

Power BI API Extravaganza

2021-08

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Rui Romano

+ 15 years "playing" with data

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#DataArchitect #DataEngineer #PowerBIAddict
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in <https://www.linkedin.com/in/ruiromano/>

🌐 <https://ruiromanoblog.wordpress.com>

🍷 <https://www.meetup.com/Power-BI-Portugal>

🐙 <https://github.com/RuiRomano/>





Power BI API Extravaganza

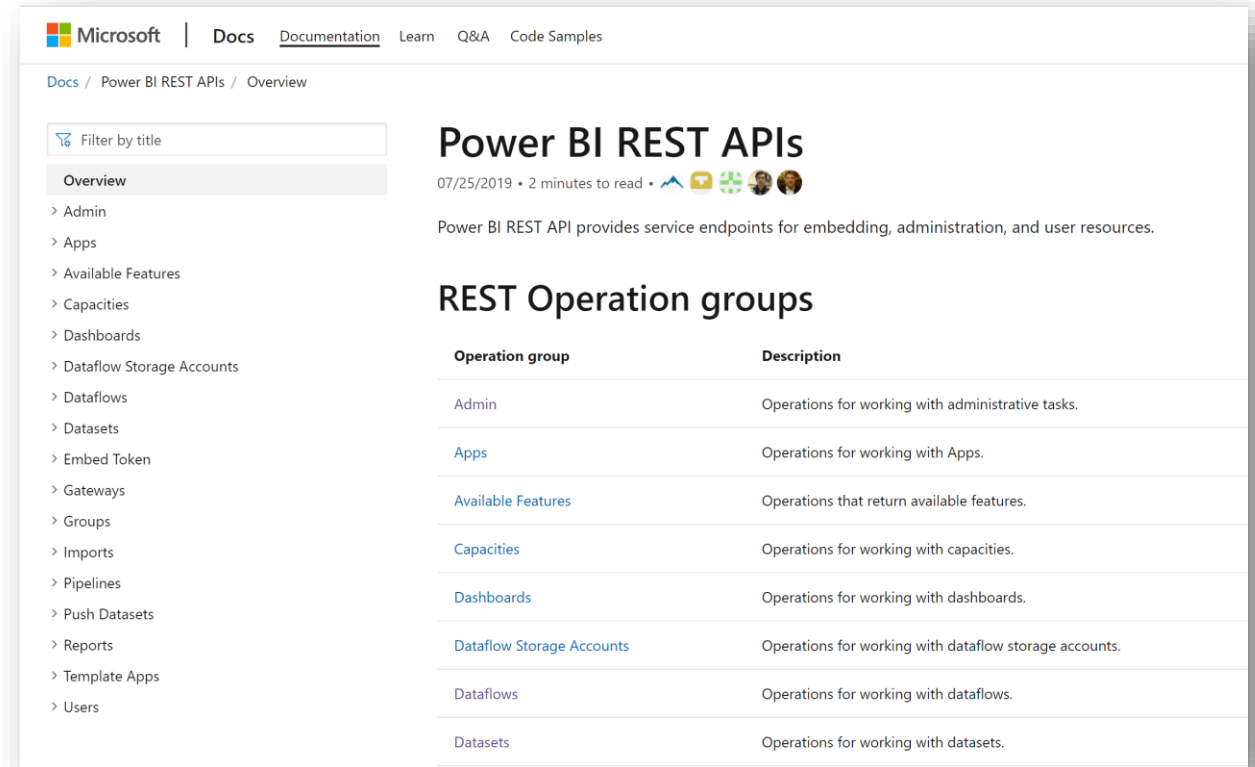
- Not a Power BI Intro!
- 100% focus on the REST API's
- Lots of powershell...
- Fast Paced 😊

Focus on the possibilities not details...

Power BI REST API's

Collection of REST API's for:

- Administration
- Monitoring
- Productivity / DevOps
- Real-Time
- Embedding— 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
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}
```

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-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"
    }
  ]
}
```

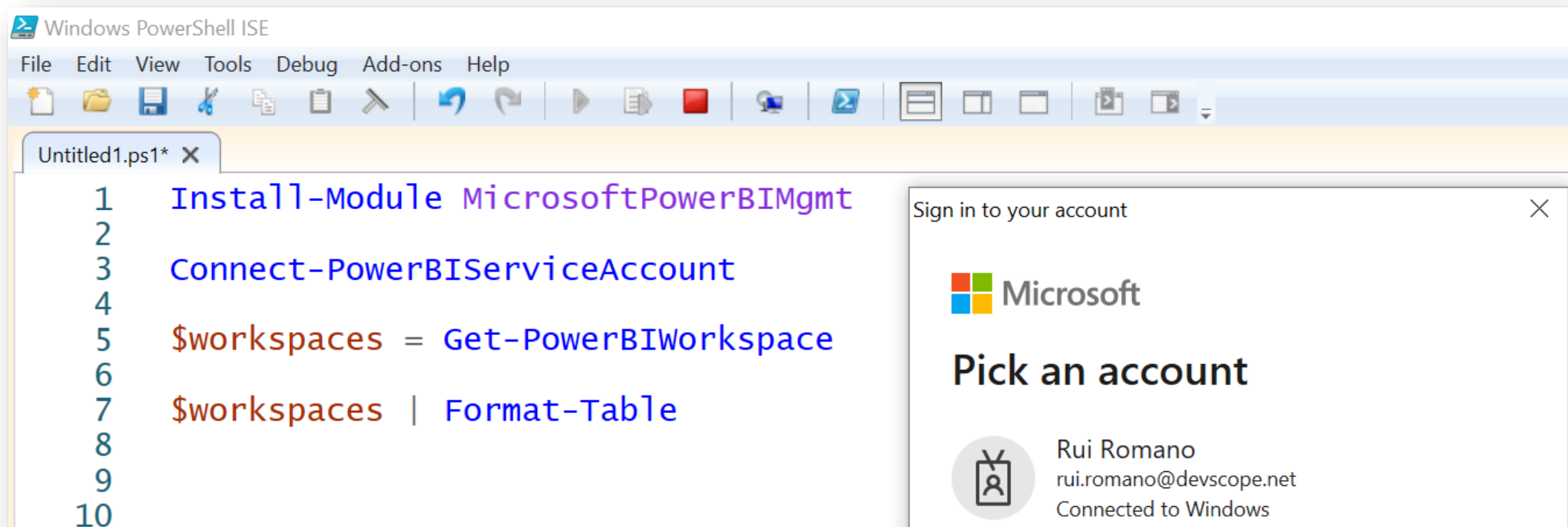
31/08/2021

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How can I work with the API's?

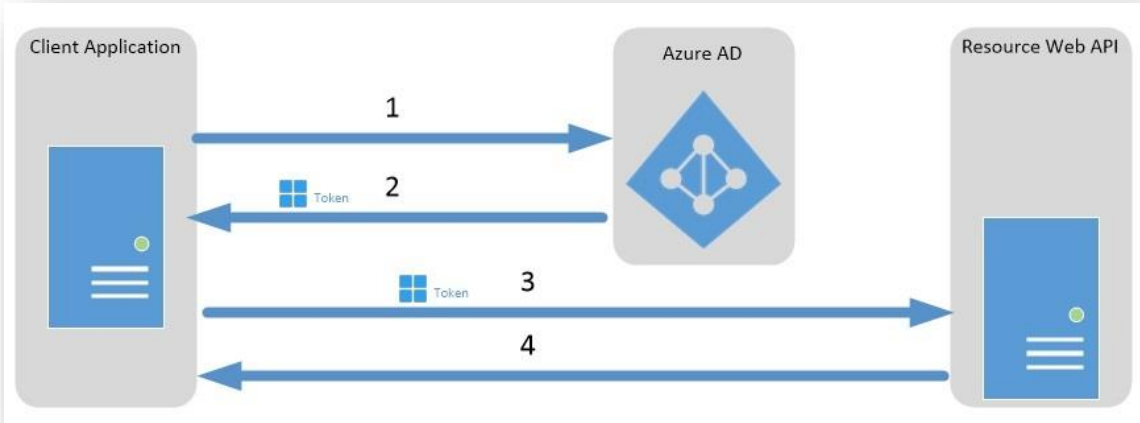
- If possible, use a Service Principal
- You need to be comfortable with code/script/automation (power automate)
Any language that can make an HTTP request is compatible: .Net, PowerShell, Python,...
- There are multiple libraries/packages available:
PowerShell – [MicrosoftPowerBIMgmt](#), [PowerBIPS](#)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

Demo MicrosoftPowerBIMgmt



API Authentication

- OAuth 2.0
- Authentication Flows:



Authentication Flow	Interactive	Requirements
Client Credentials (Recommended)	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": "IwOGYzYTlmM2YxOTQ5MGE3YmNmMDFkNTVk",
  "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)**

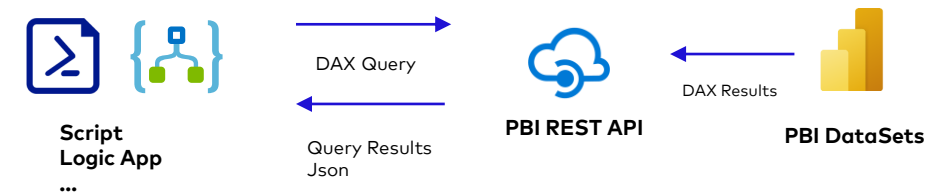
- Requirements

“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

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

A:\executequeries.ps1 X
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
```

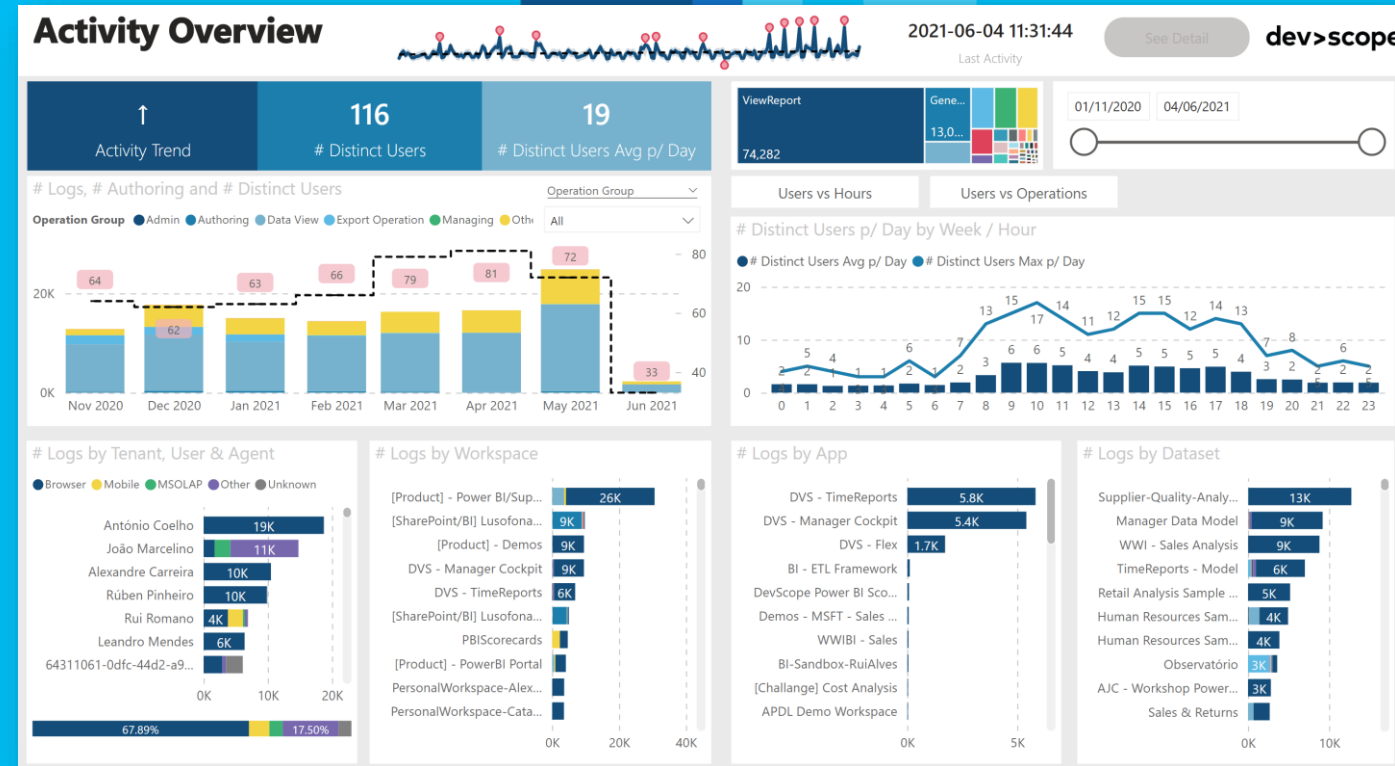
The screenshot shows a PowerShell script that sends a DAX query to the PBI REST API. The query is designed to calculate the sum of sales for a specific customer (Adams) across different product models. The output of the script is a list of rows from the query results, showing columns like DimCustomer[LastName], DimProduct[ModelName], IsGrandTotalRowTotal, and SumSalesAmount.

Download: [here](#)

Power BI Monitoring

Full session on the topic
[link](#)

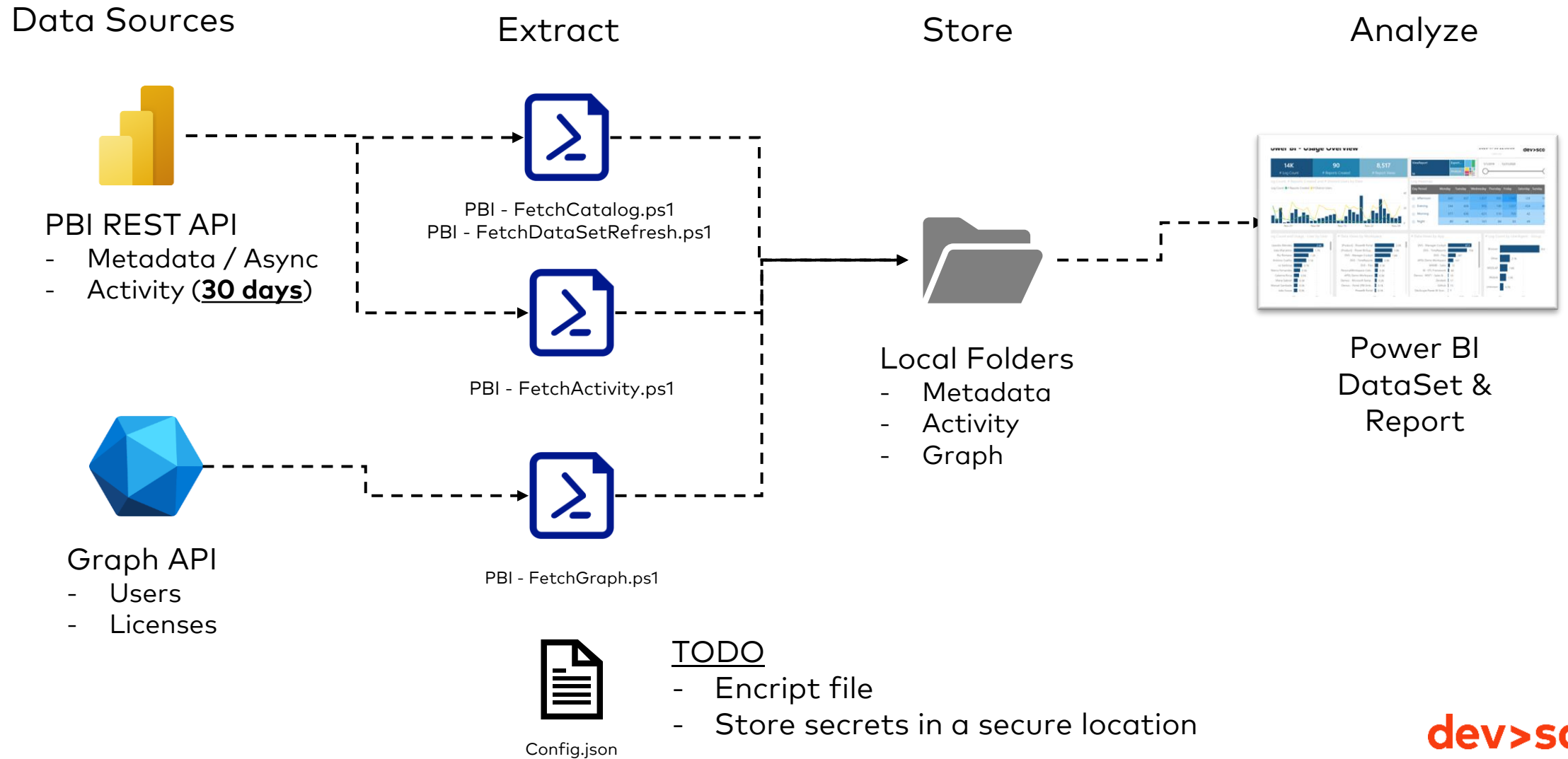
Code & Slides
[link](#)



Can you answer these questions?

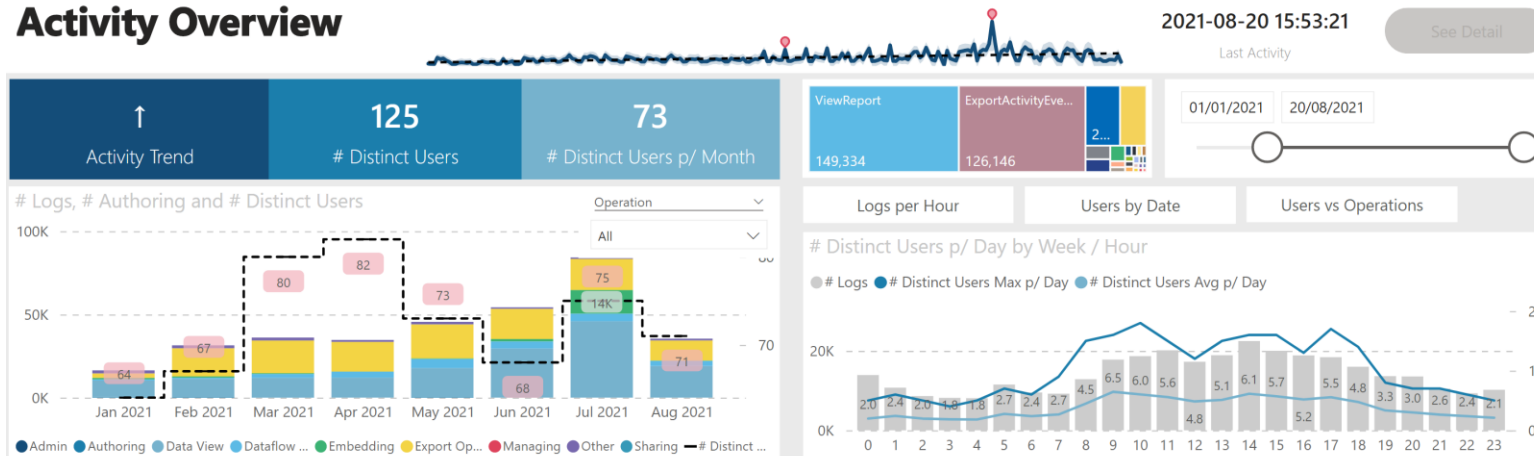
- Who are most active users?
- Which Reports/Workspaces/Datasets/Apps are mostly used?
- Are Personal Workspaces being used? How is content being shared?
- Do your users access from Browser/Mobile/Excel? Which browser?
- Top used DataSource's? FileSystem/OneDrive? SQL? Sharepoint? DataLake?
- How many **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

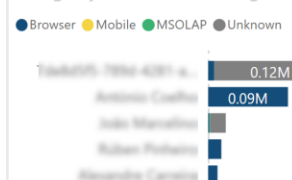


Power BI Monitor Reports

Activity Overview



Logs by Tenant, User & Agent



Logs by Workspace



Logs by App



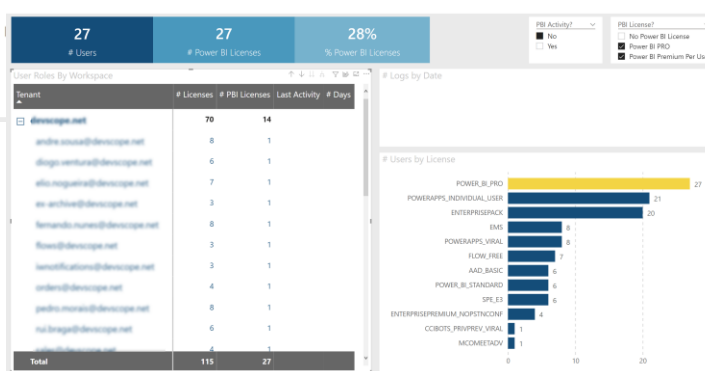
Logs by Dataset



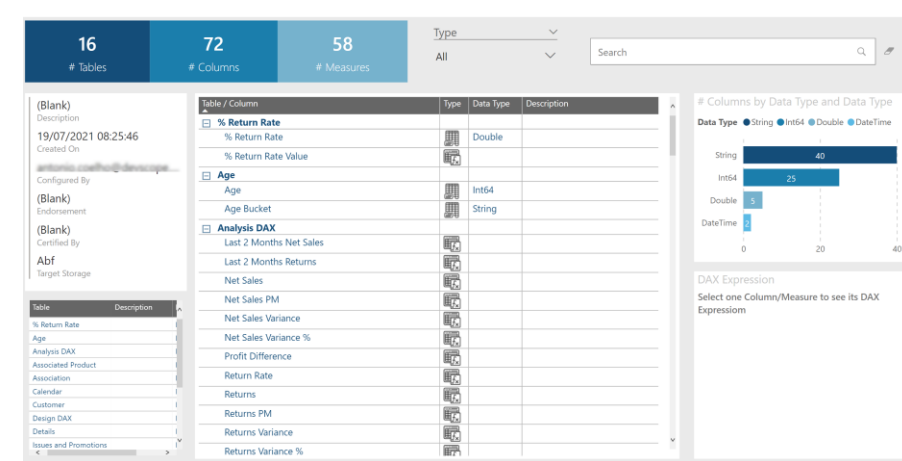
Catalog Overview



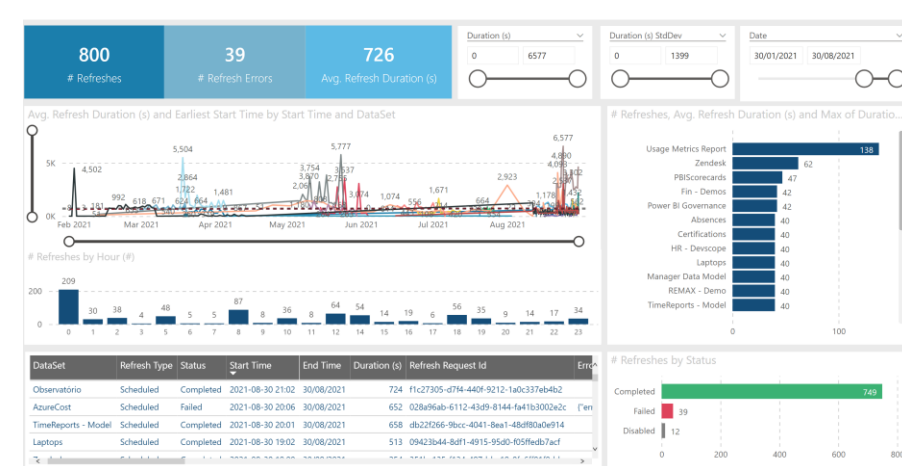
Users & Licenses



DataSet Schema



DataSets Refresh



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	<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
	RefreshHistory	Admin API - GetGroupsAsAdmin + Expand DataSets Dataset API - Get Refresh History
Users & Licenses	Users & Licenses	Graph API – Users
	Licenses Details	Graph API – SubscribedSKUs

Productivity / DevOps



Rebind Reports

Why?

Dataset issue/corruption

Minimize user impact on a dataset change / refresh

Azure AS to Premium Migration

...

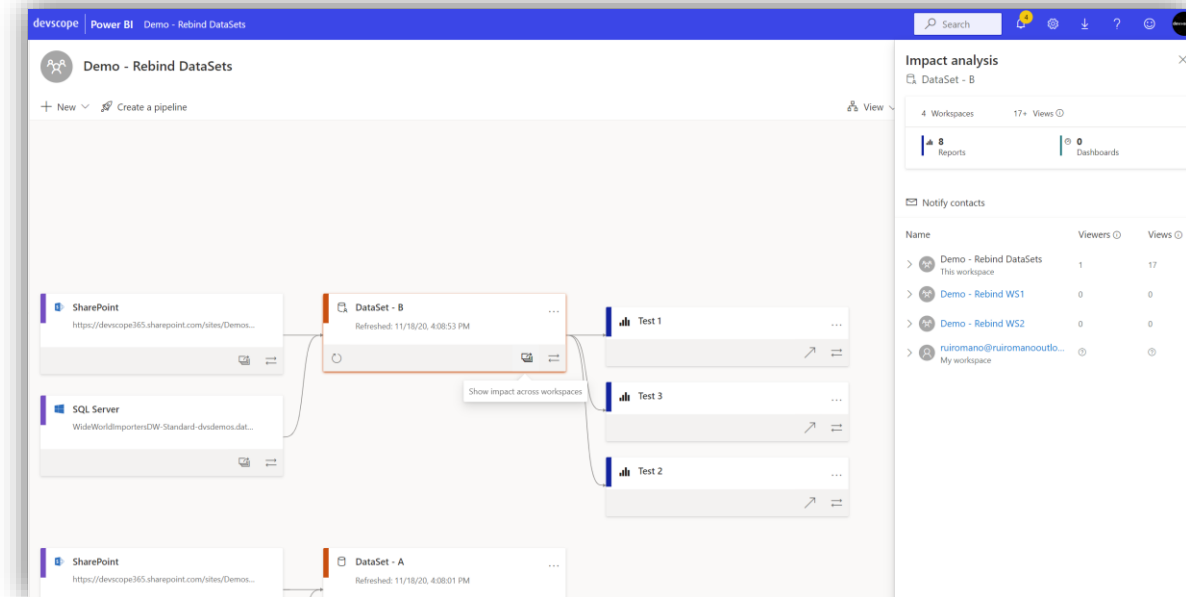
Approaches:

- Manual
 - By specifying the reports & datasets to rebind
- Automatic
 - by getting all reports connected to “old” dataset

APIs:

- [Rebind API](#)

Download: [here](#)



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'"
}
```


Power BI & DevOps

If you have Premium

Azure DevOps

Tabular Editor

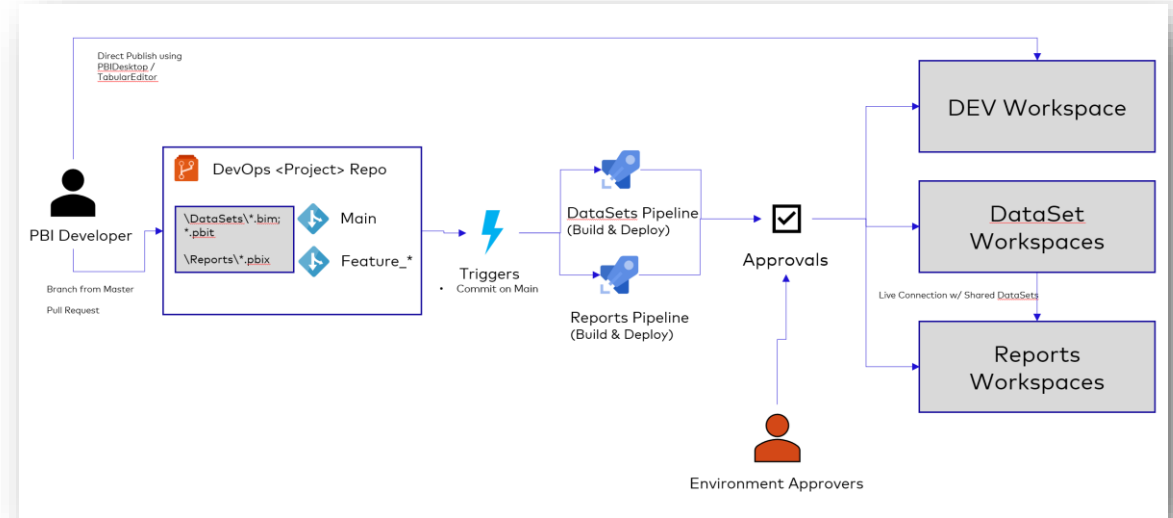
REST API's

Must Watch: [Daniel Otykier Session](#)

Deployment Pipelines

If you don't have Premium 😊

- REST API's
- PowerShell



```
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"
```

Download: [here](#)

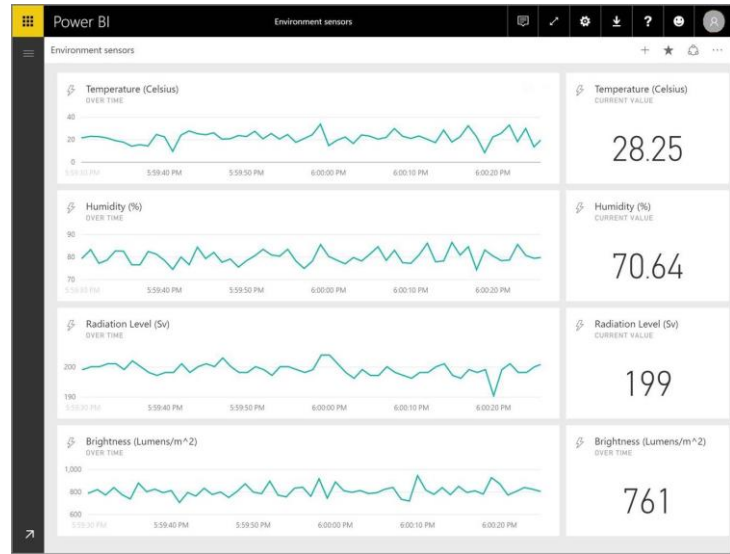
Realtime w/ REST API's



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

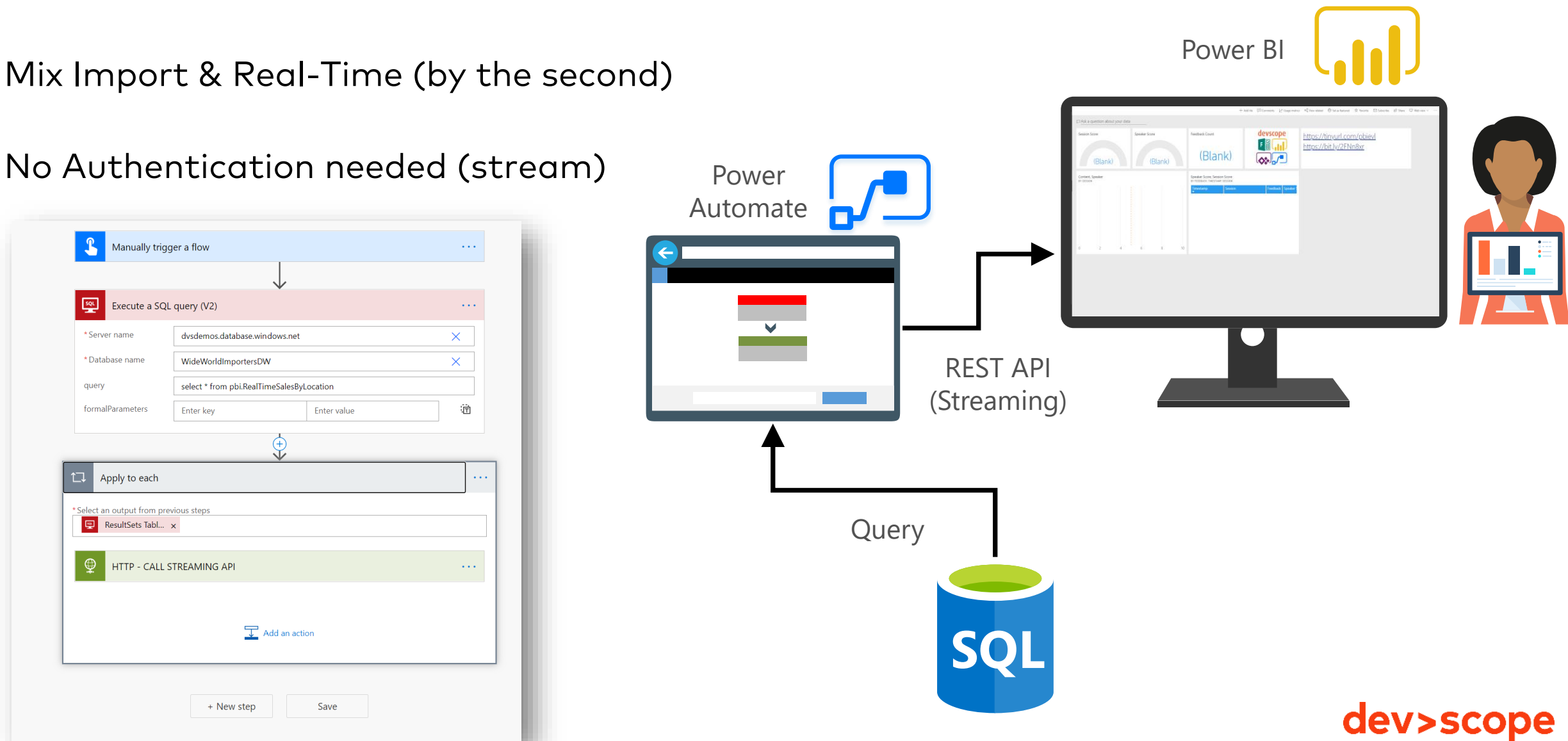


[Real-time streaming in Power BI - Power BI | Microsoft Docs](#)

PowerAutomate & PBI Streaming REST API

Mix Import & Real-Time (by the second)

No Authentication needed (stream)



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

Thanks!



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