

# Power BI API Extravaganza

2021-09

>>>>>>>>>>>>>

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# Rui Romano


+ 15 years "playing" with data

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#Consultant #PowerBIAddict #DataArchitect  
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 <https://www.meetup.com/Power-BI-Portugal>

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



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# Power BI API Extravaganza

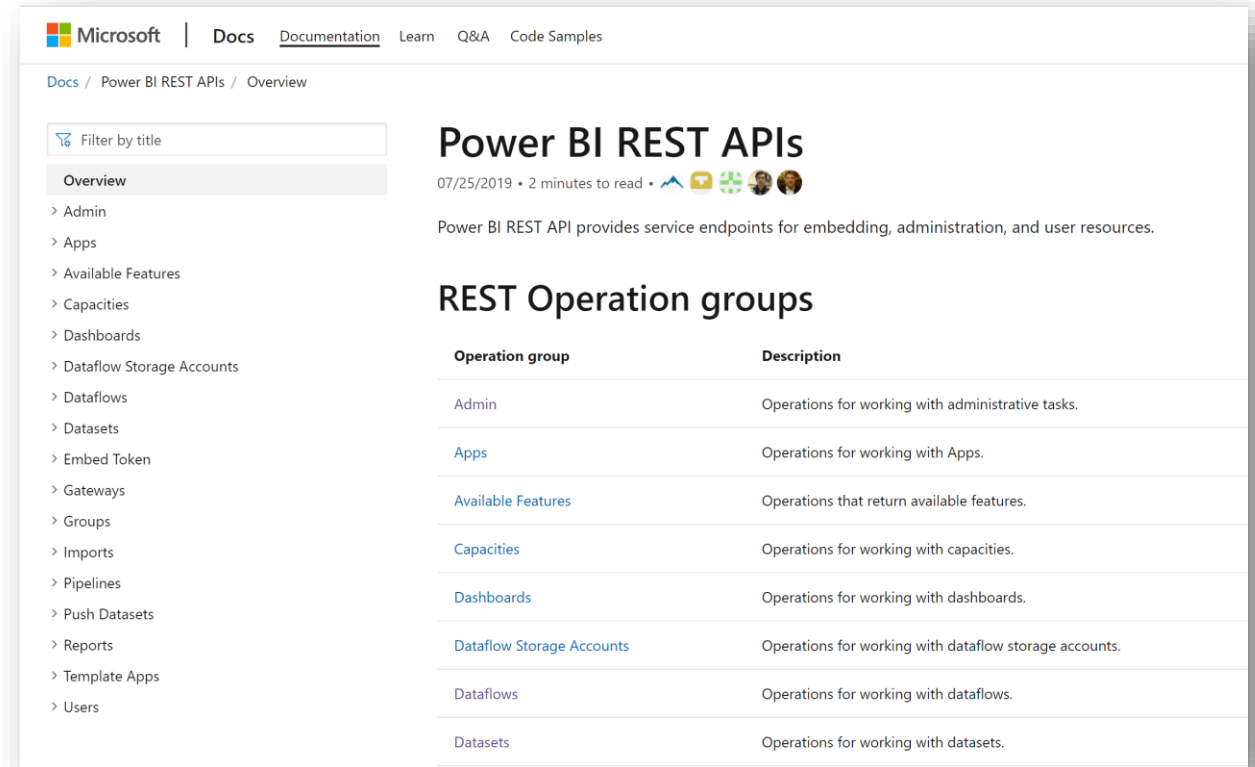
- Not a Power BI Intro!
- 100% focus on the REST API's
- Lots of scripting...
- Fast Paced 😊

*Focus on the possibilities not details...*

# Power BI REST API's

Collection of REST API's for:

- Administration
- Monitoring
- Productivity / DevOps
- Real-Time
- Embedding— Out of Scope 😊



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
<a href="#">Admin</a>	Operations for working with administrative tasks.
<a href="#">Apps</a>	Operations for working with Apps.
<a href="#">Available Features</a>	Operations that return available features.
<a href="#">Capacities</a>	Operations for working with capacities.
<a href="#">Dashboards</a>	Operations for working with dashboards.
<a href="#">Dataflow Storage Accounts</a>	Operations for working with dataflow storage accounts.
<a href="#">Dataflows</a>	Operations for working with dataflows.
<a href="#">Datasets</a>	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}
```

### URI Parameters

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

requestid: 983f107e-a730-498f-b342-a5a218de322e

Body

JSON

Copy

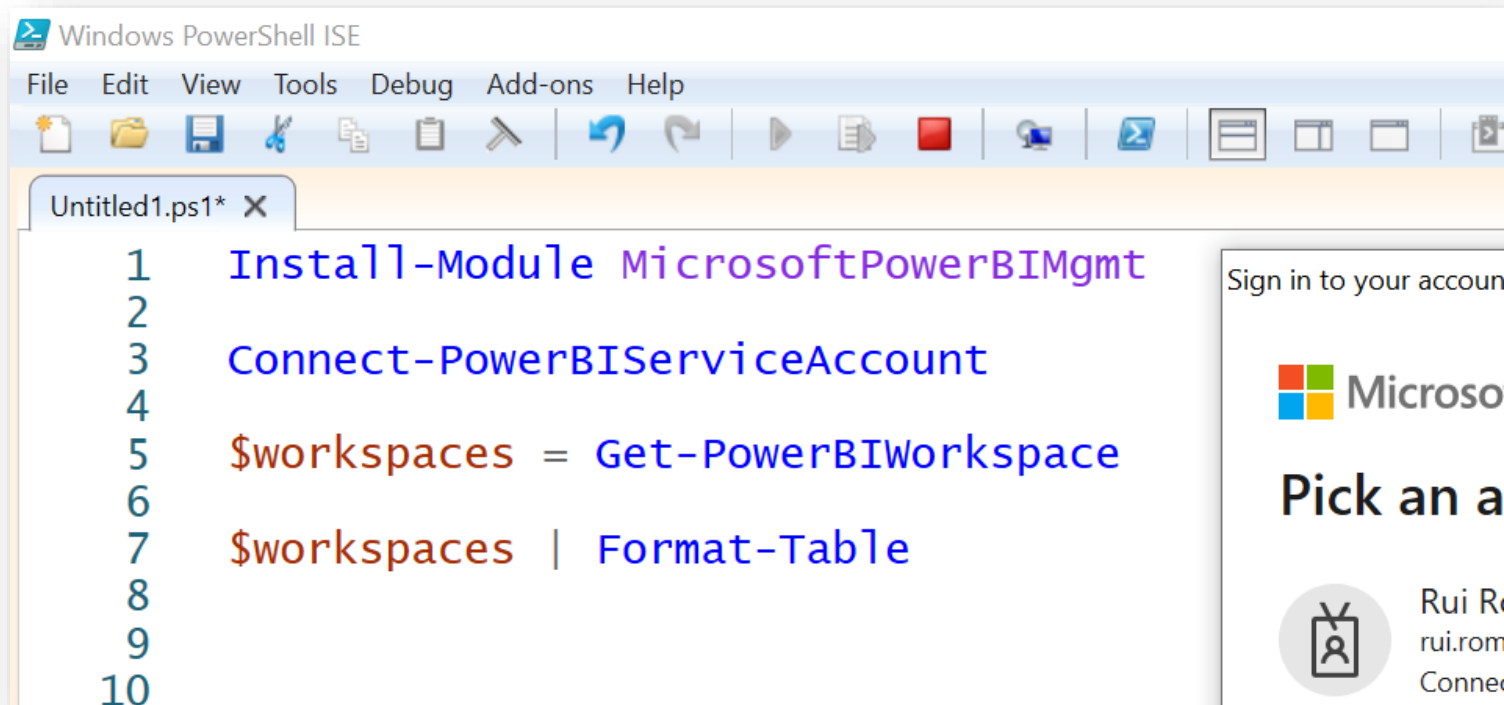
```
{
  "@odata.context": "http://wabi-west-europe-redirect.analysis.windows.net/v1.0/myorg/$metadata#groups",
  "@odata.count": 110,
  "value": [
    {
      "id": "43504e54-e44d-4a5a-bc2f-d3246fc5568a",
      "isReadOnly": false,
      "isOnDedicatedCapacity": false,
      "type": "Group",
      "name": "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)  
Anything 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



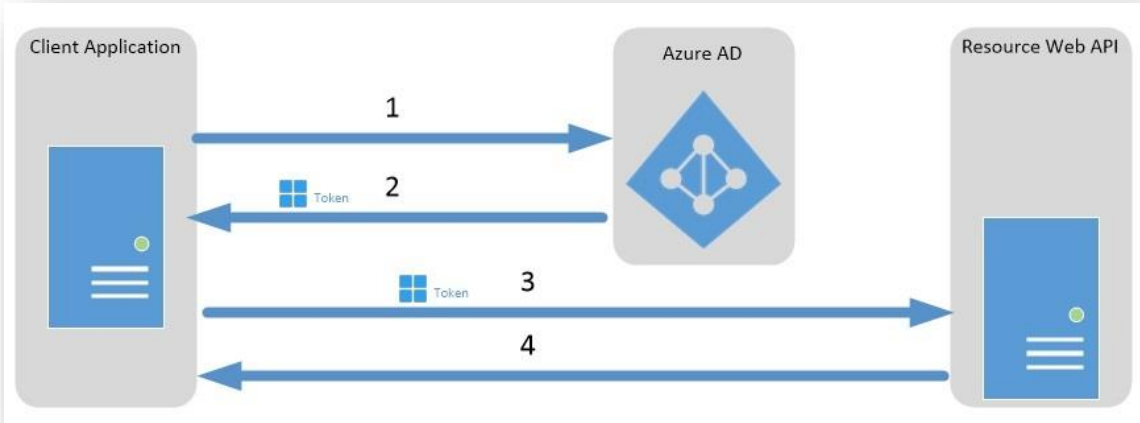
The screenshot shows the Windows PowerShell ISE interface. The menu bar includes File, Edit, View, Tools, Debug, Add-ons, and Help. The toolbar contains icons for file operations and execution. The active window is 'Untitled1.ps1\*'. The script content is as follows:

```
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 sign-in prompt is visible with the text 'Sign in to your account', the Microsoft logo, and the text 'Pick an a'. Below this, a user profile for 'Rui R' is shown with a placeholder icon and the text 'rui.rom' and 'Conne'.

# API Authentication

- OAuth 2.0
- Authentication Flows:



Authentication Flow	Interactive	Requirements
<a href="#">Client Credentials</a> (Recommended)	No	Azure AD Service Principal
<a href="#">Auth Code</a>	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)

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

More info: [link](#)

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## Scenarios / Demos

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



# Power BI DAX Query API



# REST API - Dataset Execute Queries

- The coolest [API](#)! 😊
- Works on Premium & **Shared (PRO)**

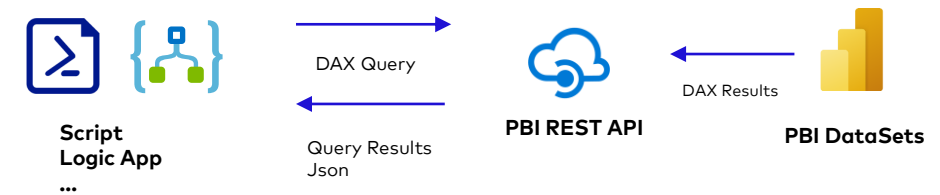
- Requirements

“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



## Integration settings

- ✓ **Allow XMLA endpoints and Analyse 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

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

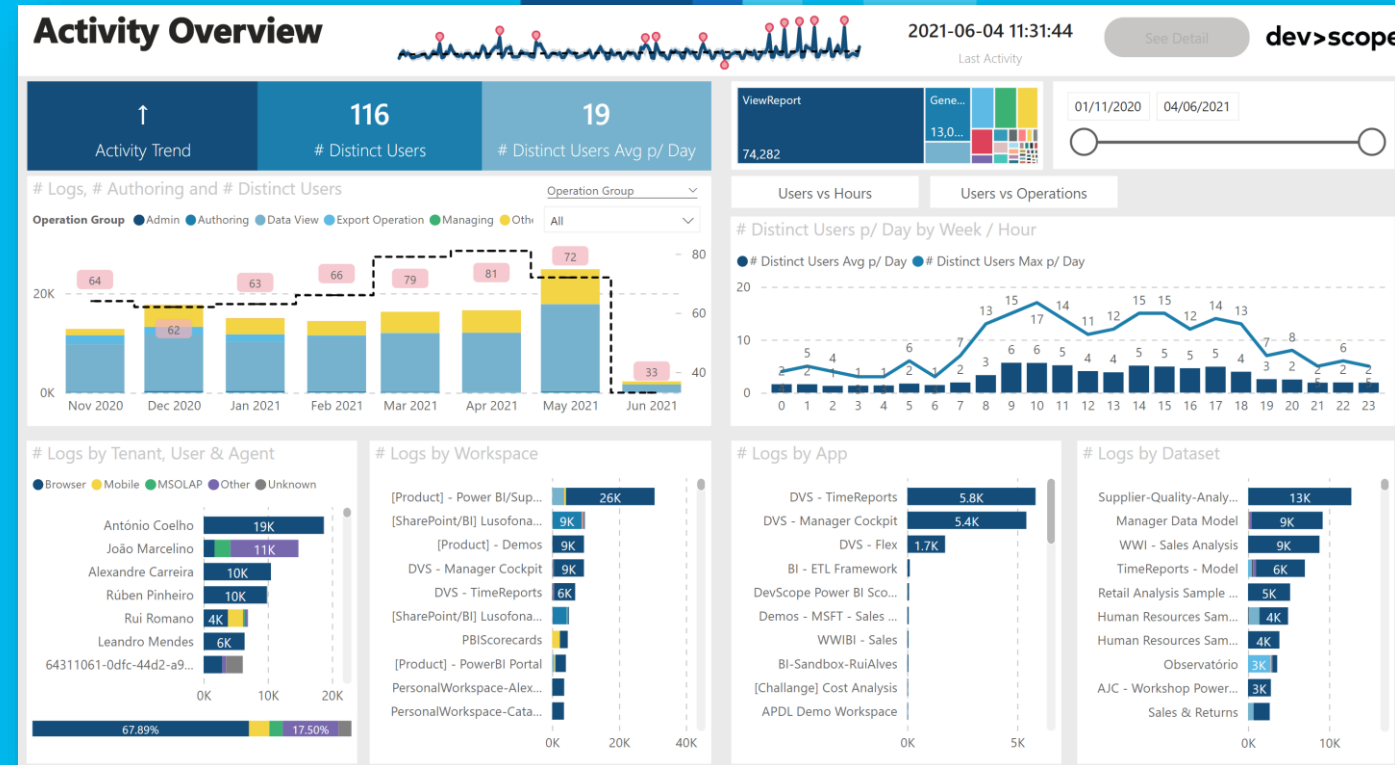
The screenshot shows a Windows PowerShell ISE window with a script that sends a DAX query to a Power BI dataset via the REST API. The script uses the `Invoke-PowerBIRestMethod` cmdlet to send a POST request. The response is converted from JSON and formatted as a table. The output shows a table with columns `DimCustomer[LastName]` and `DimProduct[ModelName]`, and rows for 'Adams' with various product models and their sales amounts.

Download: [here](#)

# Power BI Monitoring

Full session on the topic  
[link](#)

Code & Slides  
[link](#)

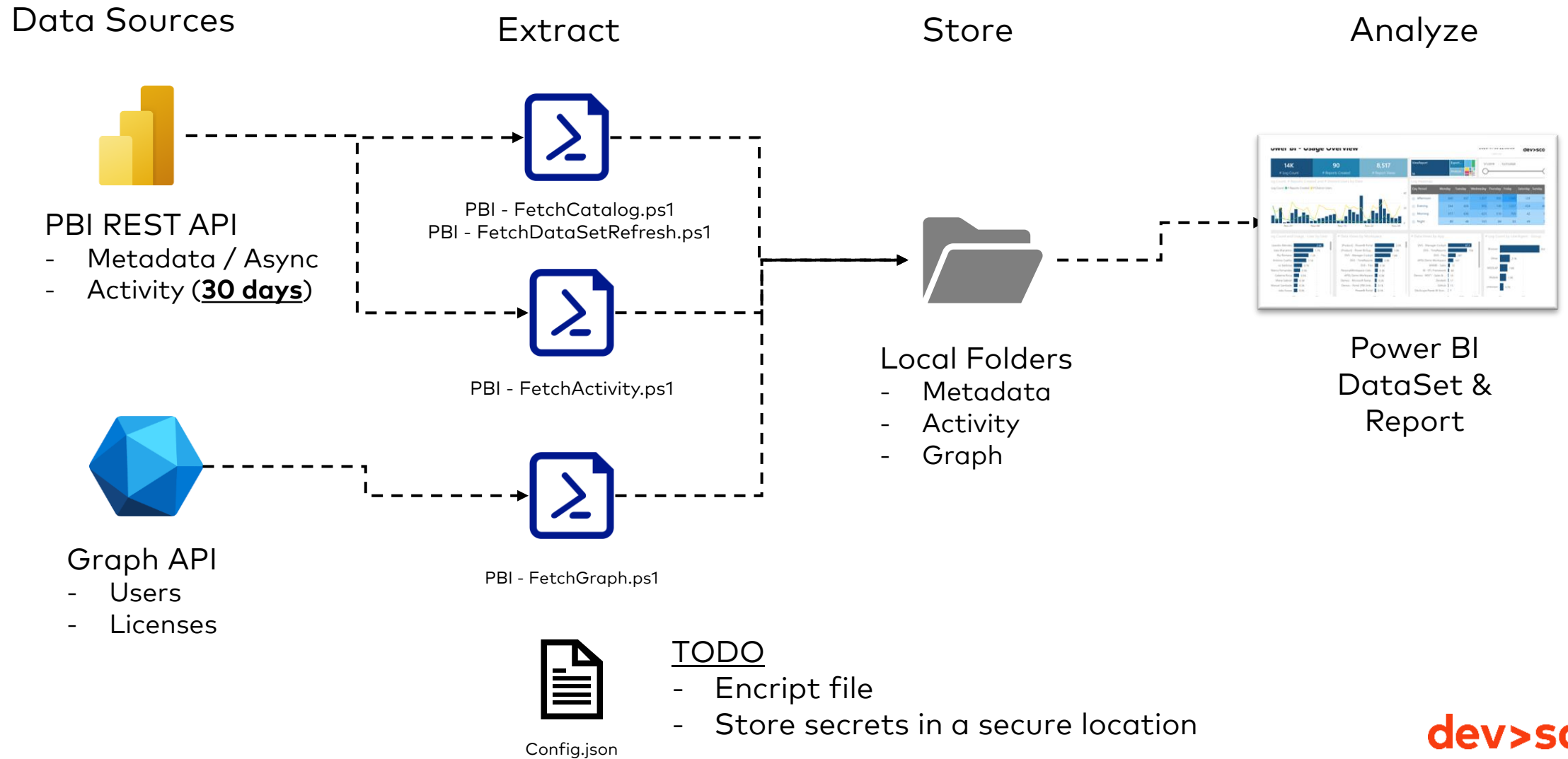


# Can you answer these questions?

- Who are most active users?
- Which Reports/Workspaces/Datasets/Apps are mostly used?
- Are Personal Workspaces being used? How is content being shared?
- Do your users access from Browser/Mobile/Excel? Which browser?
- Top used DataSource's? FileSystem/OneDrive? SQL? Sharepoint? DataLake?
- How many **distinct users**? Per Month? Per day? Per hour?
- DataSets Refreshing trends/average/errors?
- DataSets/Reports not used in more than 1 year?
- How many users with license don't use Power BI in more than 3 months?
- Are developers following Dataset naming conventions?



# Architecture



# Architecture – Recommended (one of many possibilities)

## Data Sources



### PBI REST API

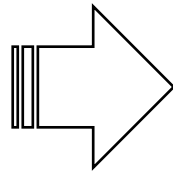
- Metadata / Async
- Activity



### Graph API

- Users
- Licenses

## Extract



### Azure Function

- Fetch Activity
- Fetch Metadata
- Fetch Users & Licenses

OR



### Azure Data Factory

- See Just Blindbæk [blog](#)

## Store



### Azure Storage

- \Metadata
- \Activity
- \Graph

## Analyze



### Power BI Report



Key Vault

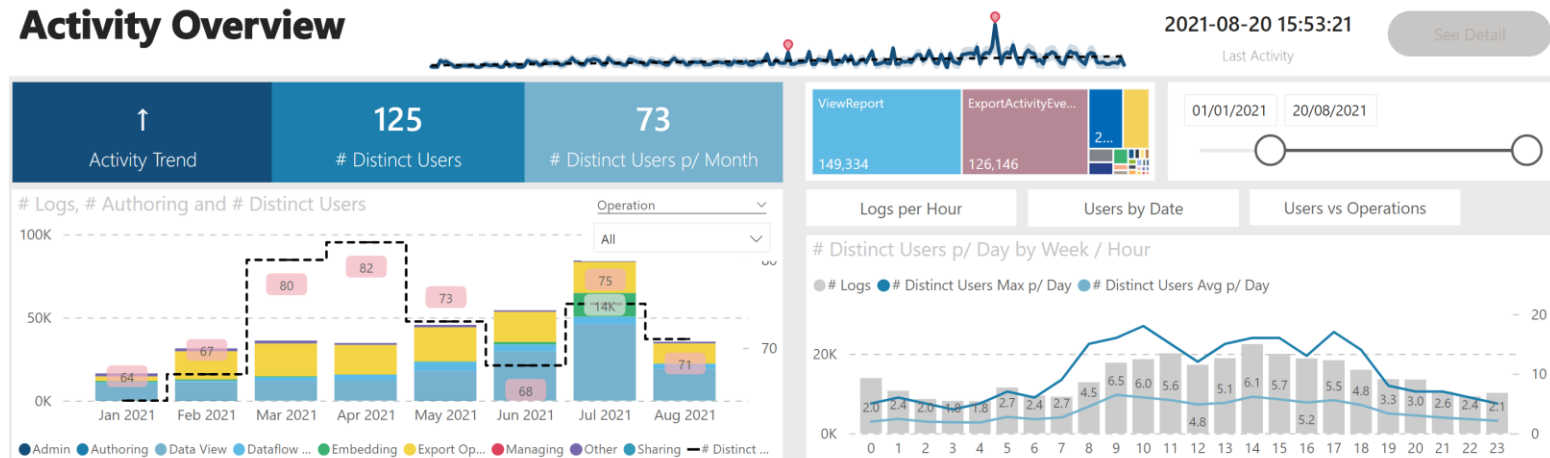


App Insights

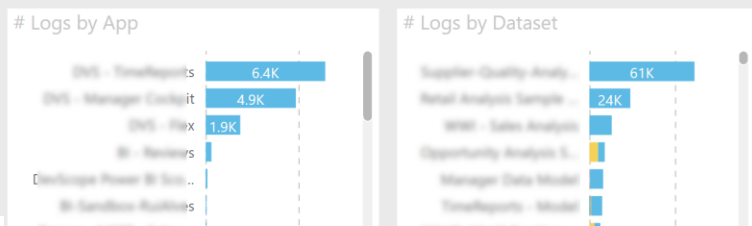
dev>scope

# Power BI Monitor Reports

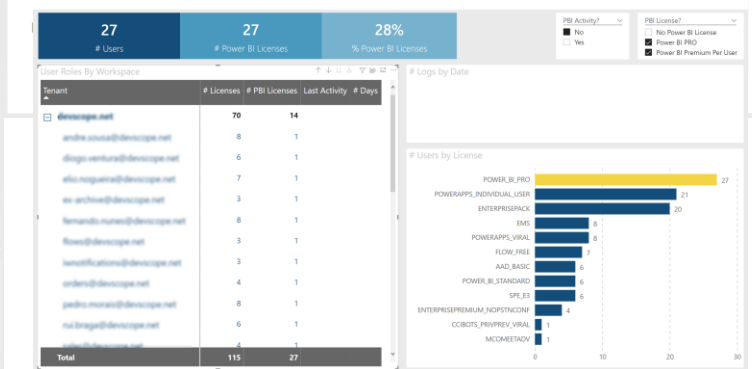
## Activity Overview



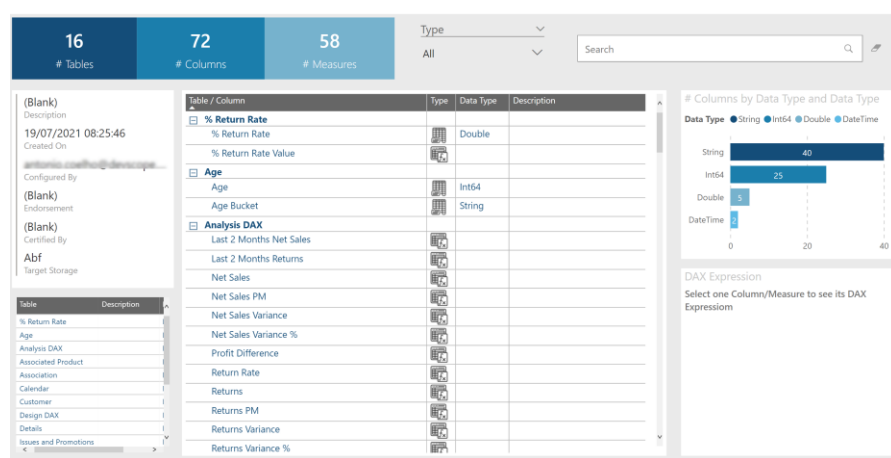
## Catalog Overview



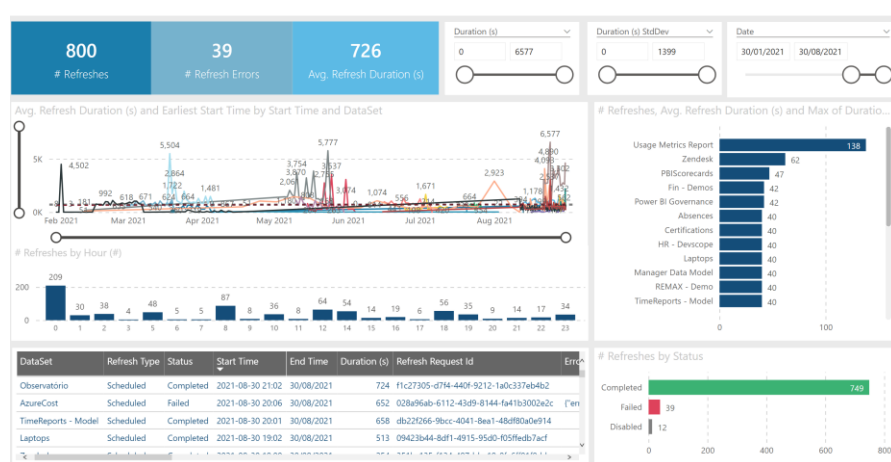
## Users & Licenses



## DataSet Schema



## DataSets Refresh



# API's Overview

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

## Productivity / DevOps



# REST API - Rebind Reports

## Why?

Dataset issue/corruption

Minimize user impact on a dataset change / refresh

Azure AS to Premium Migrations

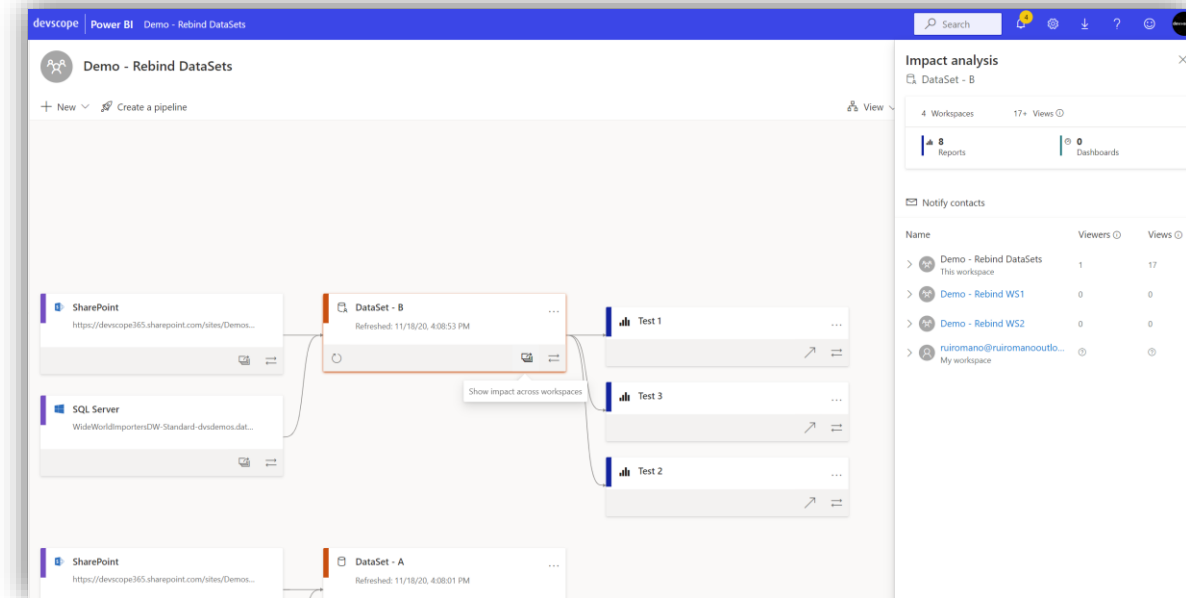
...

## 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](#)





# REST API – Power BI DevOps

If you have Premium 

Must Watch: [Daniel Otykier Session](#)

Azure DevOps

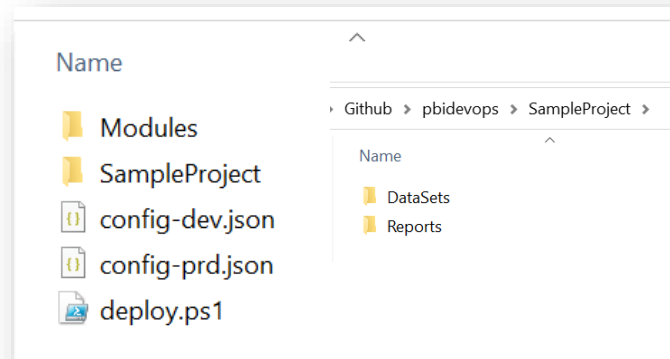
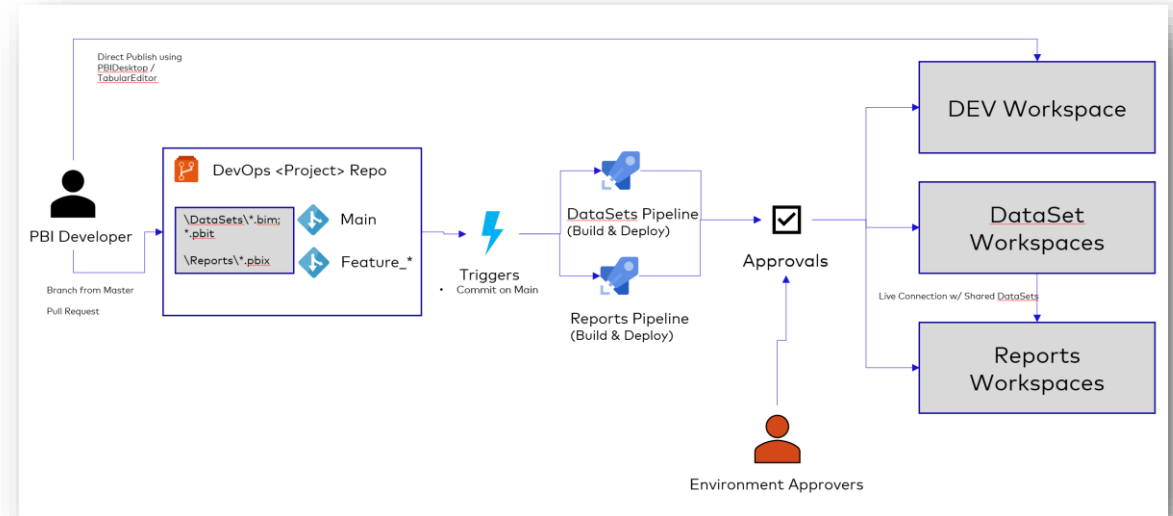
Tabular Editor

REST API's

Deployment Pipelines

If you don't have Premium

REST API's & PowerShell to the rescue



```
1 #Requires -Modules @{ ModuleName="MicrosoftPowerBIMgmt"; ModuleVersion="1.2.1026" }
2
3 $VerbosePreference = "SilentlyContinue"
4 $ErrorActionPreference = "Stop"
5
6 $currentPath = (Split-Path $MyInvocation.MyCommand.Definition -Parent)
7
8 Import-Module "$currentPath\Modules\PBIDevOps" -Force
9
10 $configPath = "$currentPath\config-prd.json"
11
12 Connect-PowerBIServiceAccount
13
14 # Deploy Workspaces
15
16 Publish-PBIWorkspaces -configPath $configPath
17
18 # Deploy Datasets
19
20 Publish-PBIDataSets -configPath $configPath -path "$currentPath\SampleProject\DataSets"
21
22 # Deploy Reports
23
24 Publish-PBIReports -configPath $configPath -path "$currentPath\SampleProject\Reports"
```

Links: [scripts](#)

# 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](#)

```
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'"
}
```

## Realtime w/ REST API's



# Push Dataset vs Streaming Dataset

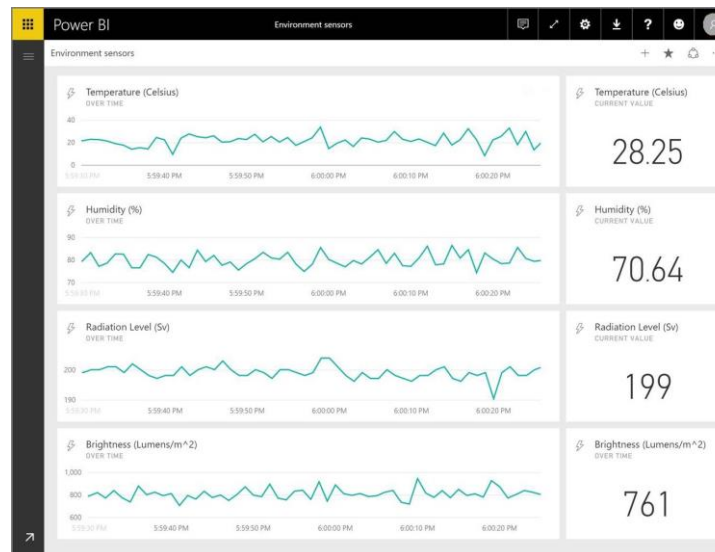
## Push Dataset

- Create a complex dataset: multiple tables, measures & relationships
- Automatically retains history
- Build Power BI Reports directly
- ~2-5s realtime
- Limitations: [link](#)

## Streaming Dataset

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



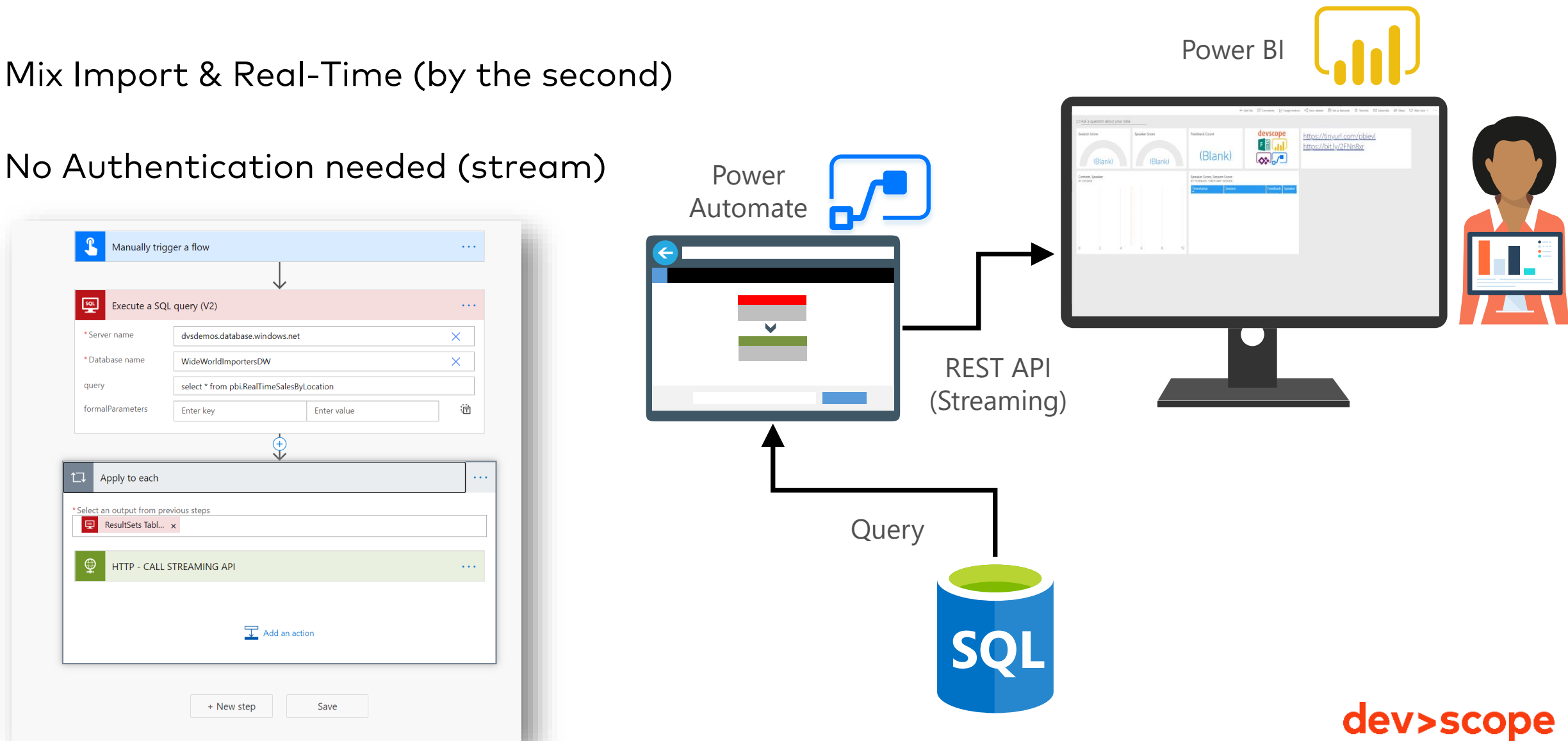
[Real-time streaming in Power BI - Power BI | Microsoft Docs](#)

Download: [here](#)

# PowerAutomate & PBI Streaming REST API

Mix Import & Real-Time (by the second)

No Authentication needed (stream)



## Rui Romano

- ❖ [linkedin.com/in/ruiromano](https://www.linkedin.com/in/ruiromano)
- ❖ [@ruiromano](https://twitter.com/ruiromano)
- ❖ <https://ruiromanoblog.wordpress.com>
- ❖ <https://github.com/RuiRomano>

# Thanks!



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