

Power BI REST API with Power Query optics

„Make your data shine!“

2022

SPEAKER



ŠTĚPÁN REŠL



**Data
Brothers**



Microsoft®
Most Valuable
Professional



JAK NA
POWER BI



Power BI
kafíčko

AGENDA

- What is Rest API**
- How it can help me**
- Access token? Why & How**
- IDs & Secrets**
- Production time**

WHAT IS REST API

REST API



VILLAGE

RESTAURANT



MENU

- MEAL
 - GET LIST OF MEALS
 - GET MEAL
- DRINKS
 - GET LIST OF DRINKS
 - GET DRINK
- PAYMENT
 - GET BILL
 - POST PAYMENT
- POST FEEDBACK



CASH REGISTER

WAITING
FOR
ORDERS



HI! I AM API.



CHEF

WAITING
FOR
ORDERS



I WOULD LIKE TO WELCOME YOU TO OUR REST(AURANT)!

CUSTOMER

REST API



VILLAGE

RESTAURANT



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CUSTOMER



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REST API



VILLAGE

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CUSTOMER

SORRY BUT YOU
HAVE TO SPECIFY
WHAT MEAL YOU
WOULD LIKE TO



CASH REGISTER

WAITING
FOR
ORDERS

X



CHEF

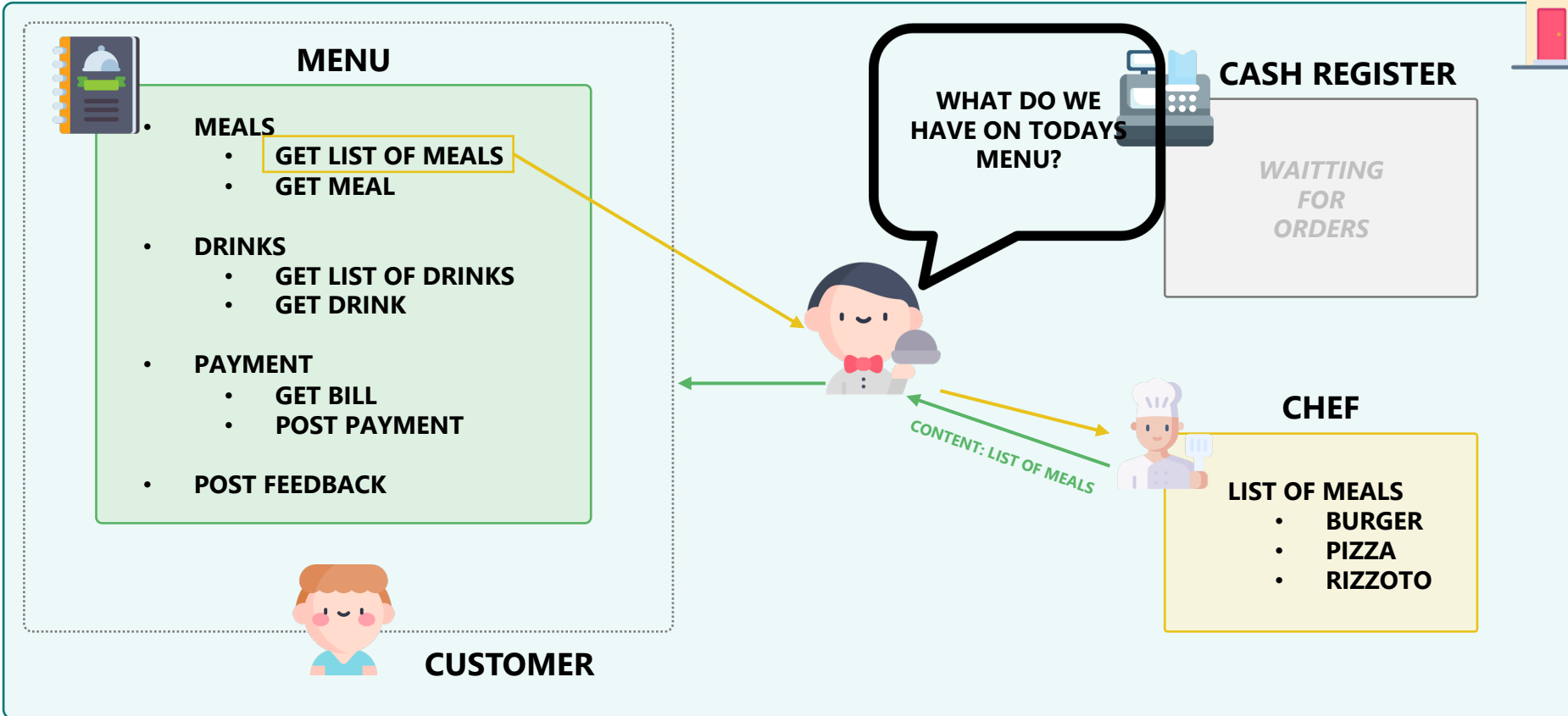
WAITING
FOR
ORDERS

REST API



VILLAGE

RESTAURANT

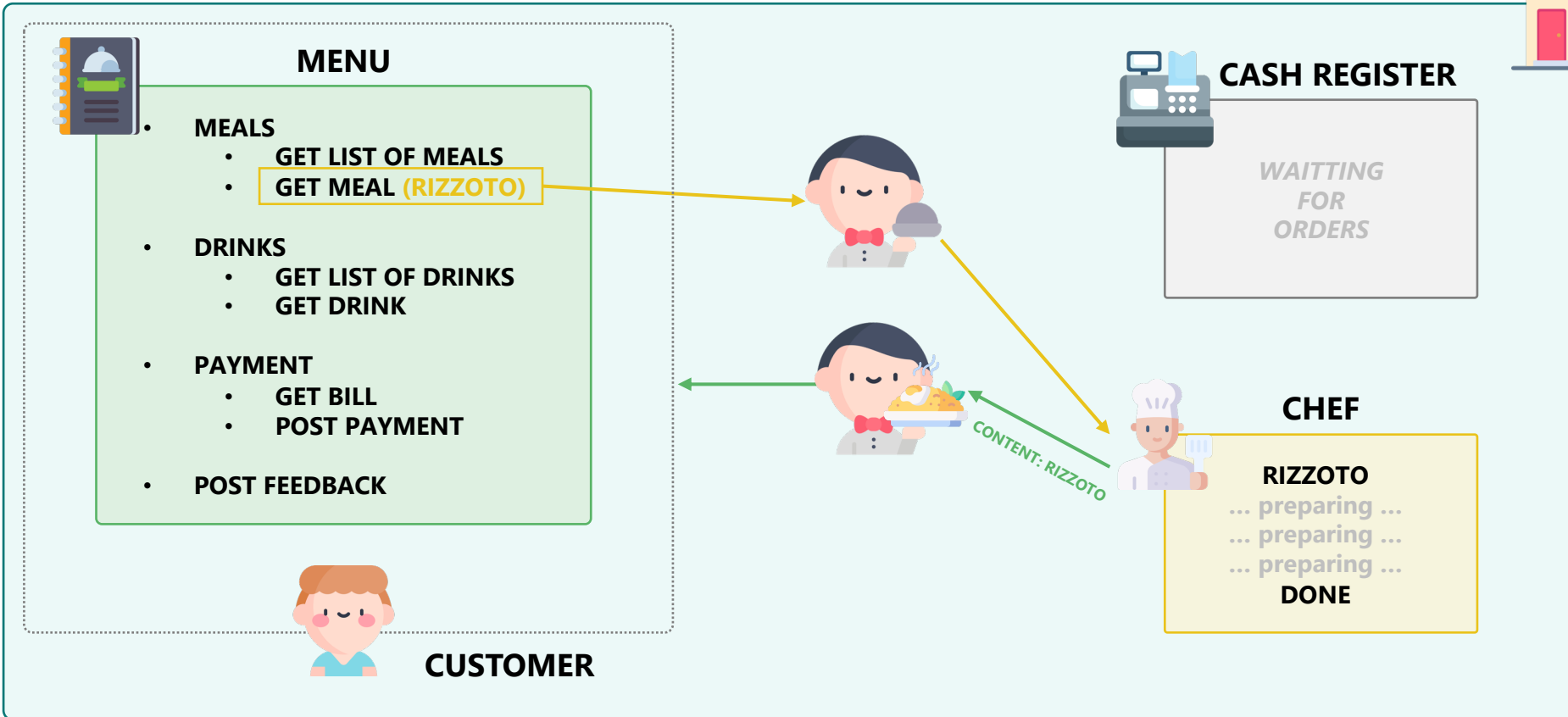


REST API



VILLAGE

RESTAURANT

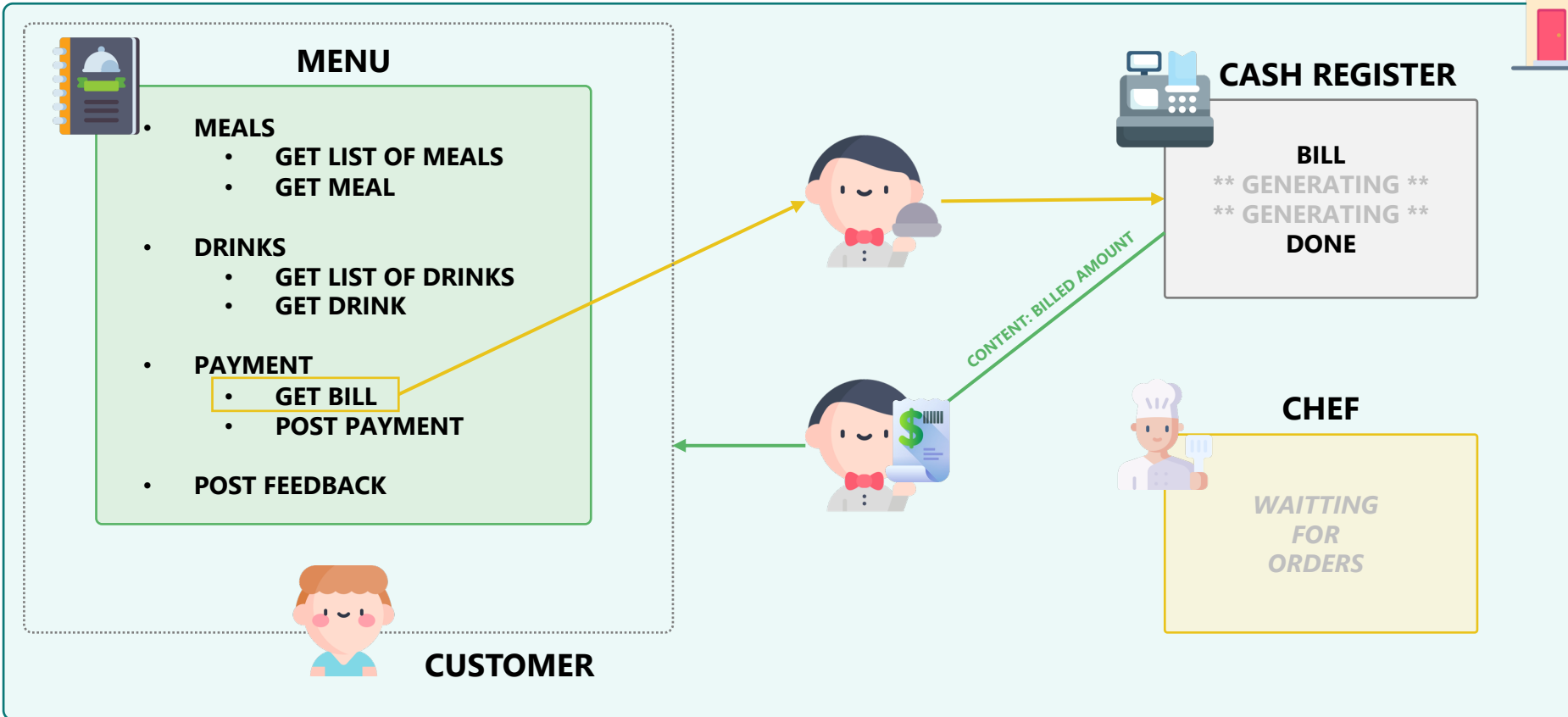


REST API



VILLAGE

RESTAURANT

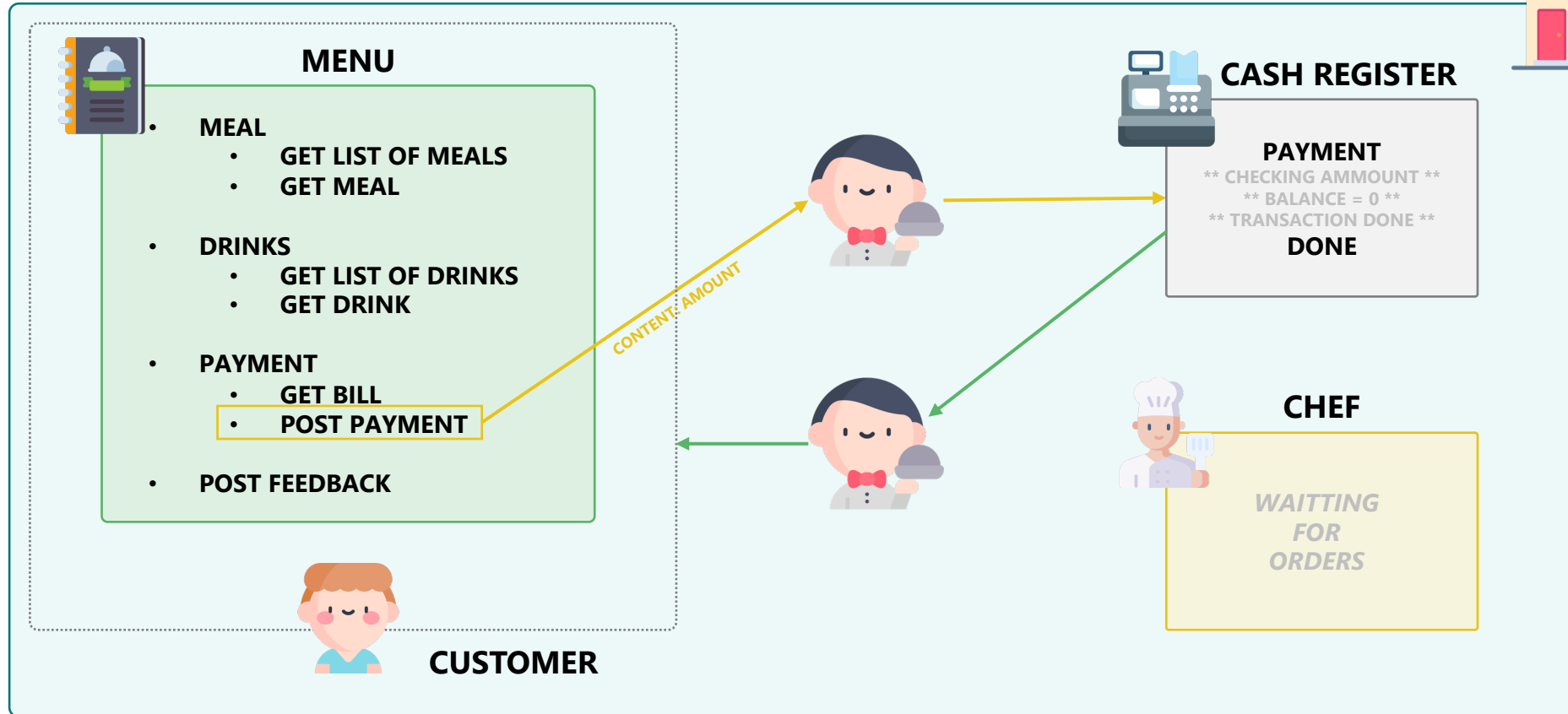


REST API

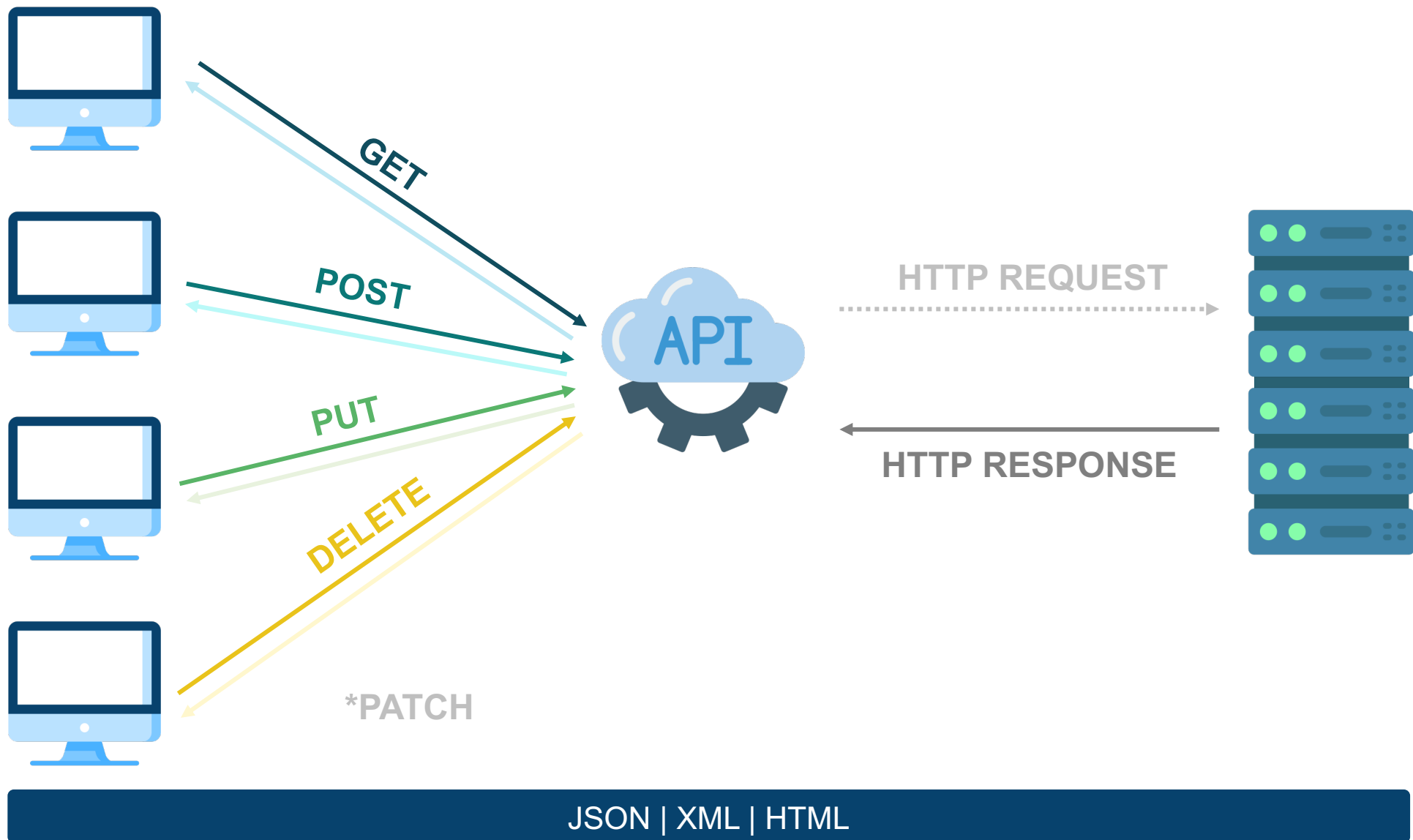


VILLAGE

RESTAURANT

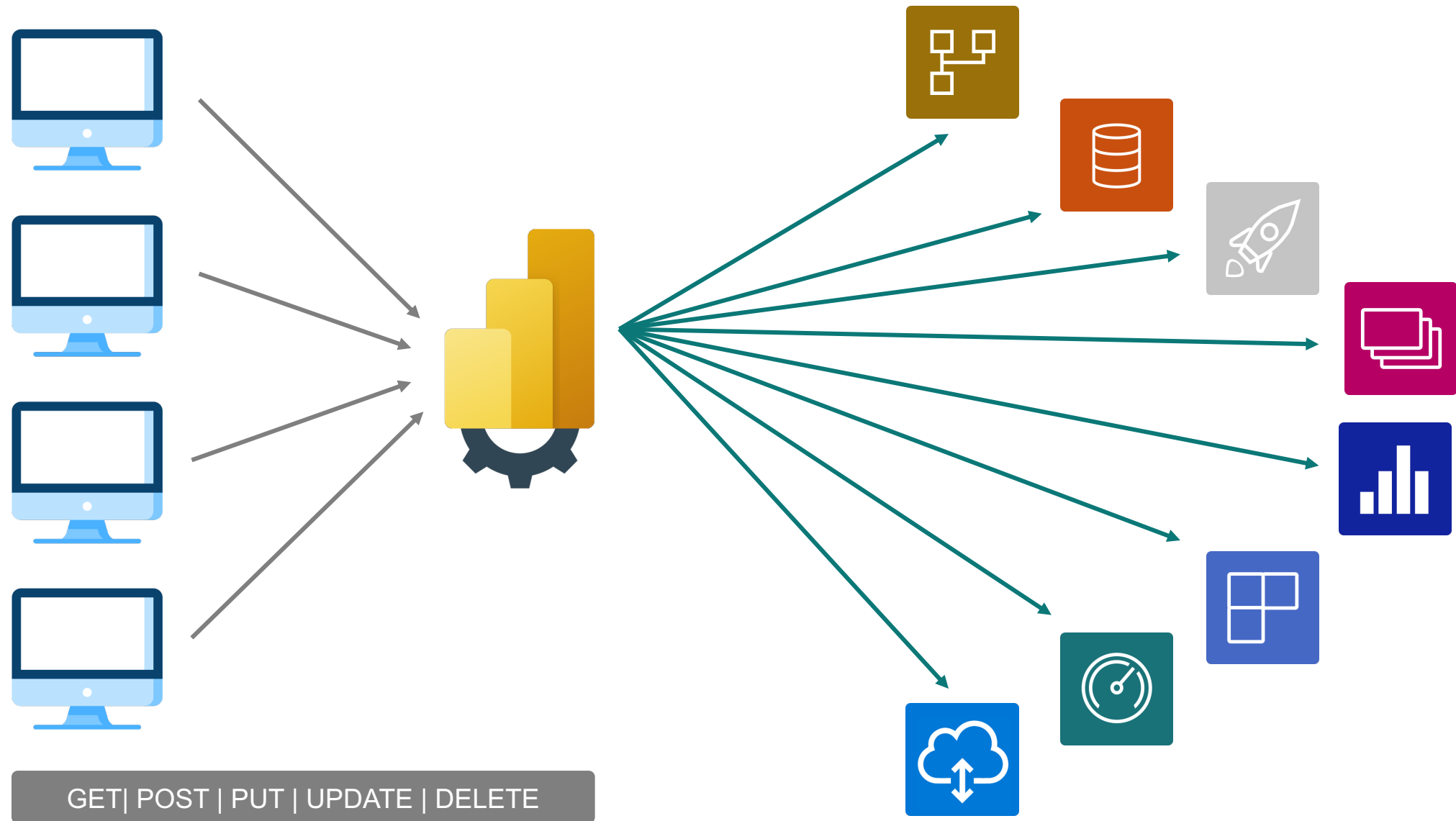


REST API



HOW IT CAN HELP ME

HOW IT CAN HELP ME



HOW IT CAN HELP ME



LOGS

HOW IT CAN HELP ME



LOGS



INFORMATIONS

HOW IT CAN HELP ME



LOGS



EXPORTS



INFORMATION

HOW IT CAN HELP ME



LOGS



EXPORTS



INFORMATIONS



AUDIT

HOW IT CAN HELP ME



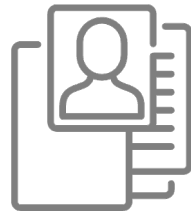
LOGS



EXPORTS



DEPLOYMENT



INFORMATIONS



AUDIT

HOW IT CAN HELP ME



LOGS



EXPORTS



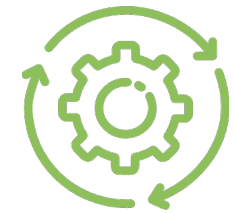
DEPLOYMENT



INFORMATIONS

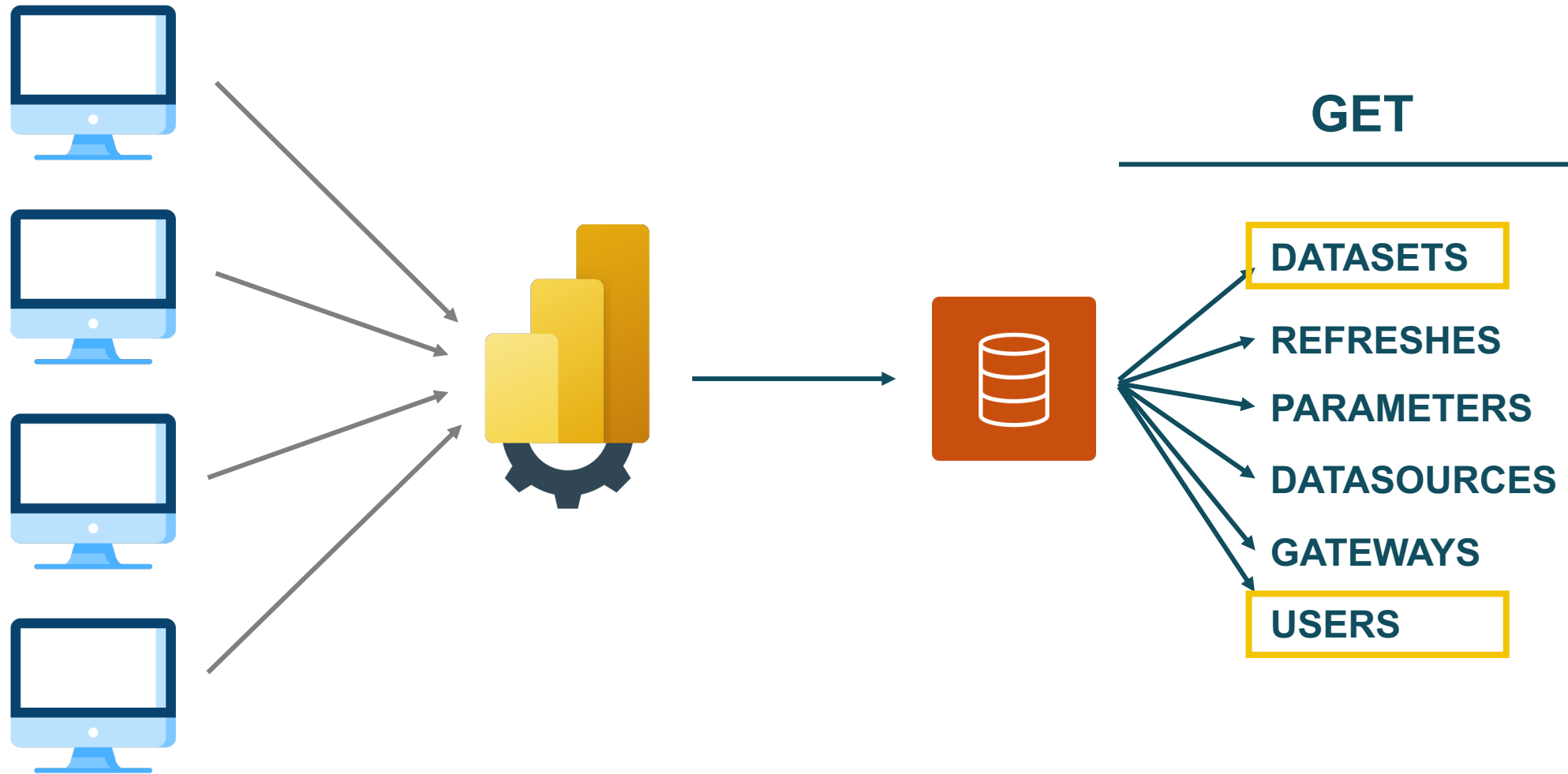


AUDIT



AUTOMATION

POWER BI REST API



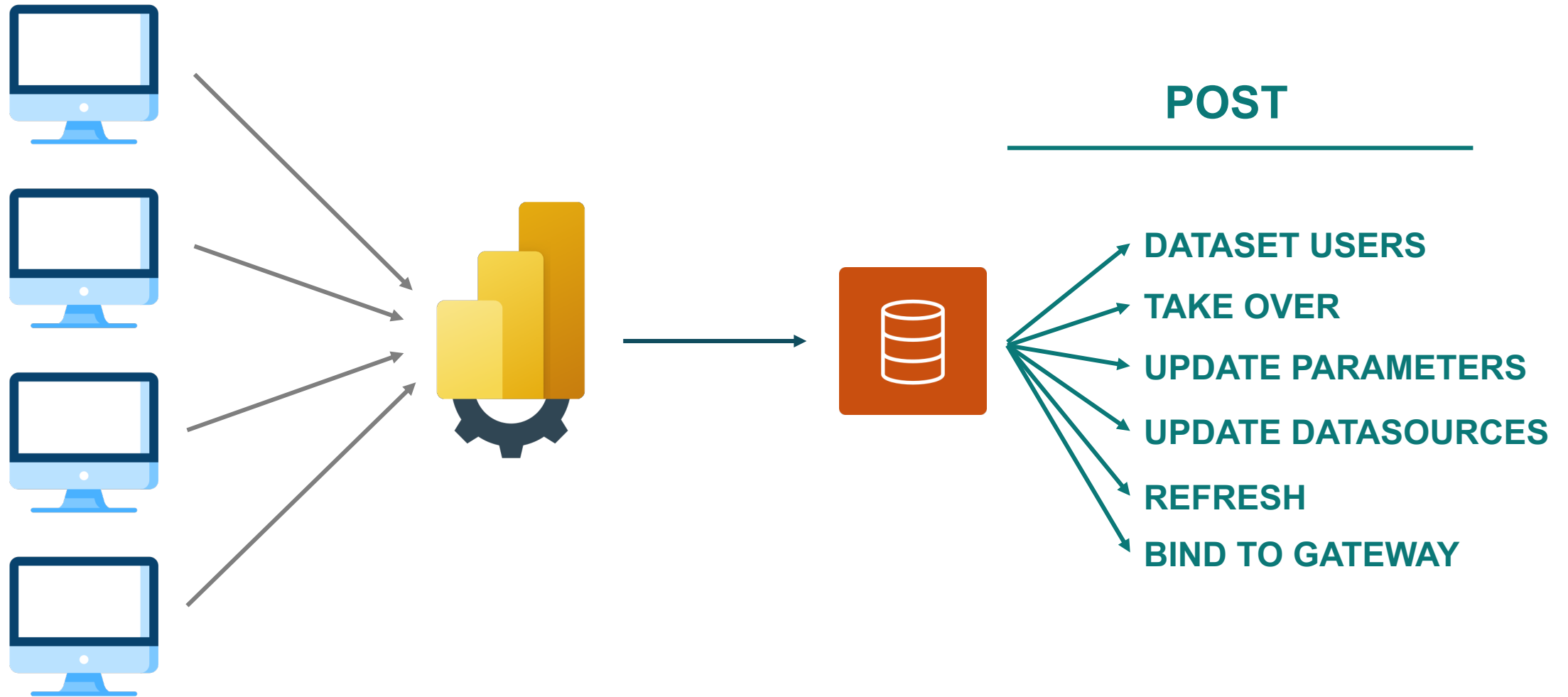
Get-Datasets

id	5931ae74-e90b-4eff-905e-bf453514c15b
name	Internal Reporting
addRowsAPIEnabled	FALSE
configuredBy	stepan.resl@databrothers.cz
isRefreshable	TRUE
isEffectiveldentityRequired	FALSE
isEffectiveldentityRolesRequired	FALSE
isOnPremGatewayRequired	null
webUrl	https://app.powerbi.com/groups/me/datasets/5931ae74-e90b-4eff-905
targetStorageMode	Abf
createdDate	2021-12-16T12:59:45.55Z
createReportEmbedURL	https://app.powerbi.com/reportEmbed?config=eyJjbHVzdGVyVXJsIjoiaH
qnaEmbedURL	https://app.powerbi.com/qnaEmbed?config=eyJjbHVzdGVyVXJsIjoiaHR0
upstreamDatasets	List

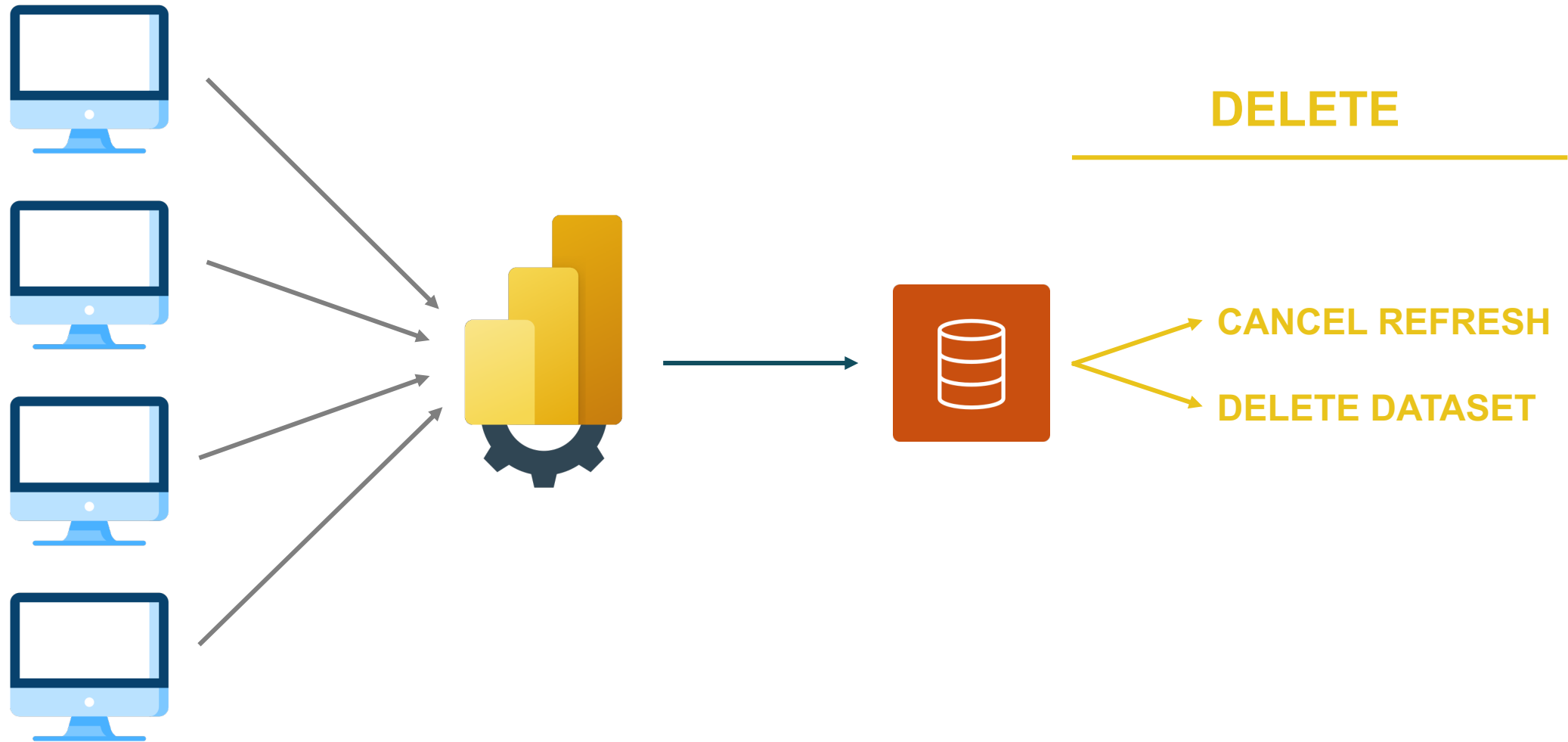
Get-DatasetUsers

	A ^B _C datasetUserAccessRight	A ^B _C emailAddress	A ^B _C displayName	A ^B _C identifier	A ^B _C graphId	A ^B _C principalType	A ^B _C userType
1	ReadWriteReshareExplore	stepan.resl@databrothers.cz	Štěpán Rešl			User	Member
2	ReadWriteReshareExplore	matej.resl@databrothers.cz	Matěj Rešl			User	Member
3	ReadWriteReshareExplore	BoD@databrothers.cz	BoD			Group	null
4	Read	null	dbiAllSecurity			Group	null
5	Read	seniors@databrothers.cz	Seniors			Group	null
6	Read	andrea.barinkova@databrothers.cz	Andrea Bařínková			User	Member
7	ReadReshare	null	Whole Organization			None	null
8	ReadWriteReshareExplore	null	testuserPrincipal			App	null

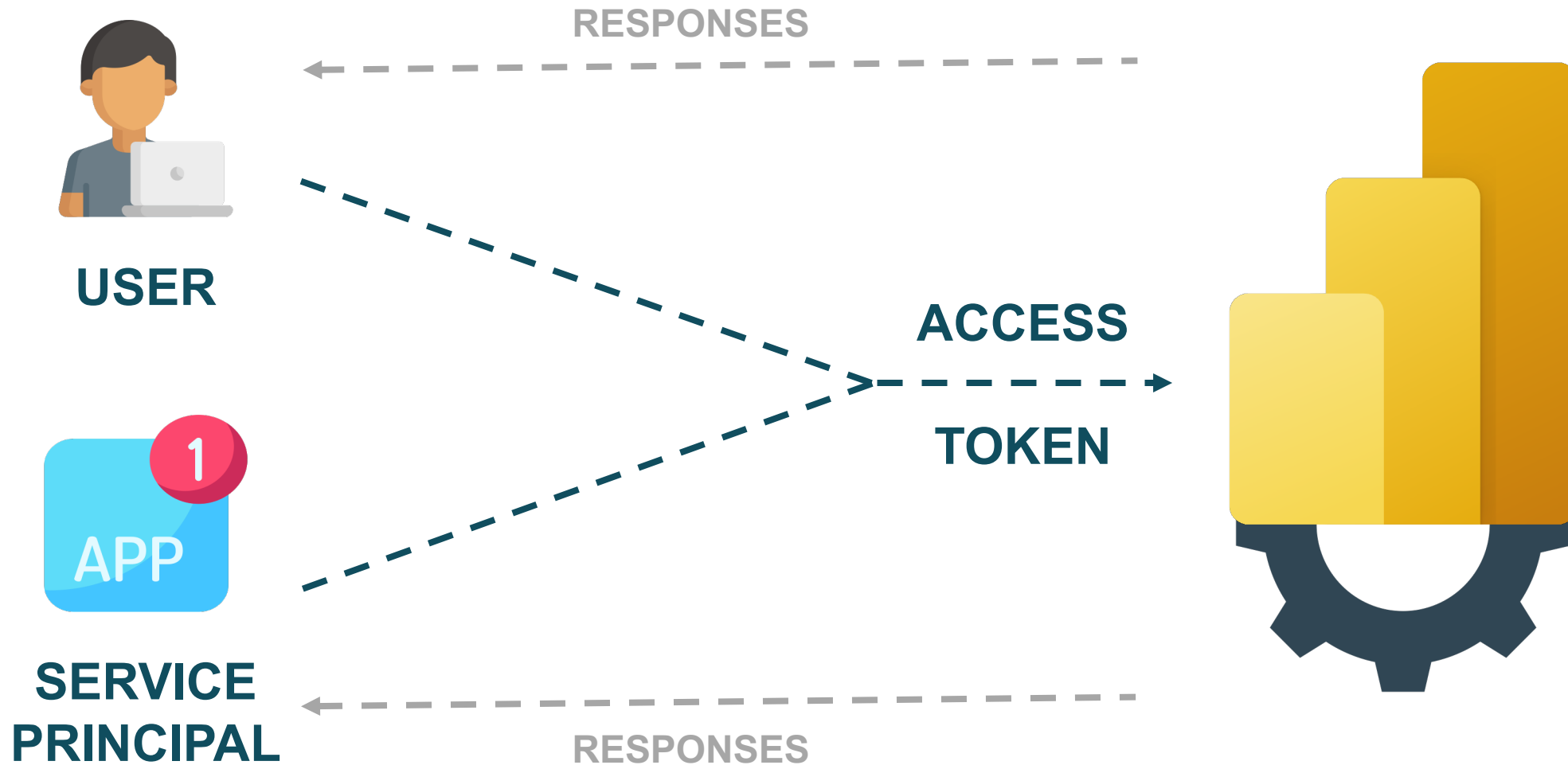
POWER BI REST API



POWER BI REST API

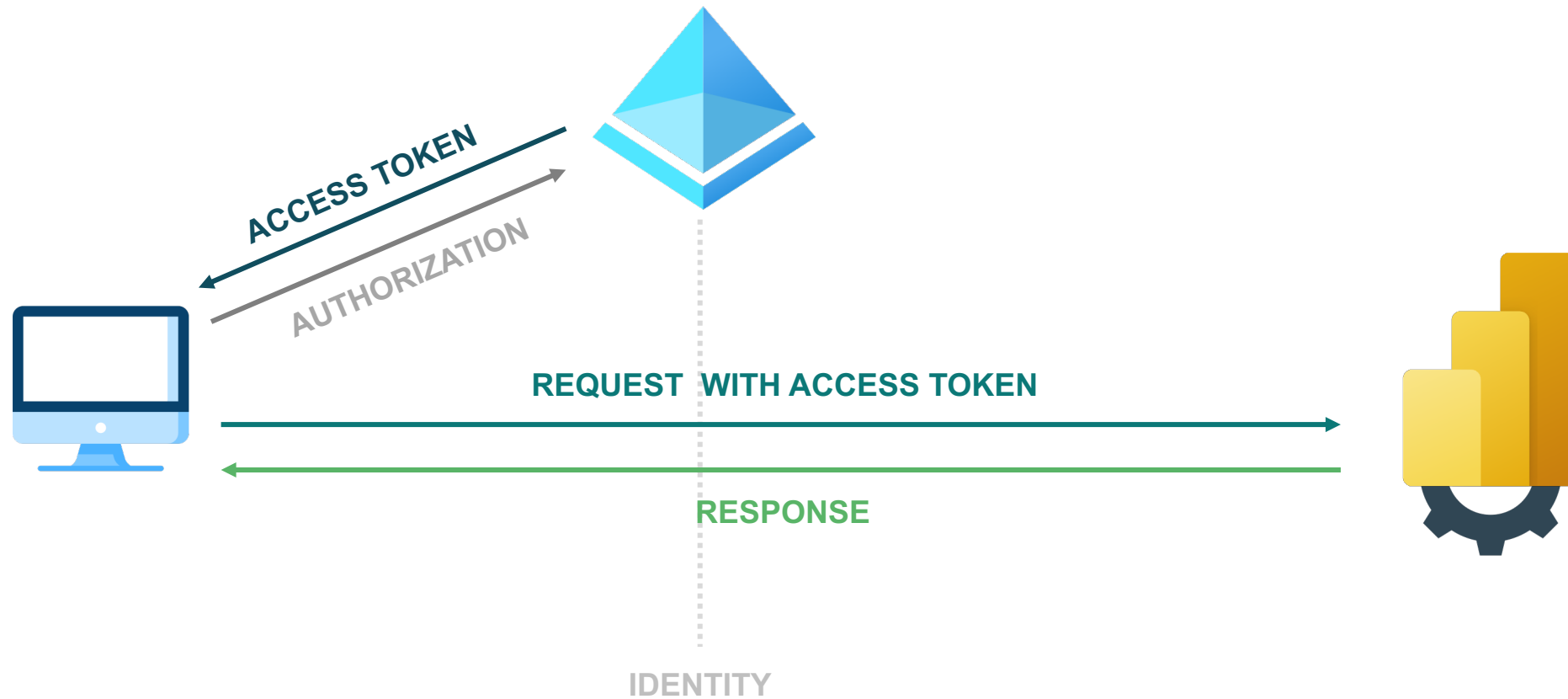


BUT HOW TO ACCESS IT?



ACCESS TOKEN – WHY & HOW?

AUTHENTICATION



WHEN TO USE WHAT TYPE?



USER



**SERVICE
PRINCIPAL**



USER

Such queries are executed from the user's perspective, so they only have access to artifacts that the user can see and always respect his rights.

Get Reports

Get Page

Take over

Clone Report

Delete Report


Update Datasources

...



USER

≡ Graph Explorer

Štěpán Rešl
stepan.resl@dataprothers.cz

Sample queries

Resources

Search sample queries

See more queries in the [Microsoft Graph API Reference docs](#).

Getting Started (8)

GET my profile

GET my profile (beta)

GET my photo

GET my mail

GET all the items in my drive

GET items trending around me

GET my manager

GETv1.0https://graph.microsoft.com/v1.0/meRun query

Request bodyRequest headersModify permissions (Preview)Access token


Response previewResponse headersCode snippetsToolkit componentAdaptive cardsExpand

When you use Microsoft Graph APIs, you agree to the [Microsoft APIs Terms of Use](#). View the [Microsoft Privacy Statement](#).



USER

Graph Explorer

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Sample queries

Resources

Search sample queries

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Getting Started (8)

GET my profile

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GET my photo

GET my mail

GET all the items in my drive

GET items trending around me

GET my manager

GET v1.0 https://graph.microsoft.com/v1.0/me

Run query

Request body

Request headers

Modify permissions (Preview)

Access token

Response preview

Response headers

Code snippets

Toolkit component

Adaptive cards

Expand

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USER

➤ Request body

📄 Request headers

🔑 Modify permissions (Preview)

🔒 Access token

Permissions (7)

One of the following permissions is required to run the query. Select a permission and click Consent.

Directory.ReadWrite.All	Allows the app to read and write data in your organization's directory, such as other users, groups. It does not allow the app to delete users or groups, or reset user passwords.	✓	Consented
User.Read	Allows you to sign in to the app with your organizational account and let the app read your profile. It also allows the app to read basic company information.	×	Consented
User.Read.All	Allows the app to read the full set of profile properties, reports, and managers of other users in your organization, on your behalf.	✓	Consented
User.ReadBasic.All	Allows the app to read a basic set of profile properties of other users in your organization on your behalf. Includes display name, first and last name, email address and photo.	×	Consented
User.ReadWrite	Allows the app to read your profile, and discover your group membership, reports and manager. It also allows the app to update your profile information on your behalf.	×	Consented
User.ReadWrite.All	Allows the app to read and write the full set of profile properties, reports, and managers of other users in your organization, on your behalf.	✓	Consented



USER

EASY USER AUTHORIZATION AGAINST AAD IN POWER QUERY???

```
937 // Output generators
938 // ** Generic Fuctions
939 pbiAdminAPI = [
940     TestConnection = (dataSourcePath) => {"pbiAdminAPI.Navigation"},
941     Authentication = [
942         Aad = [
943             AuthorizationUri = authorize_uri,
944             Resource = resource_uri
945         ]
946     ],
947     Label = Extension.LoadString("DataSourceLabel")
948 ];
949 // ** Groups
950 [
951     DataSource.Kind = "pbiAdminAPI"
952 ]
```



SERVICE PRINCIPAL

Queries of this type are directly aimed at searching for information about the environment, its management and its modification, such as:

Get Groups

Get Datasources Of Dataset

Get Users of Dataset

Get ActivityEvents

Get WidelySharedArtifactsLinksSharedToWholeOrganization

Rotate EncryptionKey

Set Information Protection Label

...



SERVICE PRINCIPAL NEEDS

Admin API settings

- ▶ Allow service principals to use read-only Power BI admin APIs
Enabled for a subset of the organization
- ▶ Enhance admin APIs responses with detailed metadata
Enabled for a subset of the organization
- ▶ Enhance admin APIs responses with DAX and mashup expressions
Enabled for a subset of the organization

Oauth with Power Query



M IS FOR MAGIC!!!



Oauth with Power Query

URL

RELATIVE PATH

BODY OF CALL

```
let
    resource = "https://analysis.windows.net/powerbi/api",
    tokenResponse =
        Json.Document(
            Web.Contents(
                "https://login.windows.net",
                [
                    RelativePath = AzureADTenantID & "/oauth2/token",
                    Content =
                        Text.ToBinary(
                            Uri.BuildQueryString(
                                [
                                    client_id = AzureApplicationClientID,
                                    resource = resource,
                                    grant_type = "client_credentials",
                                    client_secret = AzureApplicationClientSecret
                                ]
                            )
                        )
                ]
            ),
            Headers = [
                Accept = "application/json"
            ],
            ManualStatusHandling = {
                400
            }
        )
    token_output =
        tokenResponse[token_type]
        & " "
        & tokenResponse[access_token]
in
    token_output,
```



RESPONSE

✕

✓

fx

= getPBIToken("08744604·2b47618aee96", "q6", "e6b")

token_type	Bearer
expires_in	3599
ext_expires_in	3599
expires_on	1648631930 !!!!!!!
not_before	1648628030
resource	https://analysis.windows.net/powerbi/api
access_token	eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiIsIng1dCI6ImpTMVhvbMU9XRGpfNTJYndHTmd2UU8yV



Oauth with Power Query

URL

RELATIVE PATH

BODY OF CALL

ACCESS TOKEN
BUILDER

```
let
    resource = "https://analysis.windows.net/powerbi/api",
    tokenResponse =
        Json.Document(
            Web.Contents(
                "https://login.windows.net",
                [
                    RelativePath = AzureADTenantID & "/oauth2/token",
                    Content =
                        Text.ToBinary(
                            Uri.BuildQueryString(
                                [
                                    client_id = AzureApplicationClientID,
                                    resource = resource,
                                    grant_type = "client_credentials",
                                    client_secret = AzureApplicationClientSecret
                                ]
                            )
                        )
                ]
            ),
            Headers = [
                Accept = "application/json"
            ],
            ManualStatusHandling = {
                400
            }
        )
    token_output =
        tokenResponse[token_type]
        & " "
        & tokenResponse[access_token]
in
    token_output,
```


COMPLETED RESPONSE

Bearer

TOKEN TYPE

`eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiIsIng1dCI6ImpTMVhvMU9XRGPfNTJYndHTmd2UU8yVnpNYysImtpZCI6ImpTMVhvMU
iMiOQZmQOLTRkMzYtYjEwZS04NjkKZGUzMGRGY0NmLiJCjhcHBpZGFjcil6ljElCjpZAiOiJodHRwciovL3NOcy53YW5kb3dzLm5ldC8
WI2MTNOa3Zad0FBliwidmVyIjoMS4wlIn0.WXLCFLWen2Hl4vnSgNZHa8PZ9AKgCRlv2SqkdvmfjfKf_numal5vjWklW9tfziAgz37sy`

ACCESS TOKEN



Oauth with Power Query

WHERE I CAN
GET THESE???

RESOURCE IS HERE

```
let
    resource = "https://analysis.windows.net/powerbi/api",
    tokenResponse =
        Json.Document(
            Web.Contents(
                "https://login.windows.net",
                [
                    RelativePath = AzureADTenantID & "/oauth2/token",
                    Content =
                        Text.ToBinary(
                            Uri.BuildQueryString(
                                [
                                    client_id = AzureApplicationClientID,
                                    resource = resource,
                                    grant_type = "client_credentials",
                                    client_secret = AzureApplicationClientSecret
                                ]
                            )
                        )
                ]
            ),
            Headers = [
                Accept = "application/json"
            ],
            ManualStatusHandling = {
                400
            }
        )
    token_output =
        tokenResponse[token_type]
        & " "
        & tokenResponse[access_token]
in
    token_output,
```

IDS & SECRETS

IDs & Secrets



IDs & Secrets

https://portal.azure.com/#blade/Microsoft_AAD_IAM/ActiveDirectoryMenuBlade/RegisteredApps

Application (client) ID :

Object ID

: 494f275b-77a5-46cf-abbcb-134628450f9e



Certificates & secrets

Description	Expires	Value ⓘ	Secret ID
pbi	1/10/2024	<input type="text"/>	 



IDs & Secrets

Application (client) ID :

Object ID : 494f275b-77a5-46cf-abbc-134628450f9e

Description	Expires	Value ⓘ
pbi	1/10/2024	<input type="text"/>

```
let
    resource = "https://analysis.windows.net/powerbi/api",
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        Json.Document(
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                [
                    RelativePath = AzureADTenantID & "/oauth2/token",
                    Content =
                        Text.ToBinary(
                            Uri.BuildQueryString(
                                [
                                    client_id = AzureApplicationClientID,
                                    resource = resource,
                                    grant_type = "client_credentials",
                                    client_secret = AzureApplicationClientSecret
                                ]
                            )
                        )
                ],
                Headers = [
                    Accept = "application/json"
                ],
                ManualStatusHandling = {
                    400
                }
            )
        ),
    token_output =
        tokenResponse[token_type]
        & " "
        & tokenResponse[access_token]
in
    token_output,
```

PRODUCTION TIME

RULES THAT HAS TO BE FOLLOWED

- Every API Call has its limitations (calls per Hour, execution time, permissions,...)
- Client secret & Generated Token has its own lifespan and after expiration you have to create a new one!
- Power BI Desktop will allow you to do a little more then your dataset really can in Power BI Service. But Dataflow will save you!
- Dataflows store entities/tables as a type table. If loaded query output is text, number etc... Dataflow natively converts it. To prevent it you have to disable the load of query.
- Data Sources that use Anonymous authentication are automatically given the privacy level Public!!!

Lets build Dataset from functions

Functions [37]

- fx getInfo
- fx getPBIToken
- fx getModifiedWorkspaces
- fx getAppsAsAdminWithoutUsers
- fx getAppUsersAsAdmin
- fx getAppsAsAdminWithUsers
- fx getCapacities
- fx getCapacityUsersAsAdmin
- fx getDatasetUsersAsAdmin
- fx getDatasetsAsAdminWithoutUsers
- fx getDatasetsAsAdminWithUsers
- fx getDatasourcesOfDatasetAsAdmin
- fx getDatasetsAsAdminWithUsers&Datasources
- fx getDatasetRefreshes
- fx getGroupsAsAdmin
- fx getDatasetsInGroupAsAdmin
- fx getDatasetRefreshHistory
- fx getLastDatasetRefreshError
- fx get PipelinesAsAdmin
- fx getDataflowsAsAdmin
- fx getGroupsAsAdminWithUsers
- fx getUserSubscriptionsAsAdmin
- fx getDashboardsAsAdmin
- fx getDashboardTilesAsAdmin
- fx getDashboardsFromWorkspaceWithTilesAsAdmin
- fx getReportsAsAdmin
- fx getReportsInWorkspaceAsAdmin
- fx getReportUsersAsAdmin
- fx getReportSubscriptionsAsAdmin
- fx getGraphToken
- fx getLabels
- fx getDataFromDifferentDataset
- fx getAvailableFeatures
- fx getImports
- fx getDataflowStorageAccounts
- fx getLinksSharedToWholeOrganization
- fx getPublishedToWeb



- Groups
- Pipelines
- Dataflows
- User Subscriptions
- Dashboards
- Dashboards from Selected Workspace
- Reports
- Labels
- DaxQuery
- Available Features
- Imports



What Will will see on refresh in PBIS?



Data source error Information is needed in order to combine data;Information about a data source is required.. The exception was raised by the IDataReader interface. Please review the error message and provider documentation for further information and corrective action. Table: refreshMyDataset.

Cluster URI WABI-WEST-EUROPE-D-PRIMARY-redirect.analysis.windows.net

Activity ID 7887cca8-4840-44ef-899a-56bb1cf77c4d

Request ID 2ea4771b-6203-0f32-62cf-3a4b0f60d622

Time 2022-03-14 12:37:56Z

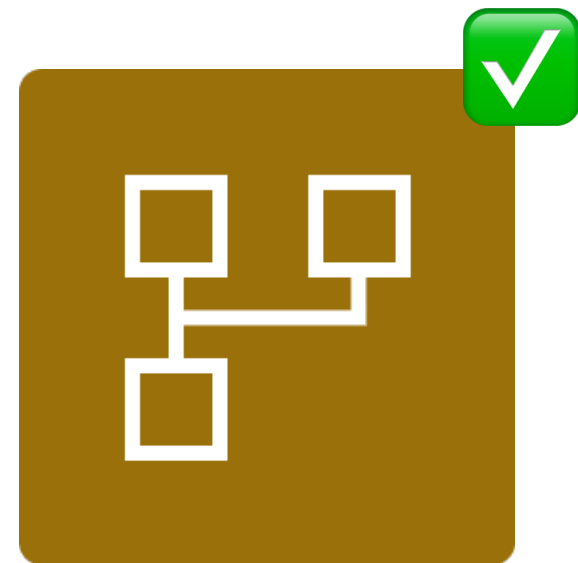
 Copy

WHY?

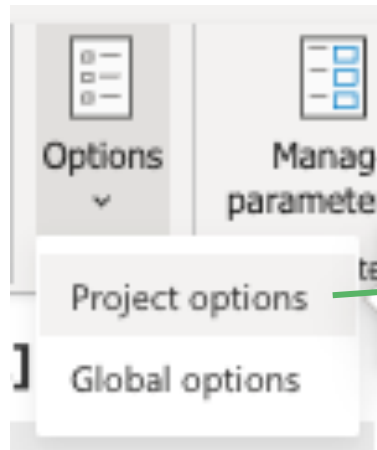


[Chris Webb's BI Blog: Power BI Data Privacy Levels And Cloud /Web-Based Data Sources Or Dataflows](#)
[Chris Webb's BI Blog \(crossjoin.co.uk\)](#)

How to make it work?



How to make it work?



Project options

Data gateway

(none) 

Locale

English (United States) 

☒ Automatically detect column types and headers for unstructured sources

☒ Allow combining data from multiple sources. This could expose sensitive or confidential data to an unauthorized person

Session ID

b29a3dcc-3da4-4207-9d28-ce1a4f83e4ee

Application version

1.0.216.8366

[Export diagnostics](#)

OK

Cancel

Data showtime

Queries [4]

Functions

fx

getToken

fx

getWorkspaces

Tokens

token

Outputs

Workspaces

```
1 let
2   Source = getWorkspaces(token,null)
3 in
4   Source
```

	id	isReadOnly	isOnDedicatedCapacity	capacityId	capacityMigrationStatus	type	state	name
1		null	FALSE			Workspace	Active	[P] Produkty
2		null	TRUE		Migrated	Workspace	Active	BoD
3		null	TRUE		Migrated	Workspace	Active	[Š] Ukázky na Školení
4		null	FALSE			Workspace	Active	[T] Vzdělávání
5		null	TRUE		Migrated	Workspace	Active	OSŽ Reporting zaměstnanců
6		null	FALSE			Workspace	Active	[T] MultiTenant RLS Test
7		null	TRUE		Migrated	Workspace	Active	[A] Marketing
8		null	TRUE		Migrated	Workspace	Active	[Š] Lego
9		null	TRUE		Migrated	Workspace	Active	[P] Management
10		null	TRUE		Migrated	Workspace	Active	FTE - Premium
11		null	TRUE		Migrated	Workspace	Active	Náklady - Premium
12		null	TRUE		Migrated	Workspace	Active	Nákladová MD Rate
13		null	FALSE			Workspace	Active	Jak vytvořit šablonu aplikace?

Query settings

Properties

Name

Workspaces

Entity type ⓘ

Custom

Applied steps

fx

Source

What about the refresh now?

Refresh history

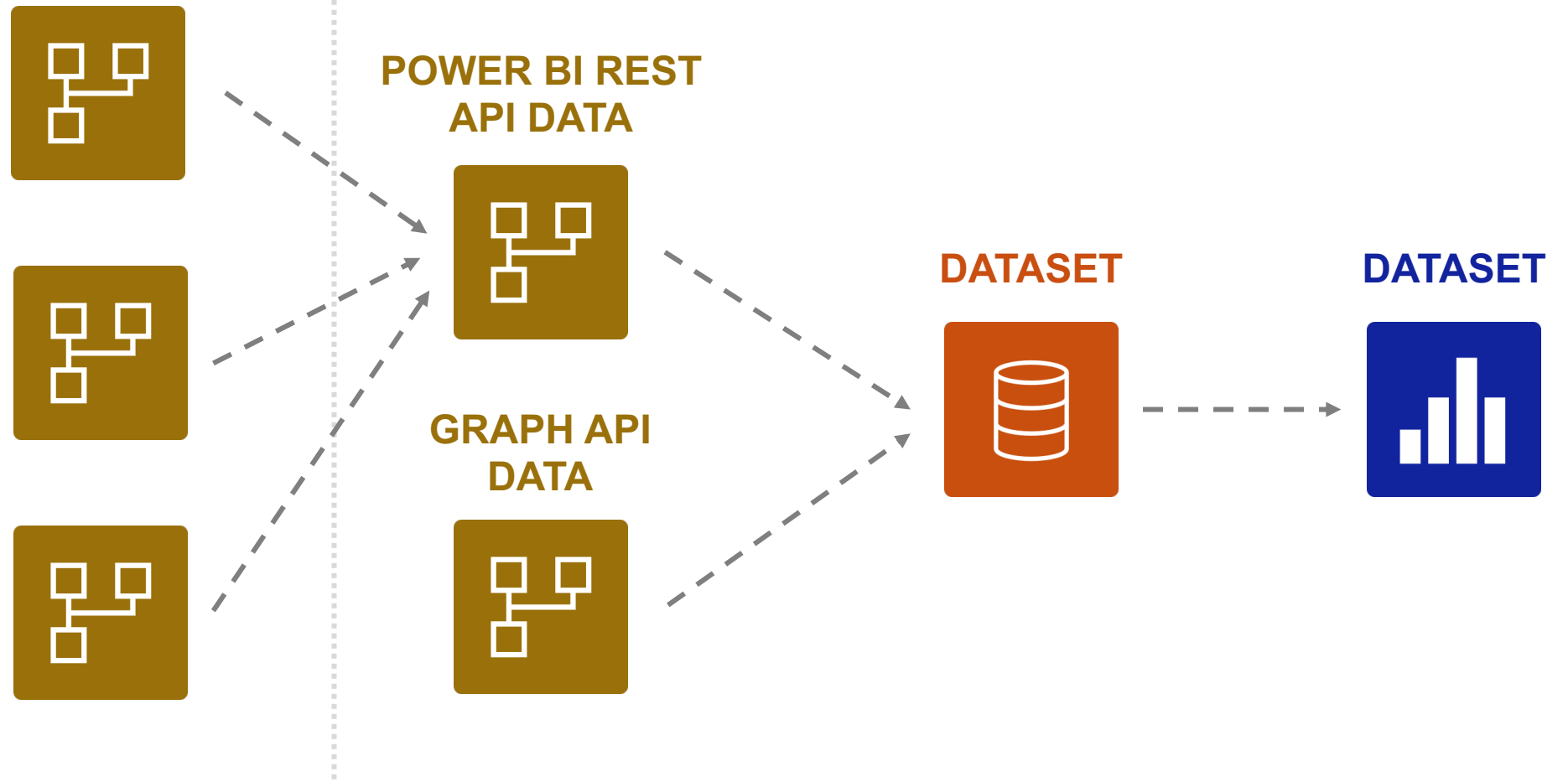
Run time	Type	Duration	Status	
30/03/2022, 13:34:37	On demand	00:00:01	Completed	⬇
29/03/2022, 11:42:43	On demand	00:00:01	Completed	⬇

Close



New construction schema?

Queries with different refresh periods



THANK YOU FOR THE ATTENTION

**WHERE TO FIND THIS
PRESENTATION?**

