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

WAITTING FOR ORDERS

HI! I AM API.

CHEF

WAITTING FOR ORDERS

CUSTOMER

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

REST API

VILLAGE

RESTAURANT

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CASH REGISTER

WAITTING FOR ORDERS

CHEF

WAITTING FOR ORDERS

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REST API

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

CASH REGISTER

WAITTING FOR ORDERS

X

CHEF

WAITTING FOR ORDERS

CUSTOMER

REST API

VILLAGE

RESTAURANT

MENU

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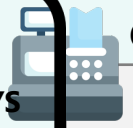
- POST FEEDBACK

CUSTOMER

WHAT DO WE HAVE ON TODAYS MENU?



CASH REGISTER

WAITTING FOR ORDERS

CONTENT: LIST OF MEALS

CHEF

LIST OF MEALS
- BURGER
- PIZZA
- RIZZOTO

REST API

VILLAGE

RESTAURANT

MENU

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

CASH REGISTER

WAITTING FOR ORDERS

CONTENT: RIZZOTO

CHEF

RIZZOTO
... preparing ...
... preparing ...
... preparing ...
DONE

CUSTOMER

REST API

VILLAGE

RESTAURANT

MENU

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

CASH REGISTER

BILL
** GENERATING **
** GENERATING **
DONE

CONTENT: BILLED AMOUNT

CHEF

WAITTING FOR ORDERS

CUSTOMER

REST API

VILLAGE

RESTAURANT

MENU

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

CONTENT: AMOUNT

CASH REGISTER

PAYMENT

** CHECKING AMMOUNT **

** BALANCE = 0 **

** TRANSACTION DONE **

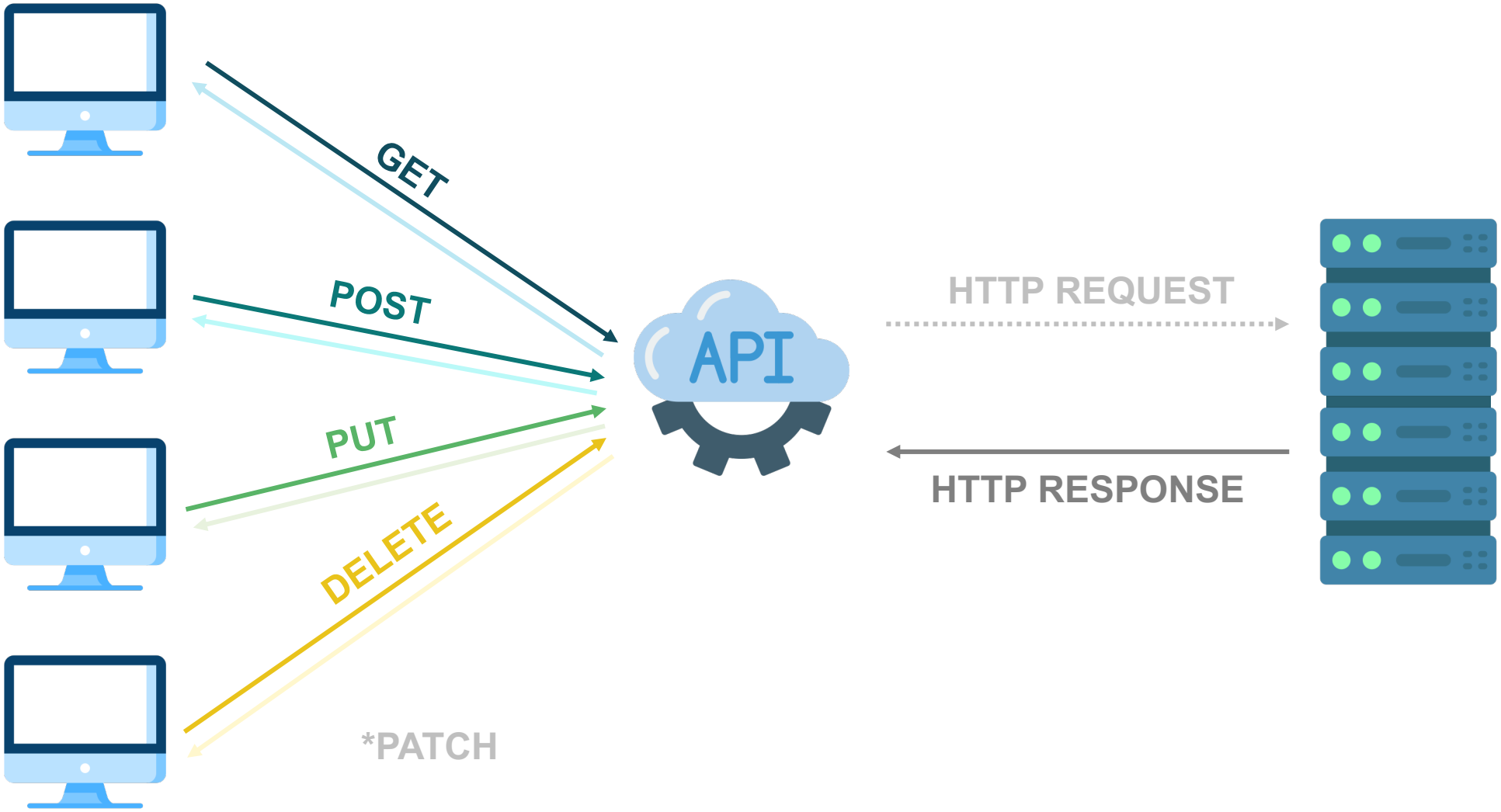
DONE

CHEF

WAITTING FOR ORDERS

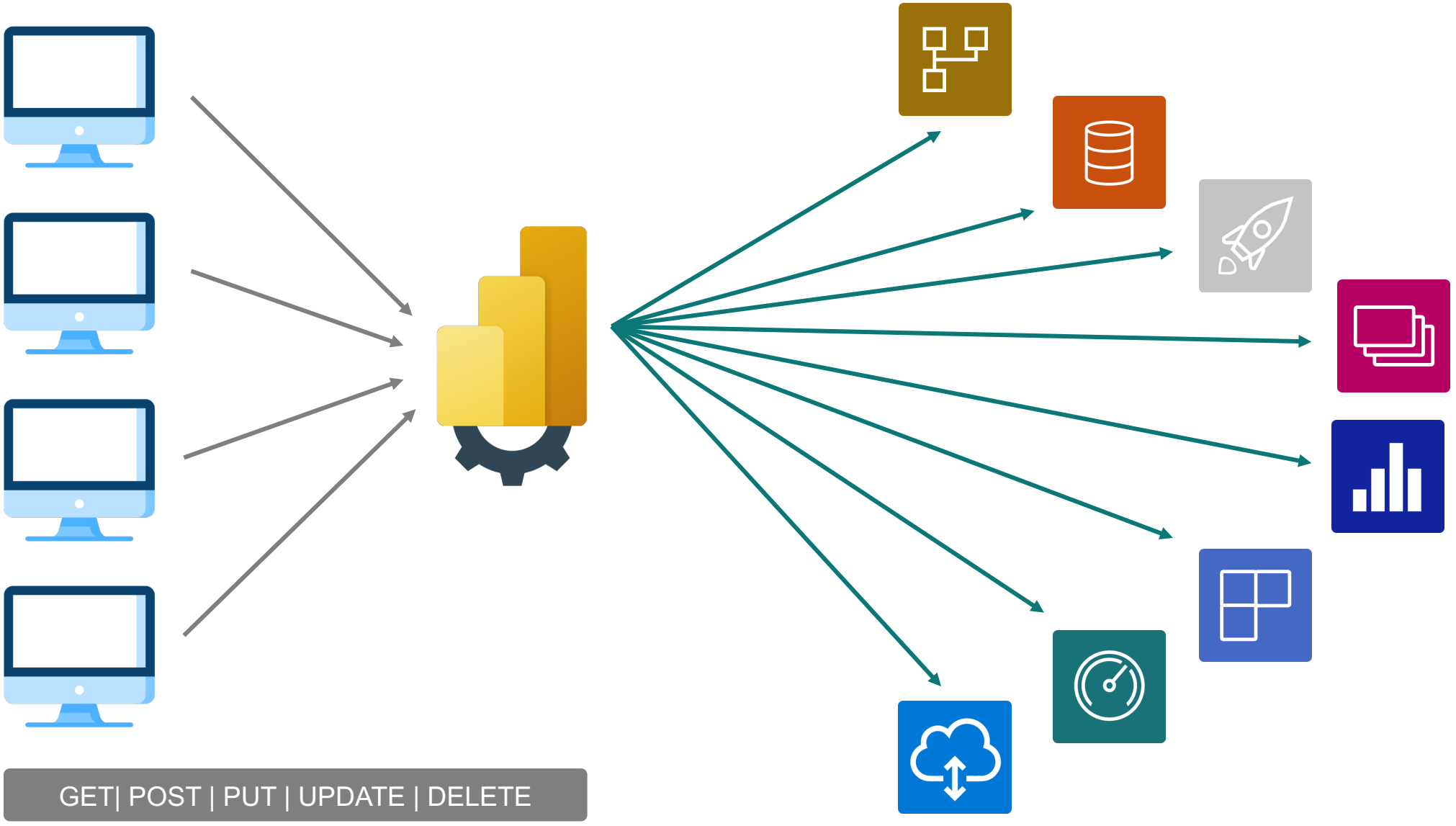
CUSTOMER

REST API


GET
POST
PUT
DELETE
*PATCH
API
HTTP REQUEST
HTTP RESPONSE
JSON | XML | HTML

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

INFORMATIONS

HOW IT CAN HELP ME

LOGS

EXPORTS

INFORMATIONS

AUDIT

HOW IT CAN HELP ME

LOGS

EXPORTS

DEPLOYMENT

INFORMATIONS

AUDIT

HOW IT CAN HELP ME

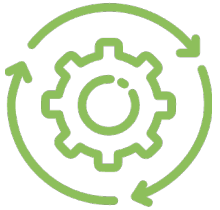
LOGS

EXPORTS

DEPLOYMENT

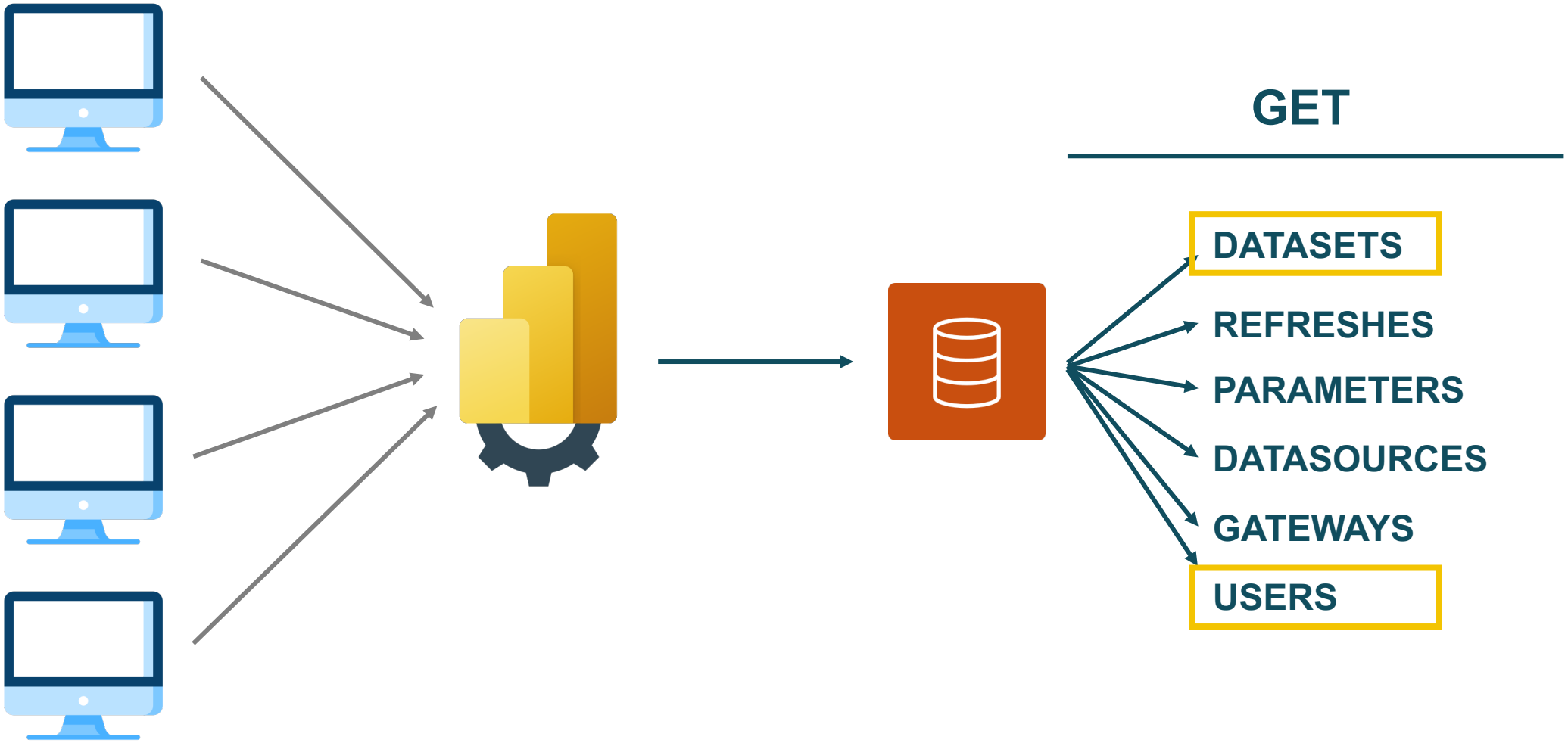
INFORMATIONS

AUDIT



AUTOMATION

POWER BI REST API



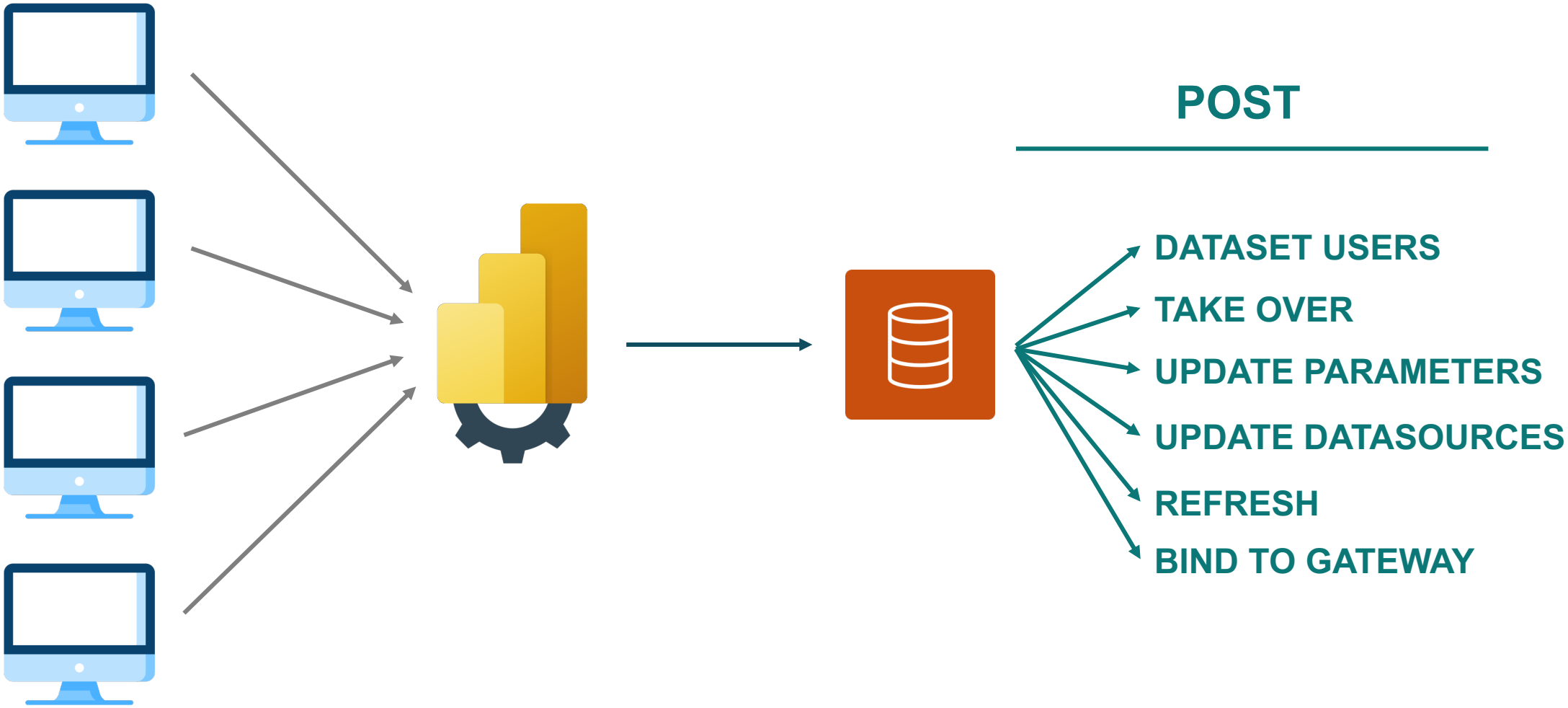
Get-Datasets

id	5931ae74-e90b-4eff-905e-bf453514c15b
name	Internal Reporting
addRowsAPIEnabled	FALSE
configuredBy	stepan.resl@databrothers.cz
isRefreshable	TRUE
isEffectiveIdentityRequired	FALSE
isEffectiveIdentityRolesRequired	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

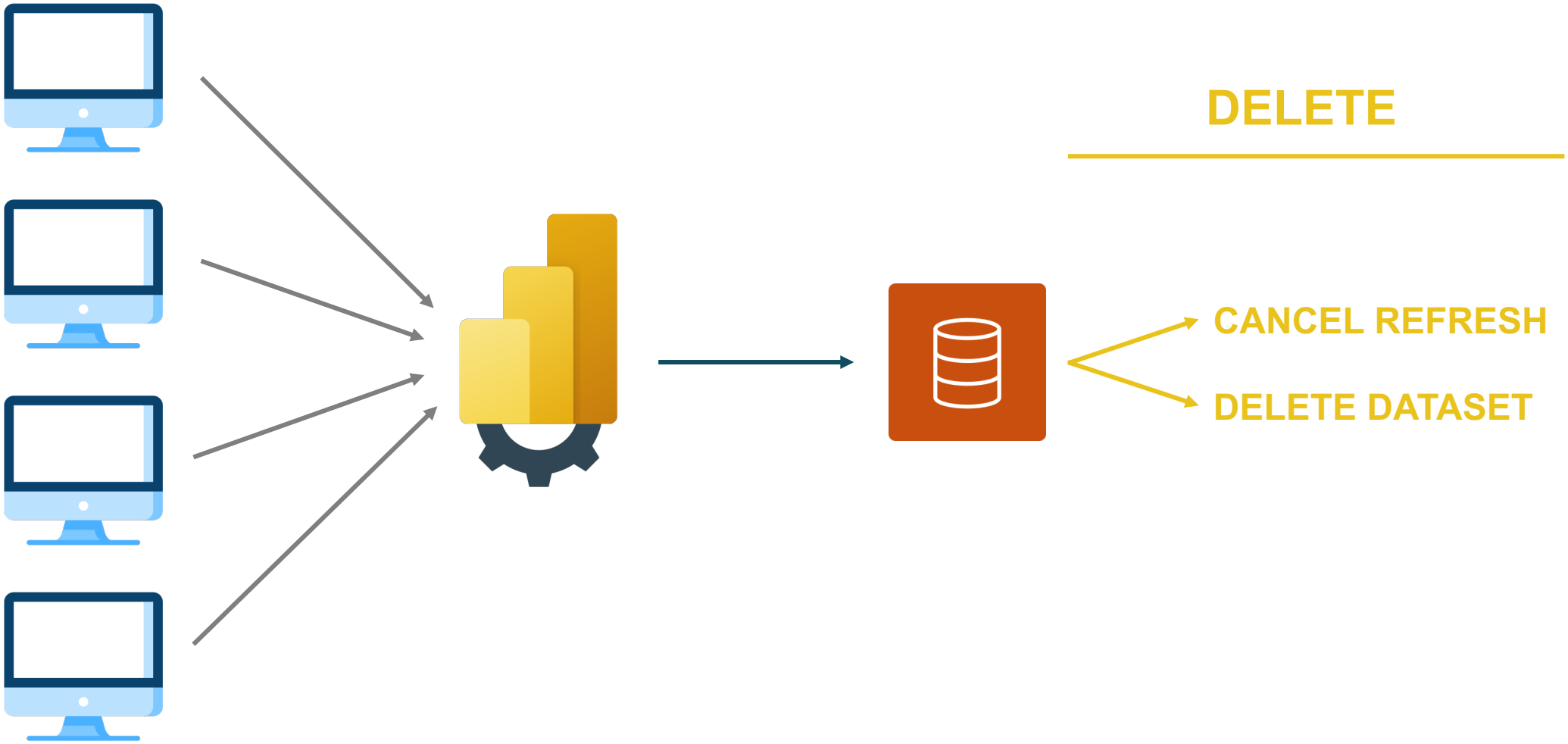
Get-DatasetUsers

	datasetUserAccessRight	emailAddress	displayName	identifier	graphId	principalType	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 Bařinková			User	Member
7	ReadReshare	*null*	Whole Organization			None	*null*
8	ReadWriteReshareExplore	*null*	testuserPrincipal			App	*null*

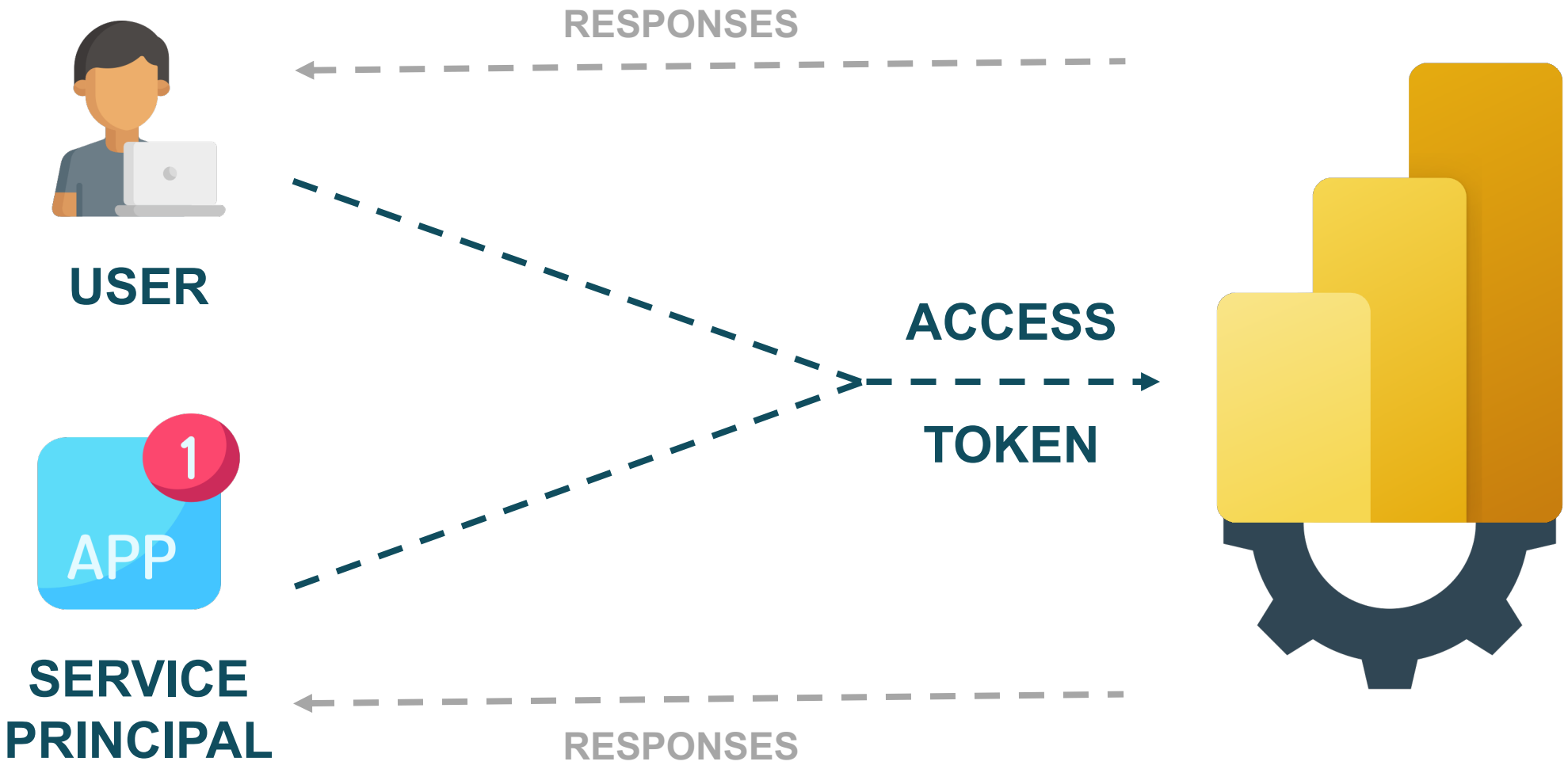
POWER BI REST API



POWER BI REST API

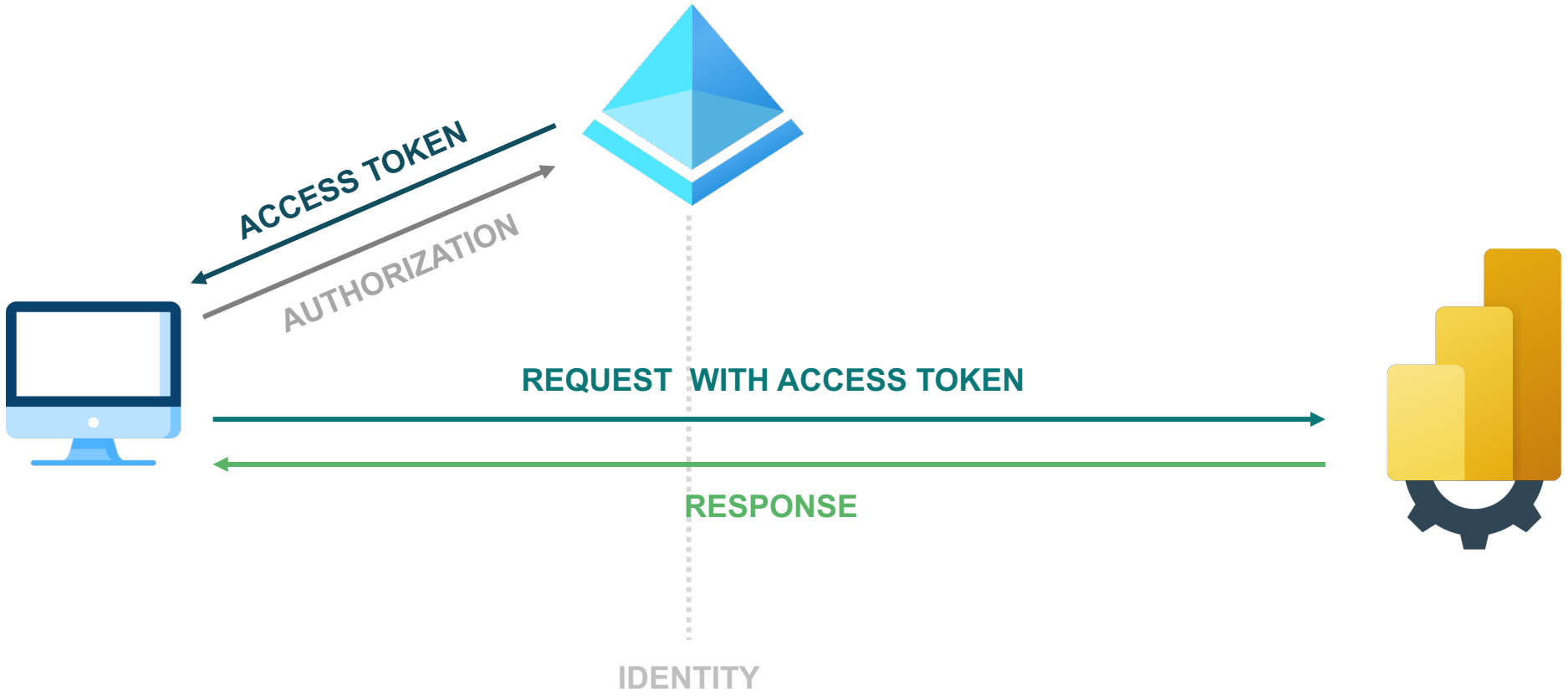


BUT HOW TO ACCESS IT?



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@databrothers.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

GET | v1.0 | https://graph.microsoft.com/v1.0/me | Run query

Request body | Request headers | Modify permissions (Preview) | Access token

When you use Microsoft Graph APIs, you agree to the Microsoft APIs Terms of Use. View the Microsoft Privacy Statement.

Response preview | Response headers | Code snippets | Toolkit component | Adaptive cards | Expand

USER

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Response preview | Response headers | Code snippets | Toolkit component | Adaptive cards | Expand

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 Fucntions
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  ]
```

tirnovar/Power-BI-Admin-REST-API-Connector: Power BI REST API Connector - Admin Version (github.com)

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,
```

Why do I use the RELATIVE PATH statement besides URL Address with parameter?

Power_BI_REST_API_PQ/get-BearerToken.pq at main · tirnovar/Power_BI_REST_API_PQ (github.com)

Because using the URL directly with the parameter will cause the Power BI Service to be unable to recognize the source against which it should set credentials and privacy level settings, it will return an error message.

RESPONSE

```
= getPBIToken("08744604·                2b47618aee96","q                6","e                6b")
```

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	eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiIsIng1dCI6ImpTMVhvMU9XRGpfNTJ2YndHTmd2UU8yV

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,
```

Power_BI_REST_API_PQ/get-BearerToken.pq at main · tirnovar/Power_BI_REST_API_PQ (github.com)

COMPLETED RESPONSE

Bearer

TOKEN TYPE

eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiIsIng1dCI6ImpTMVhvMU9XRGpfNTJ2YndHTmd2UU8yVnpNYyIsImtpZCI6ImpTMVhvMU

iMi04ZmQ0LTRkMzYtYjEwZS04NjlkZGU3MGY0NmIiLCJhcHBpZGFjciI6IjEiLCJpZHAiOiJodHRwczovL3N0cy53aW5kb3dzLm5ldC8

WI2MTNOa3Zad0FBIiwidmVyIjoiMS4wIn0.WXLCFLWen2Hl4vnSgNZHa8PZ9AKgCRlv2SqkDvmfjKf_numaI5vjWklW9tfziAgz37sy

ACCESS TOKEN

Oauth with Power Query

RESOURCE IS HERE

WHERE I CAN GET THESE???

```
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
                    }
                ]
            )
        ),
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in
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```

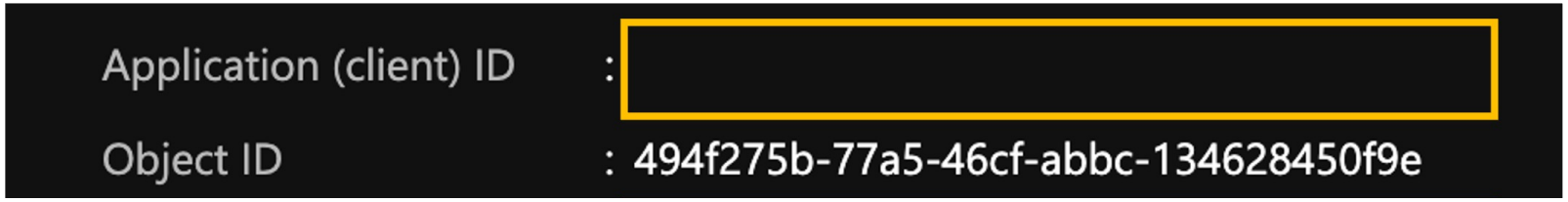
Power_BI_REST_API_PQ/get-BearerToken.pq at main · tirnovar/Power_BI_REST_API_PQ (github.com)

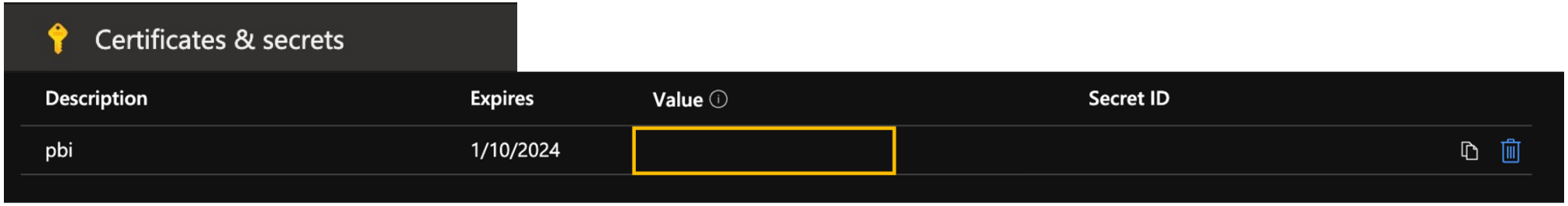
IDS & SECRETS

IDs & Secrets

IDs & Secrets

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





IDs & Secrets

Application (client) ID	:
Object ID	: 494f275b-77a5-46cf-abbc-134628450f9e

Description	Expires	Value ⓘ
pbi	1/10/2024	

```
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(
                                [
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                                    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]
  - getInfo
  - getPBIToken
  - getModifiedWorkspaces
  - getAppsAsAdminWithoutUsers
  - getAppUsersAsAdmin
  - getAppsAsAdminWithUsers
  - getCapacities
  - getCapacityUsersAsAdmin
  - getDatasetUsersAsAdmin
  - getDatasetsAsAdminWithoutUsers
  - getDatasetsAsAdminWithUsers
  - getDatasourcesOfDatasetAsAdmin
  - getDatasetsAsAdminWithUsers&Datasources
  - getDatasetRefreshes
  - getGroupsAsAdmin
  - getDatasetsInGroupAsAdmin
  - getDatasetRefreshHistory
  - getLastDatasetRehreshError
  - getPipelinesAsAdmin
  - getDataflowsAsAdmin
  - getGroupsAsAdminWithUsers
  - getUserSubscriptionsAsAdmin
  - getDashboardsAsAdmin
  - getDashboardTilesAsAdmin
  - getDashboardsFromWorkspaceWithTilesAsAdmin
  - getReportsAsAdmin
  - getReportsInWorkspaceAsAdmin
  - getReportUsersAsAdmin
  - getReportSubscriptionsAsAdmin
  - getGraphToken
  - getLabels
  - getDataFromDifferentDataset
  - getAvailableFeatures
  - getImports
  - getDataflowStorageAccounts
  - getLinksSharedToWholeOrganization
  - getPublishedToWeb

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

[GitHub - tirnovar/Power_BI_REST_API_PQ]

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

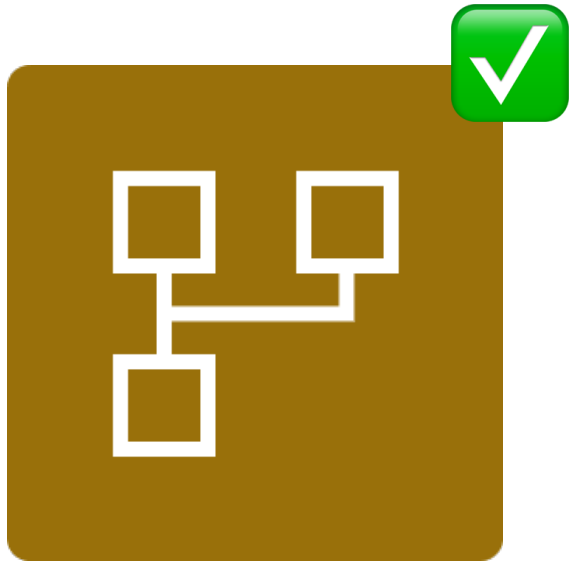
WHY?

Because using the URL directly with the parameter will cause the Power BI Service to be unable to recognize the source against which it should set credentials and privacy level settings so that it will return an error message.

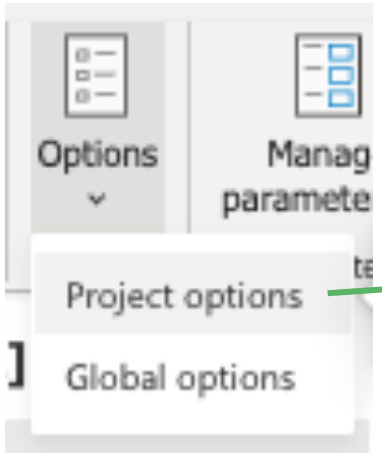
More details?

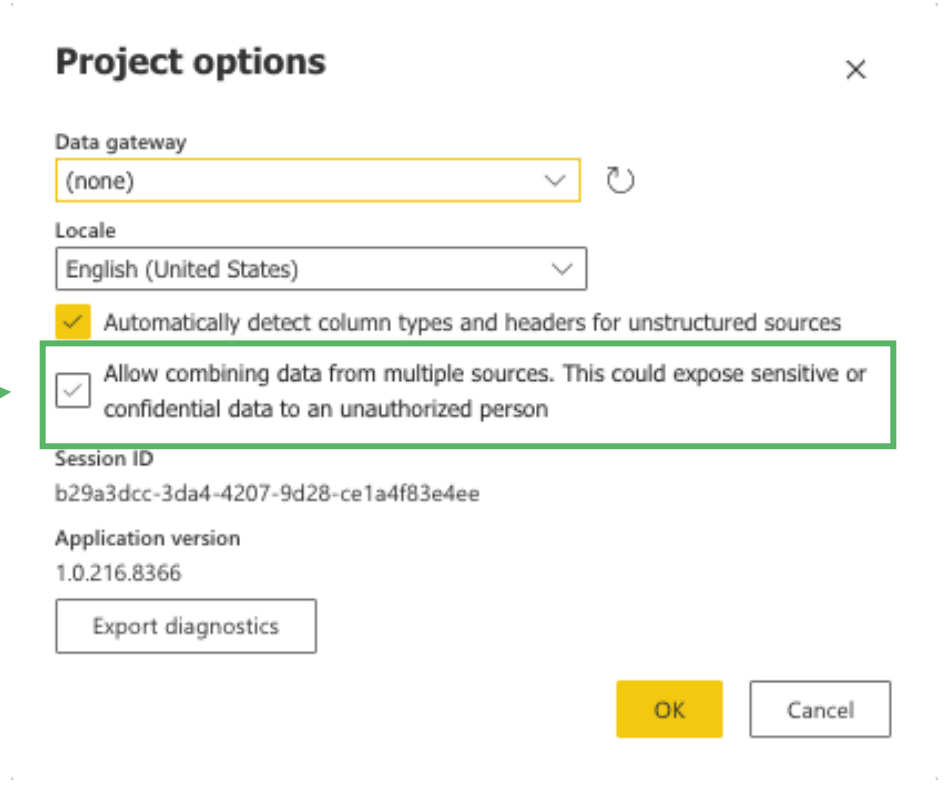
[Chris Webb's BI Blog: Power BI Data Privacy Levels And Cloud /Web-Based Data Sources Or Dataflows](Chris Webb's BI Blog (crossjoin.co.uk))

How to make it work?

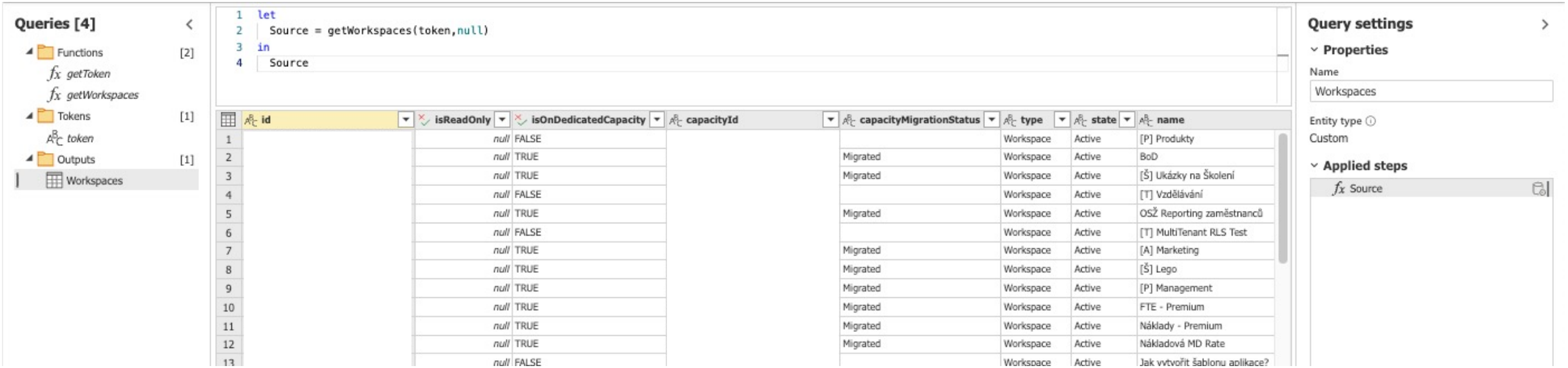


How to make it work?





Data showtime



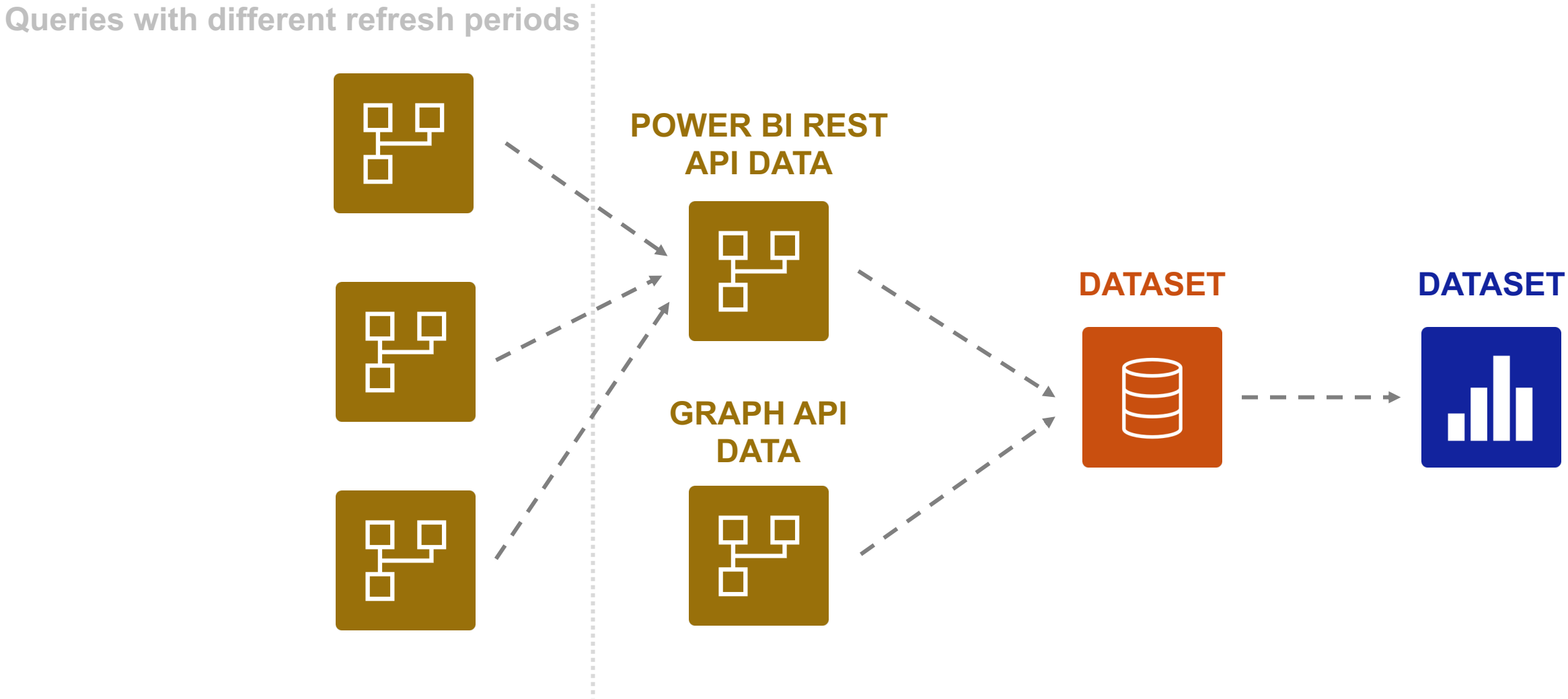
What about the refresh now?

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?



THANK YOU FOR THE ATTENTION

WHERE TO FIND THIS PRESENTATION?