

Advanced semantic models refresh automation in Power BI

Andrea Martorana Tusa



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partner srebrny



Andrea Martorana Tusa



- Italian, living in Denmark
- MVP Data Platform
- Team Manager in Pandora.
 - Product Manager for the Content Management platform, Co-admin of the Power BI tenant
- 20+ years of experience in the world of data with special focus on BI
- Speaker in many events worldwide (SQL Saturday, PASS Summit, Power BI Summit, Data Platform Summit, Power Platform Bootcamp, European Sharepoint Conference ...)



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Agenda

Automation for your semantic models

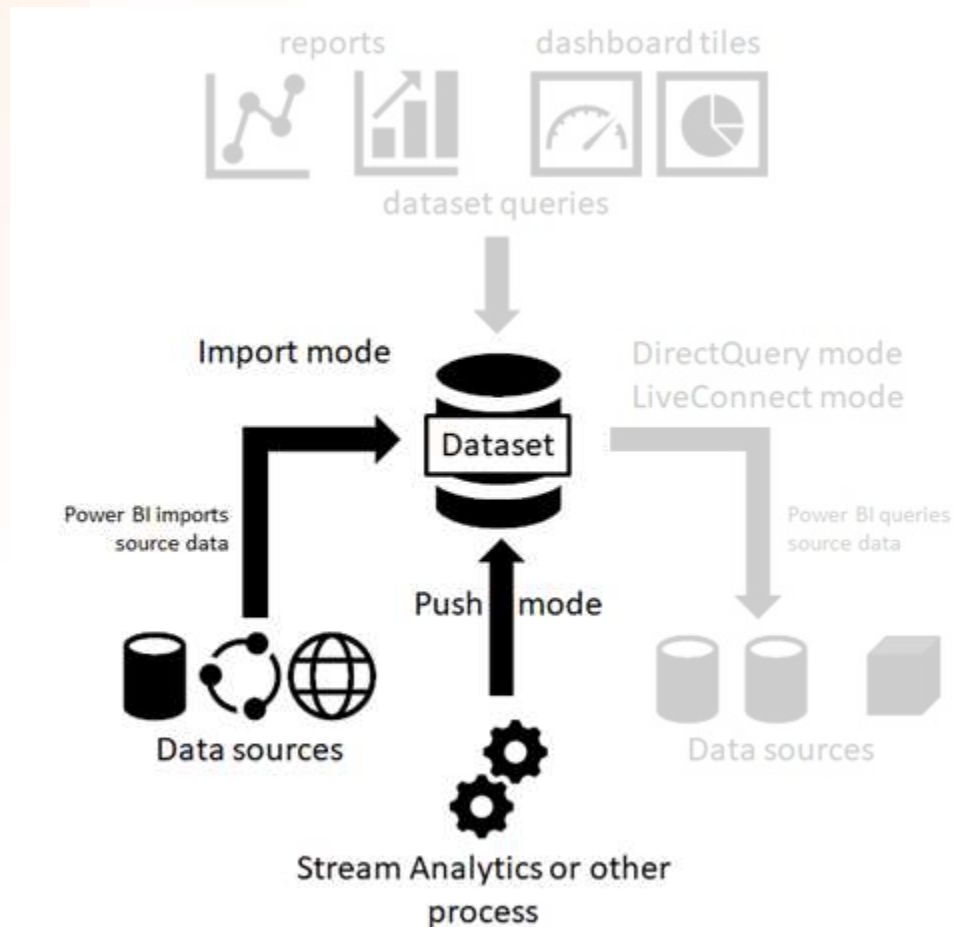
- Power BI datasets API
- Trigger a refresh using Power Automate / Logic Apps
- Trigger a refresh using Powershell
- Connect using XMLA endpoint and SQL Server
- Trigger a single table or partition refresh via XMLA endpoint
- Trigger a single table or partition refresh via Enhanced API
- Trigger a refresh via Azure Data Factory/Synapse Analytics pipelines
- Trigger a refresh via Fabric pipelines

Pandora use cases

- Parameterized flow
- Control Tower semantic model
- Dashboard for the support team

Automation for semantic models

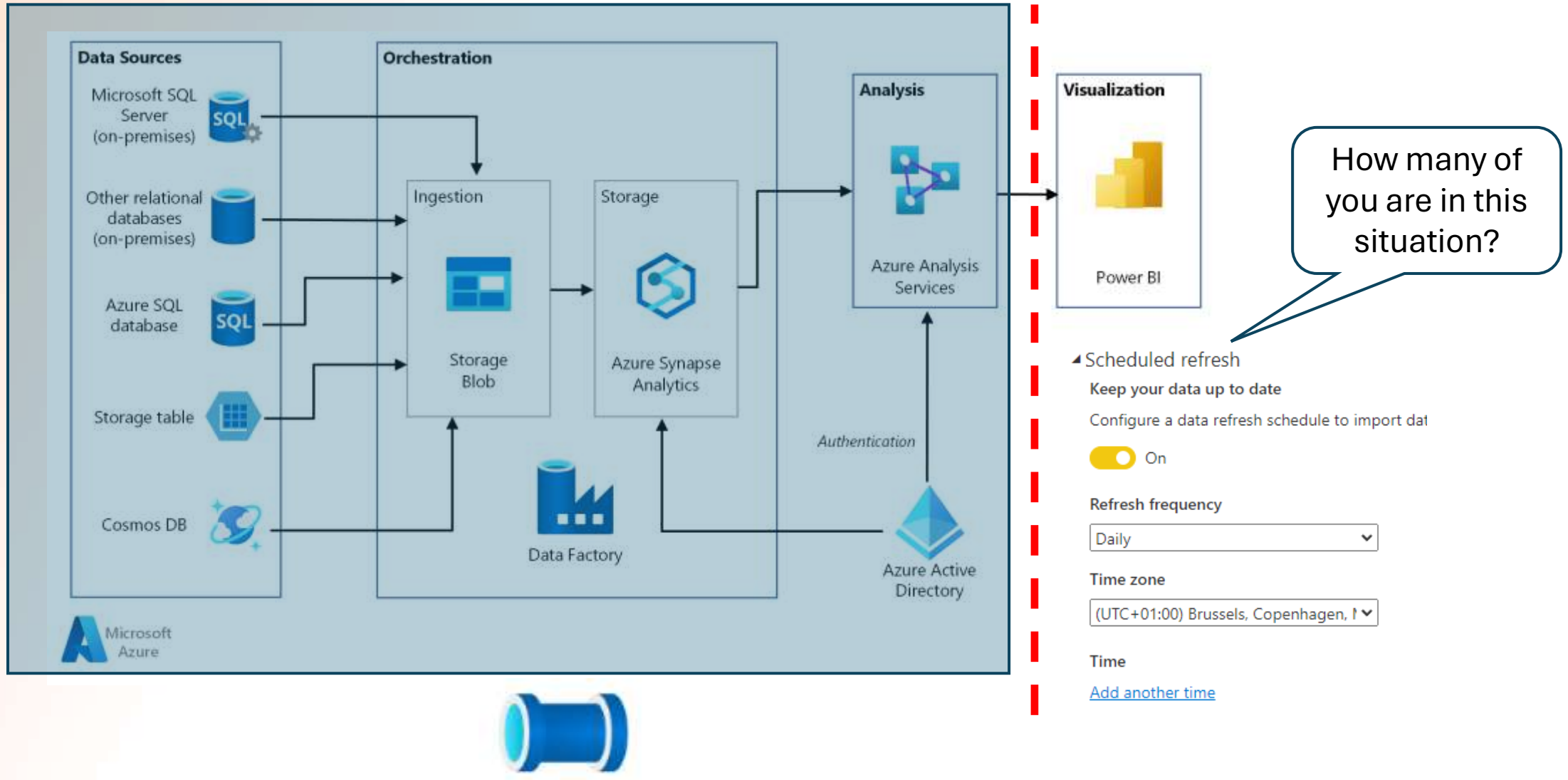
Scope definition: Import mode



Whatever the architecture, there's always a gap between the moment the data is processed in your data source and its availability in Power BI.



An extra asynchronous step is required to refresh the semantic model in Power BI.



◀ Scheduled refresh

Keep your data up to date

Configure a data refresh schedule to import data

☒ On

Refresh frequency

Daily

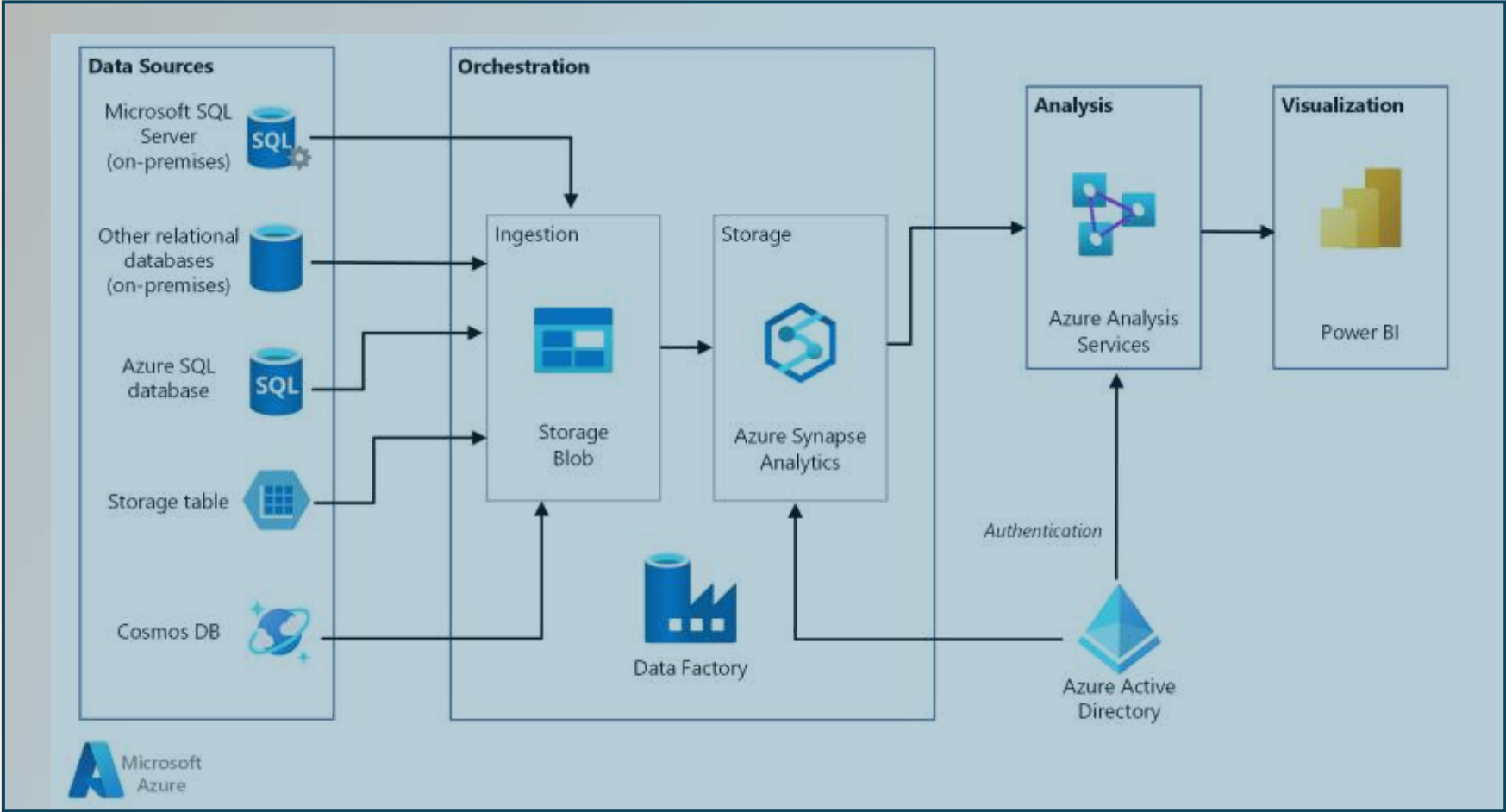
Time zone

(UTC+01:00) Brussels, Copenhagen, I

Time

[Add another time](#)


How to fill the gap? How to trigger the semantic model refresh as part of an ETL process?



Power BI REST API



Using the Power BI REST APIs

Article • 01/11/2022 • 2 minutes to read •  +1

[Is this page helpful?](#) 

The Power BI REST APIs provide service endpoints for embedding, administration, governance and user resources.

With Power BI REST APIs you can do the following:

- Manage Power BI content
- Perform admin operations
- Embed Power BI Content

Service endpoints for embedding, administration, governance and user resources.

Power BI API for datasets

▼ Datasets

- Overview

- Bind To Gateway
- Bind To Gateway In Group
- Delete Dataset
- Delete Dataset In Group
- Discover Gateways
- Discover Gateways In Group
- Execute Queries
- Get Dataset
- Get Dataset In Group
- Get Dataset To Dataflows Links In Group
- Get Datasets
- Get Datasets In Group

.....

- Post Dataset User
- Post Dataset User In Group
- Refresh Dataset
- Refresh Dataset In Group
- Set All Dataset Connections
- Set All Dataset Connections In Group
- Take Over In Group
- Update Datasources

A rich set of APIs is available for datasets handling, including refreshes

HTTP Triggers a refresh for the specified dataset from the specified workspace

POST <https://api.powerbi.com/v1.0/myorg/groups/{groupId}/datasets/{datasetId}/refreshes>

Power BI API for datasets

How to use the Power BI API?



Power Automate built-in action



Power Automate custom connector



Logic Apps action



Powershell cmdlets



Azure Synapse Analytics pipeline



Azure Data Factory pipeline



Azure Databricks notebooks

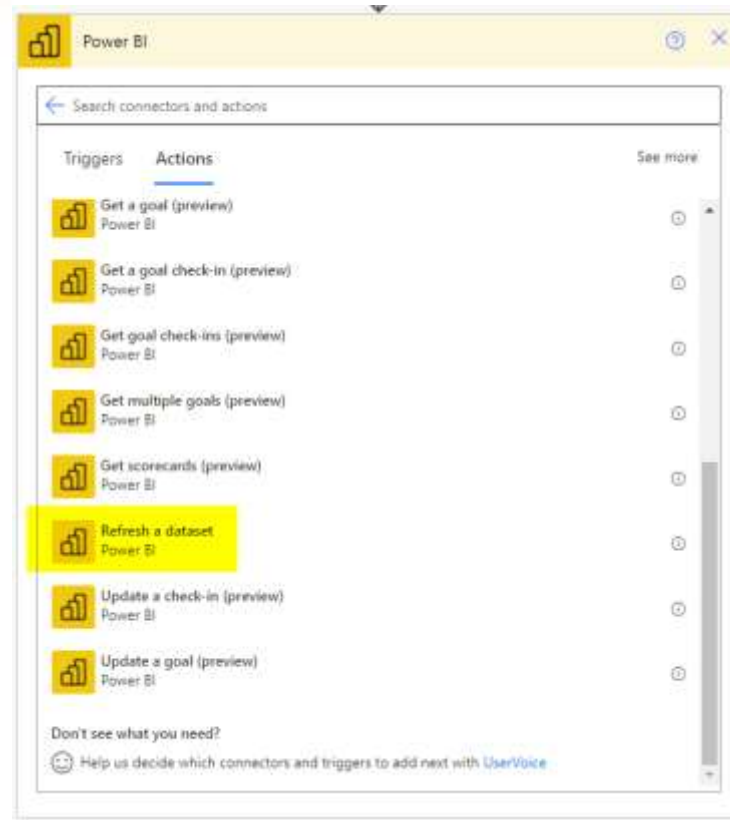


Fabric pipelines

Power Automate



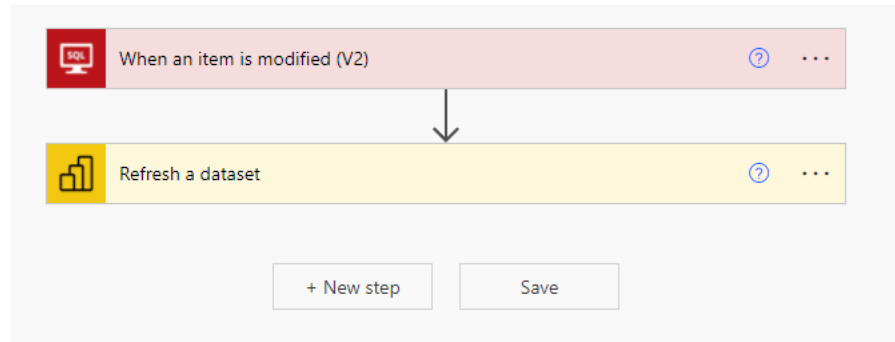
Power Automate comes with a built-in connector to perform actions in Power BI



Power Automate



It is easy and straightforward to create a flow using the standard template. You only need to set up a triggering event for the flow.



Power Automate



Trigger using a custom connector

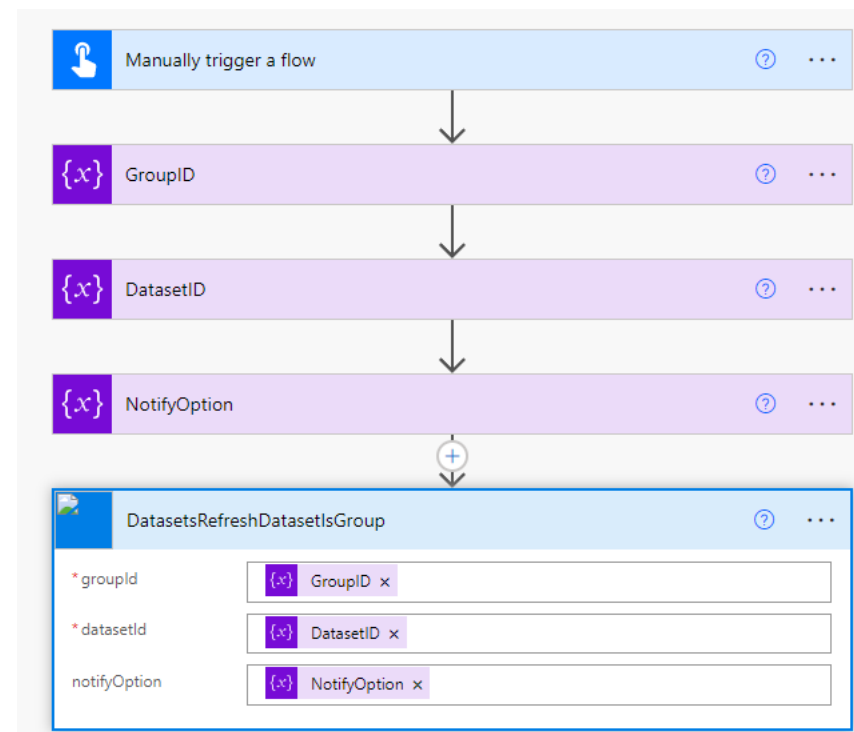
Datasets - Refresh Dataset In Group

Reference

Service: Power BI REST APIs

API Version: v1.0

Triggers a refresh for the specified dataset from the specified workspace.



Power Automate built-in action

DEMO

Enhanced refresh with API



New options available with *enhanced refresh* feature for the REST API:

- Batches commits
- Table and partition-level refresh
- Applying incremental refresh policies
- GET refresh details
- Refresh cancellation

Enhanced refresh with API



Refresh a single table/partition

POST <https://api.powerbi.com/v1.0/myorg/groups/f089354e-8366-4e18-aea3-4cb4a3a50b48/datasets/cfafbeb1-8037-4d0c-896e-a46fb27ff229/refreshes>

Request body

```
JSON Copy
{
  "type": "Full",
  "commitMode": "transactional",
  "maxParallelism": 2,
  "retryCount": 2,
  "objects": [
    {
      "table": "DimCustomer",
      "partition": "DimCustomer"
    },
    {
      "table": "DimDate"
    }
  ]
}
```

Enhanced refresh with API



How do I check partitions in my semantic model tables?

- Tabular Editor
- XMLA endpoint

Enhanced refresh with Power Automate custom connector

DEMO

Powershell



Invoke-PowerBIRestMethod

PowerShell cmdlet for managing connections to the Power BI service.

Invoke-PowerBIRestMethod

Module: [MicrosoftPowerBIMgmt.Profile](#)

Executes a REST call to the Power BI service, with the specified URL and body.

Syntax

PowerShell

 Copy

```
Invoke-PowerBIRestMethod
  -Url <String>
  -Method <PowerBIWebRequestMethod>
  [-Body <String>]
  [-OutFile <String>]
  [-ContentType <String>]
  [-Headers <Hashtable>]
  [-TimeoutSec <Int32>]
  [-Organization <String>]
  [-Version <String>]
  [<CommonParameters>]
```

Powershell



PowerShell

```
PS C:\> Invoke-PowerBIRestMethod -Url 'groups' -Method Get
```

-Url = <https://api.powerbi.com/v1.0/myorg/> + 'groups'

Equivalent to the http call: (Power BI Rest API)

HTTP

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

Powershell Invoke-PBIRestMethod



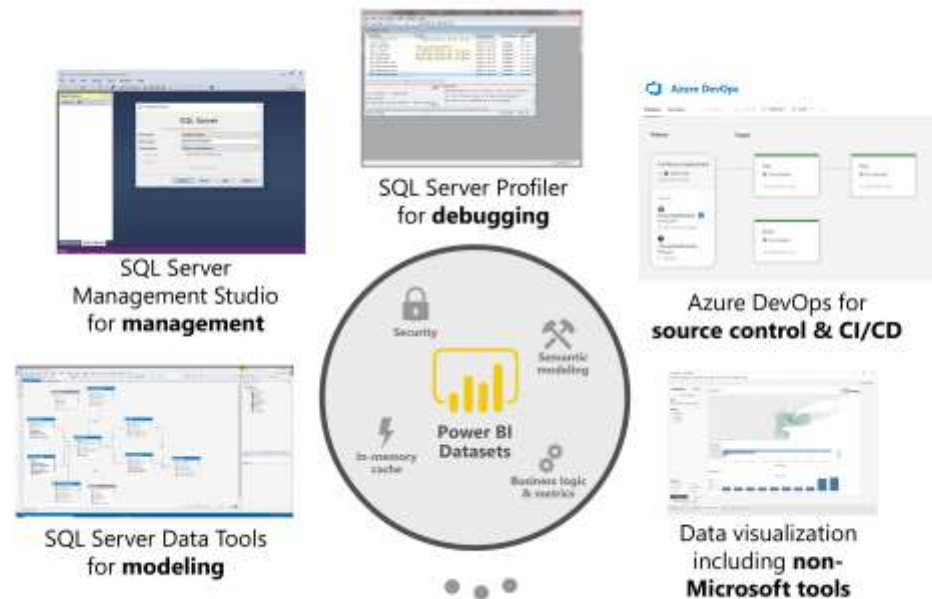
DEMO

XMLA Endpoint

It's a communications protocol between client applications and the engine that manages Power BI workspaces and datasets.

These communications are through what are commonly referred to as XMLA endpoints.

Analysis Services client tools work with Power BI through the **XMLA endpoint**





XMLA Endpoint

XMLA endpoints are supported by *Power BI Premium*, *Premium Per User* and *Power BI Embedded*. No Power BI Pro.

Unlike configuring refresh in the Power BI service, refresh operations through the XMLA endpoint are not limited to 48 times per day.



XMLA Endpoint

XMLA endpoints are supported by *Power BI Premium*, *Premium Per User* and *Power BI Embedded*. No Power BI Pro.

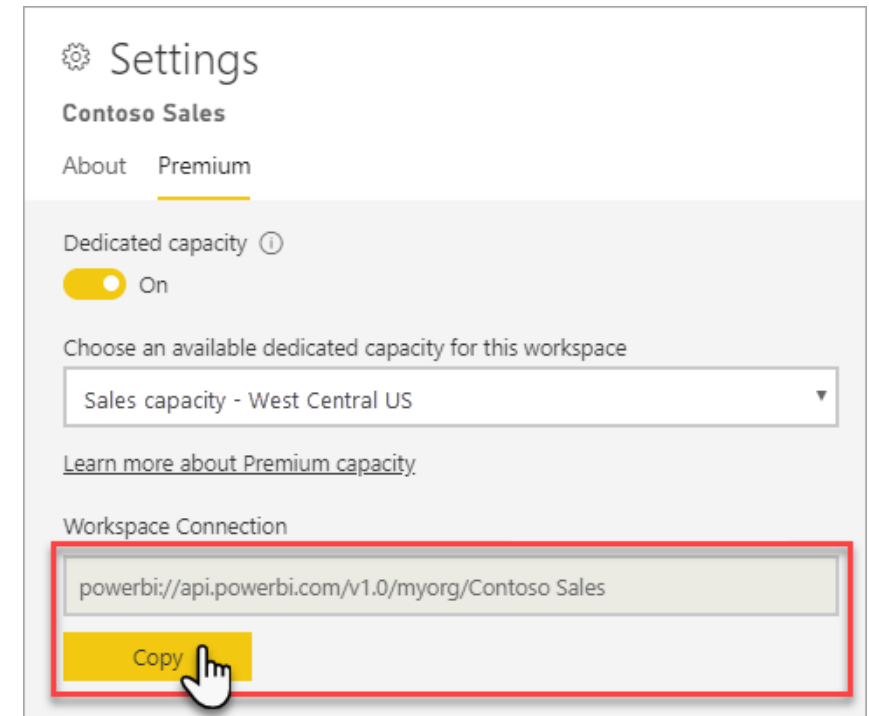
Unlike configuring refresh in the Power BI service, refresh operations through the XMLA endpoint are not limited to 48 times per day.

XMLA Endpoint

Connect to a Premium workspace

Workspaces assigned to a capacity have a connection string in URL format. For example:

`powerbi://api.powerbi.com/v1.0/[tenant name]/[workspace name]`

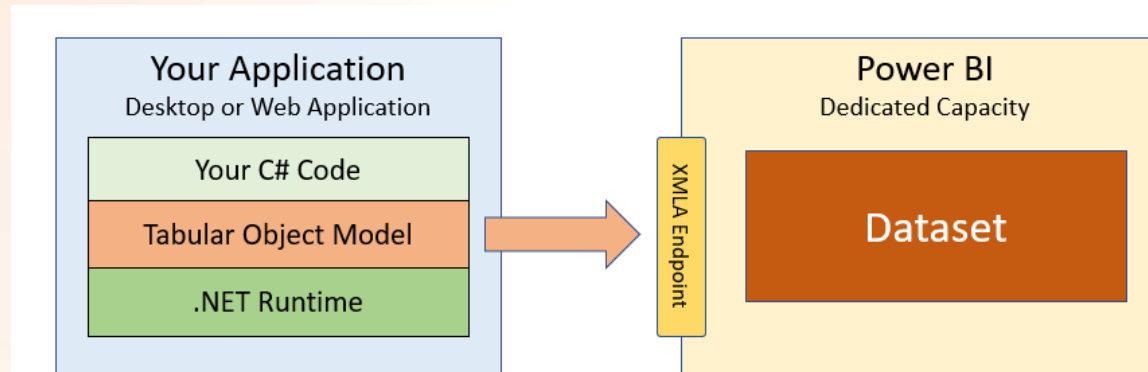


TOM for tables/partition processing

Tabular Object Model (TOM)

The Tabular Object Model (TOM) is a .NET library that provides an abstract layer on top of the XMLA endpoint. It allows developers to write code in terms of an intuitive programming model that includes classes like **Model**, **Table**, **Column**, and **Measure**. Behind the scenes, TOM translates the read and write operations in your code into HTTP requests executed against the XMLA endpoint

TMO for tables/partition processing



Refreshing models with TOM

Now let's perform a typical model maintenance operation. As you see in the following code, it's not very complicated to start a model refresh operation by using TOM:

```

.NET CLI
public static void RefreshDatabaseModel(string Name) {
    Database database = server.Databases.GetByName(Name);
    database.Model.RequestRefresh(RefreshType.DataOnly);
    database.Model.SaveChanges();
}
  
```

Just like with manual and scheduled model refresh, refreshes through the XMLA endpoint are shown in **Refresh history**, but with the label, **Via XMLA Endpoint**.

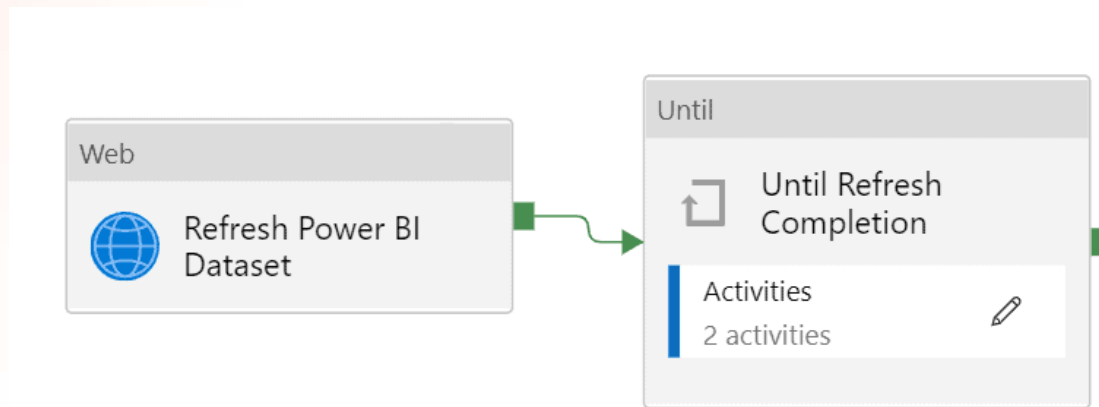
XMLA – Refresh a single table via SSMS

DEMO

Data Factory / Synapse Analytics pipelines



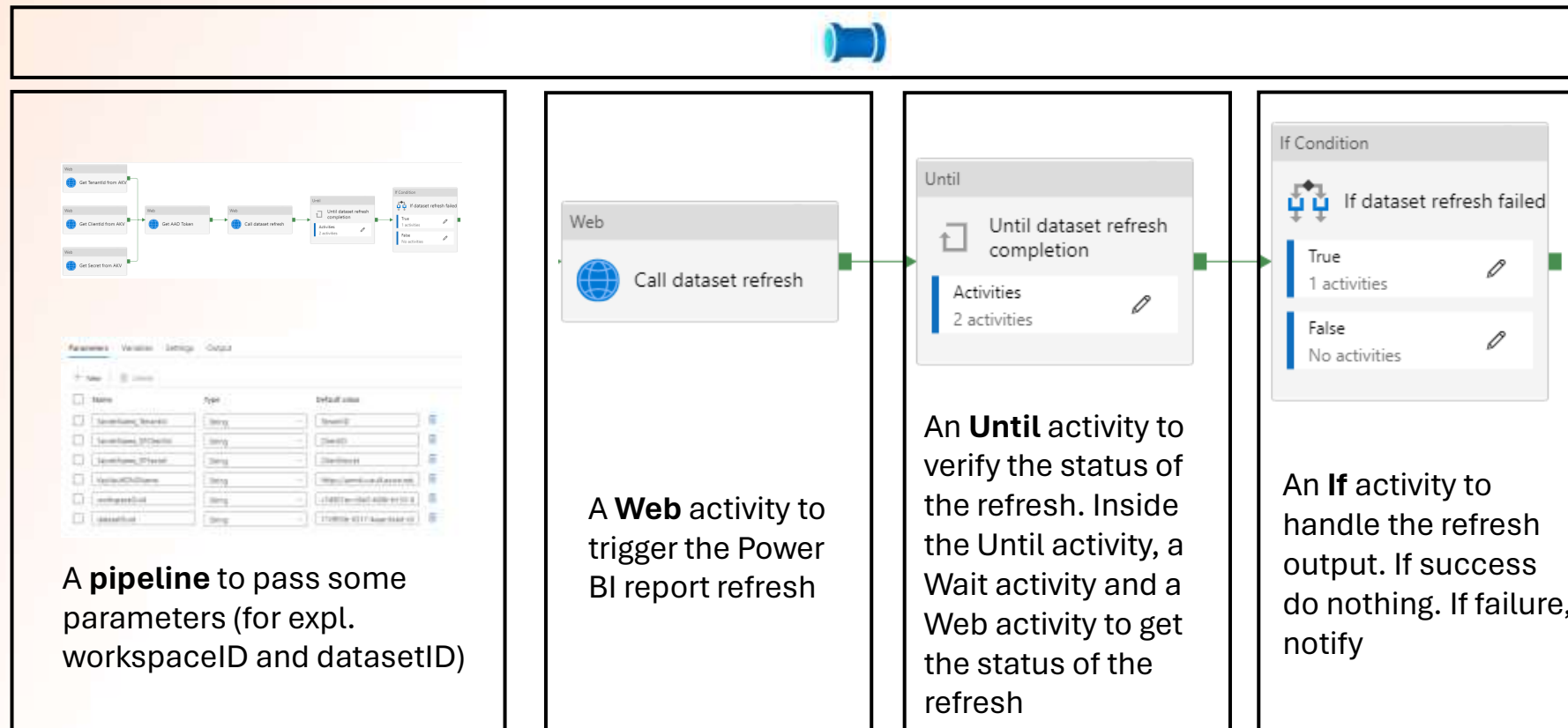
Trigger refresh from an Azure Data Factory / Synapse Analytics pipeline.



Data Factory / Synapse Analytics pipelines



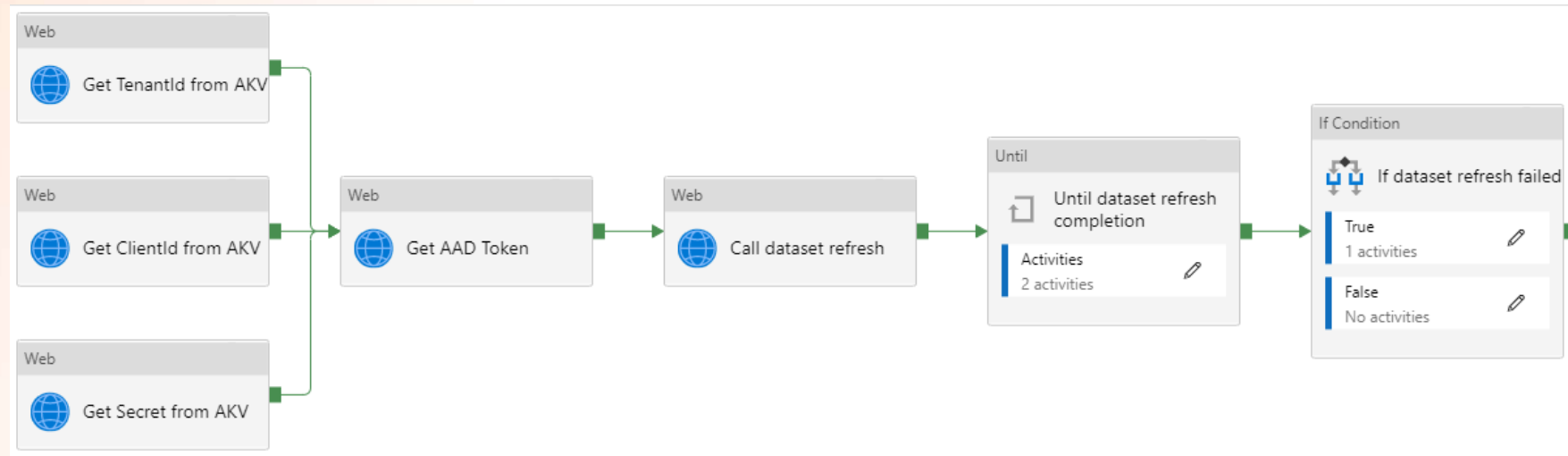
Example of setup



Data Factory / Synapse Analytics pipelines



Example of setup



Refresh the dataset from Data Factory pipeline
Refresh the dataset from Synapse Analytics pipeline

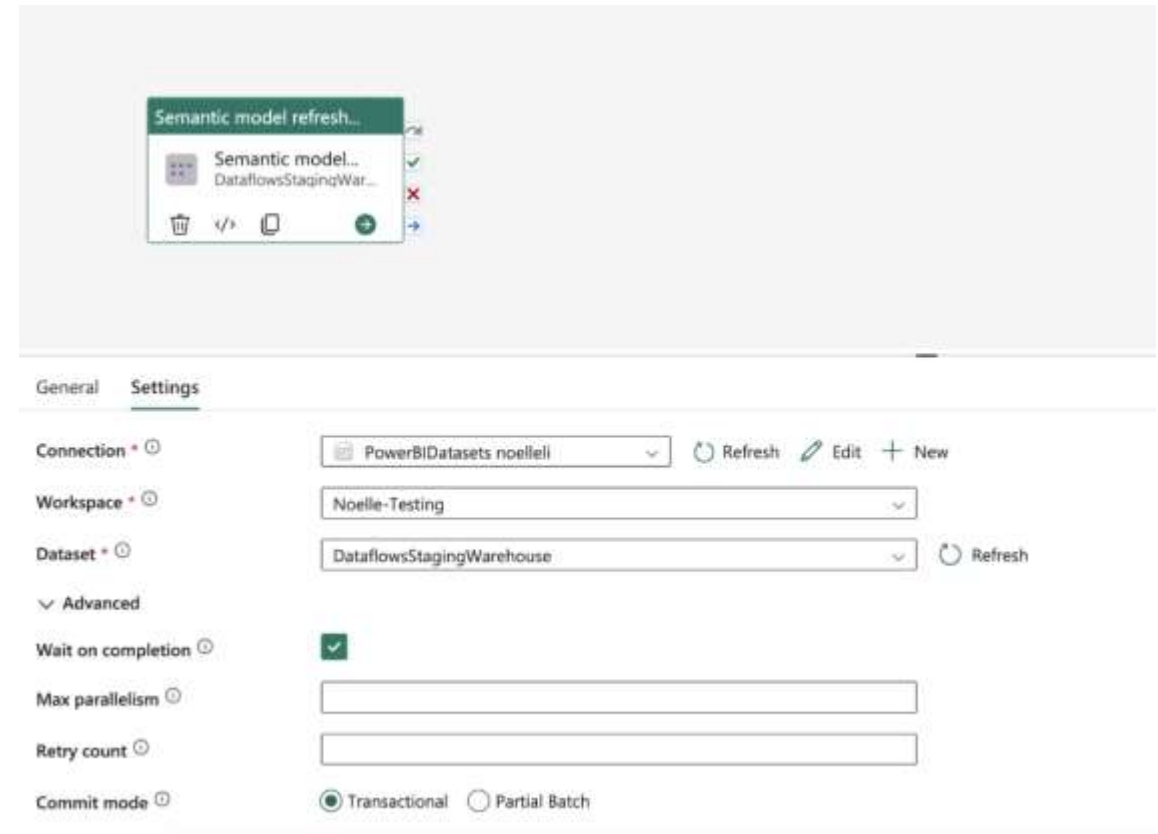
DEMO

Fabric pipelines



The March 2024 release of Fabric introduced a new activity for data pipelines: **Semantic Model Refresh activity**.

Currently it is in preview



Fabric pipelines



Use the Semantic model refresh activity to refresh a Power BI Dataset (Preview)

Article • 03/26/2024 • 2 contributors

In this article

Prerequisites

[Add a Semantic model refresh activity to a pipeline with UI](#)

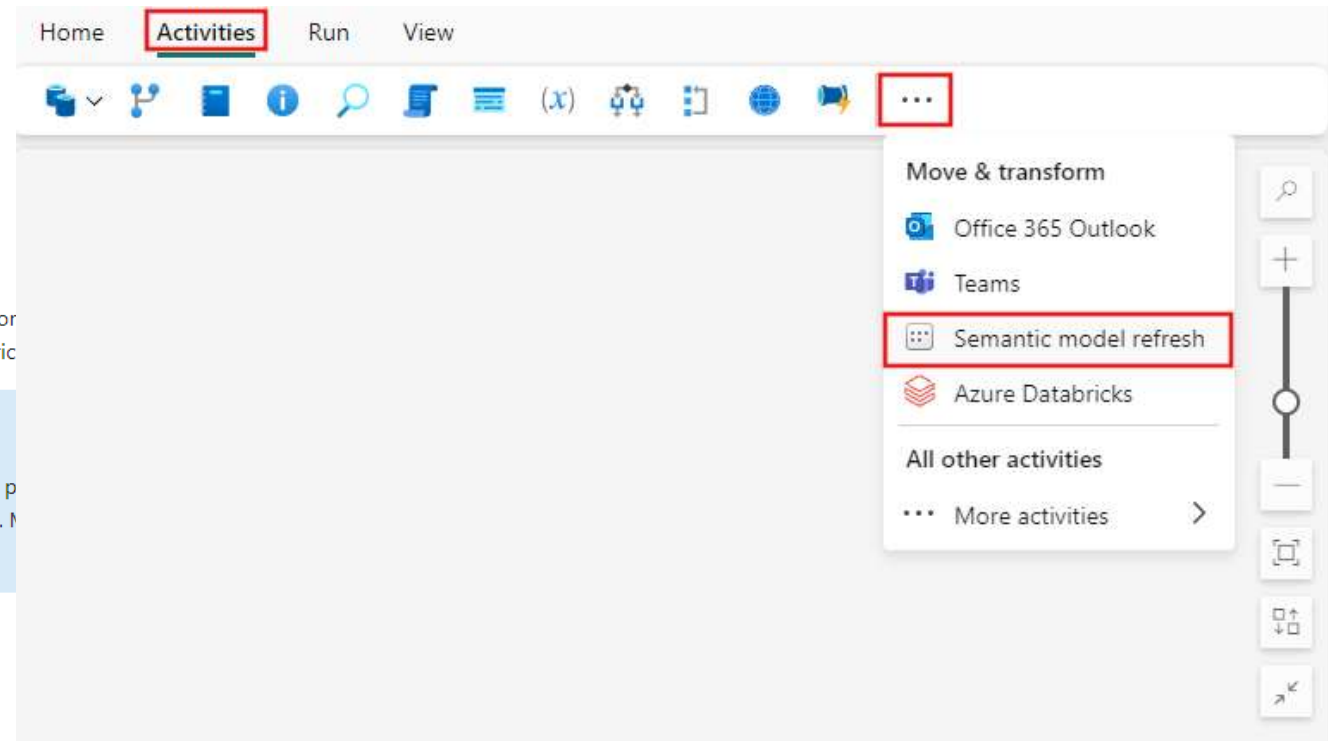
[Save and run or schedule the pipeline](#)

[Related content](#)

This guide shows you how to use the Semantic model refresh activity to create connection model datasets and refresh them from a data pipeline in Data Factory for Microsoft Fabric.

Important

The Semantic model refresh activity in Data Factory for Microsoft Fabric is currently in preview. It relates to a prerelease product that may be substantially modified before it's released. Microsoft makes no warranties, expressed or implied, with respect to the information provided here.



Fabric refresh activity



DEMO

Pandora use cases

- Parameterized flow
- Control Tower
- Dashboard for the support team



PARAMETERIZED FLOW

Scenario: Enterprise reporting. Need to automatically trigger the semantic model refresh, the moment the data load is completed

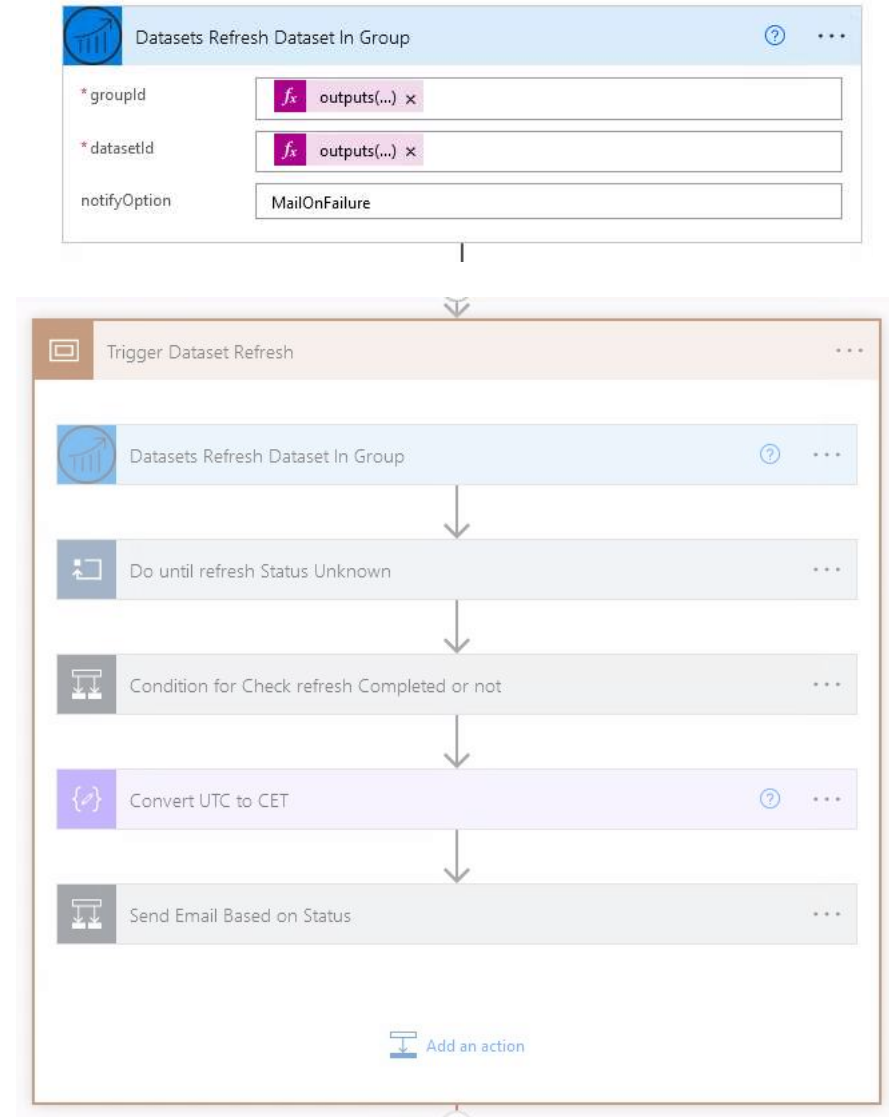
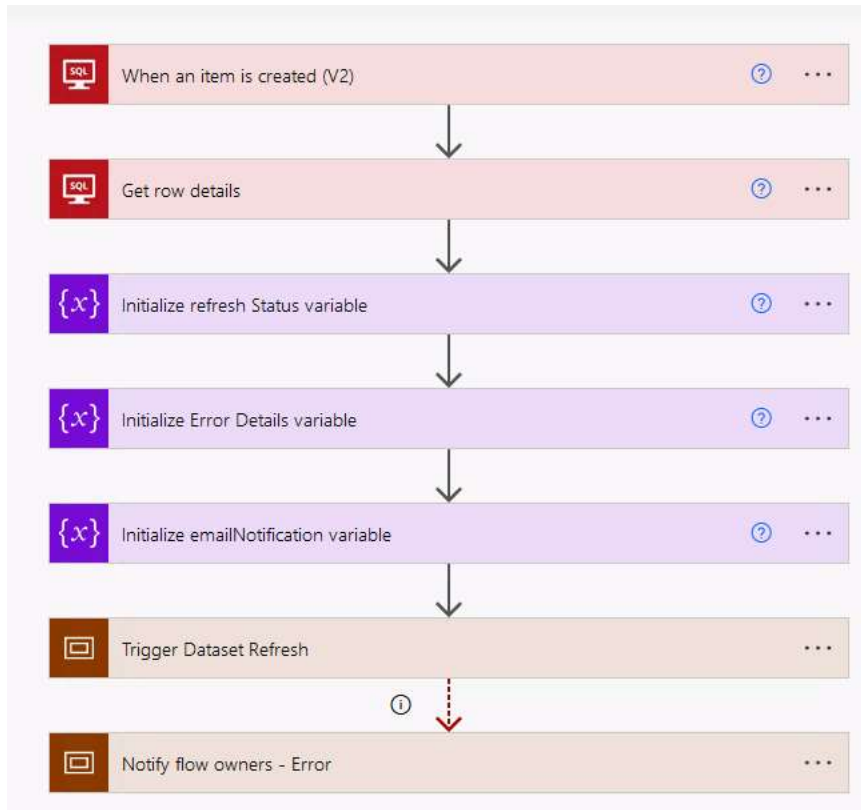
Solution: parameterized Power Automate flow. Triggered by an insert in a dummy table in the database. The trigger action passes Workspace ID and Semantic model ID as parameters to the flow. One flow fits 50 + models

Monitoring team and semantic model owners are notified in case of failure



SQL Server Agent	INSERT INTO dummytable
Jobs (filtered)	
BIM_SELLOUT_APAC	VALUES("Dataset Name","Dataset ID", "Workspace ID")

PARAMETERIZED FLOW

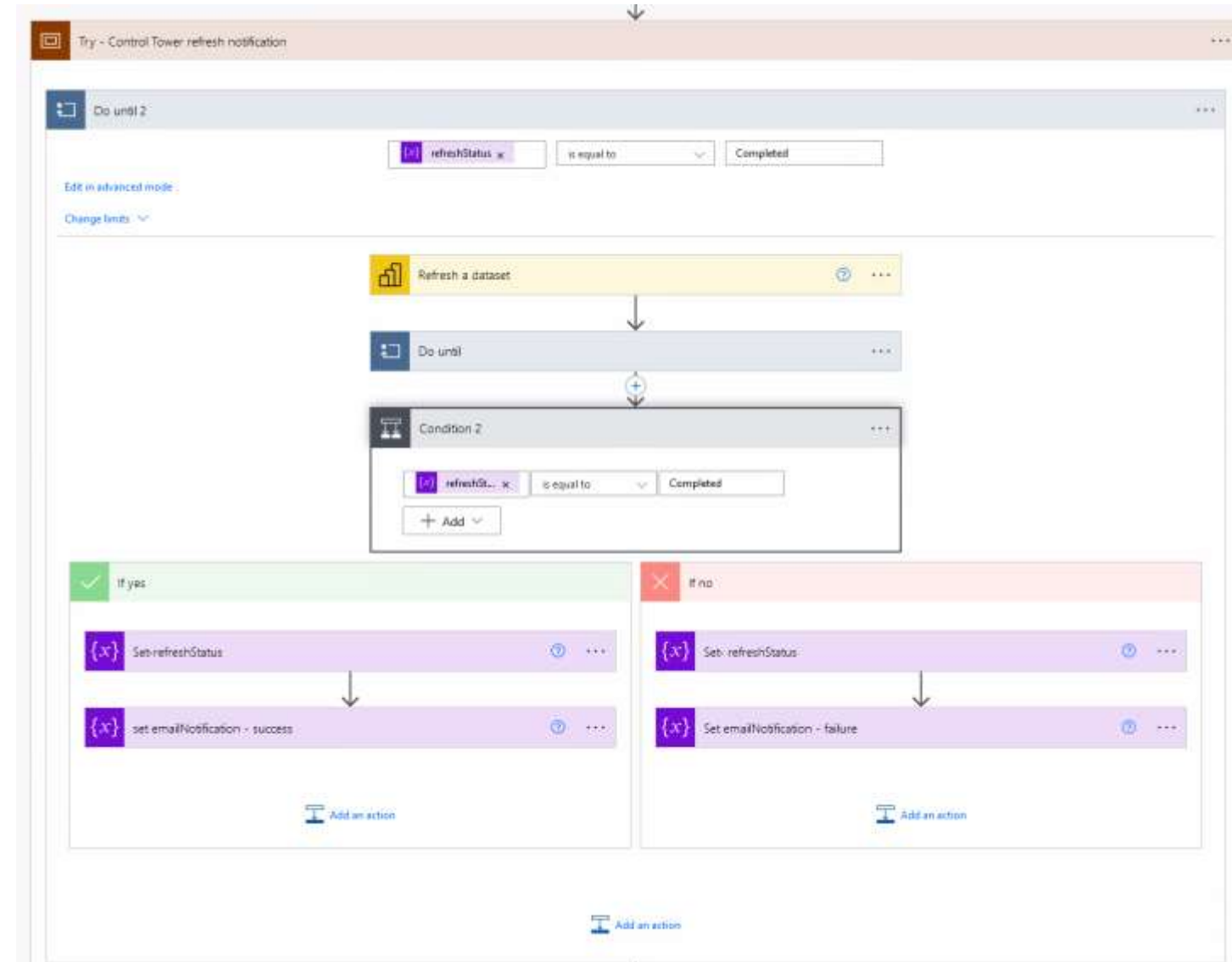
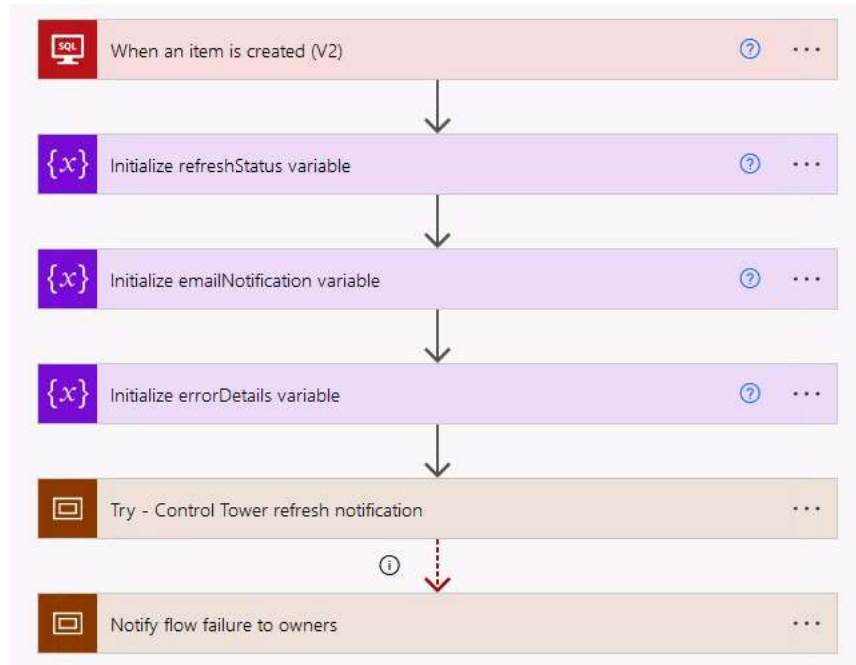


CONTROL TOWER

Scenario: Business critical report with daily level of completion for the data load. If failing, needs to be automatically retriggered.

Solution: a custom flow triggers the semantic model refresh and triggers three times in case of failure. The monitoring team is notified about status via e-mail

CONTROL TOWER

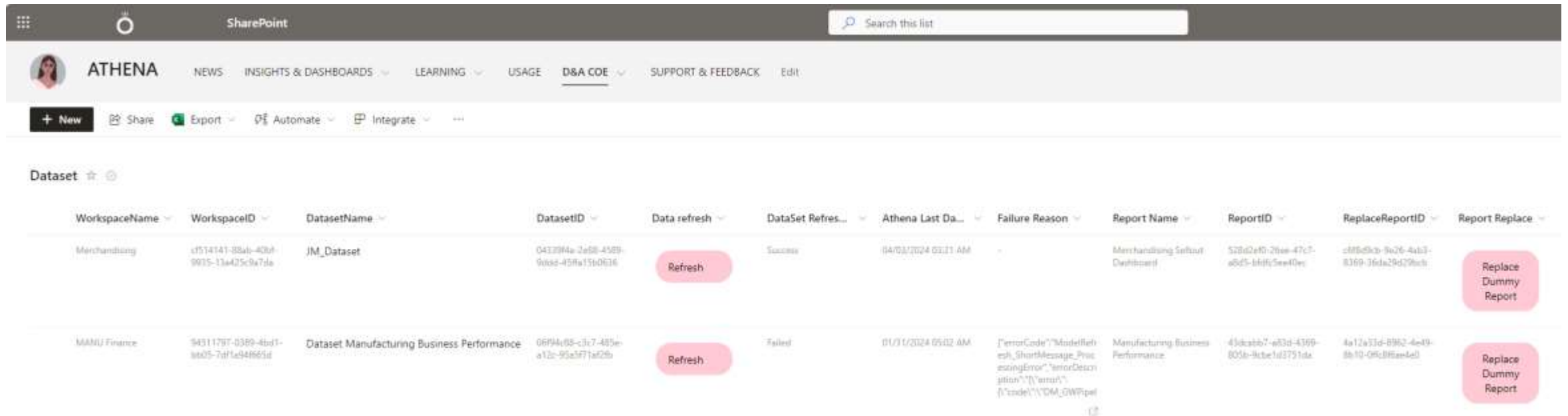


DASHBOARD FOR THE MONITORING TEAM

Scenario: Enterprise reporting monitoring 24/7. Enable the monitoring and support team to re-trigger the business-critical reports, especially on week-ends.

Requirement was not to give them any Power BI privilege.

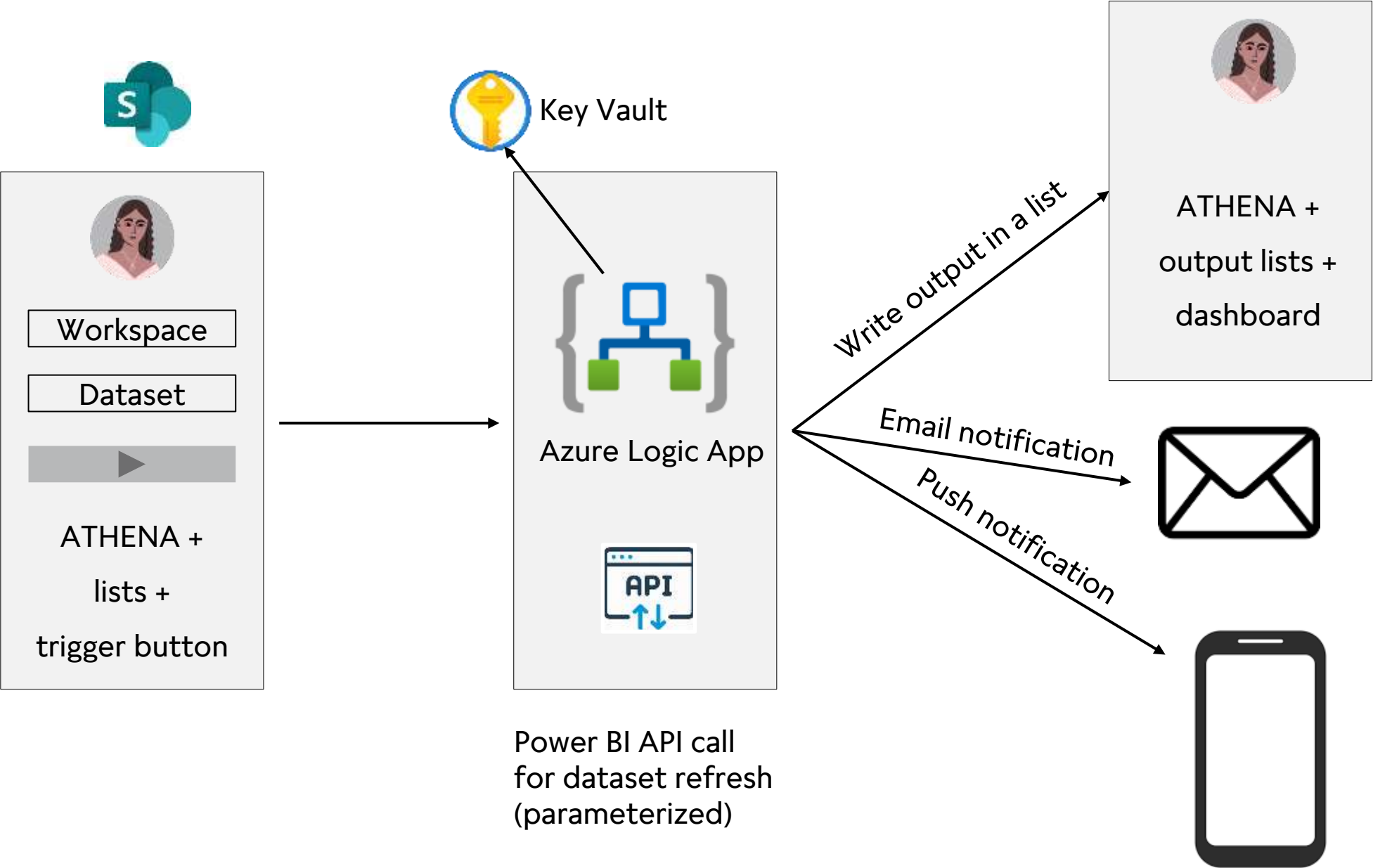
Solution: Dashboard in SharePoint for triggering the semantic model refresh via pipelines and Logic App



The screenshot shows a SharePoint dashboard interface. At the top, there's a header with the 'SharePoint' logo, a search bar, and a navigation menu with items like 'NEWS', 'INSIGHTS & DASHBOARDS', 'LEARNING', 'USAGE', 'D&A COE', 'SUPPORT & FEEDBACK', and 'Edit'. Below the header, there's a secondary navigation bar with '+ New', 'Share', 'Export', 'Automate', 'Integrate', and a menu icon. The main content area is titled 'Dataset' and contains a table with the following columns: WorkspaceName, WorkspaceID, DatasetName, DatasetID, Data refresh, DataSet Refres..., Athena Last Da..., Failure Reason, Report Name, ReportID, ReplaceReportID, and Report Replace. There are two rows of data. The first row is for 'Merchandising' with 'JM_Dataset' and a 'Refresh' button. The second row is for 'MANU Finance' with 'Dataset Manufacturing Business Performance' and a 'Refresh' button. Both rows have a 'Replace Dummy Report' button in the 'Report Replace' column.

WorkspaceName	WorkspaceID	DatasetName	DatasetID	Data refresh	DataSet Refres...	Athena Last Da...	Failure Reason	Report Name	ReportID	ReplaceReportID	Report Replace
Merchandising	c1514141-38ab-40b8-9935-13a425c9a7da	JM_Dataset	043394a-2e58-4589-9dca-45fa15b0636	Refresh	Success	04/03/2024 03:11 AM	-	Merchandising Default Dashboard	528d2e10-2f6e-47c5-a6d5-bbf65ee40e	c885d9db-9a26-4ab3-8369-3fda29d29a3b	Replace Dummy Report
MANU Finance	94311797-0389-4bd1-8a05-7dffa948665d	Dataset Manufacturing Business Performance	06f94c68-c3c7-485e-a12c-95a3f71af2db	Refresh	Failed	01/01/2024 05:02 AM	{ "errorCode": "ModelRefresh_ShortMessage_ProcessingError", "errorDescription": "The model '\\QM_GWRPpe	Manufacturing Business Performance	43dcabb7-e83d-4369-805b-9cbe1d3751da	4a12a33d-89a2-4e49-8b10-08c8f6aee4d	Replace Dummy Report

DASHBOARD FOR THE MONITORING TEAM



Q&A?





Data
Community