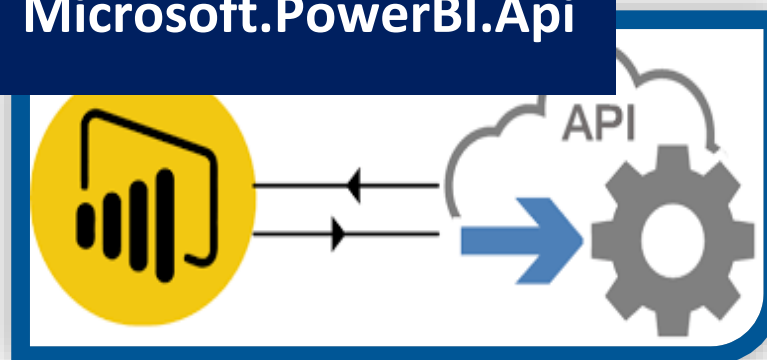


## Microsoft.PowerBI.Api



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**Cognitive Convergence** is Subject Matter Expert in Office 365, Dynamics 365, SharePoint, Project Server, Power Platform: Power Apps-Power BI-Power Automate-Power Virtual Agents.

We offer Power BI consulting services covering solution architecture refinement, customization, integration, transformation, visualization and analytics to uncover insights hidden within data and enhance data exploration.

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## OBJECTIVES

This paper will discuss Microsoft.PowerBI.Api its uses and implementation. It also discuss NuGet packages that are installed and used to generate access key of Power BI and various other functionalities and registration of Power BI app in Azure.

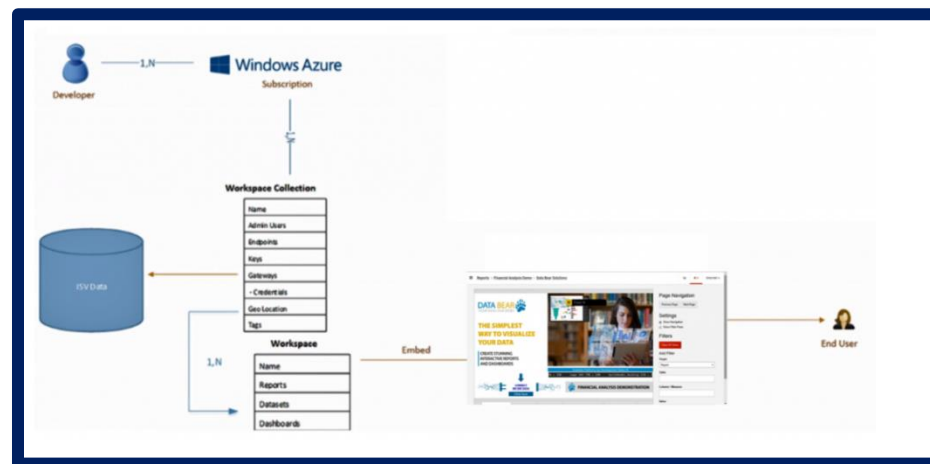
## MICROSOFT.POWERBI.API

.NET Client library for Microsoft Power BI public REST endpoints providing access to Workspaces, Reports, Datasets and more. Power BI API provides service endpoints for embedding, user resources, and administration.

## AZURE-HOSTED SERVICE

Power BI Embedded is an Azure-hosted service which allows users to embed the reports into external applications. The most important advantage of Power BI Embedded is that users don't need to have a Power BI service accounts and licenses to access Power BI reports via the application.

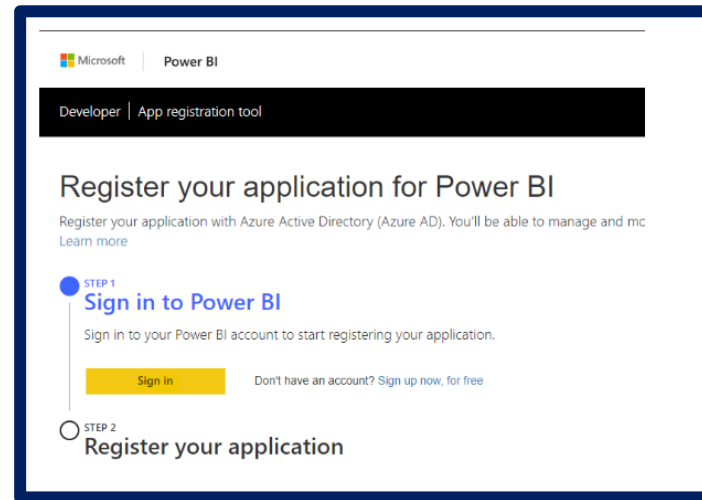
To ensure the users will have access to the most updated information the Power BI model type must be "direct query" and the data source must be cloud-based (AzureSQL) at this time. When using "Direct Query", no data is imported or copied into the data model. As interact with a visualization, Power BI Embedded queries the underlying data source, which means, viewing current data. Like any other service in Azure, resources for Power BI Embedded are provisioned through the Azure ARM APIs. In this case, the resource that provision is a Power BI Workspace Collection.



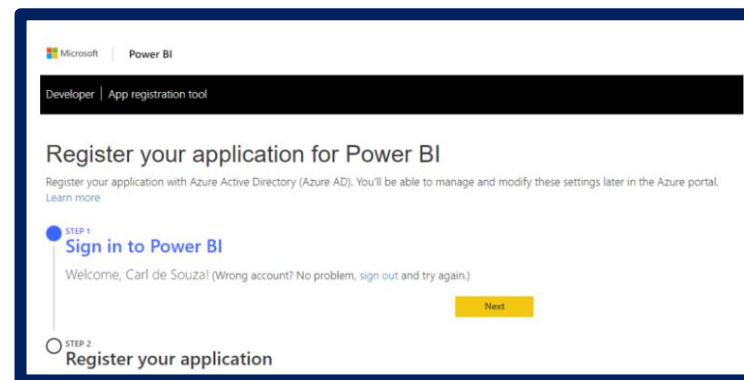
## REGISTER IN APPLICATION IN AZURE

The Power BI API contains many useful features if looking to interact with Power BI at the API level. In order to use it, we need to register an Azure App first.

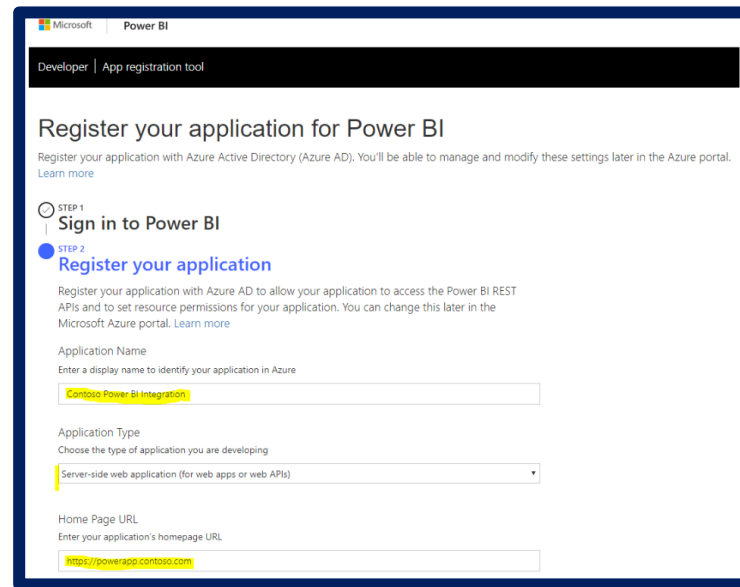
- Go to <https://dev.powerbi.com/apps> and click Sign In:



- Click Next:



- Give the App a name, such as Contoso Power BI Integration, and select the Application type and home page URL. Here we will select Server-side web application:



Microsoft | Power BI

Developer | App registration tool

## Register your application for Power BI

Register your application with Azure Active Directory (Azure AD). You'll be able to manage and modify these settings later in the Azure portal. [Learn more](#)

**STEP 1** Sign in to Power BI

**STEP 2** Register your application

Register your application with Azure AD to allow your application to access the Power BI REST APIs and to set resource permissions for your application. You can change this later in the Microsoft Azure portal. [Learn more](#)

Application Name  
Enter a display name to identify your application in Azure

Contoso Power BI Integration

Application Type  
Choose the type of application you are developing

Server-side web application (for web apps or web APIs)

Home Page URL  
Enter your application's homepage URL

https://powerapp.contoso.com

- Enter a redirect URL and select which Power BI access the app should have. Below I am checking Select All, meaning the app has access to Reading, Writing and Creating:

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

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Redirect URL  
Enter a URL where users will be redirected upon sign in so your application can receive an authorization code.

<https://powerapp.cortoso.com>

API access  
Select the APIs and the level of access your application needs. You can change these settings later in the Azure portal.  
[Learn more](#)

☒ Select all

Read only APIs	Read and write APIs	Create APIs
<input checked="" type="checkbox"/> Read all datasets	<input checked="" type="checkbox"/> Read and write all datasets	<input checked="" type="checkbox"/> Create APIs
<input checked="" type="checkbox"/> Read all dashboards	<input checked="" type="checkbox"/> Read and write all dashboards	
<input checked="" type="checkbox"/> Read all reports	<input checked="" type="checkbox"/> Read and write all reports	
<input checked="" type="checkbox"/> Read all workspaces	<input checked="" type="checkbox"/> Read and write all workspaces	
<input checked="" type="checkbox"/> Read all capacities	<input checked="" type="checkbox"/> Read and write all capacities	
<input checked="" type="checkbox"/> Read all storage accounts	<input checked="" type="checkbox"/> Read and write all storage accounts	
<input checked="" type="checkbox"/> Read all dataflows	<input checked="" type="checkbox"/> Read and write all dataflows	
<input checked="" type="checkbox"/> Read all gateways	<input checked="" type="checkbox"/> Read and write all gateways	
<input checked="" type="checkbox"/> Read all Power BI apps		

By clicking Register, you agree to the [terms of use](#)

Note: An application registered here can't be used as a service principal. [Learn how to register a service principal](#)

Register

- Once Registered, we are provided with an Application ID and an Application Secret. Click Close

Success!

Your application has been registered.

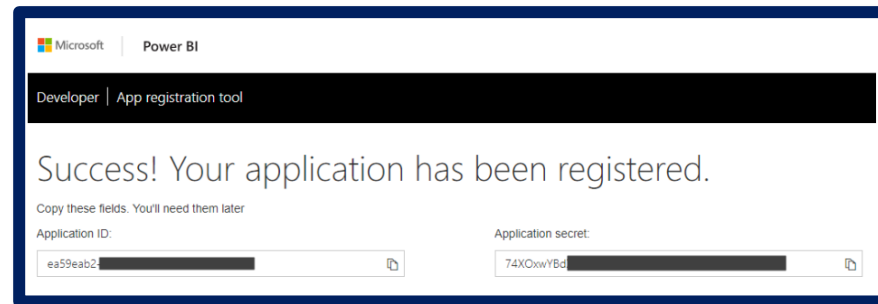
Note: You can retrieve your client ID from the Azure portal, if needed. If you lose your client secret, you'll need to create a new one in the Azure portal

Application ID:

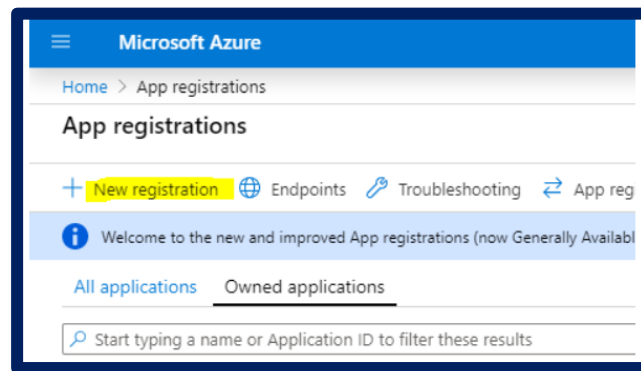
Application secret:

Close

- The app has now been registered



- Open [https://portal.azure.com/#blade/Microsoft\\_AAD\\_RegisteredApps/ApplicationsListBlade/quickStartType//sourceType/](https://portal.azure.com/#blade/Microsoft_AAD_RegisteredApps/ApplicationsListBlade/quickStartType//sourceType/) and select New Registration:



- Provide a name, e.g. PowerBIApp, and the supported account types, e.g. Single tenant, Multitenant etc, and click Register

To manage Power BI Embedded capacities,  
use the Power BI Embedded Azure  
Resource Manager REST APIs.

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**Microsoft Azure** Search resources, services, and docs (G+)

Home > App registrations > Register an application

### Register an application

**\* Name**  
The user-facing display name for this application (this can be changed later).  
PowerBIApp ✓

**Supported account types**  
Who can use this application or access this API?  
☐ Accounts in this organizational directory only (Contoso only - Single tenant)  
☒ Accounts in any organizational directory (Any Azure AD directory - Multitenant)  
☐ Accounts in any organizational directory (Any Azure AD directory - Multitenant) and personal Microsoft accounts (e.g. Skype, Xbox)  
[Help me choose...](#)

**Redirect URI (optional)**  
We'll return the authentication response to this URI after successfully authenticating the user. Providing this now is optional and it can be changed later, but a value is required for most authentication scenarios.  
 Web ✓ https://powerbiapp.contoso.com ✓

- Note the Application Client Id to use when integrating with the API:

**Microsoft Azure** Search resources, services, and docs (G+)

Home > App registrations > PowerBIApp

### PowerBIApp

Search (Ctrl+F)

Overview | Quickstart | Manage | Authentication | Certificates & secrets | API permissions | Expose an API | Owners | Roles and administrators (Preview) | Manifest | Support + Troubleshooting | Troubleshooting | New support request

Get a second? We would love your feedback on Microsoft identity platform (previously Azure AD for developer). →

Display name: PowerBIApp  
 Application (client) ID: [REDACTED]  
 Directory (tenant) ID: [REDACTED]  
 Object ID: [REDACTED]

Supported account types: Accounts in any organizational directory (Any Azure AD directory - Multitenant)  
 Redirect URIs: [REDACTED]  
 Application ID URI: [REDACTED]  
 Managed application in: [REDACTED]

Welcome to the new and improved App registrations. Looking to learn how it's changed from App registrations (Legacy)? [Learn more](#)

**Call APIs**  
Build more powerful apps with rich user and business data from Microsoft services and your own company's data sources.  
[View API permissions](#)

**Sign in users in 5 minutes**  
Use our SDKs to sign in users and call APIs in a few steps.  
[View all quickstart guides](#)

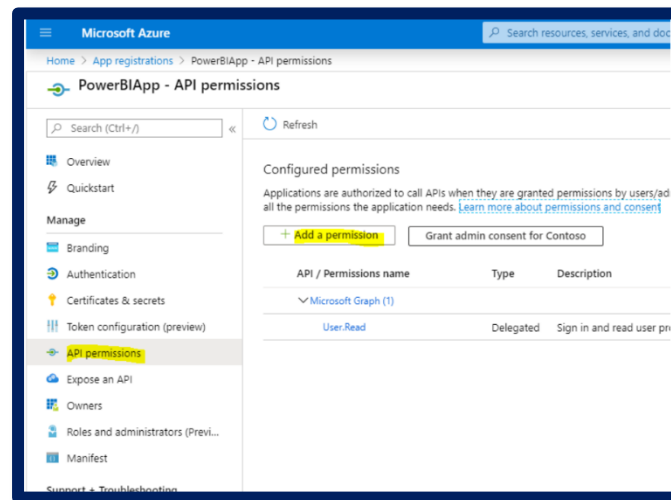
**Documentation**  
[Microsoft identity platform](#)  
[Authentication scenarios](#)  
[Authentication libraries](#)  
[Code samples](#)  
[Microsoft Graph](#)  
[Glossary](#)  
[Help and support](#)

Select API Permissions and click Add a permission:

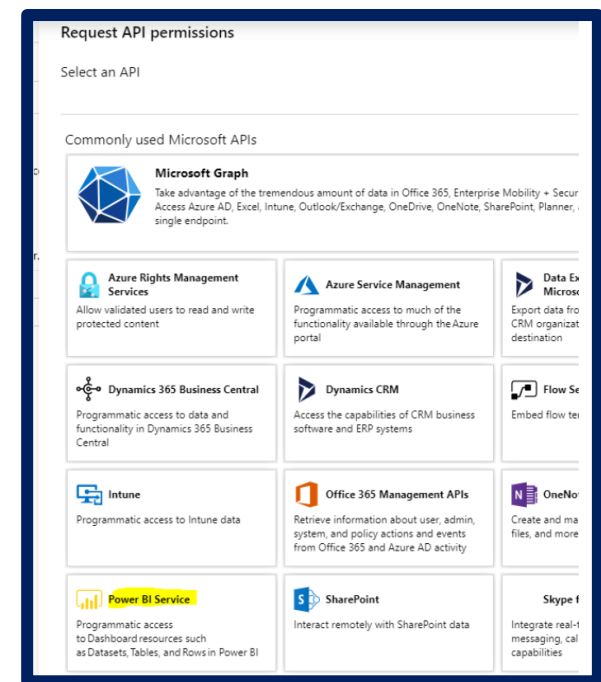
**Microsoft Azure** Search resources, s



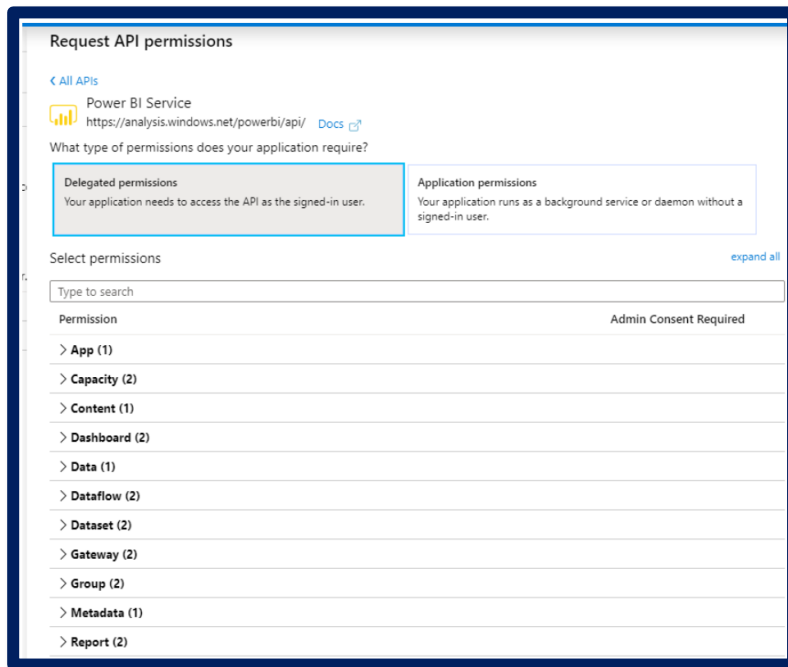
- Select API Permissions and click Add a permission:



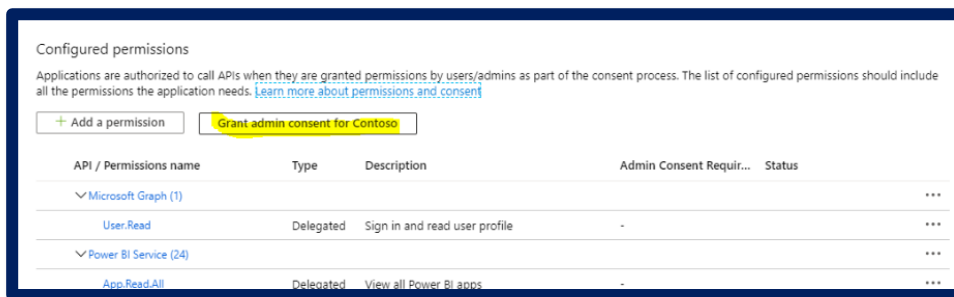
- Select Power BI Service:



- I will grant access to several pieces of Power BI API functionality, and click Add Permissions:



- Next, click on Grant admin consent for org (or run into the error “The user or administrator has not consented to use the application”):



- Once complete, go to Certificates and Secrets. We will create a new secret that we will use when using the A

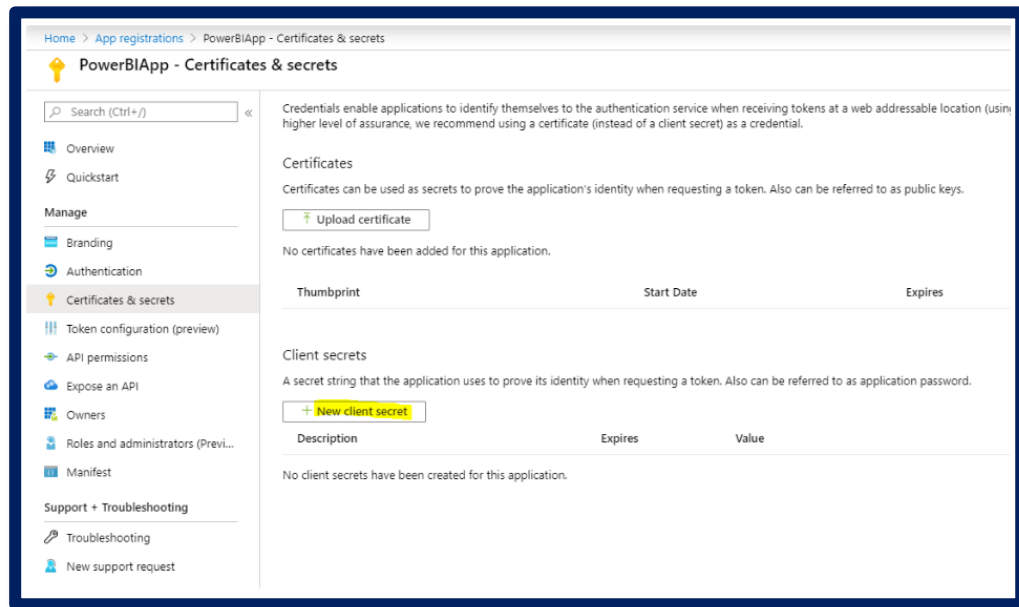
Use the Power BI REST API to programmatically access the Power BI Service features.

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- Give the secret a name and duration:

Add a client secret

Description

Expires
  
☒ In 1 year
  
☐ In 2 years
  
☐ Never

Add Cancel

That's it, set up to integrate to the Power BI API.

REST stands for Representational State Transfer, and API stands for Application Programming Interface.

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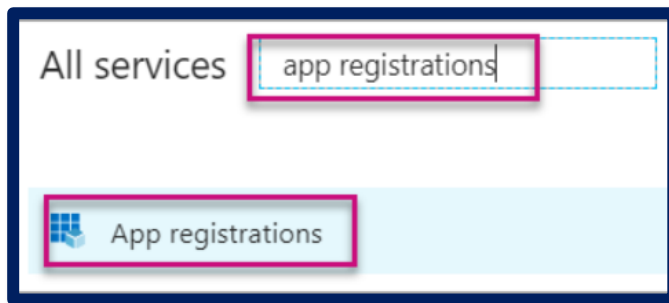
shahzad@cognitiveconvergence.com

## Application ID

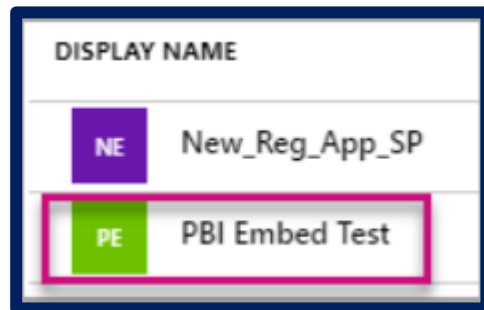
This attribute is needed for both AuthenticationTypes. Fill in the applicationId information with the Application ID from Azure. The applicationId is used by the application to identify itself to the users from which requesting permissions.

To get the applicationId, follow these steps:

- Sign into the Azure portal.
- In the left-hand nav pane, select All Services, and select App Registrations.



- Select the application



- There's an Application ID that is listed as a GUID. Use this Application ID as the applicationId for the application.

Display name	: PBI Embed Test
Application (client) ID	: 93105ba0-2cee-4b35-80ab-f1e80abdbb05
Directory (tenant) ID	: fd6d462f-fa94-4505-93bb-b1881d76a1c9
Object ID	: 5d5cfaba-574b-406a-8613-d4c9b008b234

## Workspace ID

This attribute is needed for both AuthenticationTypes. Fill in the workspaceId information with the workspace (group) GUID from Power BI.

## Report ID

This attribute is needed for both AuthenticationTypes. Fill in the reportId information with the report GUID from Power BI.

## Application secret

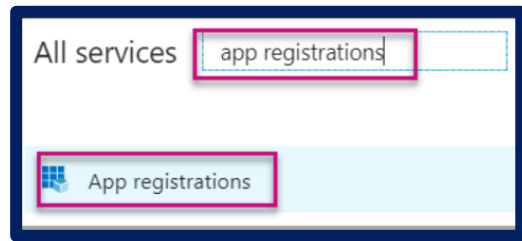
This attribute is needed only for the service principal AuthenticationType. Fill in the ApplicationSecret information from the Keys section of App registrations section in Azure. This attribute works when using service principal.

To get the ApplicationSecret, follow these steps:

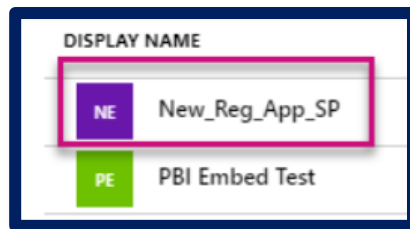
Production worthy solution obtain by  
Postman using Power BI API by  
developers

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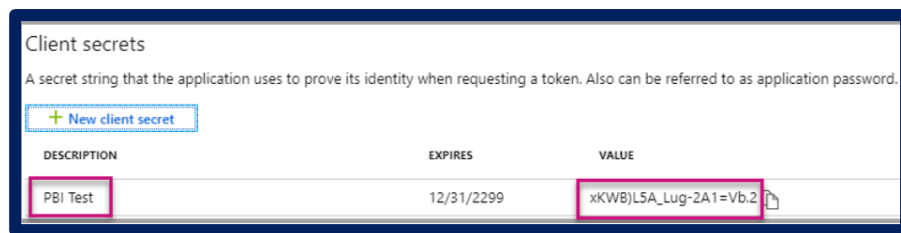
- Sign in to the Azure portal.
- In the left-hand nav pane, select All services and then select App registrations.



- Select the application that needs to use the ApplicationSecret.



- Select Certificates and secrets under Manage.
- Select New client secrets.
- Enter a name in the Description box and select a duration. Then select Save to get the Value for application. When close the Keys pane after saving the key value, the value field shows only as hidden.



## NUGET PACKAGE

---

An essential tool for any modern development platform is a mechanism through which developers can create, share, and consume useful code. Often such code is bundled into "packages" that contain compiled code (as DLLs) along with other content needed in the projects that consume these packages.

### Install NuGet client tools

To work with NuGet, as a package consumer or creator, can use command-line interface (CLI) tools as well as NuGet features in Visual Studio. Packages are installed into a Visual Studio project using the NuGet Package Manager, the Package Manager Console.

- The **Microsoft.PowerBI.Core** package contains APIs to generate report embed tokens.

### Install Package from NuGet

```
Install-Package Microsoft.PowerBI.Core
```

## SOLUTION ARCHITECTURE

---

### Packages

The Microsoft.PowerBI.Api is a REST client which helps us consume the PowerBI embedded services.

- To use this services have install this NuGet package through package manager console.

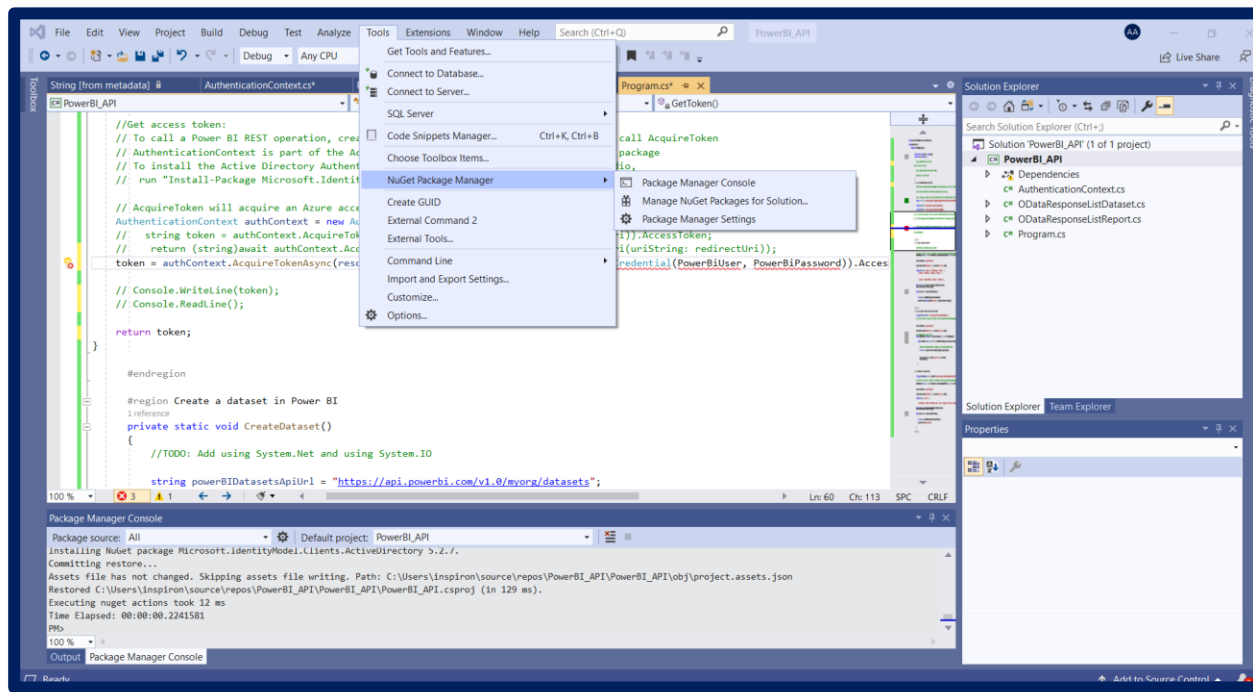
Application in Power BI Developer's portal is created to use Power BI rest API

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- Now copy and paste and click enter to install the package. This package will install all the required components to develop application.

Install-Package Microsoft.PowerBI.Core

- Might also be required to install a package for AD authentication library

Install-Package Microsoft.IdentityModel.Clients.ActiveDirectory



## Access Token

In order to use Power BI, first it requires to generate access token. The tokens are signed with the access key from Azure Power BI Embedded workspace collection. Embed tokens are used to provide read only access to a report to embed into an application. One of the most important pieces of information needed to call the Power BI REST APIs are the Access Keys. These are used to generate the app tokens that are used to authenticate API requests. To view Access Keys, click Access Keys on Settings. For more about app tokens, see Authenticating and authorizing with Power BI Workspace Collections.

- To create a report embed token need an Azure Power BI Workspace collection, access key, workspace Id & report Id.

```
var accessKey = "{AzureAccessKey}";
var embedToken = PowerBIToken.CreateReportEmbedToken(workspaceCollection, workspaceId,
reportId);
var jwt = embedToken.Generate(accessKey);
```

## PowerBI Instances

Apart from Username, Password to connect to powerbi and ClientID, received from azure registration, need 3 more information to connect to powerBI using C#.

### Authority URL:

This url is required to instantiate the AuthenticationContext class which is required for address validation. The Authority URL is:

Real time high level analytics and custom development is provided using Power BI, a Business Intelligence tool offered by Microsoft

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```
https://login.windows.net/common/oauth2/authorize
```

#### **Resource URL:**

This url is required to acquire the accesstoken after using has been authenticated. The access token will be used while communicating with powerbi to trigger refresh and fetch refresh histories. The Resource URL is:

```
https://analysis.windows.net/powerbi/api
```

#### **API URL:**

This url is required to instantiate the PowerBIClient class. The API URL is:

```
https://api.powerbi.com
```

#### **Parameters**

- The code use Microsoft.PowerBI.Security
- It use embedded token to generate access key i.e. key gets at time of registering application in Azure.
- These embedded tokens require workspaceCollectionName, workspaceId, reportId.

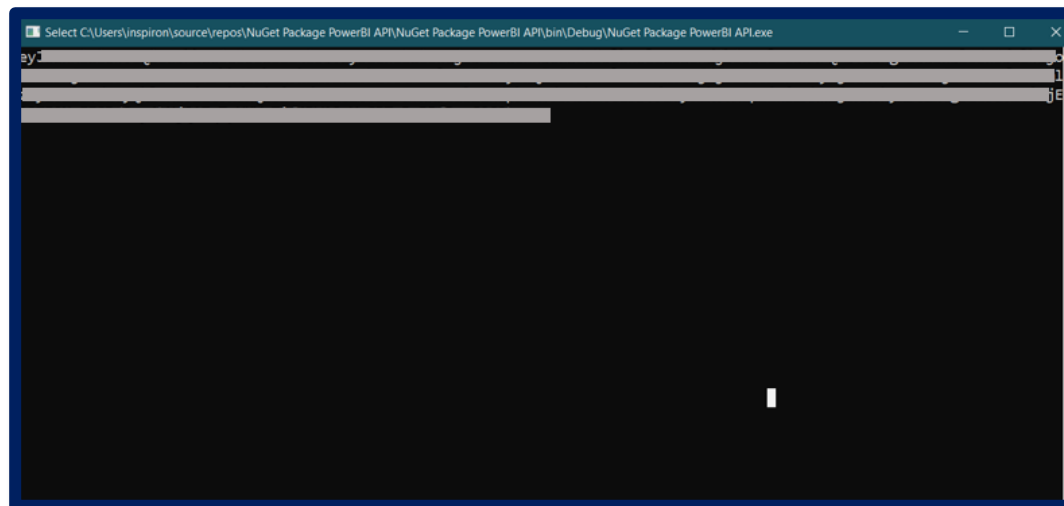
```
using System;
using Microsoft.PowerBI.Security;

namespace NuGet_Package_PowerBI_API
{
    0 references
    class Program
    {
        0 references
        static void Main(string[] args)
        {
            String workspaceCollectionName = "[redacted]";
            String workspaceId = "[redacted]";
            String reportId = "{1fed191f-27ca-49b0-b222-9ef076213e4f}";

            var accessKey = "{2e193461-a68e-491a-bdfd-4aca987eb79b}";
            var embedToken = PowerBIToken.CreateReportEmbedToken (workspaceCollectionName, workspaceId, reportId);
            var jwt = embedToken.Generate(accessKey);

            Console.WriteLine(jwt);
            Console.ReadLine();
        }
    }
}
```

Which give access key in this form



## API GROUPS FROM POWERBI CLIENT

Following API groups are available by PowerBI Client:

- Dashboards
- Datasets
- Gateways
- Groups
- Imports
- Reports

There are multiple variations for each method. For example, to get a list of reports one of the methods is defined below:

➤ *client.Reports.GetReports()* – Synchronous method to get a list of reports in "My Workspace".

➤ *client.Reports.GetReportsAsync()* – async method to get a list of reports in "My Workspace".

➤ *client.Reports.GetReportsInGroup(groupId)* – Synchronous method to get a list of reports in specific group (e.g. App workspace).

➤ *client.Reports.GetReportsInGroupAsync(groupId)* – async method to get a list of reports in specific group (e.g. App workspace).

## COMPARISON

Rest API	PowerBI.API_NuGet Package	PowerBI.JavaScript_NuGet
Rest API are used to have multiple software front-ends that need to communicate with server functionality of some sort.	Use NuGet when project, library or framework needs to be publicly distributed to software developers outside of organization.	Power BI JavaScript API will allow to write code that can securely pass through the iframe boundary, so that application can programmatically perform an action in a report and listen for events from actions that users make from within the reports themselves.
REST API provides more flexibility when developing in other language.	The PowerBI.API_NuGet packages provide functionality for asp.net applications	The PowerBI.JavaScript_NuGet packages provide functionality for asp.net applications
Not necessarily require Authorization and also perform non admin tasks.	Require Authorization and Perform Admin Task	Require Authentication and Perform Admin Task.
Embed reports, dashboards, and tiles for Power BI users and Non-Power BI users.	Power BI API provides service endpoints for embedding, user resources, and administration	The JavaScript API provides service endpoints for embedding, user resources, and administration along with advanced filtering of reports, and control over page navigation.

## CONCLUSION

In this paper we discuss Microsoft.PowerBI.API its uses and implementation. It also discuss Microsoft.PowerBI.API NuGet packages and registration of Power BI app in Azure. This paper explain how to register application in Azure and get Application ID, Workspace ID, Report Id and Application secret. To install NuGet packages in NuGet Package Manager Console in visual studio and then use the above keys and uri to generate Access keys. This access key is used to perform tasks related to Dashboards, Datasets, Gateways, Groups, Imports, Reports.

Cognitive Convergence will provide consulting services that help in designing, deploying, managing, enhancing or troubleshooting on-premises, cloud-based or hybrid Power BI environment. Cognitive Convergence will provide help to start fresh with Power BI to modernize current business analytics solution or revamp existing Power BI deployment by incorporating new data sources or adding new services.

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