

The image shows a composite of three screenshots from the Power BI Desktop environment. On the left, a TMDL (Table Modeling Definition Language) script is visible in the 'Customer.tmd' file, defining a table with columns and partitions. In the center, the 'Source control' window is open, showing a list of items and a green 'Update all' button at the bottom. On the right, a JSON snippet is shown, defining a dataset reference with a path to 'Sales.Dataset', which is highlighted with a red box.

```
1 table Customer
2   lineageTag: 379ffcdf-5e9f-4440-8a
3   ordinal: 1
4
5   partition Customer = M
6     mode: Import
7     expression:=
8     let
9       Source = Web.Contents
10      Csv = Csv.Document(So
11      #"Promoted Headers" =
12      #"Changed Type" = Tab
13      #"Parsed Date" = Tabl
14    in
15      #"Parsed Date"
16
17   column 'Address Line 1'
18     dataType: String
19     isDataTypeInferred: false
20     lineageTag: df470144-791a-4ff
21     sourceColumn: "Address Line 1
22     summarizeBy: None
23
24     annotation SummarizationSetBy
25
26   column 'Address Line 2'
27     dataType: String
28     isDataTypeInferred: false
29
```

Source control

Changes Updates (1)

Items Status

Cola Analysis

Sales.Report > {} definition.pbir > ...

```
1 {
2   "version": "1.0",
3   "datasetReference": {
4     "byPath": {
5       "path": "../Sales.Dataset"
6     },
7     "byConnection": null
8   }
9 }
```

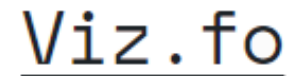
Update all

Mathias Thierbach, MVP

PROFESSIONAL DEVELOPER EXPERIENCES IN POWER BI

*Power BI Next Step, Aarhus
13 Sep 2024*

Sponsors





<https://pbi.tools/>



Mathias Thierbach

Owner of pbi-tools Ltd, London

Data Platform MVP

Power BI Contributor #TMDL

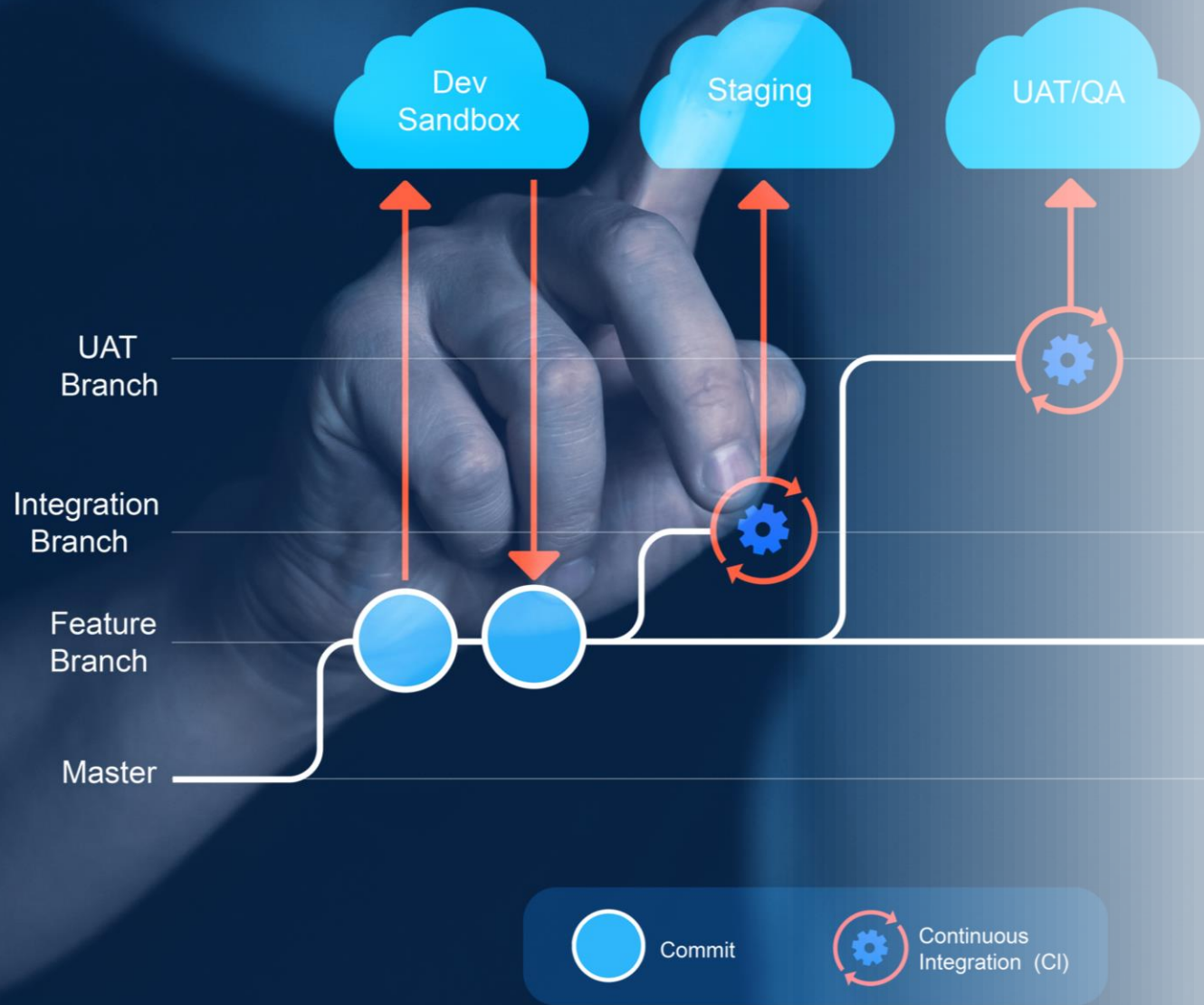
Developer of pbi-tools



Fabric & Power BI Data Ops, CI/CD
.Net, Azure

- LinkedIn: </in/mthierba>
- GitHub: github.com/pbi-tools
- YouTube: goto.pbi.tools/youtube

Expanded Branching



“Professional Developer Experiences”?

- Source control (git)
- Code-first project files
- Collaboration
- Versioning
- Staged Deployments

Agenda

PBI Developer Mode - PBIP

TMDL

Fabric Git Integration

Deployment Pipelines

Fabric REST APIs

External Tools

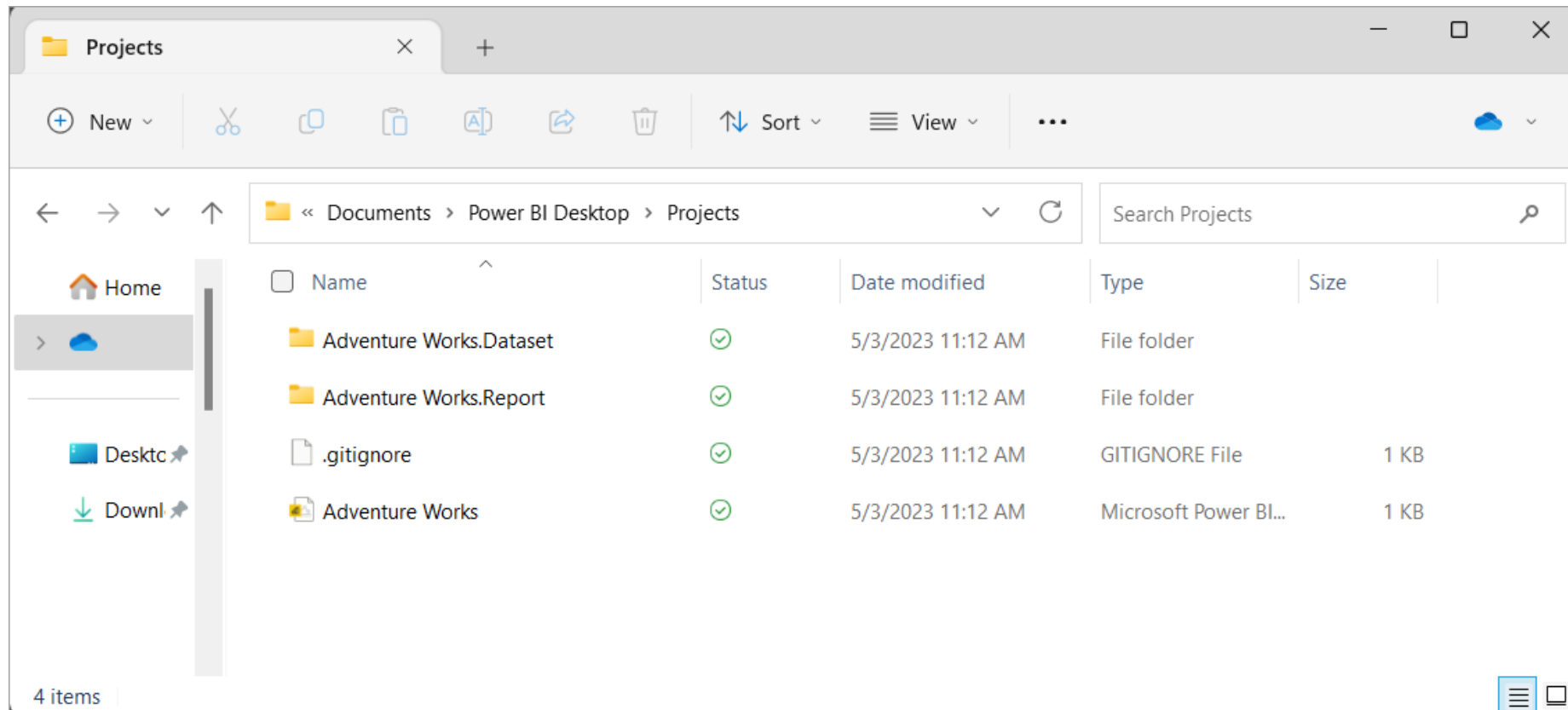
Q&A

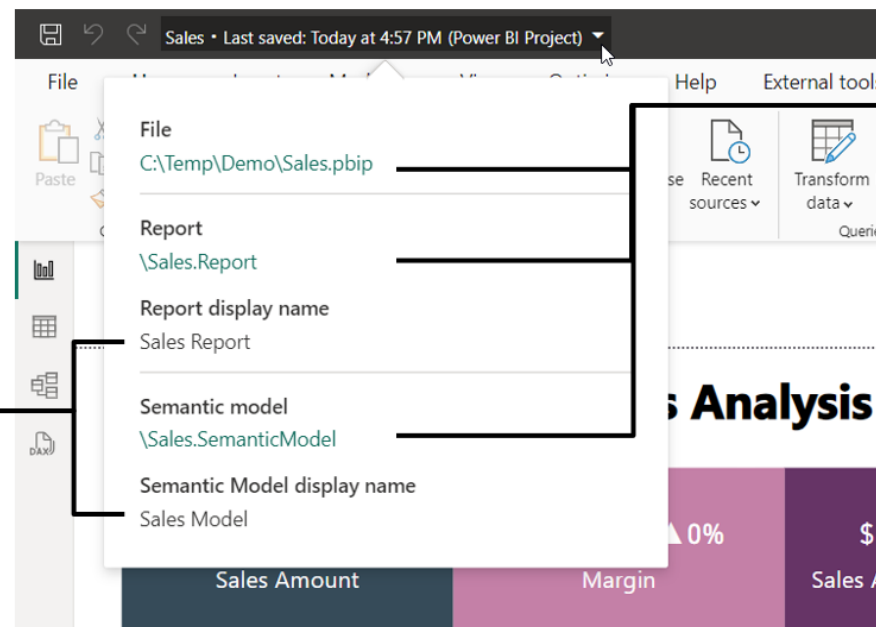
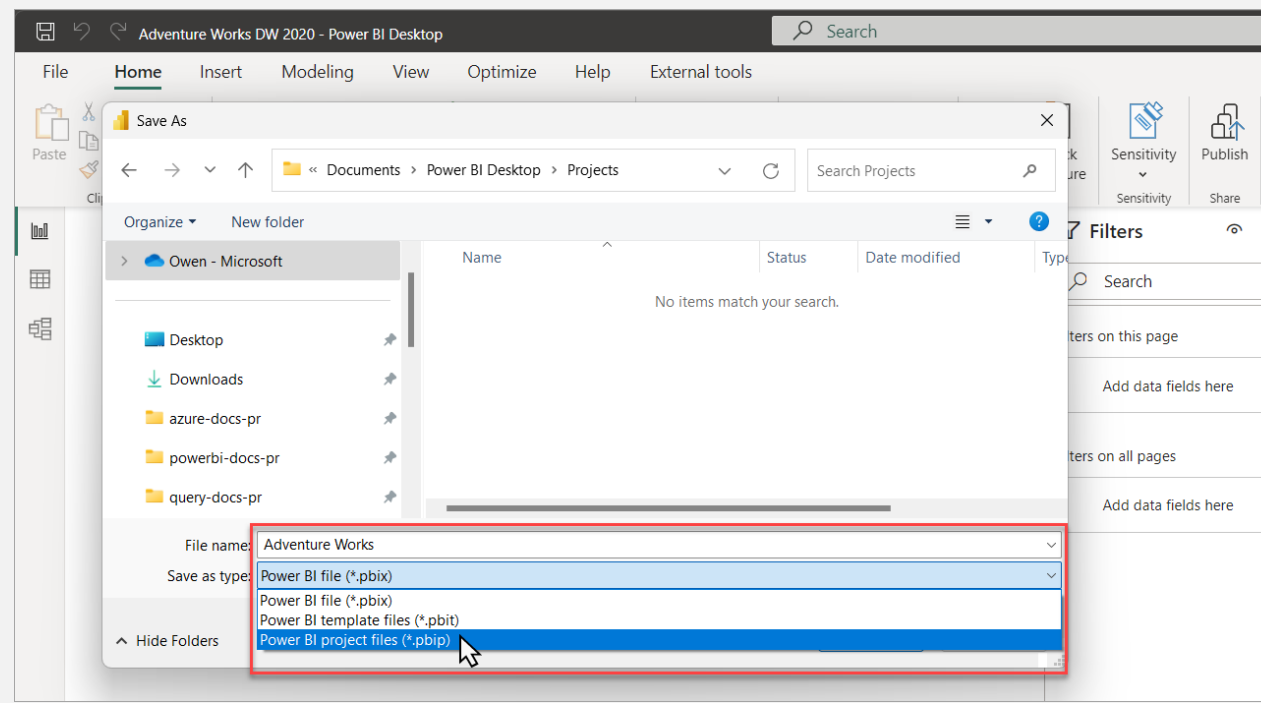
Pro Dev Tooling Overview - 2024

Existing Tools/Features	New since 2023 (in Public Preview)
<p>Microsoft GA</p> <ul style="list-style-type: none">✓ Power BI REST APIs✓ Deployment Pipelines✓ Azure DevOps PBI Extension✓ TMDL ★ <p>3rd Party Tools</p> <ul style="list-style-type: none">✓ vscode Power BI Studio✓ Tabular Editor 2&3✓ pbi-tools	<ul style="list-style-type: none"><input type="checkbox"/> PBI Desktop Developer Mode (“PBIP”)<input type="checkbox"/> TMDL vscode Extension<input type="checkbox"/> Fabric Git Integration<input type="checkbox"/> Fabric REST APIs<input type="checkbox"/> PBIR Enhanced Report Format ★

Desktop Developer Mode (Preview)

- <https://pbi.onl/pbip>
- PBIX as project folders and files (datasets, reports)





Visualize the file path of your Power BI Project files, with clickable links to the folder.

View the configured display name for both report and semantic model.

NEW: PBIR – Enhanced Report Format

- Report definition broken out into folders and files
- Pages, Visuals, Bookmarks, Report-level Measures, Images
- Json schemas publicly available for individual files
- Enable as Preview option in PBI Desktop

✓ Finance.Report

> .pbi

definition

bookmarks

bookmarks.json

c6213a156e9d09533069.bookmark.json

images

b516d33b77c4b87e39cd

visuals\91521e2041a027b3d008

} visual.json

page.json

c4e1d722a96b80877b3c

> visuals

} page.json

} pages.json

} report.json

{ } version.json

> StaticResources

Preview features

The following features are available for you to try in this release. Preview features m

\Shape map visual [Learn more](#)

\spanish language support for Q&A [Learn more](#)

\kA for live connected Analysis Services databases [Learn more](#)

\connect to external semantic models shared with me [Learn more](#) | [Share feed](#)

\tern visual tooltips [Learn more](#) | [Share feedback](#)

\lines [Learn more](#)

\s visual [Learn more](#)

\measure suggestions [Learn more](#) | [Share feedback](#)

\rameters [Learn more](#)

\ed row-level security editor [Learn more](#)

\ect interaction [Learn more](#) | [Share feedback](#)

\activity label on exported PDF [Learn more](#)

\ic format string for measures [Learn more](#)

\s OneDrive and SharePoint [Learn more](#)

\are to OneDrive and SharePoint [Learn more](#)

\iced publish dialogs [Learn more](#)

\ublish dialogs support folder selection [Learn more](#)

\ver BI Project (.pbip) save option [Learn more](#)

✓ Store semantic model using TMDL format [Learn more](#)

✓ Store reports using enhanced metadata format (PBIR) [Learn more](#)

✓ New card visual [Learn more](#)

✓ Button slicer visual

✓ Less elevated user support [Learn more](#)

- Finantials.Report
 - .pbi
 - definition
 - pages
 - report.json
 - version.json
 - StaticResources
 - .platform
 - definition.pbir
 - Finantials.SemanticModel
 - .pbi
 - definition
 - cultures
 - tables
 - database.tmdl
 - model.tmdl
 - relationships.tmdl
 - .platform
 - definition.pbism
 - diagramLayout.json
 - .gitignore
 - Finantials.pbip

```

1 {
2   "$schema": "https://developer.microsoft.com/json-schemas/fabric/
3   item/report/definition/visualContainer/1.0.0/schema.json",
4   "name": "06172100f644cf68cb7c",
5   "position": {
6     "x": 29.915014164305951,
7     "y": 174.957507082153,
8     "height": 174.957507082153
9   },
10  },
11  "visual": {
12    "visualType": "card",
13    "autoSelectVisualType": true,
14    "query": {
15      "queryState": {
16        "Values": {
17          "projections": [
18            {
19              "field": {
20                "Measure": {
21                  "Expression": {
22                    "SourceRef": {
23                      "Entity": "financials"
24                    }

```

Report PBIR format

```

1 table financials
2   lineageTag: 55c666f4-89c3-47f7-b300-b42db3a46230
3
4   measure 'Sales Amount' = SUM('financials'[Sales])
5   lineageTag: 2fcc656a-2ea7-4c03-9eaf-91dcb829a785
6
7   annotation PBI_FormatHint = {"isGeneralNumber":true}
8
9   column Segment
10  dataType: string
11  lineageTag: 25d32056-2531-48e3-884e-c8a8bfb09f49
12  summarizeBy: none
13  sourceColumn: Segment
14

```

Semantic model TMDL format

Desktop Developer Mode (*Preview*)

- No longer black-box PBIX
- Available for Pro and Premium
- Same format as Fabric Git Integration

<https://pbi.onl/devmode-docs>

<https://pbi.onl/devmode-deep-dive>

<https://pbi.onl/pbip-schemas>

TMDL ~~(Preview)~~

- New standardized folder format for model definitions
 - “Tabular Model Definition Language”
- <https://pbi.onl/devmode-tmdl-preview>
- <https://tmdl.pbi.tools/preview-announcement>
- <https://pbi.onl/tmdl-docs>
- <https://tmdl.pbi.tools/history>
- <https://pbi.onl/vscode-tmdl>

```
TMDL > tables > Customer.tmdl
1  table Customer
2      lineageTag: 379ffcdf-5e9f-4440-8af8-1d6ae93036a6
3      ordinal: 1
4
5      partition Customer = M
6          mode: Import
7          expression:=
8              let
9                  Source = Web.Contents("#[SourceUrl]", [RelativePath =
10                      Csv = Csv.Document(Source, [QuoteStyle=QuoteStyle.Csv
11                          #"Promoted Headers" = Table.PromoteHeaders(Csv, [Prom
12                          #"Changed Type" = Table.TransformColumnTypes("#Promot
13                          #"Parsed Date" = Table.TransformColumns("#Changed Typ
14                      in
15                          #"Parsed Date"
16
17      column 'Address Line 1'
18          dataType: String
19          isDataTypeInferred: false
20          lineageTag: df470144-791a-4ffb-9b31-838dad32b5cd
21          sourceColumn: "Address Line 1"
22          summarizeBy: None
23
24          annotation SummarizationSetBy = Automatic
25
26      column 'Address Line 2'
27          dataType: String
28          isDataTypeInferred: false
```

TMSL

```

14590 {
14591   "name": "Product",
14592   "annotations": [
14593     {
14594       "name": "PBI_ResultType",
14595       "value": "Table"
14596     }
14597   ],
14598   "columns": [
14599     {
14600       "name": "Product",
14601       "annotations": [
14602         {
14603           "name": "SummarizationSetBy",
14604           "value": "Automatic"
14605         }
14606       ],
14607       "dataType": "string",
14608       "isDefaultLabel": true,
14609       "lineageTag": "da435585-1f9a-44bd-ba2c-34c98f298cfc",
14610       "sourceColumn": "Product",
14611       "summarizeBy": "none"
14612     },
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14707   ],
14708   "description": "Product Catalog",
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15000   ],
15001   "lineageTag": "e9374b9a-faee-4f9e-b2e7-d9aafb9d6a91",
15002   "measures": [
15003     {
15004       "name": "# Products",
15005       "expression": "COUNTROWS('Product')",
15006       "formatString": "#,##0",
15007       "lineageTag": "1f8f1a2a-06b6-4989-8af7-212719cf3617"
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15200   ],
15201   "partitions": [
15202     {
15203       "name": "Product-171f48b3-e0ea-4ea3-b9a0-c8c673eb0648",
15204       "mode": "import",
15205       "source": {
15206         "expression": [
15207           "let",
15208           "Source = #\"RAW-Product\"",
15209           "#\"Renamed Columns\" = Table.RenameColumns(Source,{{\"Product Name\", \"Product\"}})",
15210           "#\"Changed Type\" = Table.TransformColumnTypes(#\"Renamed Columns\",{{\"ProductKey\", Int64.Type}, {\"Product Code\", type text}, {\"Product\", type text}, {\"Manufacturer\", type text}, {\"Brand\", type text}, {\"Color\", type text}, {\"Weight Unit Measure\", type text}, {\"Weight\", type number}, {\"Unit Cost\", type number}, {\"Unit Price\", type number}, {\"Subcategory Code\", type text}, {\"Subcategory\", type text}, {\"Category Code\", type text}, {\"Category\", type text}}})",
15211           "in",
15212           "#\"Changed Type\""
15213         ],
15214         "type": "m"
15215       }
15216     },
15217     { ... },
15218     { ... },
15219     { ... },
15220     { ... },
15221     { ... },
15222     { ... },
15223     { ... },
15224     { ... },
15225     { ... },
15226     { ... },
15227     { ... },
15228     { ... },
15229     { ... },
15230     { ... },
15231     { ... },
15232     { ... },
15233     { ... },
15234     { ... },
15235     { ... },
15236     { ... },
15237     { ... },
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15250     { ... },
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15258     { ... },
15259     { ... },
15260     { ... },
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15262     { ... },
15263     { ... },
15264     { ... },
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15266     { ... },
15267     { ... },
15268     { ... },
15269     { ... },
15270     { ... },
15271     { ... },
15272     { ... },
15273     { ... },
15274     { ... },
15275     { ... },
15276     { ... },
15277     { ... },
15278     { ... },
15279     { ... },
15280     { ... },
15281     { ... },
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15287     { ... },
15288     { ... },
15289     { ... },
15290     { ... },
15291     { ... },
15292     { ... },
15293     { ... },
15294     { ... },
15295     { ... },
15296     { ... },
15297     { ... },
15298     { ... },
15299     { ... }
15300   ],
15301   "type": "m"
15302 }

```

TMDL

```

1  /// Product Catalog
2  table Product
3    lineageTag: e9374b9a-faee-4f9e-b2e7-d9aafb9d6a91
4
5  /// Count of products
6  measure '# Products' =
7    var v_countProducts = COUNTROWS('Product')
8    return v_countProducts
9    formatString: #,##0
10   lineageTag: 1f8f1a2a-06b6-4989-8af7-212719cf3617
11
12 column Product
13   dataType: string
14   lineageTag: da435585-1f9a-44bd-ba2c-34c98f298cfc
15   isDefaultLabel
16   summarizeBy: none
17   sourceColumn: Product
18
19 > column ProductKey ...
20
21 > column 'Product Code' ...
22
23 > column Manufacturer ...
24
25 > hierarchy 'Product Hierarchy' ...
26
27
28
29
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```

Concise representation, e.g., no need for name property.

Explicit syntax support for object descriptions

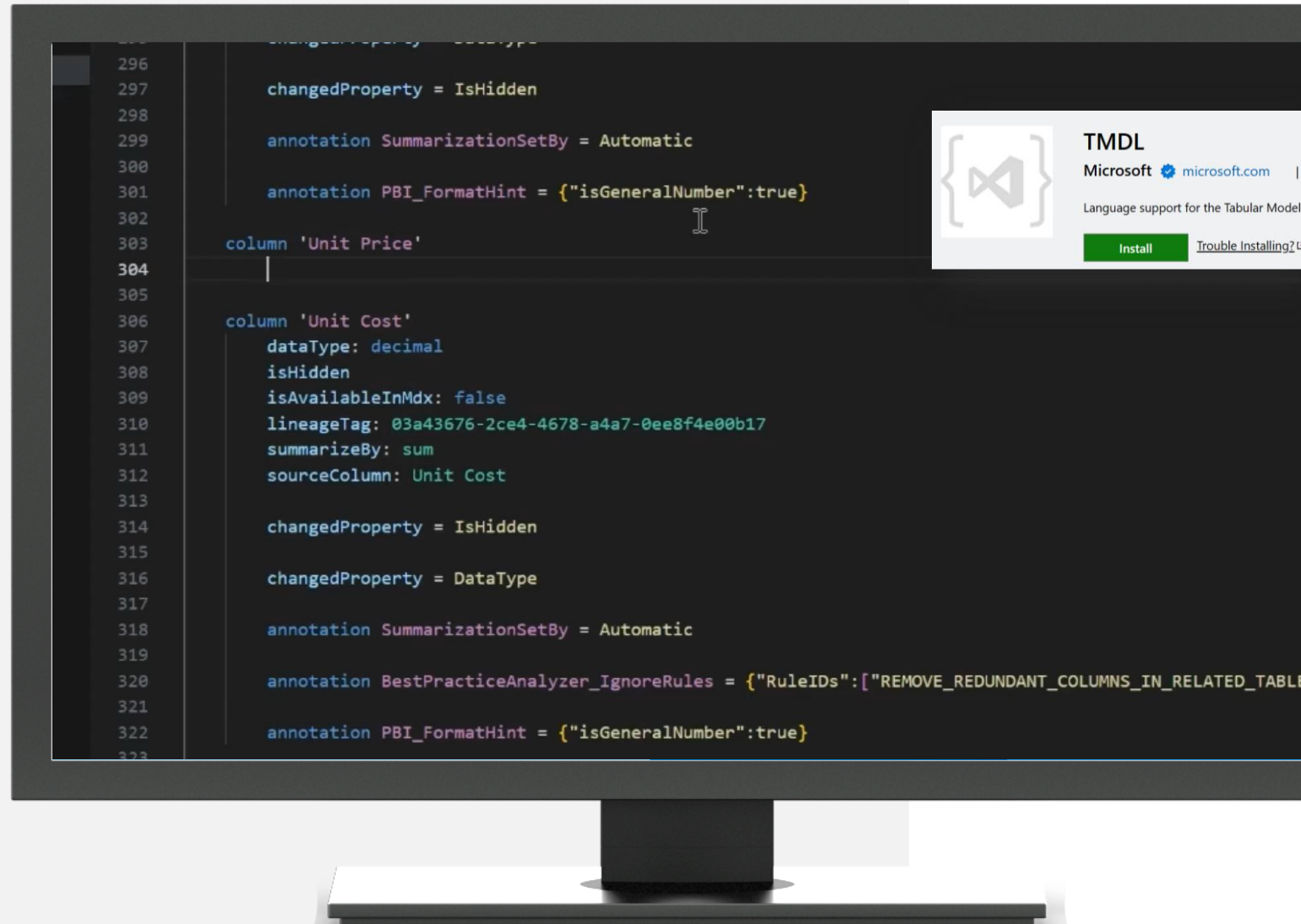
Multi-line expressions in clear text without using any escaping characters.

Use of Indentation to represent tabular object tree and properties.

Representation of child collections without the use of parent properties or delimiters.



TMDL as rich code-first modeling experience



Fabric Git Integration (Preview)

- Two-way sync Fabric Workspace ↔ Git Repository
- Select branch/folder

Workspace settings

Search

About

Premium

Azure connections

System Storage

Git integration

Other

Power BI

Extension API playground

Data Engineering

Git integration

Connect to Git with Azure DevOps to manage your code and back up your work.

View Azure DevOps account

Git provider

AzureDevOps

AAD account

Admin@pbiedaily1.onmicrosoft.com

Connect Git repository and branch

Organization *

Organization

Project *

Project

Git repository * ⓘ

Git repository

Branch * ⓘ

Branch

Git folder ⓘ

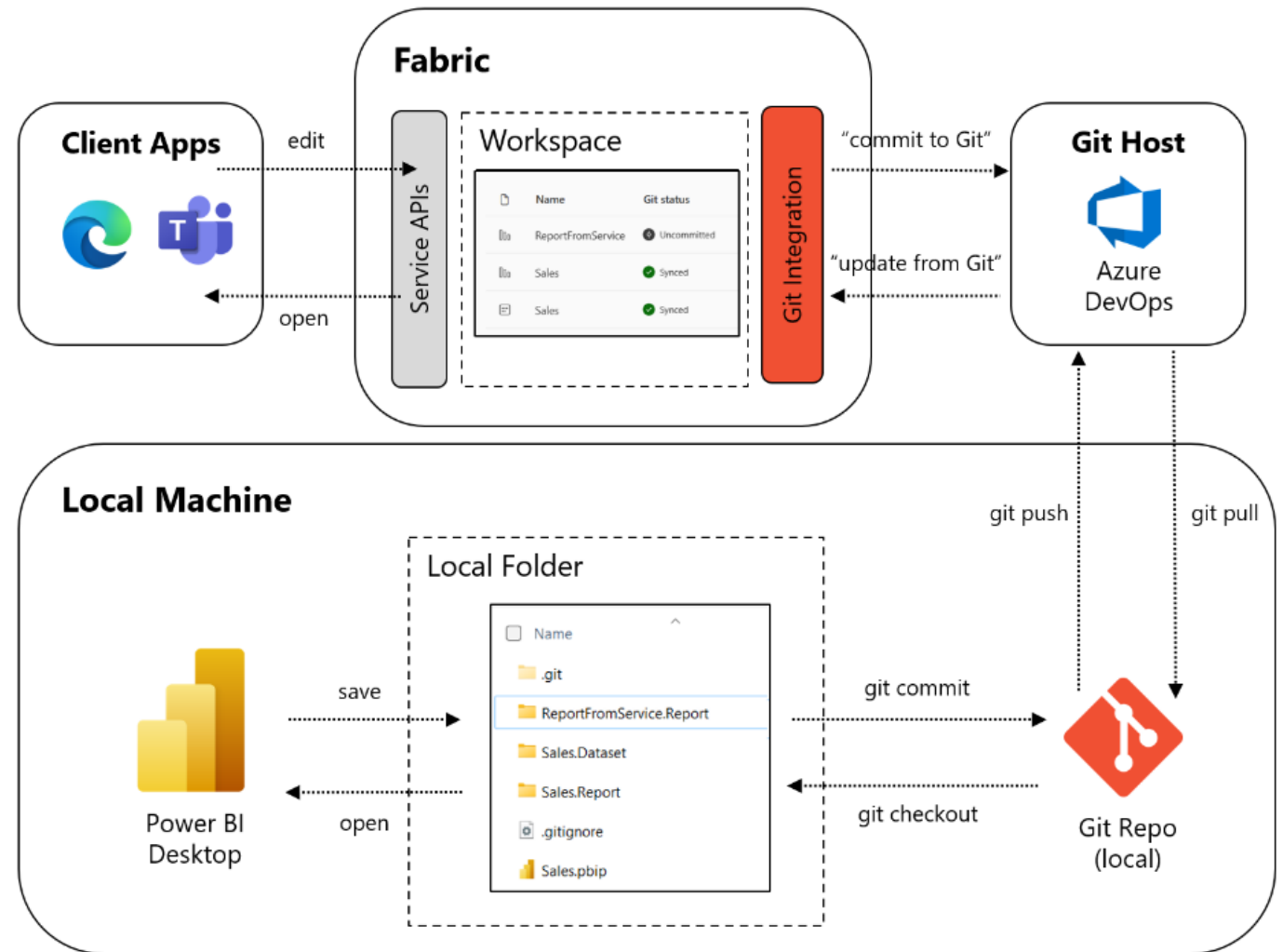
Select an existing folder

Connect and sync

Cancel

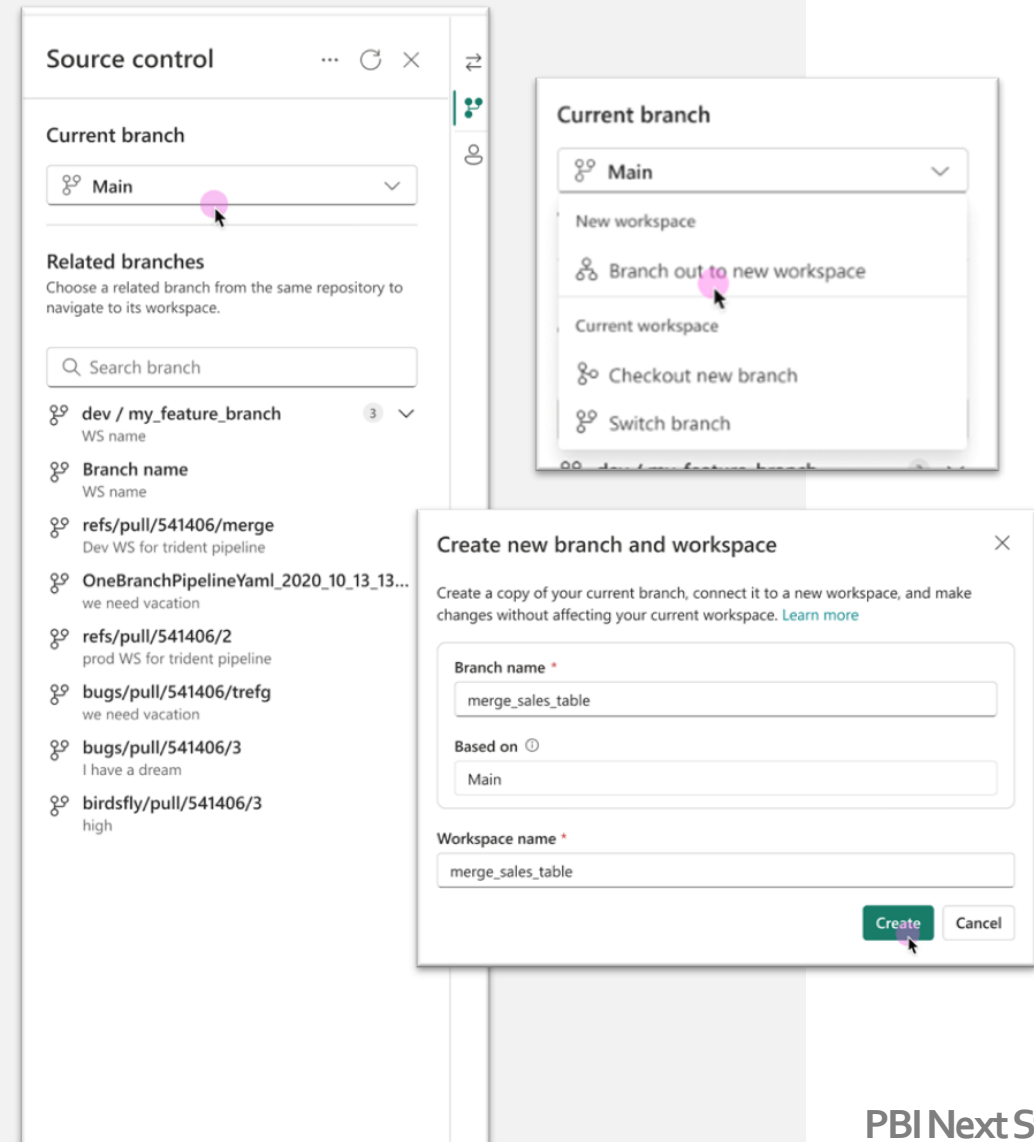
DevMode and Git Integration

<https://pbi.onl/devmode-deep-dive>



New branch-out experience

- Create a new isolated work environment (workspace & branch) in a few clicks.
- Reduce friction of creating and connecting multiple branches and workspaces



Fabric Git Integration (Preview)

Pro

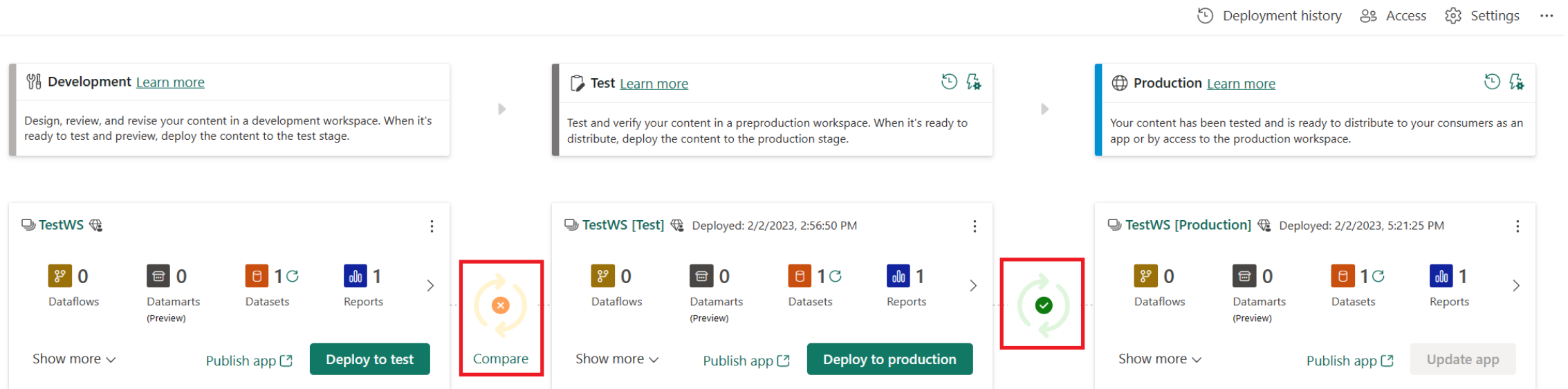
- Directly aligned with Desktop Developer Mode
- Most powerful Fabric CI/CD feature

Con

- P/PPU/F Only
- Currently limited to reports, datasets
- Azure DevOps and GitHub (PAT) only
- Sync is “black box”, no customization possible

Deployment Pipelines (GA)

- <https://fabric.onl/deployment-pipelines>
- Premium Only!



Deployment Pipelines (GA)

- New Diff view available:
<https://pbi.onl/depl-pipelines-compare>

Change review



TestWS \ Retail Analysis Sample

1

-4 +4

↓ ↑

☐ ☐

To be modified [Test]

```
1 {
2   "annotations": [
3     {
4       "name": "PBIDesktopVersion",
5       "value": "2.91.884.0 (21.03)"
6     },
7     {
8       "name": "PBI_QueryOrder",
9       "value": "[\\"Store\\",\\"Sales\\",\\"Item\\",\\"Time\\",\\"District\\"]"
10    },
11    {
12      "name": "__PBI_TimeIntelligenceEnabled",
13      "value": "1"
14    }
15  ],
16  "culture": "en-US",
17  "..."
18 }
```

To be deployed [Development]

2

3

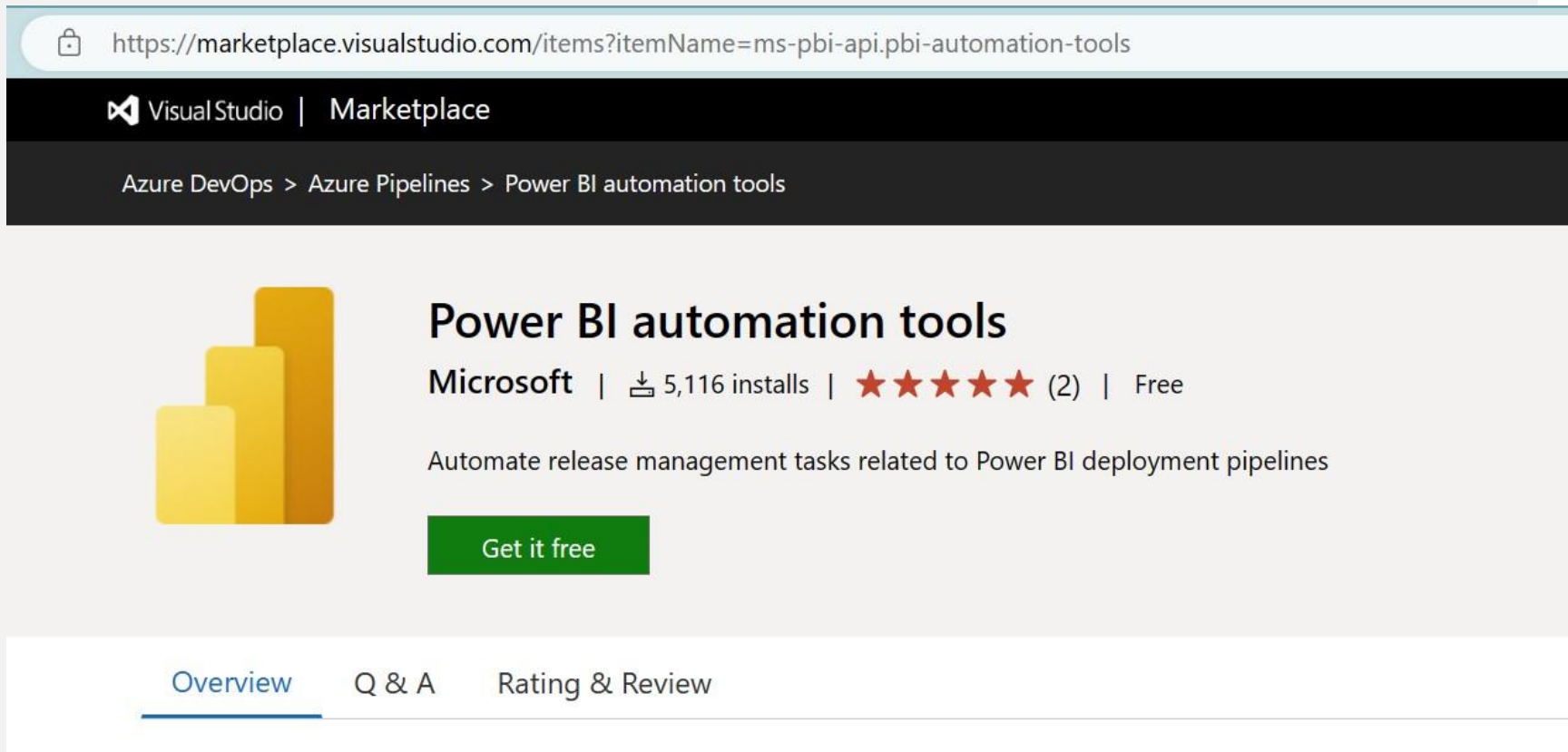
5

```
1 {
2   "annotations": [
3     {
4       "name": "PBIDesktopVersion",
5+      "value": "2.115.6858.1"
6     },
7     {
8       "name": "PBI_QueryOrder",
9       "value": "[\\"Store\\",\\"Sales\\",\\"Item\\",\\"Time\\",\\"District\\"]"
10    },
11    {
12      "name": "__PBI_TimeIntelligenceEnabled",
13      "value": "1"
14    }
15  ],
16  "culture": "en-US",
17  "..."
18 }
```

4

Deployment Pipelines and Azure DevOps

- <https://fabric.onl/depl-pipelines-ado>
- Use Azure DevOps-based approval workflows (branching model), but rely on propagation mechanics of Deployment Pipelines (Deployment rules)
- Sample: <https://dev.azure.com/pbi-tools/dataMinds-demo>




The screenshot shows the Visual Studio Marketplace page for the 'Power BI automation tools' extension. The browser address bar displays the URL: <https://marketplace.visualstudio.com/items?itemName=ms-pbi-api.pbi-automation-tools>. The page header includes the Visual Studio logo and the word 'Marketplace'. Below this, a breadcrumb trail reads 'Azure DevOps > Azure Pipelines > Power BI automation tools'. The main content area features the extension's icon (three yellow bars of increasing height), the title 'Power BI automation tools', the publisher 'Microsoft', and statistics: '5,116 installs', a 5-star rating from 2 reviews, and the price 'Free'. A description states: 'Automate release management tasks related to Power BI deployment pipelines'. A green 'Get it free' button is prominently displayed. At the bottom, a navigation bar includes links for 'Overview' (which is underlined), 'Q & A', and 'Rating & Review'.

https://marketplace.visualstudio.com/items?itemName=ms-pbi-api.pbi-automation-tools

Visual Studio | Marketplace

Azure DevOps > Azure Pipelines > Power BI automation tools

 **Power BI automation tools**

Microsoft | 📦 5,116 installs | ★★★★★ (2) | Free

Automate release management tasks related to Power BI deployment pipelines

[Get it free](#)

[Overview](#) [Q & A](#) [Rating & Review](#)

Deployment Pipelines

Supported Items (Sep 2024) - <https://fabric.onl/depl-pipeline-supported-items>

Supported

- Data Pipeline
- Dataflow Gen1
- Datamart
- Lakehouse
- Notebook
- Paginated Report
- Report*
- Semantic Model*
- Spark Environment
- Warehouse

Not Supported

- *** Dataflow Gen2
- Direct Lake semantic model
- PUSH dataset
- Streaming dataflow
- Template app workspace
- Workbook
- Metrics

Deployment Pipelines (GA)

- Pro

- No code
- New Compare View
- Parameters (“Deployment Rules”)
<https://fabric.onl/depl-pipelines-rules>

- Con

- ~~• Cannot re-bind report~~ <https://fabric.onl/depl-pipeline-auto-bind>
- Not all item types supported
- Premium only
- No source control

Fabric REST APIs (Preview)

- <https://fabric.onl/rest-api>
 - <https://fabric.onl/items-api>
 - <https://fabric.onl/git-api> **NEW**
- <https://fabric.onl/api-samples>
- Supported Item Types (Definition)
 - **Report**
 - **Semantic Model (aka Dataset)**
 - Notebook
 - Spark job

	Create (without definition)	Get	Update	Delete	List
...	X	X	X	X	✓
...	X	✓	✓	✓	✓
...	X	X	X	X	✓
...	✓	✓	✓	✓	✓
...	X	✓	✓	✓	✓
...	✓	✓	✓	✓	✓
...	✓	✓	✓	✓	✓
...	✓	✓	✓	✓	✓
...	X	X	X	X	✓
...	✓	✓	✓	✓	✓
...	X	X	X	X	✓
...	X	✓	X	✓	✓
...	X	✓	X	✓	✓
...	✓	✓	✓	✓	✓
...	X	X	X	X	✓
...	✓	✓	✓	✓	✓

Fabric Items REST APIs

Pro

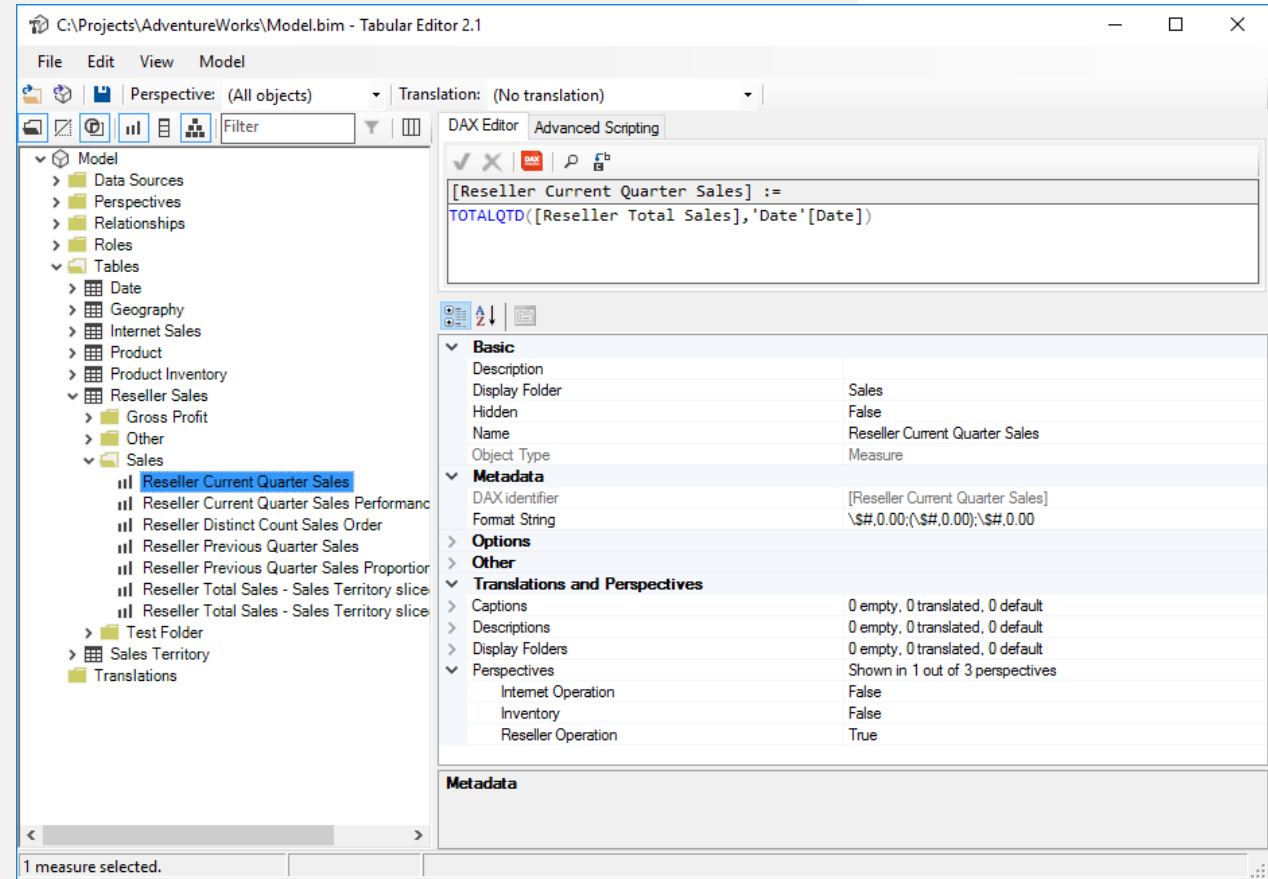
- Directly aligned with Desktop Developer Mode/PBIP
- Allows automated import/export of all Fabric item definitions in a workspace

Con

- No service principals allowed (yet)
- Not all item types supported


Tabular Editor

- Tabular Editor 2, free and open-source: <https://pbi.onl/te2>
- Integrates with PBI Desktop as external tool
- Advanced commercial version: Tabular Editor : <https://tabulareditor.com/>







Power BI/Fabric Studio for vscode


Visual Studio Code > Extension Packs > Power BI Studio



Power BI Studio

Gerhard Brueckl  [gbrueckl.at](https://github.com/gbrueckl) |  25,944 installs |  (4) | Free |  Sponsor

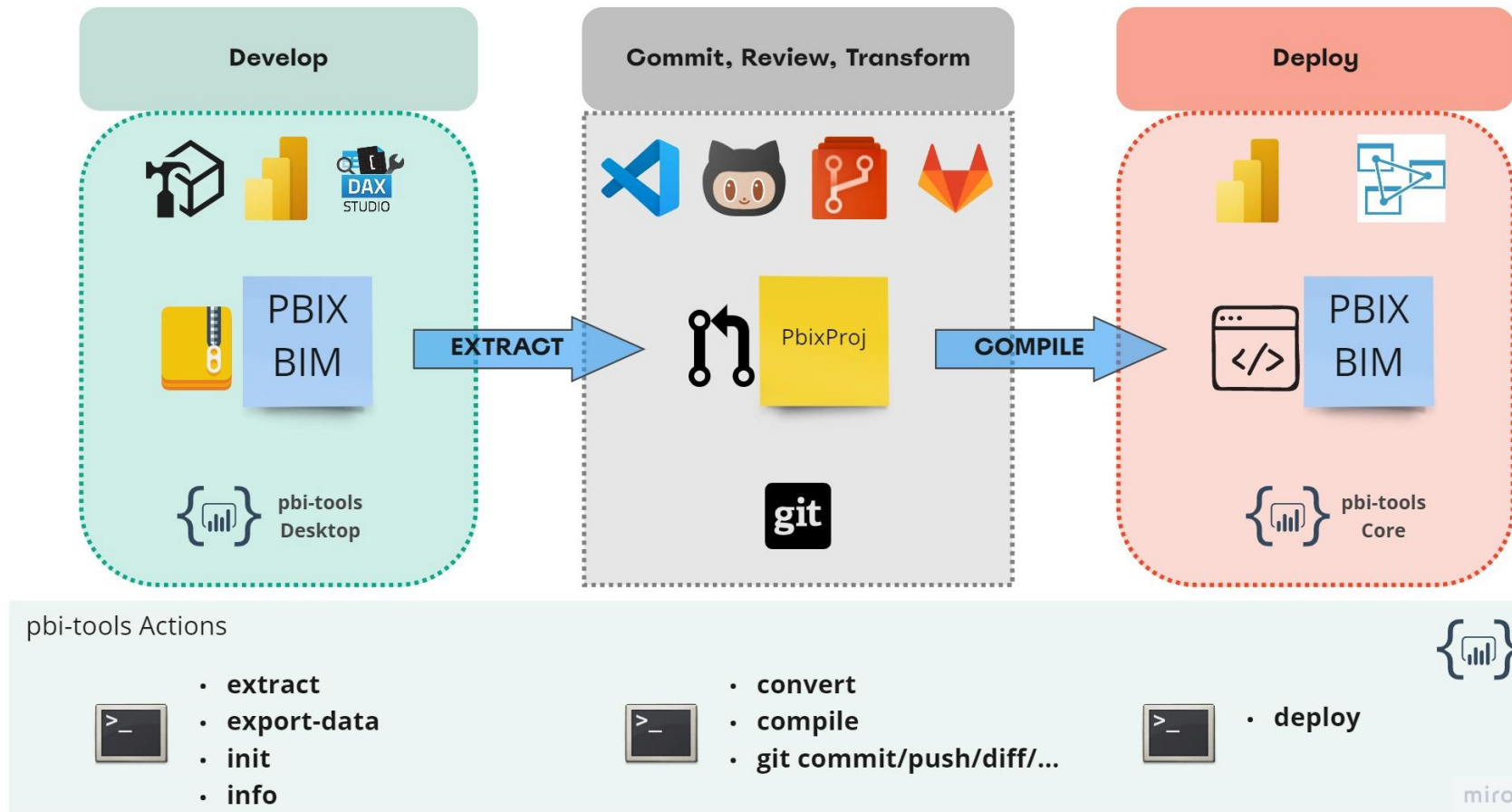
An extension to manage your Power BI resources from within VSCode

[Install](#) [Trouble Installing?](#) 

- Recommended: Power BI Extension Pack - <https://pbi.onl/vscode-ext-pack>
 - Includes TMDL, DAX, M, OneLake extensions
- Also available: Fabric Studio for vscode - <https://fabric.onl/vscode>

pbi-tools

- Free & open-source, community-driven
- <https://pbi.tools/>



pbi-tools and Azure DevOps/GitHub/GitLab/...

- Works across CI systems
- Shipped as Docker container
- Highly complex pipelines
 - Parameters
 - Model Refresh
 - Data Source Credentials
- Configuration as json (part of project sources)

```
1 {
2   "version": "0.9",
3   "created": "2021-10-17T14:45:53.9231938+01:00",
4   "lastModified": "2021-10-17T14:45:55.0022697+01:00",
5   "deployments": {
6     "Sales Insight Report 1": {
7       "mode": "Report",
8       "source": {
9         "type": "Folder",
10        "path": "./Sales Insight Report1"
11      },
12      "authentication": {
13        "type": "ServicePrincipal",
14        "tenantId": "pbitools.org",
15        "clientId": "b477...bf75",
16        "clientSecret": "%PBI_CLIENT_SECRET%"
17      },
18      "parameters": {},
19      "options": {
20        "nameConflict": "CreateOrOverwrite"
21      },
22      "logging": {},
23      "environments": {
24        "A_Development": {
25          "disabled": false,
26          "workspaceId": "82d08e54-8dd8-4af1-84fd-013c008f695d"
27        },
28        "B_Staging": {
29          "workspaceId": "9f2032e9-6189-4f45-83a7-d9b15b8709d4"
30        },
31        "C_Production": {
32          "workspaceId": "67ec2e2c-daf7-4def-8bab-fbdbb1212587"
33        }
34      }
35    }
36  }
37 }
```

The deployment manifest contains any number of deployment profiles.

References pbi-tools report sources held in the same repository.

Authentication settings. Secrets provided securely via environment variables.

Define any number of environments to deploy to.

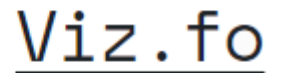
[illegible]

Big thank you to our great sponsors

Premium



Standard



Raffle prizes from the sponsors





@mthierba

/in/mthierba

github.com/pbi-tools