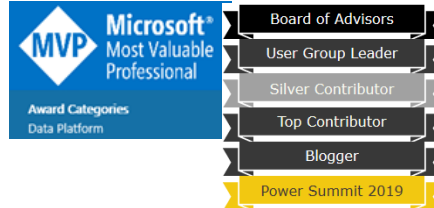
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GLOBAL PARTNERS



Vivek Patel



- Founder at Insight2Actions Inc.
- Director North America at Stridely Solution
- **Leader**:-Toronto Power BI, Power Apps, Flow user group
- PowerApps All Star Award Winner
- Data Platform MVP – 4th year
- 2019 Microsoft GRANITE AWARD RECIPIENTS
- Power BI User Group **Board of Advisors** (Member)
- Organizing Committee/Speaker
 - **Power Platform World Tour** 2017(Toronto), 2018(Montreal) and 2019 (Toronto, Calgary, Vancouver)
 - **Collaborate Canada**:- 2019 (Toronto, Ottawa, Vancouver)
 - **D365 Saturday**:- 2019 (Montreal)
 - **Business Application Summit**:- 2017 (Seattle) and 2018(Seattle)
 - **Power Summit North America**:-2018(Phoenix), 2019 (Kissimmee, FL), 2020 (Nashville, TN)
 - **Difinity**:-2019(Auckland, New Zealand)

KNOW US BETTER



STRIDE WITH VALUE

OUR GLOBAL PARTNERS



Global Footprint and Industry Coverage

The Americas

- USA, Canada

Europe

- UK
- Scandinavia
- BeNeLux
- Germany
- Greece
- Switzerland
- Spain
- Portugal
- Romania



Africa & GCC

- South Africa
- Kenya, Uganda
- Ethiopia
- Tanzania
- UAE, KSA
- Oman, Kuwait

APAC

- Japan
- Singapore
- Thailand
- Australia, NZ

Mature Service Offerings



Digital Solutions

- Mobility
- BI & Analytics
- IoT



ERP

- SAP
- Dynamics AX
- Oracle



Microsoft Services

- Custom App dev
- Full MS Suite
- Azure Cloud
- Custom API



Testing and QA

- Independent QA and Testing
- Automated and Manual Testing



SLA Driven Support 24 x 7

- Incident Management
- Change Management

ISO 9001:2015 Certified

SAP Global Partner

Microsoft Certified Partner

Our Technical Expertise

Enterprise Platform



Database



BI & Analytics



MS Product Suite



Mobile



Software Testing



IOT



Cloud



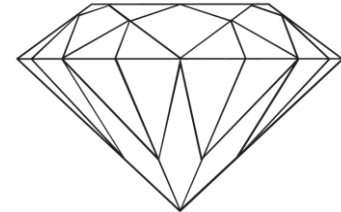
Vivek Patel



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- Data Platform **MVP**
- Power BI User Group **Board of Advisors** (Member)
- Organizer:- Global Power Platform Bootcamp-February 15,2020
- Organizing Committee/Speaker
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Session Objective

- Power BI Premium
 - Overview
 - Latest capabilities
 - Future roadmap
 - Performance
 - Scalability
 - Management



Quick Audience Survey...



1

Are you a Power BI Service Administrator?

Have access to Power BI Admin Portal

Quick Audience Survey...



1

Are you a Power BI Service Administrator?

Have access to Power BI Admin Portal

2

Does your company / client have Power BI Premium Capacity?

Quick Audience Survey...



1

Are you a Power BI Service Administrator?

Have access to Power BI Admin Portal

2

Does your company / client have Power BI Premium Capacity?

3

Are you considering to purchase PBI Premium?

Quick Audience Survey...



1

Are you a Power BI Service Administrator?

Have access to Power BI Admin Portal

2

Does your company / client have Power BI Premium Capacity?

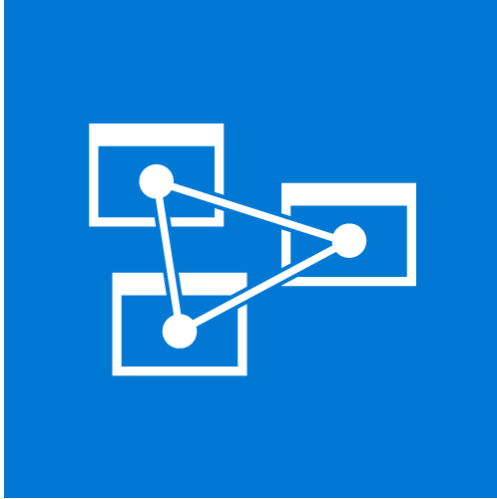
3

Are you considering to purchase PBI Premium?

4

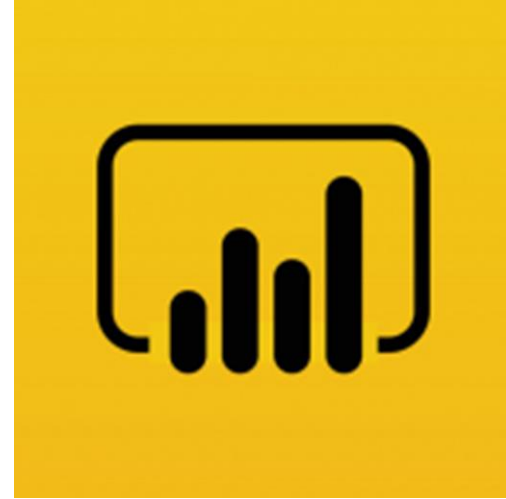
Do you have >500 PBI users (Developers + Report Consumers)?

Enterprise BI



Azure
Analysis Services

Self-service BI users



Power BI

All BI users



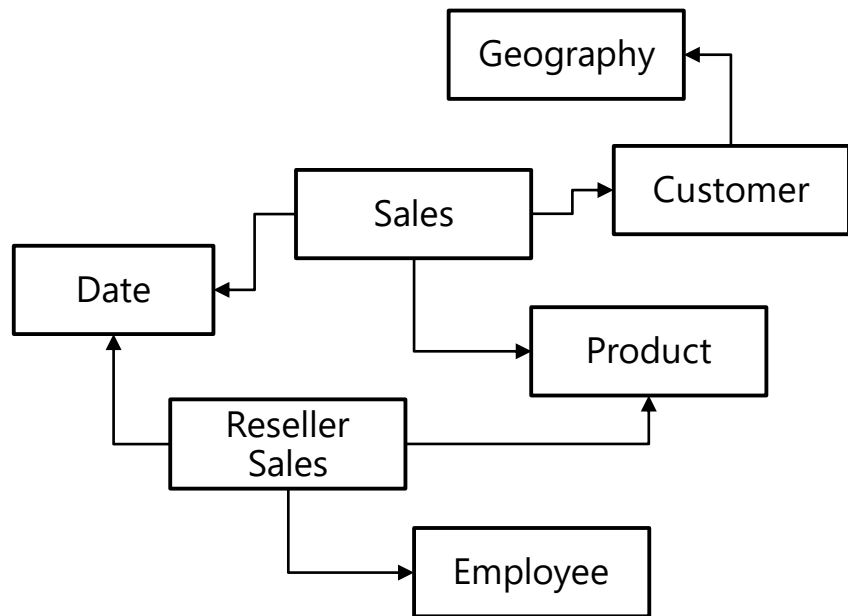
Power BI
Premium

Aggregations

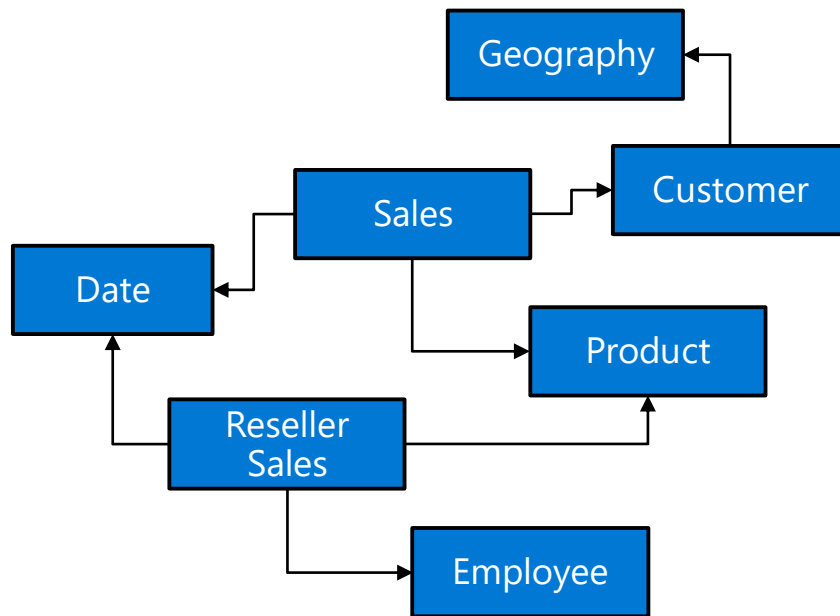
Trillion row demo:

<https://aka.ms/TrillionRowDemo>

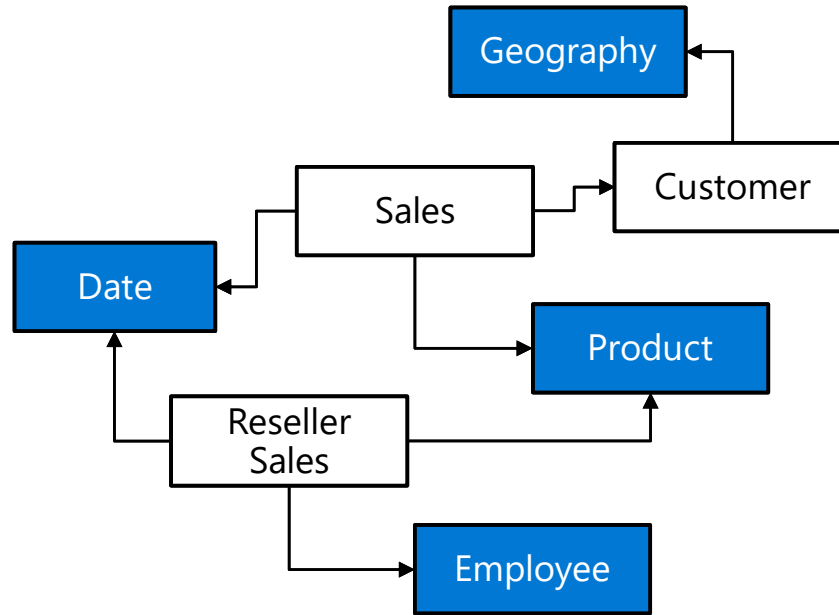
DirectQuery



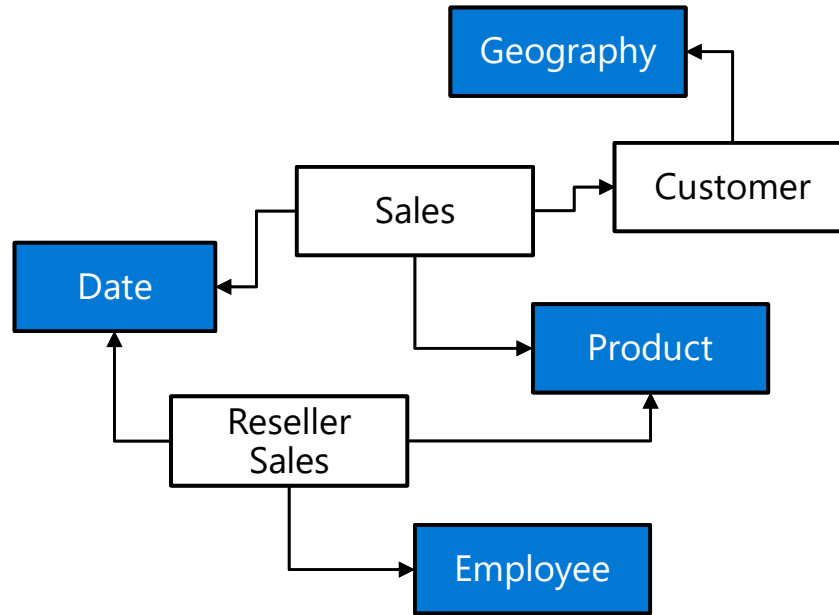
Import



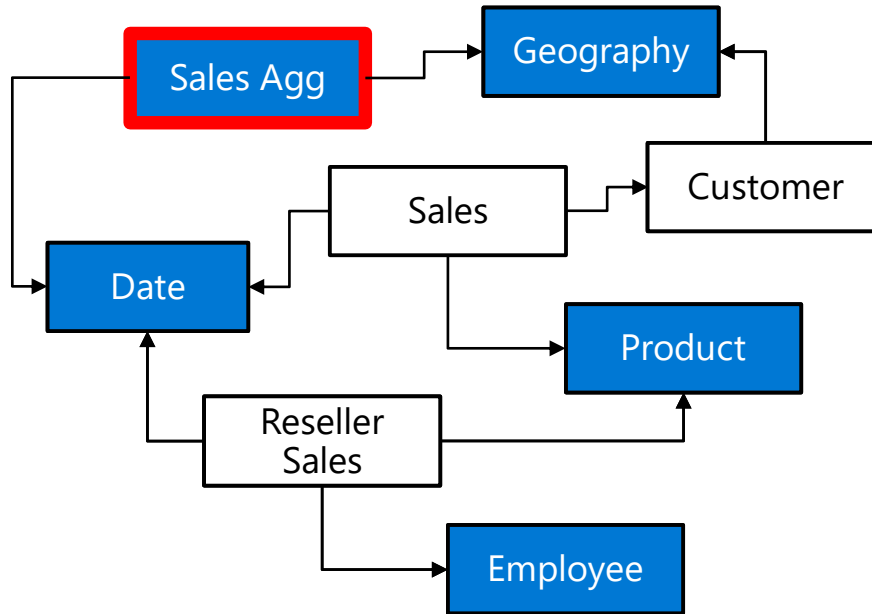
DirectQuery& Import



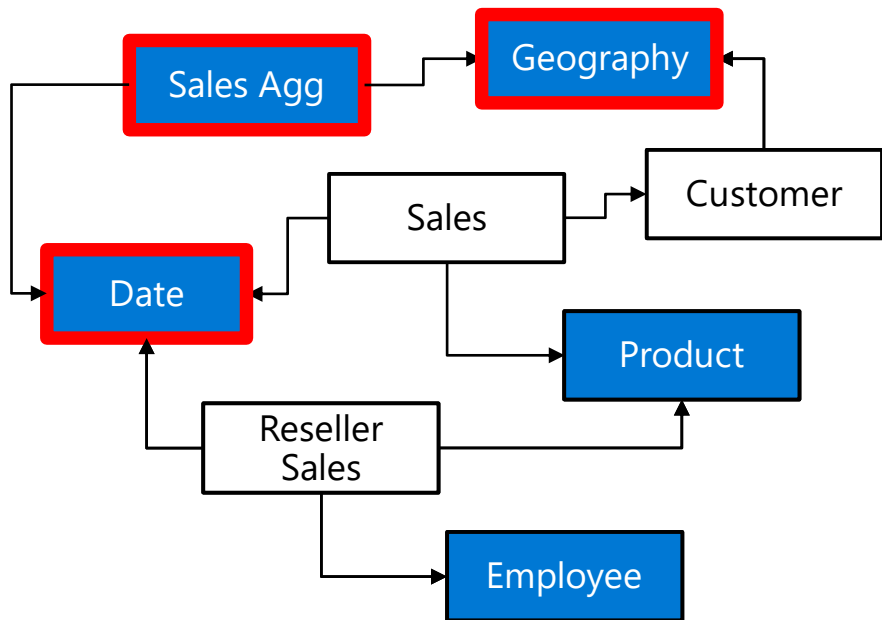
DirectQuery& Import



Aggregations



Aggregations

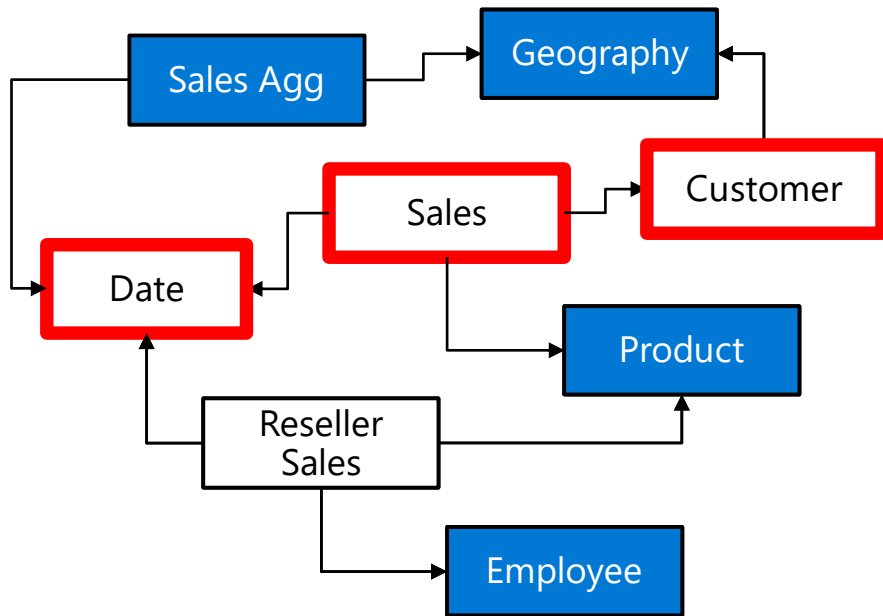


```
SummarizeColumns(  
    Date[Year],  
    Geography[City],  
    "Sales", Sum(Sales[Amount])  
)
```

DirectQuery

```
SELECT [Year],  
       [Name],  
       SUM([Amount]) AS [Amount]  
FROM   [Sales]  
INNER JOIN [Date] ON ...  
INNER JOIN [Customer] ON ...  
GROUP BY [Year],  
         [Name]
```

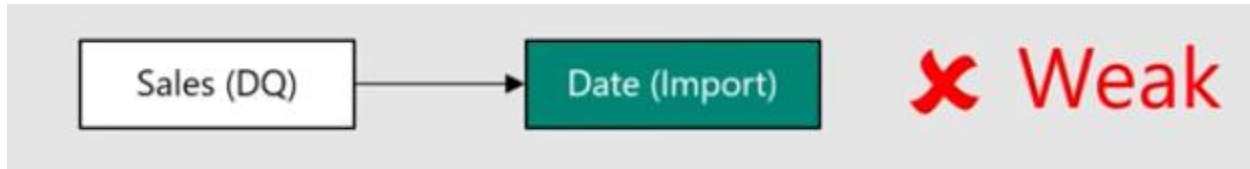

Aggregations



```
SummarizeColumns(  
    Date[Year],  
    Customer[Name],  
    "Sales", Sum(Sales[Amount])  
)
```

DirectQuery

Date relationship



Date relationship

Sales (DQ)



Date (Dual)

✓ Strong

- Able to push the “join” to the source
- Considered for aggregation hits

Strong relationship rules (both sides from a single source)

“Many side”	“One side”
Dual	Dual
Import	Dual or Import
DQ	Dual or DQ

Aggregated table

Storage mode

Setting the storage mode to Import has the following implications. Please consider them carefully before proceeding.

Setting storage mode to Import is an irreversible operation. You will not be able to switch it back to DirectQuery.

This operation will refresh tables set to Import or Dual, which may take time depending on factors such as data volume.

Weak relationships may be introduced by this change.

The number of weak relationships can be reduced by setting the following tables to Dual.

- Customer
- Product Subcategory
- Geography
- Date
- Product Category

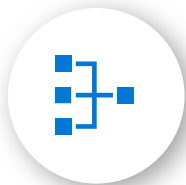
☒ Set affected tables to dual

[Learn more about setting storage mode](#)

OK

Cancel

Enterprise BI in Power BI



Semantic modeling



Governance



Scalability



Open-platform connectivity



Application lifecycle management



Manageability

Large models

Large models

Public preview

Key features

- Power BI dataset cache size parity with Azure Analysis Services models
- Limited only by Premium capacity size
- Works on Premium P SKUs and Embedded A SKUs
- Requires V2 workspaces

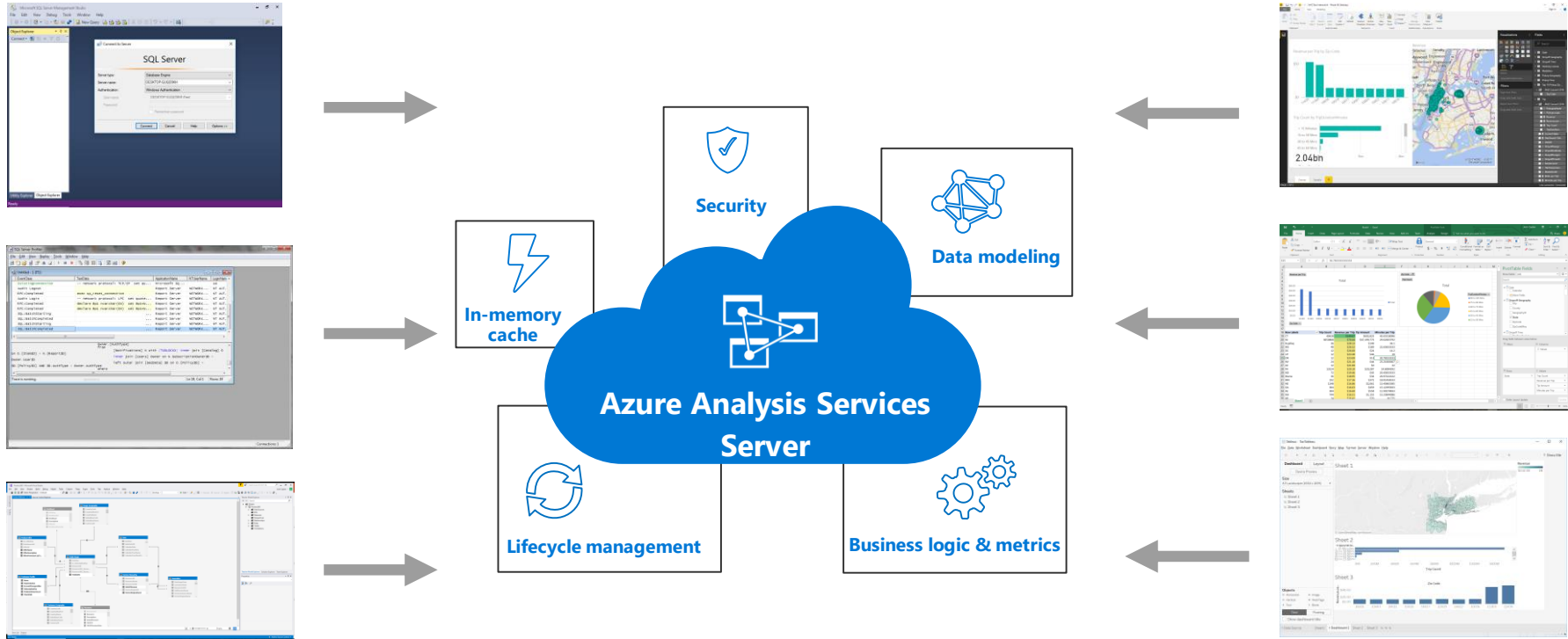
Large datasets in Premium



** Up to available memory on your capacity, excluding memory required for query execution and processing, which is often 20-30% of total memory.*

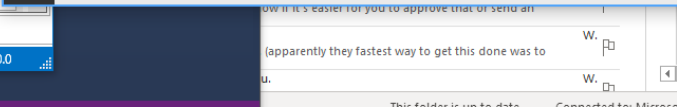
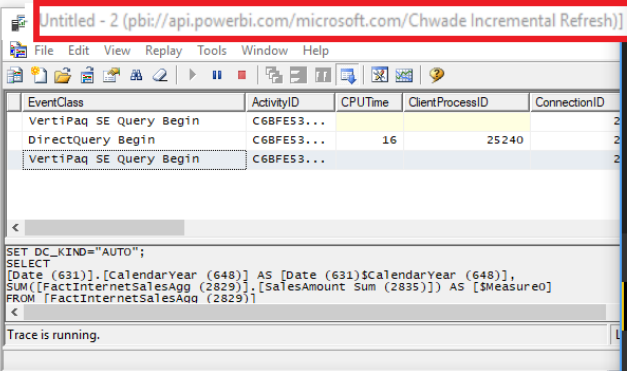
XMLA Endpoints

Connectivity: Analysis Services



Connectivity: Analysis Services





Incremental refresh

Incremental refresh

- Enable large models in Power BI
 - Faster refresh
 - More reliable
 - Lower CPU and Memory usage
- Define policy in Power BI Desktop
- Apply policy in the Power BI service
- Incremental refresh demo:
 - <https://aka.ms/IncrementalRefreshDemo>

Incremental Refresh

You can improve the speed of refresh for large tables by using incremental refresh in Premium workspaces. This setting will apply once you've published a report to the Power BI service.

Once you've deployed this table to the Power BI service, you won't be able to download it back to Power BI Desktop. [Learn more](#)

Table: Trip Incremental Refresh: On

Store rows in the last: 10 Years

Refresh rows in the last: 5 Days

☐ Detect data changes [Learn more](#)

☐ Only refresh complete days [Learn more](#)

Apply all Cancel

Performance

Power BI Premium Whitepaper

- Information about how Power BI Premium works
- Troubleshooting information

<https://docs.microsoft.com/en-us/power-bi/whitepaper-powerbi-premium-deployment>

Power BI Premium options when resolving issues


- Optimize the model or workloads
- Balance workspaces across capacities
- Scale capacity up

Premium Capacity Metrics App

AppSource

Apps for Power BI

< Apps



Power BI Premium Capacity Metrics

Microsoft

★★★★★ 3.0 (76)

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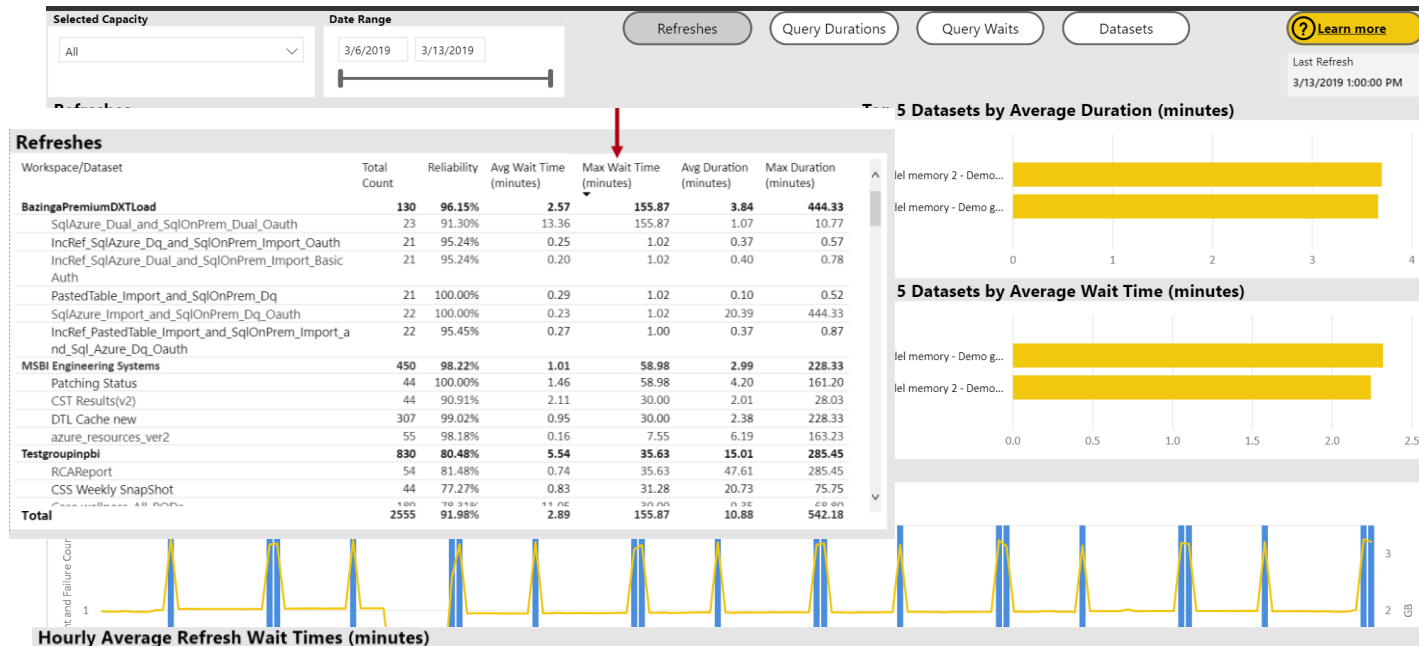
Support
[Help](#)

This app provides Power BI Premium admins comprehensive metrics history for up to seven days.

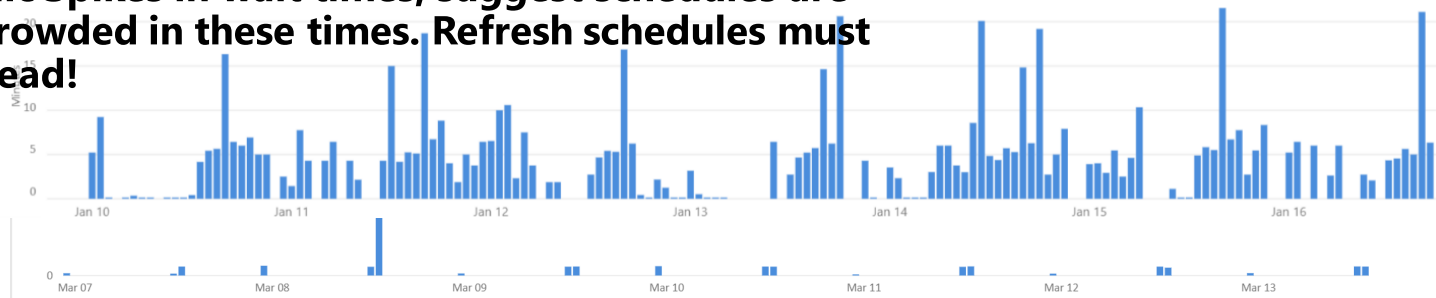
Get insights into how your premium capacities are being used and use those insights to scale Power BI for your entire organization. The reports contained in this app will give detailed information on what is consuming resources on your premium capacities and what effect that is having to other operations which are running on those capacities.

Entities	Capacities
	1
System	Memory
	10.96 GB Average 18.8 GB Highest Consumption 7/15/2018 9:00:00 AM Time of Highest Consumption
Dataset Workload	Refreshes
	1565 Total Count
	1538 Success Count
	27 Failure Count
	4 OutOfMemory Error Count
2.25 Average Duration (mins)	
0.38 Average Wait Time (mins)	

Find refresh issues with the capacity app



Periodic Spikes in wait times, suggest schedules are over crowded in these times. Refresh schedules must be spread!



Features & Price Comparison



Power BI Pro

1 GB Size Per File

10 GB Overall Space Per User

Maximum 8 Refreshes Per Day

Per User License required to share
PBI content across the
organization
No Dedicated Capacity

No Incremental Data Refresh

Does not Monitor Memory Resources
independently

10\$/Month/User



Power BI Premium

10 GB Size Per File

100 TB Overall Space Per User

Maximum 48 Refreshes Per Day

License not required to share PBI
content across the organization

Dedicated Capacity to Refresh Data efficiently

Ability to do Incremental Data Refresh

Ability to Monitor Memory Resources
independently

4995\$/Month for Organization

Why Choose Premium?

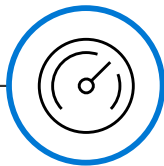
Scenario: You are renewing an Enterprise Agreement. Should you get Premium or not?

Power BI Premium



Flexibility to license
by capacity

Economics** @ orgs > 500 users



Greater scale
and performance

Larger Datasets
Frequent Refreshes
Incremental Refreshes
Aggregations
Dataset Query Caching



Unifying self-service and
enterprise BI

Paginated SSRS Reports
AI and Predictive Analytics
Dataflows at scale
Programmatic access (XMLA)
Compliance* (BYOK, MultiGeo)



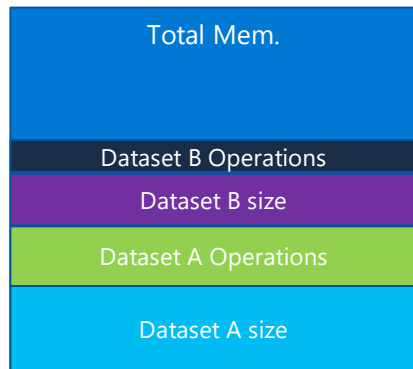
Extending on-premises
capabilities

Dedicated resources in-cloud
Licensing of on-prem PBIRS

**Creators still need pro licenses

What is taking resources

- vCPU required for:
 - Computing queries (every visual, slicer, filter, and tile kicks off its own query)
 - Calculating tables and measures during refresh
 - Pulling in data when refreshing
- Memory required for
 - Hosting the data model being queried
 - Placeholder for calculating results queries, tables and measures during report rendering



Power BI Premium - Capacity

- Available Capacity and Configuration (excluding EM):

Capacity Node	Total v-cores (Backend + frontend)	Backend V-Cores	Frontend V-Cores	DirectQuery / live connection limits	Max page renders at peak hour
P1	8 v-cores	4 v-cores, 25GB RAM	4 v-cores	30 per second	1,201-2,400
P2	16 v-cores	8 v-cores, 50GB RAM	8 v-cores	60 per second	2,401-4,800
P3	32 v-cores	16 v-cores, 100GB RAM	16 v-cores	120 per second	4,801-9600

- Use Premium Capacity Calculator to estimate your needs
- Start with P1 - Can easily upsize / add additional capacity node
- Once purchased, the Capacity is available for set up in Admin Portal

Power BI Premium - Resource Limits Recap

CPU limits:

- No more than 6, 12, or 24 refreshes (depending on SKU) running in parallel
- If too many queries are running on one core, new queries wait

Capacity Node	Total v-cores (Backend + frontend)	Backend V-Cores	Frontend V-Cores	DirectQuery / live connection limits	Max page renders at peak hour
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P2	16 v-cores	8 v-cores, 50GB RAM	8 v-cores	60 per second	2,401-4,800
P3	32 v-cores	16 v-cores, 100GB RAM	16 v-cores	120 per second	4,801-9600

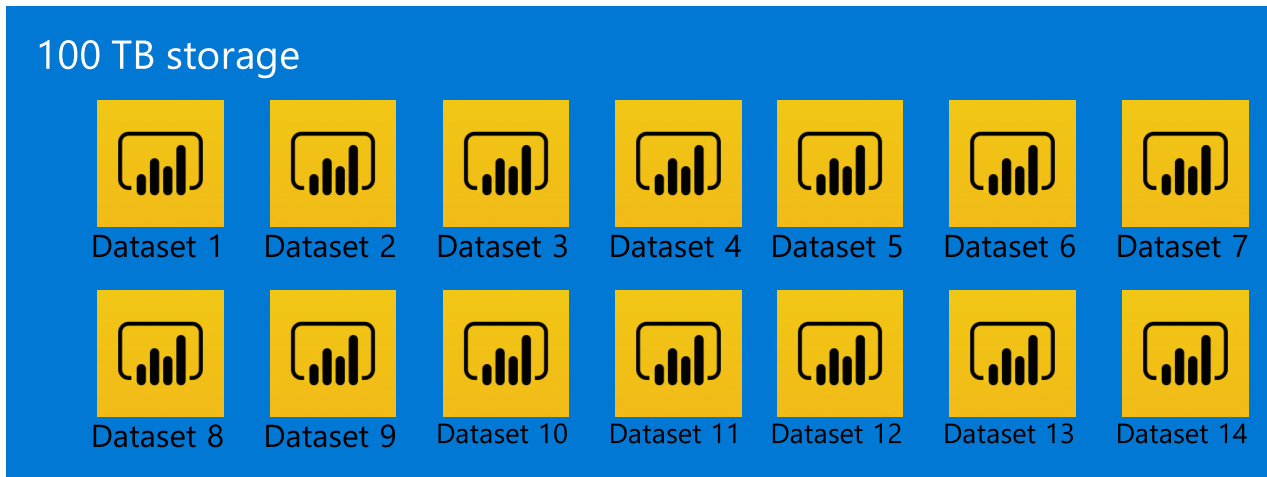
Memory Limits and Evictions:

- No more than 25, 50 or 100Gb of total memory consumption
- Evictions: When new report is requested and there is no memory available: capacity will evict the earliest-loaded inactive dataset to make room
- Parallel Refresh Limit: When refresh tries to start and can't (not enough memory or at max parallel refreshes), it'll retry later (not a queue)

What resources does Power BI consume?

Temperature: **Cool**

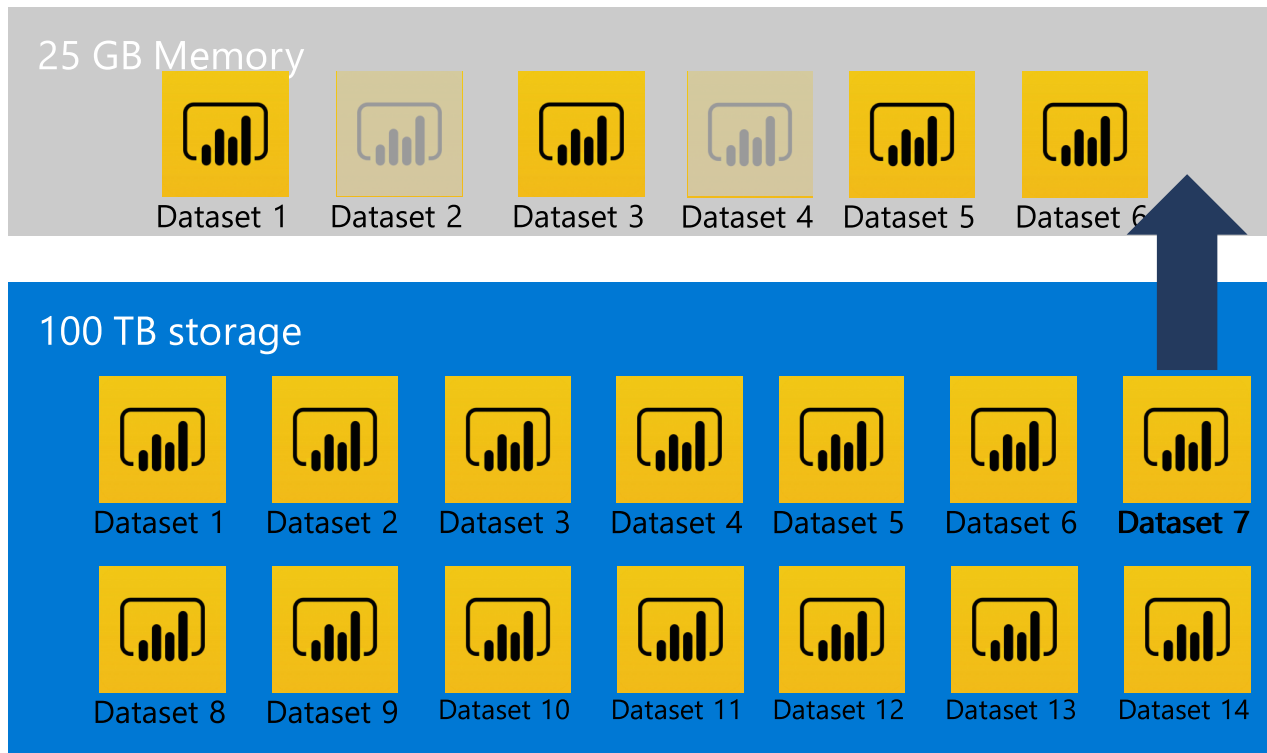
Capacity: P1
Backend v-cores: 4
Memory: 25 GB
Storage: 100 TB



How it works (briefly)

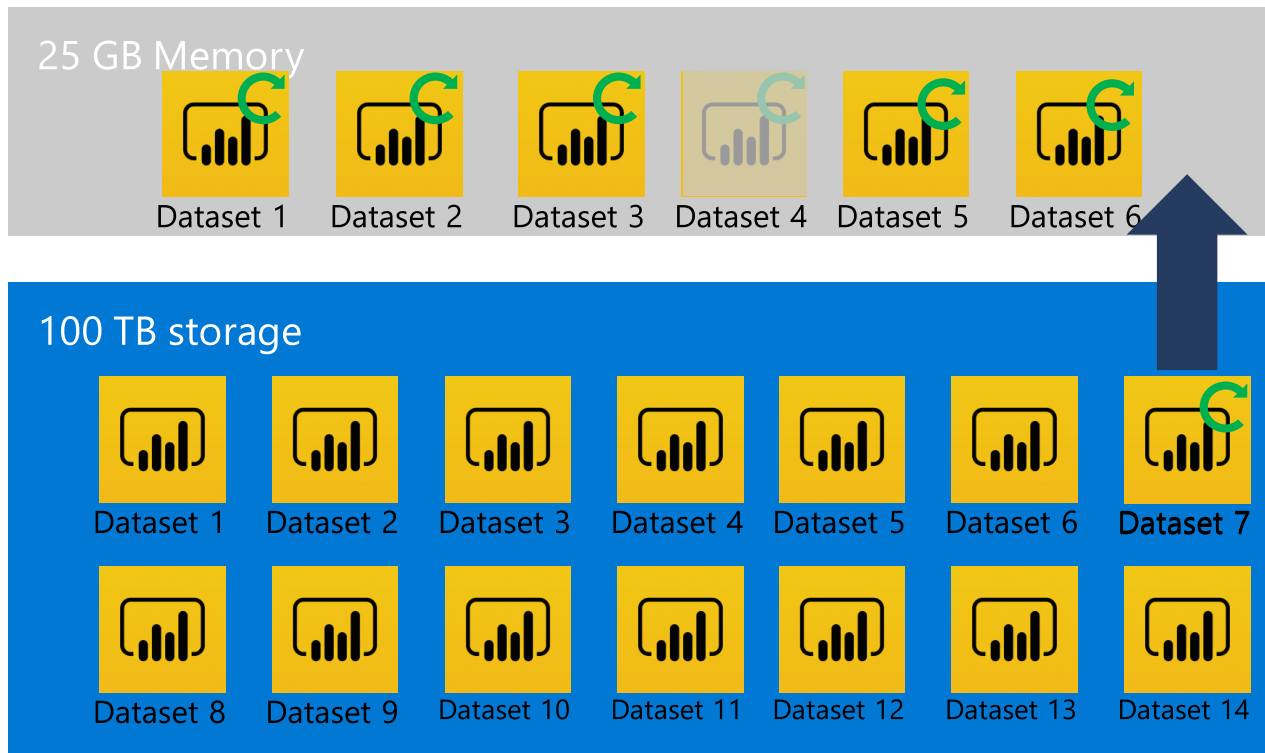
Temperature: **Warm**

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



How many datasets can I refresh at once?

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

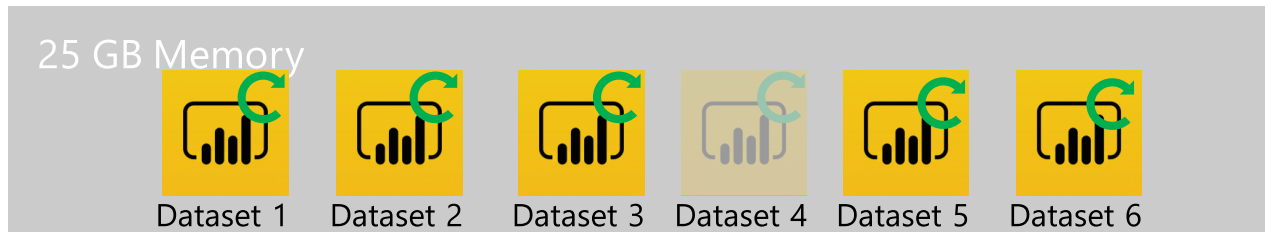


Waiting Area

How many datasets can I refresh at once?

Temperature: **Warm**

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



Waiting Area

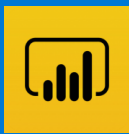


Dataset 7

100 TB storage



Dataset 1



Dataset 2



Dataset 3



Dataset 4



Dataset 5



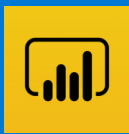
Dataset 6



Dataset 7



Dataset 8



Dataset 9



Dataset 10



Dataset 11



Dataset 12

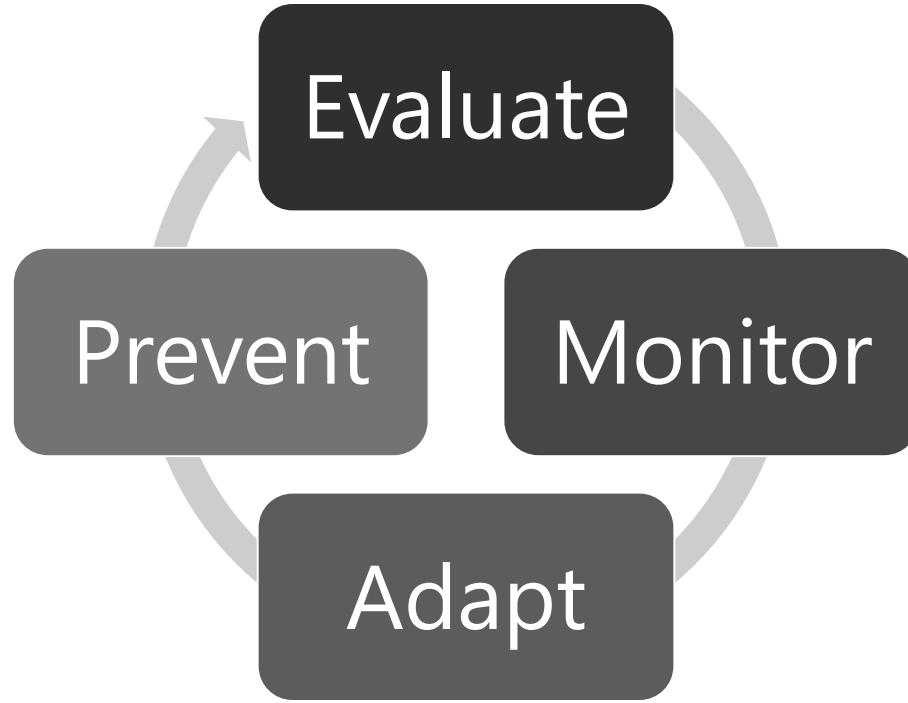


Dataset 13

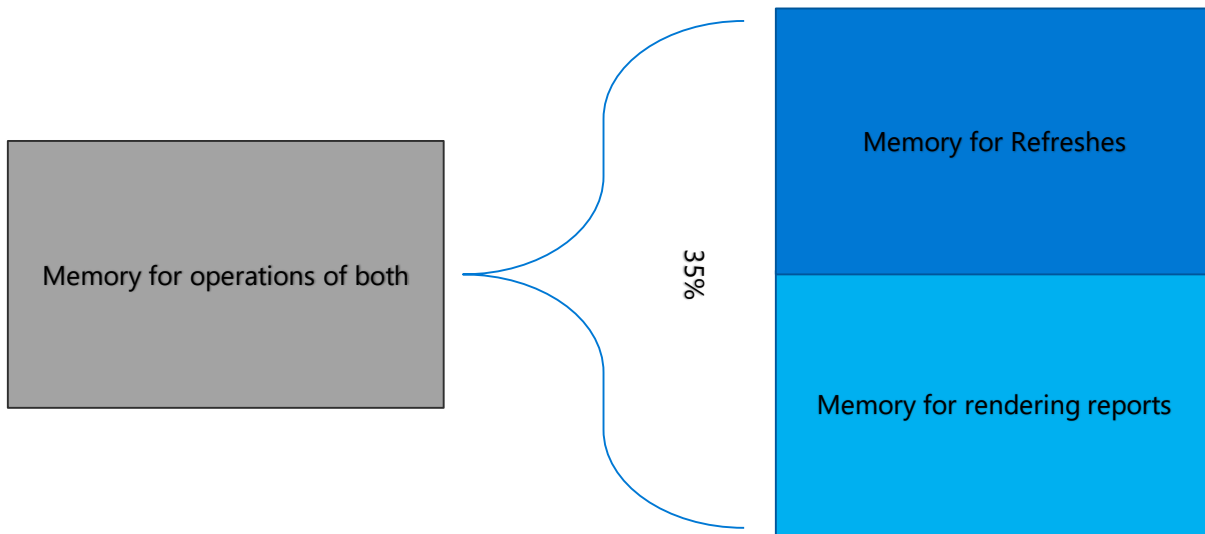
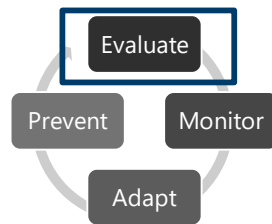


Dataset 14

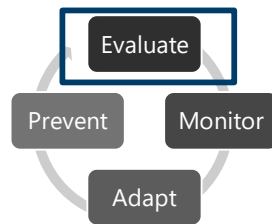
The Circle Of Life



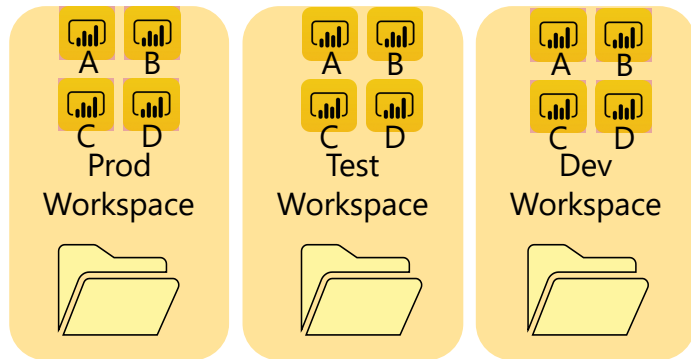
Capacity Planning – How Much Memory?



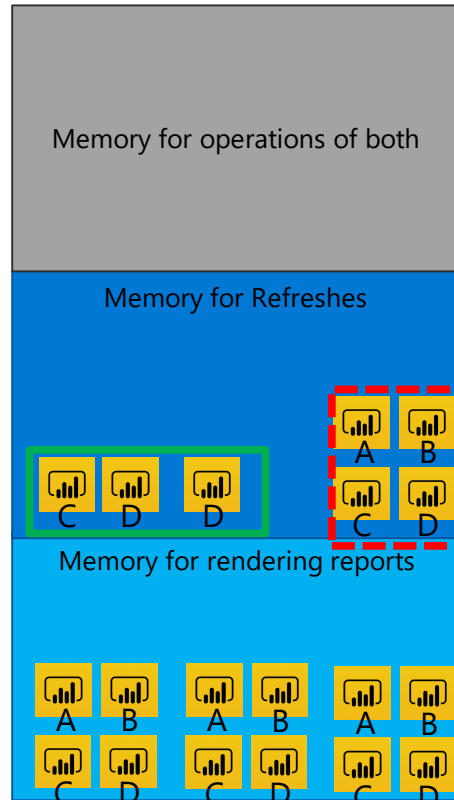
Capacity Planning – How Much Memory?



Report name	A	B	C	D
Dataset size* [Gb]	0.5	1	1.5	2



Refresh frequency	12 / day	Ad-hoc	Ad-hoc
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Results:

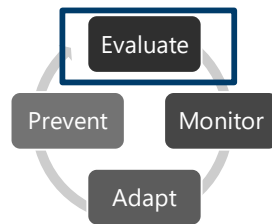
1. With a P1, memory will support the rendering load, but refreshes sometimes wait.
2. We excluded the 35% overhead recommended for queries, so a safe headroom pushes us over 25Gb RAM → P2.

$$5.5 \text{ GB} + 5 \text{ GB}$$

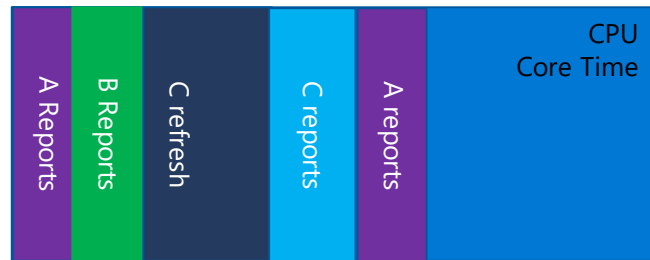
15 GB

*Measured msmdsrv.exe memory when report loaded in PBI desktop

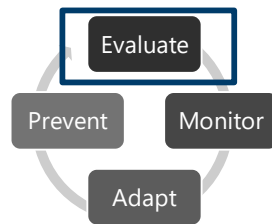
Capacity Planning – How many Vcores?



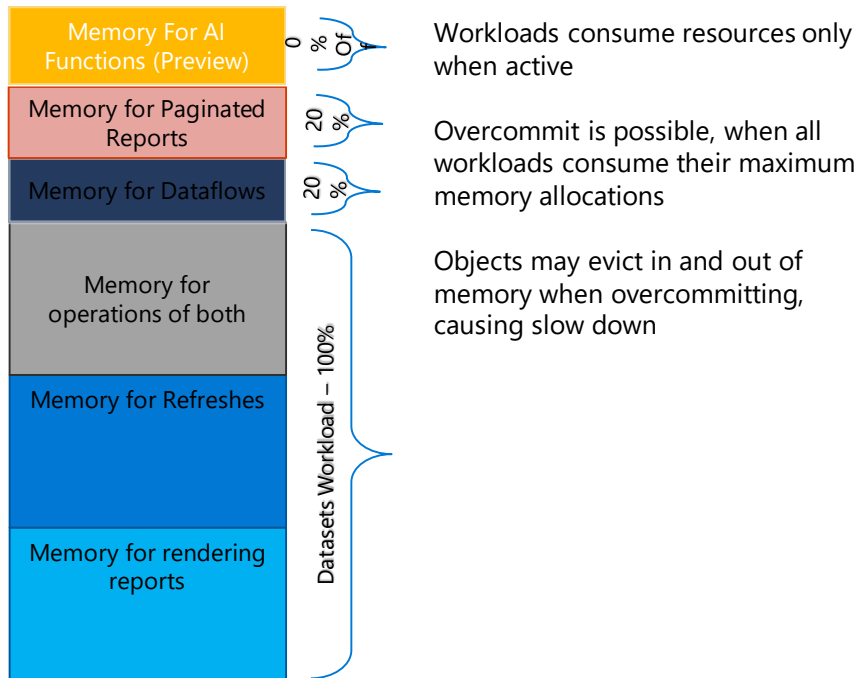
- Each Vcore serves multiple reports and refreshes
- Load Testing Tool: Sergei Gundorov's [GitHub project](#) is wrapped up in a PowerShell script for you:
 - Pick the reports you want to test load for
 - Pick the filter values you want to cycle through the load test
 - How many browser windows at once
 - Pull browser windows to visual scope
 - The tool measures how many of that report mix renders in 1h



Capacity Planning – Additional Workloads



Default memory allocation values



CPU time divided amongst all active workloads

High % of CPU cycles guaranteed for Interactive:

- PBIX rendering

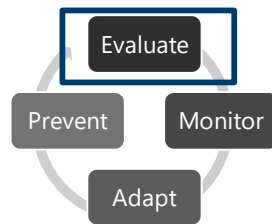
- Paginated Report rendering

Low minimum % of CPU cycles for background:

- Dataset refreshes

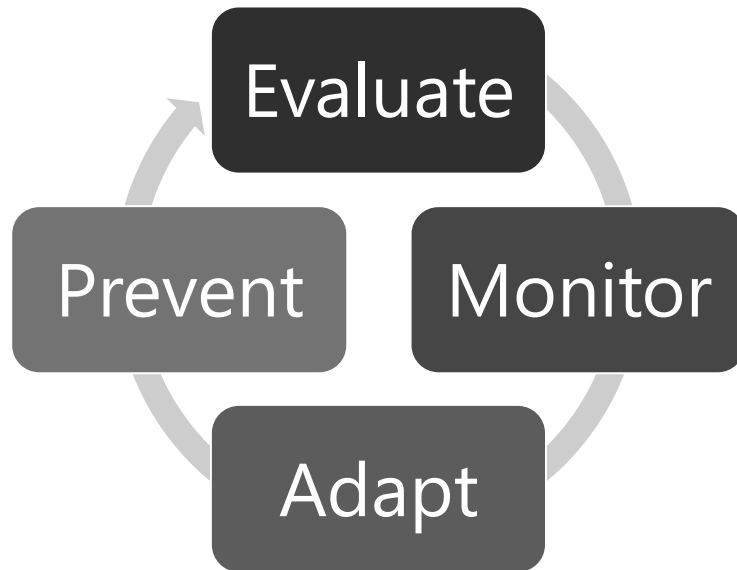
- Dataflow refreshes (when using or not using AI functions)

Capacity Planning Scenarios – Self Service BI

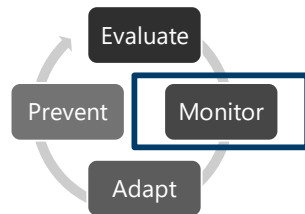


Self Service BI

- Scenario:
 - Several Power BI Pro licensees distributed across the org
 - Published unpredictable report complexity and data model size and varying refresh frequencies
 - Reports are shared throughout the org, some gain adoption and increased usage, some don't.
- Problem - You can't calculate in advance – there are too many unknowns ☹️
- So how do you know what you need?

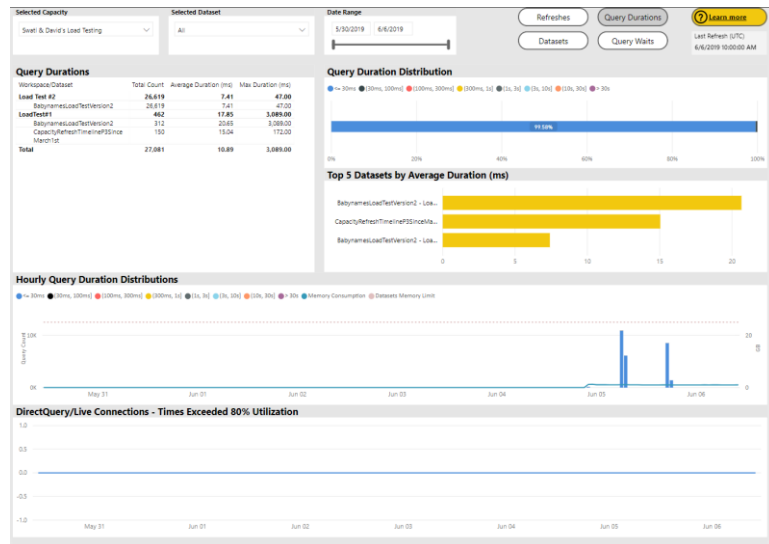


Monitor



Install the metrics app, Monitor and Compare to your Evaluate:

- Compare query duration to what you evaluated
- Compare dataset sizes to your plan
- Compare # of refreshes to what you planned
- Understand how to read symptoms of under-provisioning or overloading the capacity:
 - Excessive Query and Refresh Wait Times
 - Frequent evictions
 - Refresh failures.
- If you find undesired symptoms like query or refresh waits, understand why:
 - Are there too many people watching some report?
 - Are refreshes taking too long to sustain all refreshes requested

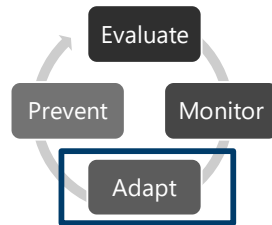


Adapt (in short)

- Optimizing content (reports) to scale always helps!
- Poor report design and data modeling decisions affect a report's performance dramatically!

Leverage these features for load reduction:

1. Incremental Dataset Refreshes – Faster refresh time for large datasets
2. Dataset Query Caching – reduce query load for common viewed visuals
3. [Shared Datasets and Certified Datasets](#) – fewer datasets required
4. [Aggregations](#) – less\smaller in-memory models and less refreshes
5. Consider Dashboards when possible – shift query traffic to refresh times



Incremental refresh ⓘ

⚠ Unable to confirm if the M query can be folded. It is not recommended to use incremental refresh with non-foldable queries. [Learn more](#)

You can improve the speed of refresh for large tables by using incremental refresh in Premium workspaces. This setting will apply once you've published a report to the Power BI service.

ⓘ Once you've deployed this table to the Power BI service, you won't be able to download it back to Power BI Desktop. [Learn more](#)

Table Incremental refresh
Trip ▼ ☒ On

Store rows where column "TripDate" is in the last:
5 ▼ Years ▼

Refresh rows where column "TripDate" is in the last:
10 ▼ Days ▼

- ☐ Detect data changes [Learn more](#)
☐ Only refresh complete days [Learn more](#)

Apply all Cancel

General Dashboards **Datasets** Workbooks Reports Dataflows Alerts Subscriptions

2018 Boston Red Sox

Company Revenue

Employee Salaries

City Data

City Data 2018

2018 Boston Red Sox - Olympic Data for all February 2018

WWI-DW

Settings for WWI-DW

This dataset has been configured by [Microsoft Corporation](#)

[Refresh history](#)

► Gateway connection

► Data source credentials

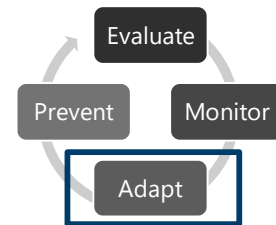
► Parameters

► Query Caching

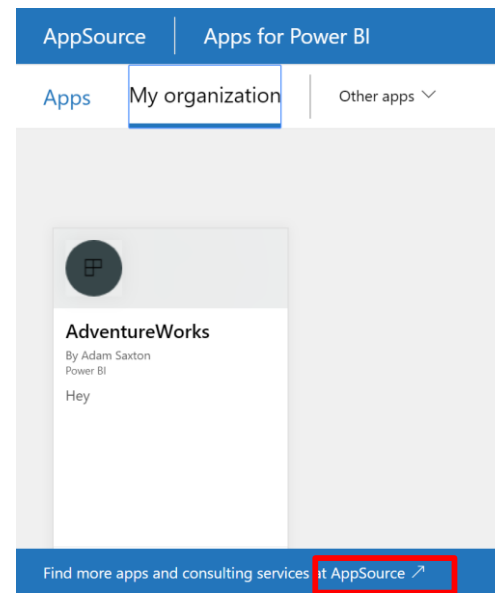
- ☒ Capacity default: query caching Off
☐ Off: Do not cache query results for this dataset
☐ On: Speed up reports by using previously saved query results. [Learn more](#)

Apply Discard

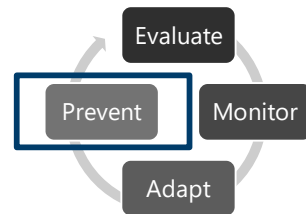
Can I Get Help Adapting My Content?



- Yes! We are training partners to identify performance mistakes, build new performant content and update existing content.



Admin Portal – where you can set things



Purpose:

- Tailor the workload behavior to meet your capacity's usage specific needs and fencing their capacity from running into issues.

Setting Name	Description	Scenario
Max Offline Dataset Size(GB)	Maximum size of the offline dataset in memory.	You can override the default and prevent one large dataset taking the capacity down
Query Memory Limit (%), Server Timeout (seconds), Max Intermediate Row Set Size , Max Result Row Set Size	Limit on how much memory and time a query can take.	You can better control impact of bad or expensive report on others using the capacity.

DATASETS - Active

Your workload is ready to use.



Query Memory Limit (%)

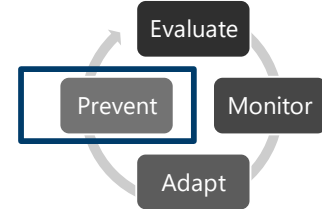
Server Timeout (seconds)

Max Intermediate Row Set Size

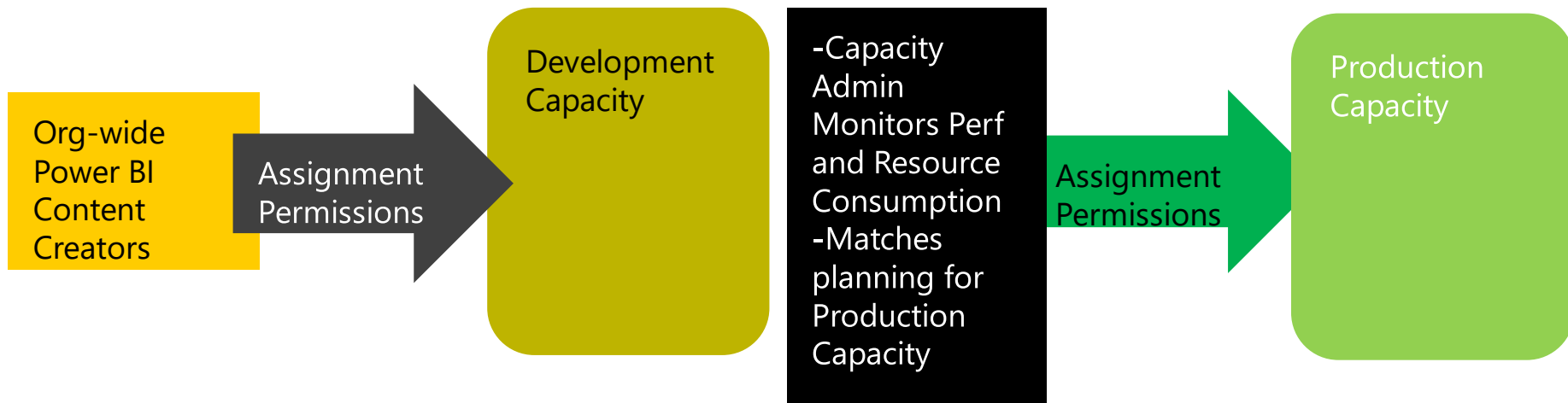
Max Result Row Set Size

Max Offline Dataset Size (GB)

Best Practices to Shield you from problems



- Allocate time for capacity management!
- Separate your capacities if you can!
- Everyone can publish to pre-prod capacity.
- Only IT folks can migrate to the prod capacity



Power BI Premium - Admin


- Welcome message for Premium
- Once license is purchased, it is not to be assigned to a user, but it is available in the Microsoft Tenant
- Power BI Admin / 0365 Admin have access to set it up in Admin Portal
- Follow easy to set-up instructions from PBI documentation

Welcome To Power BI Premium

BROAD DISTRIBUTION FOR HIGH-DEMAND CONTENT



Your organization has purchased Power BI Premium dedicated capacity, and you have permissions.

-  Premium workspaces are the place to create and publish content to share broadly.
- You can assign workspaces to dedicated capacity in workspace settings.

[Learn more about Premium capacity](#)

Got it

Power BI Premium – Admin & Permissions

- **Capacity Admin** - Has full control / admin of a given capacity
- Not the same as Power BI Admin
- Assignment done by Power BI Admin or 0365 Global Admin
- Power BI Admin and 0365 Global Admin are automatically Capacity Admin
- Has access to Capacity Settings in Admin Portal

- **Capacity Assignment Permission**

- Can assign App Workspace to the capacity
- Has to be an admin of the workspace
- Can be given to specific users or groups, or the entire organization (Not recommended)

User permissions

- ▶ Capacity admins
- ▲ Users with assignment permissions
Enabled for a subset of the organization

Apply to:

☐ The entire organization

☒ Specific users or groups

Clear all

capacity assigner X Enter email addresses

Apply Cancel

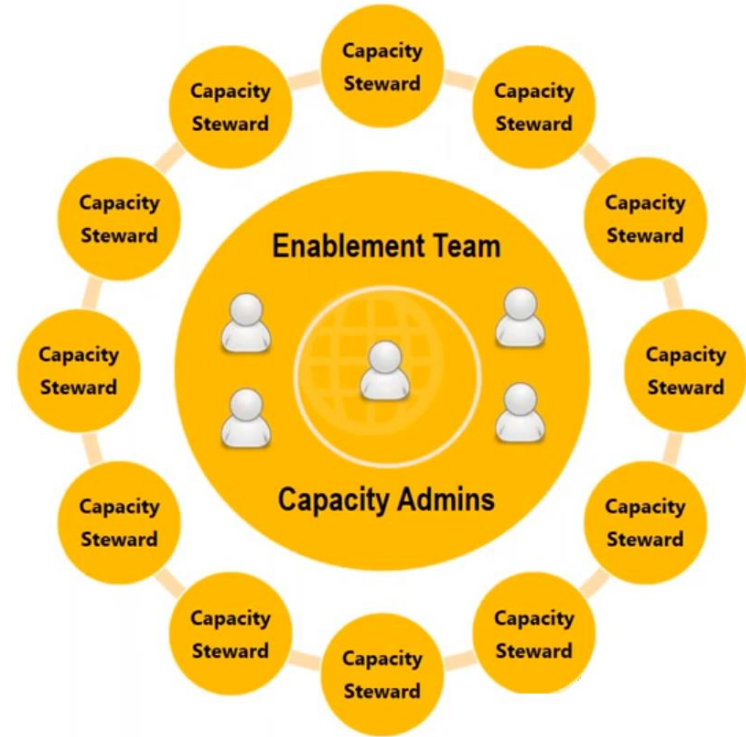
Premium Capacity - Governance Roles

- **Capacity Admin**

- Power BI Enablement Team Members
- Regional Based (AMER, EMEA, APAC)
- Train & Empower Capacity Stewards
- Train & Enable PBI Content Developers
- Assign Premium Workspaces Company-wide

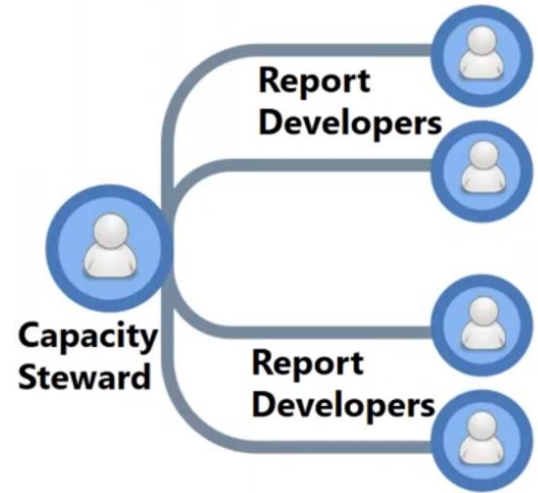
- **Capacity Steward**

- BI Partner Leads / User Champions
- With **Assignment Permission**
- Knowledgeable in their Business Areas
- Help Train PBI Content Developers
- Limited to Small Group of Key Users



Capacity Steward - Role/Responsibilities

- May Assign App Workspaces to Premium Capacity for their respective business functions / org
 - Always notify & include Enablement Team Members as Admin
- Train PBI Report / Content Developers on:
 - Best Practices, Guidelines, etc.
- Foster / Promote Knowledge Sharing
- Promote Self-Service BI (along w/Enablement Team)



Capacity Steward - Training

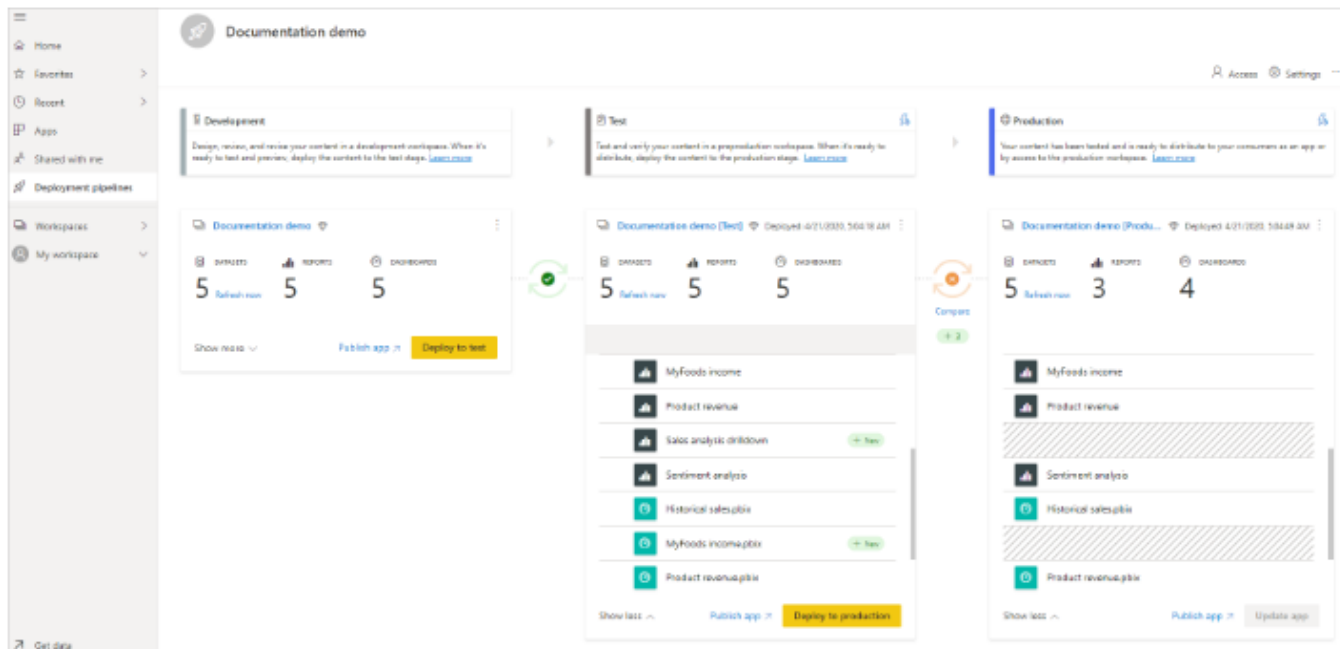
- What is Premium Capacity & License Model
- How to assign App Workspace to Premium Capacity
- App Workspace Naming Convention - Guidelines
- App/Report/Dashboard Sharing - Options and Best Practices
- RLS (Role Level Security)
- Gateway & Scheduled Refresh
- Pro License Request Flow

Power BI Premium

- Deployment Guidelines / Recommendation
- Training and Self learning
- Usage/User Metrics & Monitoring

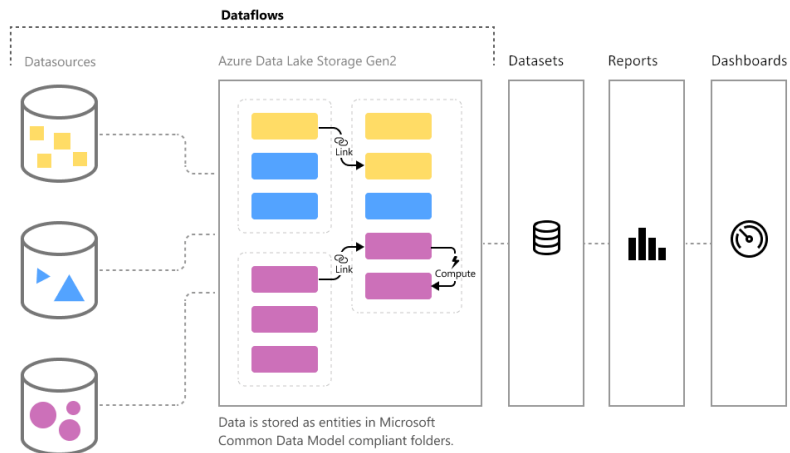
Power BI Deployment Pipeline (Preview)

- 1 Report, Multiple Environment
- Deploy on Single Click
- Double Check the Differences among the Reports



Power BI Data Flow (Preview)

- Independent Content from Power BI Report
- Common Data Model for Multiple Report
- Reduce Redundant Datasets and Dataset Refreshes
- Connect with PBI Desktop



Demo

Power BI Premium calculator

Power BI Premium calculator

- <https://powerbi.microsoft.com/en-us/calculator/>
- [Power BI Premium calculator](#)