

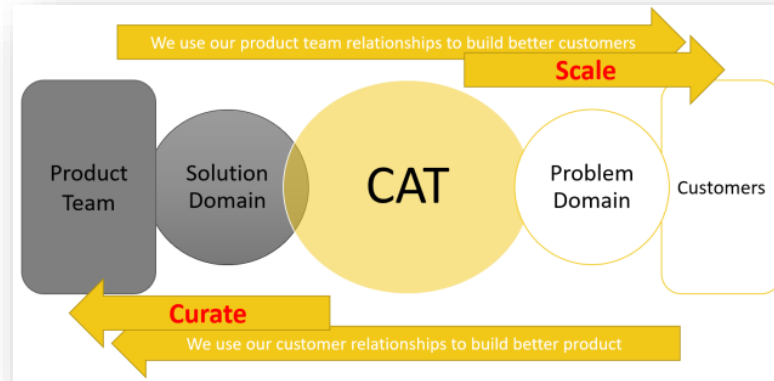


Power BI API 101



Rui Romano

Power BI CAT
Microsoft



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♥ Power BI & Data

 @RuiRomano

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

 <https://ruiromanoblog.wordpress.com>

+15 years working on Microsoft
BI & Data Stack



Slides here:

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

[Recorded Session](#)

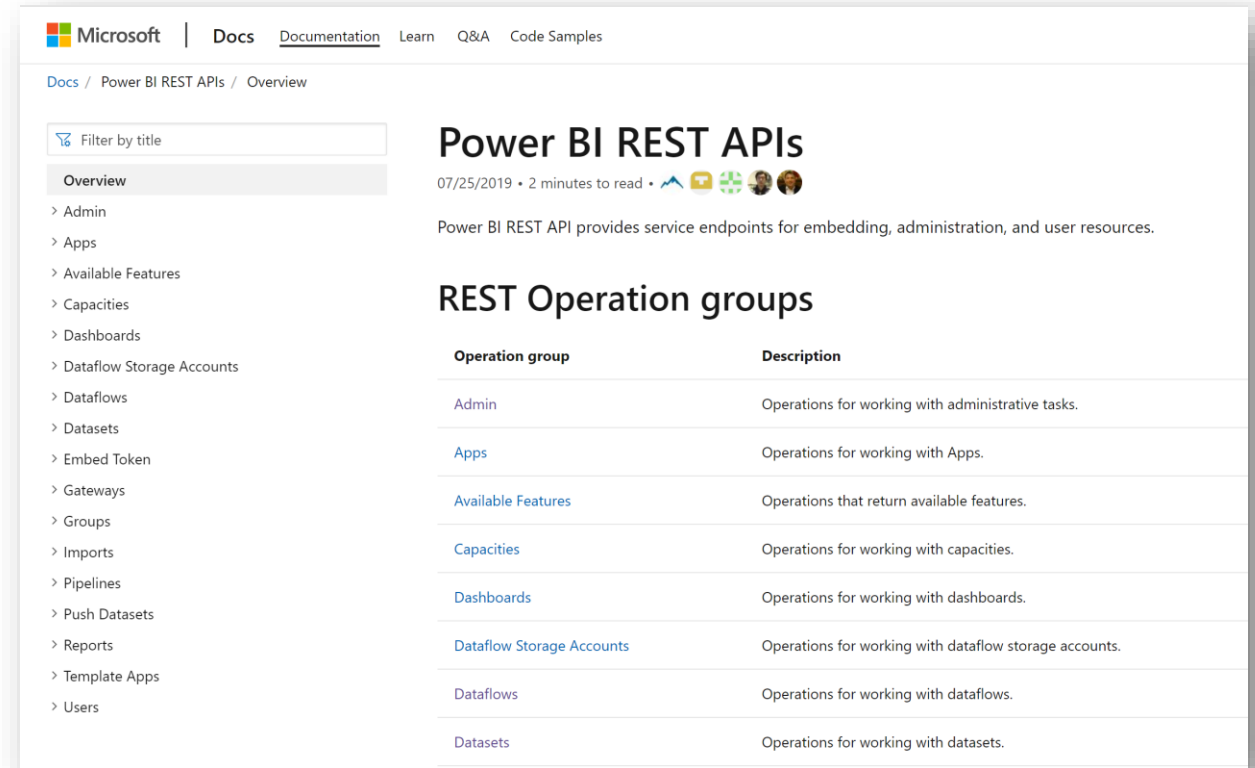
Power BI API 101

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

Power BI REST API's ?

Collection of REST API's for:

- Manage Power BI Content
- Admin Operations
- Automation
- Monitoring
- Real-Time



The screenshot shows the Microsoft Docs page for Power BI REST APIs. The page has a navigation bar with links to Docs, Documentation, Learn, Q&A, and Code Samples. Below the navigation bar, there is a breadcrumb trail: Docs / Power BI REST APIs / Overview. A search bar is present with the text 'Filter by title'. A sidebar on the left lists various topics under the 'Overview' section, including Admin, Apps, Available Features, Capacities, Dashboards, Dataflow Storage Accounts, Dataflows, Datasets, Embed Token, Gateways, Groups, Imports, Pipelines, Push Datasets, Reports, Template Apps, and Users. The main content area is titled 'Power BI REST APIs' and includes a sub-header 'REST Operation groups'. Below this, there is a table with two columns: 'Operation group' and 'Description'. The table lists various operation groups and their descriptions.

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](#)

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:

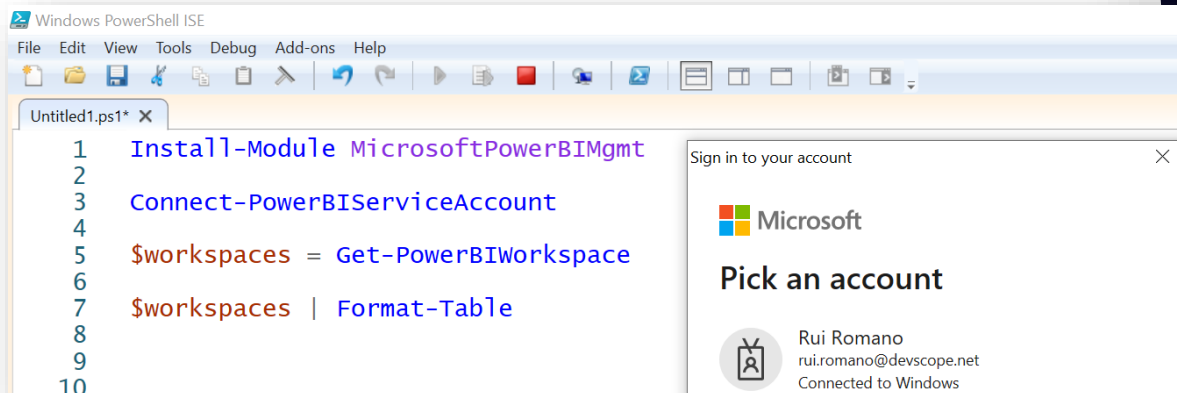
PowerShell – [MicrosoftPowerBIMgmt](#)

Python – [python-power-bi](#)

.Net – [Microsoft.PowerBI.Api](#)

Demo

MicrosoftPowerBIMgmt



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

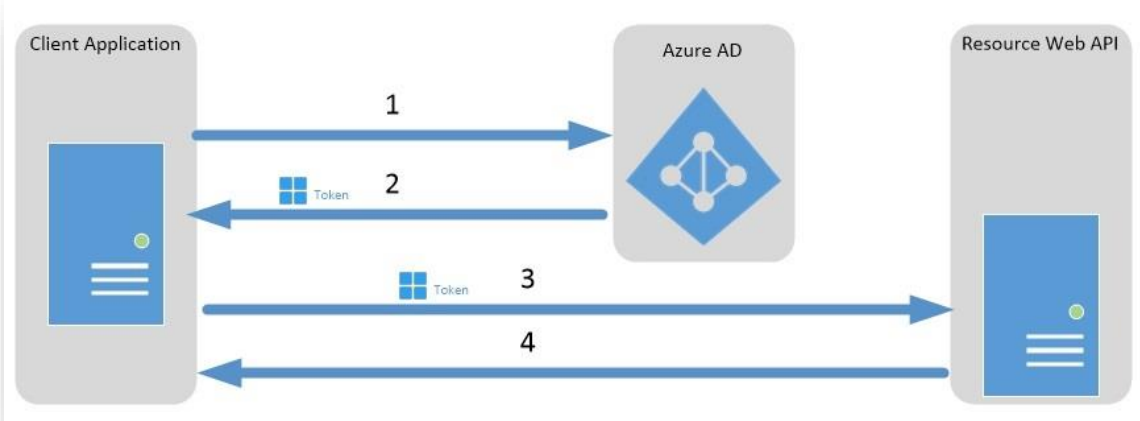
```
1 Install-Module MicrosoftPowerBIMgmt
2
3 Connect-PowerBIServiceAccount
4
5 $workspaces = Get-PowerBIWorkspace
6
7 $workspaces | Format-Table
8
9
10
```

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: Rui Romano, with the email address rui.romano@devscope.net, and a status indicating "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":  
mirror_mod.use_x = False  
mirror_mod.use_y = False  
mirror_mod.use_z = True  
  
selection at the end -add  
mirror_ob.select= 1  
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": "IwOGYzYT1mM2YxOTQ5MGE3YmNmMDFkNTVk",
  "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

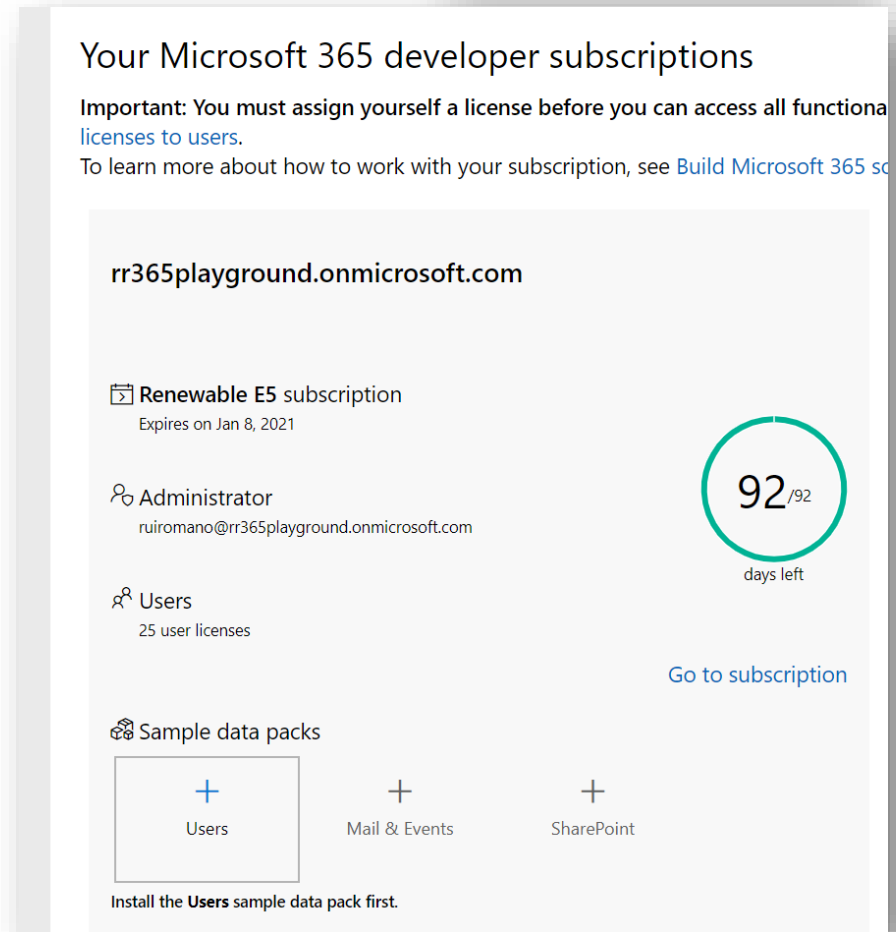
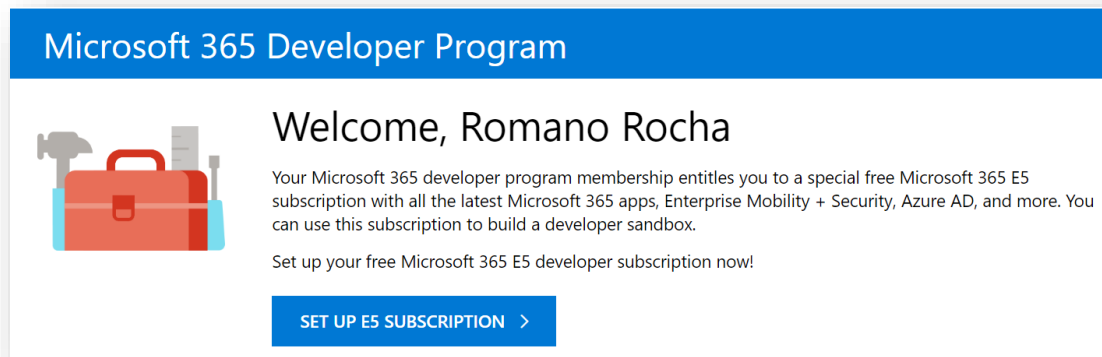
More info: [link](#)

Create your own Power BI Playground

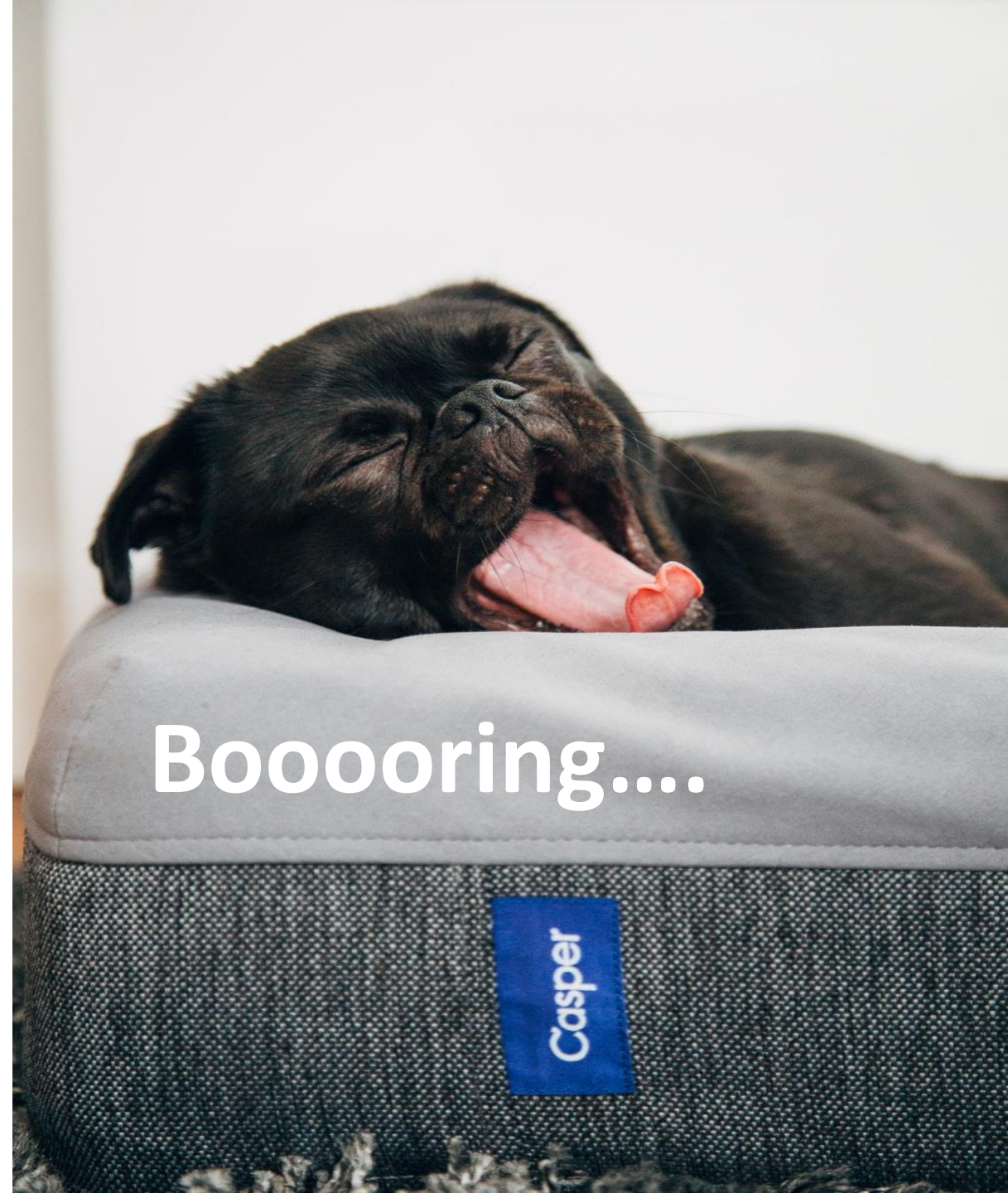
Very useful to try admin features 😊

Create a [365 Developer subscription](#)

- 90 days (renew automatically, if used for DEV)
- 25 Licenses of O365 E5 🧑 (PowerBI, PowerApps, PowerAutomate)
- Full Tenant Control



Scenarios / Demos

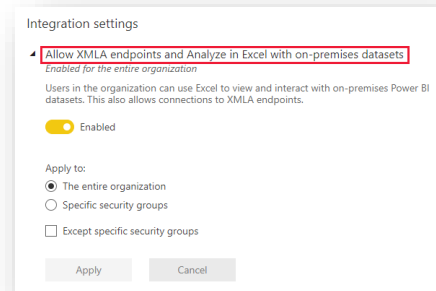
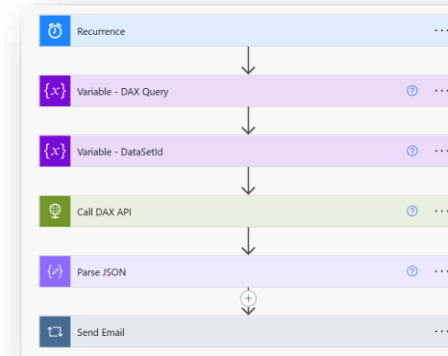
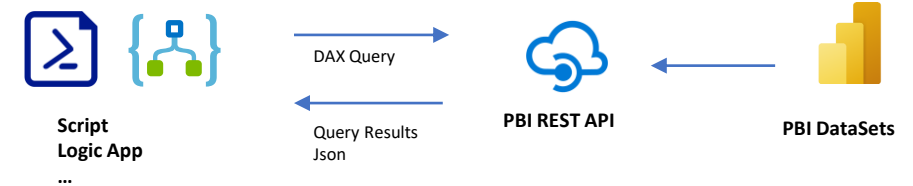


Booooring....

REST API - Dataset Execute Queries

- The coolest [API](#)! 😊
- Useful Scenarios:
 - Data Integration (*limited)
 - Data Quality - [blog post](#)
 - Alerting System using Power BI Data
 - App/Website integrations
- Works on Premium & **Shared (PRO)**
- Requirements
 - “Build” permission on the dataset
 - “Allow XMLA Endpoints and Analyze in Excel”
- [Main Limitations](#)
 - Result sets capped to 100k rows
 - No parallel queries

Script: [execute dax in PS](#)



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

This message was sent with Low importance

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

Employees.csv
555 bytes

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 Lambie	9893.4	523	4950.4	-0.5799034407205

```
Dataset-REST API DAX Query.ps1 > ...
13 $query = "EVALUATE
14
15 VAR p_currentDate = dt"$($date.ToString("yyyy-MM-dd"))"
16
17 return
18     FILTER(
19         SUMMARIZECOLUMNS(
20             'Employee'[Employee],
21             TREATAS((p_currentDate), 'Calendar'[Date]),
22             ""Sales Amount"", [Sales Amount],
23             ""Sales Qty"", [Sales Qty],
24             ""Sales Profit"", [Sales Profit],
25             ""Sales Amount vs LY"", [% Sales Amount vs ly]
26         ),
27         [Sales Amount vs LY] < 0
28     )
29
30 Connect-PowerBIServiceAccount
31
32 $body = @{
33     "queries" = @(
34         @(
35             "query" = $query
36         )
37     );
38     "includeNulls" = $false
39 }
40
41 $bodyStr = $body | ConvertTo-Json
42
43 $result = Invoke-PowerBIRestMethod -url "datasets/$datasetId/executeQueryes" -body $bodyStr
44
45 PROBLEMS OUTPUT TERMINAL DEBUG CONSOLE
46
47 Username : rromano@rmsft.onmicrosoft.com
48
49 Employee[Employee] [Sales Amount] [Sales Qty] [Sales Profit] [Sales Amount vs LY]
50 Amy Trefl 13452 504 6438.5 -0.40562167368842
51 Anthony Grosse 9257.1 625 4794.6 -0.244139428926031
52 Hudson Hollinworth 8183.5 608 3677 -0.756427866664087
53 Sophia Hinton 13960.5 525 7087.25 -0.254320486490384
54 Archer Lambie 9893.4 523 4950.4 -0.5799034407205
```

Async Refresh API's

“Fire & Forget” refresh

Call it from scripts / logic apps / power automate

Great Enhancements

- Auto Retries
- Batched commits

```
# Get running refreshes, only 1 operation is allowed

$refreshes = Invoke-PowerBIRestMethod -url "groups/$workspaceId/datasets/$datasetId/refreshes?$top=10" -method Get | ConvertFrom-Json | select -ExpandProperty value

if (!$refreshes | ? { $_.refreshType -eq "ReliableProcessing" -and $_.status -iin @("Unknown", "InProgress", "notStarted") })
{
    Write-Host "Posting a new Refresh Command"

    Invoke-PowerBIRestMethod -url "groups/$workspaceId/datasets/$datasetId/refreshes" -method Post -Body $executeJsonBody
}

Write-Host "Waiting for refresh to end"

$refreshes = Invoke-PowerBIRestMethod -url "groups/$workspaceId/datasets/$datasetId/refreshes?$top=10" -method Get | ConvertFrom-Json | select -ExpandProperty value

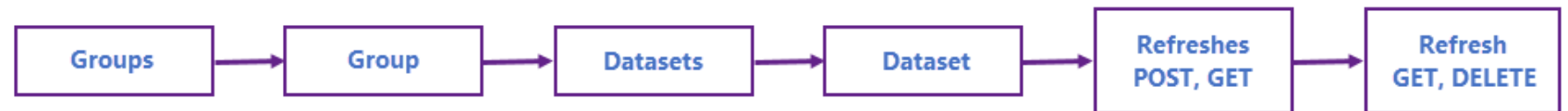
$refreshId = $refreshes[0].requestId

do
{
    $refreshDetails = Invoke-PowerBIRestMethod -url "groups/$workspaceId/datasets/$datasetId/refreshes/$refreshId" -method Get | ConvertFrom-Json

    Write-Host "Status: $($refreshDetails.status)"
    Write-Host "sleeping..."

    Start-Sleep -Seconds 2
}
while($refreshDetails.status -iin @("Unknown", "InProgress", "notStarted"))

Write-Host "Refresh complete: $([((datetime)$refreshDetails.endTime) - ([datetime]$refreshDetails.startTime)).TotalSeconds)s"
```



REST API – Bulk Workspace Delete

Why?

Cleaning demo/dev workspaces

Possible to correlate with Activity Logs

e.g. Delete unused workspaces

```
Workspaces-DeleteAsAdmin.ps1 X
4
5 param(
6     $searchPattern = @("PBIDevOps*", "Test*", "Team A*")
7 )
8
9 $ErrorActionPreference = "Stop"
10 $VerbosePreference = "SilentlyContinue"
11
12 Connect-PowerBIServiceAccount
13
14 $workspaces = Get-PowerBIWorkspace -Scope Organization -All -Filter "tolower(state) eq 'active'"
15
16 $filteredWorkspaces = @(
17     $workspaces |? {
18         $workspaceName = $_.Name
19         $searchPattern |? { $workspaceName -like $_}
20     }
21 )
22
23
24
25
26 if ($filteredWorkspaces.Count -eq 0)
27 {
28     Write-Host "No active workspaces found where Workspace Name like $([string]::join(", ", $searchPattern))"
29 }
30 else
31 {
32     Write-Host "Found '$($filteredWorkspaces.Count)' workspaces"
33     $filteredWorkspaces | Format-Table
34     $confirmation = Read-Host "Are you Sure You Want To Proceed (y)"
35     if ($confirmation -ieq 'y') {
36         foreach($workspace in $filteredWorkspaces)
37         {
38             Write-Host "Deleting Workspace: $($workspace.Name)"
39             Invoke-PowerBIRestMethod -Method Delete -Url "groups/$($workspace.id)"
40         }
41     }
42 }
43
44
45
46
47
48 }
```


Workspace Premium Capacity Switch

Why?

Need to reassign all workspaces to another capacity:

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

If there are many workspaces, 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'"
}
```

REST API - Rebind Reports

Why?

Dataset issue/corruption

Minimize user impact on a dataset change / refresh

Azure AS to Premium Migrations

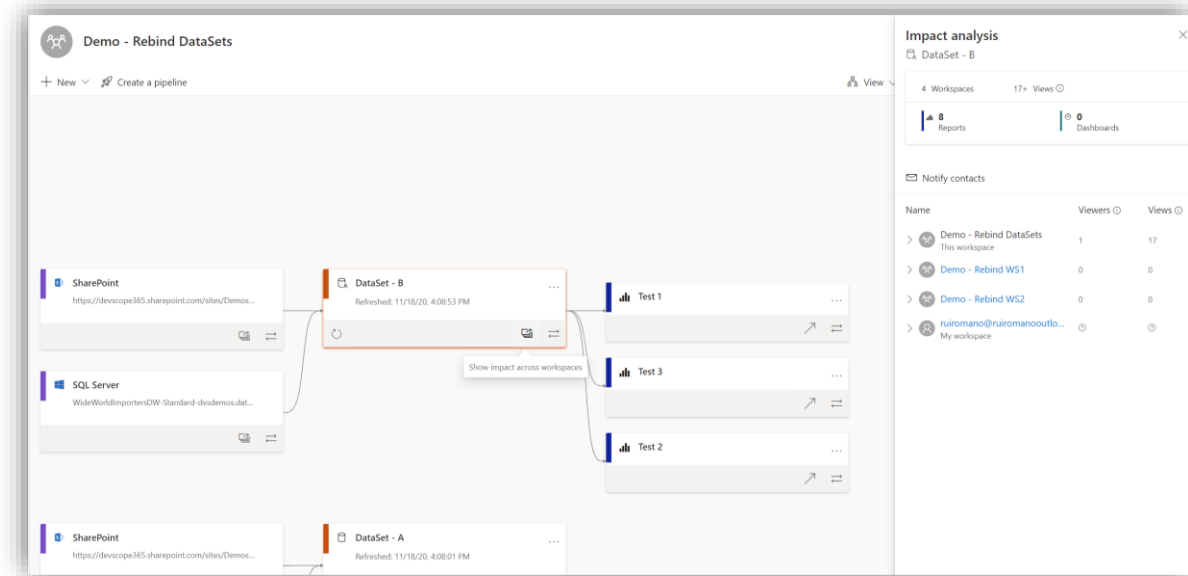
...

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](#)



Power BI Monitoring

Full session on the topic

[link](#)

Code & Slides

[link](#)

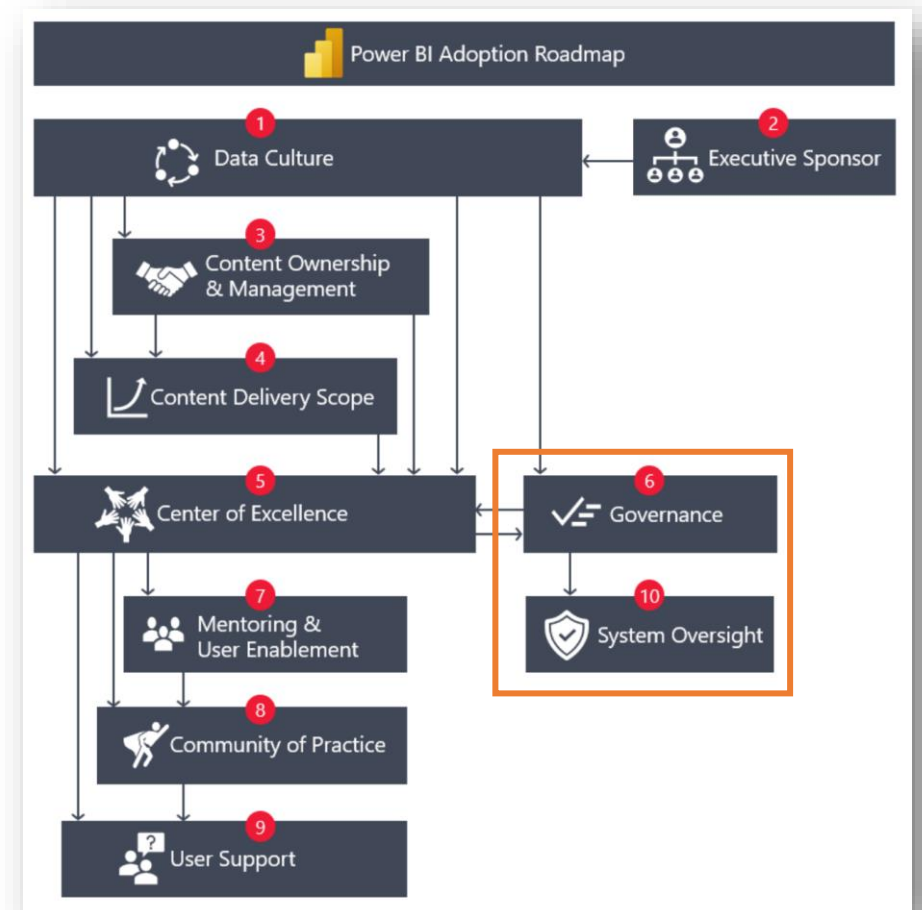


Why Monitoring?

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

- Focus on what really matters
- Detect Patterns & react to them
- Get Insights & Anticipate issues (ex: wrong sharing, non authorized export)
- Enforce guidelines (ex: naming convention)

Power BI Adoption Roadmap



How? – Azure (Recommended)

Data Sources



PBI REST API

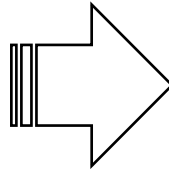
- Metadata / Async
- Activity (**30 days**)



Graph API

- Users
- Licenses

Extract



Azure Function

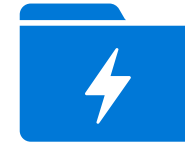


Key Vault



App Insights

Store



Azure Storage

\Metadata
\Activity
\Graph

Analyze



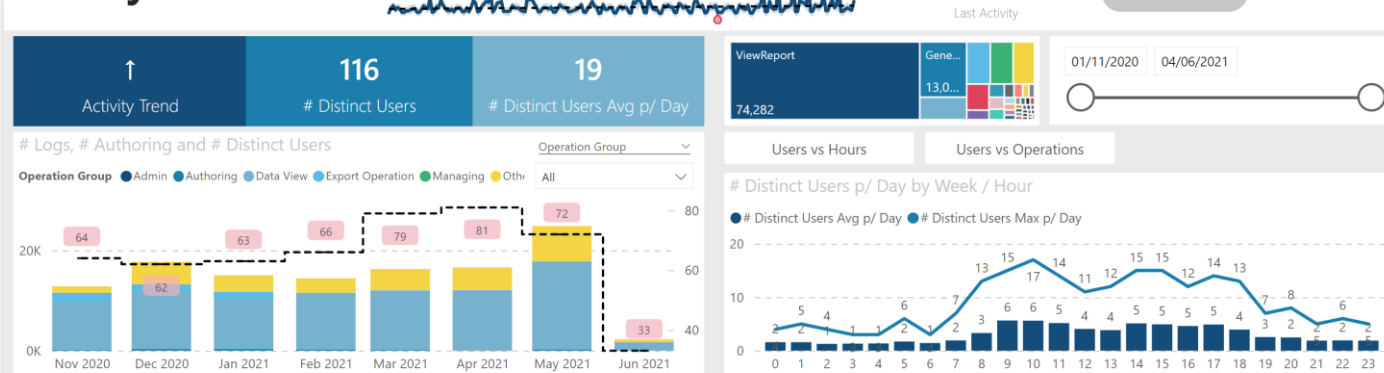
Power BI Report

API's Overview

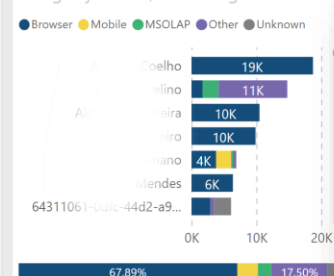
Scope	Resource	API
Activity	Power BI Activity Logs	Admin API - Activity Events
Power BI Metadata	Workspaces DataSets Reports Dashboards Permissions Schema & Lineage Apps	<ol style="list-style-type: none"> 1. Admin Scan API – GetModifiedWorkspaces 2. Admin Scan API – PostWorkspaceInfo 3. Admin Scan API – 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

Power BI Monitoring Reports

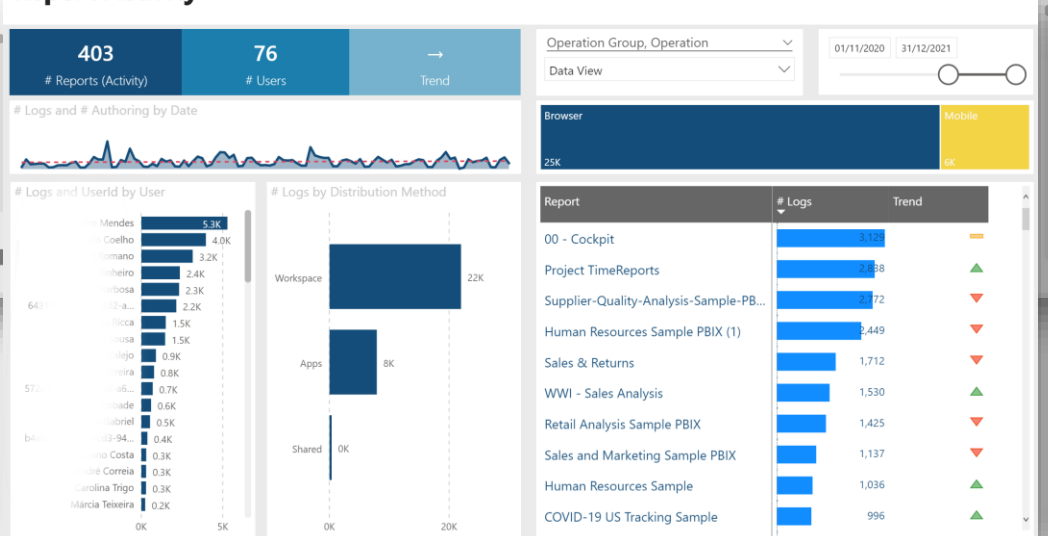
Activity Overview



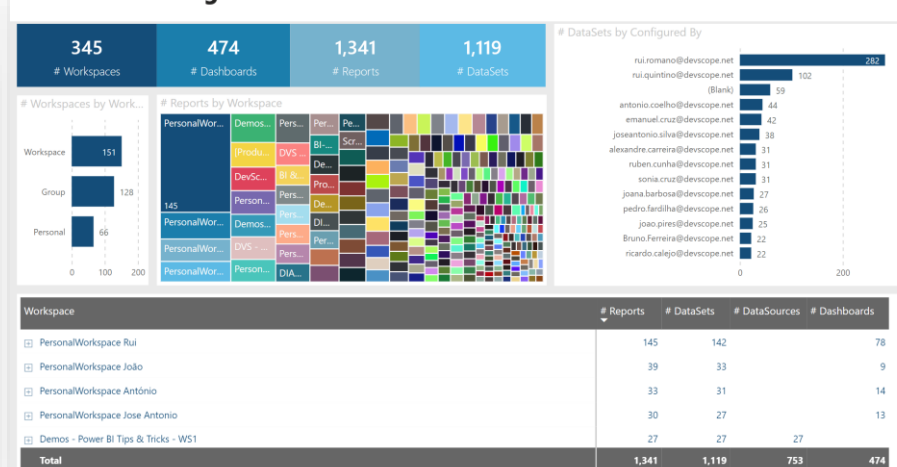
Logs by Tenant, User & Agent



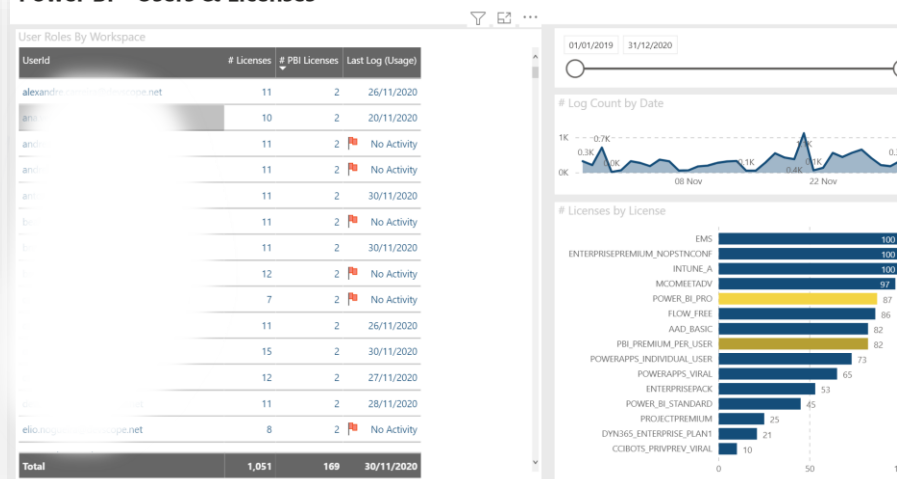
Report Activity



Power BI - Catalog Overview



Power BI - Users & Licenses



Recap

- Learn more about all the [API's available](#)
- Build your own collection of reusable scripts
- Avoid repetitive work! If its hard maybe there is another way to do it...

Thanks!

 @RuiRomano

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

 <https://ruiromanoblog.wordpress.com>