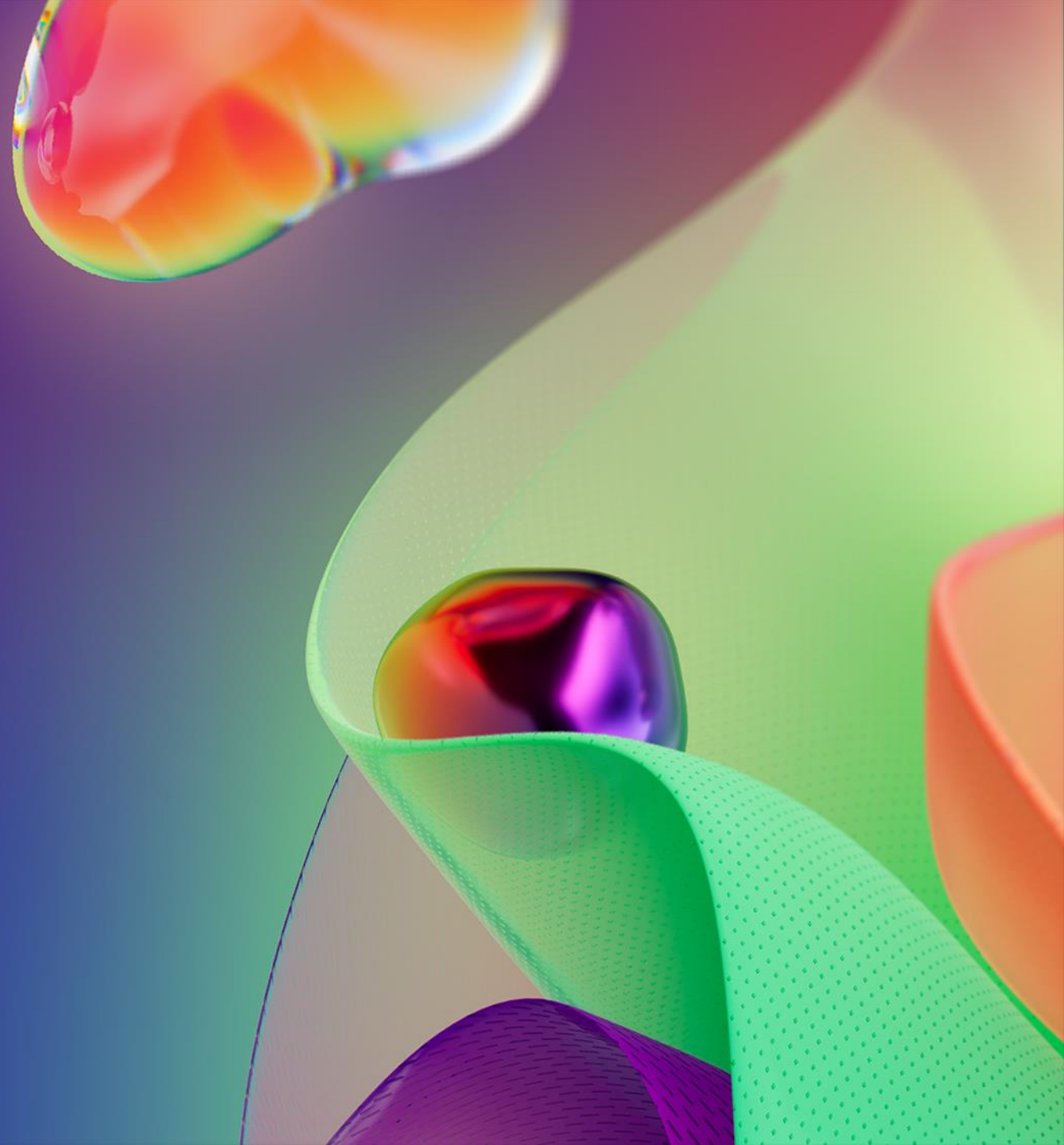




Power BI Developer Experiences



Rui Romano (he/him)

Program Manager | Power BI @ Microsoft

*Product Manager at Power BI product team, focusing on **Pro-BI experiences**.*

Professional:

LinkedIn - [/in/ruiromano](#)

Twitter - [@RuiRomano](#)

GitHub - <https://github.com/RuiRomano>

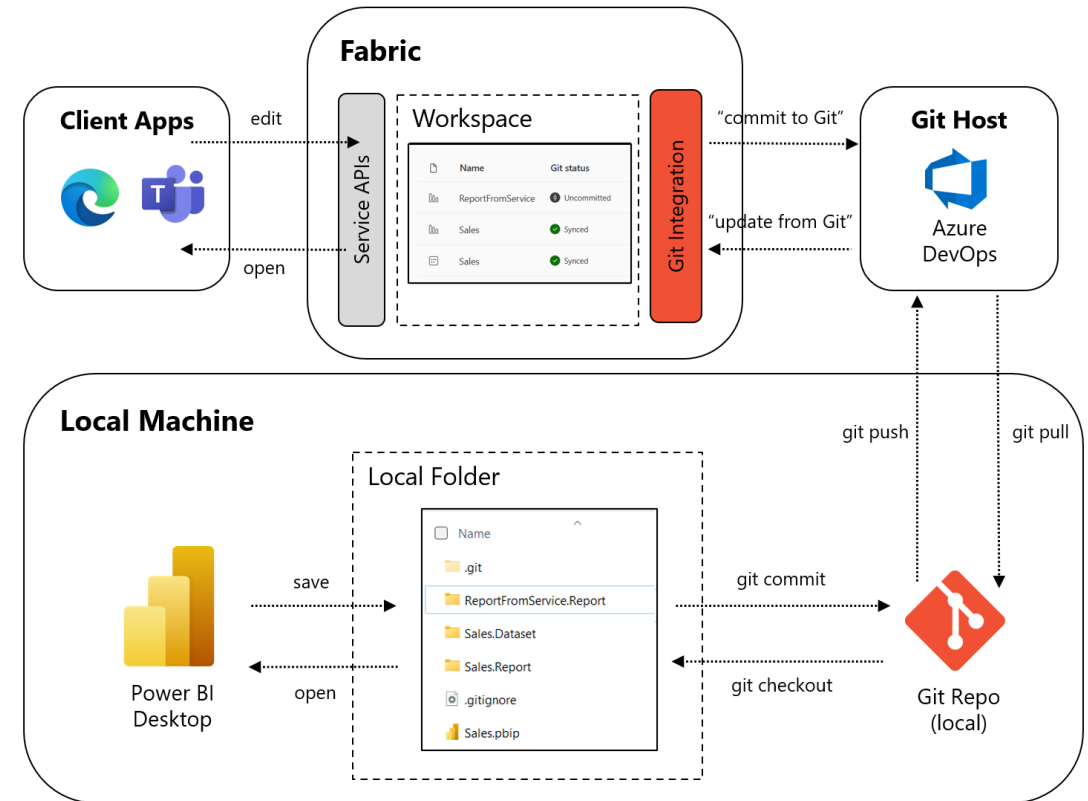


Agenda

- Power BI Pro-BI Developer Experiences
- What's next?

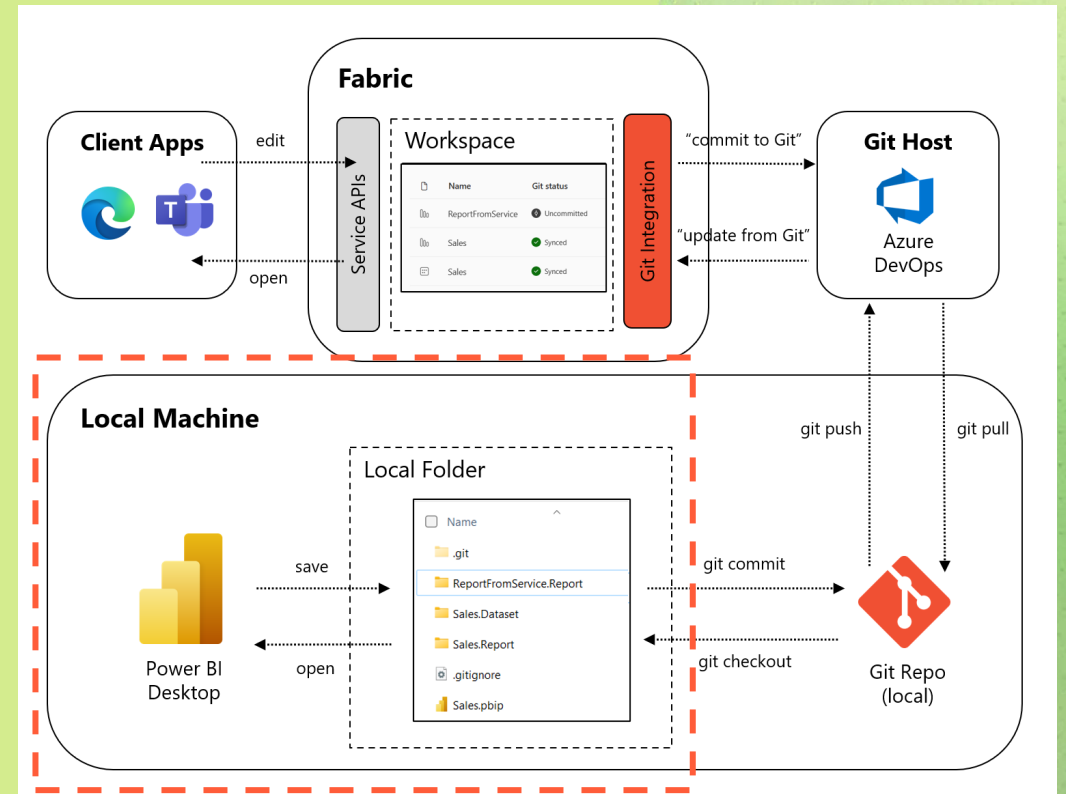
Power BI Developer Mode & Fabric Git

- Friendly **Source Control** experience
- Unblock **Collaboration**
- Improve **Efficiency**
- Achieve **Reliability** through **CI/CD**

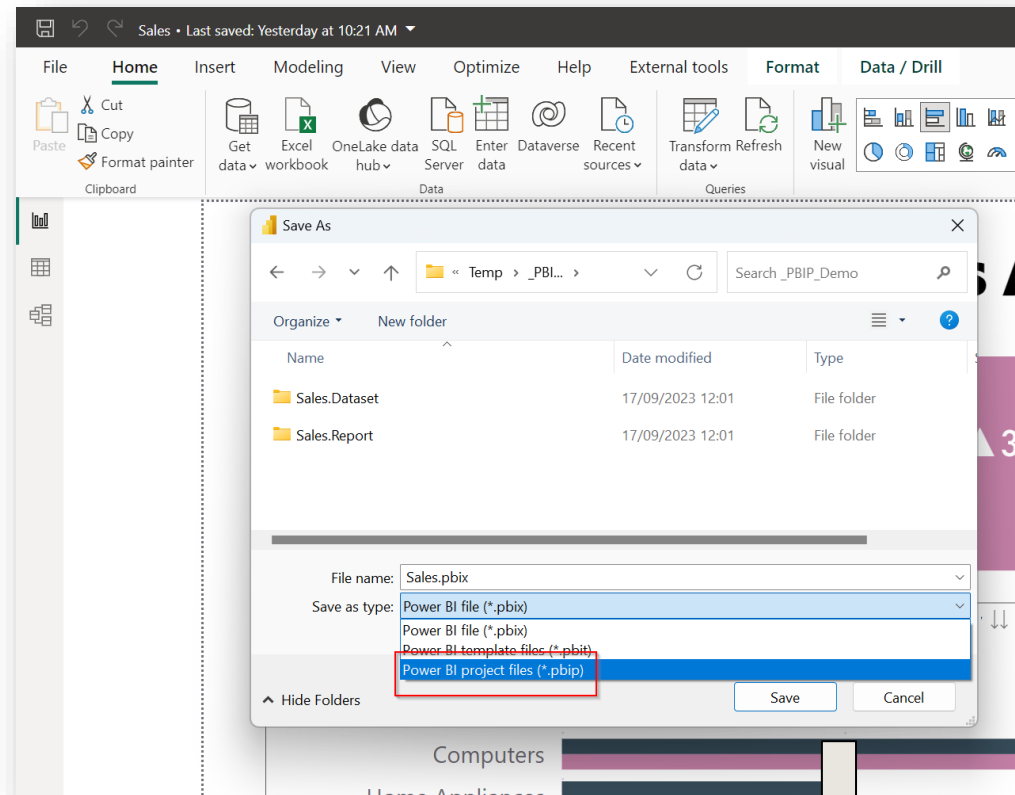


End to End flow

Save-as Power BI Project files (PBIP) aka "Developer Mode"



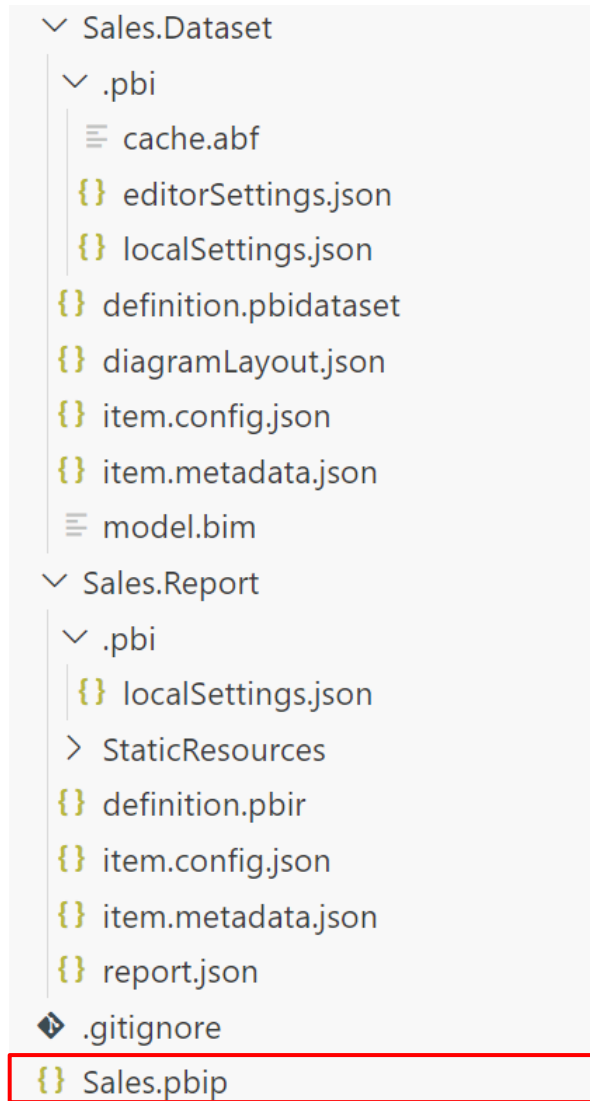
Save As "Power BI Project files" (Public Preview)



- New Save-as option: **"Power BI Project files"**
- Folder with text metadata files
- Bi-Directional Conversion
 - PBIX -> PBIP; PBIP -> PBIX
- Publish a PBIP from Desktop

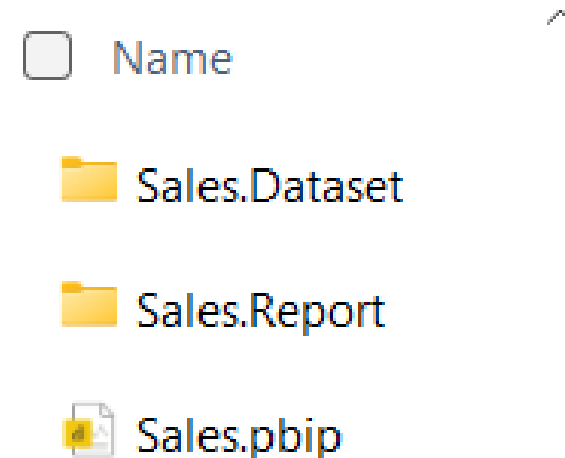
Name	Type
.git	File folder
Sales.Dataset	File folder
Sales.Report	File folder
.gitignore	Git Ignore Source ...
Sales.pbip	PBIP File

PBIP Anatomy

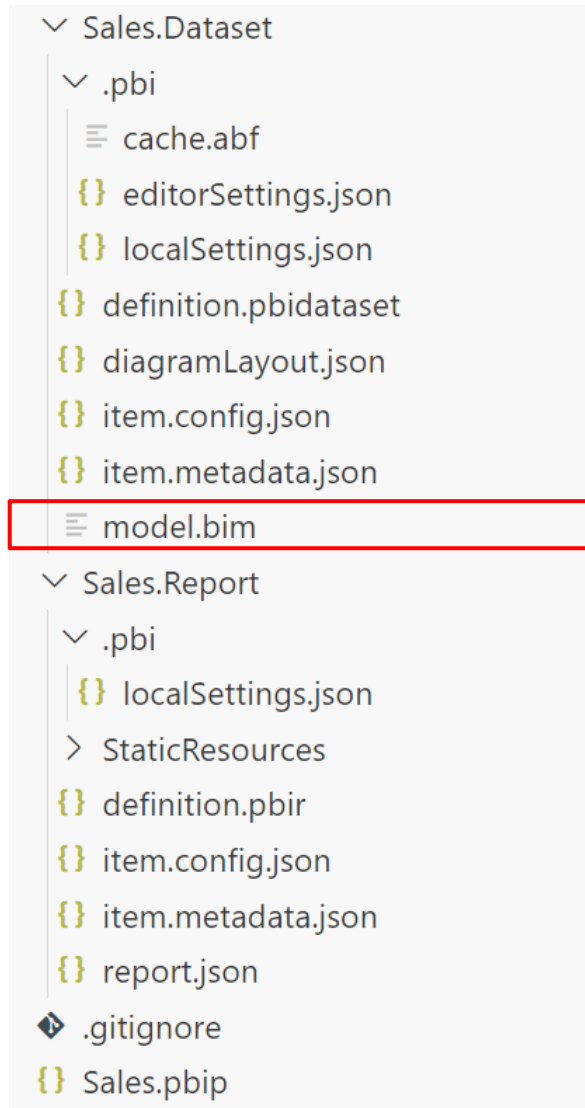


```
{} Sales.pbip > ...
1  {
2  |  "version": "1.0",
3  |  "artifacts": [
4  |  |  {
5  |  |  |  "report": {
6  |  |  |  |  "path": "Sales.Report"
7  |  |  |  }
8  |  |  }
9  |  ],
10 |  "settings": {
11 |  |  "enableAutoRecovery": true
12 |  }
13 }
```

"Just" a shortcut to the report folder



PBIP Anatomy

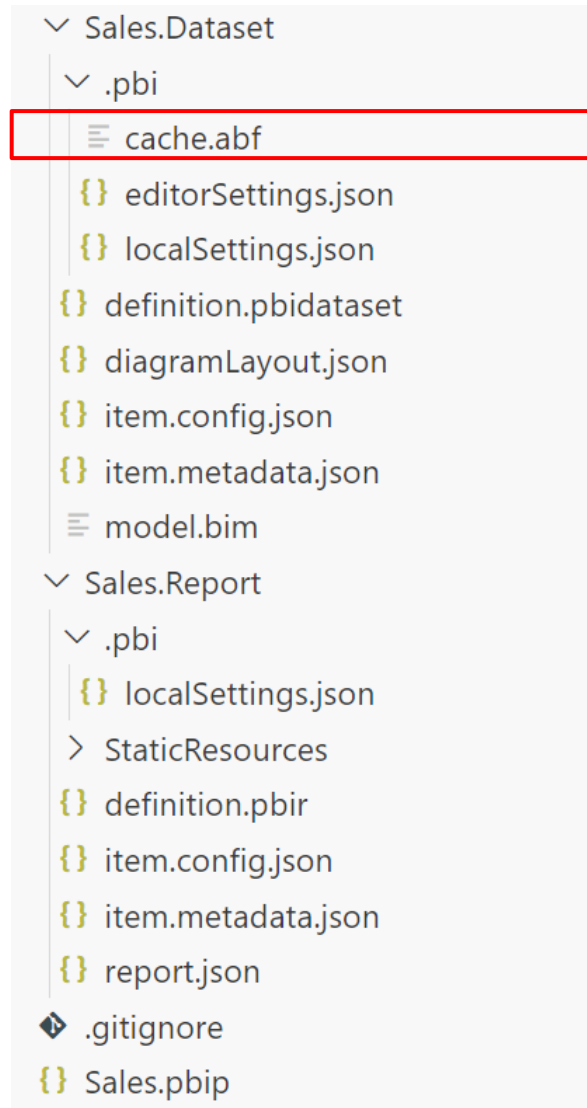


```
1 {
2   "compatibilityLevel": 1567,
3   "model": {
4     "annotations": [
5       {
6         "name": "PBIDesktopVersion",
7         "value": "2.121.702.0 (23.09)"
8       },
9       {
10        "name": "__PBI_TimeIntelligenceEnabled",
11        "value": "0"
12      },
13      {
14        "name": "PBI_QueryOrder",
15        "value": "[\\"RangeStart\\",\\"RangeEnd\\",\\"Environment\\",\\"Randomizer\\"
16      ],
17      {
18        "name": "BestPracticeAnalyzer_IgnoreRules",
19        "value": "{\\"RuleIDs\\":{\\"PARTITION_NAME_SHOULD_MATCH_TABLE_NAME_FOR_
20      },
21      {
22        "name": "__TEdtr",
23        "value": "1"
24      },
25      {
26        "name": "PBI_ProTooling",
27        "value": "[\\"DevMode\\"]"
28      }
29    ],
30    "culture": "en-US",
31    > "cultures": [...
12798 ],
12799 > "dataAccessOptions": {...
12802 },
12803 "defaultPowerBIDataSourceVersion": "powerBI_V3",
12804 "discourageImplicitMeasures": true,
12805 > "expressions": [...
13036 ],
13037 > "perspectives": [...
13189 ],
13190 > "queryGroups": [...
13200 ],
13201 > "relationships": [...
13238 ],
13239 > "roles": [...
13272 ],
13273 "sourceQueryCulture": "en-US",
13274 > "tables": [...
15535 ]
15536 }
15537 }
```

Contains the dataset definition

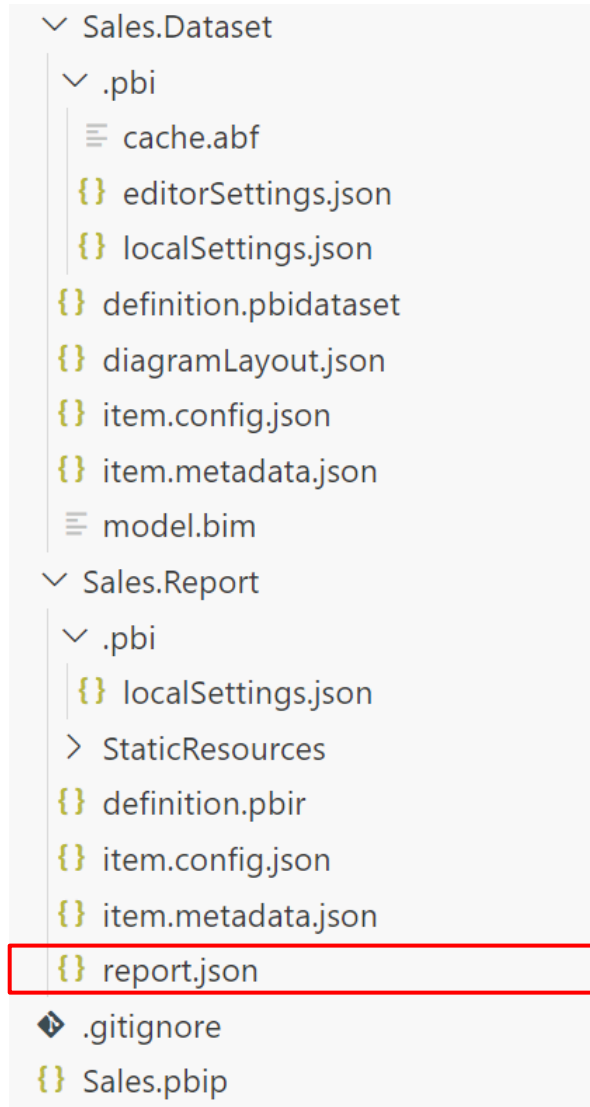
Tabular Model Scripting Language (TMSL) [database object definition](#)

PBIP Anatomy



- An Analysis Services Backup (ABF) file.
- Local Cache copy of the model and data when it was last edited.
- By default, this file is ignored by Git.

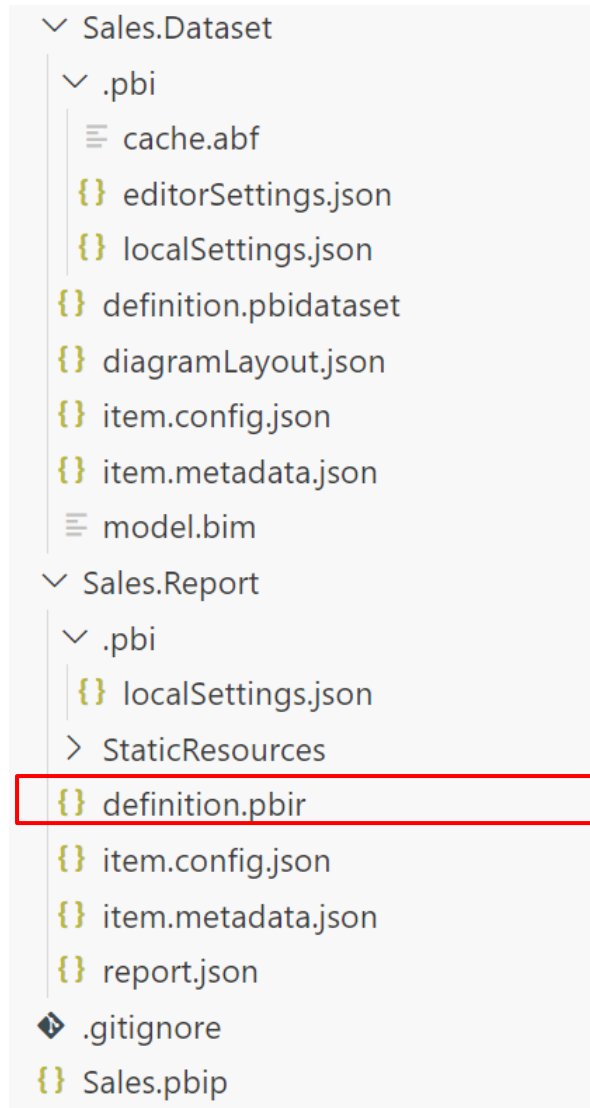
PBIP Anatomy



```
56 "sections": [  
57   {  
58     "config": "{\\"objects\\":{\\"outspacePane\\":[{\\"properties\\":{\\"width\\":{\\"expr\\":{\\"Literal\  
59     \"displayName\": \"Sales\",  
60     \"displayOption\": 1,  
61     \"filters\": \"[{\\"name\\":\\"Filterf99428c5489cc4e6747a\\",\\"expression\\":{\\"Column\\":{\\"Express  
62     \"height\": 720.00,  
63     \"name\": \"ReportSection89a9619c7025093ade1c\",  
64     \"visualContainers\": [  
65       {  
66         \"config\": \"{\\\"name\\\":\\\"0f9bcd145fc9e6fdc33\\\",\\\"layouts\\\":[{\\"id\\\":0,\\\"position\\\":{\\"x\  
67         \"filters\": \"[{\\"name\\\":\\"Filter2a1ae8311dd5bd80e06c\\\",\\"expression\\\":{\\"Column\\":{\\"Exp  
68         \"height\": 111.36,  
69         \"width\": 224.03,  
70         \"x\": 256.13,  
71         \"y\": 80.57,  
72         \"z\": 1000.00  
73       },  
74       {  
75         \"config\": \"{\\\"name\\\":\\"16d45d719c3475dec7f\\\",\\\"layouts\\\":[{\\"id\\\":0,\\\"position\\\":{\\"x\  
76         \"filters\": \"[]\",  
77         \"height\": 270.91,  
78         \"width\": 402.78,  
79         \"x\": 844.26,  
80         \"y\": 207.84,  
81         \"z\": 9000.00  
82     },  
83     {  
84       \"config\": \"{\\\"name\\\":\\"223d9300700274da67c8\\\",\\\"layouts\\\":[{\\"id\\\":0,\\\"position\\\":{\\"x\  
85       \"filters\": \"[]\",  
86       \"height\": 65.51,  
87       \"width\": 65.51,  
88       \"x\": 32.14,  
89       \"y\": 6.18,  
90       \"z\": 13000.00  
91     },  
92     {  
93       \"config\": \"{\\\"name\\\":\\"32b08d7f32cb5f9816cc\\\",\\\"layouts\\\":[{\\"id\\\":0,\\\"position\\\":{\\"x\  
94       \"filters\": \"[{\\"name\\\":\\"Filter\\\",\\"expression\\\":{\\"Column\\":{\\"Expression\\\":{\\"SourceR  
95       \"height\": 272.34,  
96       \"width\": 313.19,  
97       \"x\": 521.03,  
98       \"y\": 207.84,  
99       \"z\": 5000.00  
100    },  
  ],  
}
```

- JSON file that describes the report, pages, visuals, ...

PBIP Anatomy



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

```
1 {  
2   "version": "1.0",  
3   "datasetReference": {  
4     "byPath": null,  
5     "byConnection": {  
6       "connectionString": "Data Source=\"powerbi://api.powerbi.com/v1.0/myorg/PBIP - Publish\";  
7       Initial Catalog=Sales;Access Mode=readonly;Integrated Security=ClaimsToken",  
8       "pbiServiceModelId": null,  
9       "pbiModelVirtualServerName": "sobe_wowvirtualserver",  
10      "pbiModelDatabaseName": "e0d8125a-0493-4517-8d98-48f8c89d809c",  
11      "name": "EntityDataSource",  
12      "connectionType": "pbiServiceXmlaStyleLive"  
13    }  
14  }  
15 }
```

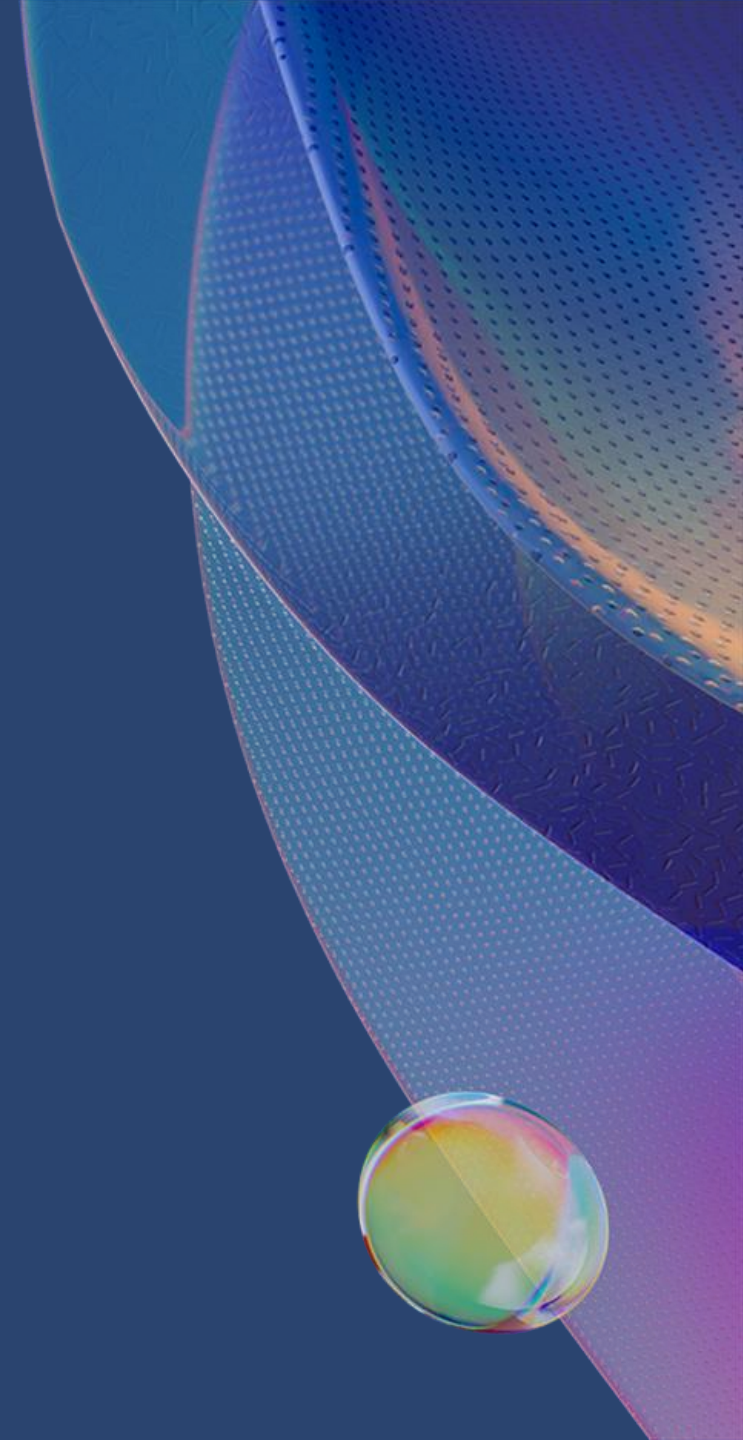
Holds the reference to the dataset

- Local – byPath
- Remote - byConnection

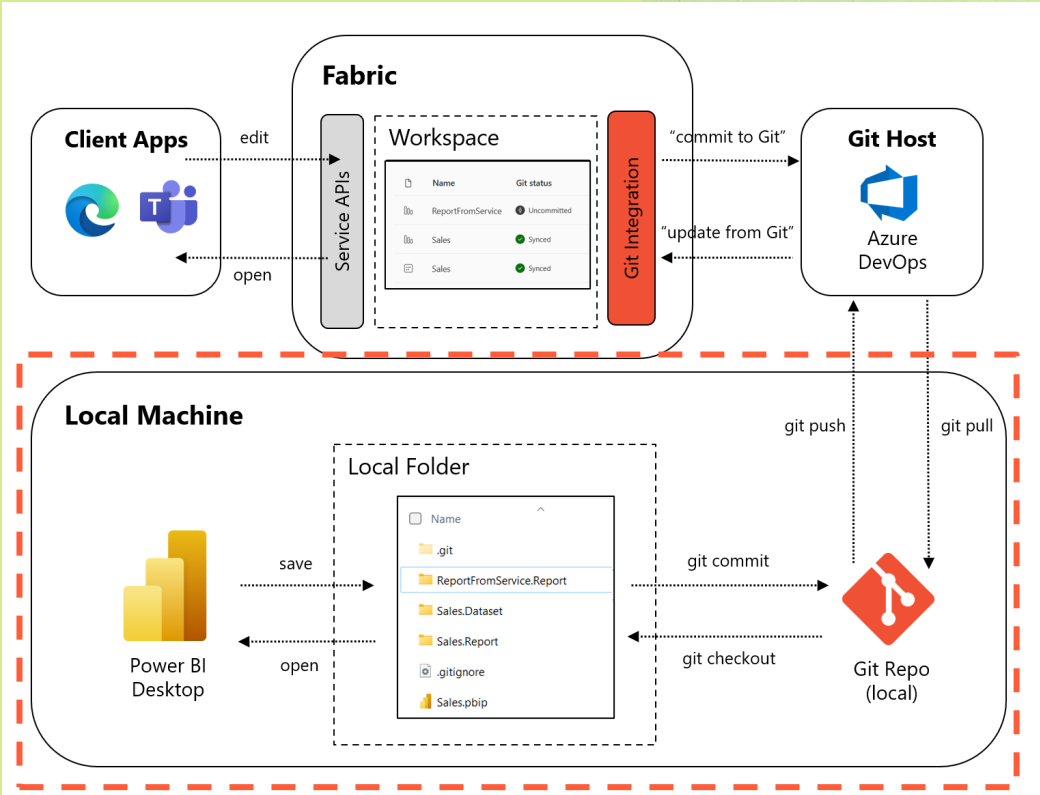
Power BI Desktop can open the .pbir file directly

Demo

1. Save as PBIP
2. External Changes



Git



Source Control your Development

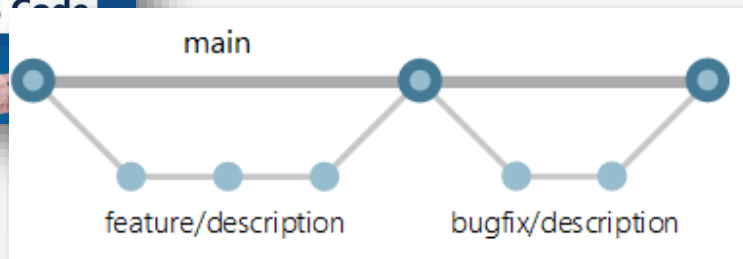
Why? Even if you are a single-developer!

- Backup your work
- Track your changes (compare / diff)
- Isolate your developments

Be familiar with Git!

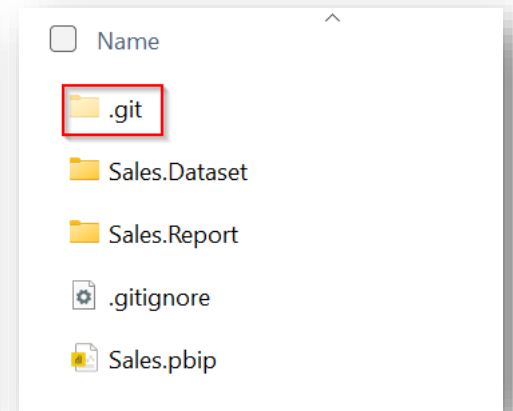
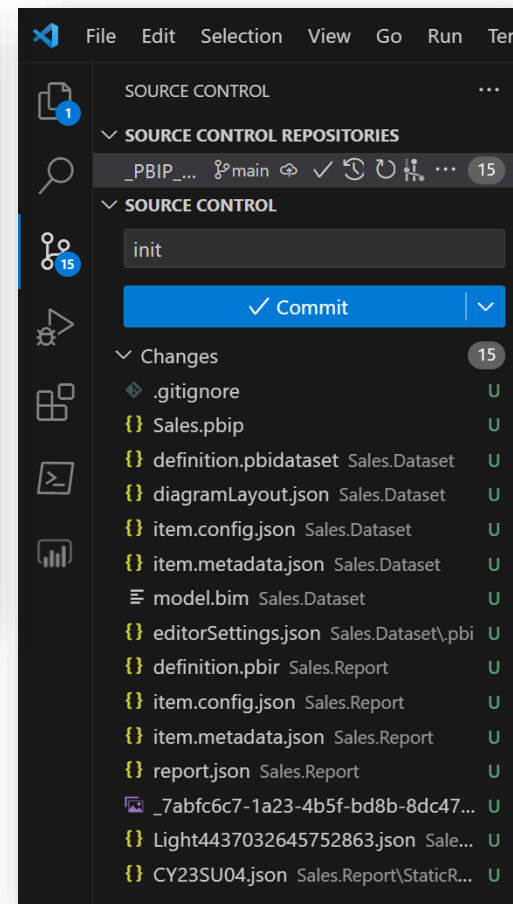
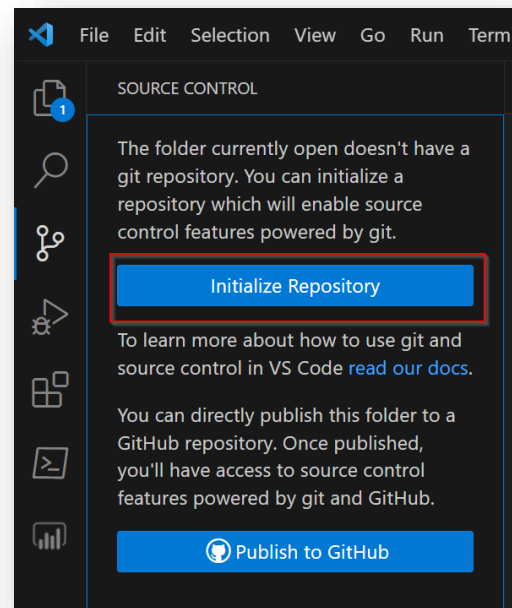
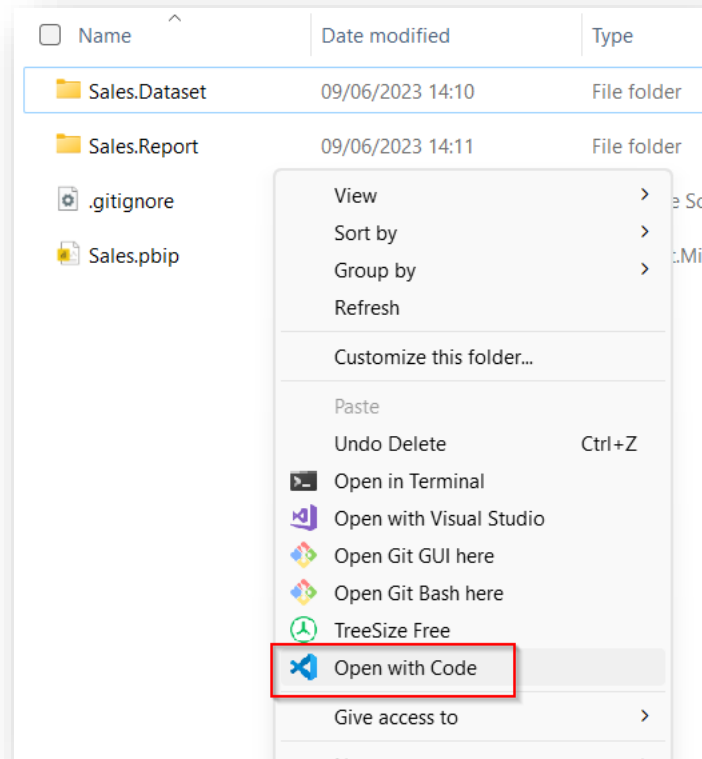
- Git Application – (e.g. [VS Code](#))
- [Basics](#) – Commit / Pull / Push / Diff's
- [Branching](#) & [Branching Strategies](#)
- Merge

```
diff --git a/report.json b/report.json
index 2327..2341+
--- a/report.json
+++ b/report.json
@@ -2332,7 +2341,7 @@
     "expression": "COUNTRONS('Sales')",
     "formatString": "#,##0",
     "lineageTag": "67791bd1-5f33-4a29-a9ac-be0ad2453fcf"
-  },
+  },
+  {
+    "name": "# Sales",
+    "expression": "DISTINCTCOUNT('Sales'[Order Number])",
+    "formatString": "#,##0",
+    "lineageTag": "67791bd1-5f33-4a29-a9ac-be0ad2453fcf"
+  },
   {
     "name": "Sales Qty by Delivery Date",
     "expression": "CALCULATE([Sales Qty], USERRELATIONSHIP('Sales'
@@ -2349,7 +2351,7 @@
     "formatString": "#,##0",
     "lineageTag": "c85c43d0-a2e1-4d90-a8a0-4009499b6eea"
   },
@@ -2354,7 +2355,7 @@
   },
 }
```



Graph	Description	Date	Author	Commit ID
main	new barchart for sales by country	16 May 2023 09:07	RuiRomano	f81652c3
	new table	15 May 2023 19:31	RuiRomano	79e1df11
	new page	15 May 2023 19:30	RuiRomano	ffabe0c9
	measure change	15 May 2023 19:30	RuiRomano	da1906c6
	init	15 May 2023 19:29	RuiRomano	2e385aaf

Git - Init



Git – Commit & Track Changes

The screenshot displays the Visual Studio Code interface during a Git commit. The left sidebar shows the 'SOURCE CONTROL' view with a 'Commit' button. The central editor shows a diff between the working tree and the index. The right sidebar shows the 'Git Graph' view.

Diff View:

```
2341- "expression": "COUNTROWS('Sales')",
2341+ "expression": "DISTINCTCOUNT('Sales'[Order Number])",
```


Git – Branching for development isolation

My files > Temp > PowerBI > SalesProject

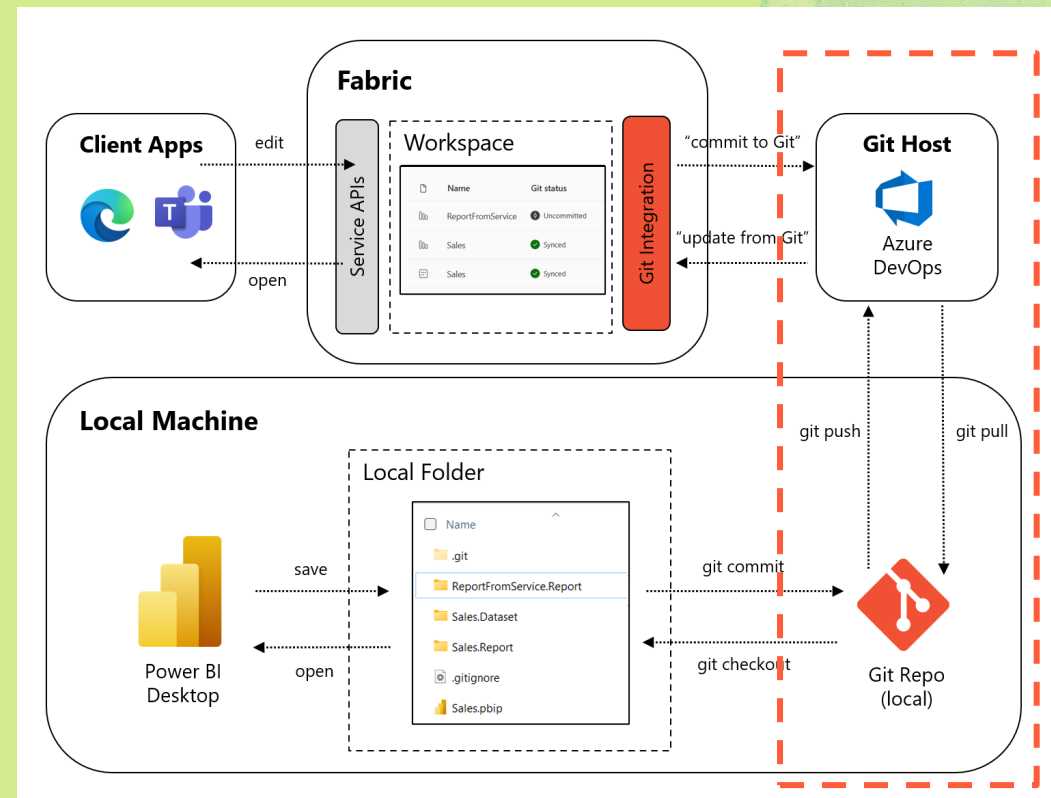
Name	Modified
Sales - Dev.pbix	July 4
Sales - Dev_V2.pbix	July 4
Sales - Dev_V3.pbix	July 4
Sales - TST.pbix	July 4
Sales.pbix	July 4

Visual Studio Code interface showing a Git branching menu. The menu is open, displaying options to create new branches or checkout existing ones. The 'dev' branch is highlighted in red. The Explorer view shows the project structure with folders like Sales.Dataset and Sales.Report, and files like definition.pbidataset, diagramLayout.json, item.config.json, item.metadata.json, model.bim, report.json, .gitignore, and Sales.pbip.

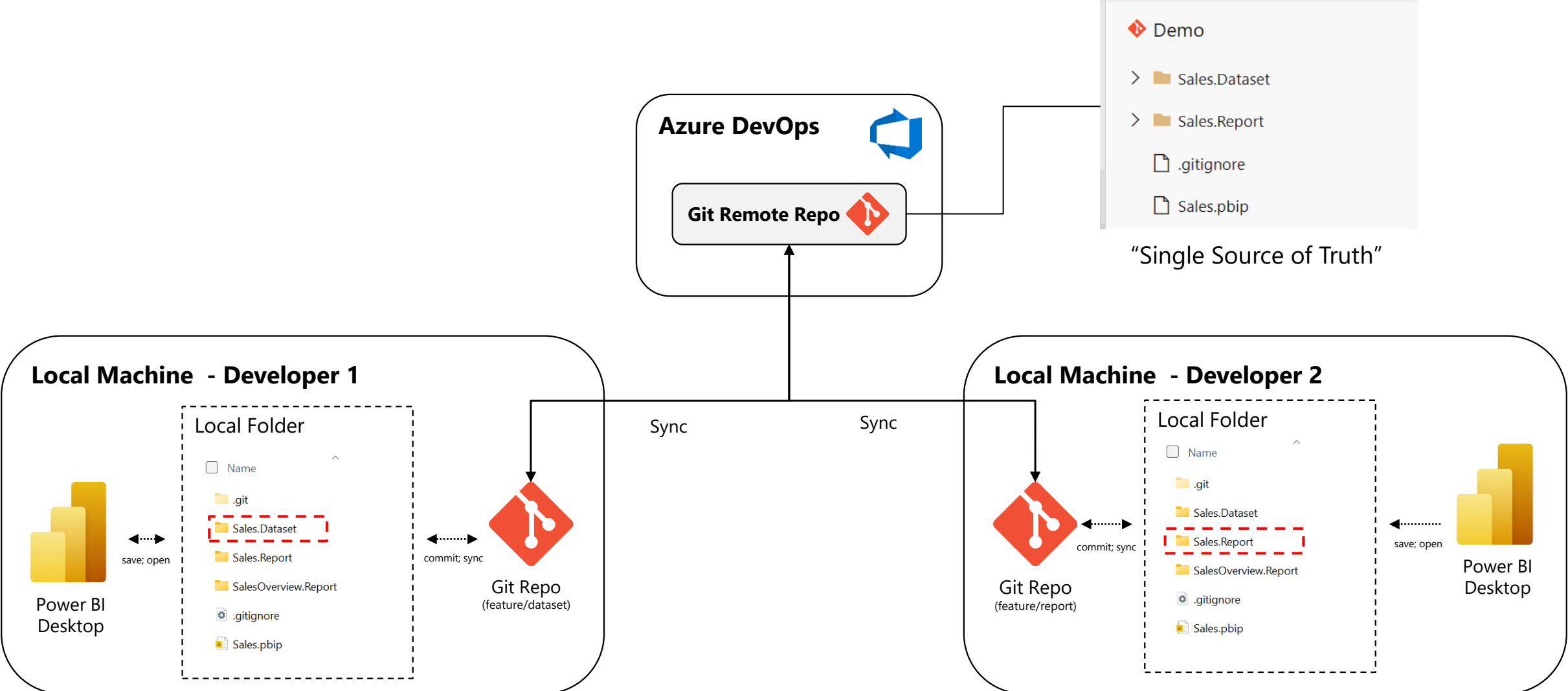
Name

.git
Sales.Dataset
Sales.Report
.gitignore
Sales.pbip

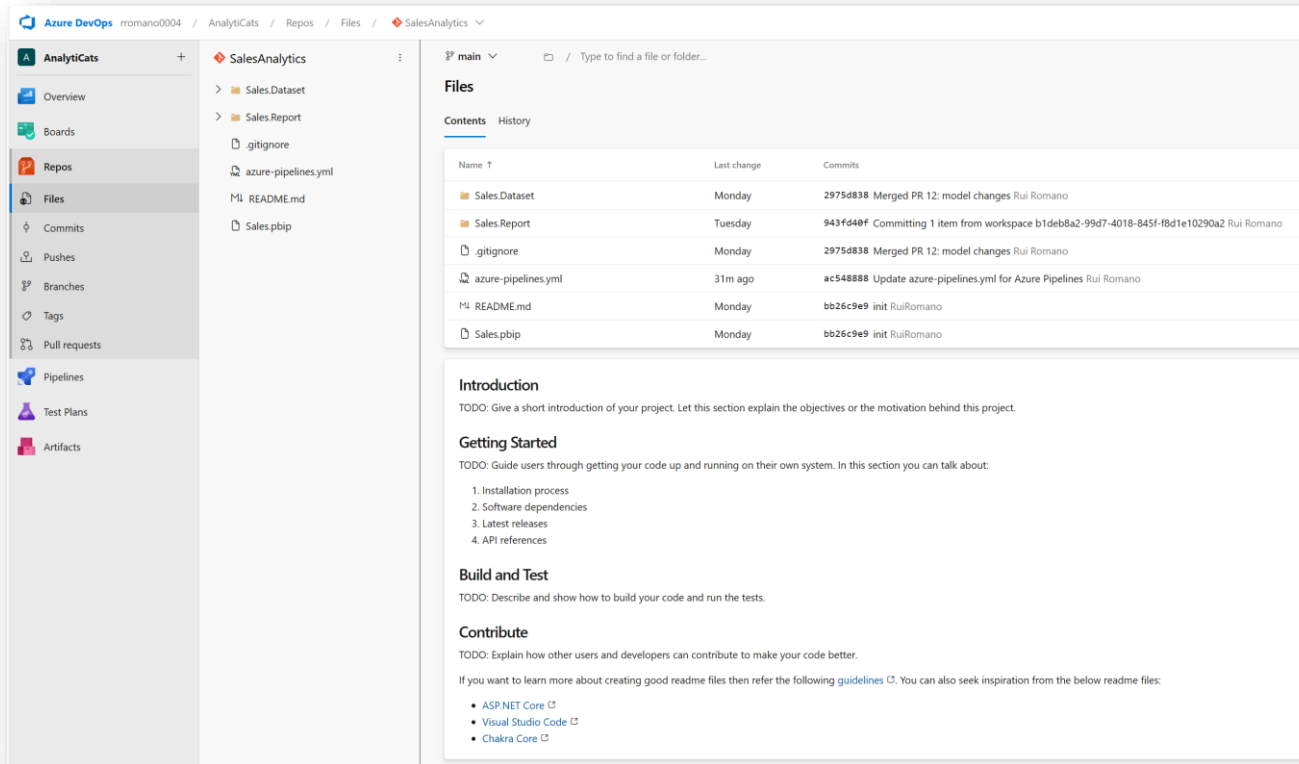
Remote Git / Co-Development



Co-Development using Power BI Desktop



Azure DevOps



Much more than just Repos / Git

Free up to 5 users

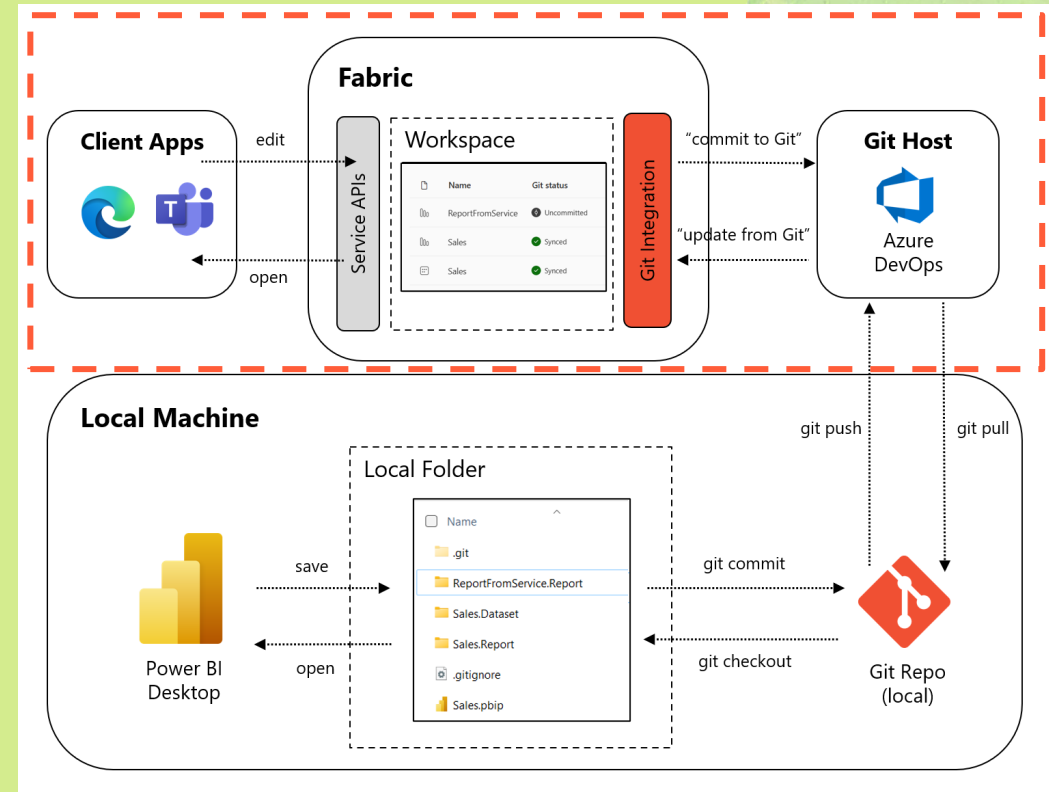
SSO Azure Active Directory

Learn more:

<https://aka.ms/pbidesktopdevmode>

<https://azure.com/devops>

Fabric Git Integration



Connect to Azure Repos

Workspace settings

- About
- Premium
- Azure connections
- System storage
- Git integration**
- Other

Power BI

Data Engineering/Science

Git integration

Connect to Git with Azure DevOps to manage your code and back up your work. [Learn more](#)

[View Azure DevOps account](#)

Connect Git repository and branch

Organization *

rromano0004

Project *

DevMode

Git repository * ⓘ

DevMode

Branch * ⓘ

main

Git folder ⓘ

Enter name of folder

[Connect and sync](#) [Cancel](#)

- Connect to a Git Branch
- Bi-directional sync
- Only metadata, data is never touched!
- Requires Premium Capacity
- SSO with AAD

Connect to Azure Repos

The screenshot displays the Power BI RR (Dev) Workspace interface. At the top, there is a search bar and a 'Source control' button with a notification icon, both highlighted with red boxes. Below this is a table of items:

Name	Git status	Type	Owner	Refreshed	Next refresh	Endorsement	Sensitivit
Sales	Synced	Report	RR (Dev) Workspace	05/09/23, 17:22:06	—	—	—
Sales	Synced	Dataset	RR (Dev) Workspace	05/09/23, 17:22:06	N/A	—	—

At the bottom of the interface, a status bar shows the current branch as 'main', the last sync time as 'Last synced: 9/7/2023 at 10:21 AM', and a commit hash 'd03bff25', all highlighted with a red box.

Commit / Update

Source control **1**

Filter by keyword

Filter



Source control

main

Changes 2 • Updates

Commit message

change to report

	Item	Status
<input type="checkbox"/>	Item	
<input checked="" type="checkbox"/>	Sales	🟡
<input type="checkbox"/>	Sales	🟡

- Changes in the workspace are detected automatically
- 'Undo' changes back to last commit

Source control

main

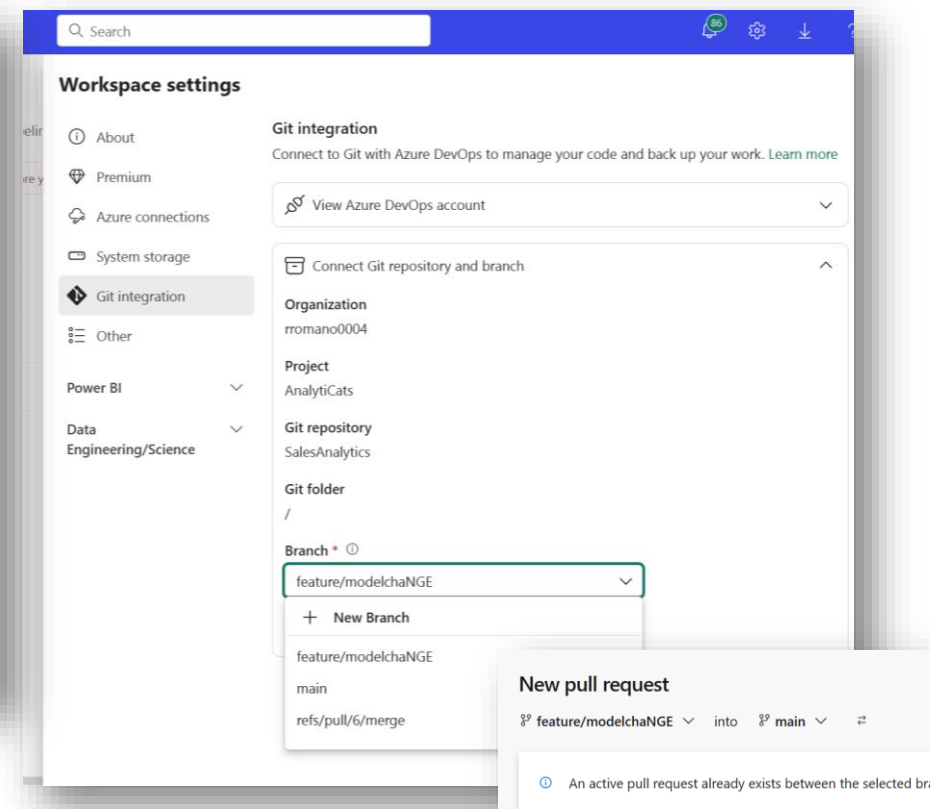
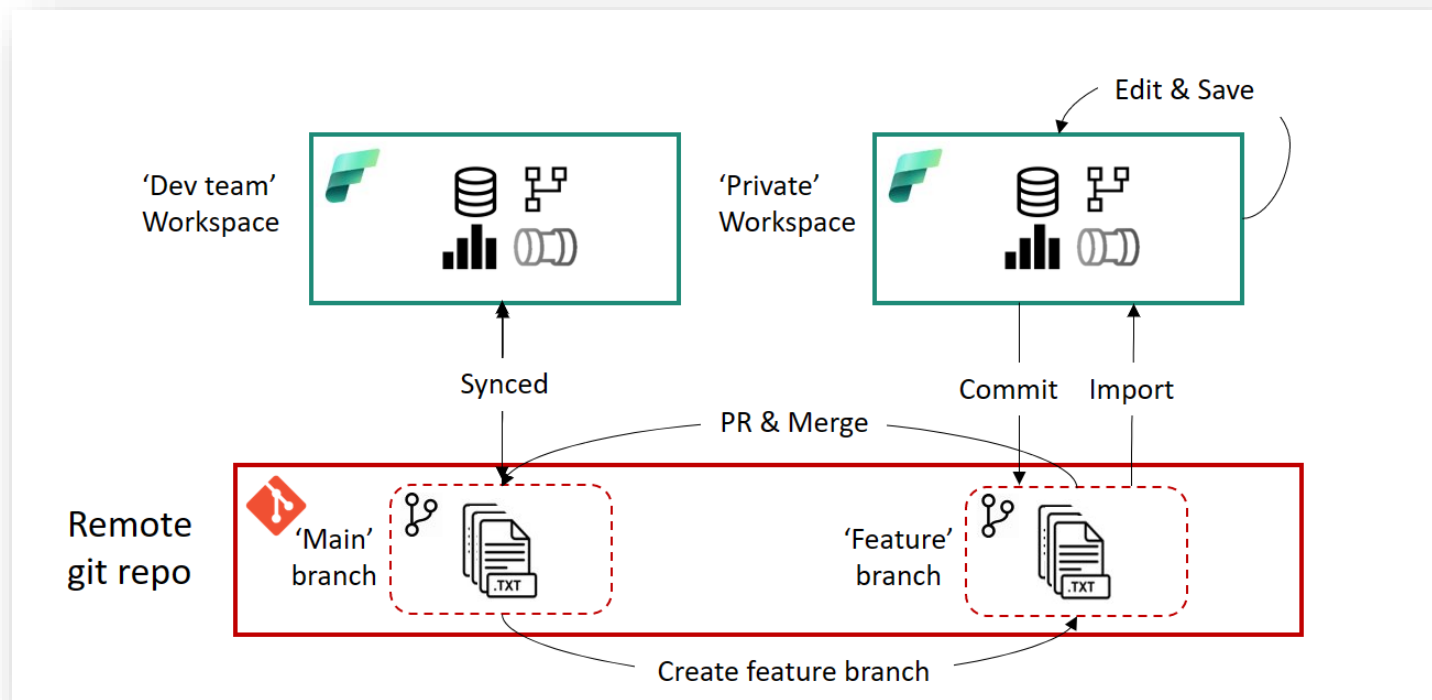
Changes Updates 1 •

	Item	Status
<input type="checkbox"/>	Item	
<input type="checkbox"/>	Sales	🟡

- New commits detected automatically
- Update the changes into the workspace
- Similar to 'publish' operation

Work in Isolation

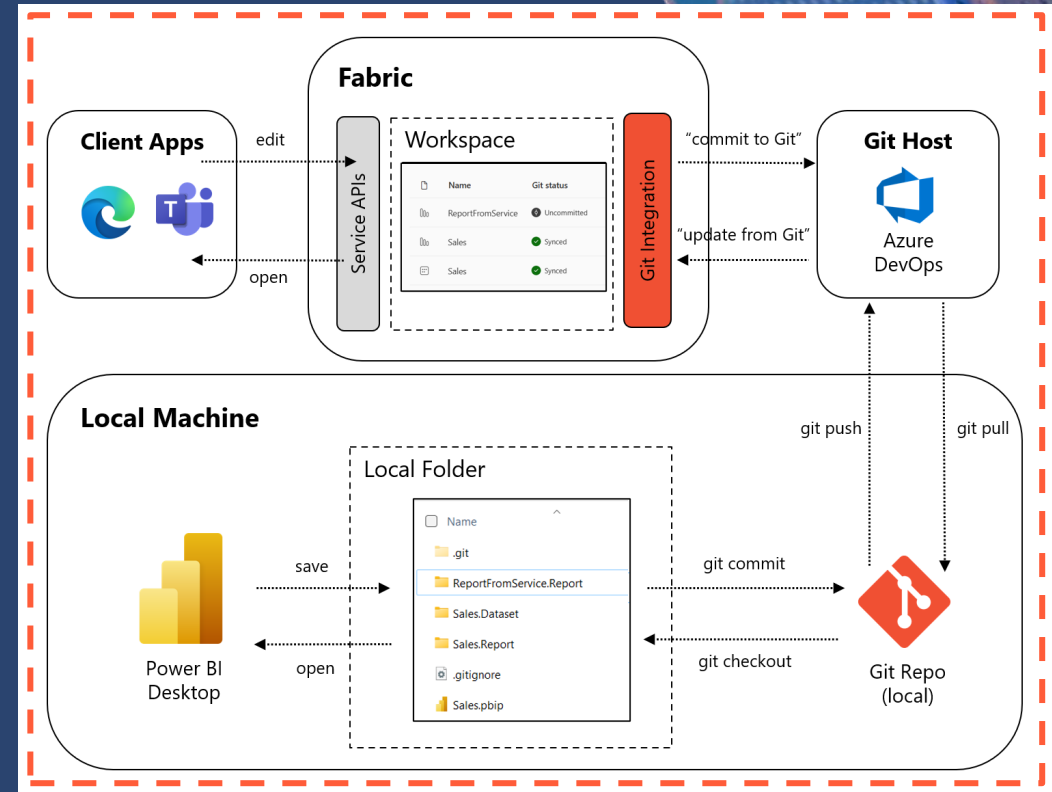
- Work in an isolated (personal dev) workspace and branch
- Pull Request to merge changes to main workspace



[Git integration branches](#)

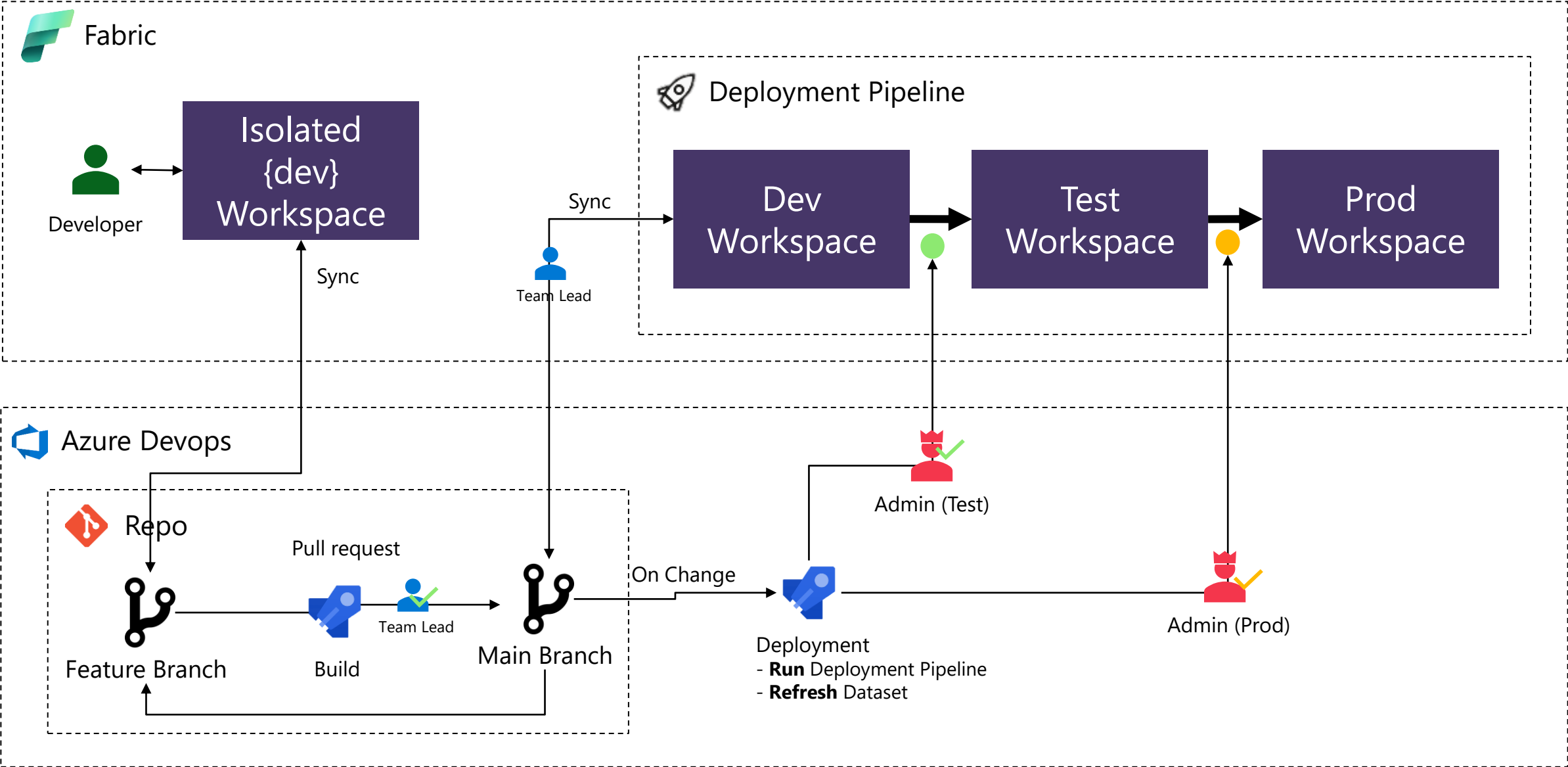
Demo

1. Fabric > ADO
2. Pull into Desktop/Local



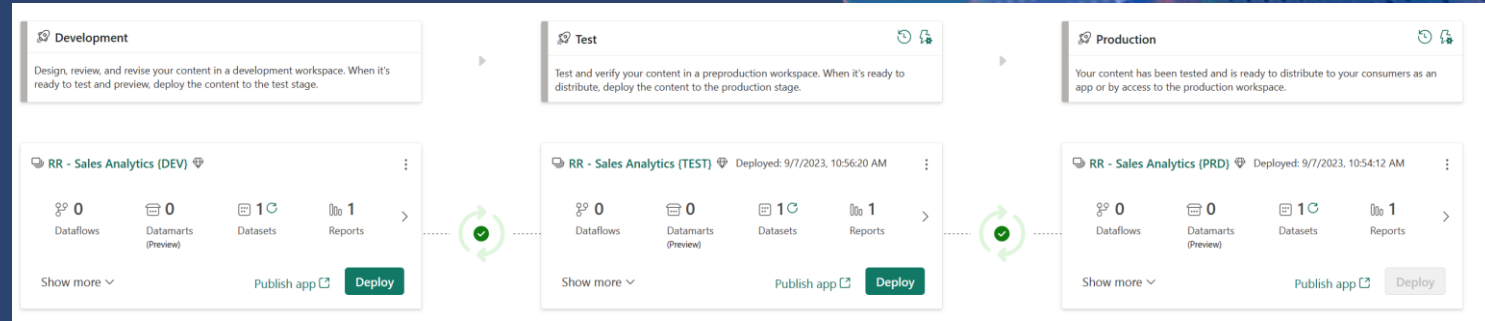
CI/CD with Fabric Git & ADO

CI/CD with Deployment Pipelines



Requirements

- Premium
- Azure DevOps
 - Build and Deployment Pipeline
 - Sample Pipelines - <https://github.com/RuiRomano/powerbi-devmode-pipelines>
 - [Tabular Editor](#) (Daniel Otykier) & [BPA Rules](#) (Michael Kovalsky)
 - [PBIX Inspector](#) (Nat Van Gulck)
 - [Power BI automation tools](#) Extension
 - [Power BI Actions](#) Extension
- [Service Principal](#)



Demo

1. Workspaces & Pipeline
2. Isolated Workspace
3. Pull Request
4. ADO Pipelines

#20230907.3 • new measure
SalesAnalytics - Build

This run will be cleaned up after 10 days based on your project settings.

Summary

Pull request by Rui Romano

Repository and version
SalesAnalytics
1.5 e4ac4c97

Errors 1 Warnings 24

Measure [New Measure] violates rule "[DAX Expressions] Measure references should be unqualified"
Run BPA Rules

Stages Jobs

Stage	Jobs	Duration	Status
Test	1 job completed	1m 30s	Success
Production	1 job completed	31s	Success

1 check passed

Fabric

- Only Dev workspace connects to Git
 - Test / Production workspaces are not connected to Git
- Deployment Pipeline to deploy to Test and Prod
 - Rules to change connection configuration

Name	Git status	Type
Sales	✓ Synced	Report
Sales	✓ Synced	Dataset
Sales Summary	✓ Synced	Report

Test
Test and verify your content in a preproduction workspace. When it's ready to distribute, deploy the content to the production stage.

Production
Your content has been tested and is ready to distribute to your consumers as an app or by access to the production workspace.

RR - Sales Analytics {TEST} Deployed: 9/7/2023, 12:37:53 PM

- Dataflows: 0
- Datamarts (Preview): 0
- Datasets: 1
- Reports: 2

RR - Sales Analytics {PRD} Deployed: 9/7/2023, 12:43:10 PM

- Dataflows: 0
- Datamarts (Preview): 0
- Datasets: 1
- Reports: 2

Sales
Dataset deployment rules

Set deployment rules
Create rules to run when deploying this item. [Learn more](#)

Data source rules

Parameter rules

Define the parameter values to apply to this item. [Learn more](#)

From: Environment To: TST

+ Add rule

ADO – Branch Policies

- 'Branch Policies' on main branch
 - Require PR for changes – No direct commits
 - Build Validation pipeline

The screenshot shows the 'main' branch settings in ADO. Under 'Branch Policies', four policies are listed, all currently turned off:

- Require a minimum number of reviewers** (Off): Require approval from a specified number of reviewers on pull requests.
- Check for linked work items** (Off): Encourage traceability by checking for linked work items on pull requests.
- Check for comment resolution** (Off): Check to see that all comments have been resolved on pull requests.
- Limit merge types** (Off): Control branch history by limiting the available types of merge when pull requests are completed.

Below this, the 'Build Validation' section is expanded, showing one policy:

Enabled	Name ↑	Path filter	Trigger
<input checked="" type="checkbox"/>	SalesAnalytics - Build		Automatic Expires after 12 h

The screenshot shows the file explorer for the 'main' branch. The files and folders are:

- SalesAnalytics (Folder)
- Sales Summary.Report (Folder)
- Sales.Dataset (Folder)
- Sales.Report (Folder)
- .gitignore (File)
- azure-pipelines-build.yml (File) - **Highlighted with a red box**
- azure-pipelines-deploy.yml (File)
- README.md (File)
- Rules-Dataset.json (File) - **Highlighted with a red box**
- Rules-Report.json (File) - **Highlighted with a red box**
- Sales.pbip (File)

ADO Pipelines - Build

- Downloads Tools
 - [Tabular Editor](#) (Daniel Otykier)
 - [PBIX Inspector](#) (Nat Van Gulck)
- Runs the rules
 - On error, break the Build and cannot complete PR

Updated model.bim

Active 16 RR Rui Romano proposes to merge feature/modelchaNGE into main 0/1 comments resolved

Overview Files Updates Commits

1 required check failed

SalesAnalytics - Build Build failed

Build / Run BPA Rules

```
23 Measure [Sales Amount (? LY)] violates rule "[DAX Expressions] Measure references should be unqualified"
```

No merge conflicts
Last checked Thursday

Description

Updated model.bim

← Jobs in run #20230919.8
SalesAnalytics - Build

Build_DataSets

Task	Duration
Build	23s
Initialize job	<1s
Checkout SalesAnalytics@refs/pul...	5s
Download TE	2s
Download PBIXInspector	2s
Run Dataset Rules	6s
Run Report Rules	4s
Post-job: Checkout SalesAnalytic...	<1s
Finalize Job	<1s
Report build status	<1s

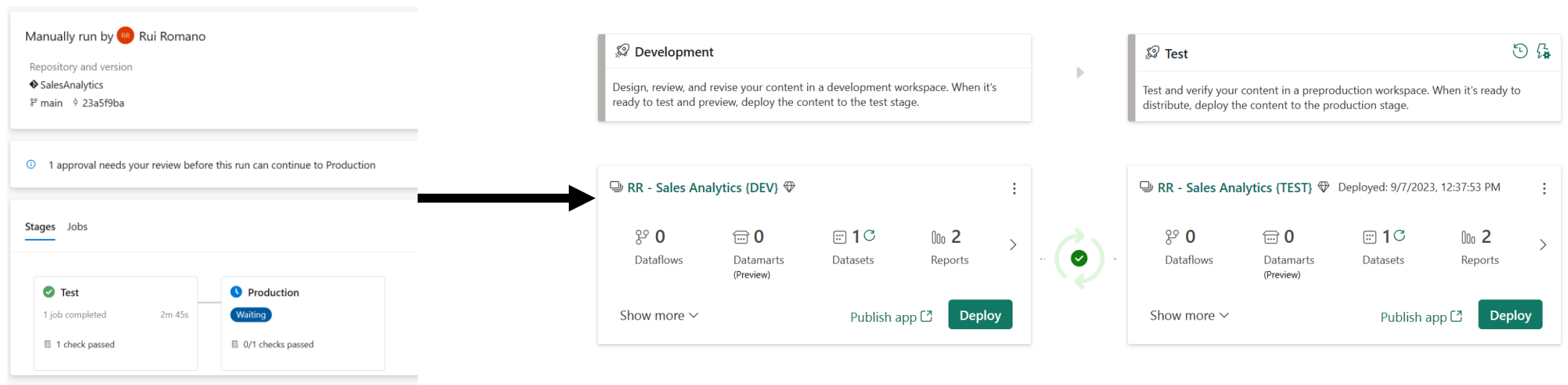
Run Report Rules

```
1 Starting: Run Report Rules
2 =====
3 Task : PowerShell
4 Description : Run a PowerShell script on linux, macOS, or Windows
5 Version : 2.226.2
6 Author : Microsoft Corporation
7 Help : https://docs.microsoft.com/azure/devops/pipelines/tasks/utility/powershell
8 =====
9 Generating script.
10 ===== Starting Command Output =====
11 "C:\Windows\System32\WindowsPowerShell\v1.0\powershell.exe" -NoLogo -NoProfile -NonInteractive -ExecutionPolicy Unrestricted -Command "powershell -c 'Invoke-Expression ([System.IO.File]::ReadAllText('c:\temp\16d45d719c3475decb7f\484fbdd73143c5bf71fa\Sacb1caf298449a8acb4\RunReportRules.ps1')).'"
12 ##[error]"Sales" - Rule "CHARTS using theme colours for certain visuals" FAILED with result: [
13 "c258740674a8a53d2c4c"
14 ], expected: [].
15 ##[warning]"Sales" - Rule "Reduce the number of visible visuals on the page" FAILED with result: false, expected: [
16 "16d45d719c3475decb7f",
17 "484fbdd73143c5bf71fa",
18 "Sacb1caf298449a8acb4"
19 ], expected: [].
20 ##[warning]"Sales Geo Analysis" - Rule "Reduce the number of objects within visuals" FAILED with result: [
21 "b1201136b7c6bd16bef7"
22 ], expected: [].
23
24
25 Press any key to quit application.
26 Finishing: Run Report Rules
```

ADO Pipelines - Deploy

- Runs the Deployment Pipeline
 - Dev -> Test
 - Test -> Prod
 - Refresh Dataset
- Each stage has an approval workflow
- [Power BI automation tools](#) and [Power BI Actions Extensions](#)

Test			
▼	✓	Deploy to Test	5m 10s
	✓	Initialize job	1s
	✓	Run Deployment P...	4m 51s
	✓	Refresh Dataset	16s
	✓	Finalize Job	<1s



What's Next?



TMDL



TMDL

Readable & Editable – Designed for Humans

TMSL

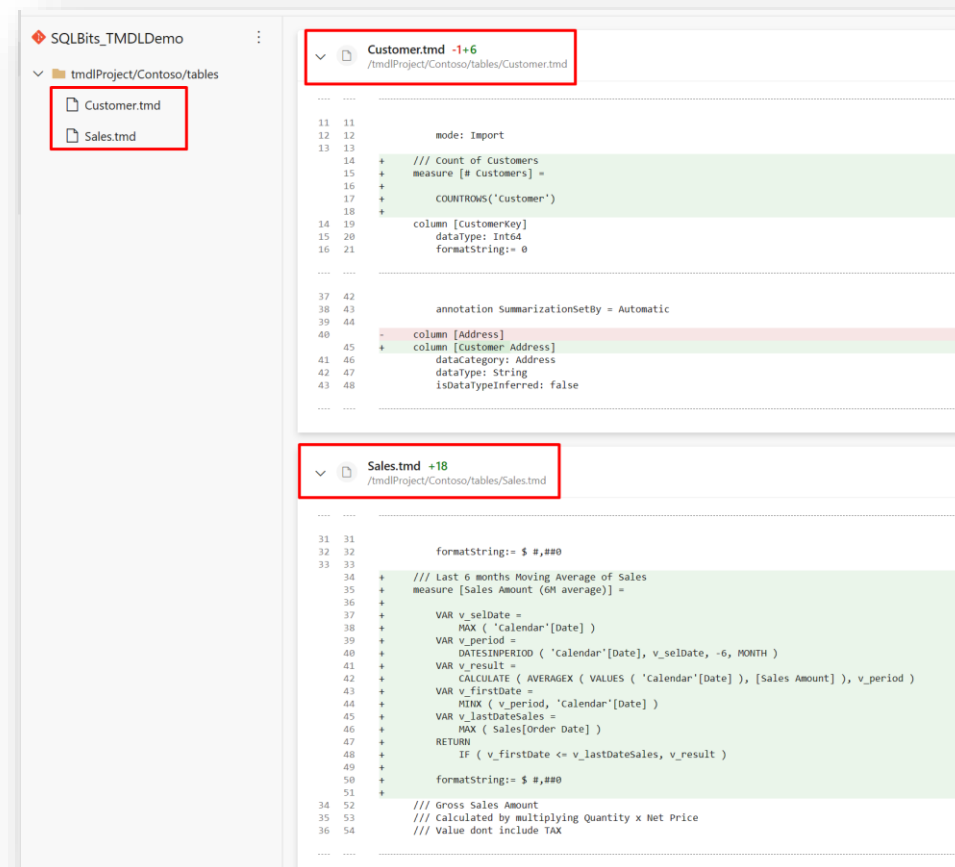
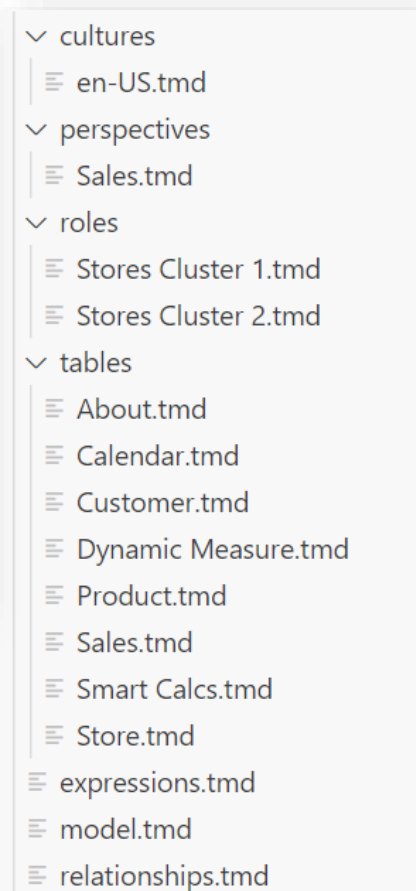
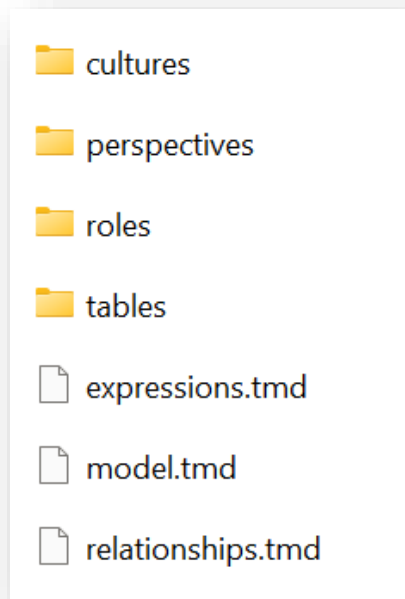
```
608     "name": "Sales",
609     "description": "Sales table for year over year analysis",
610     "lineageTag": "97143e5b-7736-4fcb-8042-26b92b1f5684",
611     "columns": [...],
612     "partitions": [
613     {
614         "name": "Sales-ddb4c40b-46fd-49ea-9a19-16e7e640a21a",
615         "mode": "import",
616         "source": {
617             "type": "m",
618             "expression": [
619                 "let",
620                 "    Source = #\"RAW-SalesDateAdjusted\",",
621                 "    #\"Changed Type\" = Table.TransformColumnTypes(Source,{{\"Order Number\", Int64.Type},",
622                 "    {\"Delivery Date\", type date}, {\"CustomerKey\", Int64.Type}, {\"StoreKey\", Int64.Type},",
623                 "    {\"Net Price\", type number}, {\"Unit Cost\", type number}, {\"",
624                 "    #\"Removed Columns\" = Table.RemoveColumns(#\"Changed Type\",{\"Unit Price\"}),",
625                 "    #\"Changed Type1\" = Table.TransformColumnTypes(#\"Removed Columns\",{\"Delivery Date\", type",
626                 "    #\"Filtered Rows\" = Table.SelectRows(#\"Changed Type1\", each [Order Date] >= RangeStart",
627                 "    #\"Changed Type2\" = Table.TransformColumnTypes(#\"Filtered Rows\",{\"Delivery Date\", type",
628                 "    #\"Added Custom\" = Table.AddColumn(#\"Changed Type2\", \"Environment\", each Environment),",
629                 "    #\"Changed Type3\" = Table.TransformColumnTypes(#\"Added Custom\",{\"Environment\", type",
630                 "in",
631                 "    #\"Changed Type3\"",
632             ]
633         }
634     ]
635 },
636 ],
637 "measures": [
638 {
639     "name": "Sales Amount (12M average)",
640     "description": [
641         "12 Month moving average sales calculation",
642     ],
643     "expression": [
644         "VAR v_selDate =",
645         "    MAX ( 'Calendar'[Date] )",
646         "VAR v_period =",
647         "    DATESINPERIOD ( 'Calendar'[Date], v_selDate, -12, MONTH )",
648         "VAR v_result =",
649         "    CALCULATE ( AVERAGEX ( VALUES ( 'Calendar'[Date] ), [Sales Amount] ), v_period )",
650         "VAR v_firstDate =",
651         "    MINX ( v_period, 'Calendar'[Date] )",
652         "VAR v_lastDateSales =",
653         "    MAX ( Sales[Order Date] )",
654     ]
655 }
```

TMDL

```
tables > Sales.tmdl
1  /// Sales table for year over year analysis
2  table Sales
3      lineageTag: 97143e5b-7736-4fcb-8042-26b92b1f5684
4      ordinal: 2
5
6      partition Sales-ddb4c40b-46fd-49ea-9a19-16e7e640a21a = M
7          mode: Import
8          expression:=
9              let
10                 Source = #\"RAW-SalesDateAdjustedAndSalesRandomized\",
11                 #\"Changed Type\" = Table.TransformColumnTypes(Source,{{\"Order Number\", Int64.Type}, {\"
12                 #\"Removed Columns\" = Table.RemoveColumns(#\"Changed Type\",{\"Unit Price\"}),
13
14                 #\"Changed Type1\" = Table.TransformColumnTypes(#\"Removed Columns\",{\"Delivery Date\", ty
15                 #\"Filtered Rows\" = Table.SelectRows(#\"Changed Type1\", each [Order Date] >= RangeStart
16                 #\"Changed Type2\" = Table.TransformColumnTypes(#\"Filtered Rows\",{\"Delivery Date\", type
17                 #\"Added Custom\" = Table.AddColumn(#\"Changed Type2\", \"Environment\", each Environment),
18                 #\"Changed Type3\" = Table.TransformColumnTypes(#\"Added Custom\",{\"Environment\", type te
19             in
20                 #\"Changed Type3\"
21
22     /// 12 Month moving average sales calculation
23     measure 'Sales Amount (12M average)' =
24         VAR v_selDate =
25             MAX ( 'Calendar'[Date] )
26         VAR v_period =
27             DATESINPERIOD ( 'Calendar'[Date], v_selDate, -12, MONTH )
28         VAR v_result =
29             CALCULATE ( AVERAGEX ( VALUES ( 'Calendar'[Date] ), [Sales Amount] ), v_period )
30         VAR v_firstDate =
31             MINX ( v_period, 'Calendar'[Date] )
32         VAR v_lastDateSales =
33             MAX ( Sales[Order Date] )
34         RETURN
35             IF ( v_firstDate <= v_lastDateSales, v_result )
36     formatString:= $ #,##0
37     lineageTag: 7fd60f7e-287e-46c3-a745-24c4507bc77b
38
39     annotation PBI_FormatHint = {\"isCustom\":true}
40
```

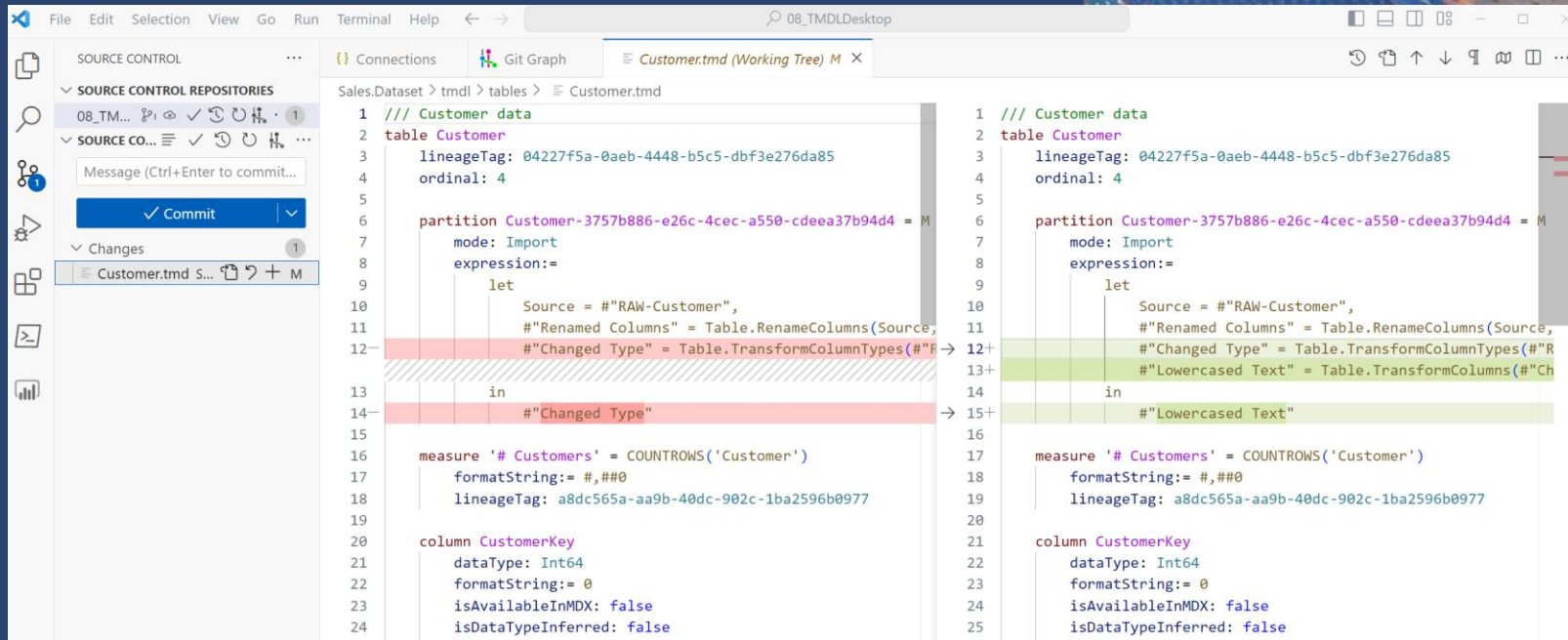
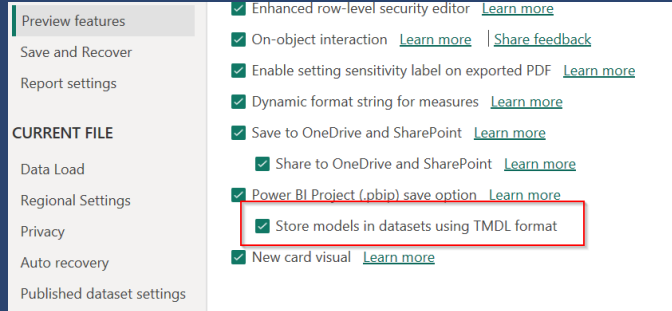
TMDL

Collaborative – Folder Structure & Cleaner Diff's/Merge



Demo

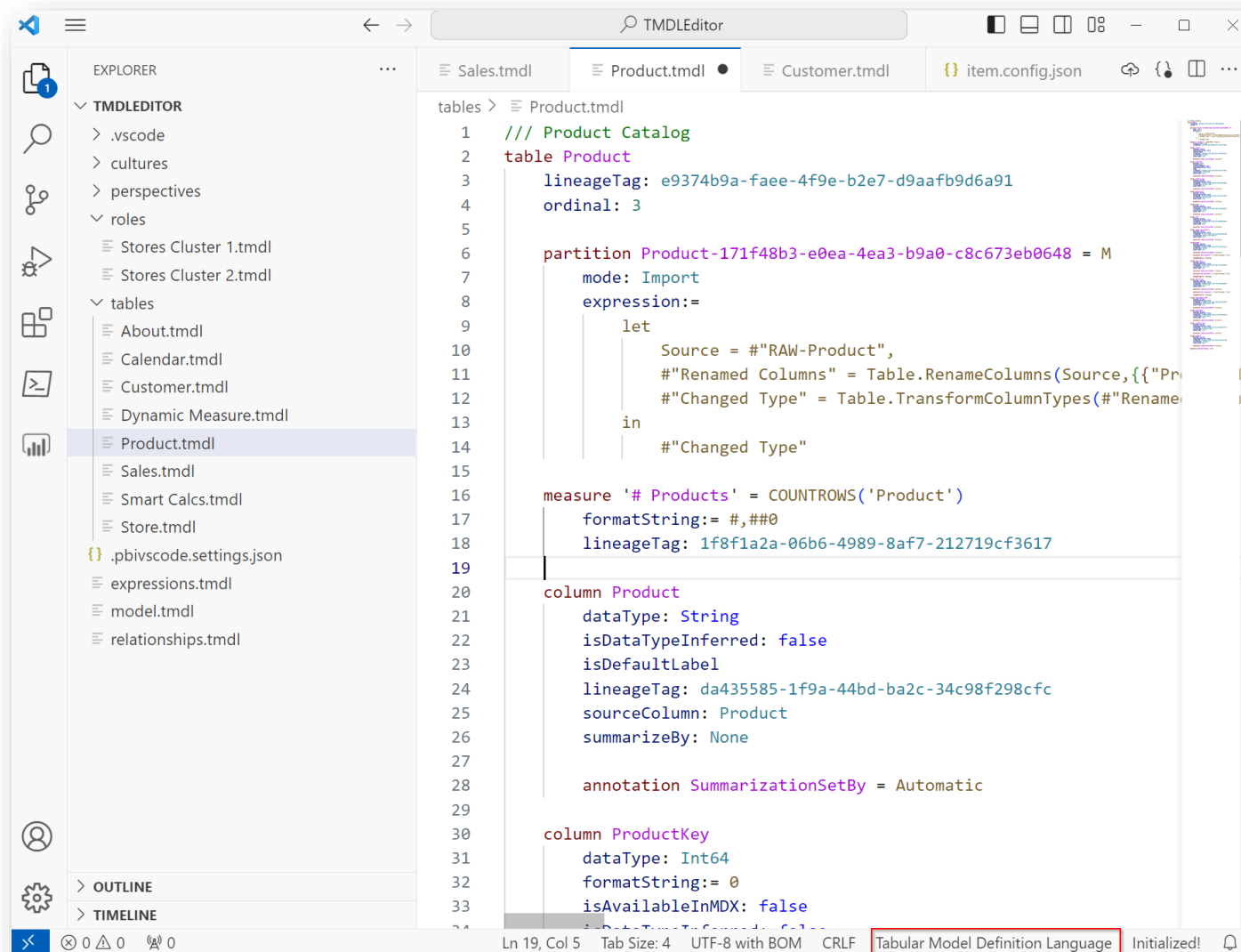
TMDL in Power BI Desktop



TMDL in VS Code



TMDL in VS Code – Language Extension



```
1  /// Product Catalog
2  table Product
3      lineageTag: e9374b9a-faee-4f9e-b2e7-d9aafb9d6a91
4      ordinal: 3
5
6      partition Product-171f48b3-e0ea-4ea3-b9a0-c8c673eb0648 = M
7          mode: Import
8          expression:=
9              let
10                 Source = #"RAW-Product",
11                 #"Renamed Columns" = Table.RenameColumns(Source, {"Pr
12                 #"Changed Type" = Table.TransformColumnTypes("#Rename
13             in
14                 #"Changed Type"
15
16         measure '# Products' = COUNTROWS('Product')
17         formatString:= #,##0
18         lineageTag: 1f8f1a2a-06b6-4989-8af7-212719cf3617
19
20     column Product
21         dataType: String
22         isDataTypeInferred: false
23         isDefaultLabel
24         lineageTag: da435585-1f9a-44bd-ba2c-34c98f298cfc
25         sourceColumn: Product
26         summarizeBy: None
27
28         annotation SummarizationSetBy = Automatic
29
30     column ProductKey
31         dataType: Int64
32         formatString:= 0
33         isAvailableInMDX: false
34         isDataTimeToCommaDelimitCol
```

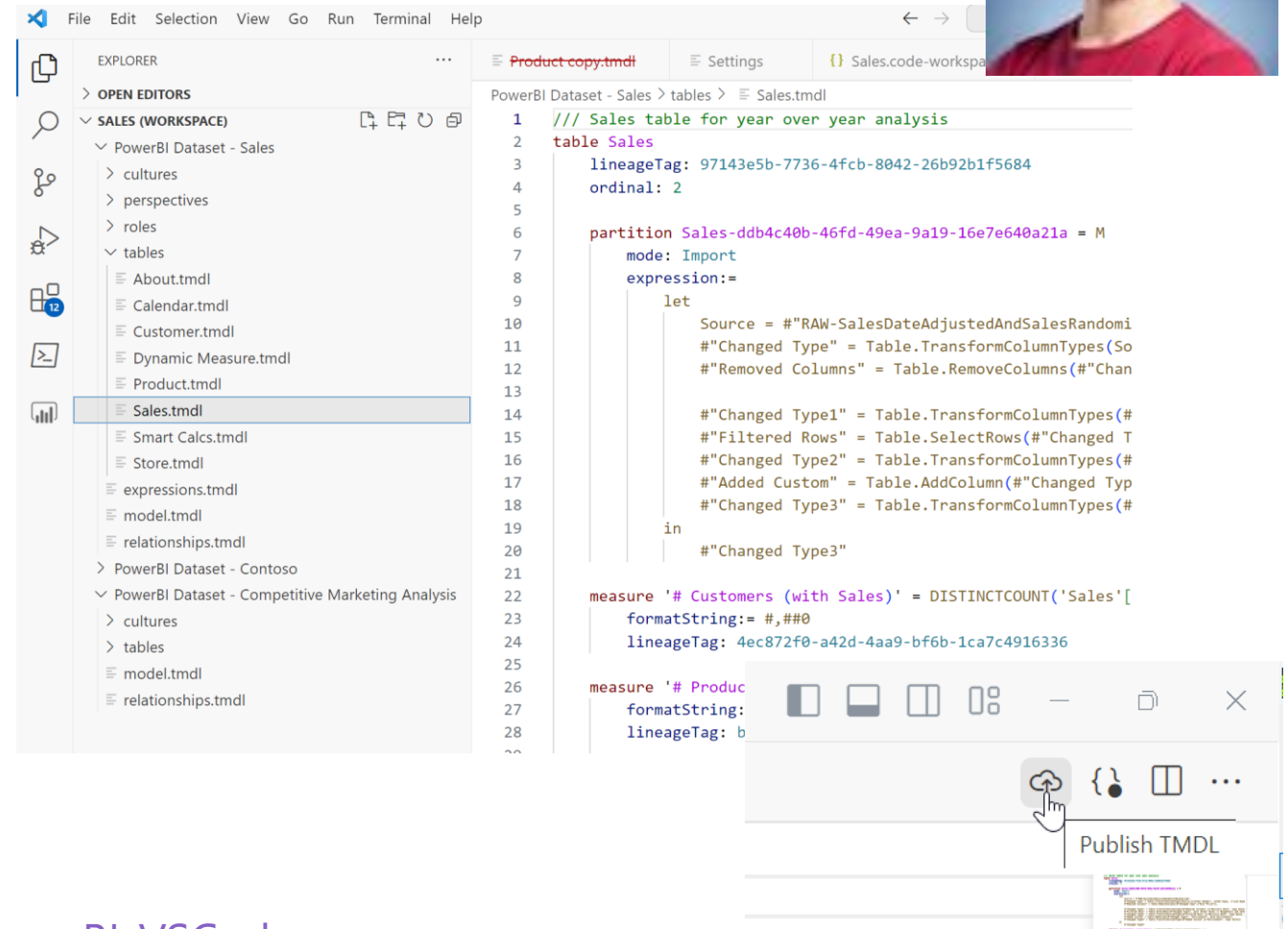
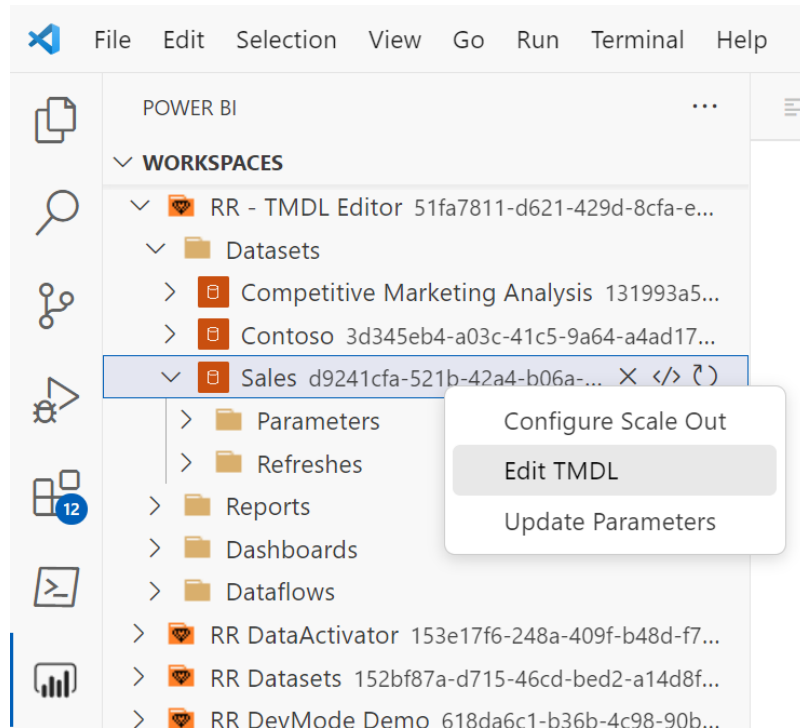
First Release "only" with Syntax Highlight

Soon at: <https://aka.ms/vscode-tmdl>

Vision

- Code first approach
- Formatter
- Intellisense: TMDL; DAX; PowerQuery
- Easy Model Refactoring
- Co-pilot experiences
 - > Hey co-pilot, any modeling improvements?
 - > Hey co-pilot, rename all measures in PascalCase

TMDL in VS Code – Edit TMDL



VS Code Extension - <https://github.com/gbrueckl/PowerBI-VSCode>

Preview Release - <https://gbpublic.blob.core.windows.net/files/powerbi-vscode-1.0.0.vsix>

New Fabric item APIs



Fabric Items API

Items

Reference

[Feedback](#)

Service: Fabric REST APIs

API Version: v1

Operations

Create Item	Creates an item in the specified workspace.
Delete Item	Deletes the specified item.
Get Item	Returns the specified item.
Get Item Definition	Returns the specified item definition.
List Items	Returns a list of items from the specified workspace.
Update Item	Updates the properties of the specified item.
Update Item Definition	Updates the item definition for specified Item Id.

Update Item Definition

Update an item example

Sample Request

HTTP

HTTP

Copy

POST <https://api.fabric.microsoft.com/v1/workspaces/cfafbeb1-8037-4d0c-896e-a46fb27ff229/items/5b218778-e>

```
{
  "parts": [
    {
      "path": "report.json",
      "payload": "InlineBase64 payload 1",
      "payloadType": "InlineBase64"
    },
    {
      "path": "definition.pbir",
      "payload": "InlineBase64 payload 2",
      "payloadType": "InlineBase64"
    }
  ]
}
```

Demo

1. Export
2. Import

```
> Test-Export.ps1 > ...
1   $currentPath = (Split-Path $MyInvocation.MyCommand.Definition -Parent)
2
3   Set-Location $currentPath
4
5   Import-Module ".\FabricPS-PBIP.psm1" -Force
6
7   ▶ $workspaceId = "d020f53d-eb41-421d-af50-8279882524f3"
8
9   Export-FabricItems -workspaceId $workspaceId -outputPath '.\output'
```

```
> Test-Import.ps1 > ...
1   $currentPath = (Split-Path $MyInvocation.MyCommand.Definition -Parent)
2
3   Set-Location $currentPath
4
5   Import-Module ".\FabricPS-PBIP.psm1" -Force
6
7   ▶ $workspaceId = "cdfc383c-5eaa-4f39-91de-0eb26fdd2401"
8
9   Import-FabricItems -workspaceId $workspaceId -path '.\SamplePBIP' -filter "*Sales.Report*"
```

New Report Format

Learn more at:

<https://aka.ms/pbidesktopdevmode>

<https://aka.ms/gitintro>

