End to end monitoring for a successful Power BI implementation!


DATA BREACH

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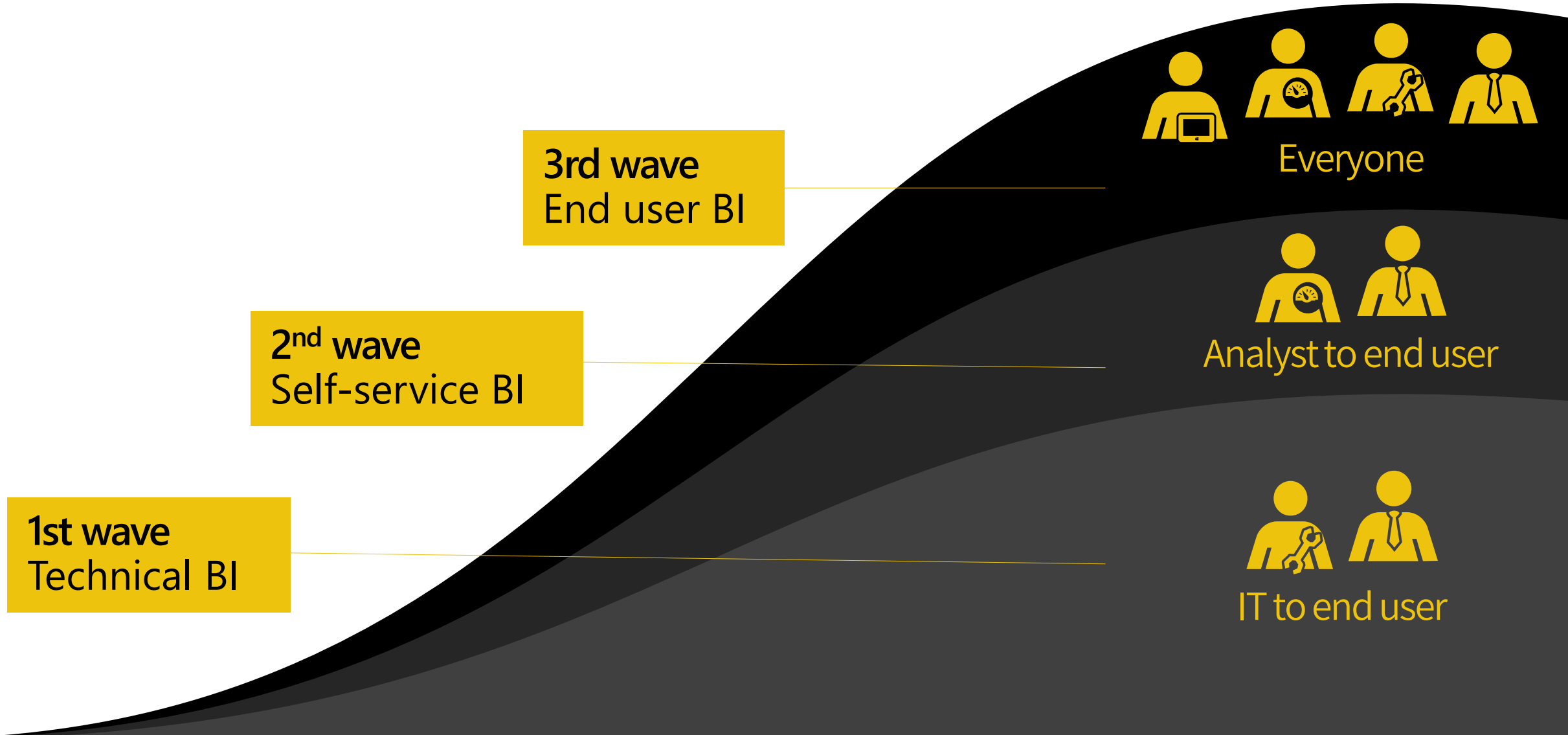
Agenda
What we will cover today

- Why and how?
- Functional overview
- Technical overview
- Demos
- Non-functionals
- Learnings & mistakes we've made
- Wrap-up

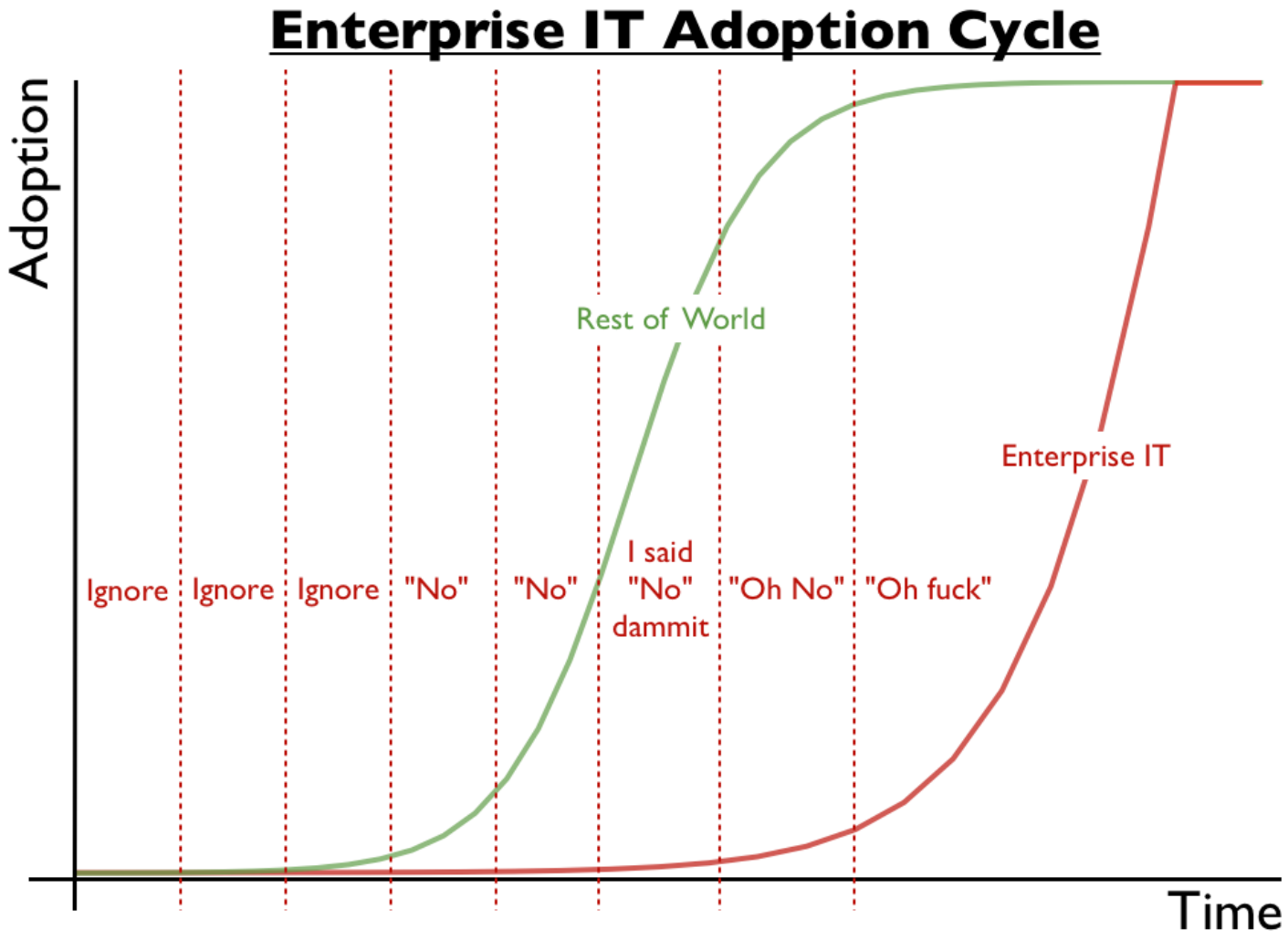
Why?

Why do we want to monitor our tenant?

(Power) BI for everyone!

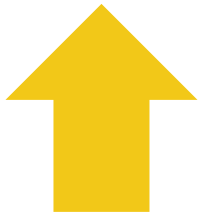


Enterprise rollout



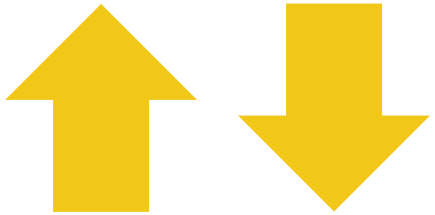
Delivery approaches

Business-Led Self-Service BI



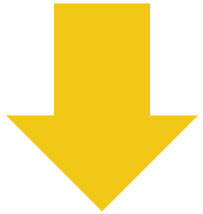
Bottom-Up

IT- Managed Self-Service BI



Blended

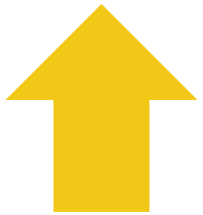
Corporate BI



Top-Down

Exponential growth of content

Business-Led Self-Service BI



Bottom-Up

Dave
Finance

Anne
Human Resources

Leila
Marketing

Reza
Engineer

Expo cont

So what…?

Everyone can do their own analysis

But we're lacking in terms of…

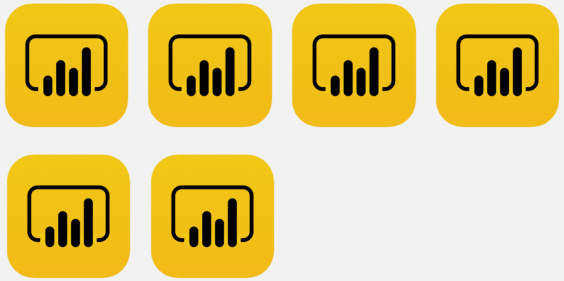
- Control
- Data sensitivity
- Correctness
- Solution health

… and more

Get order in the chaos

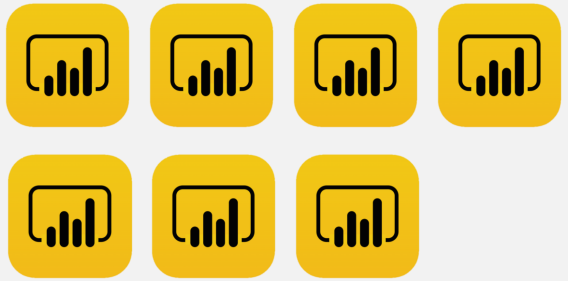
Dave
Finance

Anne
Human Resources



Leila
Marketing

Reza
Engineer



Separate people and content!

Dave
Finance

Anne
Human Resources

Leila
Marketing

Reza
Engineer

The importance of monitoring

What do you think?

- **Why** is monitoring important?
- **What** different thing do you want to monitor as…
  - …a content owner?
  - …a Power BI Administrator?
- **How** do you want to get these insights provided?

What do we want to know about Power BI? And why?

834 0423

Functional Overview

Importance of monitoring

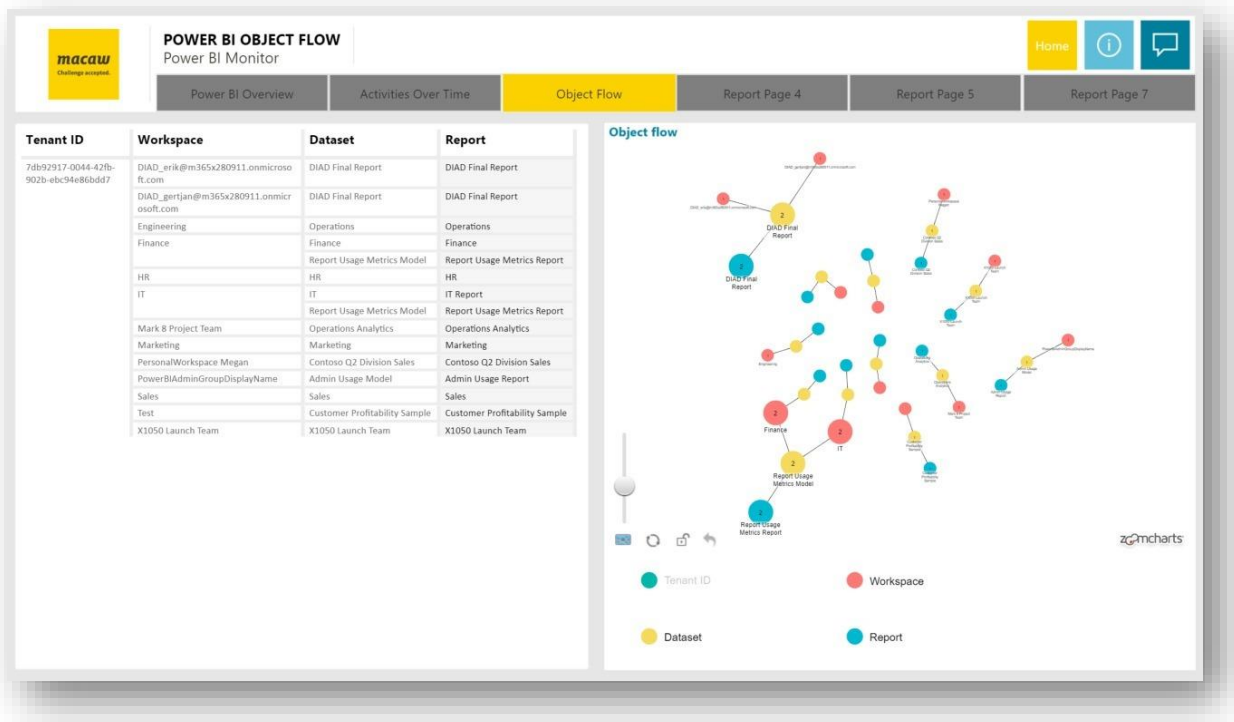
Content availability

Usage

Performance

Lineage

Environmental health



Things to monitor

Secure data uploaded to the service

Publish data to the entire organisation

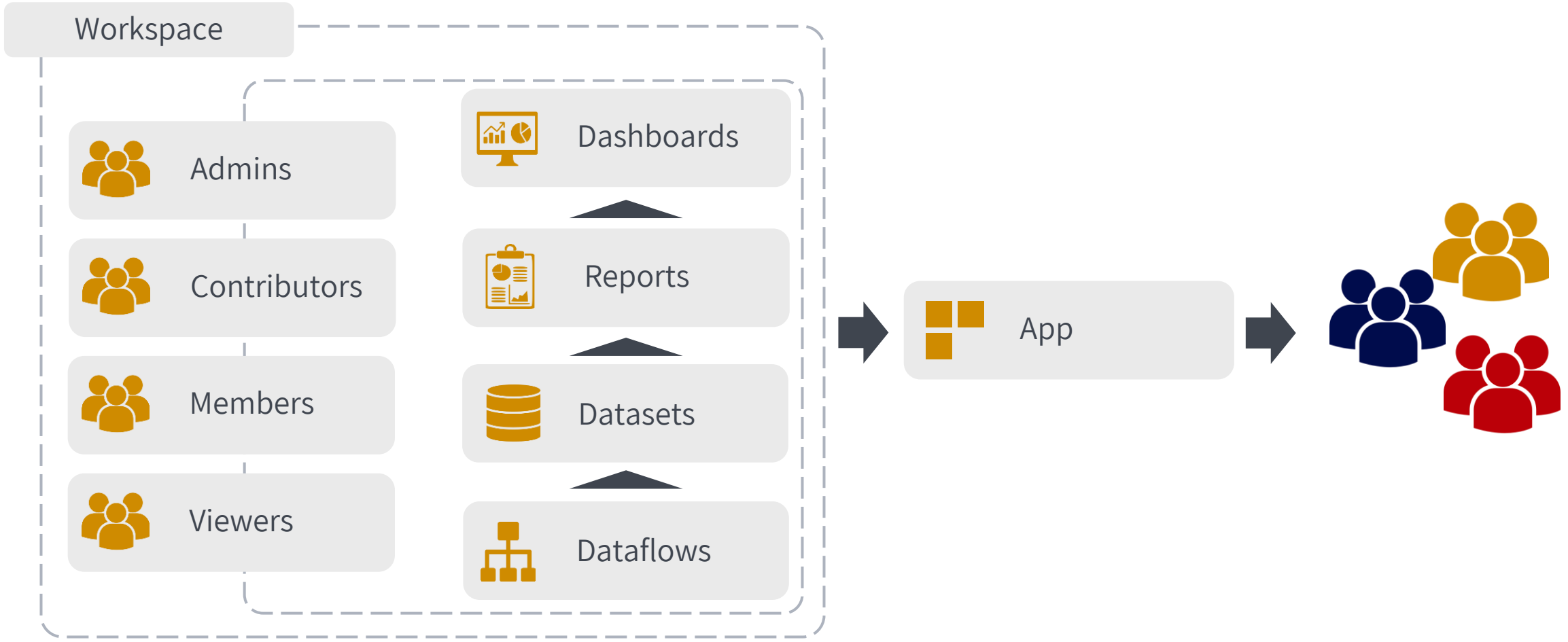
Share content to external users

Publish to web

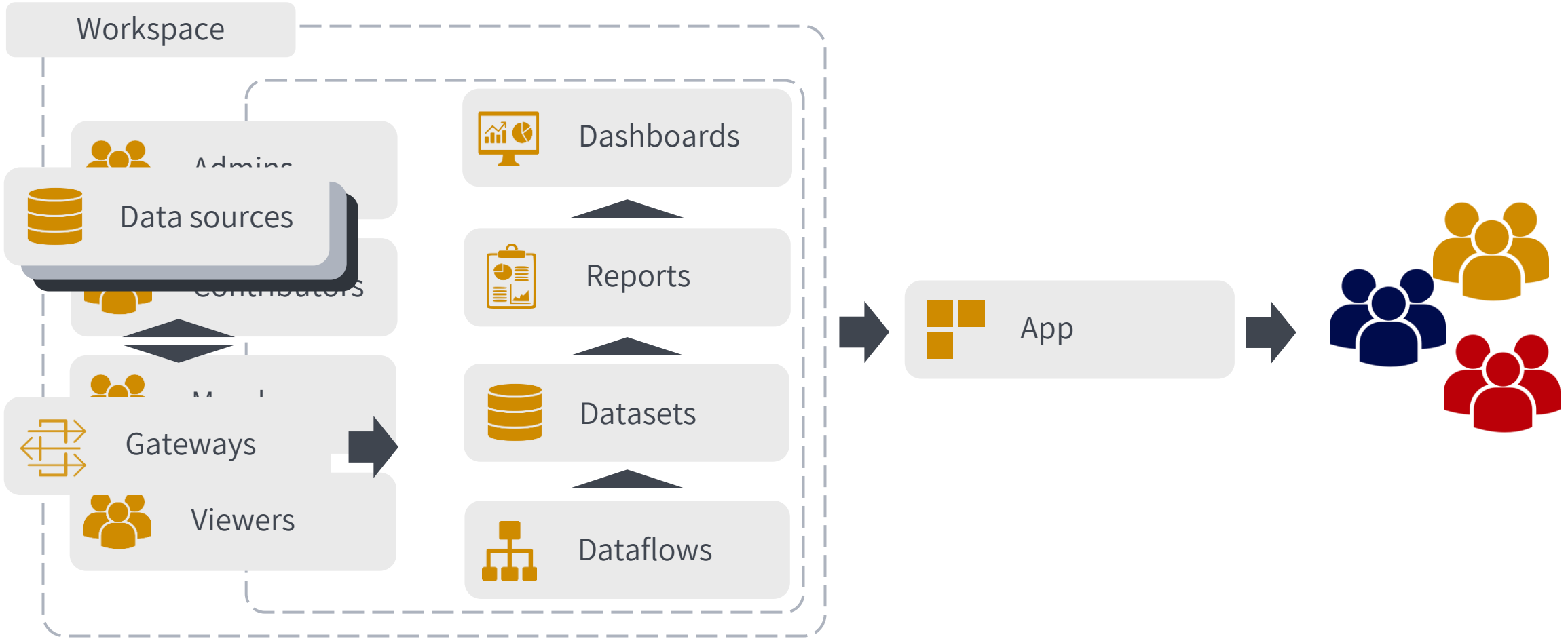
Custom visuals

Audit logs

What objects are available

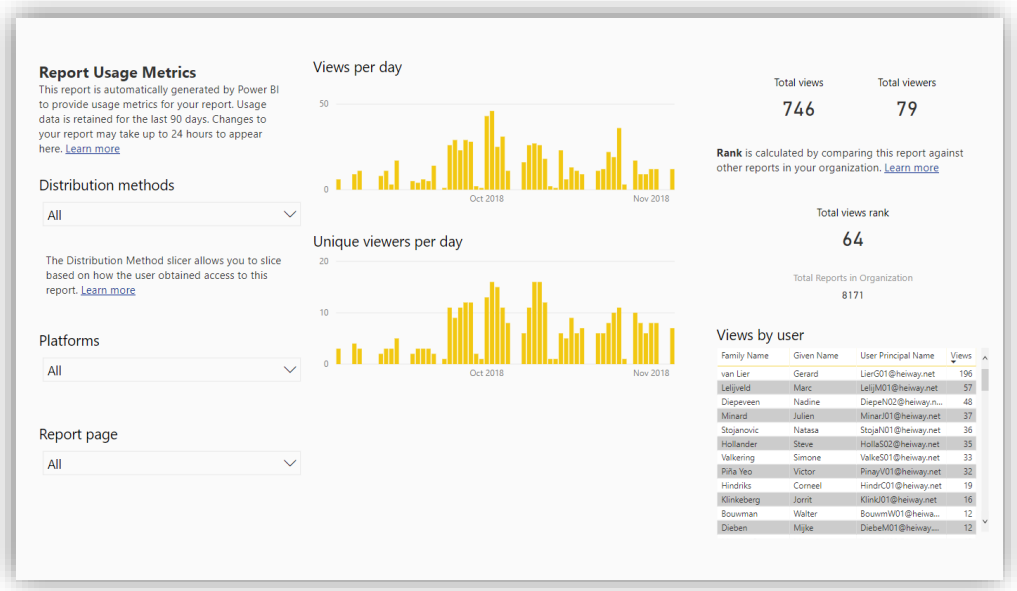


What objects are available

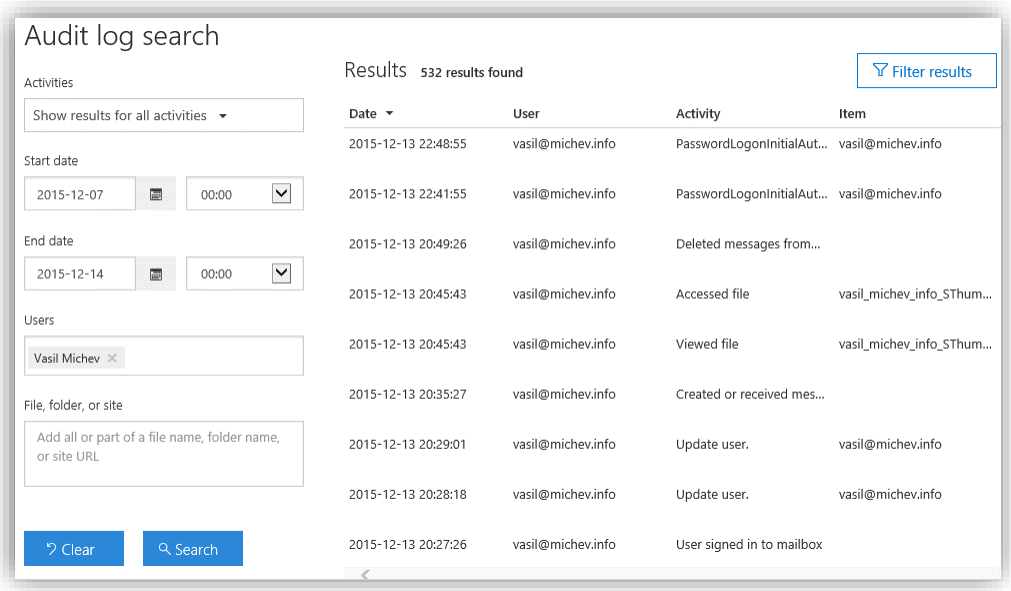


How to monitor this..

What the Power BI service provides



Usage Metrics in Power BI Service



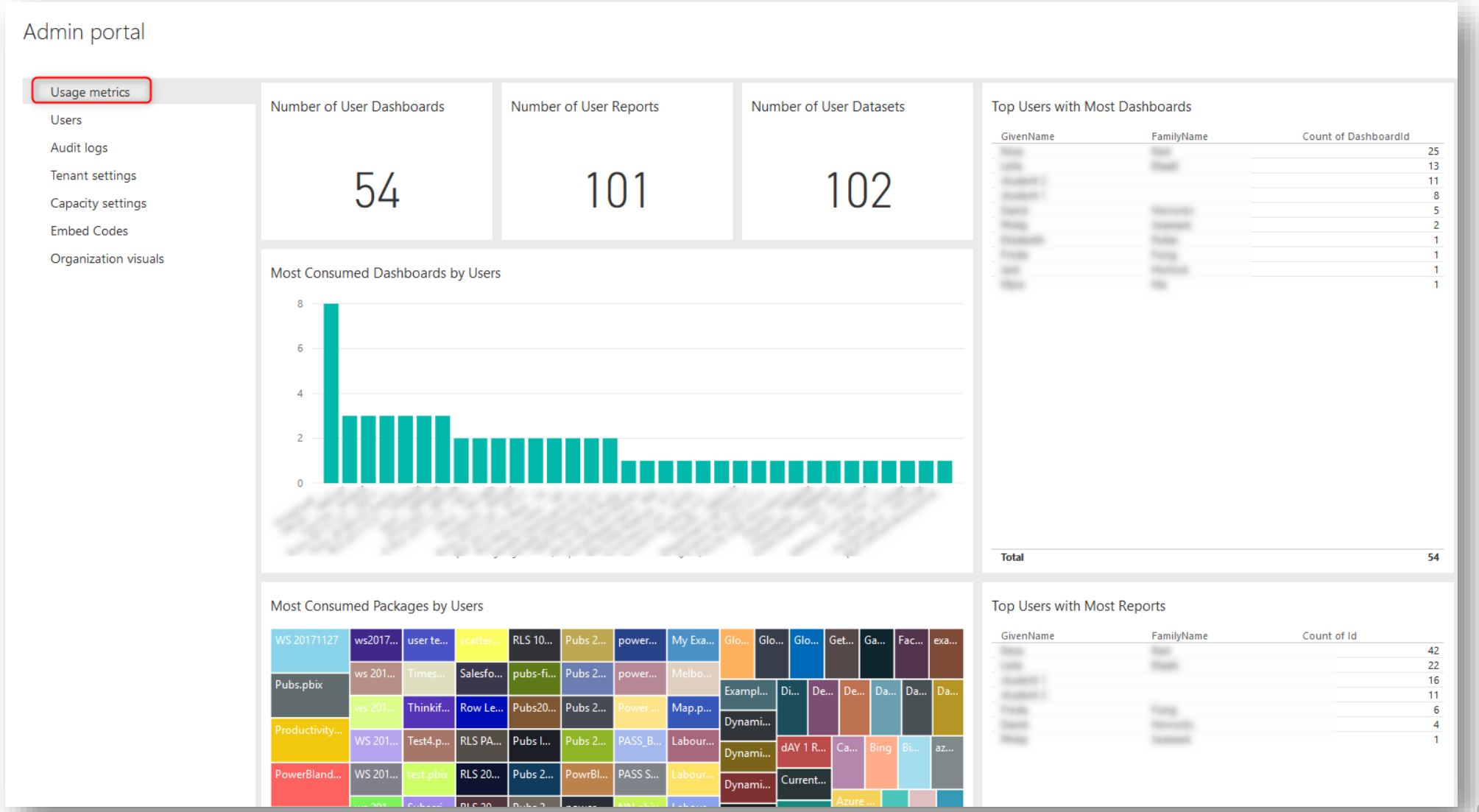
Audit logs in M365 admin portal (manually)

Audit Logs

Power BI activities

- Viewed Power BI dashboard
- Edited Power BI dashboard
- Shared Power BI dashboard
- Viewed Power BI tile
- Viewed Power BI report
- Printed Power BI report page
- Published Power BI report to web
- Created Power BI report
- Created Power BI dataset
- Created Power BI group
- Added Power BI group members
- Created organizational Power BI content pack
- Installed Power BI app
- Updated organization's Power BI settings
- Started Power BI extended trial
- Created Power BI gateway
- Added data source to Power BI gateway
- Changed Power BI gateway admins
- Created Power BI dashboard
- Deleted Power BI dashboard
- Printed Power BI dashboard
- Exported Power BI tile data
- Deleted Power BI report
- Downloaded Power BI report
- Exported Power BI report visual data
- Edited Power BI report
- Deleted Power BI dataset
- Deleted Power BI group
- Removed Power BI group members
- Created Power BI app
- Updated Power BI app
- Started Power BI trial
- Analyzed Power BI dataset
- Deleted Power BI gateway
- Removed data source from Power BI gatew
- Changed Power BI gateway data source use
- Set scheduled refresh on Power BI dataset
- Deleted organizational Power BI content pack
- Edited Power BI dataset
- Generated Power BI Embed Token
- Updated Power BI dataset data sources
- Binded Power BI dataset to gateway
- Took over Power BI dataset
- Imported file to Power BI
- Generated Power BI datapool SAS token
- Updated Power BI datapool
- Viewed Power BI datapool
- Set scheduled refresh on Power BI datapool
- Received Power BI datapool secret from Key Vault
- Updated Power BI email subscription
- Created Power BI folder
- Updated Power BI folder
- Deleted Power BI folder access
- Posted Power BI comment
- Analyzed Power BI report
- Unpublished Power BI app
- Renamed Power BI dashboard
- Shared Power BI report
- Discovered Power BI dataset data sources
- Requested Power BI dataset refresh
- Changed Power BI dataset connections
- Updated Power BI gateway data source credentials
- Updated Power BI dataset parameters
- Created Power BI datapool
- Deleted Power BI datapool
- Exported Power BI datapool
- Requested Power BI datapool refresh
- Created Power BI email subscription
- Deleted Power BI email subscription
- Deleted Power BI folder
- Added Power BI folder access
- Updated Power BI folder access
- Deleted Power BI comment
- Viewed Power BI usage metrics

What the Power BI admin portal offers



Power BI
REST API

Power BI REST API provides service endpoints for embedding, administration, and user resources.

The Power BI API can be used from both a user and a service principal perspective.

In all scenarios, an Azure Active Directory App Registration is needed with the right permissions granted, in order to interact with the Power BI REST API.

Power BI Cmdlets
PowerShell Module

- Power BI General management
- Data Management
- Profile Management
- Report Management
- Workspace Management

```
Get-PowerBIWorkspace
  [-Scope <PowerBIUserScope>]
  [-Filter <String>]
  [-User <String>]
  [-Deleted]
  [-Orphaned]
  [-First <Int32>]
  [-Skip <Int32>]
  [<CommonParameters>]
```

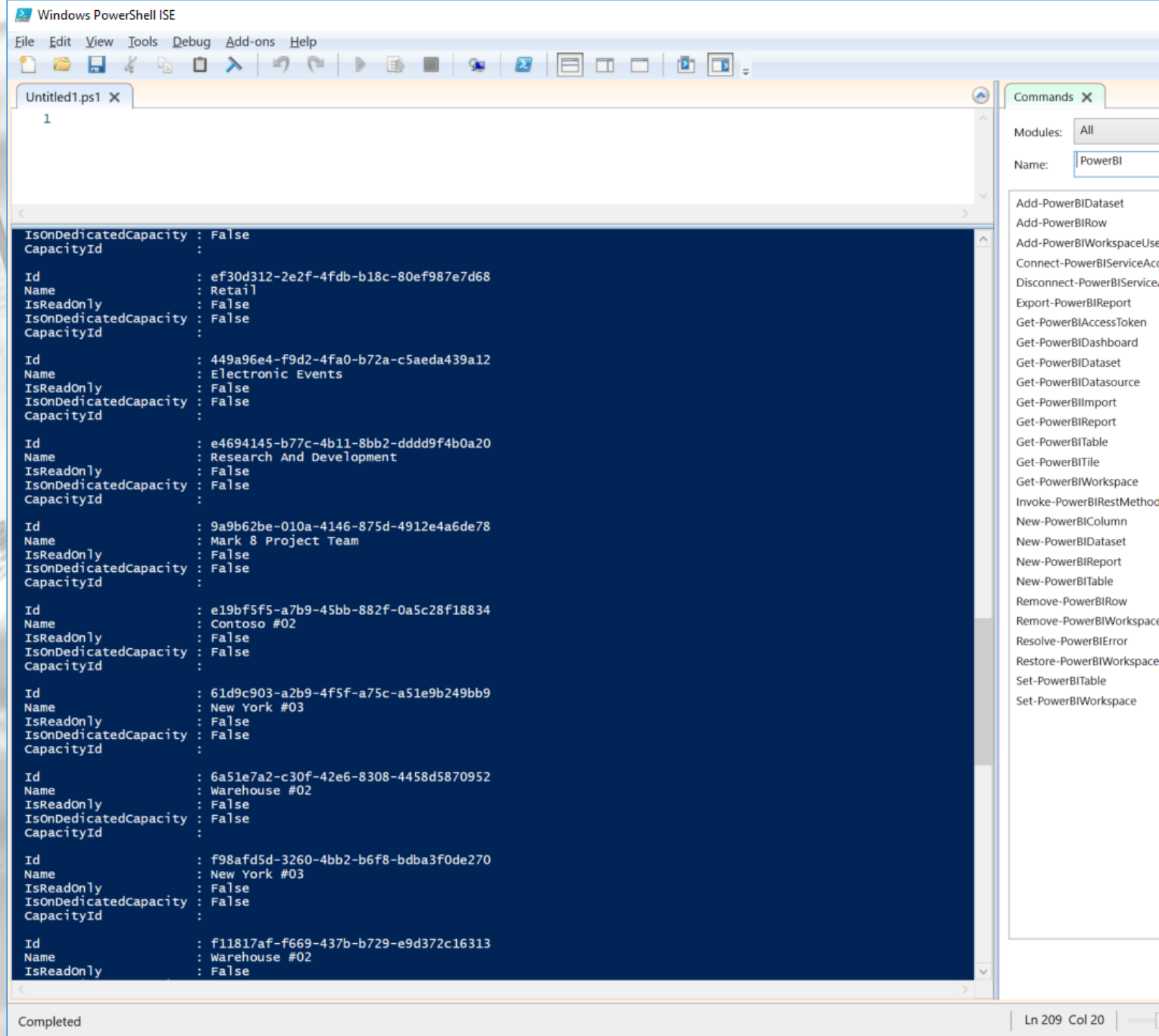
```
PS C:\Windows\system32> Get-Help PowerBI

Name                                Category  Module                          Synopsis
----                                --------  ------                          --------
Add-PowerBIDataSet                  Function  Microsoft.PowerBI.Powe...       ...
Connect-PowerBI                     Function  Microsoft.PowerBI.Powe...       ...
Get-PowerBIGroups                   Function  Microsoft.PowerBI.Powe...       ...
Get-PowerBIDataSets                 Function  Microsoft.PowerBI.Powe...       ...
New-PowerBIDataSet                  Function  Microsoft.PowerBI.Powe...       ...
Add-PowerBIRows                     Function  Microsoft.PowerBI.Powe...       ...
New-PowerBITable                    Function  Microsoft.PowerBI.Powe...       ...
Update-PowerBITableSchema           Function  Microsoft.PowerBI.Powe...       ...
Remove-PowerBIRows                  Function  Microsoft.PowerBI.Powe...       ...
Get_PowerBIAccessToken              Function  Microsoft.PowerBI.Powe...       ...
Get-PowerBITables                   Function  Microsoft.PowerBI.Powe...       ...
New-PowerBIColumn                   Function  Microsoft.PowerBI.Powe...       ...
```

Query the Power BI Service using PowerShell

Demo:

Power BI Cmdlets



PowerShell

Pros

- Easy to get started
- Write locally to CSV etc.
- Good for ad-hoc

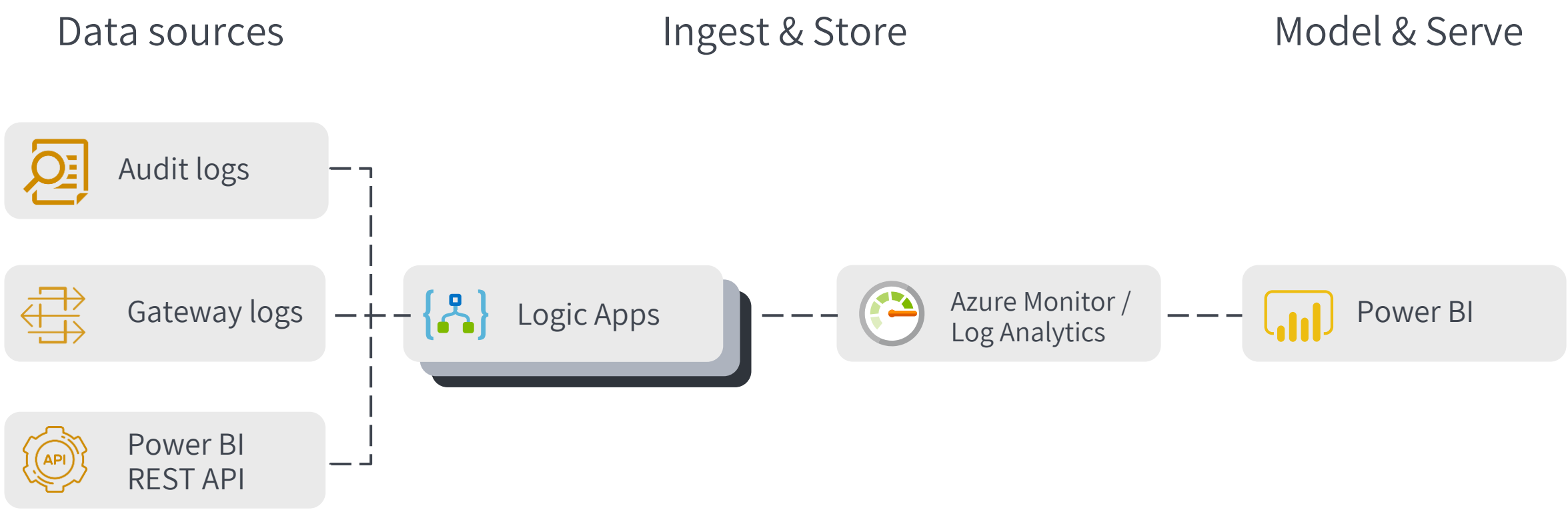
Cons

- Limited to out-of-the-box functions
- Rest API call = advanced
- Secret management
- Unattended execution

Technical overview

Architecture of the solution

High-level architecture



Power BI
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Power BI
REST API

GET https://api.powerbi.com/v1.0/myorg/admin/groups/{groupId}/reports

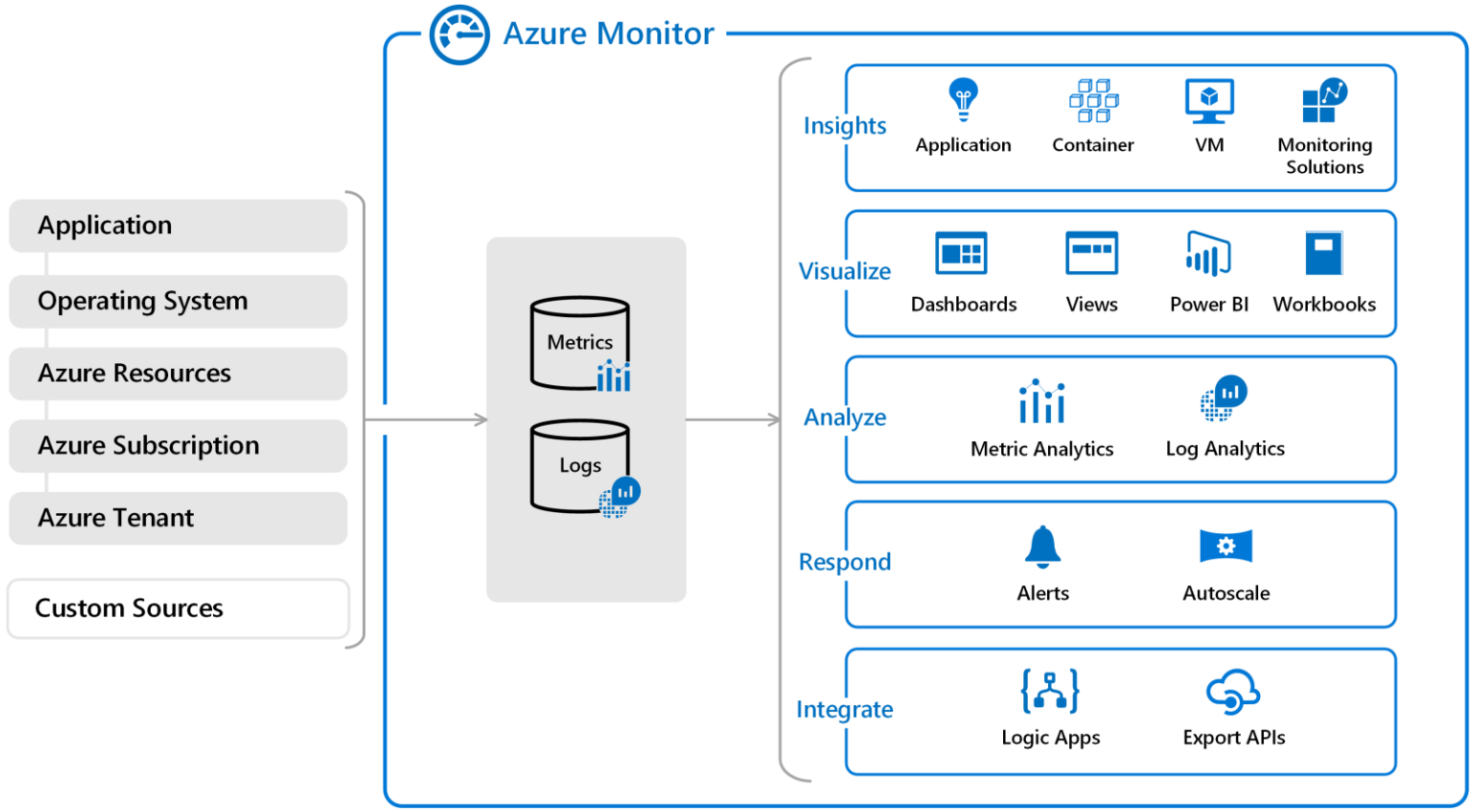

```
{
 "value": [
  {
   "datasetId": "cfafbeb1-8037-4d0c-896e-a46fb27ff229",
   "id": "5b218778-e7a5-4d73-8187-f10824047715",
   "name": "SalesMarketing",
   "webUrl": "https://app.powerbi.com/groups/f089354e-8366-4e18-aea3-4cb4a3a50b48/reports/5b218778-e7a5-4d73-8187-f10824047715",
   "embedUrl": "https://app.powerbi.com/reportEmbed?reportId=5b218778-e7a5-4d73-8187-f10824047715&groupId=f089354e-8366-4e18-aea3-4cb4a3a50b48"
  }
 ]
}
```

Azure Services

Check out all different components

Log Analytics Workspace / Azure Monitor

Azure Monitor delivers a comprehensive solution for collecting, analyzing, and acting on telemetry from your cloud and on-premises environments. It helps you understand how your applications are performing and proactively identifies issues affecting them and the resources they depend on.



New Query 1*

Help | Settings | Sample queries | Query explorer

loganalytics-workspace-powerbi

Run | Time range: Last 24 hours | Save | Copy link | Export | New alert rule | Pin

```
PBI_Workspaces_CL
| limit 50
```

Schema | Filter (preview)

Filter by name or type...

Collapse all

Active

- loganalytics-workspace-p...
  - LogManagement
  - Custom Logs
    - GatewayErrorLog_CL
    - GatewayInfoLog_CL
    - GatewayNetworkLog_CL
    - MyRecordType_CL
    - OnPremDataGatewayLogs_CL
    - PBIMonitorAADActivitiesTE...
    - PBIMonitorGeneralActivities...
    - PBIMonitorTenantGroups_CL
    - PBIMonitorTenantUserMem...
    - PBIMonitorTenantUsers_CL
    - PBI_AuditLog_Activities_CL
    - PBI_Dashboards_CL
    - PBI_Datasets_CL
    - PBI_Reports_CL
    - PBI_WorkspaceUsers_CL
    - PBI_Workspaces_CL
    - PbiWorkspaces_CL
    - PowerBIWorkspaces_CL
    - Workspaces_CL
  - Functions

Favorite workspaces

Completed. Showing results from the last 24 hours. 00:00:00.543 50 records

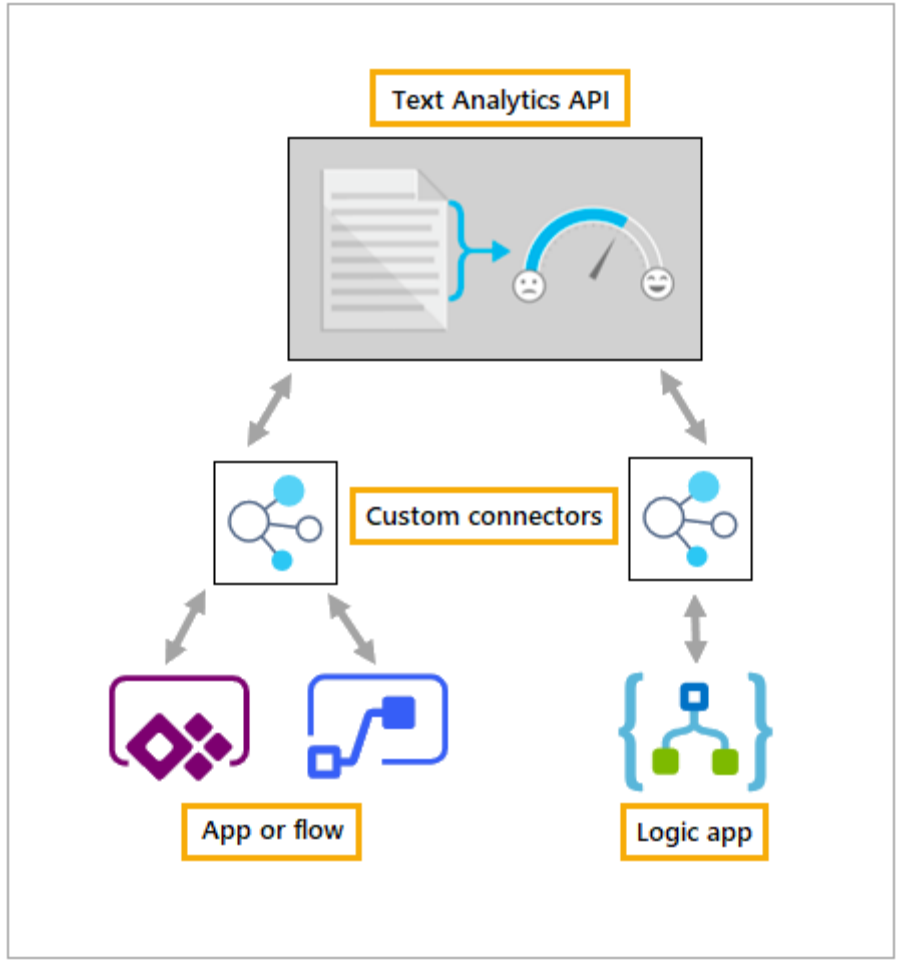
TABLE | CHART | Columns | Display time (UTC+00:00)

Drag a column header and drop it here to group by that column

id_g	isReadOnly_b	isOnDedicatedCapacity_b	name_s	capacityId_g	Type	_Res
82ccf334-fadf-4891-9b14-9319da9d276f	false	false	DIAD_gertjan@m365x280911.onmicrosoft.com		PBI_Workspaces_CL	
6b3d9f38-e241-418f-8120-c241eb4fd55e	false	false	DIAD_erik@m365x280911.onmicrosoft.com		PBI_Workspaces_CL	
bfdbe2eb-aa04-4630-8348-3d204b2a...	false	false	Mark 8 Project Team		PBI_Workspaces_CL	
d96efe56-e5c4-4b90-af2a-3f4a1e3715...	false	false	Engineering		PBI_Workspaces_CL	
5c4cda1e-52b9-420c-a40a-8ae0b6afb...	false	false	Finance		PBI_Workspaces_CL	
73767088-a768-497d-bca0-232f2b749...	false	false	Marketing		PBI_Workspaces_CL	
2440bc9c-2c53-456d-8745-343b2f3ca...	false	false	Sales		PBI_Workspaces_CL	
7f90a2a0-8910-4869-a430-17c0edf516fe	false	false	HR		PBI_Workspaces_CL	
2a448f2e-fd4a-4ccf-b251-c3b7bb6345...	false	false	IT		PBI_Workspaces_CL	
22c831a8-f13c-4a89-9ce6-eb7e71d4d8...	false	false	X1050 Launch Team		PBI_Workspaces_CL	
419ba4a1-fadd-4378-a7f8-41ae494abf...	false	false	Production Line		PBI_Workspaces_CL	
9d661a50-16ce-48fc-98e4-629e3b6b8...	false	false	Business Development		PBI_Workspaces_CL	
1d240e76-ac86-49ee-b4b8-34f9d571b...	false	false	DG-2000 Product Team		PBI_Workspaces_CL	
e24b202e-74db-4297-9ff8-ef90508bf...	false	false	DG-2000 Feedback		PBI_Workspaces_CL	

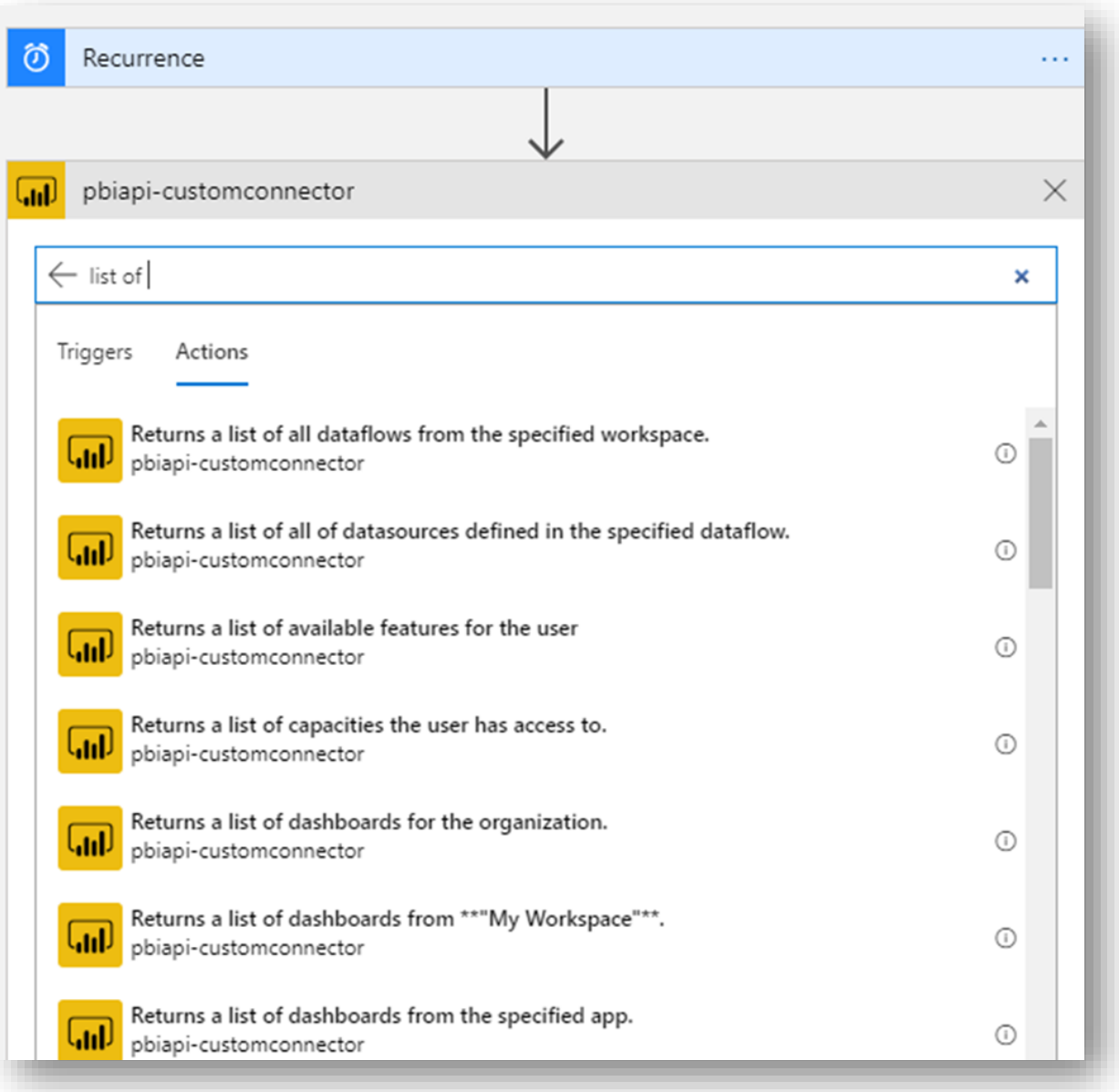
Logic Apps
Custom Connector

While Azure Logic Apps, Microsoft Power Automate, and Microsoft Power Apps offer over 325+ connectors to connect to Microsoft and non-Microsoft services, you may want to communicate with services that aren't available as prebuilt connectors. Custom connectors address this scenario by allowing you to create (and even share) a connector with its own triggers and actions.



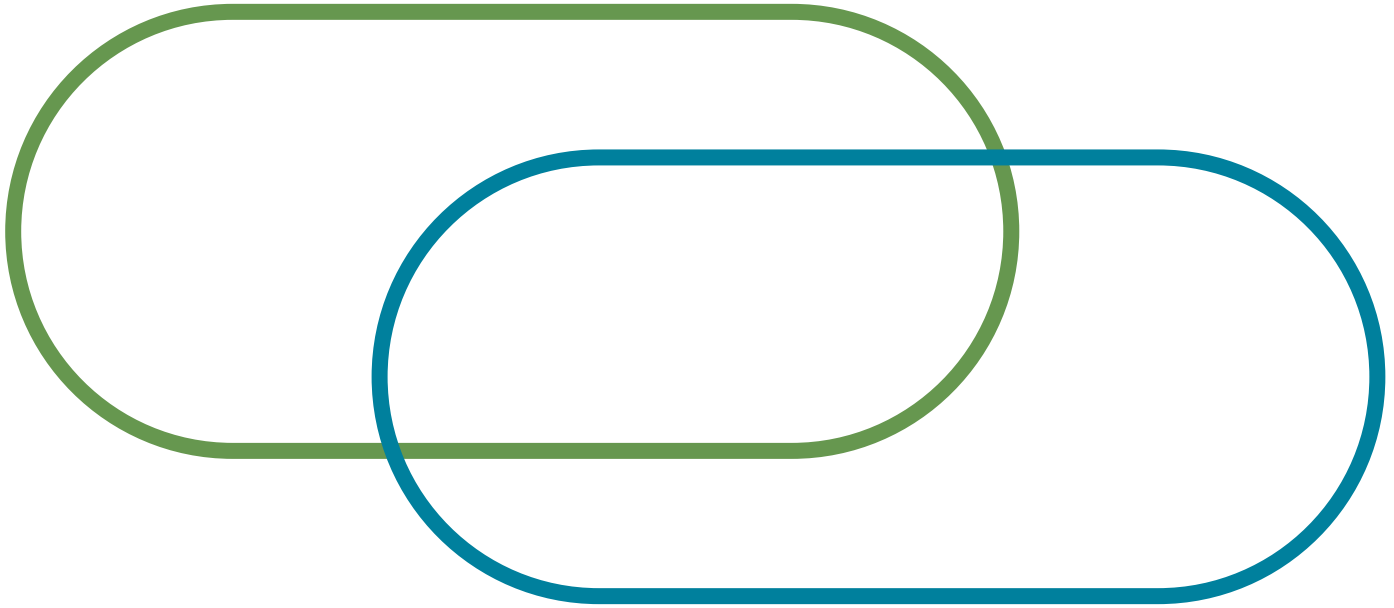
Logic Apps
Custom Connector

- Easier setup for recurring API calls to a specified API then repeatedly configuring HTTPS call with complex authentication
- All defined API calls are listed in a dropdown menu
- One-time authentication setup and stored in an API Connection in the resource group



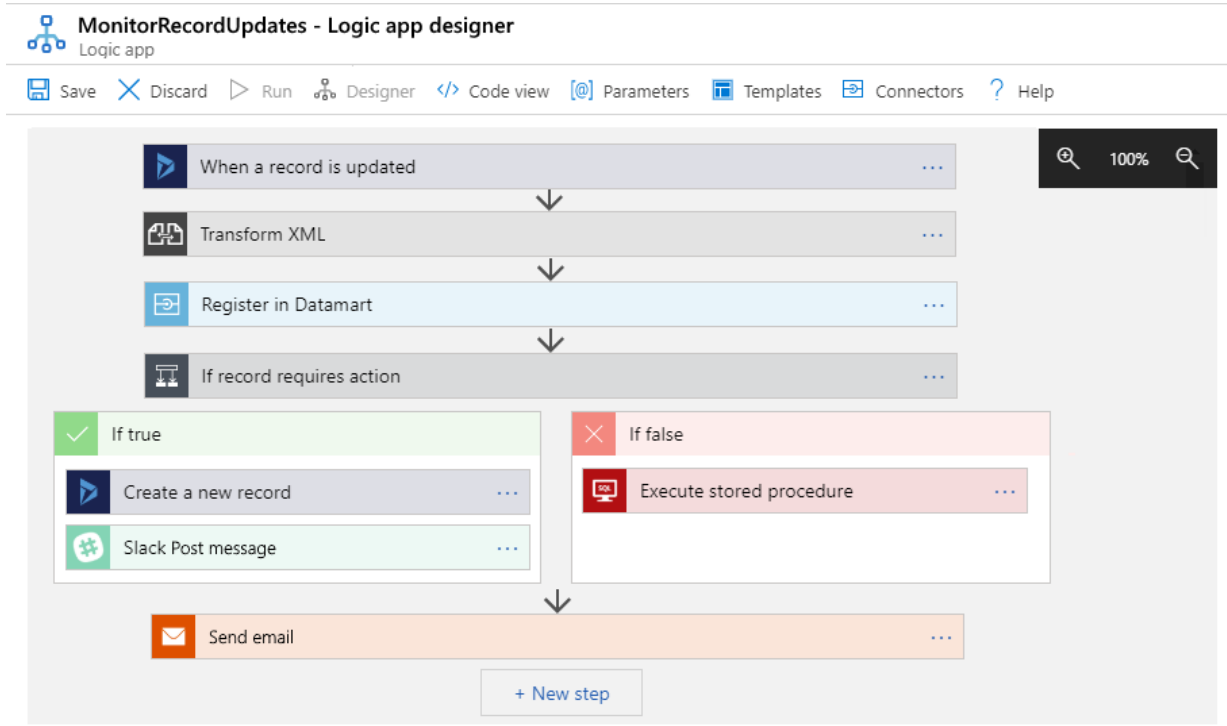
API Connection

- Authentication through API is saved in API connection
- Multiple API connection can exist in a Resource Group



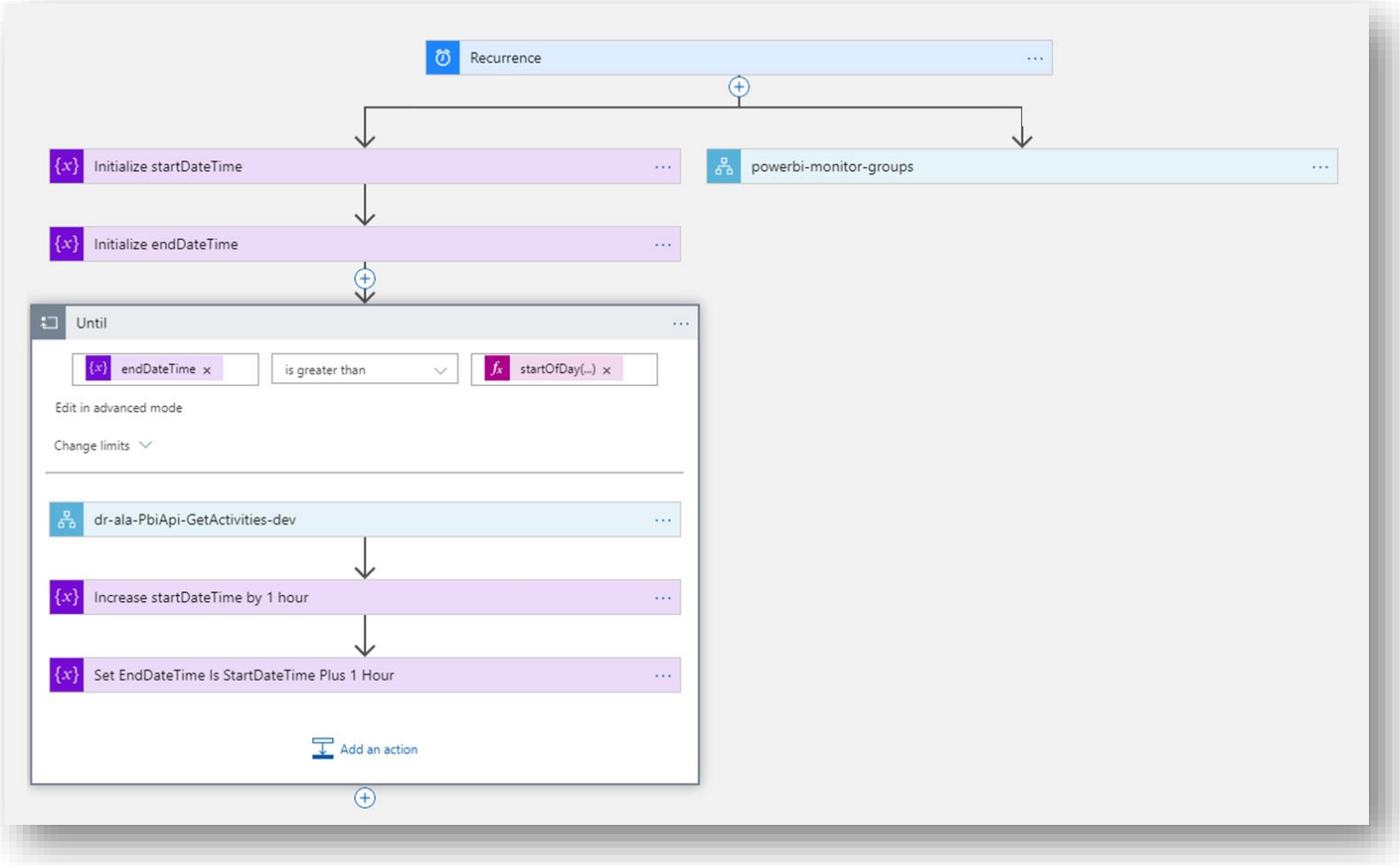
Logic App

Azure Logic Apps is a cloud service that helps you schedule, automate, and orchestrate tasks, business processes, and workflows when you need to integrate apps, data, systems, and services across enterprises or organizations. Logic Apps simplifies how you design and build scalable solutions for app integration, data integration, system integration, enterprise application integration (EAI), and business-to-business (B2B) communication, whether in the cloud, on premises, or both.



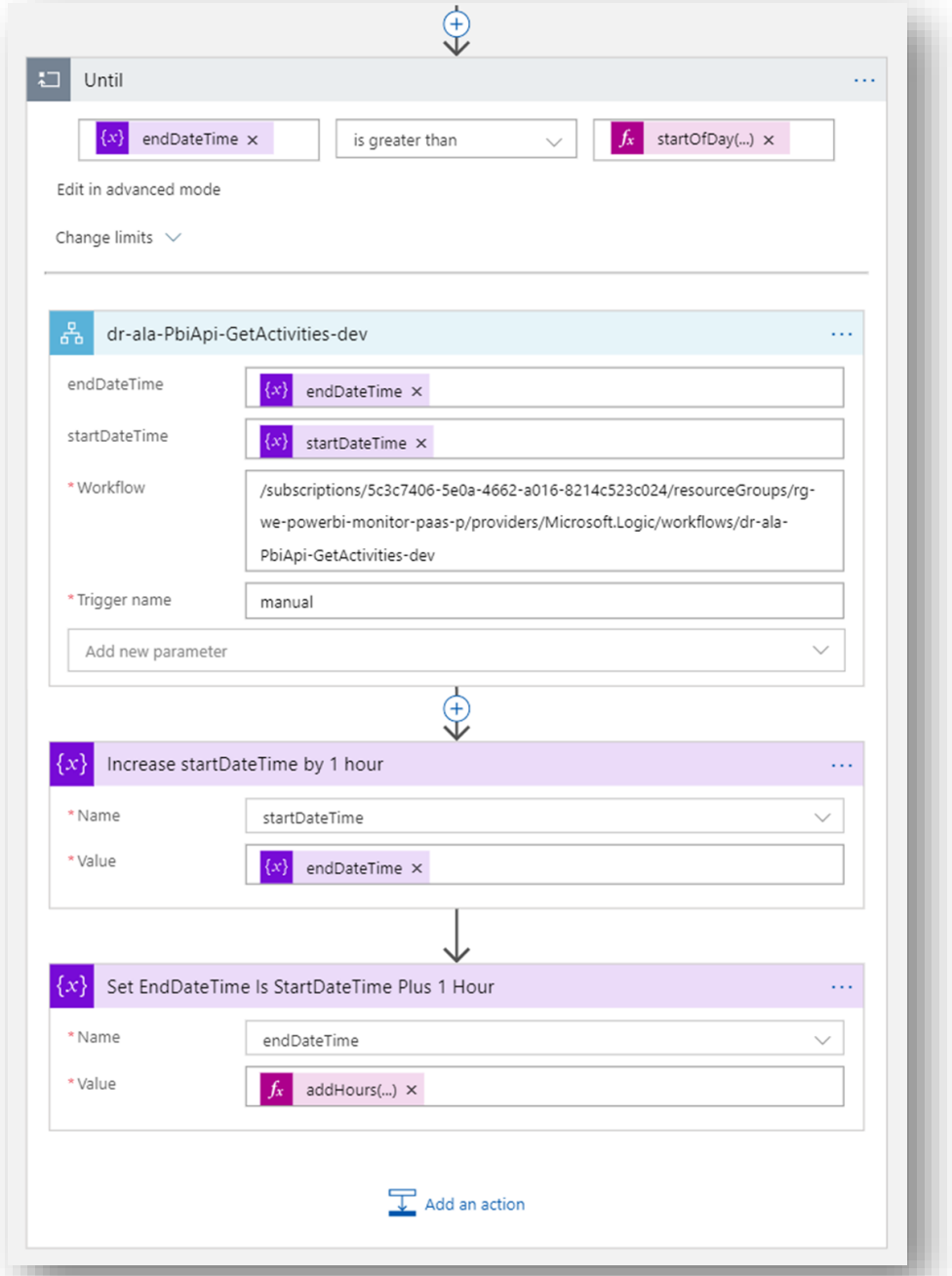
Logic Apps
Orchestration

- One schedule to rule them all!
- Triggers all other Logic Apps
- Loops through time frames for logic apps that must be triggered per hour
- Triggers every day to get the data from the previous day

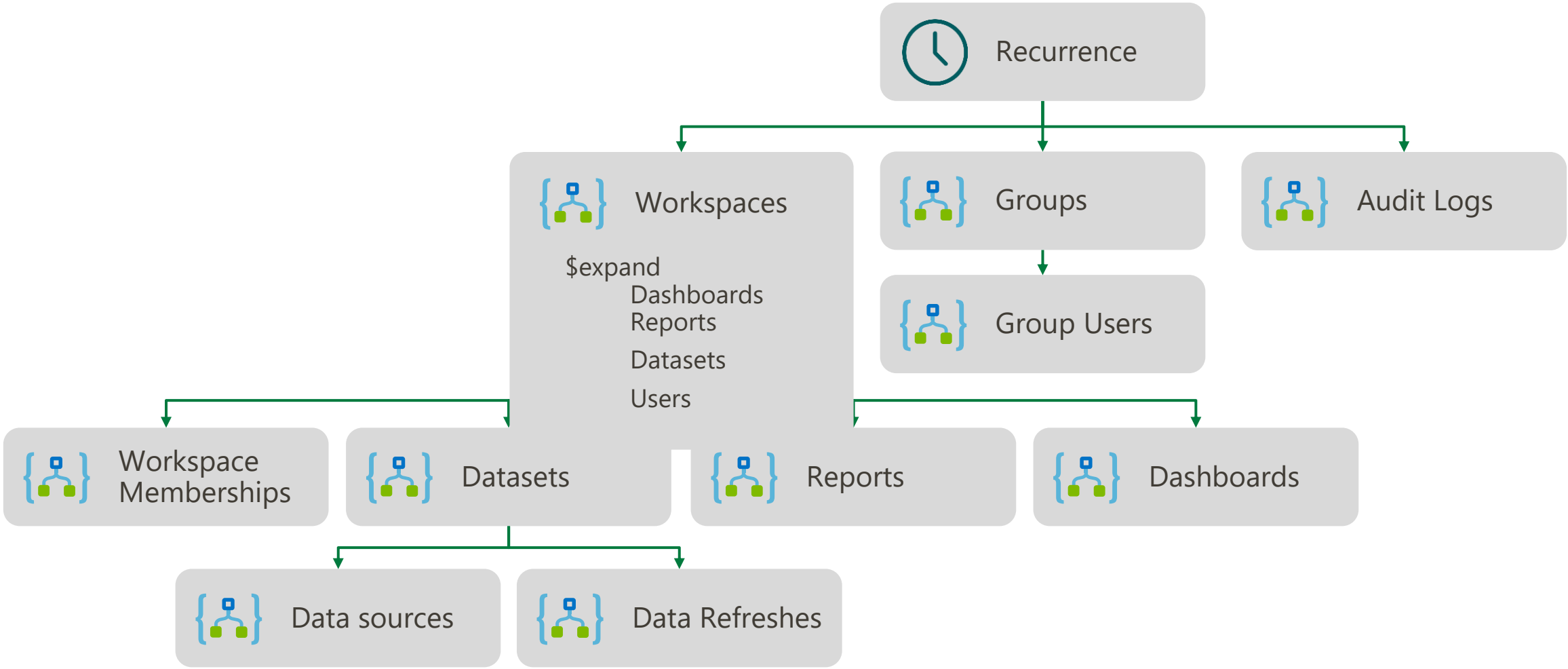


Logic Apps
Loops

- As there are limitation to the API, we created loops to get the data per hour
- After every trigger, the start- and end time are raised with 1 hour to trigger the next run
- The loop continues till it reaches the next day



Logic Apps architecture



$expand=

Sample Request

HTTP

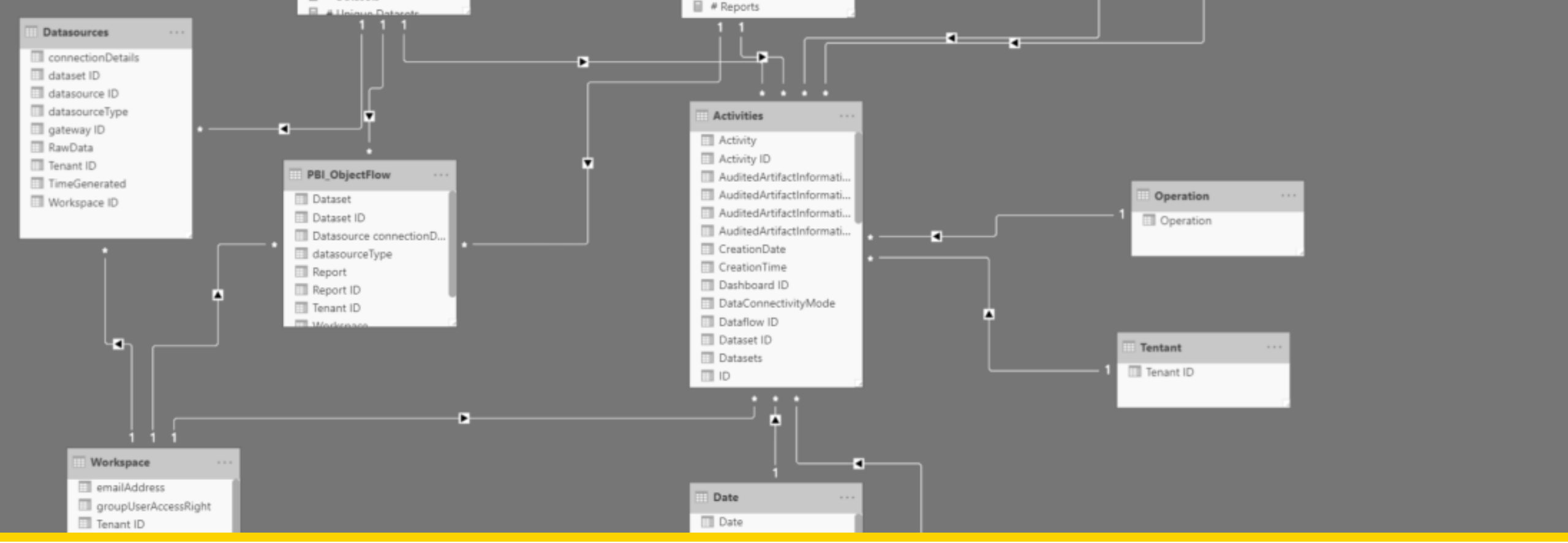
Copy

```
GET https://api.powerbi.com/v1.0/myorg/admin/groups?$expand=dashboards&$top=100
```

JSON

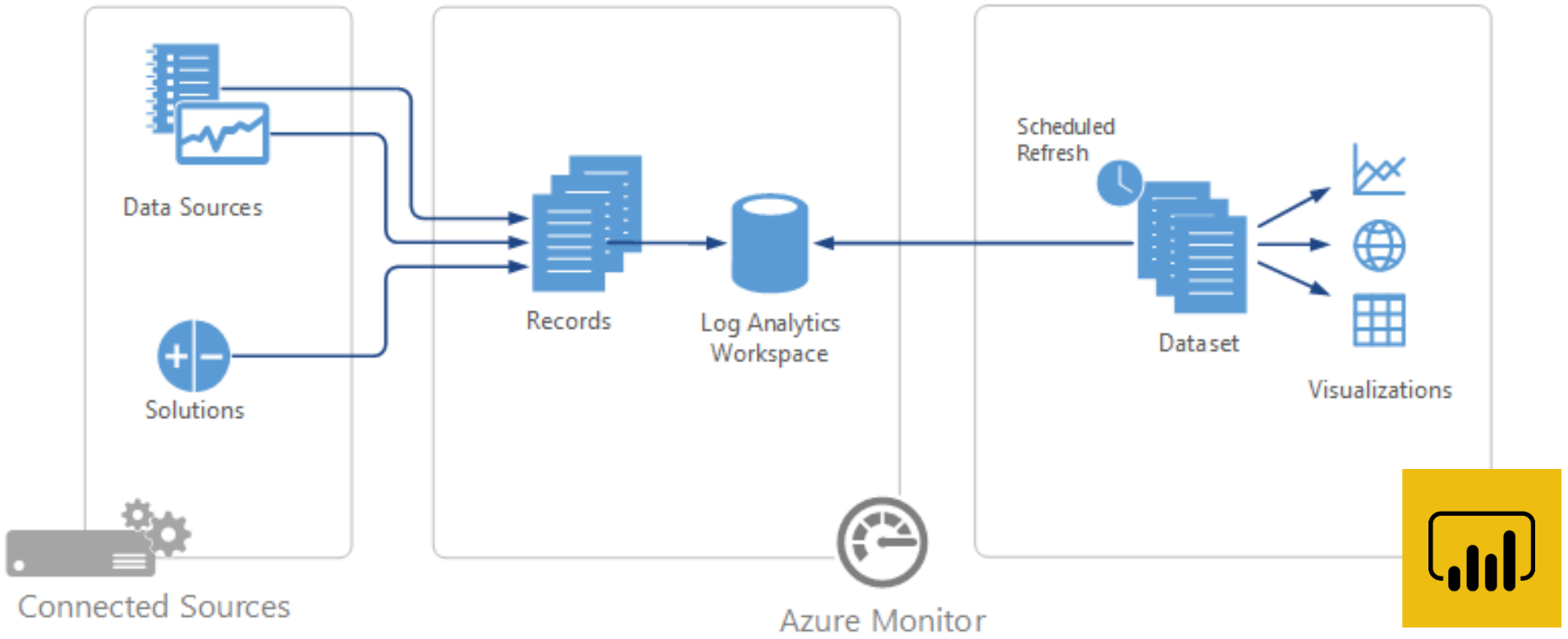
Copy


```
{
  "value": [
    {
      "id": "94E57E92-CEE2-486D-8CC8-218C97200579",
      "isReadOnly": false,
      "isOnDedicatedCapacity": false,
      "capacityMigrationStatus": "Migrated",
      "description": "shorter description",
      "type": "Workspace",
      "state": "Removing",
      "name": "a",
      "dashboards": [
        {
          "id": "4668133c-ae3f-42fb-ad7c-214a8623280c",
          "displayName": "SQlAzure-Refresh.pbix",
          "isReadOnly": false
        },
        {
          "id": "a8f18ca7-63e8-4220-bc1c-f576ec180b98",
          "displayName": "cdvc",
          "isReadOnly": false
        }
      ]
    }
  ]
}
```



Power BI data model

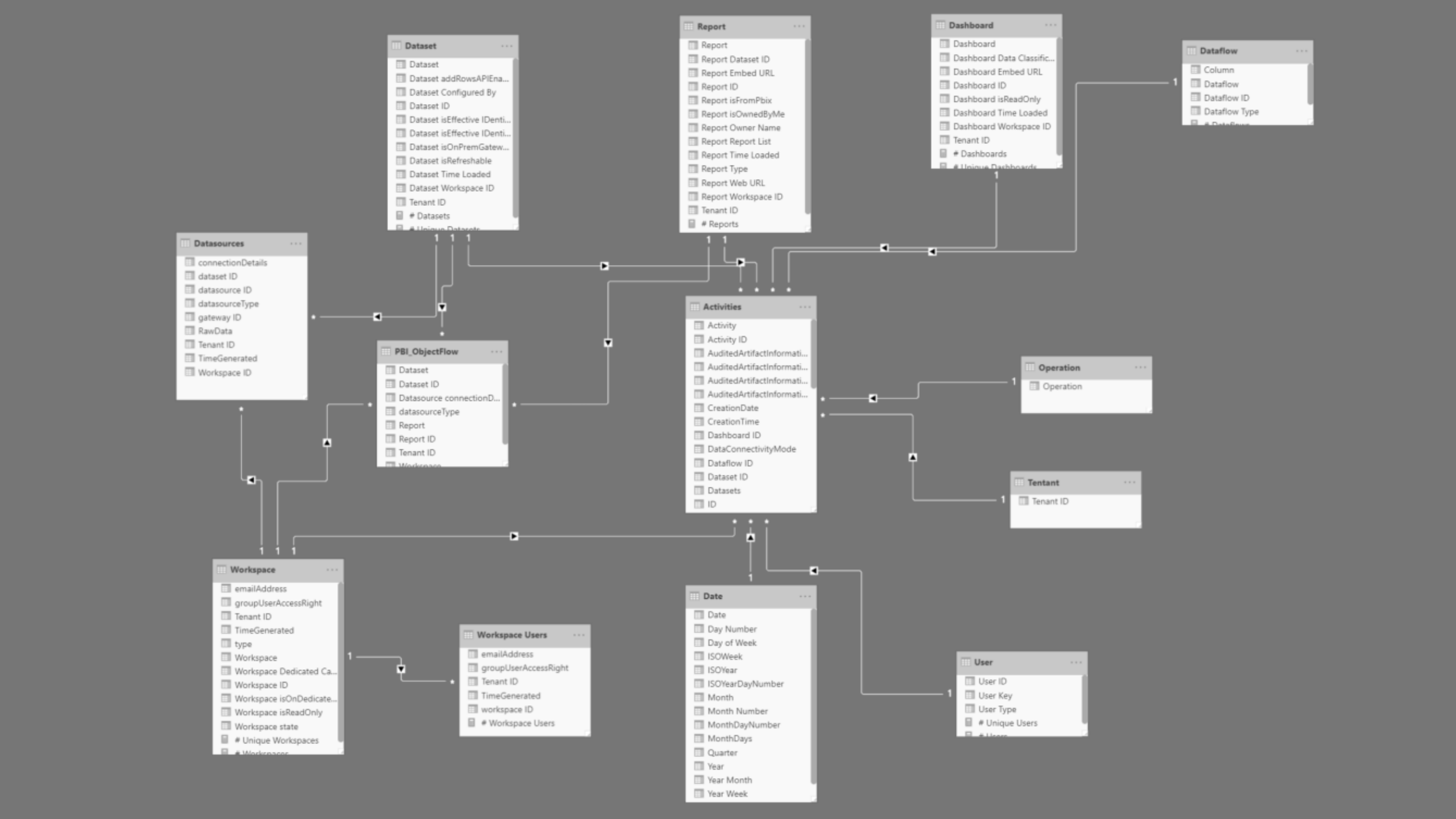
Overview



Log Analytics Query in Power Query

```
/*
The exported Power Query Formula Language (M Language ) can be used with Power Query in Excel
and Power BI Desktop.
For Power BI Desktop follow the instructions below:
1) Download Power BI Desktop from https://powerbi.microsoft.com/desktop/
2) In Power BI Desktop select: 'Get Data' -> 'Blank Query'->'Advanced Query Editor'
3) Paste the M Language script into the Advanced Query Editor and select 'Done'
*/


let
    AnalyticsQuery =
        let Source = Json.Document(Web.Contents("https://api.loganalytics.io/v1/workspaces/aca85b0a-c295-49bf-9755-1d90b250ff19/query",
        [Query=[#"query"="pbi_workspaces_CL
        ",#"x-ms-app"="OmsAnalyticsPBI",#"timespan"="P1D",#"prefer"="ai.response-thinning=true"],Timeout=#duration(0,0,4,0)])),
        TypeMap = #table(
        { "AnalyticsTypes", "Type" },
        {
        { "string",   Text.Type },
        { "int",      Int32.Type },
        { "long",     Int64.Type },
        { "real",     Double.Type },
        { "timespan", Duration.Type },
        { "datetime", DateTimeZone.Type },
        { "bool",     Logical.Type },
        { "guid",     Text.Type },
        { "dynamic",  Text.Type }
        }),
        DataTable = Source[tables]{0},
        Columns = Table.FromRecords(DataTable[columns]),
        ColumnsWithType = Table.Join(Columns, {"type"}, TypeMap , {"AnalyticsTypes"}),
        Rows = Table.FromRows(DataTable[rows], Columns[name]),
        Table = Table.TransformColumnTypes(Rows, Table.ToList(ColumnsWithType, (c) => { c{0}, c{3}}))
    in
        Table
in AnalyticsQuery
```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Tenant ID
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groupUserAccessRight
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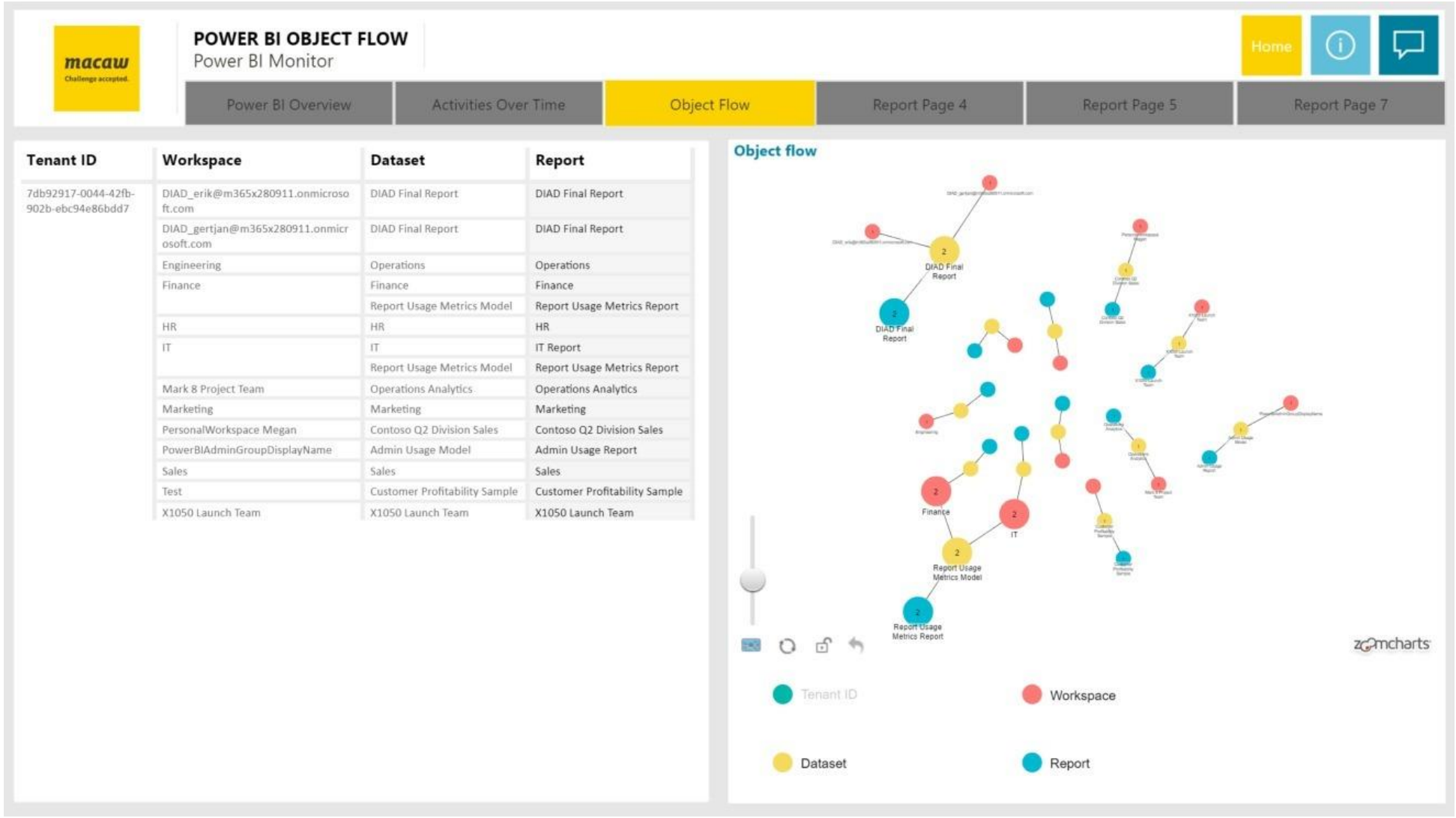
Workspace isReadOnly
Workspace state
Unique Workspaces
Workspace Users
emailAddress
groupUserAccessRight
Tenant ID
TimeGenerated
workspace ID
Workspace Users
Date
Date
Day Number
Day of Week
ISOWeek
ISOYear
ISOYearDayNumber
Month
Month Number
MonthDayNumber
MonthDays
Quarter
Year
Year Month
Year Week
User
User ID
User Key
User Type
Unique Users

Power BI report + DEMO



Log Analytics API limitations

Category	Limits
Maximum records returned in a single query	500,000
Maximum size of data returned	64,000,000 bytes (~61 MiB)
Maximum query running time	10 minutes
Maximum request rate	200 requests per 30 seconds per AAD user or client IP address

Non-functionals

Non-functionals you should think about…

- Retention
- Privacy
- Availability
- Security
- Error handling
- Disaster recovery
- Cost management
- Documentation

Learnings & mistakes we have made

What do we want to achieve?

Mistakes we've made
Overview

- Inefficient orchestration
- Looping over the same page resulting in extremely high run-cost
- Reaching the API Limitations for Log Analytics

Log Analytics API limitations

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Mistakes we've made
Orchestration

Loops to extract all data available per workspace, resulted in hitting the API limits.

- Worked fine for small organizations and during testing.
- Hitting the limits with bigger tenants (enterprises)

Admin - Groups GetGroupsAsAdmin

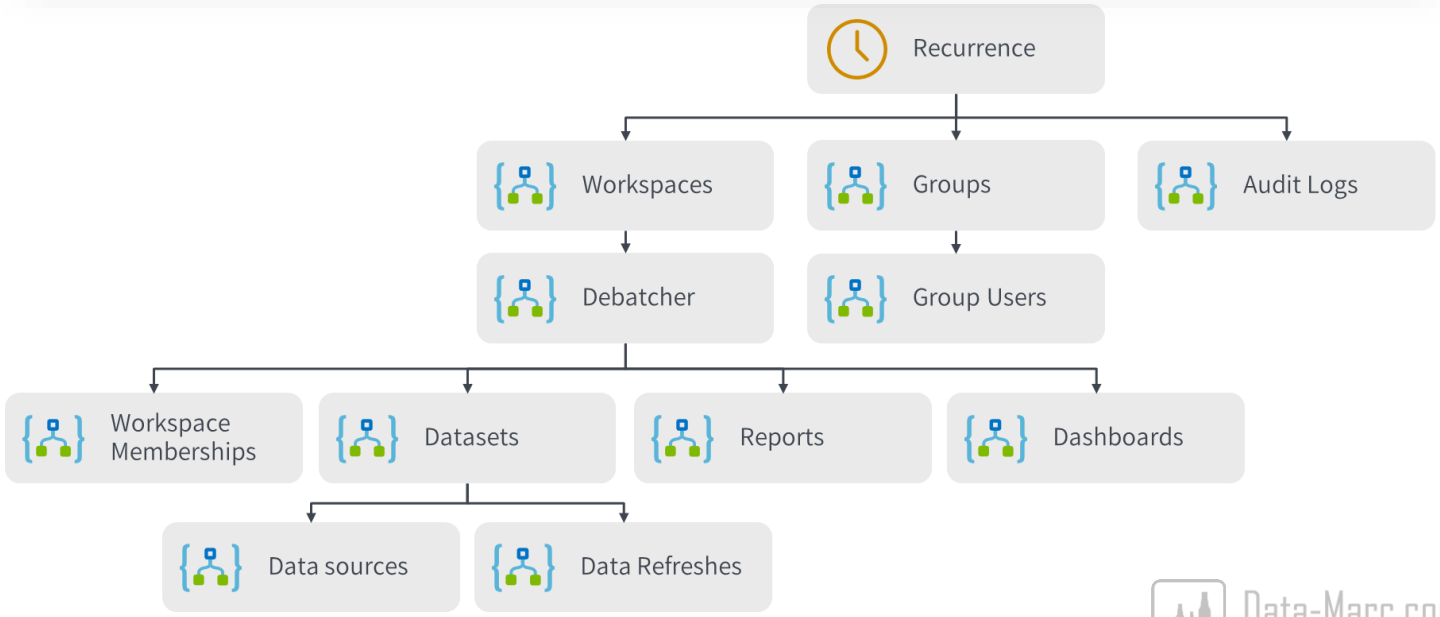
Service: Power BI REST APIs

API Version: v1.0

Returns a list of workspaces for the organization.

Note: The user must have administrator rights (such as Office 365 Global Administrator or Power BI Service Administrator) to call this API.

This API allows 200 requests per hour at maximum.



Mistakes we've made
Orchestration

Microsoft Power BI Blog

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Avoiding workspace loops by expanding navigation properties in the GetGroupsAsAdmin API

Harjinder Raheja
Senior Software Engineer

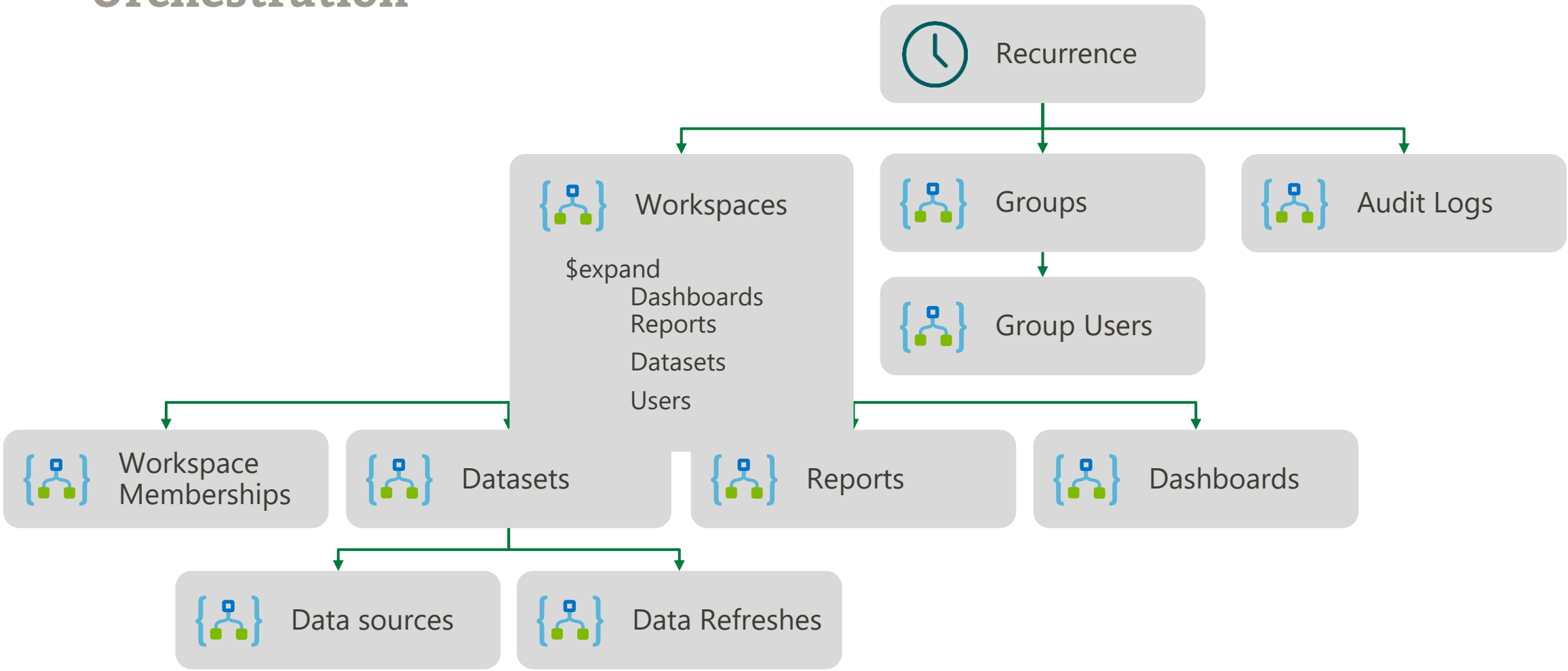
June 28, 2019

We are excited to announce the recent release of support for $expand in the GetGroupsAsAdmin API! As a Power BI service admin if you need to list all workspaces in your tenant, including their users, reports, dashboards, and datasets, $expand helps you do this quickly and efficiently.

Support for $expand in the GetGroupsAsAdmin API enables you to retrieve the details of the navigation properties for users, reports, dashboards, and datasets directly in the workspace properties. You no longer need to loop through each workspace and call 4 separate APIs. With $expand, you can accomplish that work with a single API call. This makes your solutions dramatically simpler, more intuitive, faster to develop, and easier to maintain.

Using the $expand query option is very straight forward. Here's the API call to get the first

Mistakes we've made
Orchestration



$expand=

Sample Request

HTTP

Copy

```
GET https://api.powerbi.com/v1.0/myorg/admin/groups?$expand=dashboards&$top=100
```

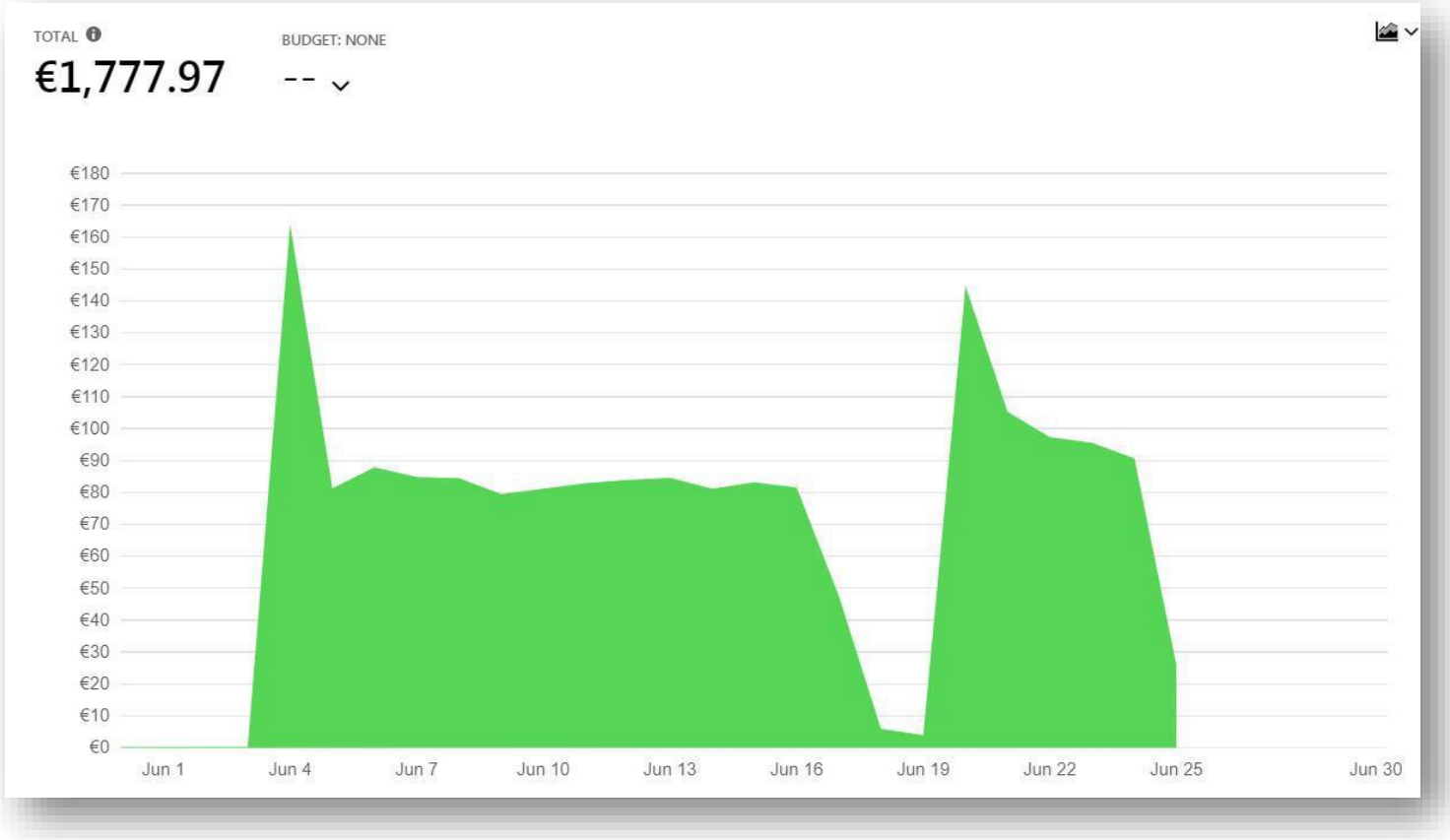
JSON

Copy


```
{
  "value": [
    {
      "id": "94E57E92-CEE2-486D-8CC8-218C97200579",
      "isReadOnly": false,
      "isOnDedicatedCapacity": false,
      "capacityMigrationStatus": "Migrated",
      "description": "shorter description",
      "type": "Workspace",
      "state": "Removing",
      "name": "a",
      "dashboards": [
        {
          "id": "4668133c-ae3f-42fb-ad7c-214a8623280c",
          "displayName": "SQlAzure-Refresh.pbix",
          "isReadOnly": false
        },
        {
          "id": "a8f18ca7-63e8-4220-bc1c-f576ec180b98",
          "displayName": "cdvc",
          "isReadOnly": false
        }
      ]
    }
  ]
}
```

Mistakes we've made
Costs

Loops kept on running till the run timed-out. As a result extremely high Azure costs.



Wrap-up

Open points

- No query session information (how executes what query to the tabular model)
- Get All Apps is missing from an admin perspective
- Performance metrics from either the gateway and premium capacities can be challenging
- No information about memberships of apps
- No information about permissions on objects in workspaces
- No information on current Embed Codes

Native future enhancements

Azure Monitor integration

06/03/2020 • 2 minutes to read •

> ⓘ Important
>
> **Some of the functionality described in this release plan has not been released.** Delivery timelines may change and projected functionality may not be released (see **Microsoft policy**). Learn more: **What's new and planned**

Enabled for	Public preview	General availability
Admins, makers, or analysts, automatically	-	Jan 2021

Feature details

Azure Monitor integration will allow customers to connect their Power BI environment to pre-configured Azure Log Analytics workspaces. This will provide long term data storage, retention policies, ad hoc query capability, and the ability to analyze the log data directly from Power BI.

Take aways

- Monitoring is **more than usage insights**
- Building your own monitoring solution is key for:
  - **End-to-end** usage monitoring, not only individual workspaces!
  - Extract the information and store it yourself to have **full control of the data**
  - **Complete governance** of the Power BI service
- Monitoring is key for a **successful implementation** of Power BI within an enterprise environment

Thanks for attending!

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