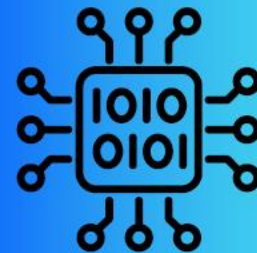


TechEd

Největší česko-slovenská
konference o IT

20. - 22. 5. 2025 | PRAHA/ONLINE

www.teched.cz | www.techedsr.sk



Power BI jako black box

Kateřina Saryčeva | Tched 2025

TechEd

GOPAS



Kateřina Saryčeva

- Senior Data Analyst v Ness Czech
- Rozvoj DWH, Power BI kompetence & Power Platform



Power BI Data Analyst Associate
Power Automate RPA Developer Associate



<https://www.linkedin.com/in/katerina-saryceva/>

 Main Power BI components Power BI REST API Configurations Embedding

Agenda



Power BI
Service



Power BI
Report Server

Power BI Solution type

Sales Report

Last effective date 01.04.2025

YearMonth

2025-3

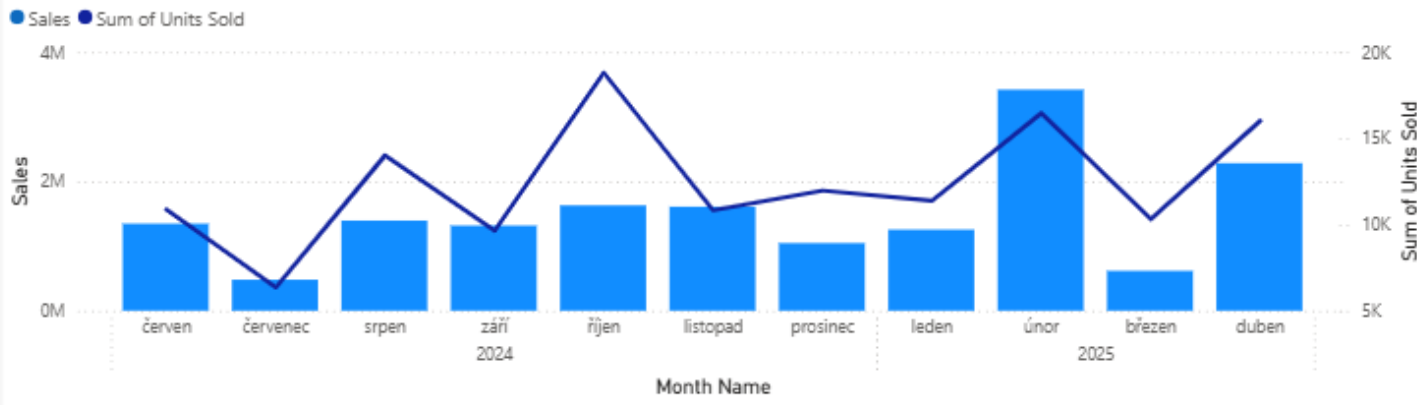
Country

- Canada
- France
- Germany
- Mexico
- United States of America

[▶ Approve](#)

katsar@vnffl.onmicrosoft.com
UserName
katsar@vnffl.onmicrosoft.com
UPN

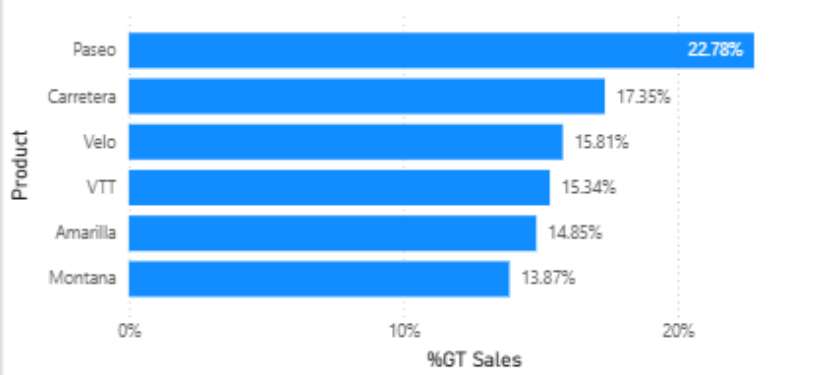
Sales and Sum of Units Sold by Calendar Year and Month Name



Sales Last year

Product	Sales	Sales LY	Sales YoY
Paseo	3,737,091.30	1,492,723.44	↓ -2,244,367.86
Carretera	2,845,234.90	217,105.78	↓ -2,628,129.12
Velo	2,593,435.20	1,799,471.80	↑ -793,963.40
VTT	2,516,500.06	777,483.71	↓ -1,739,016.35
Amarilla	2,435,826.86	1,524,423.40	↑ -911,403.46
Montana	2,274,581.92	1,291,462.45	↑ -983,119.47
Total	16,402,670.24	7,102,670.58	-9,299,999.66

%GT Sales by Product



Power BI Report

File Run

Design Zoom First Previous of 1 Next Last Refresh Stop Back

Print Page Setup Print Layout Export Document Map Parameters Find

Views Zoom Navigation Options

Select company: Contoso Suites View Report



Contoso Suites
 123 Coffee Street
 Buffalo, NY 98052
 USA

Telephone 012345678
<http://www.contososuites.com>

Owl Wholesales
 123 Violet Road , Phoenix, CO 85003 USA

Invoice CIV-000676 000007-1

30 November 2019

Payment terms: Net 45 days
 Payment due 1/14/2020

\$321,113.52

ITEM	DESCRIPTION	QUANTITY		SALES PRICE	DISCOUNT	AMOUNT
D011	Lens	2	Each	2	0	4.00
L0001	Mid-Range Speaker	35	Each	500	0	17,500.00
P0001	Acoustic Foam Panel	117	Each	37	0	4,329.00
D0003	Standard Speaker	23	Each	220	0	5,060.00
T0001	Speaker cable 10	65	Each	500	0	32,500.00
D0004	High End Speaker	12	Each	2000	0	24,000.00
T0004	Television M120 37" Silver	53	Each	350	0	18,550.00
T00002	Projector Television	23	Each	3750	0	86,250.00
T0005	Television HDTV X590 52" White	33	Each	2890	0	95,370.00
T0003	Surround Sound Receiver	56	Each	450	0	25,200.00
SALES SUBTOTAL AMOUNT						4.00
SALES TAX						12,350.52

Sales invoice notes

METHODS OF PAYMENT

Electronic payment Check
 Payment **US-009** Make check payable to **Contoso**
 Sort code **Suites**
 Account No. 34567

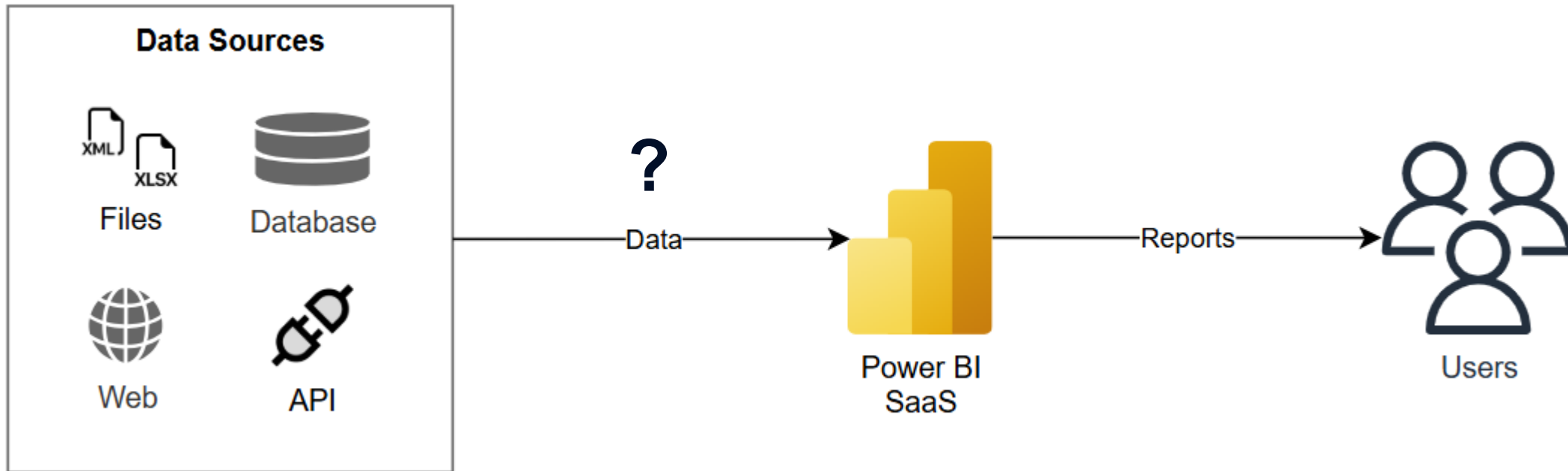
OTHER INFORMATION

Tax registration no. **1234123400**
 Our reference **Karl Bystrom**

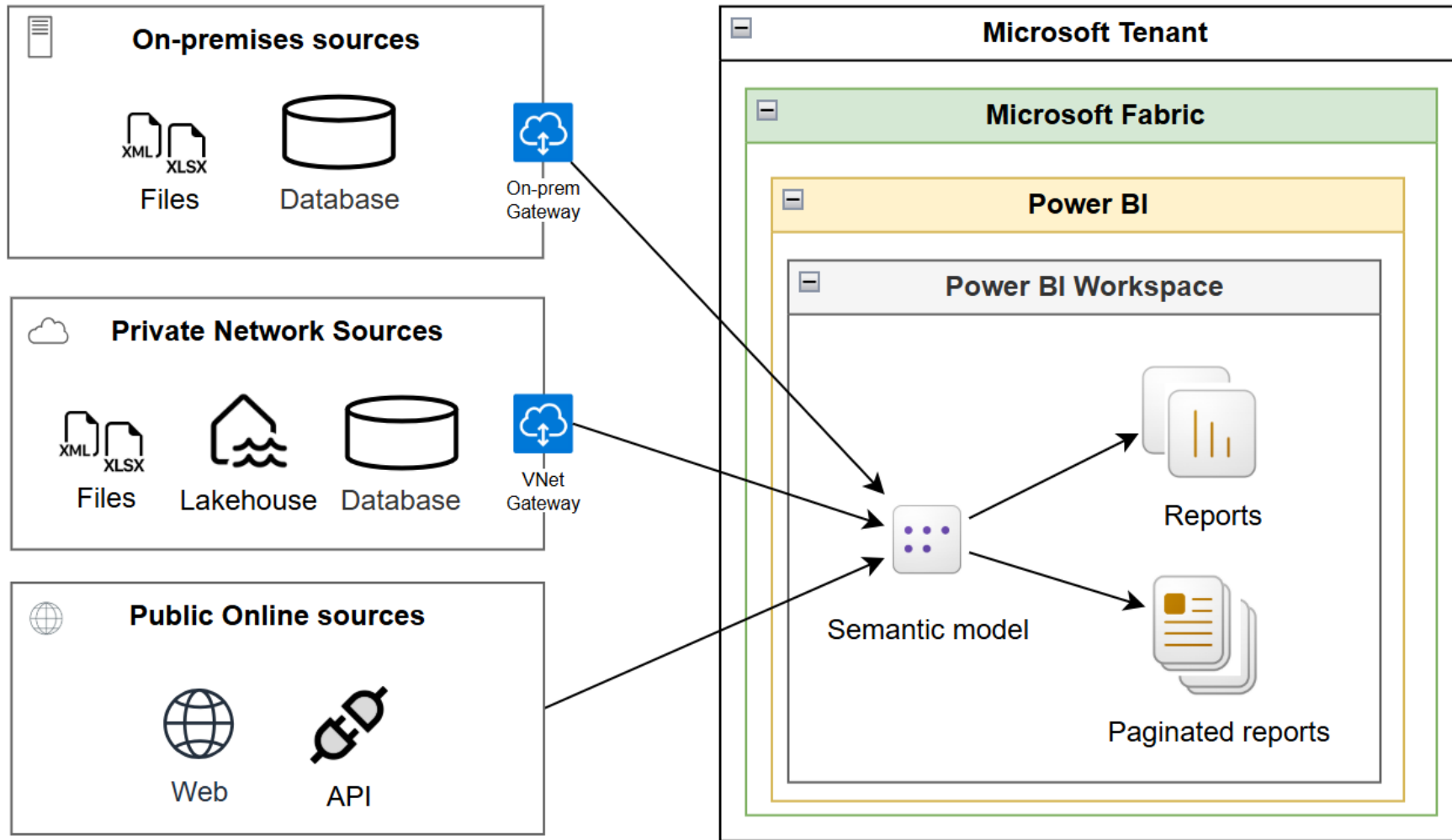
Disclaimer: This is a sample and is provided 'as is' without warranty of any kind. Sample data included are for illustration only and are fictitious. No real association is intended or inferred.

Paginated Report

Main Power BI components



Power BI as a Black box



Power BI Components

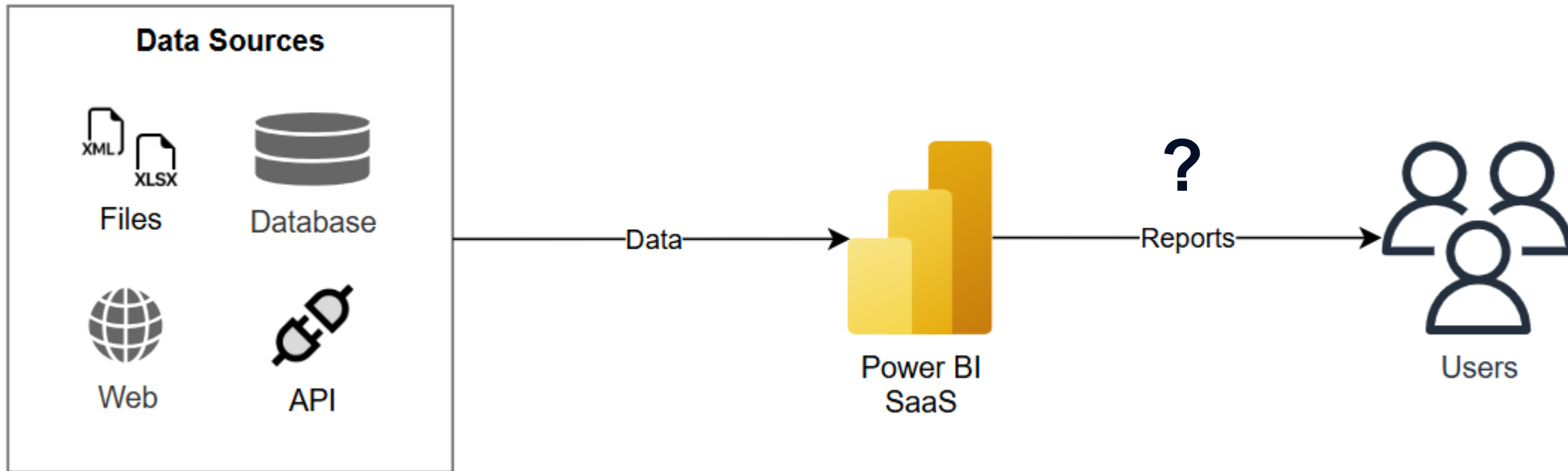
The gateway communicates on the following outbound ports:
TCP 443, 5671, 5672, and
from 9350 through 9354.

The gateway **doesn't require inbound ports.**

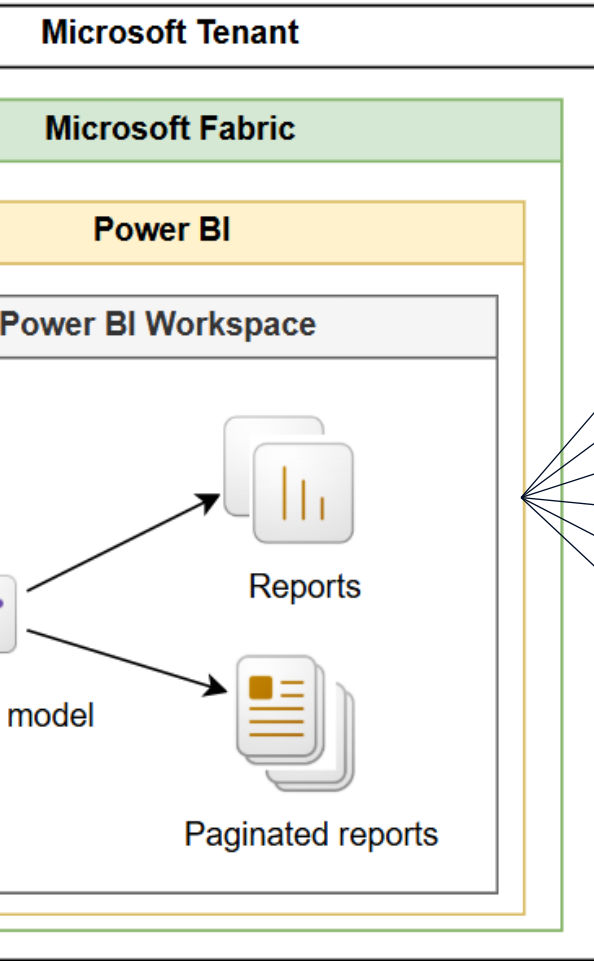
[Power BI security white paper - Power BI | Microsoft Learn](#)



Gateway Security



Power BI as a Black box



- 🌐 Power BI web App
- 🗣️ Teams App
- ✉️ Email Subscription
- 📁 Sharepoint Subscription
- 📱 Power BI Mobile
- 📄 Embedding



Report Distribution

Workspace

- Group
- Pracovní prostor

 Power BI Service

Semantic Model

- Dataset
- Sémantický model
- Kolekce dat

 Power BI Desktop

Power BI Report

- Dynamic report
- Interactive report
- Sestava

 Power BI Desktop

Paginated report

- Pixel-perfect report
- Stránkovaná sestava

 Power BI Report Builder

Naming game

Power BI reports
are visual and
dynamic

Paginated
reports are
designed for
fixed layout

Workspace =
Group
Semantic model
= Dataset

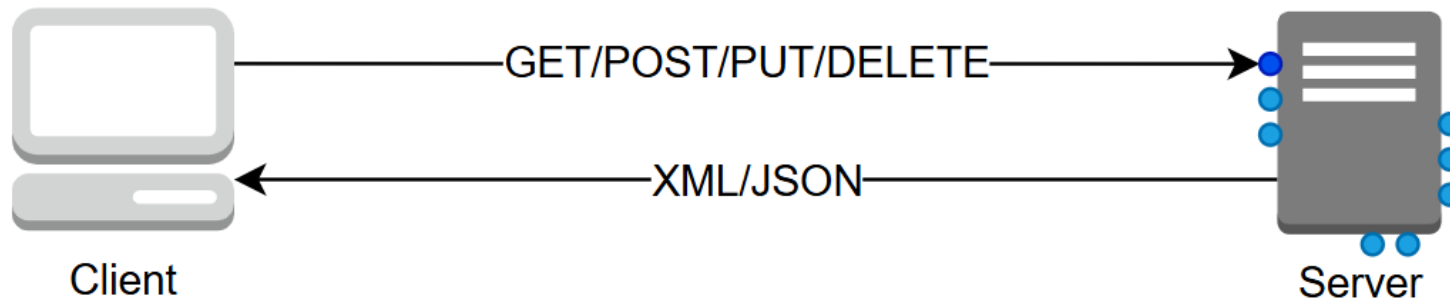
Power BI is a
tool in Microsoft
Fabric

You might need
a Gateway to
read from some
data sources

It's important to
get the report as
close to the user
as possible

Power BI REST API

- **RE**presentational **S**tate Transfer **A**pplication **P**rogramming Interface
- Architectural concept
- Roy Fielding first presented it in 2000



REST API



Power BI REST API

Use Case	License	Paying per...
Create and share content	Power BI Pro Premium Per User	user/month
Administrative tasks	Power BI Pro Premium Per User	user/month
Export Report to file	Fabric F64 or higher, Power BI Embedded, Power BI Premium per capacity	capacity/month or capacity/hour
Embedding	Power BI Embedded, Fabric F8 or higher, Power BI Premium per capacity	capacity/month or capacity/hour

Licensing

Table of contents

Groups - Get Groups

Reference

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

Returns a list of workspaces the user has access to.

Permissions

This API call can be called by a service principal profile. For more information see: [Service principal profiles in Power BI Embedded](#).

Required Scope

Workspace.Read.All or Workspace.ReadWrite.All

Limitations

- User permissions for workspaces take time to get updated and may not be immediately available when using API calls. To refresh user permissions, use the [Refresh User Permissions](#) API call.

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}
```

Exit focus mode

REST API Try It

Try the REST API with the inputs below.

katsar@vnffl.onmicrosoft.com
Signed In
MSFT
[Sign out](#)

Request URL

GET

Parameters

name	value
<input type="text"/>	<input type="text"/>

Headers

name	value
<input type="text"/>	<input type="text"/>

Request Preview

HTTP Copy

```
GET https://api.powerbi.com/v1.0/myorg/groups
Authorization: Bearer eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiIsIng1dCI6Ikh0djBPSTNSd3FzSEZFM5hb018c2h0S0JYRSIsImtpZCI6Ikh0djBPST
```

Run

Response Code: 200

Try It feature

Workspace ID

Semantic Model ID

https://app.powerbi.com/groups/0debb70d-1d8c-42ae-8ed3-488fed0e932c/datasets/3e4a46e4-3cb4-41cb-8230-537db1962a2b/details?experience=power-bi

PBDayDemo_dataset

File Refresh Share Explore this data Analyze in Excel Lineage Open data model Write DAX queries Model health

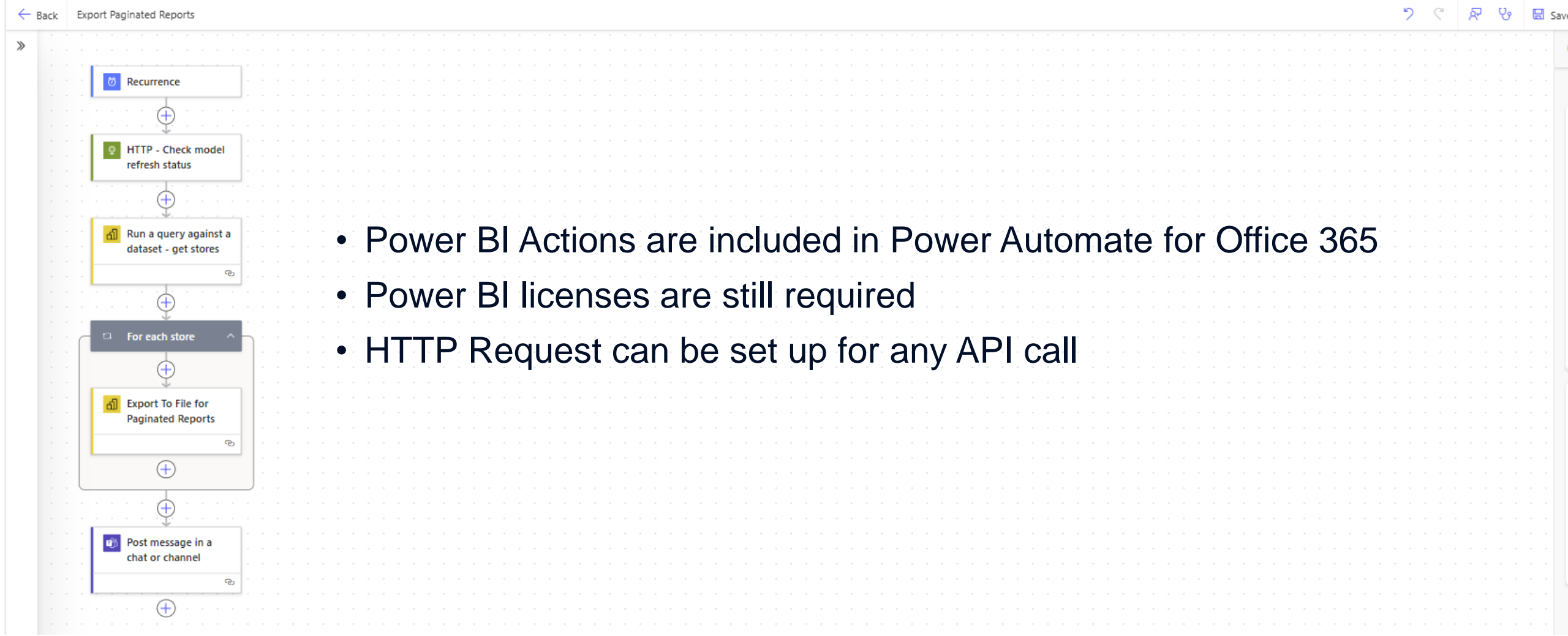
Details for PBDayDemo_dataset
Embedding
+ Add description
Refreshed 18/05/25, 22:02:53

Discover business insights
Explore this data to get insights
interactive report you can share
Explore this data

See what already exists
These items use the same data source as PBDayDemo_dataset.

Name	Type	Relation	Location	Refreshed
EmbeddedReport	Report	Downstream	Embedding	18/05/25, 22:02:53

Power BI ID's



- Power BI Actions are included in Power Automate for Office 365
- Power BI licenses are still required
- HTTP Request can be set up for any API call

Power Automate

Tool	Useful resources
PowerShell	Cmdlets for PowerShell
C#, .NET	Microsoft.PowerBI.Api NuGets for Visual Studio Code
Python	Microsoft Authentication Library (MSAL) for Python
Other samples	GitHub - microsoft/PowerBI-Developer-Samples

DEV tools

Power BI REST API
can be used for
automation and
Report embedding

To work with Power
BI you need a **Power
BI Pro** licence

Some API requests
require **Premium per
capacity** license

MS Documentation
has „**Try It**“ feature

For API calls you can
use Power Automate,
Power Shell,
or your own
application

There are **libraries**
for Visual Studio and
Power Shell

Configurations

- A valid Access token must be present in all API operations
- Proves permissions to the Power BI REST API
- Expires in an hour
- Service Principal or Master User

Entra ID

- Azure Active Directory

Access Token

- Azure AD Token
- Entra ID Token
- Microsoft Entra Token

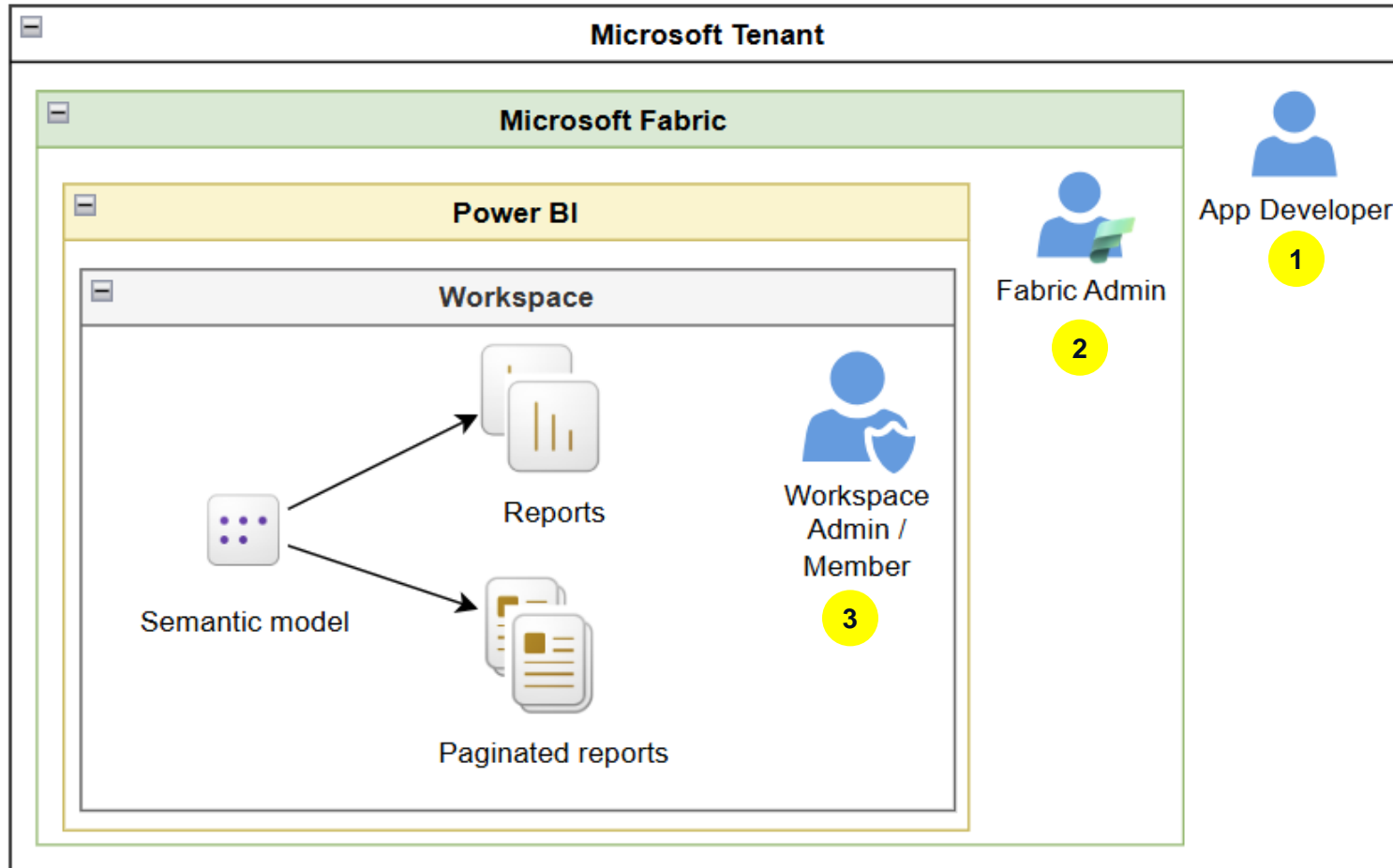
Access Token

	Master User "Service account"	Service Principal User
Purpose:	For Ad-hoc Automation & Analysis, Development	Recommended authorization method for Apps
Credentials:	Username and password / OAuth 2.0	Application secret or a certificate
Licenses:	Power BI Pro / Premium per User	Per Capacity (Fabric, Embedded...)

DEV/TEST

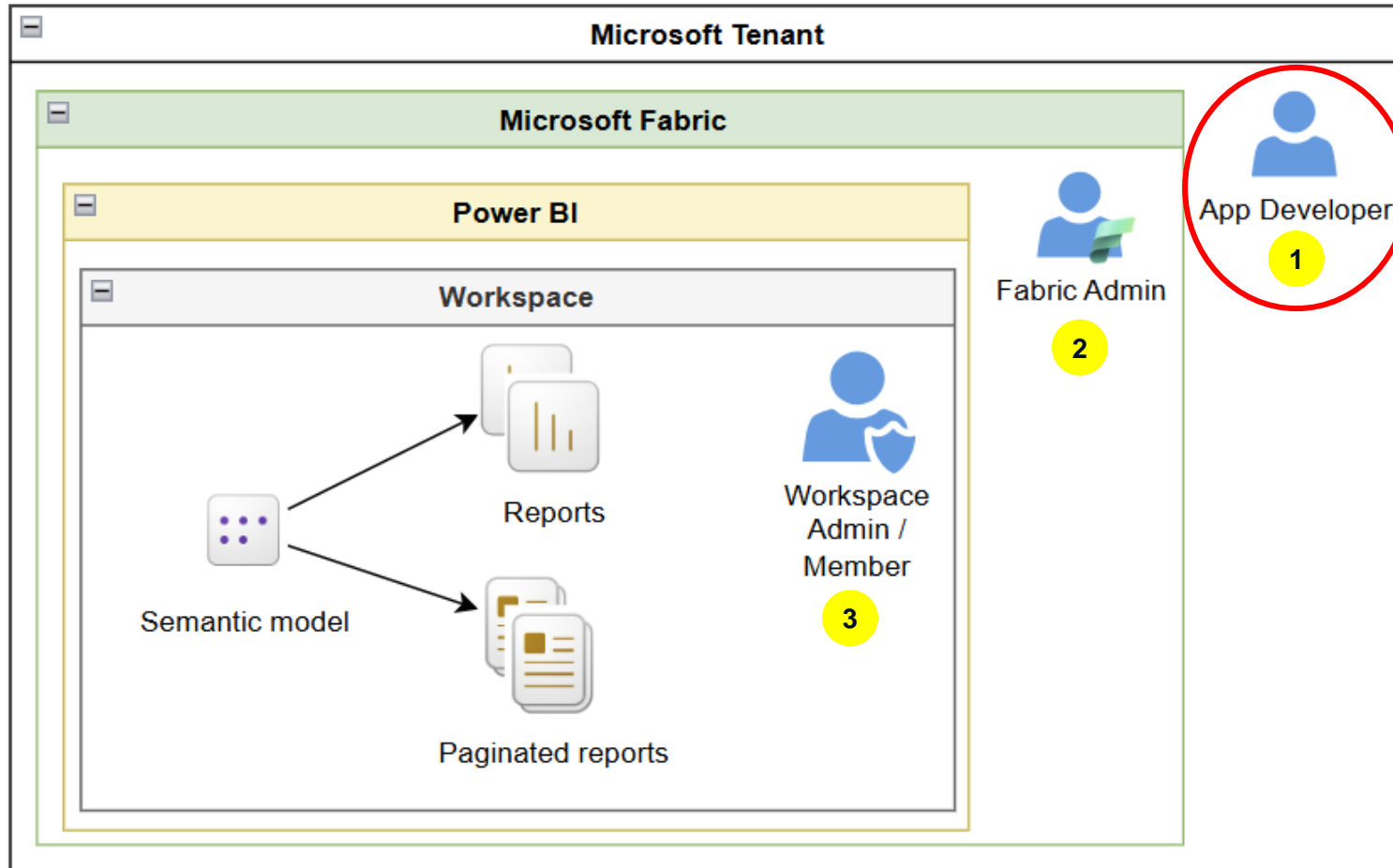
PROD

Authentication identity



1. Register your Application in Entra ID, Add Service Principal to a Group
2. Allow API calls in Fabric Admin panel
3. Grant access to Power BI Content

Admin settings



1. Register your Application in Entra ID, Add Service Principal to a Group
2. Allow API calls in Fabric Admin panel
3. Grant access to Power BI Content

Admin settings

← ↻ 🔒 https://portal.azure.com/#view/Microsoft_AAD_RegisteredApps/CreateApplicationBlade/isMSAApp~/false

Microsoft Azure Search resources, services, and docs (G+/) Copilot

Home > MSFT | Overview >

Register an application

* Name

The user-facing display name for this application (this can be changed later).

TechEdApp ✓

Supported account types

Who can use this application or access this API?

- Accounts in this organizational directory only (MSFT only - Single tenant)
- Accounts in any organizational directory (Any Microsoft Entra ID tenant - Multitenant)
- Accounts in any organizational directory (Any Microsoft Entra ID tenant - Multitenant) and personal Microsoft accounts (e.g. Skype, Xbox)
- Personal Microsoft accounts only

[Help me choose](#)

By proceeding, you agree to the [Microsoft Platform Policies](#)

Register

Entra ID App registration

The screenshot shows the Microsoft Azure portal interface. The main content area displays the 'TechEdApp | Certificates & secrets' page. A modal dialog titled 'Add a client secret' is open, allowing the user to create a new secret. The dialog includes a 'Description' field with the value 'MySecret' and an 'Expires' dropdown menu set to 'Recommended: 180 days (6 months)'. At the bottom of the dialog are 'Add' and 'Cancel' buttons. The background page shows a navigation sidebar with 'Certificates & secrets' selected, and a main area with a message about application registration certificates and secrets.

Microsoft Azure

Search resources, services, and docs (G+)

Copilot

katsar@vnffl.onmicrosof...
MSFT (VNFFL.ONMICROSOFT.CO...)

Home > MSFT | Overview > App registrations > TechEdApp

TechEdApp | Certificates & secrets

Search

Got feedback?

Overview

Quickstart

Integration assistant

Diagnose and solve problems

Manage

Branding & properties

Authentication

Certificates & secrets

Token configuration

API permissions

Expose an API

App roles

Owners

Add or remove favorites by pressing Ctrl+Shift+F

Add a client secret

Description: MySecret

Expires: Recommended: 180 days (6 months)

Application registration certificates, secrets and federated credentials

Certificates (0) **Client secrets (0)** Federated credentials (0)

A secret string that the application uses to prove its identity when receiving tokens from the identity provider.

+ New client secret

Description	Expires
No client secrets have been created for this application.	

Add Cancel

Client Secret for Service Principal

← ↻ 🔒 https://portal.azure.com/#view/Microsoft_AAD_IAM/AddGroupBlade

Microsoft Azure Search resources, services, and docs (G+/) Copilot

Home > All groups >

New Group

Got feedback?

Group type * ⓘ
Security

Group name * ⓘ
TechEdSPGroup ✓

Group description ⓘ
Enter a description for the group

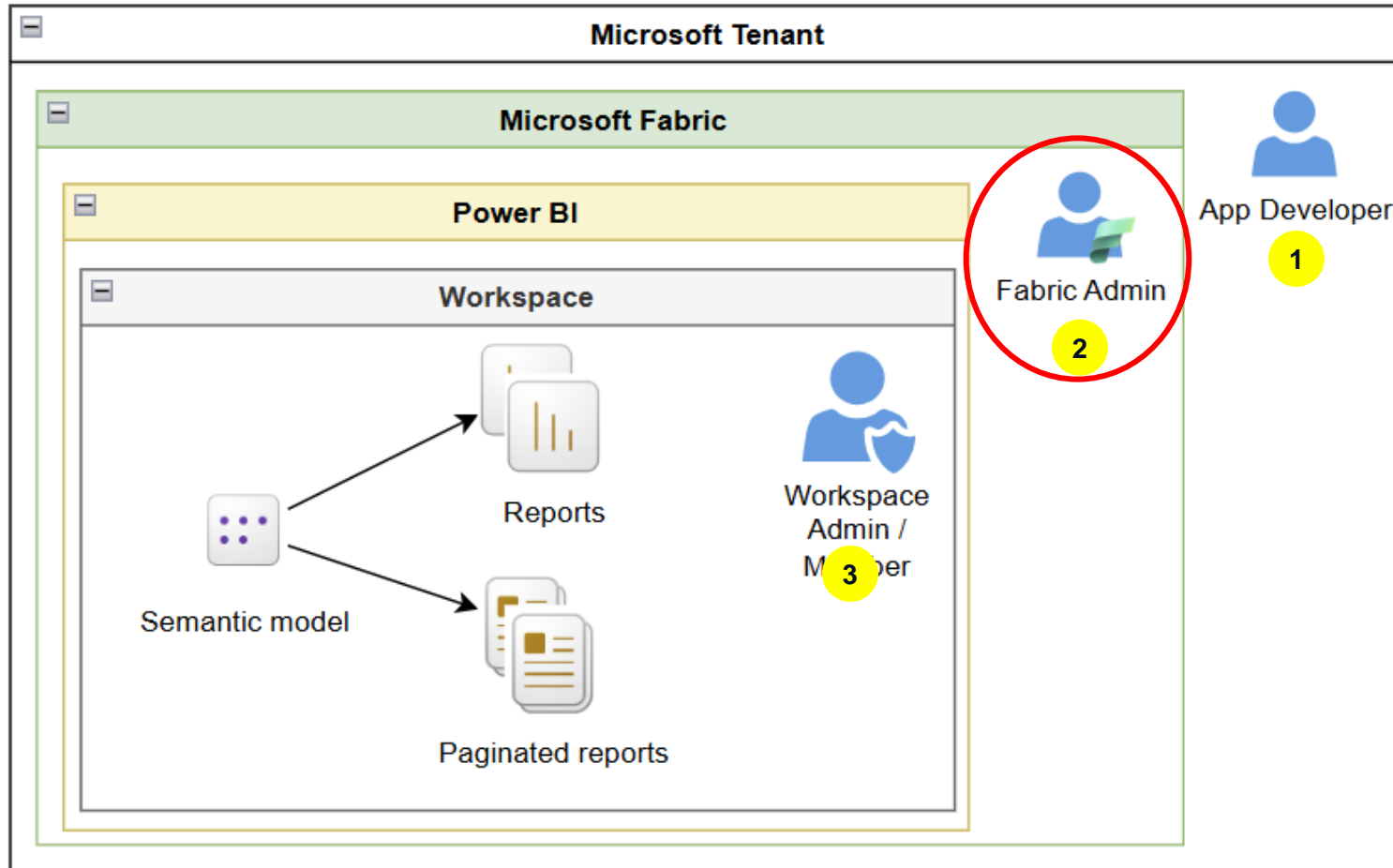
Microsoft Entra roles can be assigned to the group ⓘ
 Yes No

Membership type ⓘ
Assigned

Owners
No owners selected

Create

Service Principal Group



1. Register your Application in Entra ID, Add Service Principal to a Group
2. Allow API calls in Fabric Admin panel
3. Grant access to Power BI Content

Admin settings

The screenshot shows the Microsoft Fabric Admin portal interface. The browser address bar displays <https://app.powerbi.com/admin-portal/tenantSettings?experience=power-bi>. The page title is "Admin portal". On the left, a navigation sidebar lists various settings categories such as "Tenant settings", "Usage metrics", "Users", "Premium Per User", "Audit logs", "Domains", "Workloads", "Tags", "Capacity settings", "Refresh summary", "Embed Codes", "Organizational visuals", "Azure connections", "Workspaces", "Custom branding", "Fabric identities", "Featured content", and "Help + support". The main content area is divided into three sections: "Developer settings", "Admin API settings", and "Admin API settings".

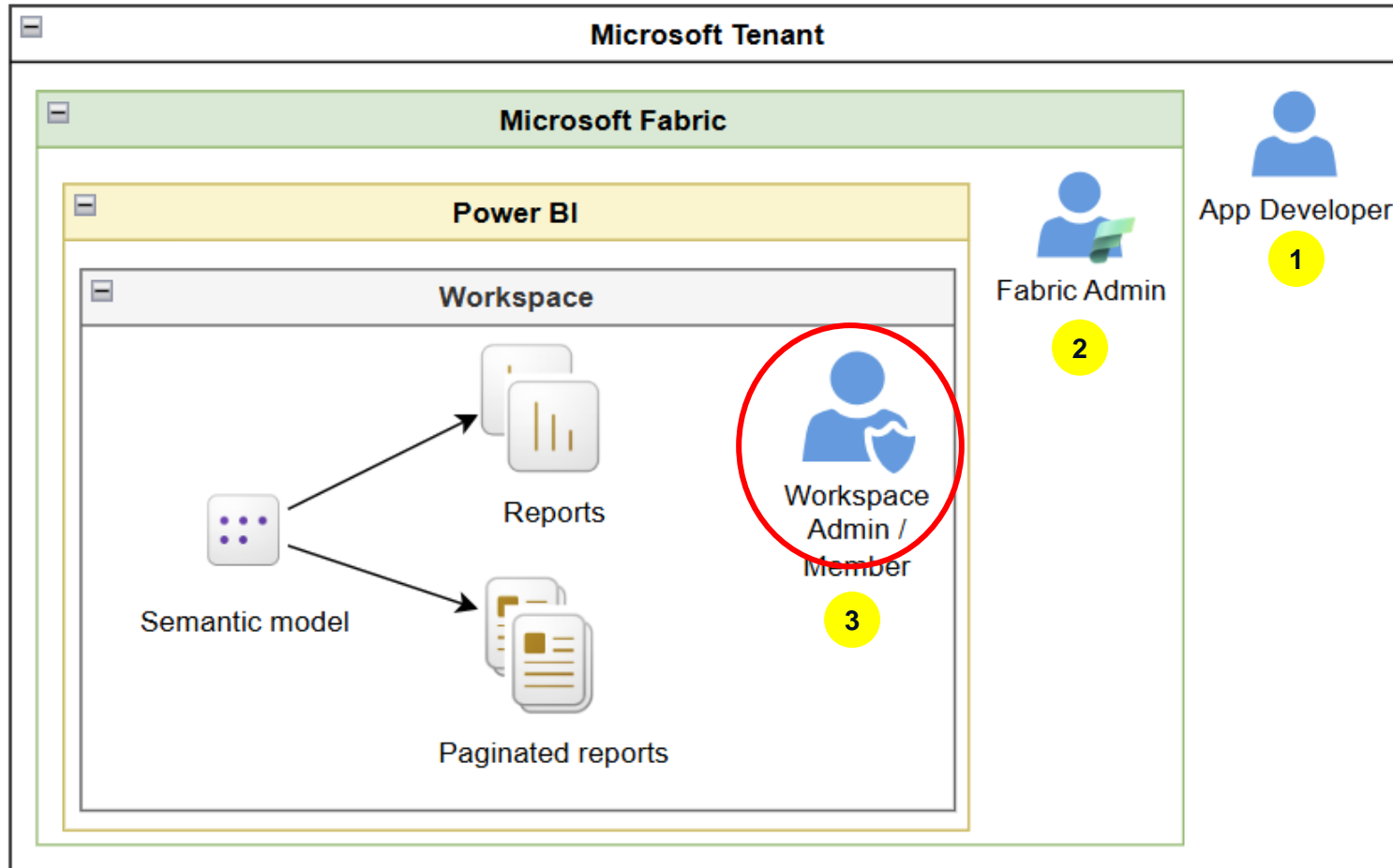
Developer settings

- Service principals can use Fabric APIs
Unapplied changes
Web apps registered in Microsoft Entra ID can use service principals, rather than user credentials, to authenticate to Fabric APIs. To allow an app to use a service principal as an authentication method, the service principal must be added to an allowed security group. [Learn More](#)
- Enabled
- Service principals can use APIs to access tenant-level features controlled by Fabric admins and enabled for the entire organization or for security groups they're included in. You can control access of service principals by creating dedicated security groups for them and using these groups in any Fabric tenant level settings. [Learn More](#)**
- Apply to:
 - The entire organization
 - Specific security groups**
-
- Except specific security groups
-

Admin API settings

- Service principals can access read-only admin APIs
Disabled for the entire organization
- Service principals can access admin APIs used for updates
Disabled for the entire organization

Fabric Admin portal



1. Register your Application in Entra ID, Add Service Principal to a Group
2. Allow API calls in Fabric Admin panel
3. Grant access to Power BI Content

Admin settings

Power BI Embedding

Search

Fabric Trial: 19 days left

Home

Create

Browse

OneLake

Apps

Metrics

Workspaces

Embedding

...

Power BI

Embedding

+ New item

New folder

Import

Migrate

Create app

Filter by

Choose from predesigned task flows or add a task to build one

Select from one of Microsoft's predesigned task flows or add a task to start building one yourself.

Select a predesigned task flow

Add a task

Import a task flow

Name	Type	Task	Owner	Refreshed	Next refresh	Endorsement
EmbeddedReport	Report	—	Embedding	19/05/2025, 22...	—	—
PBDayDemo_dataset	Report	—	Embedding	19/05/2025, 22...	—	—
PBDayDemo_dataset	Semantic m...	—	Embedding	19/05/2025, 2...	N/A	—

Add people

Embedding

Admins, members, and contributors have edit and view access. Viewers only have view access. [Learn more](#)

TechEdSPGroup

Member

Add

Workspace Permissions

```
{  
    // For app only authentication, we need the specific tenant id in the authority url  
    var tenantSpecificURL = m_authorityUrl.Replace("organizations", TenantID);  
  
    IConfidentialClientApplication clientApp = ConfidentialClientApplicationBuilder  
        .Create(ApplicationId)  
        .WithClientSecret(ApplicationSecret)  
        .WithAuthority(tenantSpecificURL)  
        .Build();  
  
    authenticationResult = await clientApp.AcquireTokenForClient(m_scope).ExecuteAsync();  
}  
  
return authenticationResult.AccessToken;
```

 AadService.cs

Authorize

Master User authentication is for DEV/TEST

Service Principal is recommended for PROD

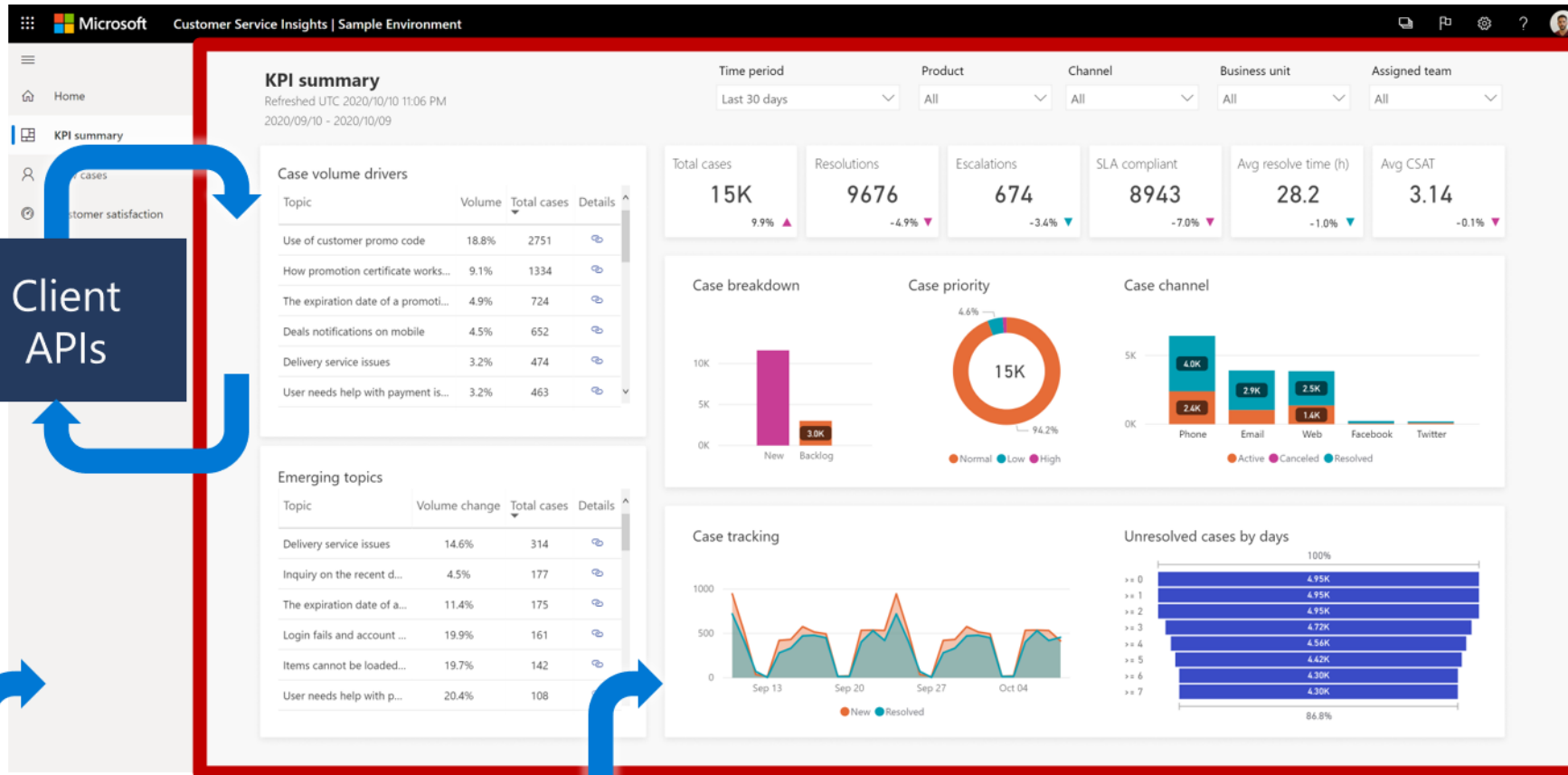
To get a Service Principal Register your application in Entra ID

Service Principal should be in a Security group

Fabric Admin should allow API calls for Security group

Grant Workspace access to the Security Group

Embedding



Client APIs

iFrame boundary

Client application

Embedded report

Embedding

Microsoft Power BI Embedded Analytics Playground (Preview)

Run | Copy code | Reset code | Start over

Set up your Power BI Embedded demo environment Set up now

```

89
90 embedPowerBIReport();
91 await reportLoaded;
92
93 // Insert here the code you want to run after the report is loaded
94
95 await reportRendered;
96
97 // Insert here the code you want to run after the report is rendered
98
99
    
```

Sales Report

Last effective date 01.04.2025

Sales and Sum of Units Sold by Calendar Year and Month Name

- Sales
- Sum of Units Sold

YearMonth: 2025-3

Country:

- Canada
- France
- Germany
- Mexico
- United States of America



Month	Sales (M)	Sum of Units Sold (K)
červen	~1.5	~15
červenec	~1.8	~18
srpen	~1.5	~15
září 2024	~1.0	~10
říjen	~1.8	~18
listopad	~1.2	~12
prosinec	~0.8	~8
leden	~1.5	~15
únor 2025	~3.5	~35
březen	~1.0	~10
duben	~2.0	~20

AutoSave

Developer Playground

Embed for your organization	Embed for your customers
<ul style="list-style-type: none">• user owns data	<ul style="list-style-type: none">• App owns data
Users inside your organization <i>with Power BI accounts</i>	External users (customers, partners) <i>who don't have Power BI accounts</i>
Internal apps, portals, SharePoint, Teams	External customer-facing apps or multi-tenant SaaS apps
Azure AD user identity	Service principal or master user
Power BI Pro or Premium Per User	Power BI Premium capacity (P SKUs or Embedded A SKUs)

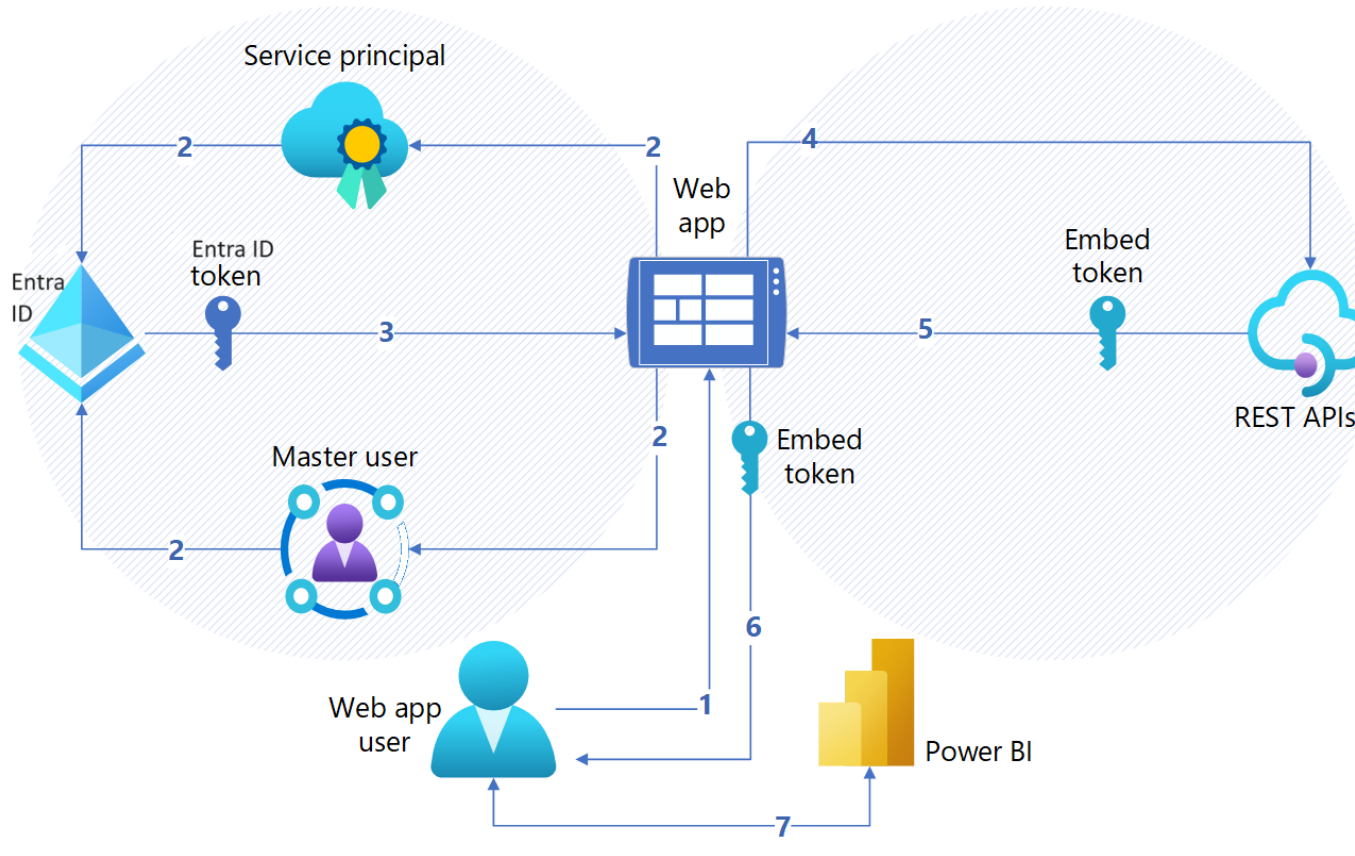
Embedding model

 Access Token	 Embed Token
A passport (who you are)	A ticket (what you can see)
Used by Backend / server	Used by Frontend / browser
Lets you call Power BI REST API	Used to show the report
Expires in 1 hour	Expires when Access token expires

Embed Token

Receiving the Entra ID Token

Generating an embed token



Authentication logic



Object Level
Security



Row Level
Security

Country	Product ↑	Units Sold	Sale Price	Gross Sales	Profit
Germany	Amarilla	4,219.5	125	527,437.5	21,097.5
France	Amarilla	1,899	20	37,980	18,990
Germany	Amarilla	1,686	7	11,802	3,372
United States of America	Amarilla	2,141	12	25,692	19,269
United States of America	Amarilla	1,143	7	8,001	2,286
United States of America	Amarilla	615	15	9,225	3,075
United States of America	Amarilla	1,989	12	23,868	17,662.32
France	Amarilla	321	15	4,815	1,556.85

RLS & OLS

User Owns Data
For Internal users
with Power BI
Pro/PPU licence

App Owns Data
for external users
with no Power BI
licence

Access Token
Allows API
communication

Embed Token
allows Power BI
object access

Check out
**Developer
Playground**

**Row Level
Security** ensures
data filtering by
user identity

- [Power BI Developer Center | Microsoft Power BI](#)
- [Power BI REST APIs for embedded analytics and automation - Power BI REST API | Microsoft Learn](#)
- [GitHub - microsoft/PowerBI-Developer-Samples: A collection of Power BI samples for developer use.](#)
- [Power BI Developer in a Day - YouTube](#)

Useful links

TechEd

Největší česko-slovenská
konference o IT

