

The background image shows a cityscape at night. On the left, a hillside is covered with a series of white, rectangular buildings that are illuminated from within, creating a warm glow. To the right, a large, arched steel bridge spans a body of water. The bridge's structure is lit up, and its reflection is visible in the water. The sky is a deep blue with some clouds, and the overall scene is a blend of urban architecture and natural elements.

devscope

Rui Romano

Power BI Developer

Rui Romano

#PowerBIAddict #DataEngineer
#DataArchitect #MSFTBI #MVP
#DataPlatform #Dev

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- 🌐 <https://ruiromanoblog.wordpress.com>
- in <https://www.linkedin.com/in/ruiromano/>
- 🐦 **@RuiRomano**

devscope



Agenda

Intro & Discussion over all Power BI for a Developer

- Power BI Template Apps
- Power BI Embedded
- Custom Visuals
- REST APIs / Devops

Power BI: experience your data

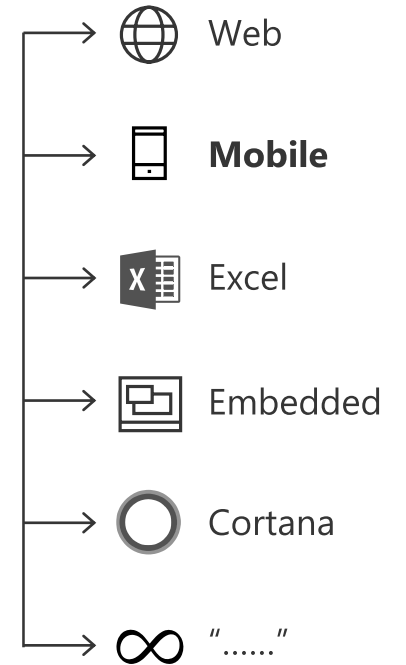
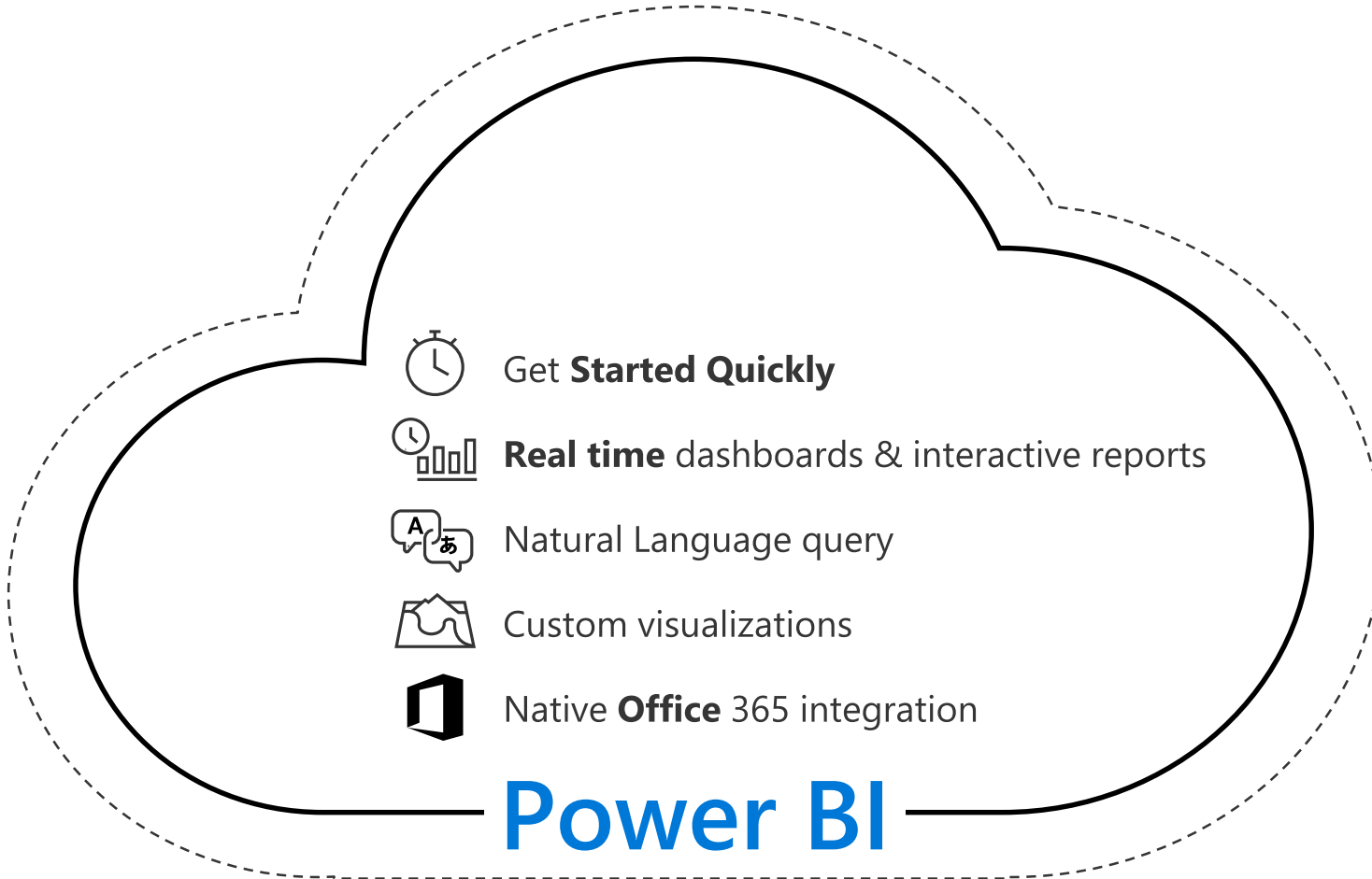
Any data, any way, anywhere



Cloud data



On-premises data



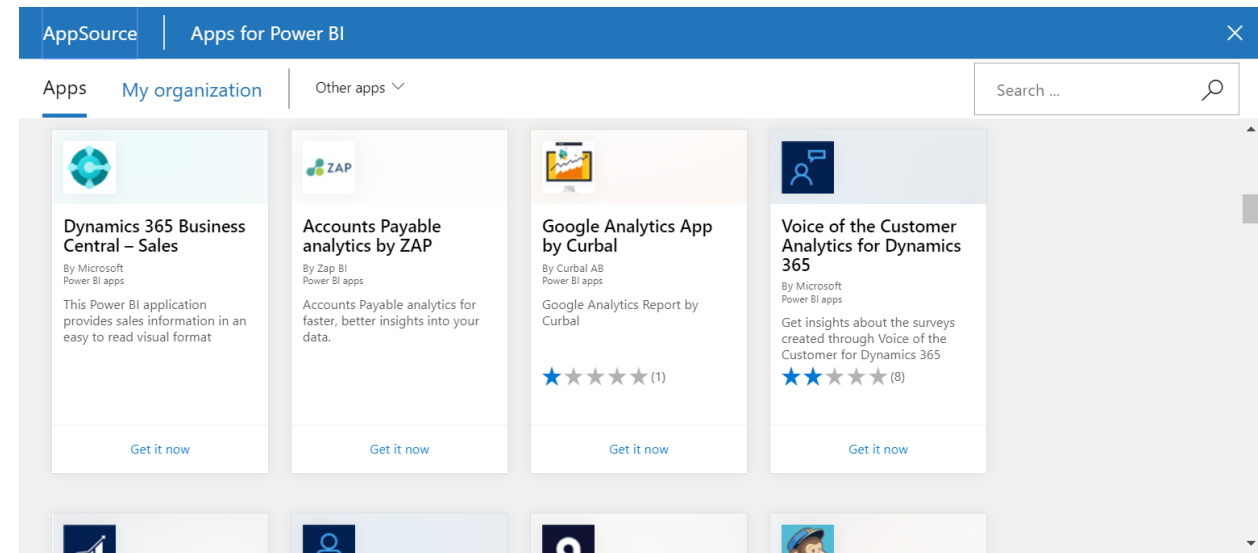
Template Apps

Low cost (customer & supplier)

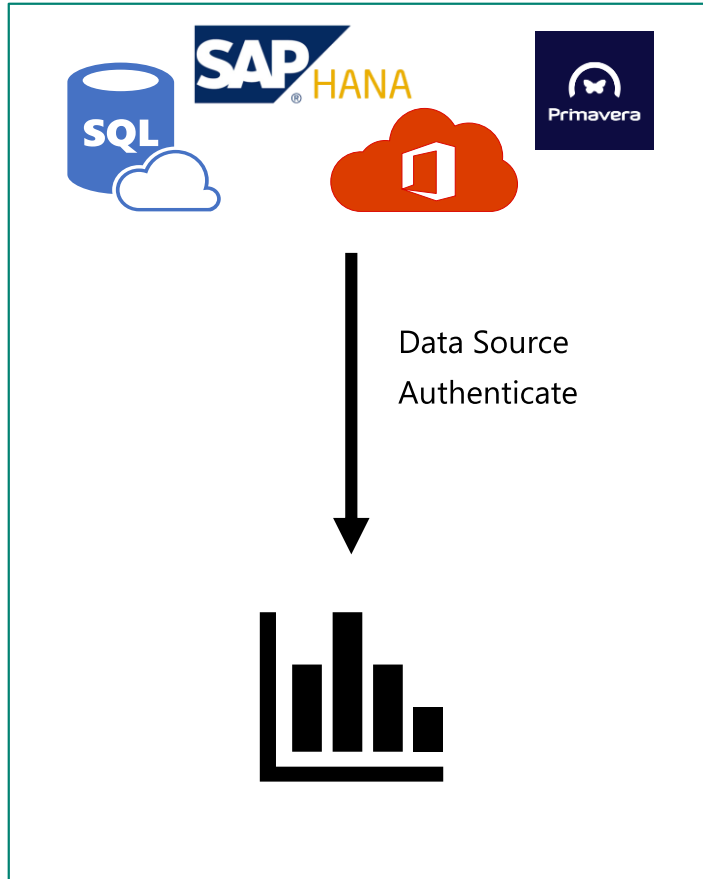
Easy Installation & Distribution

Give powerful analytics to your end-user

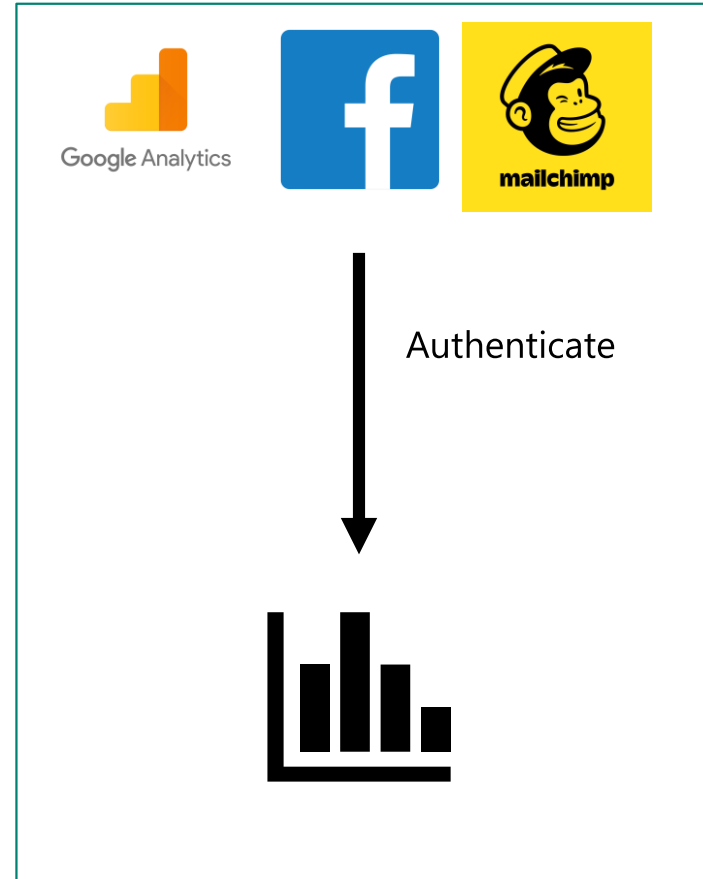
Big Opportunity for Marketing & Sales



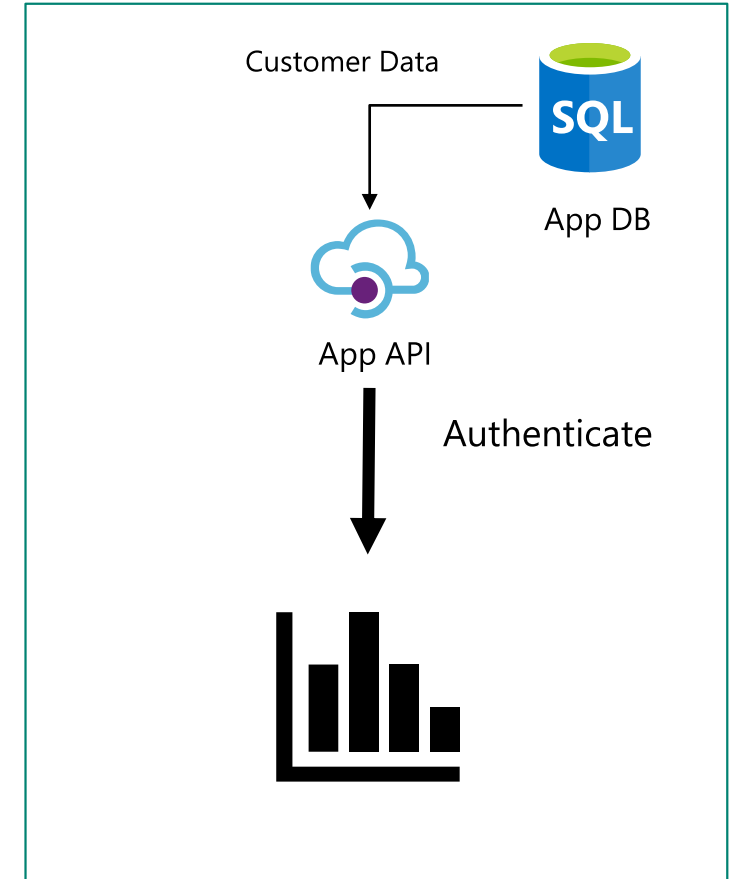
Template apps use cases



**Template Solution over
common data**
Ex: Finance / HR



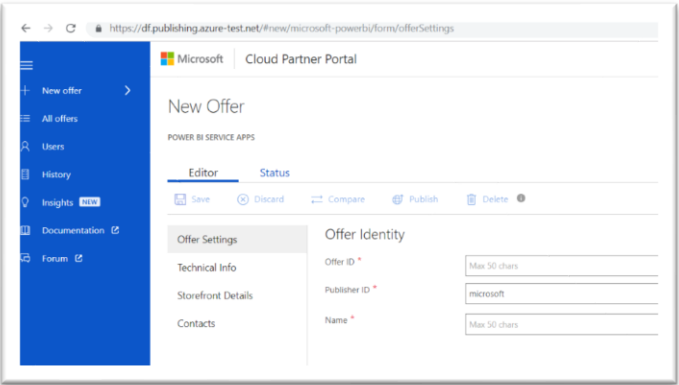
Cloud Data Sources Template
Ex: Google Analytics



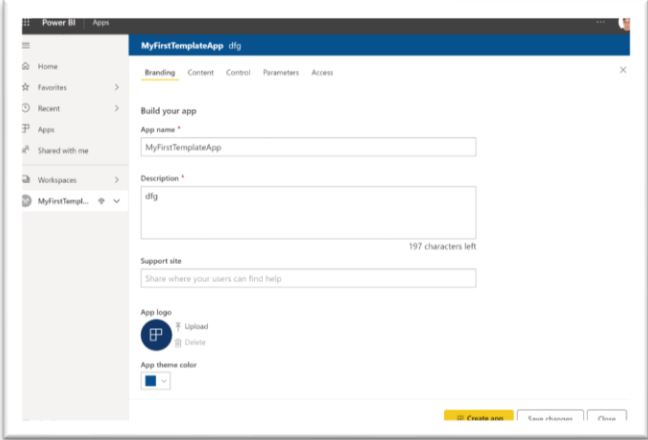
Your App Template
Ex: Low cost to provide
state of the art analytics

Template apps provide codeless experiences

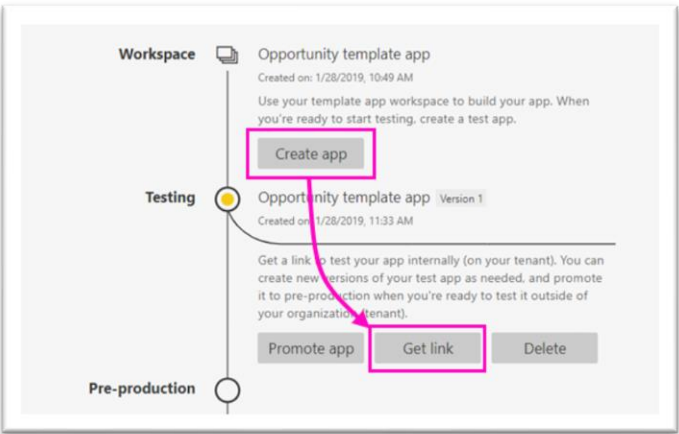
Self service for publishers



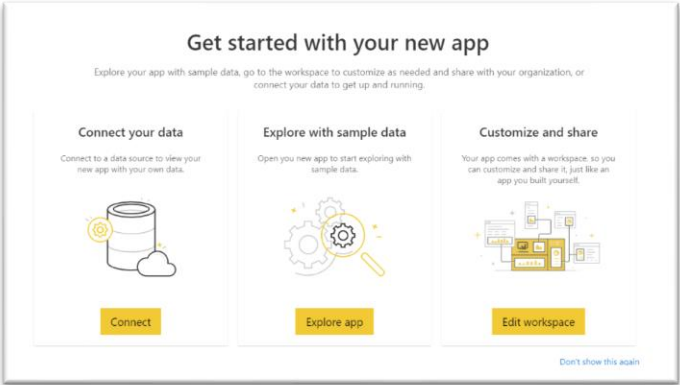
Publisher app control



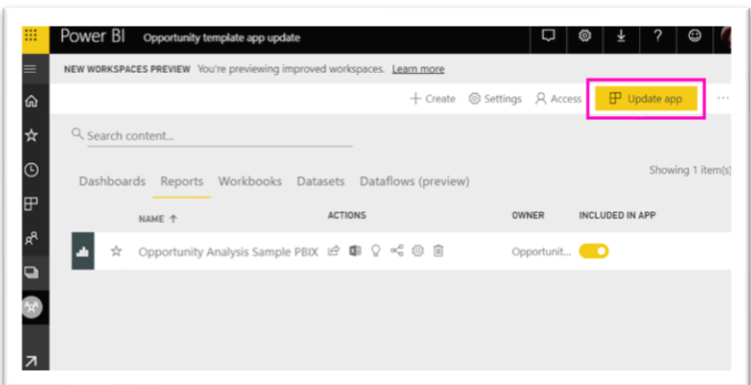
Apps developer experience



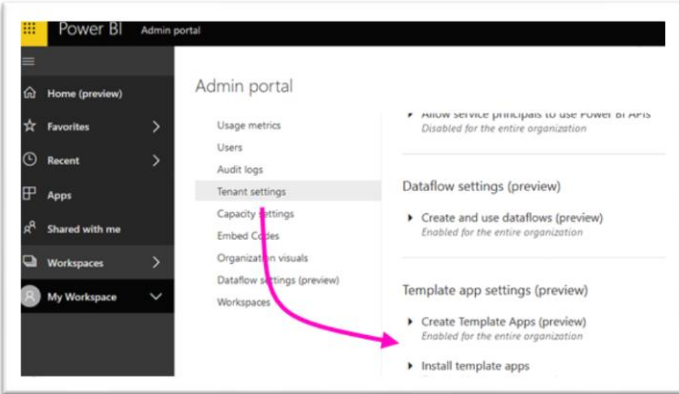
Sample experience



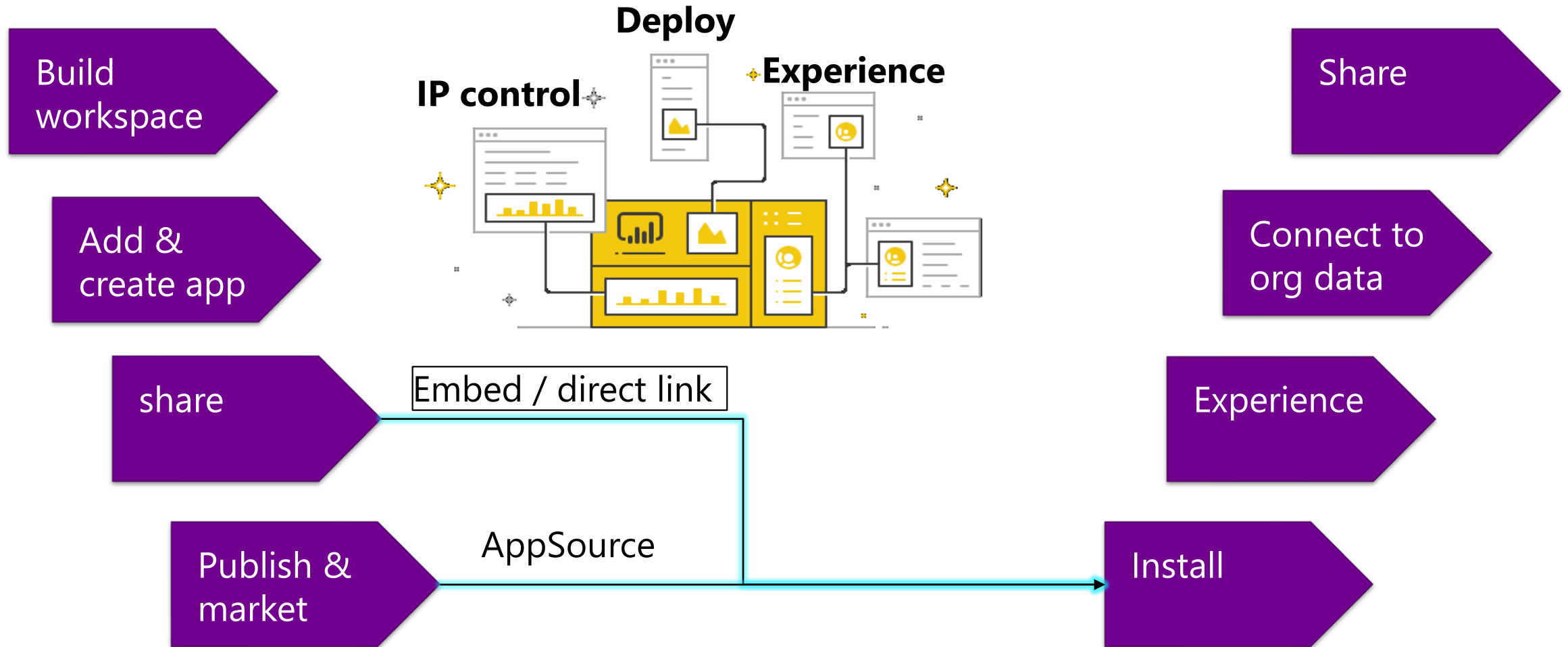
Fully customized content



Enterprise governance



Build and scale



DEMO

- Install Template App from App Source
- Remax App
- Financial Template App



Publishing Options

Private - Link Sharing

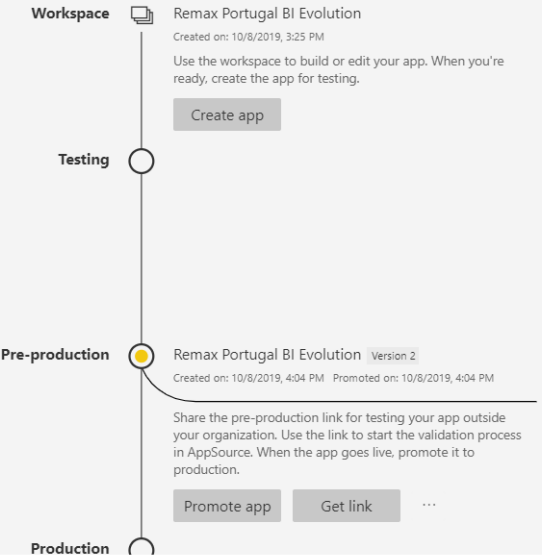
Just share the app link with your users

Public – AppSource

Available in AppSource – the template app Marketplace

Users who install will receive a email
Monetization through selling the PBIX/Template
(Marketing)

Release Management



Thank you for installing my Power BI Template App!



Reid Havens <reid@havensconsulting.net>

To Rui Romano

03.07.2019



You forwarded this message on 03.07.2019 15:40.

If there are problems with how this message is displayed, click here to view it in a web browser.

MessageHeaderAnalyzer

+ Get more add-ins

HAVENS
CONSULTING

Thank you for installing my **Power BI report** from **Microsoft AppSource**. I

built this app to show how high quality a Power BI report can be when you

Learn more

- MBAS Template Apps Session by Gil Raviv
 - <https://community.powerbi.com/t5/MBAS-Gallery/Microsoft-Power-BI-Introducing-Power-BI-template-apps/m-p/712531>

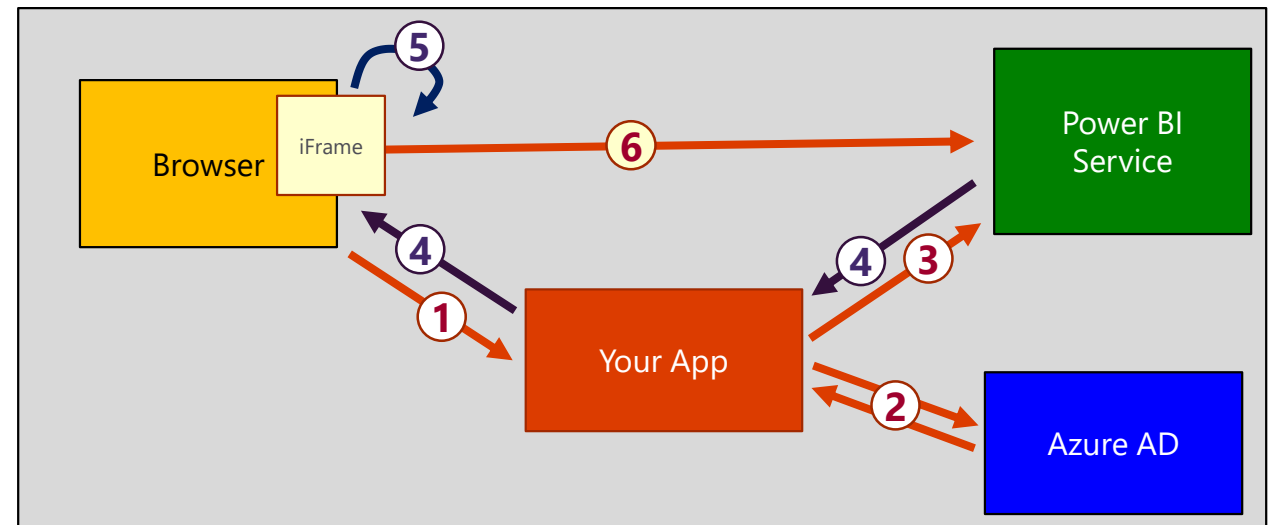
Power BI Embedded

Integrate Power BI into your Application

Extend your App analytic capabilities quickly / lower cost

JavaScript API + REST API

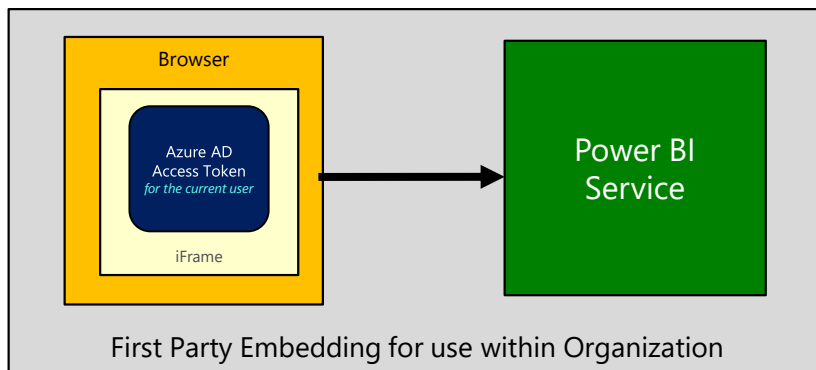
OAuth 2.0 + Open ID



Power BI Embedded Modes

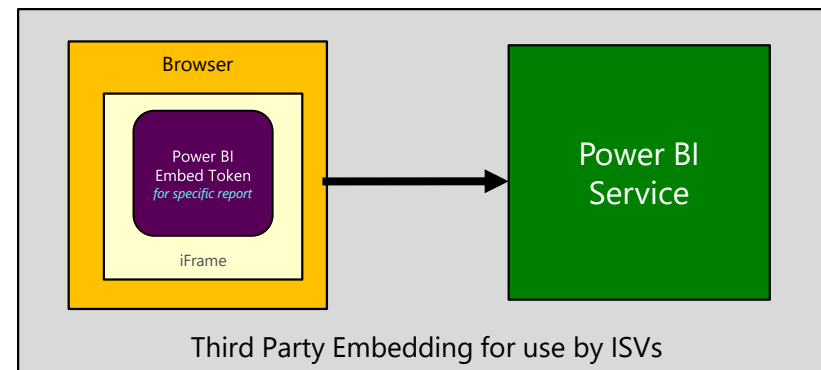
User-Owns-Data

- All users require a Power BI license
- Useful in corporate environments
- App authenticates as current user
- Your code runs with user's permissions
- User's access token passed to browser



App-Owns-Data

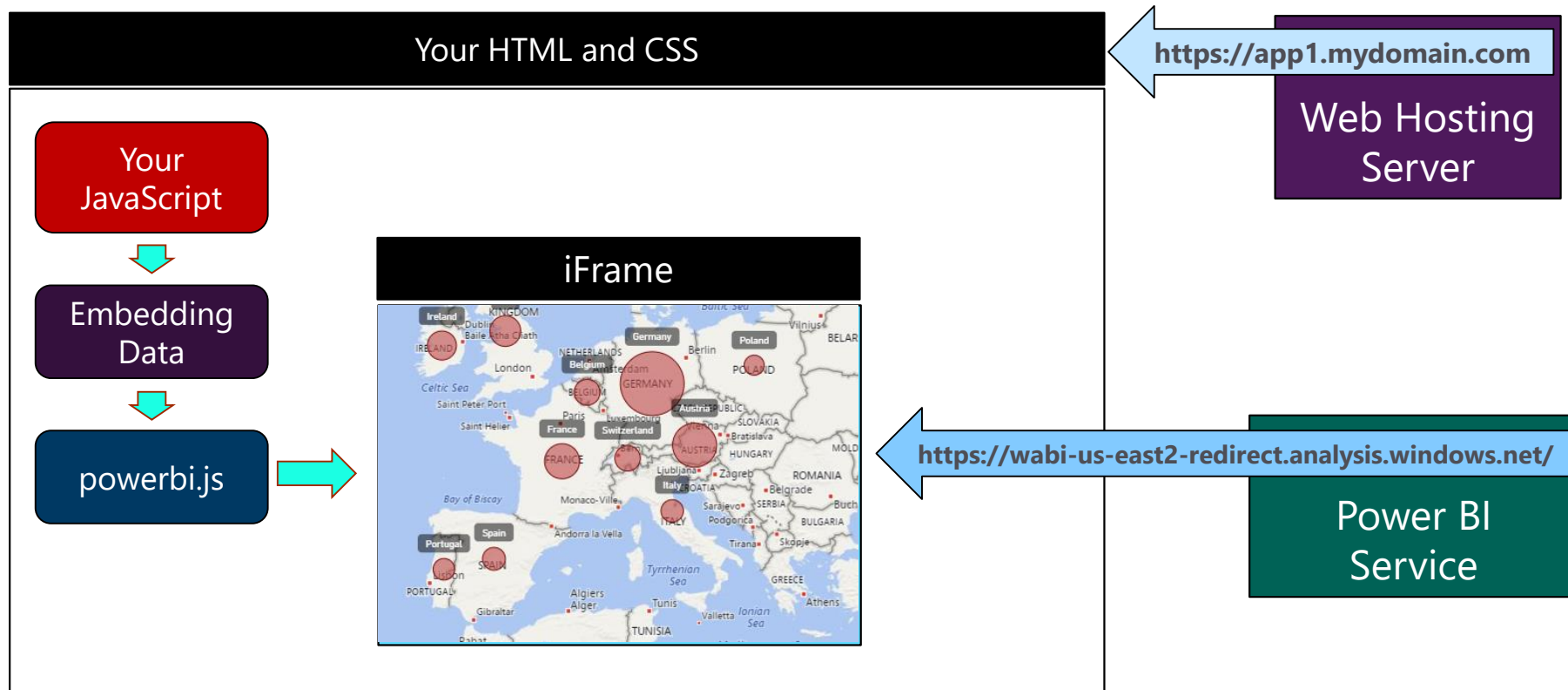
- No users require Power BI license
- Useful for commercial applications
- App authenticates with app-only identity
- Your code runs with admin permissions
- Embed token passed to browser



Report Embedding architecture

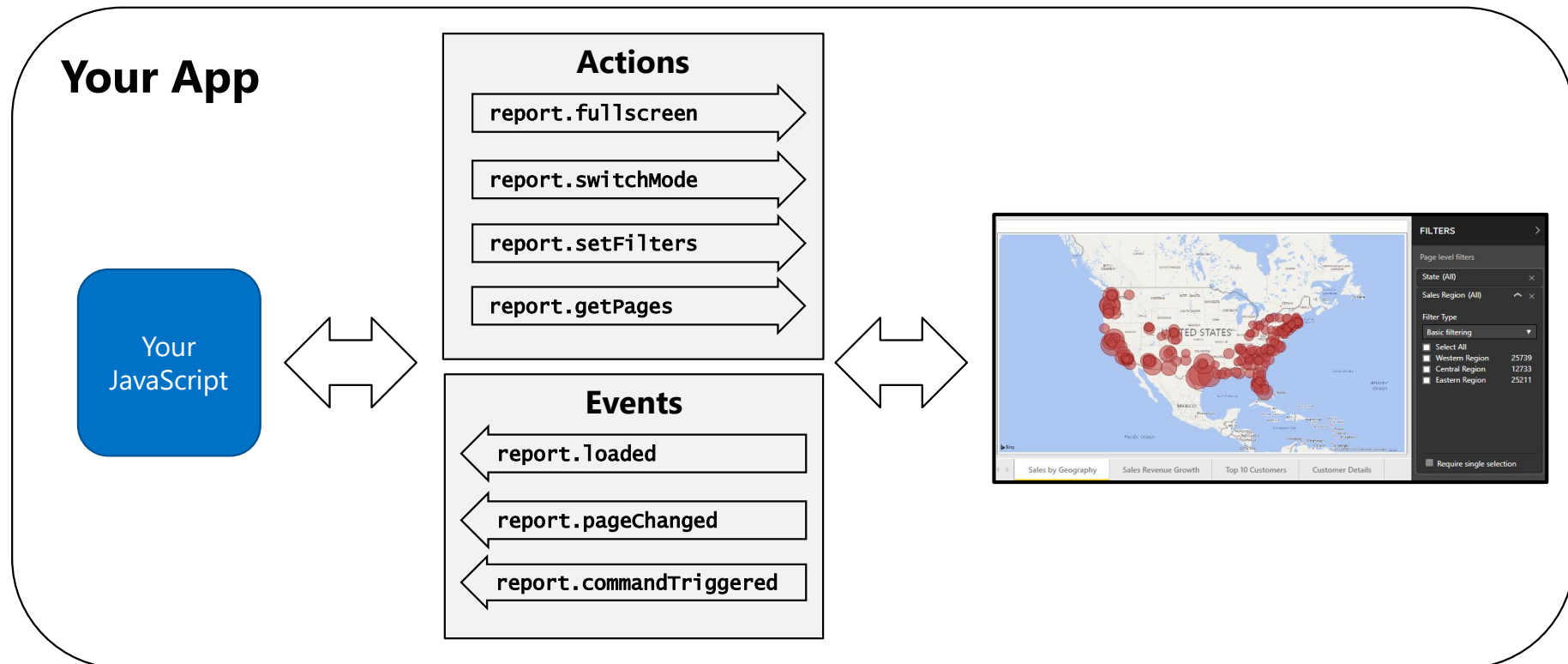
Embedding involves creating an iFrame on the page

- [Power BI JavaScript API](#) transparently creates iFrame and sets source to Power BI Service
- ***The iFrame and hosting page originate from different DNS domains***



A promise-based programming model

- 2 Way communication
- Programming based on asynchronous requests and promises
- Embedded objects programmed using actions and events



Hello World with Power BI embedding

powerbi.js library provides powerbi as top-level service object

- You call powerbi.embed and pass configuration object with access token
- Models object available to supply configuration settings
- Configuration object sets tokenType to either TokenType.Embed or TokenType.Aad

```
// data required for embedding Power BI report
var embedReportId = "ba274ba0-93be-4e53-af65-fdc8a559c557";
var embedUrl = "https://app.powerbi.com/reportEmbed?reportId=ba274ba0-93be-4e53-af65-fdc8a559c557&groupId=7f4";
var accessToken = "eyJ0eXAiOiJKV1QiLCJhbGciOiJSUzI1NiIsIngldCI6I1Rpb0d5d3dsaHZkRmJYWjgxMldwUGF5OUFsVSIsImtpZ0";

// Get models object to access enums for embed configuration
var models = window['powerbi-client'].models;

// create embed configuration object
var config = {
  type: 'report',
  id: embedReportId,
  embedUrl: embedUrl,
  accessToken: accessToken,
  tokenType: models.TokenType.Aad
};

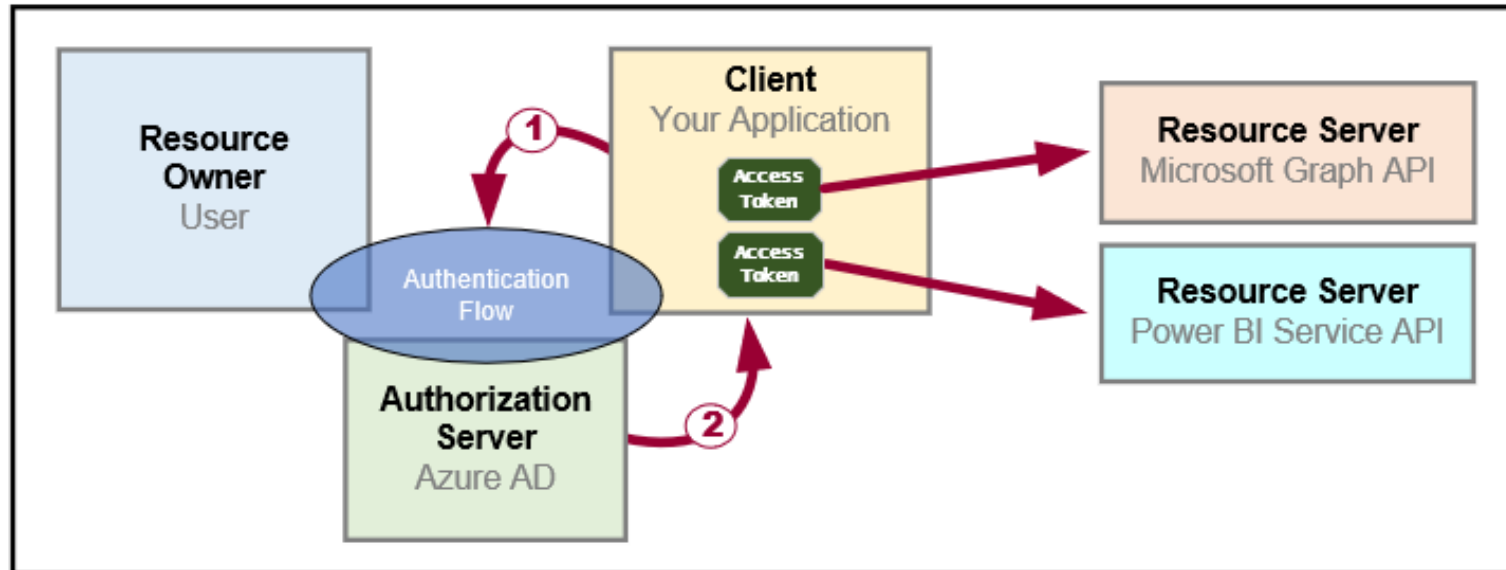
// Get a reference to the embedded report HTML element
var reportContainer = document.getElementById('embedContainer');

// Embed the report and display it within the div container.
var report = powerbi.embed(reportContainer, config);
```

OAuth 2.0 fundamentals

Client application calls to resource server on behalf of a user

- Client implements authentication flow to acquire access token
- Access token contains permission grants for client to call resource server
- Client passes access token when calling to resource server
- Resource server inspects access token to ensure client has permissions



Azure AD applications

Creating applications required for AAU authentication

- Applications are as Native application or Web Applications
- Application identified using GUID known as application ID
- Application ID often referred to as client ID or app ID
- **Can be used as Service Principal vs a Master Account**

critical path training labs - App registrations

Search (Ctrl+/)

Users

Groups

Enterprise applications

Devices

App registrations

Application proxy

+ New application registration

Endpoints

Troubleshoot

To view and manage your registrations for converged applications, please visit the [Microsoft Application Console](#).

Search by name or AppID

All apps

| DISPLAY NAME | APPLICATION TYPE | APPLICATION ID |
|-----------------------|------------------|--------------------------------------|
| My Native Application | Native | a96d73bf-ed85-4829-bd70-904each1e933 |
| My Web Application | Web app / API | 17c41b86-853a-41ca-8446-92035a3699b3 |

Microsoft

tedp@pbiox.onmicrosoft.com

My Native Application

This app would like to:

- View all datapools
- Read and write all datapools
- Read and Write all Reports
- View users Groups
- View all Groups
- View all Reports (preview)
- Create content (preview)
- View content properties (preview)
- Read and Write all Datasets
- View all Datasets
- View all Dashboards (preview)
- Add data to any of your datasets in Power BI (preview)
- Read and Write all Dashboards
- View all content in tenant
- Read and write all workspaces
- View all workspaces
- Read and write all capacities
- View all capacities
- Sign you in and read your profile

You should only accept if you trust the publisher (Critical Path Training Labs) and if you selected this app from a store or website you trust. Ask your admin if you're not sure.

Cancel Accept

DEMO

- [Power BI Embedded Playground](#)
- [AppOwnsData](#)
- [UserOwnsData](#)

Microsoft Power BI Embedded Playground

Sample tool

Showcase NEW

Documentation

Samples

Code

Embed

Interact

Select mode to embed your report in:

☒ View mode ⓘ
☐ Edit mode ⓘ
☐ Create mode ⓘ

Select token type:
☒ Embed token
☐ AAD token

Fill in the fields below to get the code to embed y...

Embed Token

Code

Run

Copy

```
// Read embed application token from  
textbox  
var txtAccessToken =  
$('#txtAccessToken').val();  
  
// Read embed URL from textbox  
var txtEmbedUrl =  
$('#txtReportEmbed').val();  
  
// Read report Id from textbox  
var txtEmbedReportId =  
$('#txtReportId').val();
```

App-Owns-Data App

Report

Dashboard

Q&A

New Report

Toggle Edit Mode

Full Screen

Print

MARKET ANALYSIS

\$15.55M
Total Sales

25.67%
% Sales Growth vs PY

% Sales Growth vs ...
Bar chart showing % Sales Growth vs PY for various manufacturers: Currus, Pirum, Abbas, Quibus, Leo, Pomum.

Total Sales by Month (Short Name) and Manufacturer
Line chart showing Total Sales by Month (Short Name) and Manufacturer (Abbas, Currus, Leo, Pirum, Pomum, Quibus).

Total Sales by State
Map of North America showing Total Sales by State.

Total Sales, % Sales Growth vs PY and Total Sales by C...
Scatter plot showing % Sales Growth vs PY and Total Sales by C...

| Product | Total Sales | Total Costs | Total Sales (fy) |
|-------------|------------------|--------------|------------------|
| Pirum UM-01 | \$1,103,412.03 | 1,101,458.43 | \$1,130,542.46 |
| Pirum UE-14 | \$1,007,954.6925 | 1,005,899.09 | |
| Abbas UM-42 | \$906,749.025 | 905,538.23 | \$697,356.98 |
| Pirum UE-11 | \$906,575.25 | 904,775.25 | |
| Pirum UE-07 | \$891,229.7625 | 887,995.76 | \$16,534.88 |
| Pirum RS-03 | \$786,502.6575 | 783,866.26 | \$154,915.22 |
| Pirum UE-06 | \$711,541.7925 | 709,714.19 | \$57,932.49 |
| Pirum RP-43 | \$651,163.0125 | 648,649.01 | \$342,120.61 |
| Pirum RP-44 | \$647,735.34 | 645,234.54 | \$357,815.38 |
| Pirum UM-06 | \$643,135.9725 | 641,406.77 | |
| Pirum RP-32 | \$442,601.874 | \$45,160.68 | \$410,858.42 |

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Learn more

- Ted Pattinson MBAS Session + Github
 - <https://community.powerbi.com/t5/MBAS-Gallery/Microsoft-Power-BI-Developing-with-Power-BI-embedding/m-p/712578>
 - <https://github.com/CriticalPathTraining/PowerBiEmbedded>
- Power BI Embedded Playground
 - <https://microsoft.github.io/PowerBI-JavaScript/demo/v2-demo/>
- Microsoft JavaScript API
 - <https://github.com/Microsoft/powerbi-javascript/wiki>

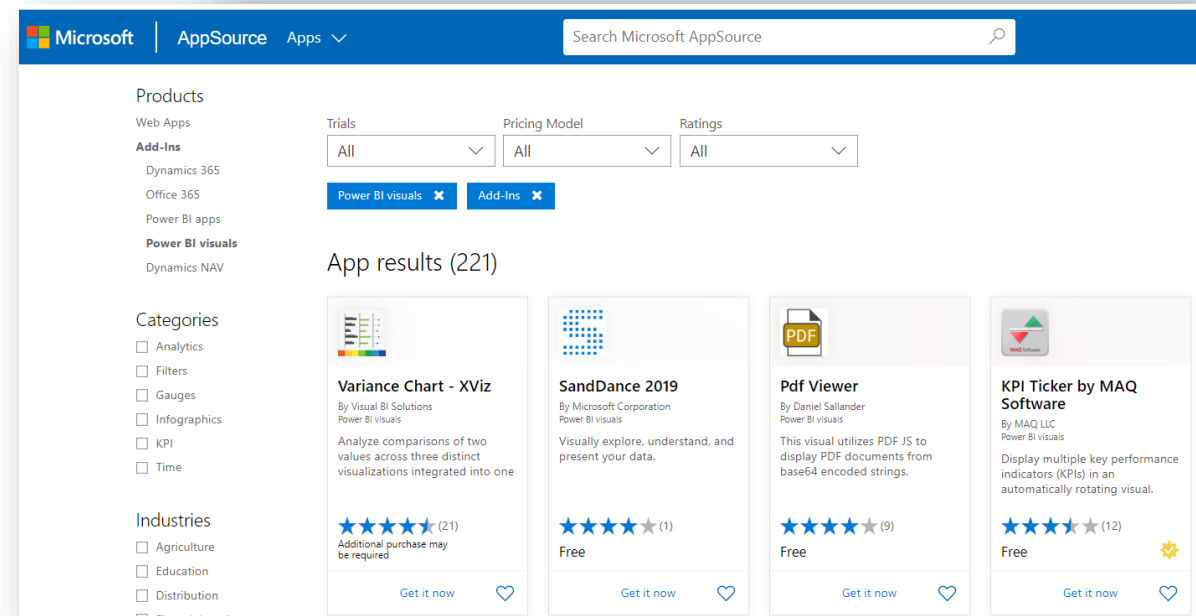
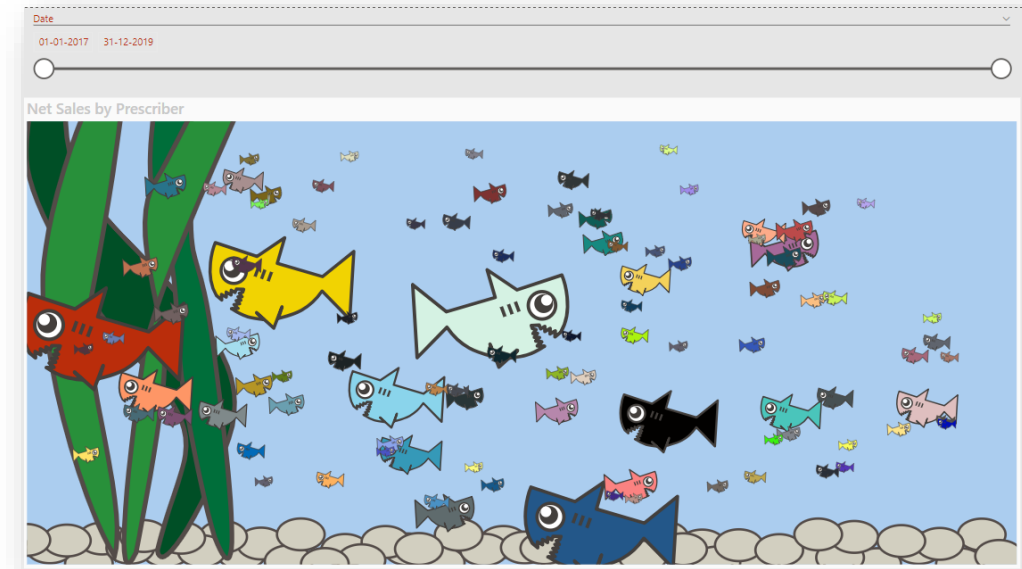
Custom Visuals

The ability to create new visuals that can be added to a report that are not included “out of the box”

Existing visuals developed by the community are available in the marketplace, or you can add them from a file.

There are over 200 existing visuals in the marketplace.

<https://appsource.microsoft.com/en-us/marketplace/apps?product=power-bi-visuals>



Microsoft | AppSource Apps

Search Microsoft AppSource

Products

- Web Apps
- Add-Ins
 - Dynamics 365
 - Office 365
 - Power BI apps
 - Power BI visuals**
 - Dynamics NAV

Categories

- ☐ Analytics
- ☐ Filters
- ☐ Gauges
- ☐ Infographics
- ☐ KPI
- ☐ Time

Industries

- ☐ Agriculture
- ☐ Education
- ☐ Distribution
- ☐ Financial services

Trials: All Pricing Model: All Ratings: All

Power BI visuals Add-Ins

App results (221)

Variance Chart - XViz
By Visual BI Solutions
Power BI visuals

Analyze comparisons of two values across three distinct visualizations integrated into one.

★★★★★ (21)
Additional purchase may be required

Get it now

SandDance 2019
By Microsoft Corporation
Power BI visuals

Visually explore, understand, and present your data.

★★★★★ (1)
Free

Get it now

PDF Viewer
By Daniel Sallander
Power BI visuals

This visual utilizes PDF JS to display PDF documents from base64 encoded strings.

★★★★★ (9)
Free

Get it now

KPI Ticker by MAQ Software
By MAQ LLC
Power BI visuals

Display multiple key performance indicators (KPIs) in an automatically rotating visual.

★★★★★ (12)
Free

Get it now

What do you need?

- Code Editor, ex: [VSCode](#)
- [Node.JS](#)
- Power BI Account

First time setup

- > npm i -g powerbi-visuals-tools
- > pbiviz --install-cert

(to create a secure connection between local machine & powerbi.com)

<https://docs.microsoft.com/en-us/power-bi/developer/custom-visual-develop-tutorial>

Creating a Custom Visual

Create a new template visual

> pbiviz new MyVisual

Enable debugging

> pbiviz start

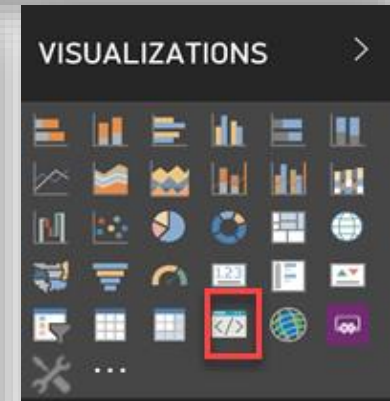
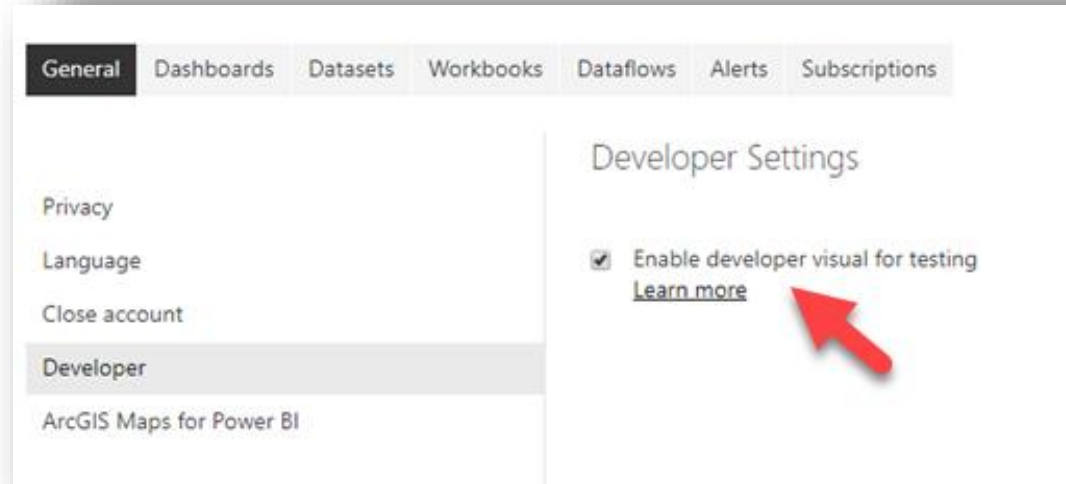
Test/Debug at powerbi.com

```
C:\@Repos\Github\pbideveloper\CustomVisuals>pbiviz new MyAwesomeVisual
info Creating new visual
info Installing packages...
info Installed packages.
done Visual creation complete

C:\@Repos\Github\pbideveloper\CustomVisuals>cd myAwesomeVisual

C:\@Repos\Github\pbideveloper\CustomVisuals\myAwesomeVisual>pbiviz start

info Starting server...
info Start preparing plugin template
i [wds]: Project is running at https://localhost:8080/webpack-dev-server/
i [wds]: webpack output is served from /assets
```



Key Files

pbiviz.json

Contains configuration of the visual: name, icon image, author, API version, etc

capabilities.json

Formatting options, data fields and mappings

src/visual.ts

Code to display the visual

style/visual.less

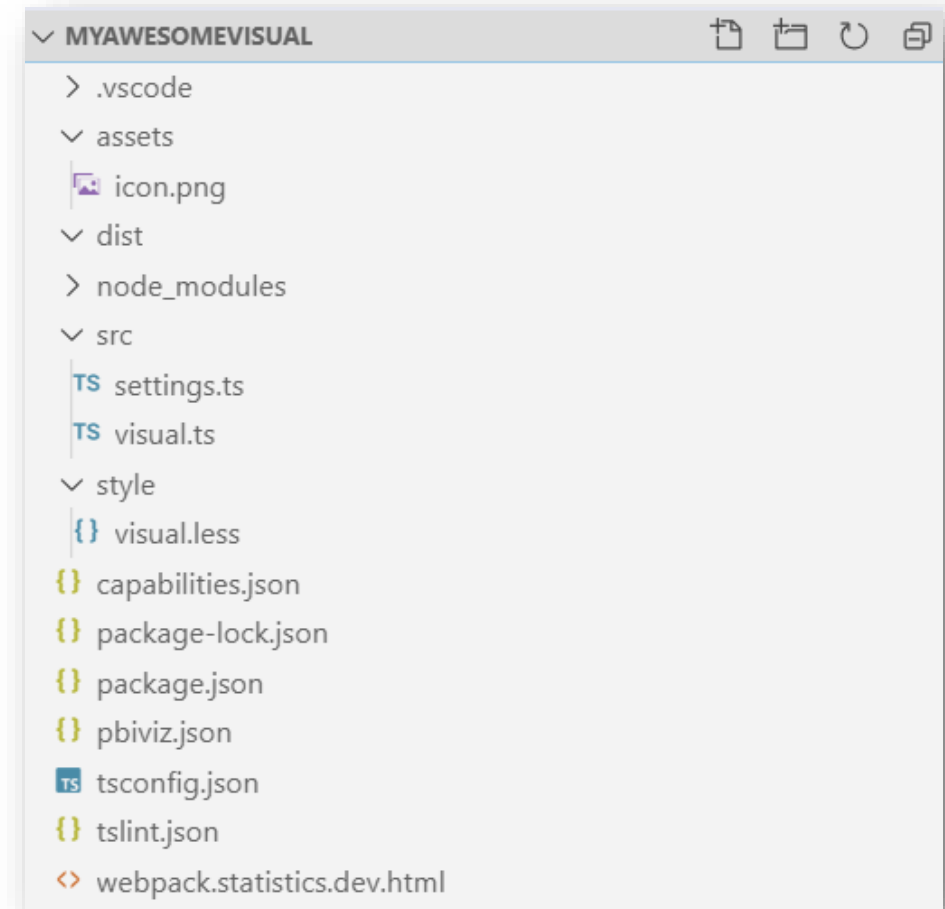
CSS styling of the visual output

src/settings.ts

Code to manage the formatting options / visual settings

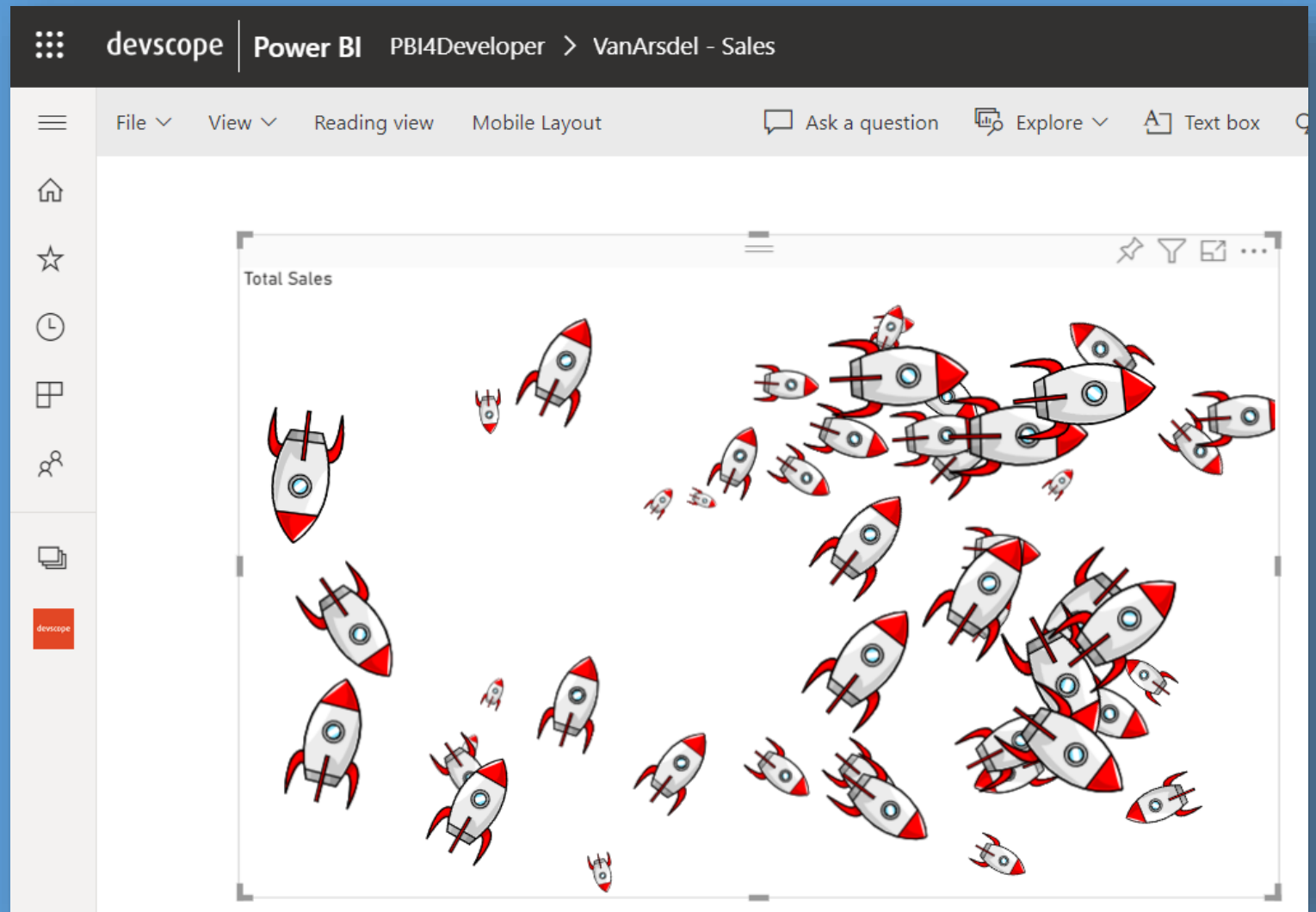
assets/icon.png

Icon displayed in Power BI visualisations selector



DEMO

- Custom Visual



Publishing Options

File

Can be shared over email etc

Organization Visuals

Published privately to everyone within your organization

Public – AppSource

Available in AppSource – the visuals Marketplace

Monetization through [In-App-Purchases](#)

Certified Visuals

Visuals in the Marketplace that meet specified code requirements

Learn more

- James Dales MBAS Session
 - <https://community.powerbi.com/t5/MBAS-Gallery/Microsoft-Power-BI-How-to-build-a-custom-visual-for-Power-BI/m-p/711408>
- Microsoft Docs
 - <https://docs.microsoft.com/en-us/power-bi/developer/custom-visual-develop-tutorial>

Power BI Service API

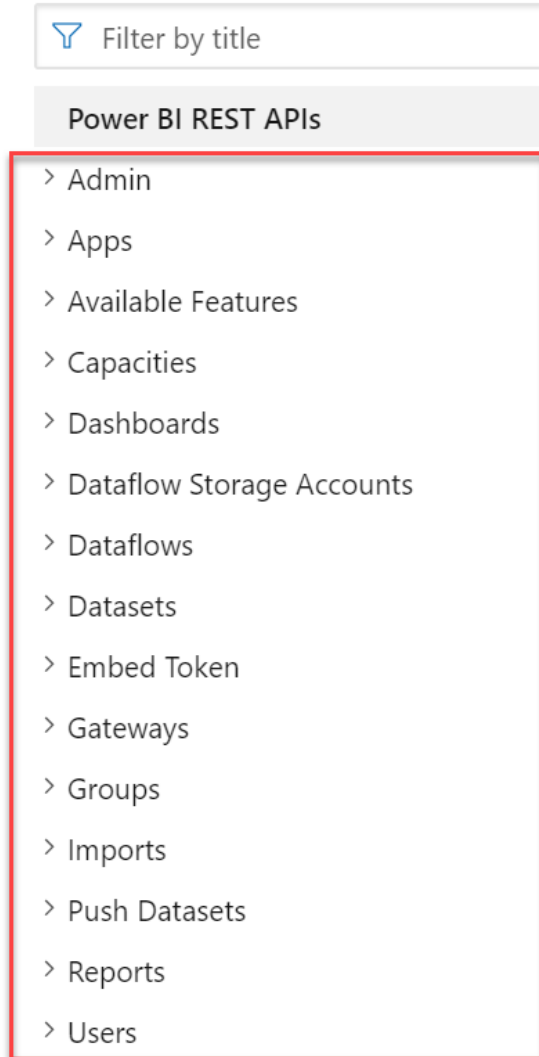
What is the Power BI service API?

- API built on OAuth2, OpenID Connect, REST and ODATA
- API secured by Azure Active Directory (AAD)
- API to interact with workspaces, datasets, reports, dashboards, gateways,...
- API also often called "Power BI REST API"




What can you do with the Power BI service API?

- Publish PBIX project files
- Index all your Power BI Content
- Update connection details and datasource credentials
- Create workspaces and clone content across workspaces
- Create streaming datasets in order to build real-time dashboards

Power BI REST API



Power BI REST APIs

07/25/2019 • 2 minutes to read •    

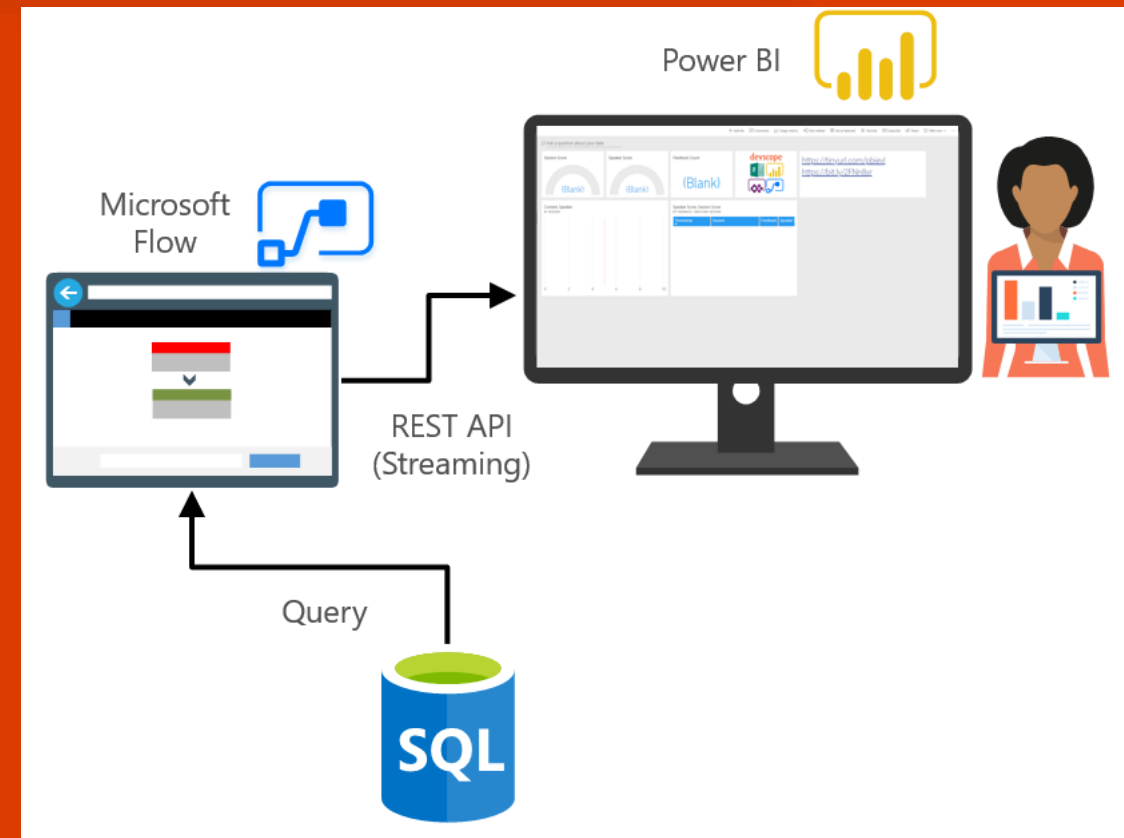
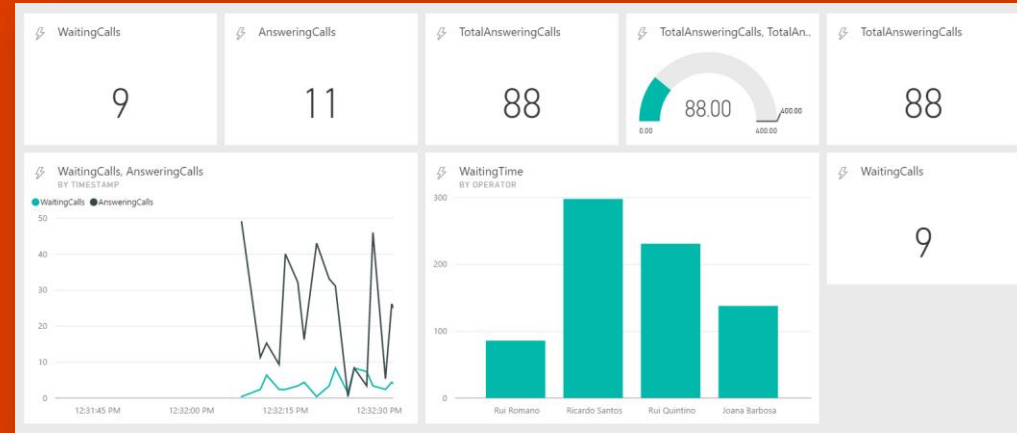
Power BI REST API provides service endpoints for embedding, administration, and user resources.

REST Operation groups

| Operation group | Description |
|---|--|
| Admin | Operations for working with administrative tasks. |
| Apps | Operations for working with Apps. |
| Available Features | Operations that return available features. |
| Capacities | Operations for working with capacities. |
| Dashboards | Operations for working with dashboards. |
| Dataflow Storage Accounts | Operations for working with dataflow storage accounts. |

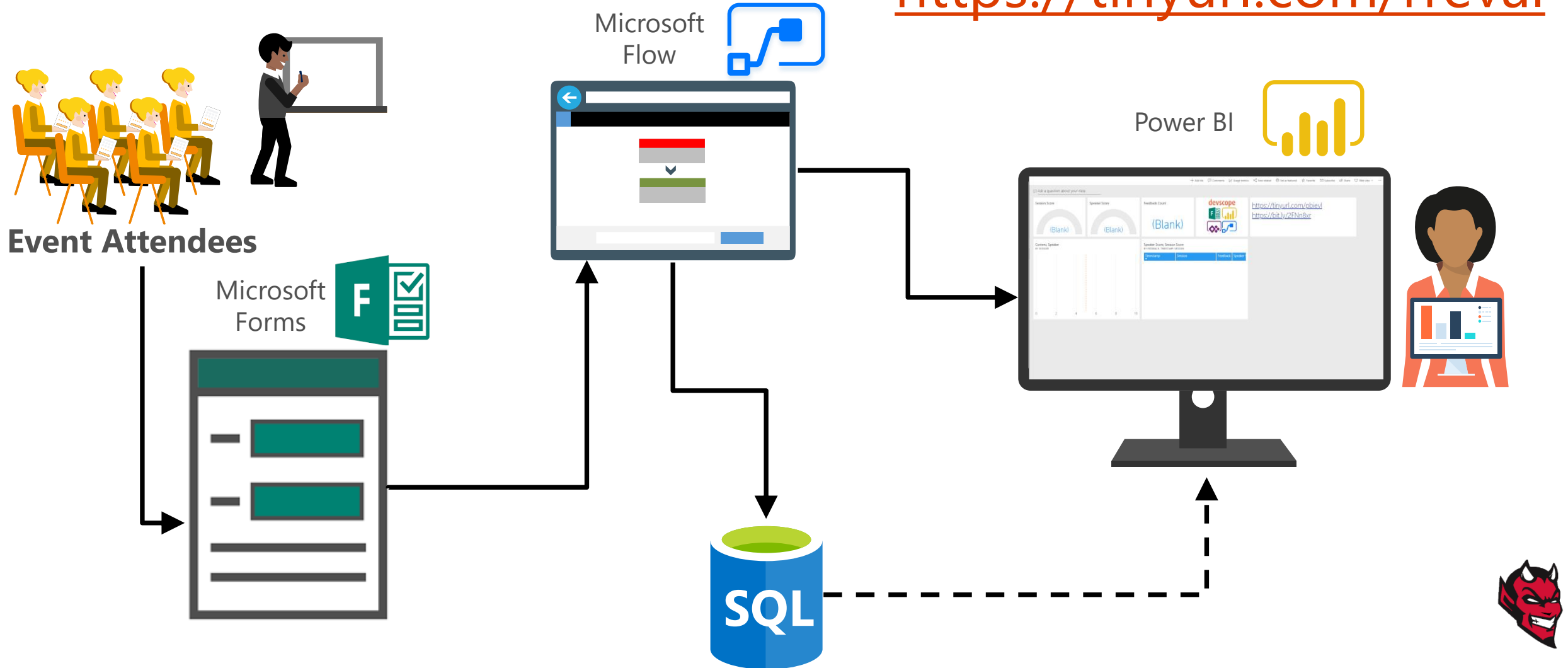
DEMO

- REST API Playground
- REST API to automate Publish
- Governance
- Realtime DataSets
- Flow + Streaming



Session Evaluation w/ Power Platform

<https://tinyurl.com/rreval>



Obrigado!

The DevScope logo, consisting of a red square with the word "devscope" in white lowercase letters.

Rui.Romano@DevScope.net



<https://ruiromanoblog.wordpress.com>

@RuiRomano

DevScope Suite of Power BI tools



PowerBI Tiles

Embed Power BI Reports in PowerPoint presentations, Word documents or Outlook messages.

[Try Now](#)



PowerBI Robots

Schedule and automatically send Power BI data to anyone, anywhere.

[Try Now](#)



PowerBI SmartPivot

Connect data from Power BI or OLAP cubes to Excel, search for any values in the data model and apply filters in bulk.

[Try Now](#)