



Power BI API Extravaganza

2021-11



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Power BI CAT

Microsoft

 @RuiRomano

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 <https://ruiromanoblog.wordpress.com>



Lives in Porto, Portugal

+15 years working on Microsoft BI & Data Stack

 Power BI & Data Architecture



Slides here:

<https://github.com/RuiRomano/sessionslides>

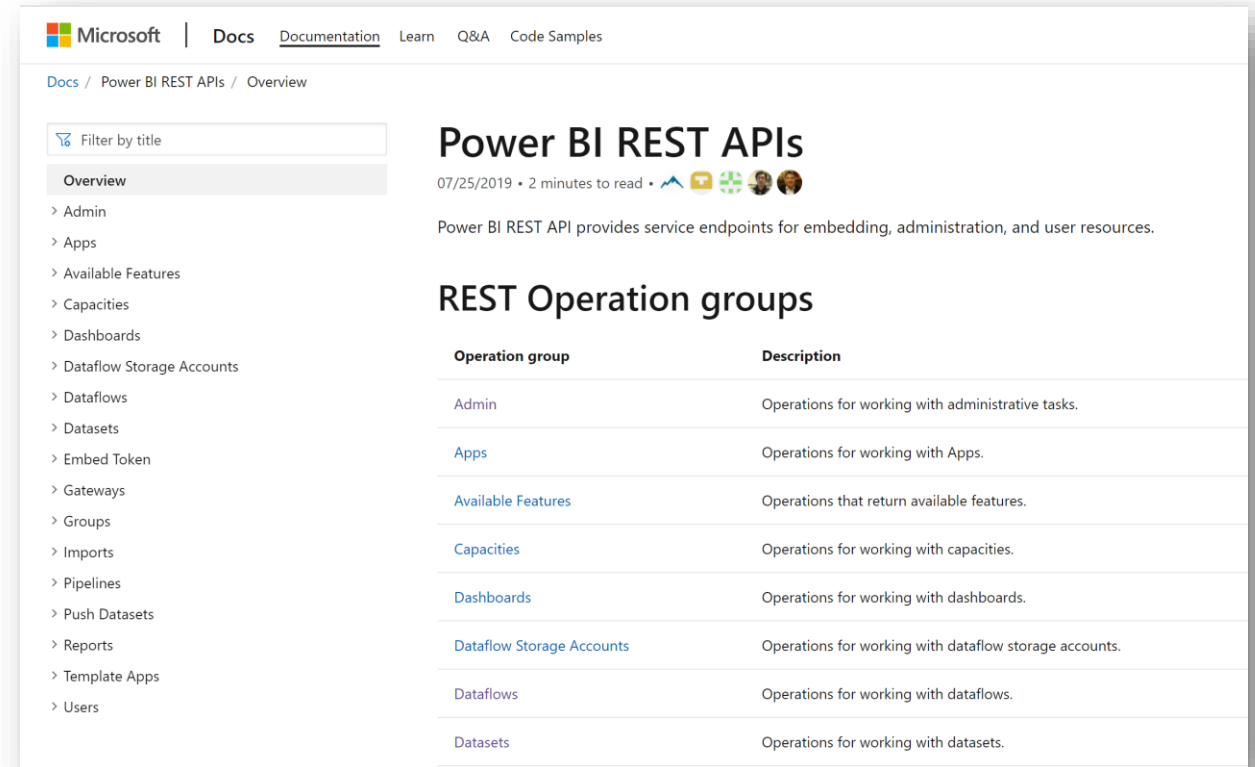
Power BI API Extravaganza

- Not a Power BI Intro!
- 100% focus on the REST API's
- Lots of powershell...
- Fast Paced 😊
Focus on the possibilities not details...

Power BI REST API's ?

Collection of REST API's for:

- Administration
- Monitoring
- Productivity / DevOps
- Real-Time
- Embedding



Microsoft | Docs Documentation Learn Q&A Code Samples

Docs / Power BI REST APIs / Overview

Filter by title

Overview

- > Admin
- > Apps
- > Available Features
- > Capacities
- > Dashboards
- > Dataflow Storage Accounts
- > Dataflows
- > Datasets
- > Embed Token
- > Gateways
- > Groups
- > Imports
- > Pipelines
- > Push Datasets
- > Reports
- > Template Apps
- > Users

Power BI REST APIs

07/25/2019 • 2 minutes to read • 🏠 📁 🌐 👤

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

REST Operation groups

Operation group	Description
Admin	Operations for working with administrative tasks.
Apps	Operations for working with Apps.
Available Features	Operations that return available features.
Capacities	Operations for working with capacities.
Dashboards	Operations for working with dashboards.
Dataflow Storage Accounts	Operations for working with dataflow storage accounts.
Dataflows	Operations for working with dataflows.
Datasets	Operations for working with datasets.

[Power BI REST APIs - Power BI REST API | Microsoft Docs](#)

Links: [PBI API Session](#)

How can I “play” with the API’s?

- Go to the [Docs](#) and “Try it” with your Power BI tenant data

Contents

Groups - Get Groups

Service: Power BI REST APIs
API Version: v1.0

Returns a list of workspaces the user has access to.

Note: Users that have been recently added to a group may not have their new group immediately available, see [Refresh user permissions](#).

Required scope: Workspace.Read.All or Workspace.ReadWrite.All
To set the permissions scope, see [Register an app](#).

HTTP

Copy

Try It

GET <https://api.powerbi.com/v1.0/myorg/groups>

With optional parameters:

HTTP

Copy

GET [https://api.powerbi.com/v1.0/myorg/groups?\\$filter={filter}&\\$top={\\$top}&\\$skip={\\$skip}](https://api.powerbi.com/v1.0/myorg/groups?$filter={filter}&$top={$top}&$skip={$skip})

URI Parameters

Name	In	Required	Type	Description
\$filter	query		string	Filters the results, based on a boolean condition
\$skip	query		integer int32	Skips the first n results

requestid: 983f107e-a730-498f-b342-a5a210de322e

Body

JSON

Copy

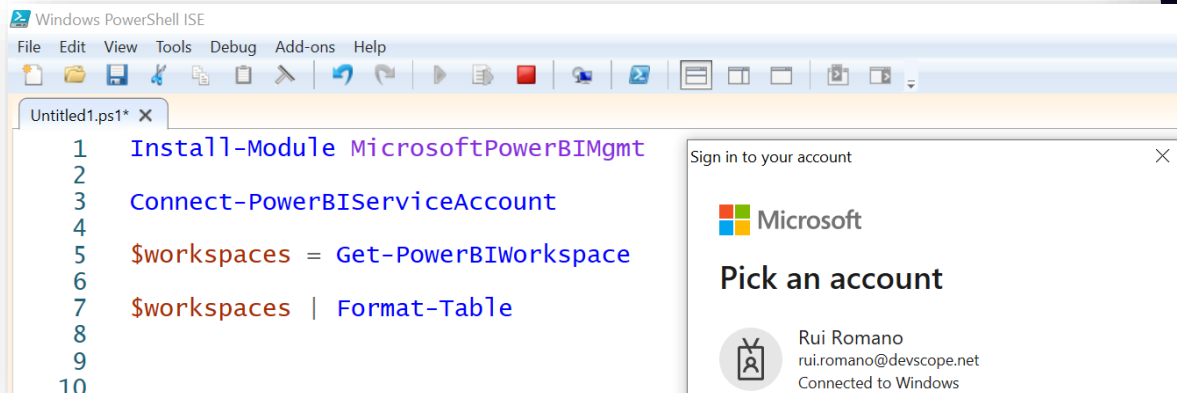
```
{
  "@odata.context": "http://wabi-west-europe-redirect.analysis.windows.net/v1.0/myorg/$metadata#groups",
  "@odata.count": 110,
  "value": [
    {
      "id": "43504e54-e44d-4a5a-bc2f-d3246fc5568a",
      "isReadOnly": false,
      "isOnDedicatedCapacity": false,
      "type": "Group",
      "name": "pbtiptstricksdata"
    },
    {
      "id": "29d49eaf-4016-4f67-91f1-7ba111cdf086",
      "isReadOnly": false,
      "isOnDedicatedCapacity": false,
      "type": "Group",
      "name": "DVS Sharepoint Play"
    },
    {
      "id": "a36d64a4-9cf7-438a-92af-87db0b54e562",
      "isReadOnly": false,
      "isOnDedicatedCapacity": false,
      "type": "Group",
      "name": "Lisbon Data8ricks"
    },
    {
      "id": "e4790749-58d6-4608-855a-c9124bd9eab7",
      "isReadOnly": false,
      "isOnDedicatedCapacity": false,
      "type": "Group",
      "name": "PBI Embed"
    },
    {
      "id": "ca6dc9f6-62eb-43fb-9244-4c2ab87d3803",
      "isReadOnly": false,
      "isOnDedicatedCapacity": false,
      "type": "Group",
      "name": "WMI Sales Home"
    }
  ]
}
```

How can I work with the API's?

- You need to be comfortable with code/script/automation (power automate)
Any language that can make an HTTP request is compatible: .Net, PowerShell, Python,...
- There are multiple libraries/packages available:
PowerShell – [MicrosoftPowerBIMgmt](#), [PowerBIPS](#) (♥)
Python – [python-power-bi](#)
.Net – [Microsoft.PowerBI.Api](#)
- If possible, use a Service Principal

Demo

MicrosoftPowerBIMgmt



The screenshot shows the Windows PowerShell ISE interface. The main window displays a PowerShell script with the following commands:

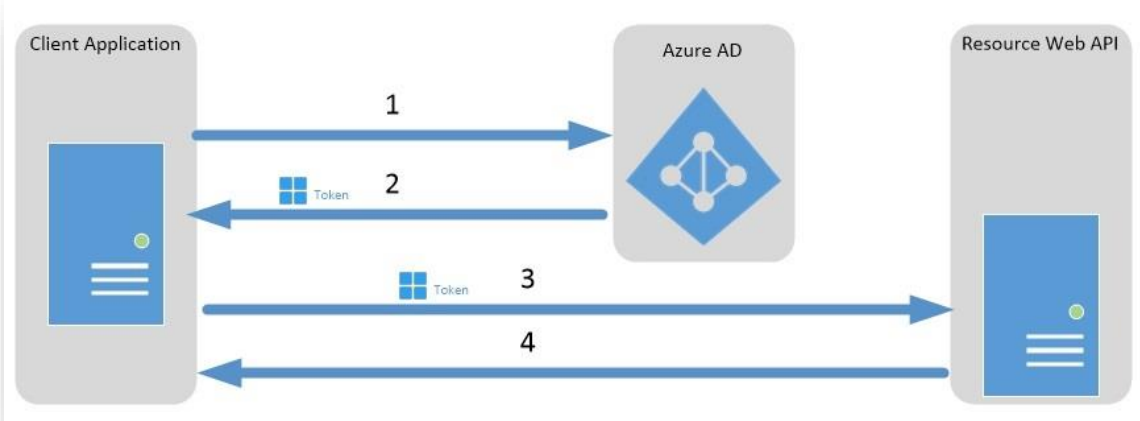
```
1 Install-Module MicrosoftPowerBIMgmt
2
3 Connect-PowerBIServiceAccount
4
5 $workspaces = Get-PowerBIWorkspace
6
7 $workspaces | Format-Table
8
9
10
```

On the right side, a Microsoft account sign-in dialog is open, titled "Sign in to your account". It displays the Microsoft logo and the text "Pick an account". Below this, a user profile is shown for "Rui Romano" with the email "rui.romano@devscope.net" and the status "Connected to Windows".

```
mirror_mod = modifier_ob.  
Set mirror object to mirror  
mirror_mod.mirror_object =  
operation == "MIRROR_X":  
mirror_mod.use_x = True  
mirror_mod.use_y = False  
mirror_mod.use_z = False  
operation == "MIRROR_Y":  
mirror_mod.use_x = False  
mirror_mod.use_y = True  
mirror_mod.use_z = False  
operation == "MIRROR_Z":  
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mirror_mod.use_y = False  
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selection at the end -add  
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modifier_ob.select=1  
context.scene.objects.active  
("Selected" + str(modifier_ob.  
mirror_ob.select = 0  
= bpy.context.selected_object  
data.objects[one.name].select  
  
print("please select exactly  
  
-- OPERATOR CLASSES --  
  
types.Operator):  
X mirror to the selected  
object.mirror_mirror_x"  
mirror X"  
  
context):  
context.active_object is not
```

API Authentication

- OAuth 2.0
- Authentication Flows:



Authentication Flow	Interactive	Requirements
Client Credentials (Recommended for non interactive)	No	Azure AD Service Principal
Auth Code	Yes	Power BI Account

```
POST /token HTTP/1.1
Host: authorization-server.com

grant_type=client_credentials
&client_id=xxxxxxxxxx
&client_secret=xxxxxxxxxx
```



```
HTTP/1.1 200 OK
Content-Type: application/json
Cache-Control: no-store
Pragma: no-cache

{
  "access_token": "MTQ0NjJkZmQ5OTM2NDE1ZTZjNGZmZjI3",
  "token_type": "bearer",
  "expires_in": 3600,
  "refresh_token": "IwOGYzYTlmM2YxOTQ5MGE3YmNmMDFkNTVh",
  "scope": "create"
}
```


Service Principal – Manual Step by Step

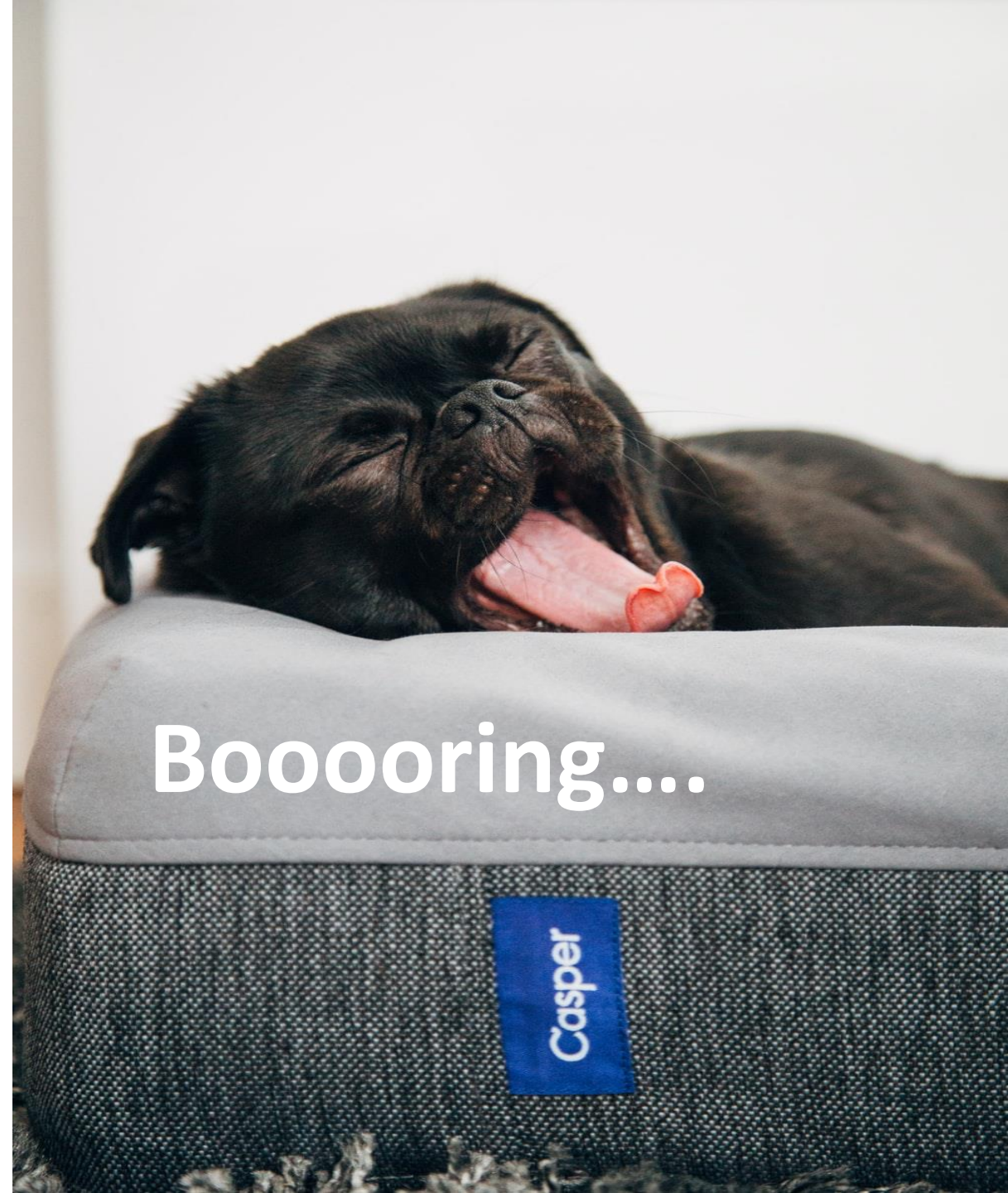
1. Go to [Azure AD Active Directory](#)
2. Go to [App Registrations](#) and create a new App (leave defaults)
3. Generate a new App Secret
4. Save the App Id, App Secret & Tenant Id
5. [Create/Reuse an Azure AD Security Group](#)
6. Add the Service Principal to the Security Group as a member
7. Authorize the Security Group in Power BI Admin Portal Tenant Settings:
 - Allow service principals to use Power BI APIs
 - Allow service principals to use read-only Power BI admin APIs – if admin calls are necessary (ex: monitoring)
 - Allow XMLA endpoints and Analyze in Excel with on-premises datasets (execute Queries)

Note: You don't need to add any Power BI API Permissions

More info: [link](#)

Scenarios / Demos

- DAX Queries w/ REST API
- Monitoring
- Productivity / DevOps
- Realtime



Power BI Execute Queries API

Underperforming Employees - 2021-11-08T17:48:29.2908586Z

This message was sent with Low importance

RR Rui Romano
Mon 08/11/2021 17:48
To: Rui Romano



Underperforming Employees:

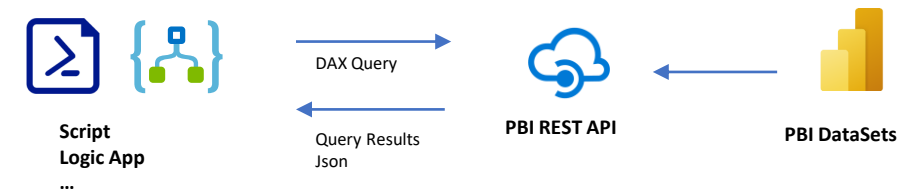
Employee[Employee]	[Sales Amount]	[Sales Qty]	[Sales Profit]	[Sales Amount vs LY]
Amy Trefl	13452	504	6438.5	-0.40562167368842
Anthony Grosse	9257.1	625	4794.6	-0.244139428926031
Hudson Hollinworth	8183.5	608	3677	-0.756427866664087
Sophia Hinton	13960.5	525	7087.25	-0.254320486490384
Archer Lamble	9893.4	523	4950.4	-0.5799034407205

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mirror_mod.use_z = False  
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selection at the end -add  
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= bpy.context.selected_object  
data.objects[one.name].select  
  
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mirror X"  
  
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REST API - Dataset Execute Queries

- The coolest [API](#)! 😊
- Works on Premium & **Shared (PRO)**
- Requirements
 - “Build” permission on the dataset
 - Enable Tenant Setting “Allow XMLA Endpoints and Analyse in Excel with on-premises datasets”
- [Main Limitations](#)
 - Result sets capped to 100k rows
 - No parallel queries

Download: [here](#)



Integration settings

- ✓ **Allow XMLA endpoints and Analyze in Excel with on-premises datasets**
Enabled for the entire organization

Users in the organization can use Excel to view and interact with on-premises Power BI datasets. This also allows connections to XMLA endpoints.

☒ Enabled

Apply to:

☒ The entire organization

☐ Specific security groups

☐ Except specific security groups

Apply

Cancel

```
Windows PowerShell ISE
File Edit View Tools Debug Add-ons Help

1 $requestUrl = "datasets/88f9df14-be84-4473-a3d1-55ac7c8d1ff4/executeQueries"
2
3 $requestBody = @"
4 {
5   "queries":
6   [
7     {
8       "query": "EVALUATE SUMMARIZECOLUMNS(
9         ROLLUPADDTOTOTAL(
10          ROLLUPGROUP('DimCustomer'[LastName], 'DimProduct'[ModelName]), \"IsGrandTotalRowTotal\"
11        ),
12        TREATAS ( { \"Adams\" }, DimCustomer[LastName]),
13        \"SumSalesAmount\", CALCULATE(SUM('FactInternetSales'[SalesAmount]))
14      )
15    ]
16  },
17  \"serializerSettings\": { \"includeNulls\": true }
18 }
19 @\"
20
21 Login-PowerBI
22 $result = Invoke-PowerBIRestMethod -Method Post -Url $requestUrl -Body $requestBody
23 $sparsed = $result | ConvertFrom-Json
24 $sparsed.results[0].tables[0].rows | Format-List
```

DimCustomer[LastName] : Adams
DimProduct[ModelName] : Touring Tire
[IsGrandTotalRowTotal] : False
[SumSalesAmount] : 86.97

DimCustomer[LastName] : Adams
DimProduct[ModelName] : Touring-1000
[IsGrandTotalRowTotal] : False
[SumSalesAmount] : 9936.28

DimCustomer[LastName] : Adams
DimProduct[ModelName] : Touring-3000
[IsGrandTotalRowTotal] : False
[SumSalesAmount] : 1484.7

DimCustomer[LastName] : Adams
DimProduct[ModelName] : Road-350-W
[IsGrandTotalRowTotal] : False
[SumSalesAmount] : 10205.94

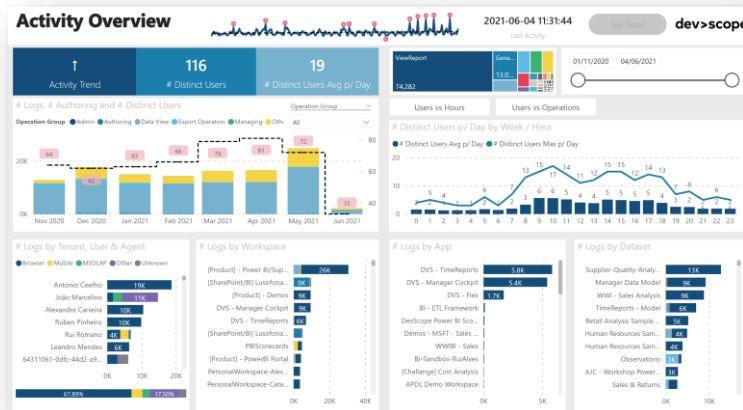
DimCustomer[LastName] : Adams
DimProduct[ModelName] : Road-750
[IsGrandTotalRowTotal] : False
[SumSalesAmount] : 2159.96

DimCustomer[LastName] : Adams
DimProduct[ModelName] : Mountain-400-W

Power BI Monitoring

Full session on the topic
[link](#)

Code & Slides
[link](#)



```
mirror_mod = modifier_ob.  
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mirror_mod.use_z = False  
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```

```
selection at the end -add  
mirror_ob.select= 1  
modifier_ob.select=1  
context.scene.objects.active  
("Selected" + str(modifier.  
mirror_ob.select = 0  
= bpy.context.selected_object  
data.objects[one.name].select  
print("please select exactly
```

OPERATOR CLASSES

```
types.Operator):  
X mirror to the selected  
object.mirror_mirror_x"  
mirror X"
```

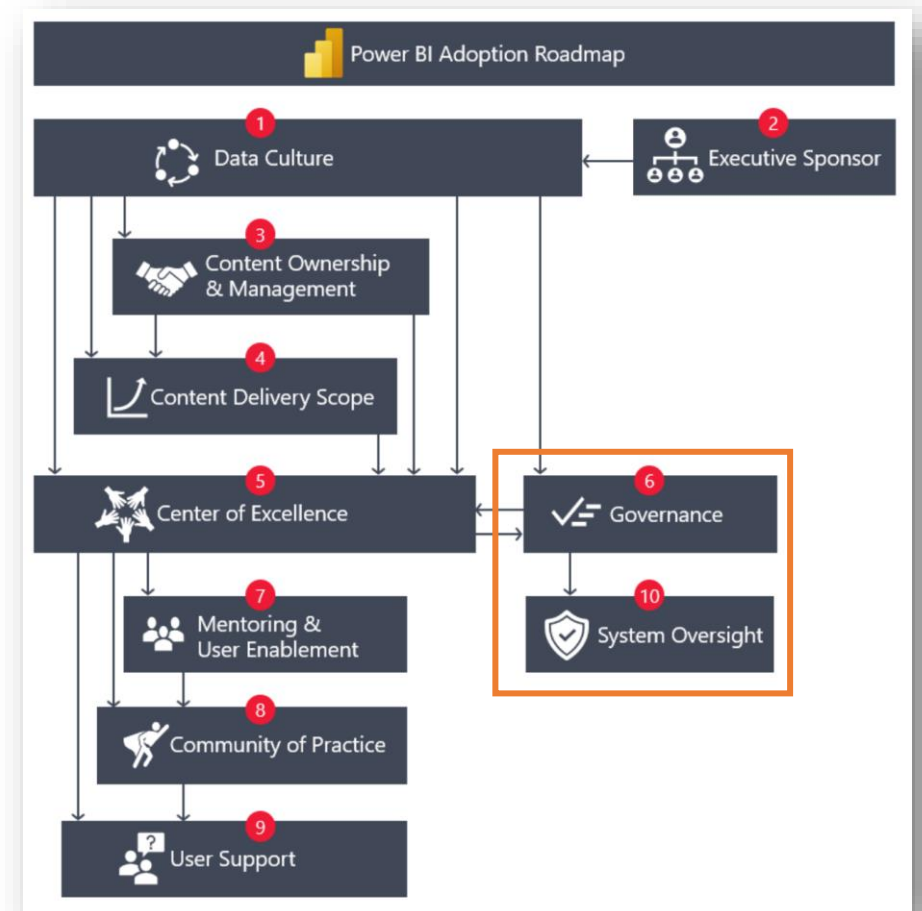
```
context):  
context.active_object is not
```

Why Monitoring?

Power BI Monitoring is one of the pillars for a good Power BI Governance, allows you to:

- Focus on what really matters
- Detect Patterns
- Get Insights on Power BI Usage
- Anticipate Issues

Power BI Adoption Roadmap



How? – Simplest (Easiest)

Data Sources



PBI REST API

- Metadata / Async
- Activity (**30 days**)



Graph API

- Users
- Licenses

Extract



PBI - FetchCatalog.ps1
PBI - FetchDataSetRefresh.ps1



PBI - FetchActivity.ps1



PBI - FetchGraph.ps1



Config.json

TODO

- Encrypt file
- Store secrets in a secure location

Store



Local Folders

- Metadata
- Activity
- Graph

Analyze



Power BI DataSet & Report

How? – Azure (Recommended)

Data Sources



PBI REST API

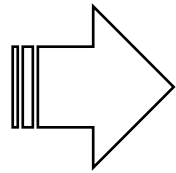
- Metadata / Async
- Activity (**30 days**)



Graph API

- Users
- Licenses

Extract



Azure Function

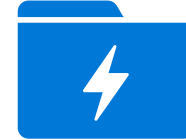


Key Vault



App Insights

Store



Azure Storage

\Metadata
\Activity
\Graph

Analyze



Power BI Report

API's Overview

Scope	Resource	API
Activity	Power BI Activity Logs	Admin API - Activity Events
Power BI Metadata	Workspaces DataSets Reports Dashboards Permissions Schema & Lineage Apps	<ol style="list-style-type: none"> 1. Admin Scan API – GetModifiedWorkspaces 2. Admin Scan API – PostWorkspaceInfo 3. Admin Scan API – GetScanStatus (loop) 4. Admin Scan API – GetScanResult Admin API - GetAppsAsAdmin
	RefreshHistory	Admin API - GetGroupsAsAdmin + Expand DataSets Dataset API - Get Refresh History
Users & Licenses	Users & Licenses	Graph API – Users
	Licenses Details	Graph API – SubscribedSKUs

Productivity

- Rebinding
- Premium Capacity Switch
- Devops

```
mirror_mod = modifier_ob.  
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mirror_mod.use_x = False  
mirror_mod.use_y = True  
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modifier_ob.select=1  
context.scene.objects.active  
("Selected" + str(modifier_ob.  
mirror_ob.select = 0  
= bpy.context.selected_object  
data.objects[one.name].select  
print("please select exactly  
-- OPERATOR CLASSES --  
  
types.Operator):  
X mirror to the selected  
object.mirror_mirror_x"  
mirror X"  
  
context):  
context.active_object is not
```

REST API - Rebind Reports

Why?

Dataset issue/corruption

Minimize user impact on a dataset change / refresh

Azure AS to Premium Migrations

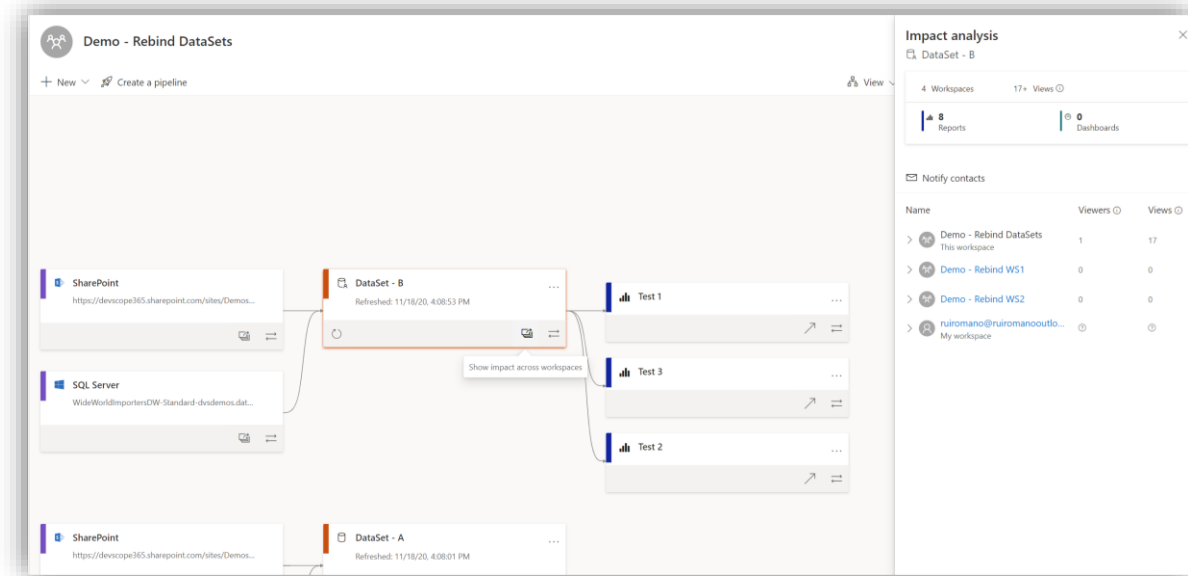
...

Two Approaches:

- Manual - By specifying the reports & datasets to rebind
- Automatic - From one dataset to the other

REST API: [Rebind API](#)

Links: [Automatic Rebind Script](#)



Workspace Premium Capacity Switch

Why?

Need to reassign all workspaces to another capacity:

- Gen 1 to Gen 2 migration
- P Sku <-> A Sku <-> PPU

Please don't do it manually 😊

API's:

- [AssignWorkspacesToCapacity](#)

Download: [here](#)

```
ice-Premium Capacity Switch.ps1 | Report-Rebind-Manual.ps1

#Requires -Modules @{ ModuleName="MicrosoftPowerBIMgmt"; ModuleVersion="1.2.1026" }

cls

$sourceCapacityId = "BEBF8A28-B230-4187-AD24-92FE2ECEAD53" #rrpbiembedtestgen2
$targetCapacityId = "B841DB73-7A03-4349-BE78-2B81C32EC60F" #Premium Per User

$currentPath = (Split-Path $MyInvocation.MyCommand.Definition -Parent)

Connect-PowerBIServiceAccount

Write-Host "Getting workspaces"

# If your tenant has more than 5000 workspaces
$premiumWorkspaces = Invoke-PowerBIRestMethod -url "admin/groups?`$stop=5000&`$filter=isonDedicated"

$sourcePremiumWorkspaces = @($premiumWorkspaces |? {$_ .capacityId -eq $sourceCapacityId})

if ($sourcePremiumWorkspaces.Count -gt 0)
{
    Write-Host "Assigning $($sourcePremiumWorkspaces.Count) workspaces to new capacity '$targetCapacityId'"

    $workspaceIds = @($sourcePremiumWorkspaces.id)

    # Unassign workspaces

    $body = @{
        capacityMigrationAssignments= @( @{
            targetCapacityObjectId = $targetCapacityId;
            workspacesToAssign = $workspaceIds
        } )
    }

    $bodyStr = ConvertTo-Json $body -Depth 3

    Invoke-PowerBIRestMethod -url "admin/capacities/AssignWorkspaces" -method Post -body $bodyStr
}
else
{
    Write-Host "No workspaces on source capacity: '$sourceCapacityId'"
}
```


Power BI & DevOps

If you have Premium 

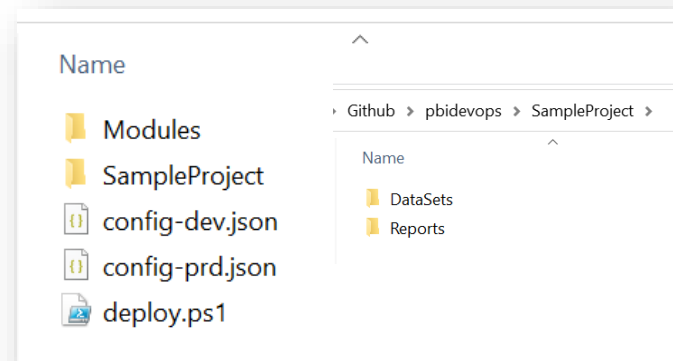
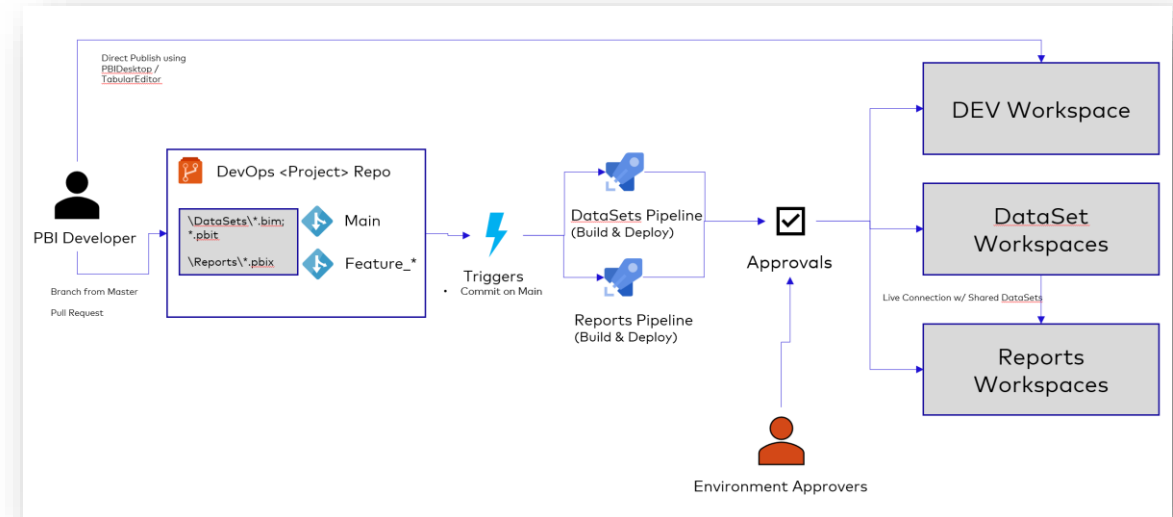
Must Watch: [Daniel Otykier Session](#)

- Azure DevOps
- Tabular Editor
- REST API's

Deployment Pipelines

If you don't have Premium

REST API's & PowerShell to the rescue



```
26
27 Connect-PowerBIServiceAccount
28
29 if ($workspaces)
30 {
31     Publish-PBIWorkspaces -configPath $configPath
32 }
33
34 if ($datasets)
35 {
36     Publish-PBIDataSets -configPath $configPath -path "$path\DataSets"
37 }
38
39 if ($reports)
40 {
41     # README - The live connected PBIX reports need to be binded to an existent Datas
42     Publish-PBIReports -configPath $configPath -path "$path\Reports"
43 }
44
45 if ($paginatedReports)
46 {
47     Publish-PBIReports -configPath $configPath -path "$path\PaginatedReports"
48 }
49
```

Links: [scripts](#)

Realtime w/ REST API's

- Push Datasets
- Streaming Datasets & PowerAutomate

```
mirror_mod = modifier_ob.  
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--- OPERATOR CLASSES ---

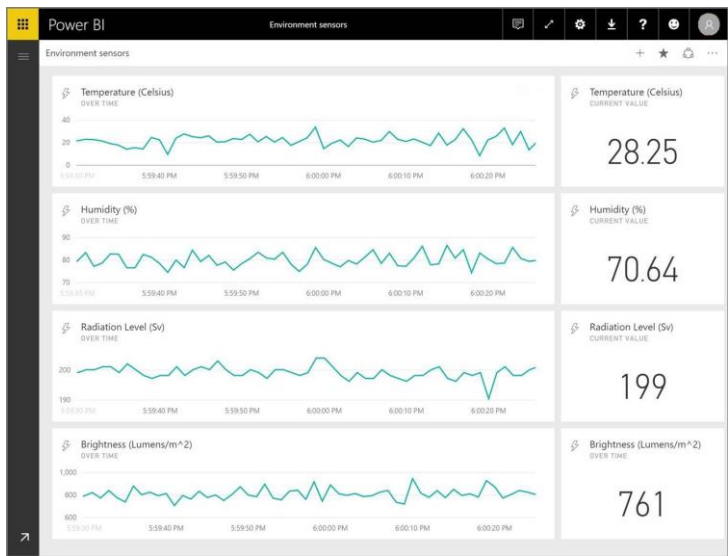
```
types.Operator):  
X mirror to the selected  
object.mirror_mirror_x"  
mirror X"
```

```
context):  
context.active_object is not
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Push Dataset vs Streaming Dataset

Push Dataset	Streaming Dataset
<ul style="list-style-type: none"> Create a complex dataset: multiple tables, measures & relationships Automatically retains history Build Power BI Reports directly ~2-5s realtime Limitations: link 	<ul style="list-style-type: none"> Limited to 1 table Cannot create measures No History, only if “Historic Analysis” is enabled <1s realtime

Capability	Push	Streaming	PubNub
Dashboard tiles update in real-time as data is pushed in	Yes. For visuals built via reports and then pinned to dashboard.	Yes. For custom streaming tiles added directly to the dashboard.	Yes. For custom streaming tiles added directly to the dashboard.
Dashboard tiles update with smooth animations	No.	Yes.	Yes.
Data stored permanently in Power BI for historic analysis	Yes.	No. Data is temporarily stored for one hour to render visuals.	No.
Build Power BI Reports atop the data	Yes.	No.	No.
Max rate of data ingestion.	1 request/s 16 MB/request	5 request/s 15 KB/request	N/A Data is not being pushed into Power BI
Limits on data throughput	1M rows/hour	None.	N/A Data is not being pushed into Power BI



[Real-time streaming in Power BI - Power BI | Microsoft Docs](#)

Download: [here](#)

Thanks!

 @RuiRomano

 <https://www.linkedin.com/in/ruiromano/>

 <https://ruiromanoblog.wordpress.com>