

BI4Dynamics Application

Installation Manual for BC Cloud on Azure Virtual Machine

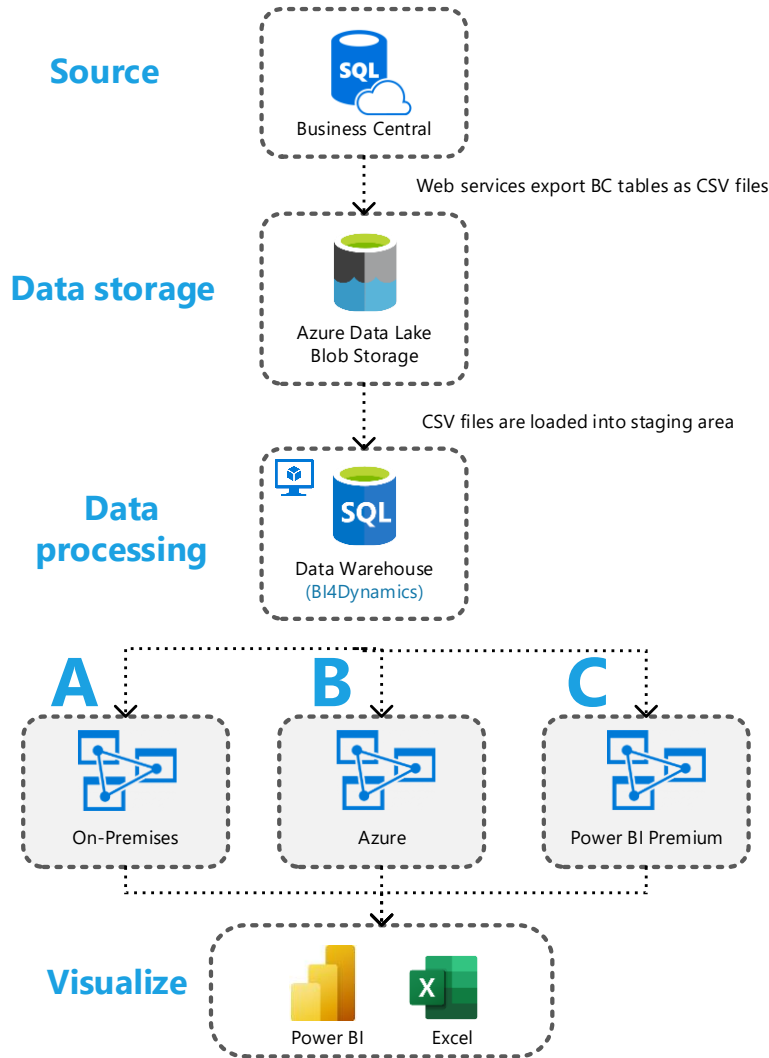
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1. Installation of BI4Dynamics application

1.1. Implementation options



	Local Analytics (A)	Azure Analytics (B)	Power BI Premium (C)
Install Gateway	✗	On-Premises Data gateway	
Create new instance	✗	✓	✓
Add data source	BC cloud	BC cloud	BC cloud
Install data warehouse	✓	✓	✓
Export data to Blob Storage	✓	✓	✓
Map Gateway to Data source	✗	✗	✓
Process instance	✓	✓	✓

1.2. Prerequisites

1.2.1. BC credentials

Description	Value
BC Admin User	adminuser@bi4dynamics.onmicrosoft.com
BC Admin User Password	rtPxXqxJ2IkOIJFR9Eki#8

1.2.2. Information about Azure SQL Virtual Machine and Azure Storage

All prerequisite fields are result of Local or VM installation (fields here are for example only):

Azure Storage:

Description	Value
Subscription	Pay-As-You-Go
Resource Group	vm-bi4-demo
Azure Storage Account	vmbi4demostorage
Storage Account Blob Key	4T+eDbv9U7G7Wd785S0P86V++VBdqIaPeTTHHvun1IGgN4I==

Azure SQL VM:

Description	Value
RDP Public IP (or RDP file)	51.137.66.72
SQL server name (as seen in Azure)	vm-bi4-demo.westeurope.cloudapp.azure.com
VM Admin Account	vm-admin-user
VM Admin Account Password	6!dJ2yS34MbbQiPHs@rd

Azure Container instance:

Description	Value
Subscription	Pay-As-You-Go
Container Instance	vmbi4democontainer

1.2.3. Implementation options for analytical database

Azure Analysis Services – implementation option B:

Description	Value
Azure Analysis Services	asazure://westeurope.asazure.windows.net/bi4dynamicshybrid
Username (AAS admin)	mg@bi4dynamics.com
Password	Qpewoicsj490wkss

Power BI Premium – implementation option C:

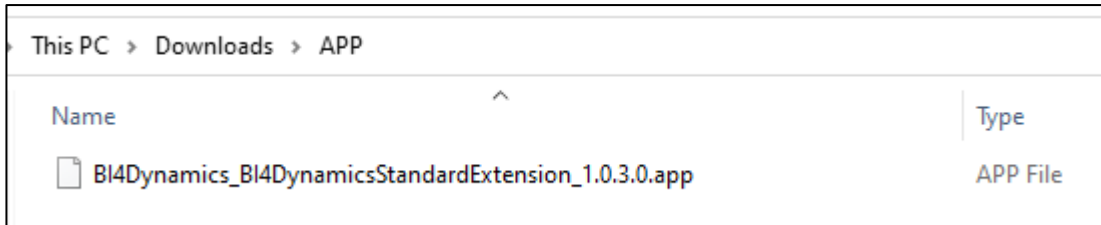
Description	Value
Workspace connection	Power BI://api.Power BI.com/v1.0/myorg/BI4Dynamics%20PPU%
Username (Power BI)	mg@bi4dynamics.com
Password	Qpewoicsj490wkss

1.3. Installing BI4Dynamics application

1.3.1. Install BI4Dynamics extension to BC tenant

Install BI4Dynamics BC Extension to your BC tenant. Extension must be installed on Production environment. As this is a standard BC installation, we will not describe steps.

<https://www.bi4dynamics.com/dl/azure/APP.zip>



1.3.2. Install desktop BI4Dynamics application

IMPORTANT! Before installing BI4Dynamics, please check hardware and software requirements, make sure you have sufficient permissions and an active internet connected.

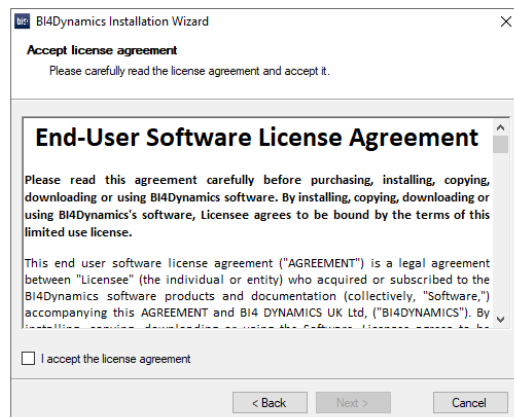
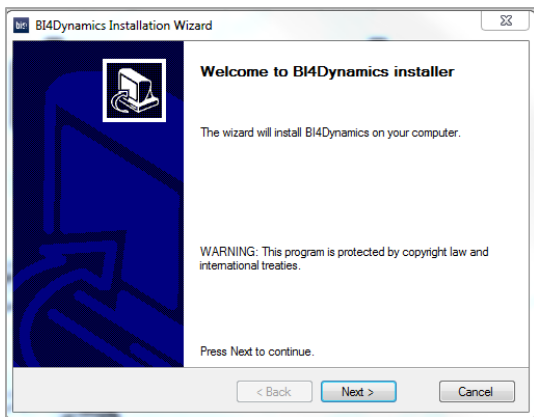
IMPORTANT! The installation process must be started on VM where BI4Dynamics Data Warehouse will be created.

1. Double-click **BI4Dynamics.exe** to start the installation*.

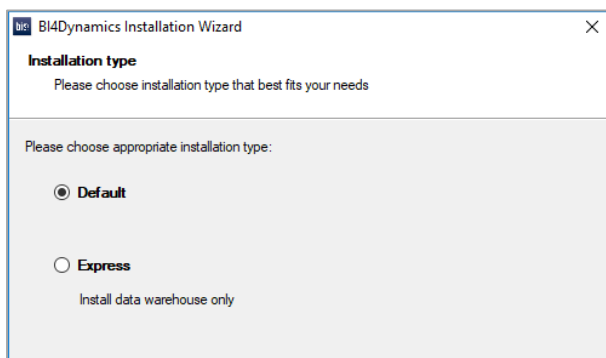
**Always start BI4Dynamics as an administrator.*

Note: The name of the file varies based on the version you are using.

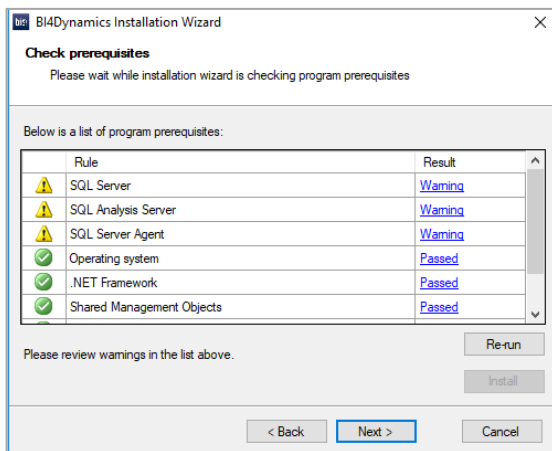
2. Follow the instructions on screen and **Accept** the license agreement.



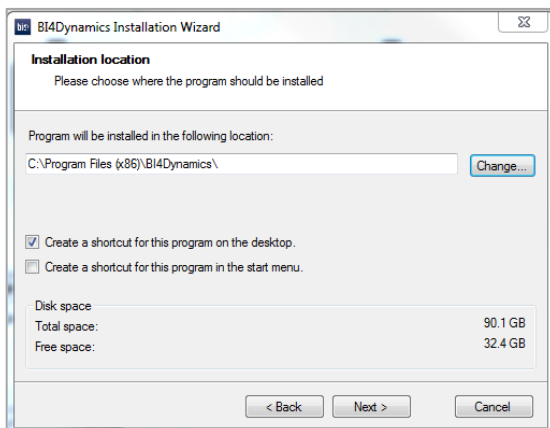
3. Choose Default option.



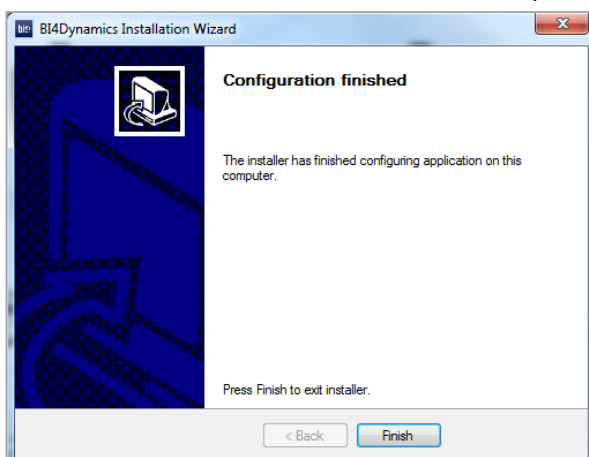
- The installer will check for some of the prerequisites. If you fail any of the tests you can click on the result to see the error. You must fix the problem before you can rerun the test. Once all the tests are successfully completed you can continue with the installation.



- If a correct version of Shared Management Objects, Analysis Management Objects or .NET Framework are not installed, please click the Install button, which will trigger the installation of correct version of SMO's, AMO's, CLR Types or .NET Framework.
- Select the folder where you would like to install BI4Dynamics. You can choose to create a shortcut on the desktop and/or in the start menu.



- Confirm the configuration and begin the installation of BI4Dynamics.
- Click **Finish** after the installation is completed.



1.4. Creating BI4Dynamics instance

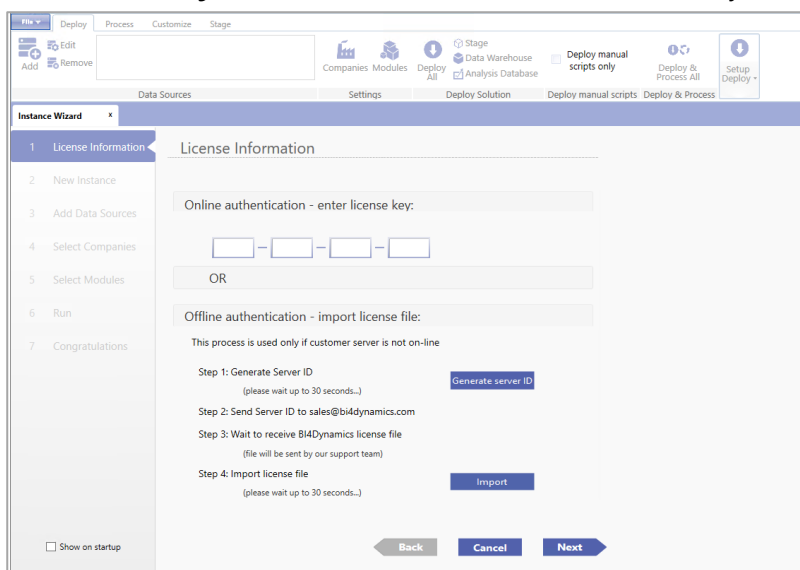
Deploying a BI4Dynamics solution is a six-step process:

1. Providing license information
2. Creating an instance
3. Adding the data sources
4. Selecting companies
5. Selecting Azure Framework module
6. Deploying and processing model

When you open the application, an instance wizard will start to guide you through the configuration.

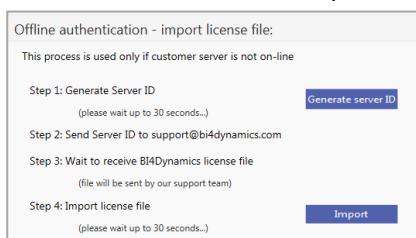
1.4.1. Providing license information

1. Launch **BI4Dynamics.exe** from the folder where BI4Dynamics was installed to open application.



Note: BI4Dynamics is 64-bit application, but the default installation location is C:\Program Files (x86)\BI4Dynamics NAV. Application can also be started from the Desktop shortcut or from the Start Menu shortcut.

2. Enter the BI4Dynamics **online license key**
- OR
3. Follow the instructions on screen to receive an **offline license key** (in case you do not have the internet connection or port 80 on the server is closed).



Note: If you experience any problems with authorization, please contact us via support@bi4dynamic.com.

4. Click **Next**.

2. Implementation option A: Local Analysis Services

2.1. Creating Instance

2.1.1. Step 1: Create a new instance

Instance properties

1. Check the **Source is BC Cloud** checkbox.
2. Type the **Name** of the new instance.
3. Select what **Language** the solution will be deployed in.

SQL server

1. Keep or change **Database Name** of the BI4Dynamics Data Warehouse.
2. Type **SQL Server Name** where the BI4Dynamics Data Warehouse will be deployed (in case of Azure Virtual Machine: vm-bi4-demo.westeurope.cloudapp.azure.com)
3. **Authentication** type: **Windows**

Analysis Services

1. Keep or change the **Analysis Database Name** of the Analysis Services instance.
2. Keep or change the **Analysis Database Server** name where the Analysis Services model will be deployed.
3. **Authentication** type: Windows

New Instance

Instance properties

Instance Name:

Language:

SQL Server

Database Name:

SQL Server Name:

Authentication:

SQL Database File Locations:

Data: ...

Log: ...

SQL Database Collation:

Analysis Services

Analysis Database Name:

Analysis Server Name:

Analysis Server Option:

Authentication:

Username:

Password:

Mode type:

Integration Services

Use Integration Services:

SSIS Server name: Ver.

2.1.2. Step 2: Test installed resources

Integration Services

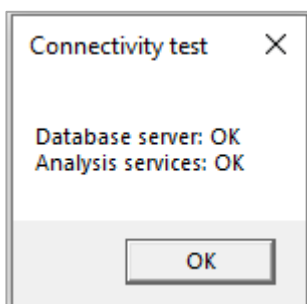
Check **SQL Integration Service** to process BI4Dynamics using the Integration Services (used for parallel processing).

Refresh

Click **Refresh** to set default values for **SQL Database file Locations** (data and log files) and **SQL Database Collation** are entered automatically. Modify if necessary.

Test

Click **Test Connectivity** to check the credentials and connectivity to Database Server and Analysis Services. This should be the message:



Click **Next**.

2.1.3. Step 3: Add Data Source

Azure Storage Information

This information is about **Azure Storage Account** that will be used to keep BC data. The values have been created during VM installation and are listed as a prerequisite for BC application installation.

1. Select **Cloud** as the Data Source.
2. Type **Storage Account Name**
3. Type **Container Name** (this resource should not be confused for Container instance aka Docker, that is another Azure resource, used for exporting tables to Storage Account)
4. Type **Blob Key**

Click **Test** to check if the entered information is correct.

Add Data Sources

Add all NAV source databases you wish to analyze in BI4Dynamics to your BI4Dynamics instance.

Data Source Source

Cloud

Azure Storage Information

Storage Account Name: vmbi4demostorageaccount

Container Name: vmbi4democontainer

Blob Key: 86V++V8dqIaPeTTHHvun1GgN4I=

Test Storage Credentials:

Add Business Central

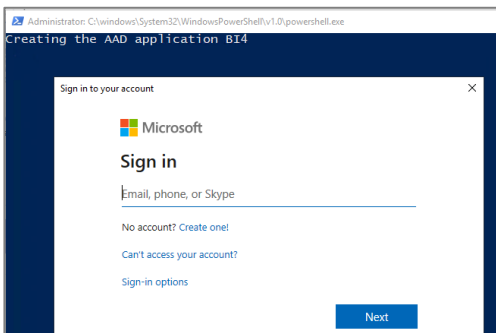
As a next step, we need to provide **Data Source Information**. There are 2 options to do it:

- *Option 1: Using email and password.*
- *Option 2: Using client secret.*

Option 1: Using email and password

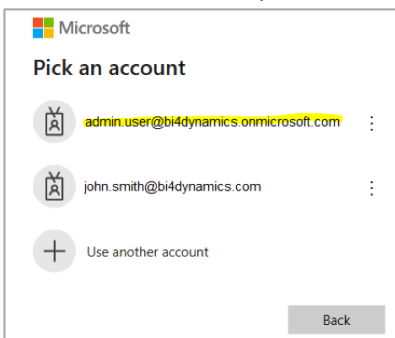
In this option, the data will be accessed through **BC Admin Credentials**.

1. Click **Login** and a new window will open up:

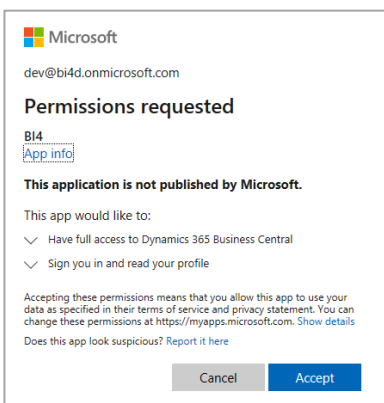


2. Insert **BC Admin Credentials**

After entering the credentials wait 15 seconds to sign in again. In this process, BC admin will allow BI4Dynamics application to access BC data. Enter **BC admin** credentials (sometimes, account login does not work correctly, in such case use option **Use another account** and enter the same **BC admin** account credentials):



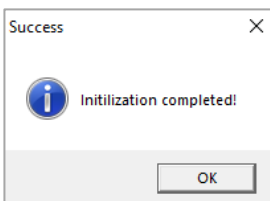
New window will pop-up:



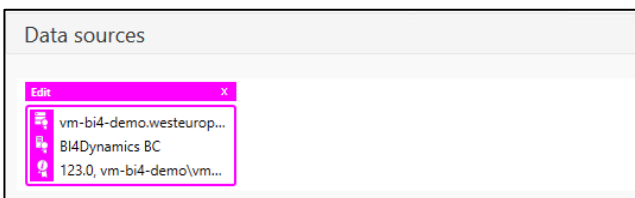
Click **Accept**.

Application will automatically fill-in **BC Tenant ID** and **App Registration Client ID**:
 (You can enter this information if you have it from previous process without login process)

3. Select **BC environment** and click **Initialize Data Lake**.



After Initializing click **Add** to add the selected data source and wait...
 Your screen should look like this:



You have successfully added data source

Click **Next**.

Option 2: Using client secret

In this option, we need to create App Registration on Microsoft Azure and link it in Business Central.

1. Create App registration in Microsoft Azure

- a. In Microsoft Azure search for App registrations
- b. Click on New registrations
- c. Under Name type in any name of an app registration
- d. Under Redirect URI select public client/native
- e. Click Register

Home > App registrations >

Register an application

* Name

The user-facing display name for this application (this can be changed later).

BI4Dynamics app registration ✓

Supported account types

Who can use this application or access this API?

- Accounts in this organizational directory only (BI4Dynamics 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)
- Personal Microsoft accounts only

[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.

Public client/native (mobile ...) ✓ e.g. myapp://auth ✓

Register an app you're working on here. Integrate gallery apps and other apps from outside your organization by adding from [Enterprise applications](#).

By proceeding, you agree to the [Microsoft Platform Policies](#)

Register

Home > App registrations >

BI4Dynamics app registration

Search << Delete Endpoints Preview features

- Overview
- Quickstart
- Integration assistant

Manage

- Branding & properties
- Authentication

Essentials

Display name : [BI4Dynamics app registration](#)

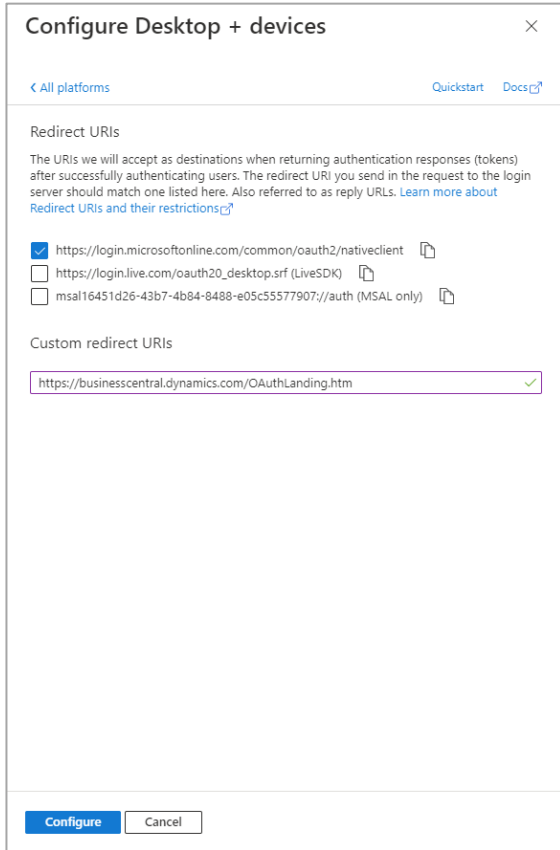
Application (client) ID : [REDACTED]

Object ID : a71628b0-7a99-4e92-a214-80c2dadd70e1

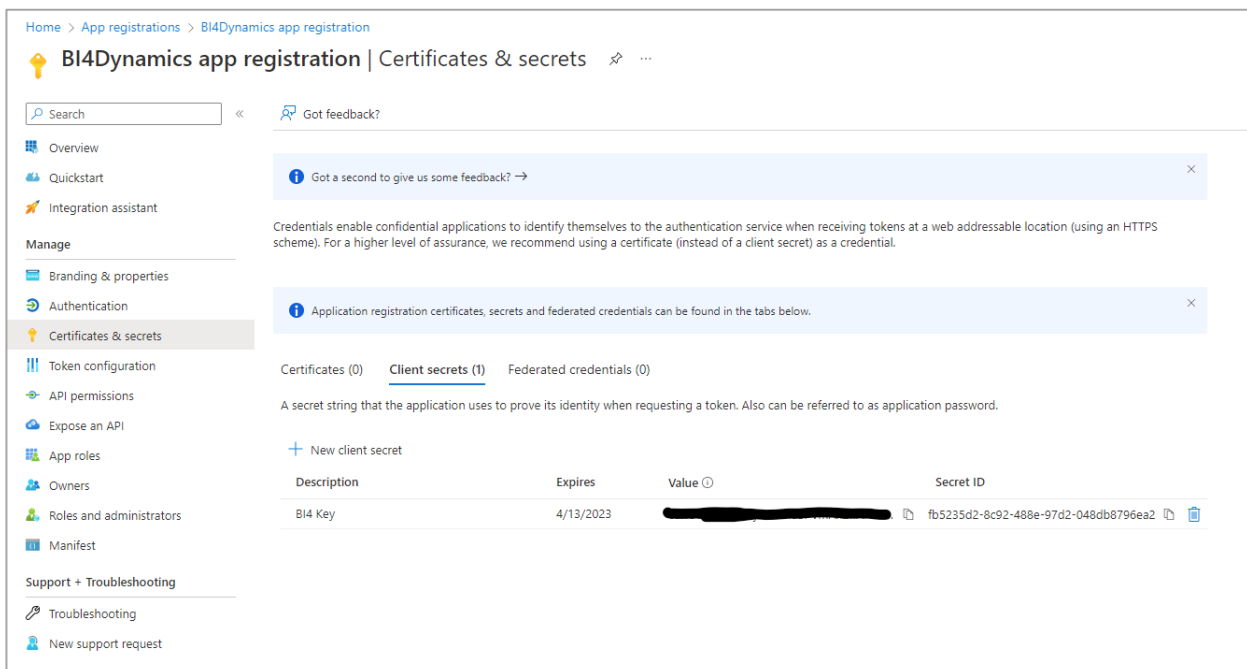
Directory (tenant) ID : [REDACTED]

Supported account types : [My organization only](#)

- f. Copy and save **Application (client) ID** as **Client ID** and **Directory (tenant) ID** as **Tenant ID**
- g. Under **Redirect URIs** click on **Add a Redirect URI**
- h. Click **Add a platform**
- i. Under **Mobile and desktop applications** select **Mobile and desktop applications**



- j. Check **https://login.microsoftonline.com/common/oauth2/nativeclient** and under Custom redirect URIs write **https://businesscentral.dynamics.com/OAuthLanding.htm**
- k. Click **Configure**



- l. Under Manage select **Certificates & secrets**
- m. Click on **New client secret**
- n. Under **Description** write any name
- o. Under **Expires** select any expiration date/month
- p. Click on **Add**
- q. Copy value under **Value** and store it somewhere safe as **Client Secret**
- r. Under **Manage** select **API permissions**
- s. Click on **Add a permission**
- t. Select **Dynamics 365 Business Central**
- u. Under **Delegated permissions** select **User Impersonation** and **Financials.ReadWrite.All**
- v. Under **Application permissions** select **app_access**, **API.ReadWrite.All** and **Automation.ReadWrite.All**
- w. Click on **Add permissions**
- x. Click on **Grand admin consent**

Configured permissions

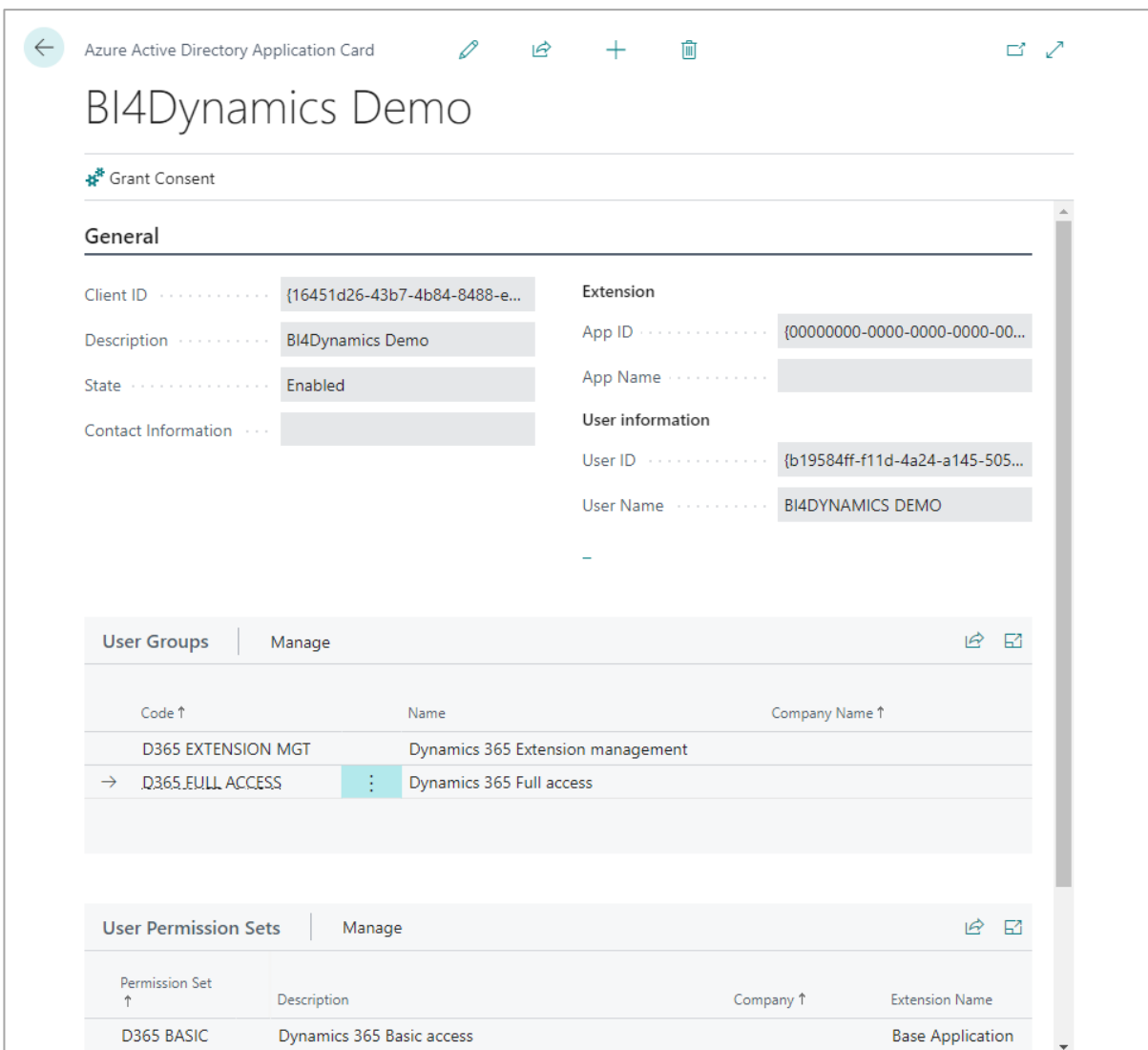
Applications are authorized to call APIs when they are granted permissions by users/admins as part of the consent process. The list of configured permissions should include all the permissions the application needs. [Learn more about permissions and consent](#)

+ Add a permission ✓ Grant admin consent for BI4Dynamics

API / Permissions name	Type	Description	Admin consent requ...	Status
▼ Dynamics 365 Business Central (5) ...				
API.ReadWrite.All	Application	Full access to web services API	Yes	✔ Granted for BI4Dynamics ...
app_access	Application	Access according to the application's permissions in Dyna...	Yes	✔ Granted for BI4Dynamics ...
Automation.ReadWrite.All	Application	Full access to automation	Yes	✔ Granted for BI4Dynamics ...
Financials.ReadWrite.All	Delegated	Access Dynamics 365 Business Central as the signed-in user	No	✔ Granted for BI4Dynamics ...
user_impersonation	Delegated	Access as the signed-in user	No	✔ Granted for BI4Dynamics ...
▼ Microsoft Graph (1) ...				
User.Read	Delegated	Sign in and read user profile	No	✔ Granted for BI4Dynamics ...

2. Link app registration in Business Central

- a. Login into environment you want to use
- b. In BC search for **Azure Active Directory Applications**
- c. Click on **New**
- d. Under **Client ID** paste Client ID from app registration
- e. Under **Description** type in any name
- f. Under **State** select **Enabled**
- g. Under **User Groups** add **D365 EXTENSION MGT** and **D365 FULL ACCESS**
- h. Under **Company Name** delete company name
- i. Click **Grant Consent**
- j. Sign in with your account and click **Accept**



3. Adding new data source in BI4 app

- Under Token request select **Using client secret** if it's not selected
- Under **Tenant ID**, **Client ID** and **Client Secret** write/paste in information you saved previously
- Under Environment Name write in environment name in which you created Azure Active Directory Applications
- Click on **Login**

4. Editing existing data source in BI4 app

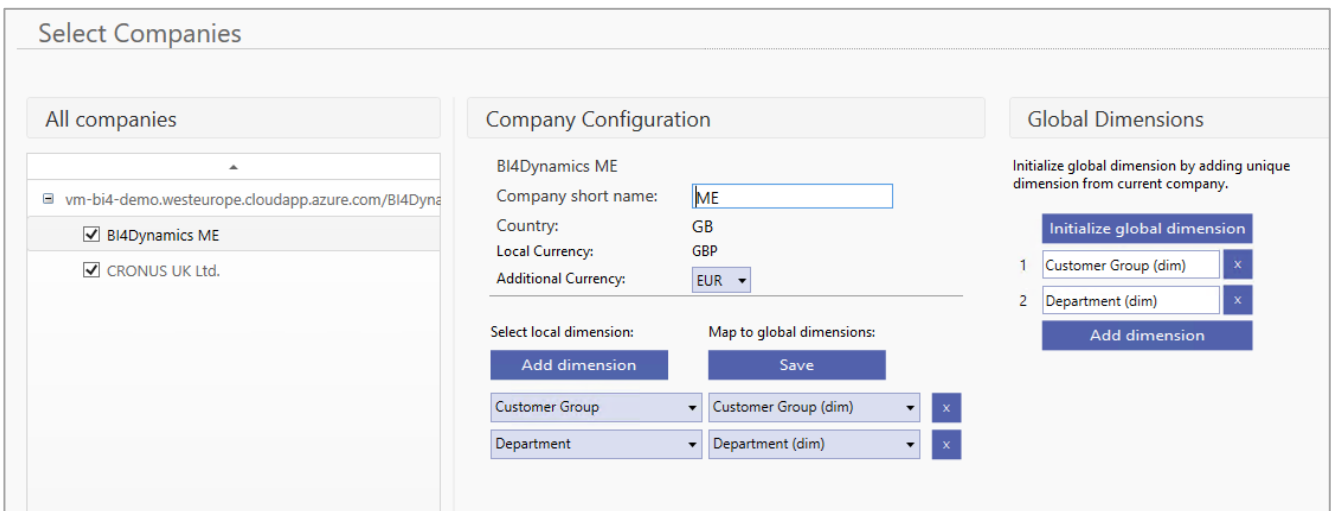
- Select data source you want edit
- Click **Edit**
- Under Token request change it to **Using client secret**
- Delete old **Client ID** and **Tenant ID**
- Under **Tenant ID**, **Client ID** and **Client Secret** write/paste in information you saved previously
- Under Environment Name write in environment name in which you created Azure Active Directory Applications
- Click on **OK**

You have successfully added data source.

Click **Next**.

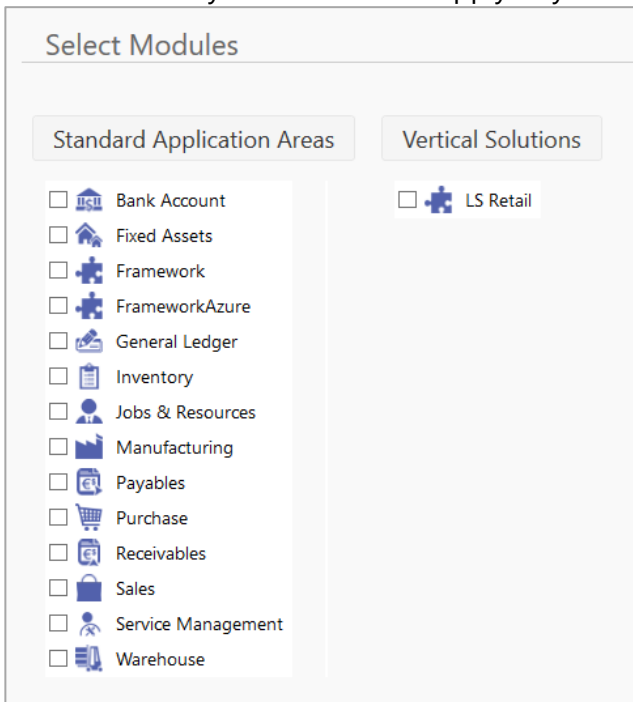
2.1.4. Step 4: Selecting Companies and Global Dimensions

1. From the list of companies **tick the ones you want to include in your instance** and configure additional settings for each selected company:
 - a. **Company short name:** User-friendly name (e.g. ME)
Country and Local Currency are read from BC (no input).
 - b. **Additional Currency:** select the additional currency for this company (e.g. USD);
Transaction values in local currency will be recalculated by exchange rate valid at transaction date to values in additional currency (ACY). There are few hundred ACY measures.
 - c. **Dimensions:**
 - i. Click **Initialize global dimensions** (delete the dimension by clicking the X button next to the dimension name if one or more dimensions will not be used in the project).
We suggest adding a prefix or suffix ("**dim**" or "**Dim**") to global dimension name, so that
 - global dimensions are easier to find in the front-end tool (Excel, Power BI) and
 - we have unique name in application (you may have global dimension "Job" which is also a standard BI4Dynamics dimension, having two with same name will cause an error).
 - ii. Click **Add dimension** to add the company dimensions and map it to corresponding global dimension. Mapping is done automatically, but you can manually change it if needed.
 - iii. Continue adding and mapping dimensions for other selected companies. Only click Initialize global dimension if there are additional dimensions that are not present in the first company.
2. Click **Next**.



2.1.5. Step 5: Selecting Modules

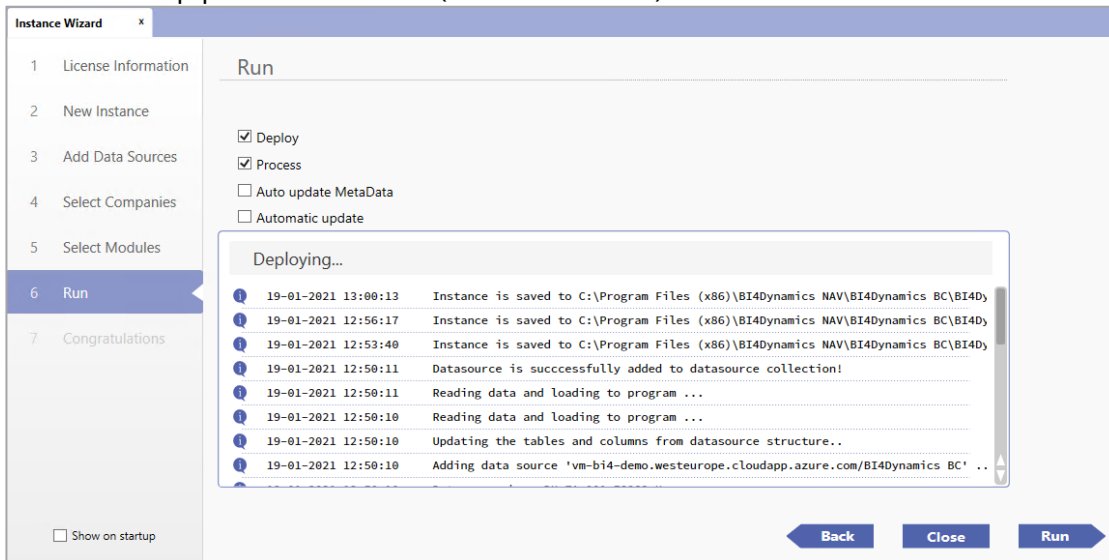
Select Modules you would like to apply to your instance:



Click **Next**.

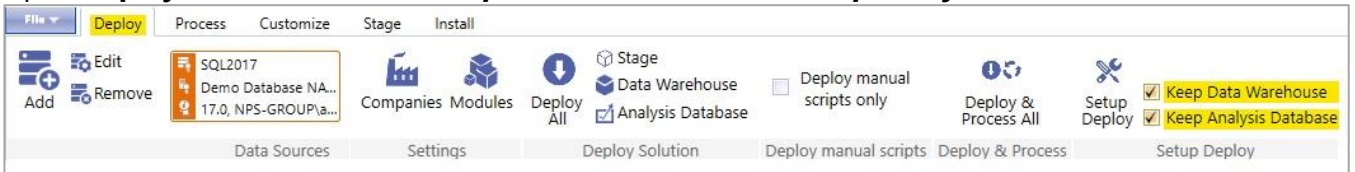
2.1.6. Step 6: Finishing the setup

In the last step please click **Close** (do not click Run)

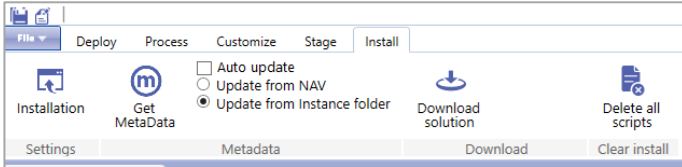


2.1.7. Step 7: Installing Data Warehouse and Analytics

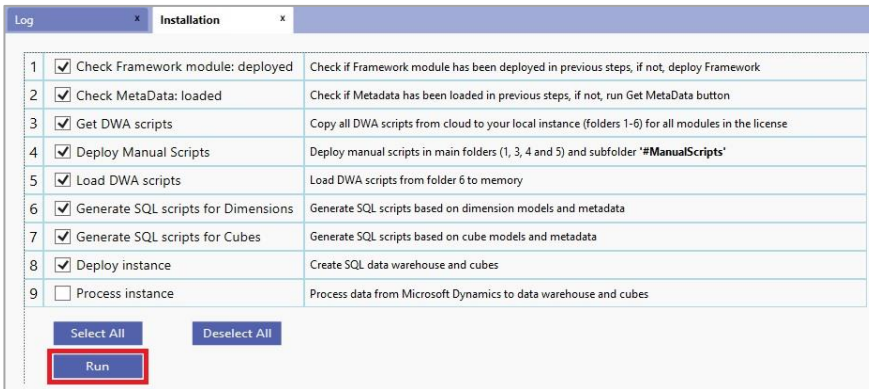
Open **Deploy** tab and make sure **Keep Data Warehouse** and **Keep Analysis Database** are checked



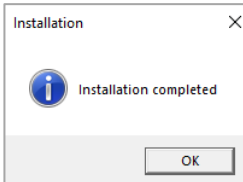
Move to **Install** tab and click **Installation** button.



On the **Installation** screen, uncheck **#9 Process Instance**, click **Run**



Wait for the **"Installation Completed"** message.

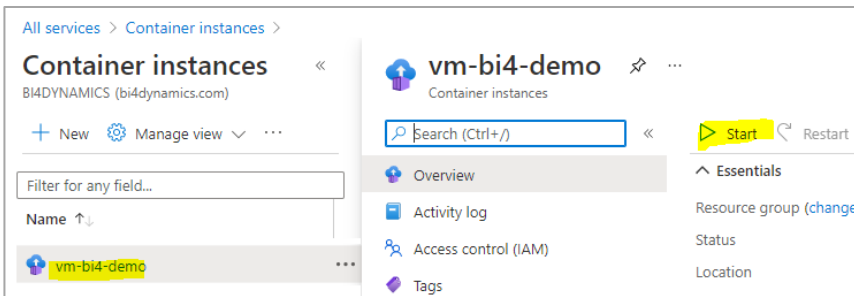


You have successfully deployed data warehouse and analytics.

2.2. Exporting data from BC to Blob Storage

We want to get table data from BC to data warehouse. The first step is to get data from BC to Blob Storage. This process is triggered by running Container instance. In installation process now, we will run the process manually, to immediately get data from BC to Blob Storage. Later, this is triggered by daily job.

Run Container Instance to export data from BC Cloud to Blob Storage (in Azure portal):

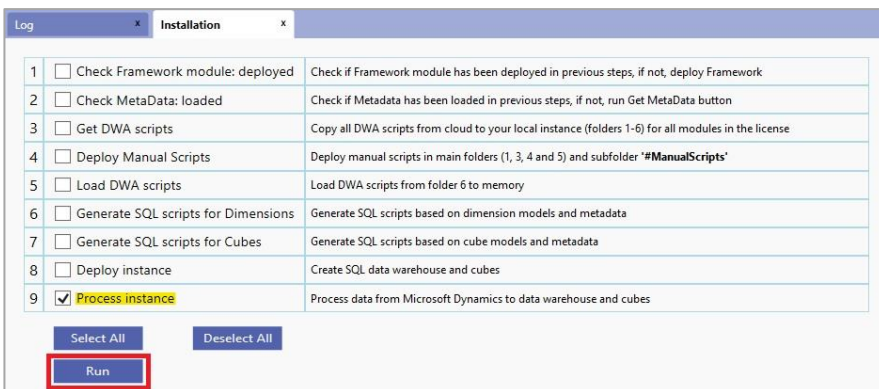


Wait until the process is finished. It can take 30 minutes for database with few million records.

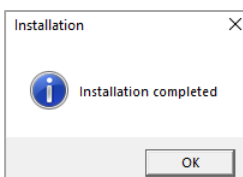
You have successfully exported data from BC to Blob Storage

2.3. Processing instance (DW and analytics)

On the **Installation** screen, please **check #9 Process Instance**, click **Run**



Wait for the **"Installation Completed"** message.



You have successfully installed data warehouse and analytics.

3. Implementation option B: Azure Analysis Services

When you choose to install analytics as Azure Analysis Services, you need to install following:

- Azure Analysis Service in Azure portal
- On-Premises Gateway on your BI server

We recommend to first install On-premises Gateway and later Azure Analysis Services as we enter parameters from on-Premises gateway to Azure Analysis Service settings.

3.1. Installing On-premises Data Gateway

On-premises data gateway is needed when connecting to Azure Analysis Service. This requires two steps:

1. Install On-Premises data gateway on local computer
2. Configure On-Premises data gateway field in Azure Analysis Services by selecting the On-Premises data gateway

3.1.1. Install On-Premises data gateway on virtual machine

Download On-Premises data gateway to virtual machine

Download On-Premises Data gateway from Microsoft site:

<https://www.microsoft.com/en-us/download/details.aspx?id=53127>

Install On-premises data gateway

Follow the documentation from Microsoft site:

<https://docs.microsoft.com/en-us/data-integration/gateway/service-gateway-install>

Note: Please be very careful when selecting the right region. Installation process will set On-Premises Gateway to your default region, that may not be the same as Azure Analysis Services. The feature is not so exposed during installation so it can easily go unnoticed.

On-premises data gateway

You are signed in as mg@bi4dynamics.com and are ready to register the gateway.

New on-premises data gateway name

Add to an existing gateway cluster [Learn more](#)

Recovery key (8 character minimum)

This key is needed to restore the gateway and can't be changed. Record it in a safe place.

Confirm recovery key

We'll use this region to connect the gateway to cloud services: North Europe **Change Region**

[Provide relay details](#) By default, Azure Relays are automatically provisioned

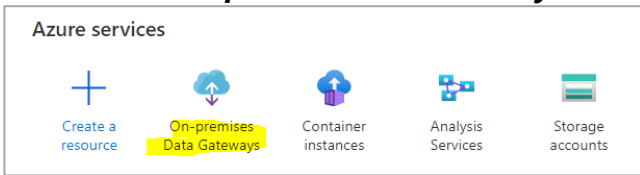
<< Back Configure

If you have set the wrong Region, and your Gateway does not appear in the available list of gateways of your Azure Analysis Services than you must re-install On-Premises data gateway.

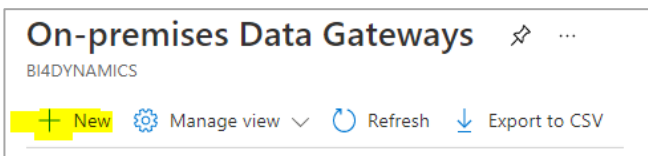
3.1.2. Setup On-premises Data Gateway as Azure Service

Go to **Azure portal**

Click on icon **On-premises Data Gateway**



Click on **+ New**



Enter all fields:

Resource name

Subscription

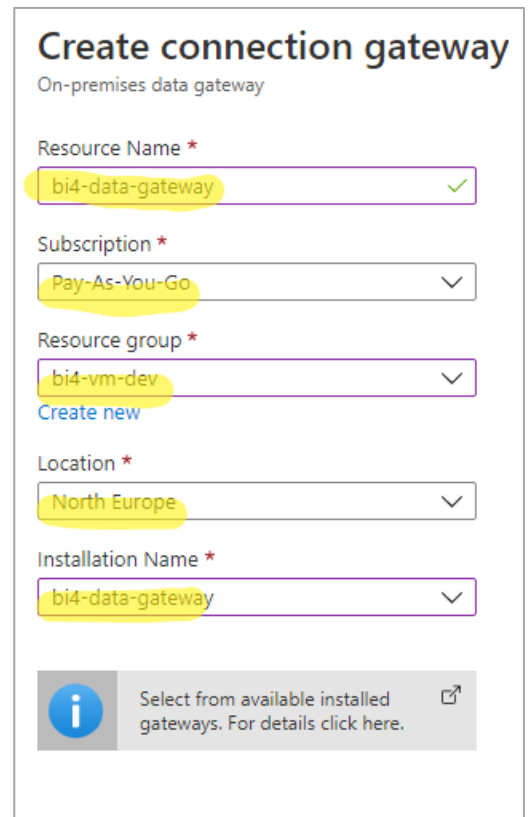
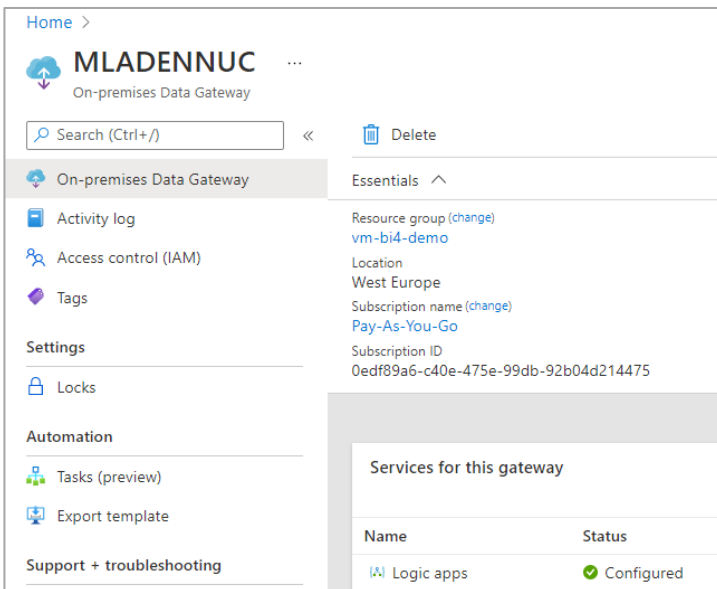
Resource group

Location

Installation name: select on-premises gateway that you have created in previous step from the list of available gateways

Then click **Create**

Click **Go to Resource:**



You have successfully created an On-premises Data Gateway as Azure Service.

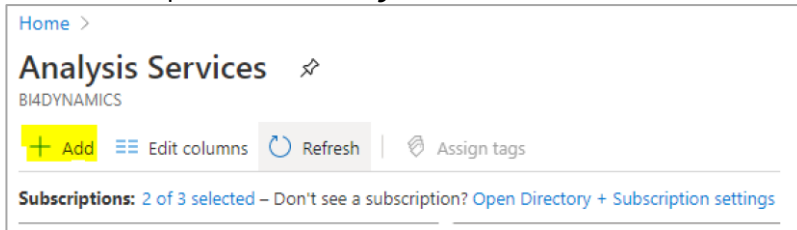
On-premises Data Gateway must be selected on Azure Service like Azure Analysis Services that will use this gateway to receive On-premises data.

3.2. Installing Azure Analysis Services

3.2.1. Create Azure Analysis Services

Before installing BI4Dynamics app you need to have available Azure Analysis Services that will host BI4Dynamics database.

Go to Azure portal, find **Analysis Services** and click **+Add**



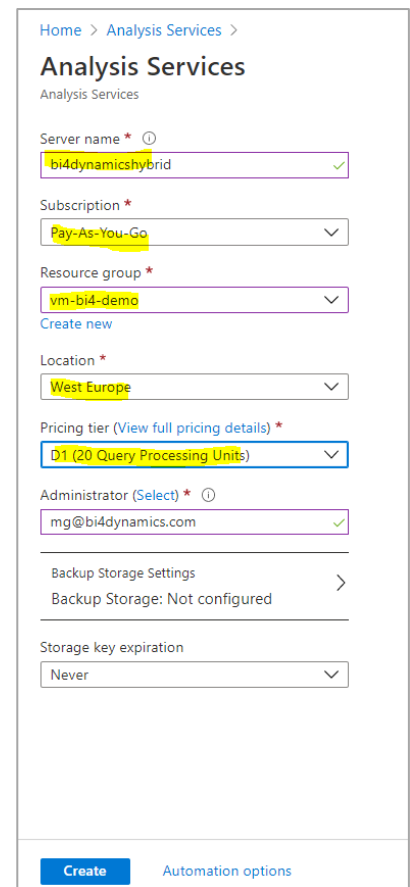
Enter the following fields:

- **Server name**: unique name of Analysis Server
- **Subscription**
- **Resource group**
- **Location**
- **Pricing tier**

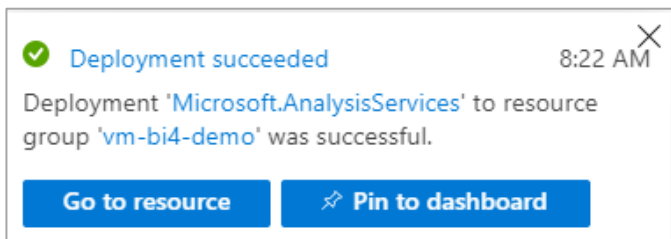
Database size (GB) will depend on data type, cardinality, and number of rows in your data warehouse

QPUS (number of processing units) will depend on database size and number of users that will query the data

Suggestion: start with lower tier, check if data can fit into database and if response time from your BI tool (Excel or Power BI) is good enough. If not, go for higher tier. It takes 60 seconds to change tier to next level.

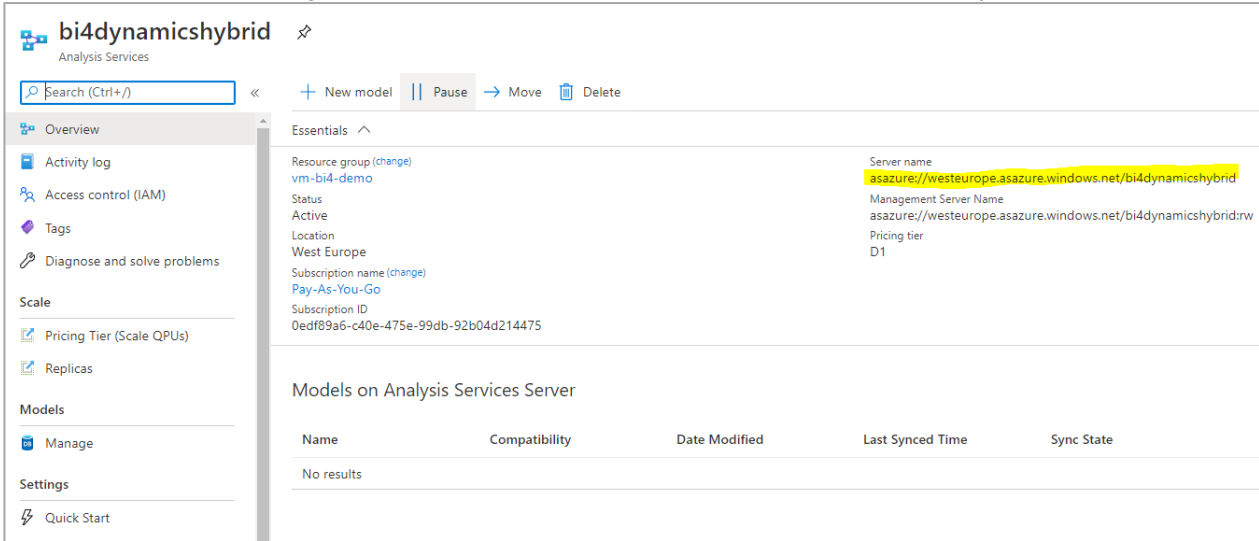


Click **Create**



You have successfully created Azure Analysis Services

Go to resource and **copy Server name** to notepad as it will be used in BI4Dynamics app installation.



In our example server name is: **asazure://westeurope.asazure.windows.net/bi4dynamicshybrid**

3.2.2. Connect to Azure Analysis Services

To verify installation, connect to **Analysis Services Server** use **SSMS** (SQL Server Management Studio) and enter:

Server Type: Analysis Services

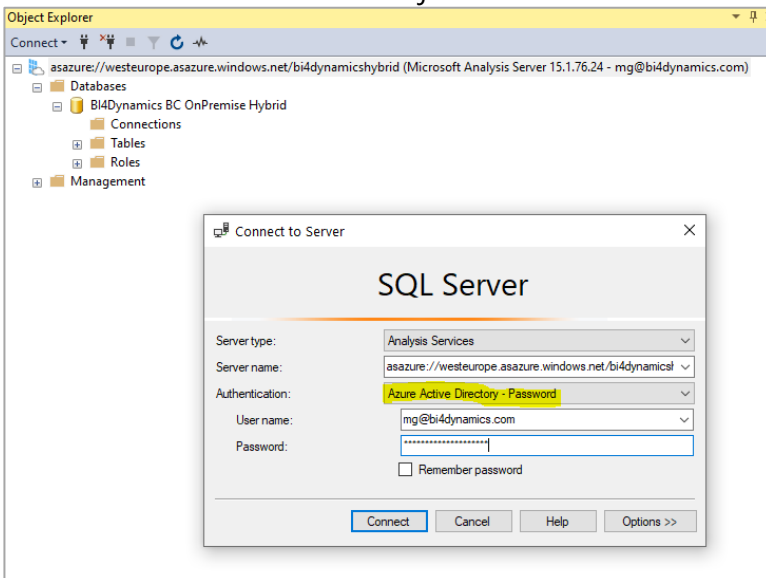
Server name

Authentication: Azure Active Directory

Username

Password

Here is a database that we have just created:

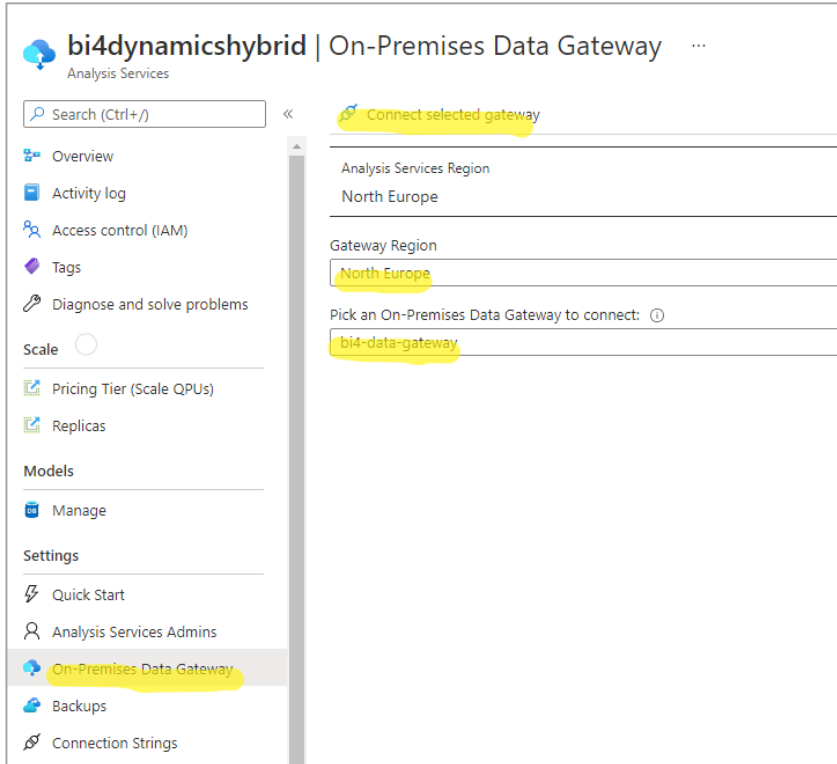


3.2.3. Select On-Premises Data Gateway

On-Premises Data Gateway is needed when Azure Service received data from On-Premises. When Azure Analysis Services is receiving data from On-Premises source than this option must be selected.

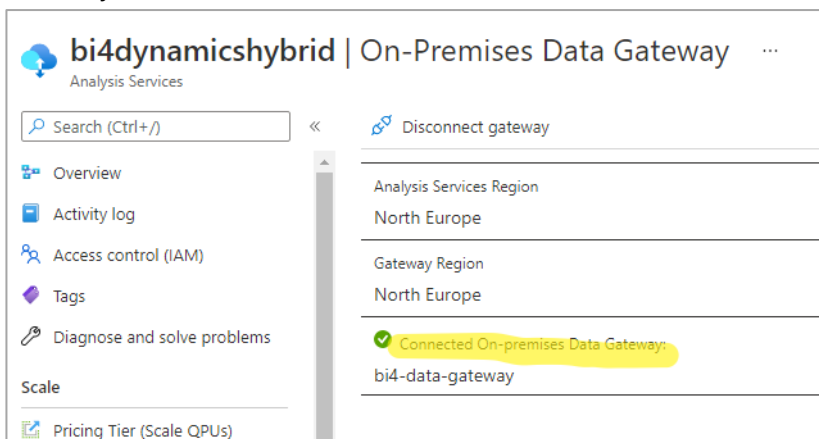
Click on **On-premises data gateway**

And **Pick an On-Premises Data Gateway to connect**



Click **Connect selected gateway**.

Gateway is now connected:



3.3. Creating Instance

3.3.1. Step 1: Create a new instance

Instance properties	
Source is BC Cloud (SaaS):	<input checked="" type="checkbox"/>
Instance Name:	BI4Dynamics BC OnPremise
Language:	English (United States)
SQL Server	
Database Name:	BI4Dynamics BC OnPremise Hybrid
SQL Server Name:	MLADENNUC\BC
Authentication:	Windows
Username:	NPS-GROUP\mgvozden
Password:
Analysis Services	
Analysis Database Name:	BI4Dynamics BC OnPremise Hybrid
Analysis Server Name:	asazure://westeurope.asazure.wir
Authentication:	Azure Active Directory
Username:	mg@bi4dynamics.com
Password:
Analysis Server Option:	Tabular
Mode type:	Import

Instance properties

1. Check the **Source is BC Cloud** checkbox.
2. Type the **Name** of the new instance.
3. Select what **Language** the solution will be deployed in

SQL server

As we are moving Analytics to Azure, we also need to move credential information to Azure Analysis Services. Authentication for SQL server will be saved to Azure Analysis Services string connection as Account impersonation.

When choosing Azure Active Directory in Analysis Services setup, a new Authentication window will open for SQL Server. Please enter:

- **Username:** same user in **DOMAIN\adminuser** format
- **Password:** password for this user

Analysis Services

- Check the **Source is BC Cloud** checkbox.
- **Analysis Server name:** enter the name of the Azure Analysis Services
Authentication: Azure Active Directory
Username: email of the admin user ([adminuser@domain.com](#)) that has been entered when creating Azure Analysis Services
Password: enter password for Azure Active Directory

3.3.2. Step 2: Test installed resources

This is the current setting on the form, and we continue with installation:

Integration Services

Check **SQL Integration Service** to process BI4Dynamics using the Integration services (parallel processing).

Refresh

Click **Refresh** to set default values for **SQL Database file Locations** (data and log files) and **SQL Database Collation** are entered automatically. Modify if necessary.

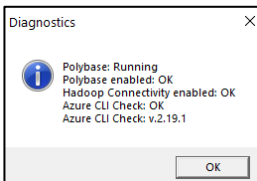
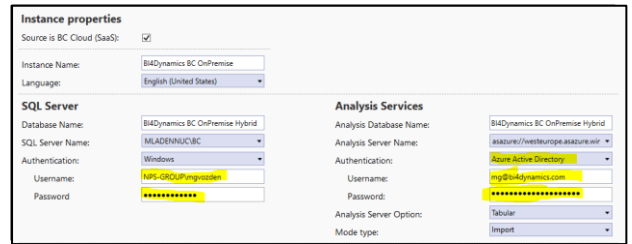
Test

Please note that

- **VM** is for installation on of Azure SQL VM
- **Local** is for local server installation

We are testing more resources on **VM** than on **Local**.

Click **VM** or **Local** to test resources that must be installed on VM or Local Machine to proceed with BC installation. Diagnostics message should confirm that all resources are available, set and running. In case any of these shows ERROR, stop BC installation and fix the reported service error. This should be the message:



Continue and click **Refresh** to update file locations
Click **Next**.

3.3.3. Step 3: Add Data Source

Azure Storage Information

This information is about **Azure Storage Account** that will be used to keep BC data. The values have been created during VM installation and are listed as a prerequisite for BC application installation.

1. Type **Subscription** that is used for Storage Account
2. Type Virtual Machine Resource Group as **VM Resource Group**
3. Type **Storage Account Name**
4. Type **Container Name** (this resource should not be confused for Container instance aka Docker, that is another Azure resource, used for exporting tables to Storage Account)
5. Type **Blob Key**

Click **Test** to check if the entered information is correct.

<ol style="list-style-type: none"> 1 License Information 2 New Instance <li style="background-color: #4a7ebb; color: white;">3 Add Data Sources 4 Select Companies 5 Select Modules 6 Run 7 Congratulations 	<h4 style="text-align: center;">Add Data Sources</h4> <p>Add all NAV source databases you wish to analyze in BI4Dynamics to your BI4Dynamics instance.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> <h5 style="text-align: center; margin: 0;">Azure Storage Information</h5> </div> <p>Subscription: <input type="text" value="Pay-As-You-Go"/></p> <p>VM Resource Group: <input type="text" value="vm-bi4-demo"/></p> <p>Storage Account Name: <input type="text" value="vmbi4demostorageaccount"/></p> <p>Container Name: <input type="text" value="vmbi4democontainer"/></p> <p>Blob Key: <input type="text" value="Ss04Gr1dCLgciaxFY0AGOa1hFgyFVp8"/></p> <p>Test Storage Credentials: <input type="button" value="Test"/></p>
--	---

Add Business Central

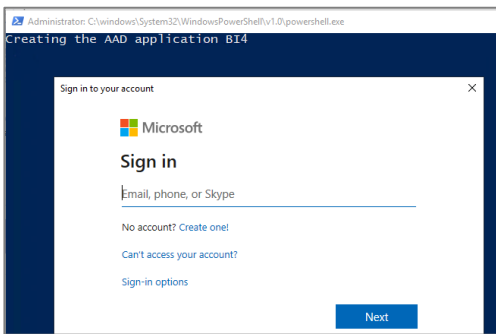
As a next step, we need to provide **Data Source Information**. There are 2 options to do it:

- *Option 1: Using email and password.*
- *Option 2: Using client secret.*

Option 1: Using email and password

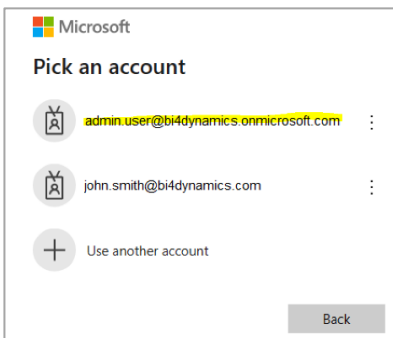
In this option, the data will be accessed through **BC Admin Credentials**.

4. Click **Login** and a new window will open up:

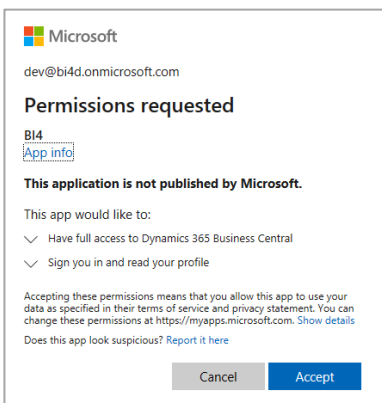


5. Insert **BC Admin Credentials**

After entering the credentials wait 15 seconds to sign in again. In this process, BC admin will allow BI4Dynamics application to access BC data. Enter **BC admin** credentials (sometimes, account login does not work correctly, in such case use option **Use another account** and enter the same **BC admin** account credentials):



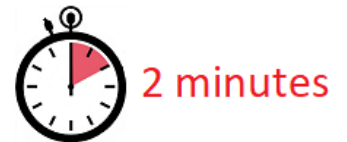
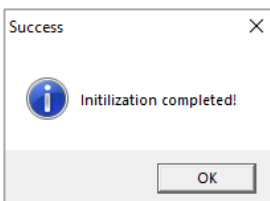
New window will pop-up:



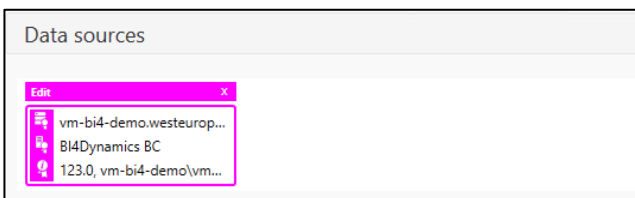
Click **Accept**.

Application will automatically fill-in **BC Tenant ID** and **App Registration Client ID**:
 (You can enter this information if you have it from previous process without login process)

6. Select **BC environment** and click **Initialize Data Lake**.



After Initializing click **Add** to add the selected data source and wait...
 Your screen should look like this:



You have successfully added data source

Click **Next**.

Option 2: Using client secret

In this option, we need to create App Registration on Microsoft Azure and link it in Business Central.

5. Create App registration in Microsoft Azure

- a. In Microsoft Azure search for App registrations
- b. Click on New registrations
- c. Under Name type in any name of an app registration
- d. Under Redirect URI select public client/native
- e. Click Register

Home > App registrations >

Register an application

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

BI4Dynamics app registration ✓

Supported account types
Who can use this application or access this API?

- Accounts in this organizational directory only (BI4Dynamics 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)
- Personal Microsoft accounts only

[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.

Public client/native (mobile ...) e.g. myapp://auth ✓

Register an app you're working on here. Integrate gallery apps and other apps from outside your organization by adding from [Enterprise applications](#).

By proceeding, you agree to the [Microsoft Platform Policies](#)

Register

Home > App registrations >

BI4Dynamics app registration

Search << Delete Endpoints Preview features

- Overview
- Quickstart
- Integration assistant

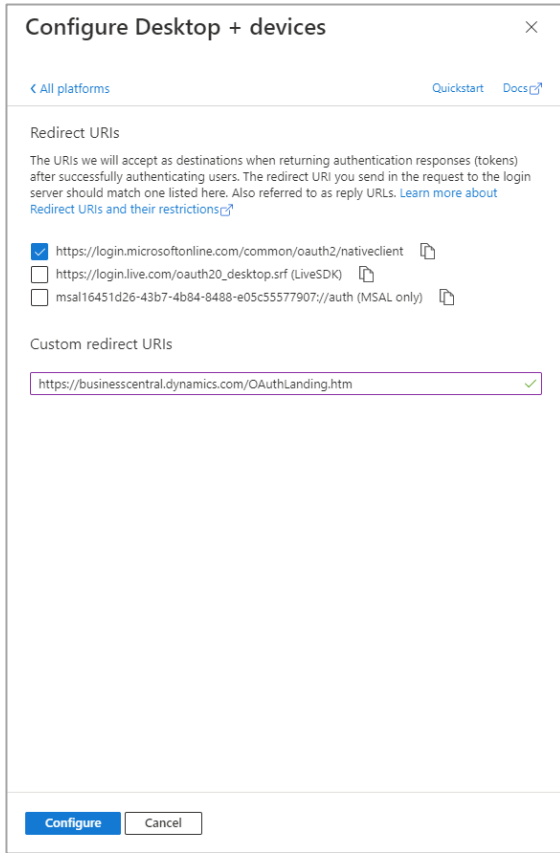
Manage

- Branding & properties
- Authentication

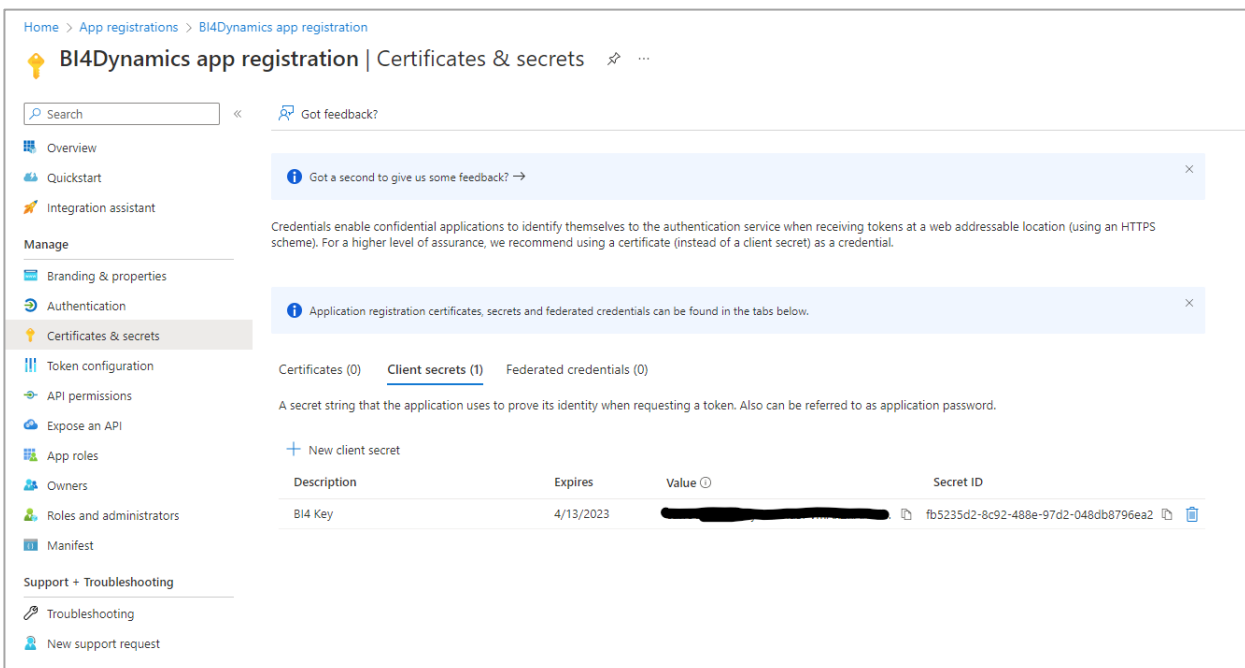
Essentials

- Display name : [BI4Dynamics app registration](#)
- Application (client) ID : [Redacted]
- Object ID : a71628b0-7a99-4e92-a214-80c2dadd70e1
- Directory (tenant) ID : [Redacted]
- Supported account types : [My organization only](#)

- f. Copy and save **Application (client) ID** as **Client ID** and **Directory (tenant) ID** as **Tenant ID**
- g. Under **Redirect URIs** click on **Add a Redirect URI**
- h. Click **Add a platform**
- i. Under **Mobile and desktop applications** select **Mobile and desktop applications**



- j. Check **https://login.microsoftonline.com/common/oauth2/nativeclient** and under Custom redirect URIs write **https://businesscentral.dynamics.com/OAuthLanding.htm**
- k. Click **Configure**



- l. Under Manage select **Certificates & secrets**
- m. Click on **New client secret**
- n. Under **Description** write any name
- o. Under **Expires** select any expiration date/month
- p. Click on **Add**
- q. Copy value under **Value** and store it somewhere safe as **Client Secret**
- r. Under **Manage** select **API permissions**
- s. Click on **Add a permission**
- t. Select **Dynamics 365 Business Central**
- u. Under **Delegated permissions** select **User Impersonation** and **Financials.ReadWrite.All**
- v. Under **Application permissions** select **app_access**, **API.ReadWrite.All** and **Automation.ReadWrite.All**
- w. Click on **Add permissions**
- x. Click on **Grand admin consent**

Configured permissions

Applications are authorized to call APIs when they are granted permissions by users/admins as part of the consent process. The list of configured permissions should include all the permissions the application needs. [Learn more about permissions and consent](#)

+ Add a permission ✓ Grant admin consent for BI4Dynamics

API / Permissions name	Type	Description	Admin consent requ...	Status
▼ Dynamics 365 Business Central (5) ***				
API.ReadWrite.All	Application	Full access to web services API	Yes	✓ Granted for BI4Dynamics ***
app_access	Application	Access according to the application's permissions in Dyna...	Yes	✓ Granted for BI4Dynamics ***
Automation.ReadWrite.All	Application	Full access to automation	Yes	✓ Granted for BI4Dynamics ***
Financials.ReadWrite.All	Delegated	Access Dynamics 365 Business Central as the signed-in user	No	✓ Granted for BI4Dynamics ***
user_impersonation	Delegated	Access as the signed-in user	No	✓ Granted for BI4Dynamics ***
▼ Microsoft Graph (1) ***				
User.Read	Delegated	Sign in and read user profile	No	✓ Granted for BI4Dynamics ***

6. Link app registration in Business Central

- a. Login into environment you want to use
- b. In BC search for **Azure Active Directory Applications**
- c. Click on **New**
- d. Under **Client ID** paste Client ID from app registration
- e. Under **Description** type in any name
- f. Under **State** select **Enabled**
- g. Under **User Groups** add **D365 EXTENSION MGT** and **D365 FULL ACCESS**
- h. Under **Company Name** delete company name
- i. Click **Grant Consent**
- j. Sign in with your account and click **Accept**

The screenshot shows the 'Azure Active Directory Application Card' for an application named 'BI4Dynamics Demo'. The card is titled 'Grant Consent' and is divided into several sections:

- General:** Contains fields for Client ID, Description, State, Contact Information, Extension, App ID, App Name, User information, User ID, and User Name.
- User Groups:** A table listing user groups with columns for Code, Name, and Company Name.
- User Permission Sets:** A table listing permission sets with columns for Permission Set, Description, Company, and Extension Name.

General	
Client ID	{16451d26-43b7-4b84-8488-e...}
Description	BI4Dynamics Demo
State	Enabled
Contact Information	
Extension	
App ID	{00000000-0000-0000-0000-00...}
App Name	
User information	
User ID	{b19584ff-f11d-4a24-a145-505...}
User Name	BI4DYNAMICS DEMO

User Groups		
Code ↑	Name	Company Name ↑
D365 EXTENSION MGT	Dynamics 365 Extension management	
→ D365.FULL.ACCESS	Dynamics 365 Full access	

User Permission Sets			
Permission Set ↑	Description	Company ↑	Extension Name
D365 BASIC	Dynamics 365 Basic access		Base Application

7. Adding new data source in BI4 app

- Under Token request select **Using client secret** if it's not selected
- Under **Tenant ID, Client ID** and **Client Secret** write/paste in information you saved previously
- Under Environment Name write in environment name in which you created Azure Active Directory Applications
- Click on **Login**

8. Editing existing data source in BI4 app

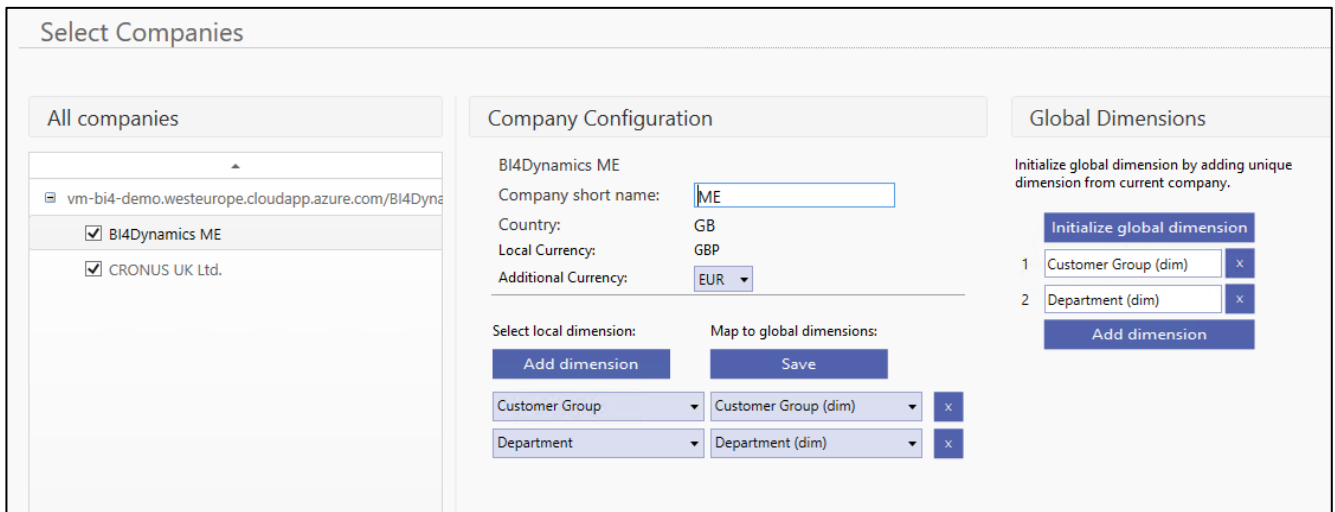
- Select data source you want edit
- Click **Edit**
- Under Token request change it to **Using client secret**
- Delete old **Client ID** and **Tenant ID**
- Under **Tenant ID, Client ID** and **Client Secret** write/paste in information you saved previously
- Under Environment Name write in environment name in which you created Azure Active Directory Applications
- Click on **OK**

You have successfully added data source.

Click **Next**.

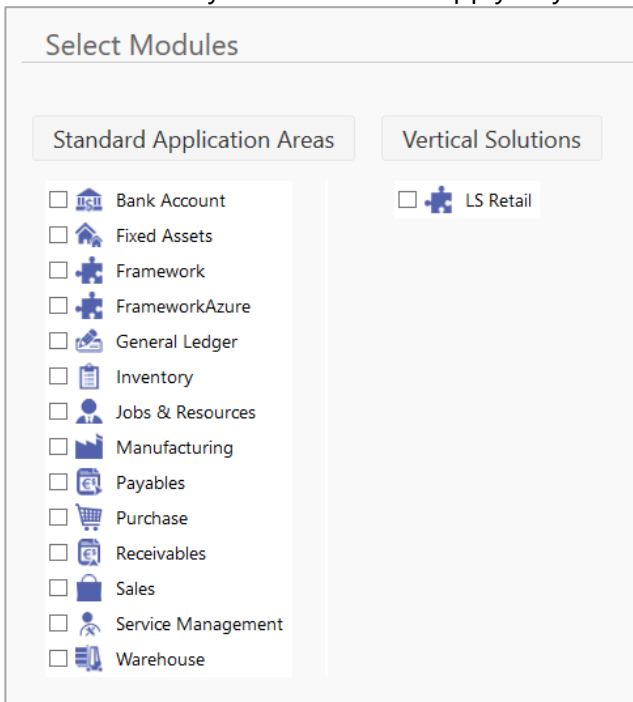
3.3.4. Step 4: Selecting Companies and Global Dimensions

3. From the list of companies **tick the ones you want to include in your instance** and configure additional settings for each selected company:
 - a. **Company short name:** User-friendly name (e.g. ME)
Country and Local Currency are read from BC (no input).
 - b. **Additional Currency:** select the additional currency for this company (e.g. USD);
Transaction values in local currency will be recalculated by exchange rate valid at transaction date to values in additional currency (ACY). There are few hundred ACY measures.
 - c. **Dimensions:**
 - i. Click **Initialize global dimensions** (delete the dimension by clicking the X button next to the dimension name if one or more dimensions will not be used in the project).
We suggest adding a prefix or suffix ("**dim**" or "**Dim**") to global dimension name, so that
 - global dimensions are easier to find in the front-end tool (Excel, Power BI) and
 - we have unique name in application (you may have global dimension "Job" which is also a standard BI4Dynamics dimension, having two with same name will cause an error).
 - ii. Click **Add dimension** to add the company dimensions and map it to corresponding global dimension. Mapping is done automatically, but you can manually change it if needed.
Delete the dimension by clicking the X button next to the dimension name
 - iii. Continue adding and mapping dimensions for other selected companies. Only click Initialize global dimension if there are additional dimensions that are not present in the first company.
4. Click **Next**.



3.3.5. Step 5: Selecting Modules

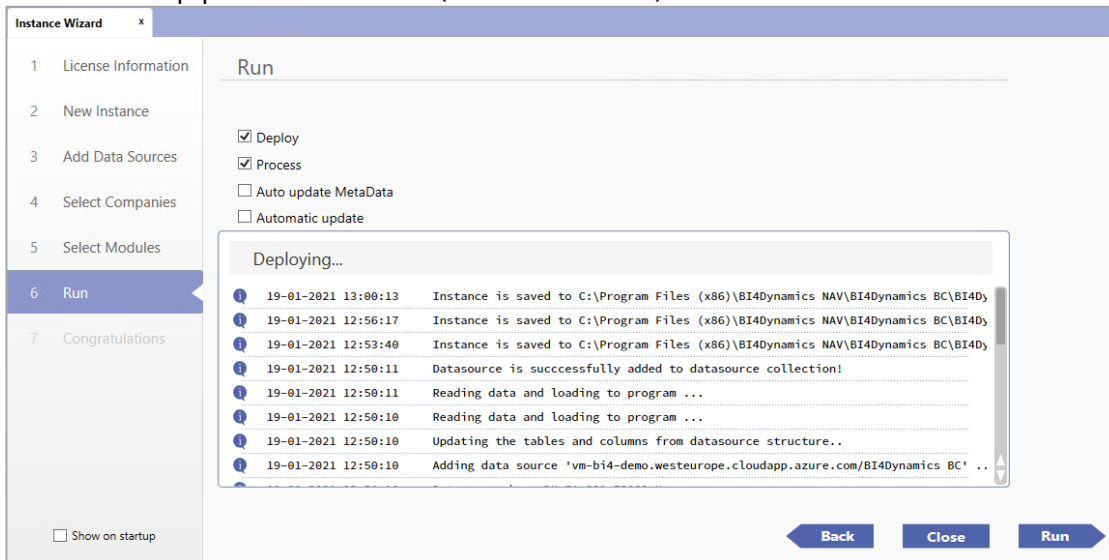
Select Modules you would like to apply to your instance:



Click **Next**.

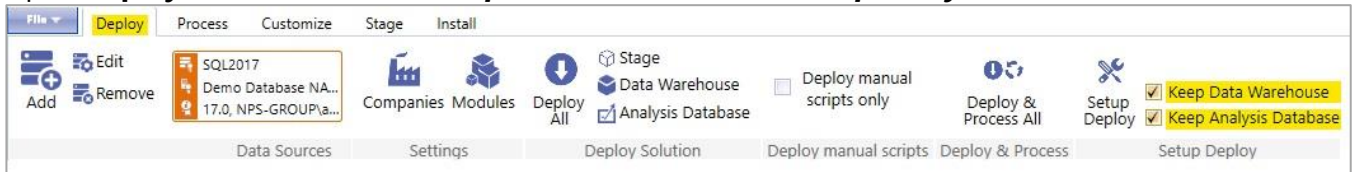
3.3.6. Step 6: Finishing the setup

In the last step please click **Close** (do not click Run)

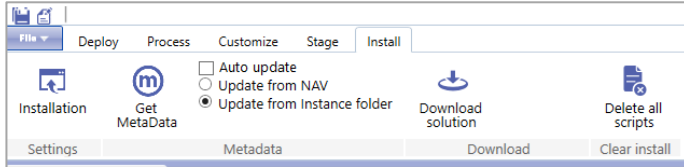


3.3.7. Step 7: Installing Data Warehouse and Analytics

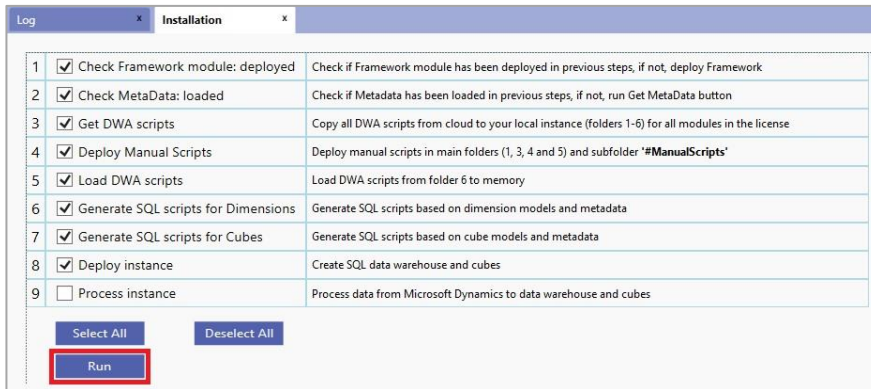
Open **Deploy** tab and make sure **Keep Data Warehouse** and **Keep Analysis Database** are checked



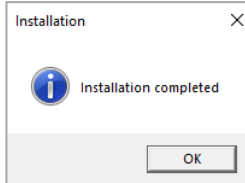
Move to **Install** tab and click **Installation** button.



On the **Installation** screen, uncheck **#9 Process Instance**, click **Run**



Wait for the **“Installation Completed”** message.

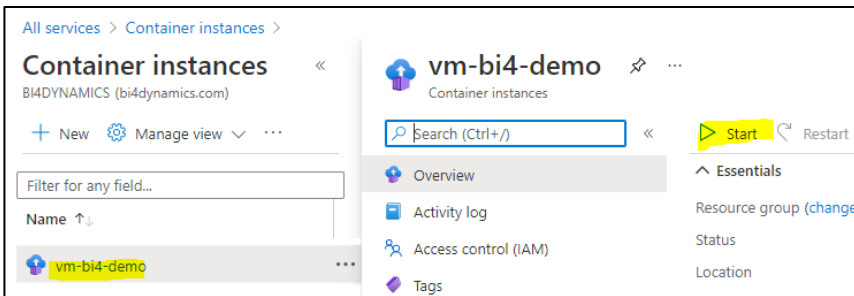


You have successfully deployed data warehouse and analytics.

3.4. Exporting data from BC to Blob Storage

We want to get table data from BC to data warehouse. The first step is to get data from BC to Blob Storage. This process is triggered by running Container instance. In installation process now, we will run the process manually, to immediately get data from BC to Blob Storage. Later, this is triggered by daily job.

Run Container Instance to export data from BC Cloud to Blob Storage (in Azure portal):

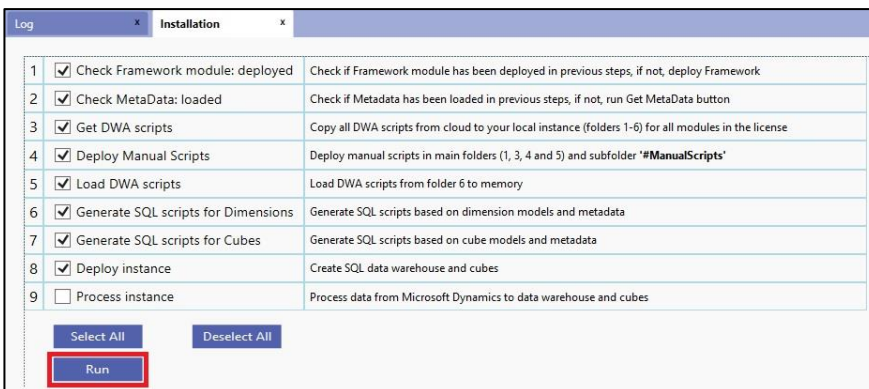


Wait until the process is finished. It can take 30 minutes for database with few million records.

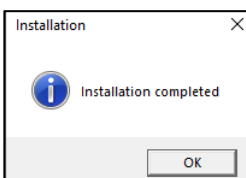
You have successfully exported data from BC to Blob Storage

3.5. Processing instance (DW and analytics)

On the **Installation** screen, please **check #9 Process Instance**, click **Run**



Wait for the **"Installation Completed"** message.



You have successfully installed data warehouse and analytics.

4. Implementation option C: Power BI Premium

4.1. Installing On-premises Data Gateway

Download On-Premises data gateway to virtual machine

Download On-Premises Data gateway from Microsoft site:

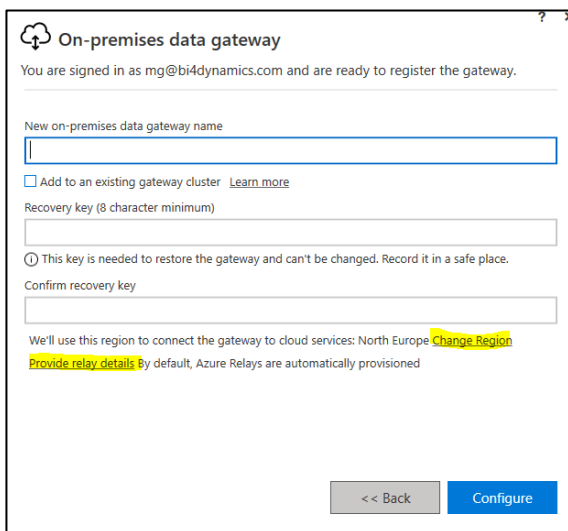
<https://www.microsoft.com/en-us/download/details.aspx?id=53127>

Install On-premises data gateway

Follow the documentation from Microsoft site:

<https://docs.microsoft.com/en-us/data-integration/gateway/service-gateway-install>

Note: Please be very careful when selecting the right region. Installation process will set On-Premises Gateway to your default region that may not be the same as Azure Analysis Services. The feature is not so exposed during installation so it can easily go unnoticed.

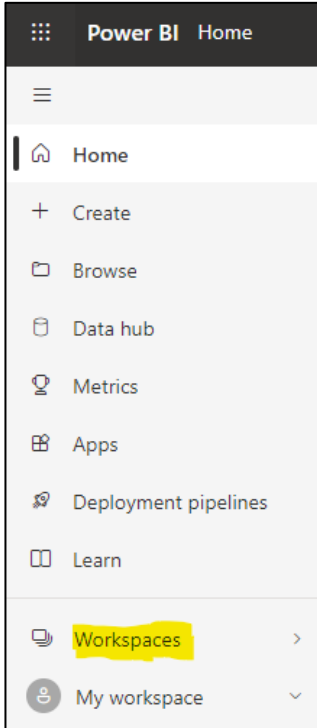


The screenshot shows the 'On-premises data gateway' configuration window. At the top, it says 'On-premises data gateway' with a cloud icon and a question mark. Below that, it states 'You are signed in as mg@bi4dynamics.com and are ready to register the gateway.' There are several input fields: 'New on-premises data gateway name' (empty), 'Recovery key (8 character minimum)' (empty), and 'Confirm recovery key' (empty). There is a checkbox for 'Add to an existing gateway cluster' with a 'Learn more' link. Below the recovery key fields, there is a note: 'We'll use this region to connect the gateway to cloud services: North Europe Change Region'. A link 'Provide relay details' is also present. At the bottom, there are two buttons: '<< Back' and 'Configure'.

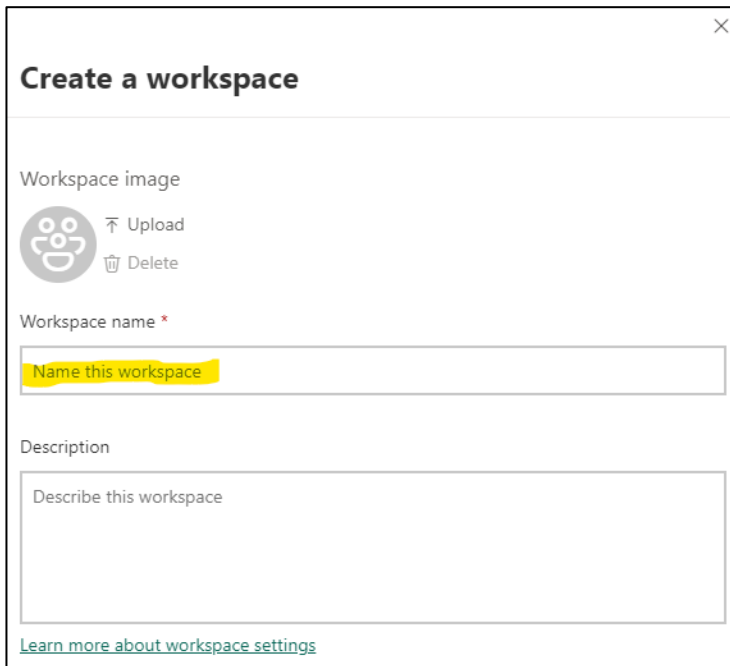
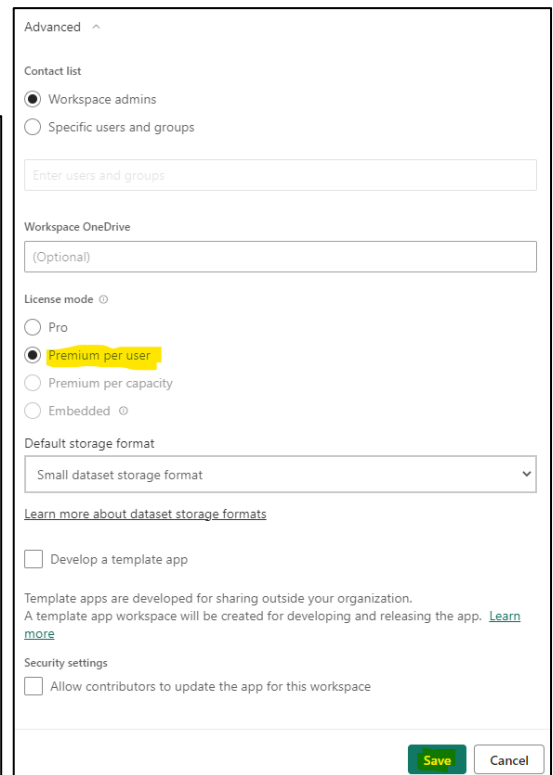
If you have set the wrong Region, and your Gateway does not appear in the available list of gateways of your Azure Analysis Services than you must re-install On-Premises data gateway.

4.2. Creating Power BI workspace

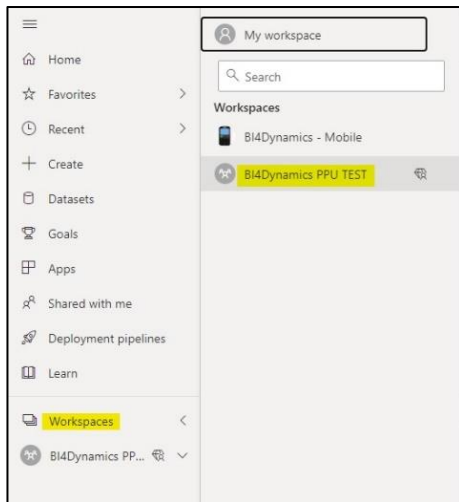
1. Open Power BI portal, press **Workspaces** and *click on **Create a workspace***.



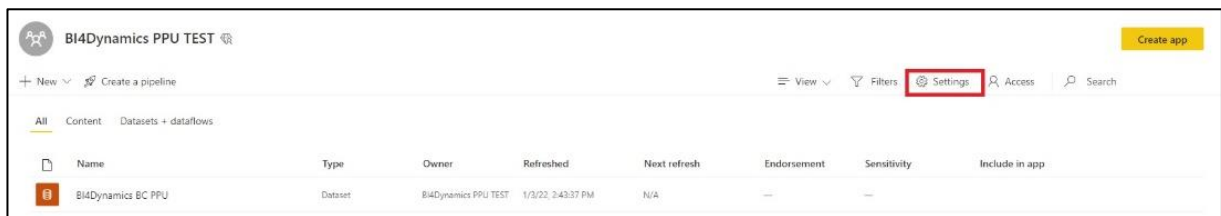
2. Name the workspace and select **Premium per user** under License mode.

A screenshot of the 'Create a workspace' dialog box. The dialog has a title bar with a close button. The main content area is titled 'Create a workspace'. It contains several sections: 'Workspace image' with an upload and delete icon; 'Workspace name' with a text input field containing 'Name this workspace'; 'Description' with a text area containing 'Describe this workspace'; and a link 'Learn more about workspace settings' at the bottom left.A screenshot of the 'Advanced' settings panel for workspace creation. The panel is titled 'Advanced' and has a dropdown arrow. It contains several sections: 'Contact list' with radio buttons for 'Workspace admins' (selected) and 'Specific users and groups'; a text input field for 'Enter users and groups'; 'Workspace OneDrive' with a text input field containing '(Optional)'; 'License mode' with radio buttons for 'Pro', 'Premium per user' (selected and highlighted), 'Premium per capacity', and 'Embedded'; 'Default storage format' with a dropdown menu set to 'Small dataset storage format'; a link 'Learn more about dataset storage formats'; a checkbox for 'Develop a template app'; a note about template apps; and 'Security settings' with a checkbox for 'Allow contributors to update the app for this workspace'. At the bottom right, there are 'Save' and 'Cancel' buttons.

3. Navigate to your Workspace

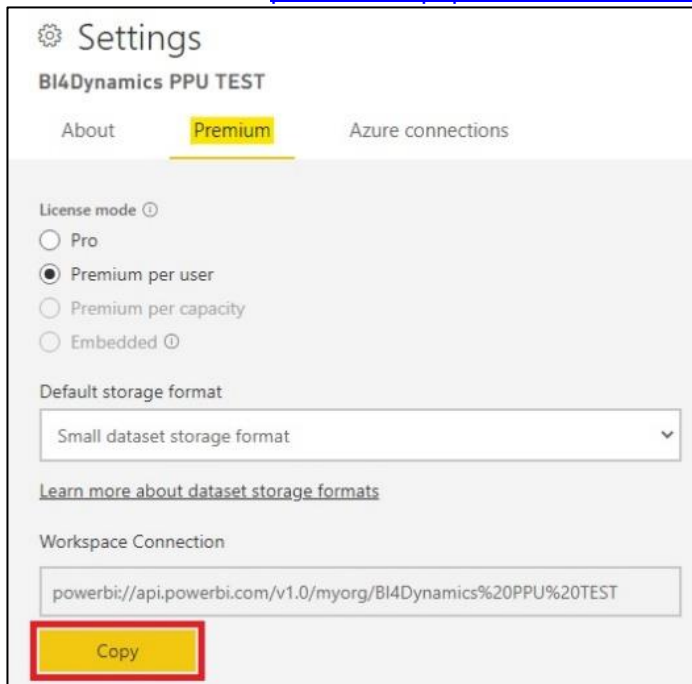


4. Press Settings button

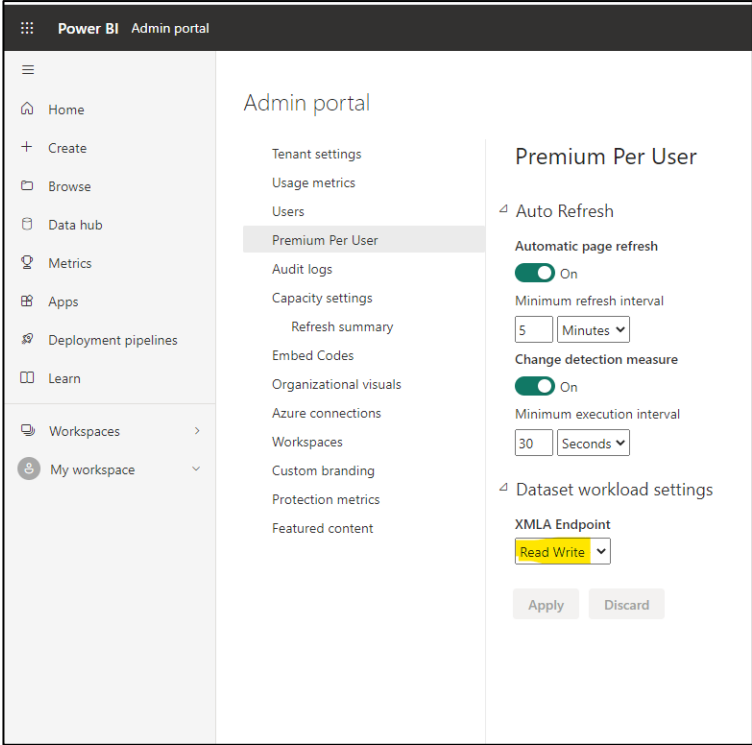


5. Select Premium tab and Premium per user option and copy Workspace Connection.

Link should look like that: powerbi://api.powerbi.com/v1.0/myorg/BI4Dynamics%20PPU%20TEST



6. Go to **Amin Portal**, select **Premium per User** and set **XMLA Endpoint** as **Read Write** (By default, it is set as only Read).



4.3. Creating Instance

4.3.1. Step 1: Create a new instance

Instance properties

1. Check the **Source is BC Cloud** checkbox.
2. Type the **Name** of the new instance.
3. Select what **Language** the solution will be deployed in

SQL server

- **SQL Server Name:** name of the server DW will be installed on
- **Authentication:** Windows

Analysis Services

- Check the **Source is BC Cloud** checkbox.
- **Analysis Server Option:** Power BI (XMLA endpoint)
- **Workspace:** connection link to the Power BI workspace that you have created in the previous steps
- **Authentication:** Azure Active Directory
- **Username:** Power BI Premium user email (adminuser@domain.com)
- **Password:** password for Azure Active Directory

4.3.2. Step 2: Test installed resources

This is the current setting on the form, and we continue with installation:

Integration Services

Check **SQL Integration Service** to process BI4Dynamics using the Integration services (parallel processing).

Refresh

Click **Refresh** to set default values for **SQL Database file Locations** (data and log files) and **SQL Database Collation** are entered automatically. Modify if necessary.

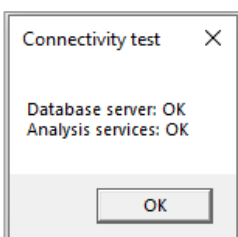
Test

Please note that:

- **VM** is for installation on of Azure SQL VM
- **Local** is for local server installation

We are testing more resources on **VM** than on **Local**.

Click **VM** or **Local** to test resources that must be installed on VM or Local Machine to proceed with BC installation. Diagnostics message should confirm that all resources are available, set and running. In case any of these shows ERROR, stop BC installation and fix the reported service error. This should be the message:



Continue and click **Refresh** to update file locations

Click **Next**.

4.3.3. Step 3: Add Data Source

Azure Storage Information

This information is about **Azure Storage Account** that will be used to keep BC data. The values have been created during VM installation and are listed as a prerequisite for BC application installation.

1. Type **Subscription** that is used for Storage Account
2. Type Virtual Machine Resource Group as **VM Resource Group**
3. Type **Storage Account Name**
4. Type **Container Name** (this resource should not be confused for Container instance aka Docker, that is another Azure resource, used for exporting tables to Storage Account)
5. Type **Blob Key**

Click **Test** to check if the entered information is correct.

<ol style="list-style-type: none"> 1 License Information 2 New Instance <li style="background-color: #4a7ebb; color: white;">3 Add Data Sources 4 Select Companies 5 Select Modules 6 Run 7 Congratulations 	<h4 style="text-align: center;">Add Data Sources</h4> <p style="text-align: center;">Add all NAV source databases you wish to analyze in BI4Dynamics to your BI4Dynamics instance.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-bottom: 10px;"> <p style="text-align: center;">Azure Storage Information</p> </div> <p>Subscription: <input type="text" value="Pay-As-You-Go"/></p> <p>VM Resource Group: <input type="text" value="vm-bi4-demo"/></p> <p>Storage Account Name: <input type="text" value="vmbi4demostorageaccount"/></p> <p>Container Name: <input type="text" value="vmbi4democontainer"/></p> <p>Blob Key: <input type="text" value="Ss04Gr1dCLgciaxFY0AGOa1hFgyFVp8"/></p> <p>Test Storage Credentials: <input type="button" value="Test"/></p>
--	--

Add Business Central

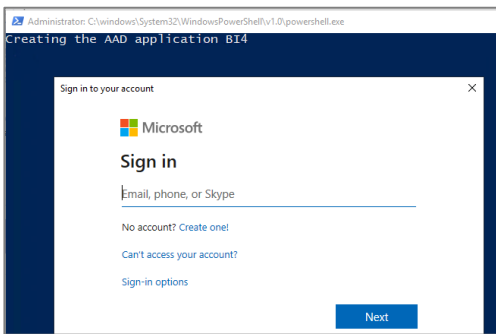
As a next step, we need to provide **Data Source Information**. There are 2 options to do it:

- *Option 1: Using email and password.*
- *Option 2: Using client secret.*

Option 1: Using email and password

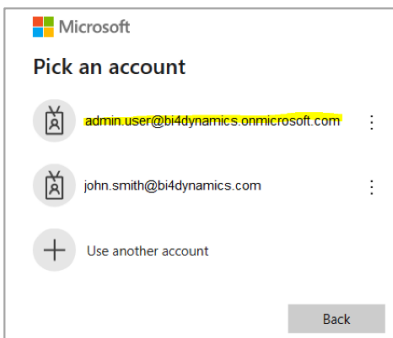
In this option, the data will be accessed through **BC Admin Credentials**.

1. Click **Login** and a new window will open up:

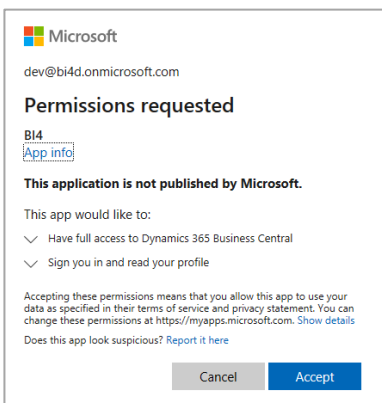


2. Insert **BC Admin Credentials**

After entering the credentials wait 15 seconds to sign in again. In this process, BC admin will allow BI4Dynamics application to access BC data. Enter **BC admin** credentials (sometimes, account login does not work correctly, in such case use option **Use another account** and enter the same **BC admin** account credentials):



New window will pop-up:



Click **Accept**.

Application will automatically fill-in **BC Tenant ID** and **App Registration Client ID**:
(You can enter this information if you have it from previous process without login process)

Tenant ID: 4087c3b3-ce26-417e-8076-b506e436

Client ID: [Redacted]

Client Secret: [Redacted]

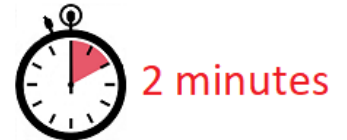
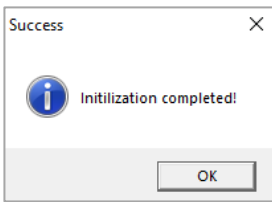
Environment Name: BI4Dynamics_UK

Login

Initialize Data Lake

OK

3. Select **BC environment** and click **Initialize Data Lake**.



After Initializing click **Add** to add the selected data source and wait...
Your screen should look like this:



You have successfully added data source

Click **Next**.

Option 2: Using client secret

In this option, we need to create App Registration on Microsoft Azure and link it in Business Central.

1. Create App registration in Microsoft Azure

- a. In Microsoft Azure search for App registrations
- b. Click on New registrations
- c. Under Name type in any name of an app registration
- d. Under Redirect URI select public client/native
- e. Click Register

Home > App registrations >

Register an application

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

BI4Dynamics app registration ✓

Supported account types
Who can use this application or access this API?

- Accounts in this organizational directory only (BI4Dynamics 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)
- Personal Microsoft accounts only

[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.

Public client/native (mobile ...) e.g. myapp://auth ✓

Register an app you're working on here. Integrate gallery apps and other apps from outside your organization by adding from [Enterprise applications](#).

By proceeding, you agree to the [Microsoft Platform Policies](#)

Register

Home > App registrations >

BI4Dynamics app registration

Search << Delete Endpoints Preview features

- Overview
- Quickstart
- Integration assistant

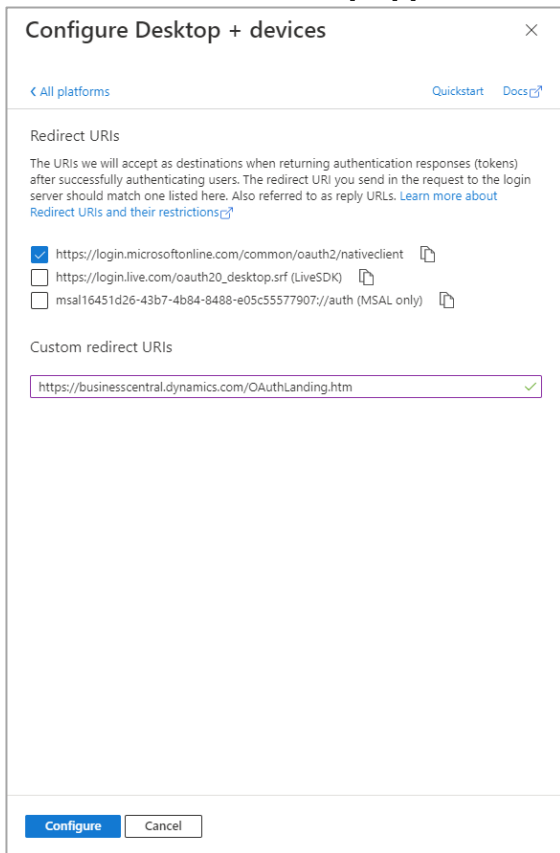
Manage

- Branding & properties
- Authentication

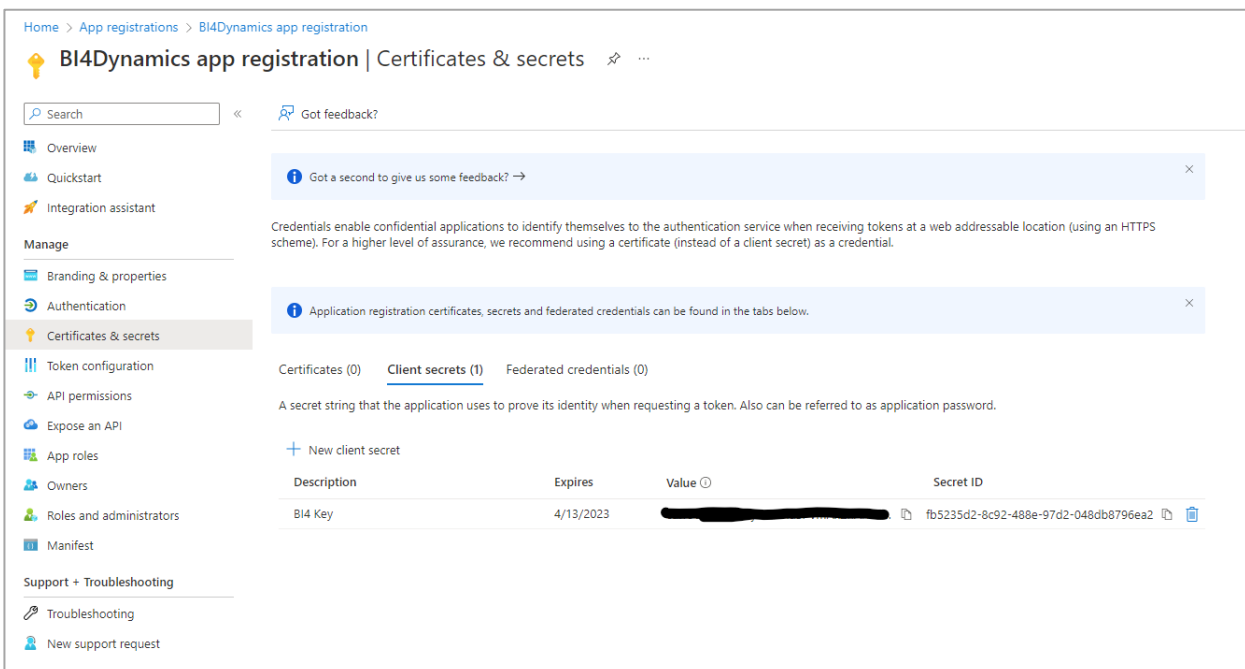
Essentials

- Display name : [BI4Dynamics app registration](#)
- Application (client) ID : [REDACTED]
- Object ID : a71628b0-7a99-4e92-a214-80c2dadd70e1
- Directory (tenant) ID : [REDACTED]
- Supported account types : [My organization only](#)

- f. Copy and save **Application (client) ID** as **Client ID** and **Directory (tenant) ID** as **Tenant ID**
- g. Under **Redirect URIs** click on **Add a Redirect URI**
- h. Click **Add a platform**
- i. Under **Mobile and desktop applications** select **Mobile and desktop applications**



- j. Check **https://login.microsoftonline.com/common/oauth2/nativeclient** and under Custom redirect URIs write **https://businesscentral.dynamics.com/OAuthLanding.htm**
- k. Click **Configure**



- l.** Under Manage select **Certificates & secrets**
- m.** Click on **New client secret**
- n.** Under **Description** write any name
- o.** Under **Expires** select any expiration date/month
- p.** Click on **Add**
- q.** Copy value under **Value** and store it somewhere safe as **Client Secret**
- r.** Under **Manage** select **API permissions**
- s.** Click on **Add a permission**
- t.** Select **Dynamics 365 Business Central**
- u.** Under **Delegated permissions** select **User Impersonation** and **Financials.ReadWrite.All**
- v.** Under **Application permissions** select **app_access**, **API.ReadWrite.All** and **Automation.ReadWrite.All**
- w.** Click on **Add permissions**
- x.** Click on **Grand admin consent**

Configured permissions

Applications are authorized to call APIs when they are granted permissions by users/admins as part of the consent process. The list of configured permissions should include all the permissions the application needs. [Learn more about permissions and consent](#)

+ Add a permission ✓ Grant admin consent for BI4Dynamics

API / Permissions name	Type	Description	Admin consent requ...	Status
▼ Dynamics 365 Business Central (5)				...
API.ReadWrite.All	Application	Full access to web services API	Yes	✓ Granted for BI4Dynamics ...
app_access	Application	Access according to the application's permissions in Dyna...	Yes	✓ Granted for BI4Dynamics ...
Automation.ReadWrite.All	Application	Full access to automation	Yes	✓ Granted for BI4Dynamics ...
Financials.ReadWrite.All	Delegated	Access Dynamics 365 Business Central as the signed-in user	No	✓ Granted for BI4Dynamics ...
user_impersonation	Delegated	Access as the signed-in user	No	✓ Granted for BI4Dynamics ...
▼ Microsoft Graph (1)				...
User.Read	Delegated	Sign in and read user profile	No	✓ Granted for BI4Dynamics ...

5. Link app registration in Business Central

- a. Login into environment you want to use
- b. In BC search for **Azure Active Directory Applications**
- c. Click on **New**
- d. Under **Client ID** paste Client ID from app registration
- e. Under **Description** type in any name
- f. Under **State** select **Enabled**
- g. Under **User Groups** add **D365 EXTENSION MGT** and **D365 FULL ACCESS**
- h. Under **Company Name** delete company name
- i. Click **Grant Consent**
- j. Sign in with your account and click **Accept**

The screenshot shows the 'Azure Active Directory Application Card' for an application named 'BI4Dynamics Demo'. The card is titled 'Grant Consent' and is divided into several sections:

- General:** Contains fields for Client ID, Description, State, Contact Information, Extension, App ID, App Name, User information, User ID, and User Name.
- User Groups:** A table listing user groups associated with the application.
- User Permission Sets:** A table listing permission sets associated with the application.

General	
Client ID	{16451d26-43b7-4b84-8488-e...}
Description	BI4Dynamics Demo
State	Enabled
Contact Information	
Extension	
App ID	{00000000-0000-0000-0000-00...}
App Name	
User information	
User ID	{b19584ff-f11d-4a24-a145-505...}
User Name	BI4DYNAMICS DEMO

User Groups		
Code ↑	Name	Company Name ↑
D365 EXTENSION MGT	Dynamics 365 Extension management	
→ D365.FULL.ACCESS	Dynamics 365 Full access	

User Permission Sets			
Permission Set ↑	Description	Company ↑	Extension Name
D365 BASIC	Dynamics 365 Basic access		Base Application

6. Adding new data source in BI4 app

- Under Token request select **Using client secret** if it's not selected
- Under **Tenant ID**, **Client ID** and **Client Secret** write/paste in information you saved previously
- Under Environment Name write in environment name in which you created Azure Active Directory Applications
- Click on **Login**

7. Editing existing data source in BI4 app

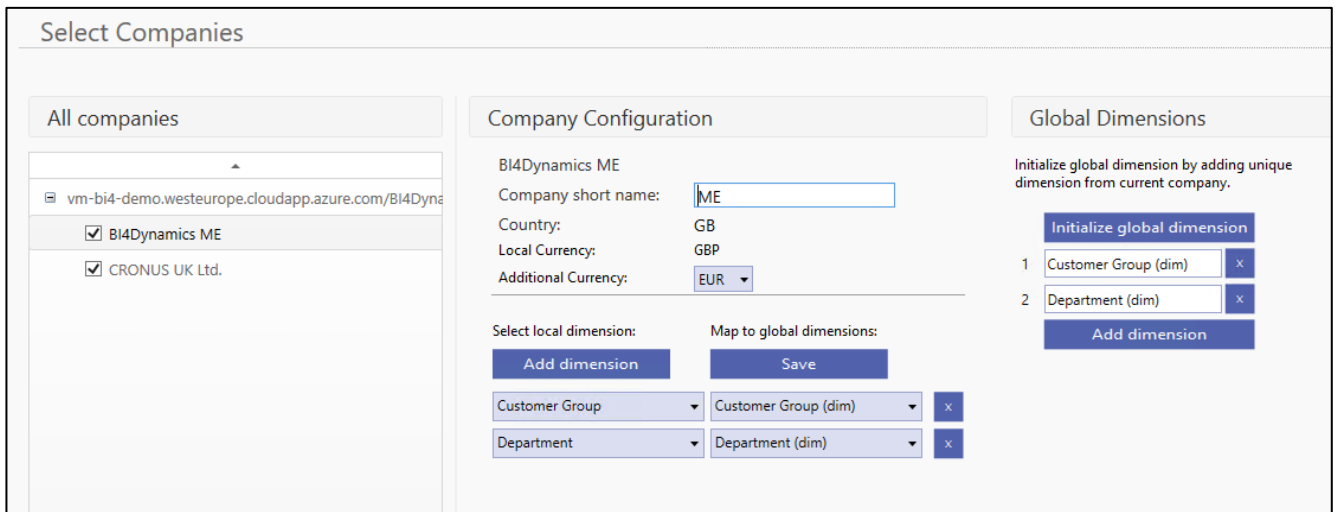
- Select data source you want edit
- Click **Edit**
- Under Token request change it to **Using client secret**
- Delete old **Client ID** and **Tenant ID**
- Under **Tenant ID**, **Client ID** and **Client Secret** write/paste in information you saved previously
- Under Environment Name write in environment name in which you created Azure Active Directory Applications
- Click on **OK**

You have successfully added data source.

Click **Next**.

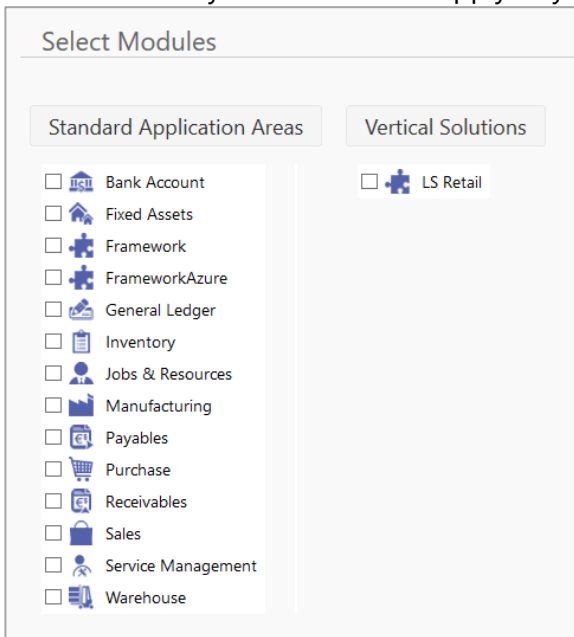
4.3.4. Step 4: Selecting Companies and Global Dimensions

8. From the list of companies **tick the ones you want to include in your instance** and configure additional settings for each selected company:
 - a. **Company short name:** User-friendly name (e.g. ME)
Country and Local Currency are read from BC (no input).
 - b. **Additional Currency:** select the additional currency for this company (e.g. USD);
Transaction values in local currency will be recalculated by exchange rate valid at transaction date to values in additional currency (ACY). There are few hundred ACY measures.
 - c. **Dimensions:**
 - i. Click **Initialize global dimensions** (delete the dimension by clicking the X button next to the dimension name if one or more dimensions will not be used in the project).
We suggest adding a prefix or suffix ("**dim**" or "**Dim**") to global dimension name, so that
 - global dimensions are easier to find in the front-end tool (Excel, Power BI) and
 - we have unique name in application (you may have global dimension "Job" which is also a standard BI4Dynamics dimension, having two with same name will cause an error).
 - ii. Click **Add dimension** to add the company dimensions and map it to corresponding global dimension. Mapping is done automatically, but you can manually change it if needed.
Delete the dimension by clicking the X button next to the dimension name
 - iii. Continue adding and mapping dimensions for other selected companies. Only click Initialize global dimension if there are additional dimensions that are not present in the first company.
9. Click **Next**.



4.3.5. Step 5: Selecting Modules

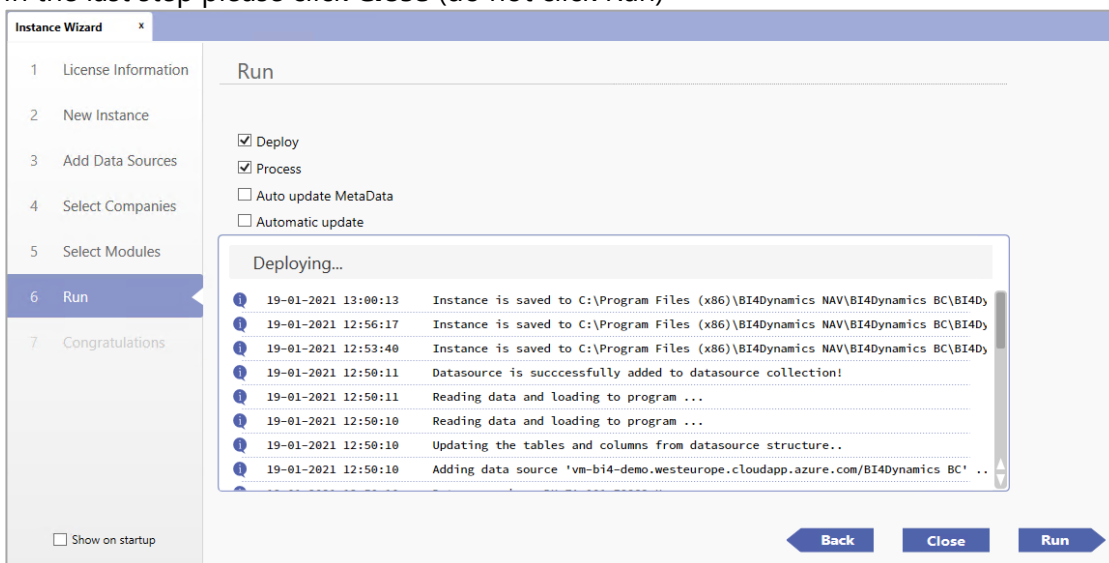
Select Modules you would like to apply to your instance:



Click **Next**.

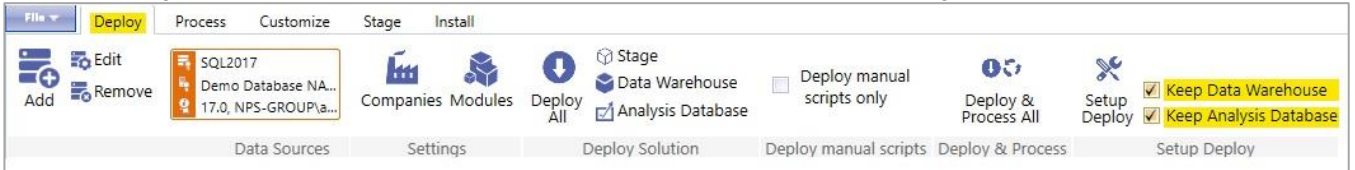
4.3.6. Step 6: Finishing the setup

In the last step please click **Close** (do not click Run)

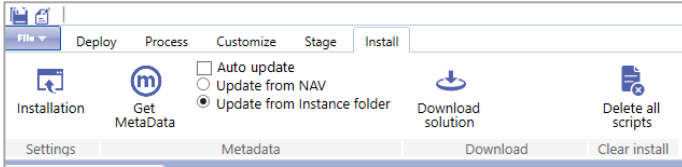


4.3.7. Step 7: Installing Data Warehouse and Analytics

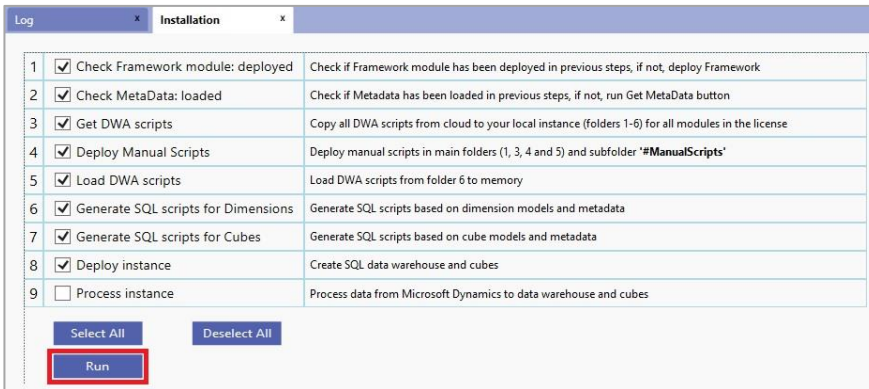
Open **Deploy** tab and make sure **Keep Data Warehouse** and **Keep Analysis Database** are checked



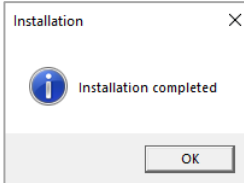
Move to **Install** tab and click **Installation** button.



On the **Installation** screen, uncheck **#9 Process Instance**, click **Run**



Wait for the **"Installation Completed"** message.

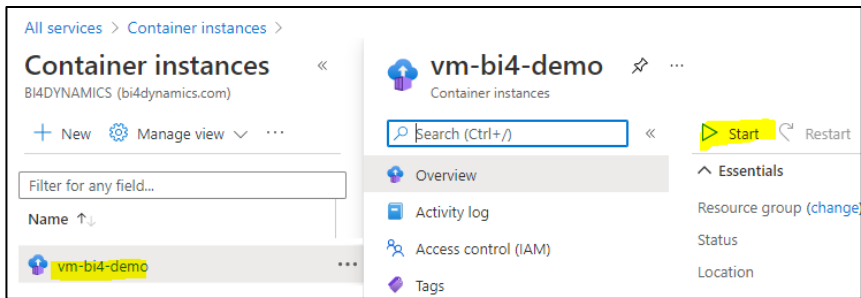


You have successfully deployed data warehouse and analytics.

4.4. Exporting data from BC to Blob Storage

We want to get table data from BC to data warehouse. The first step is to get data from BC to Blob Storage. This process is triggered by running Container instance. In installation process now, we will run the process manually, to immediately get data from BC to Blob Storage. Later, this is triggered by daily job.

Run Container Instance to export data from BC Cloud to Blob Storage (in Azure portal):

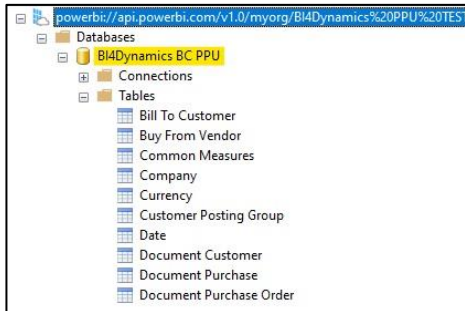


Wait until the process is finished. It can take 30 minutes for database with few million records.

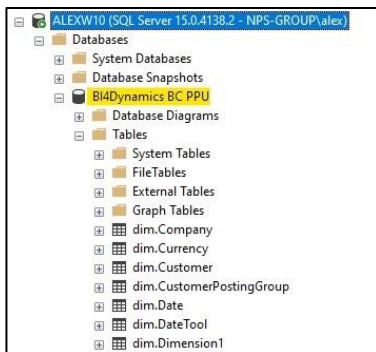
You have successfully exported data from BC to Blob Storage

4.5. Setup On-Premises Data Gateway

Open **SQL Server Management Studio** and connect to Power BI workspace. Newly created analysis database should have tables, which are currently still empty, since data is not yet processed.

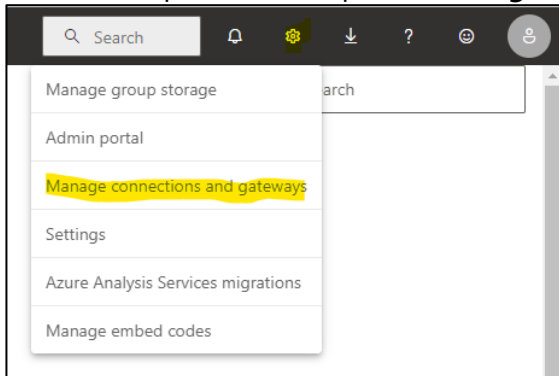


Connect to local Database SQL server to check that instance database has been created.

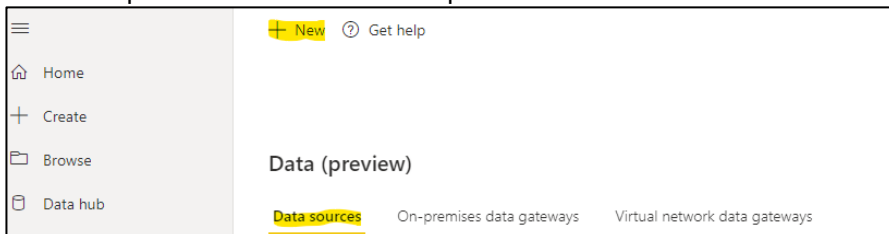


The next step is to add this database as datasource.

To do that open Power BI portal **Settings** and navigate to **Manage gateways**.



Choose option **Data Sources** and press **+New**.

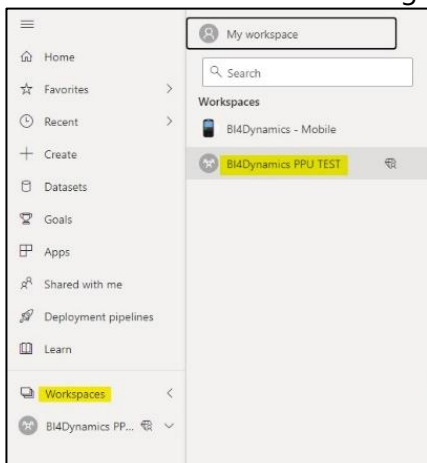


Then fill in the following:

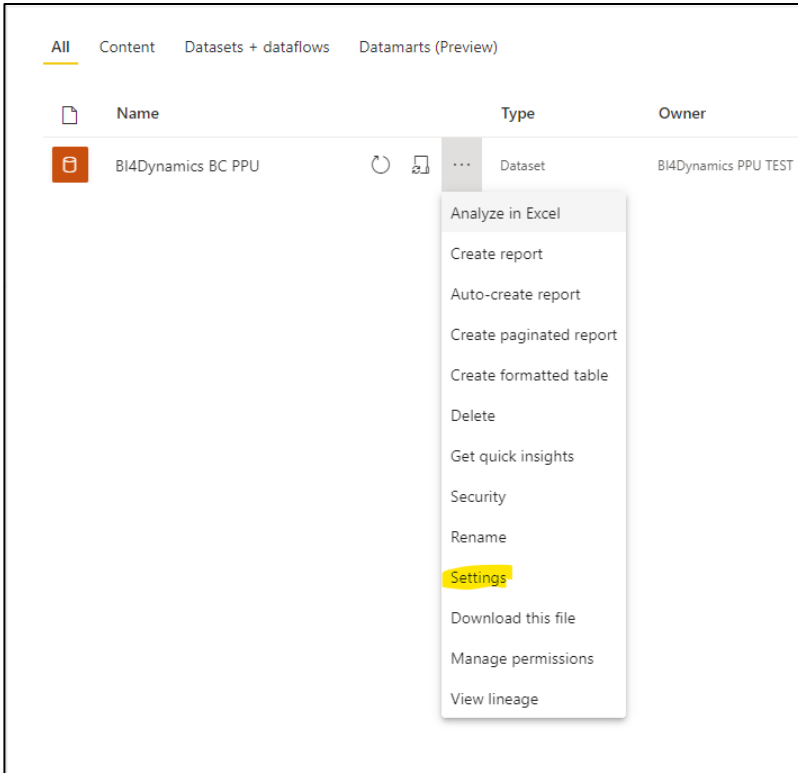
- Choose **Gateway cluster name** (created during installation of **On-premises data gateway**)
- Specify the **Database** and **Data Source names** (in our case they are the same for simplicity)
- Choose **Data Source Type** as **SQL Server**
- Specify your local **Server name**
- Enter **Authentication method** as **Windows** and **insert your credentials**
- Click **Create**

Make sure that connection was established successfully.

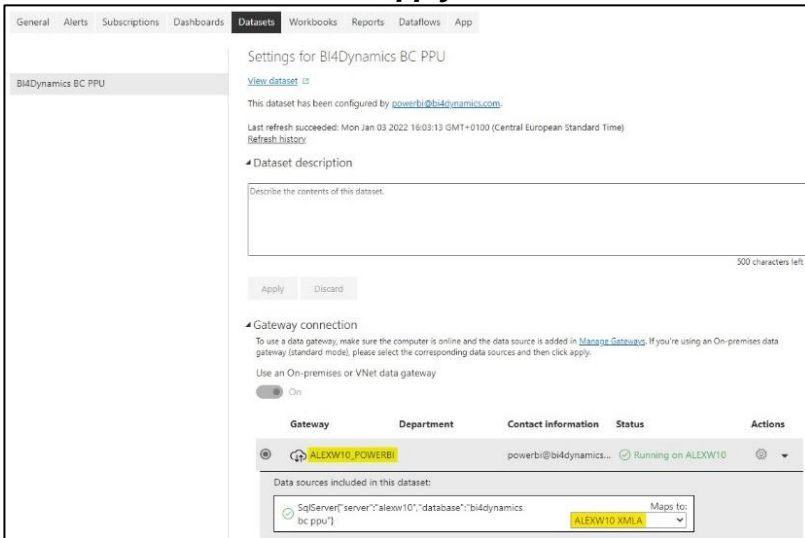
Relate Power BI database with gateway data source. To do that navigate to your workspace.



Press three-dot sign and select **Settings** from the pop-up menu

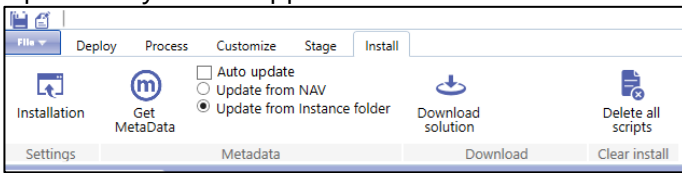


Under **Gateway connection** select the gateway you have installed on your computer and map gateway to the datasource used, click **Apply**.

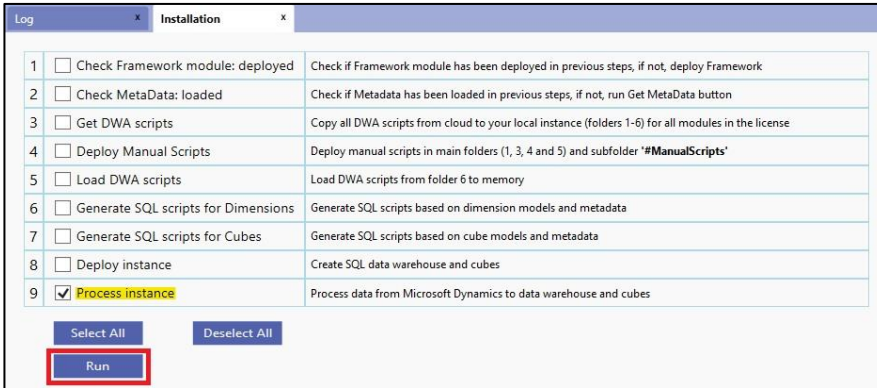


4.6. Processing instance (DW and analytics)

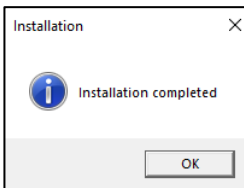
Open BI4Dynamics application and move to **Install tab** and click **Installation** button.



Select **#9 Process Instance** and click **Run**.



Wait for the **"Installation Completed"** message.



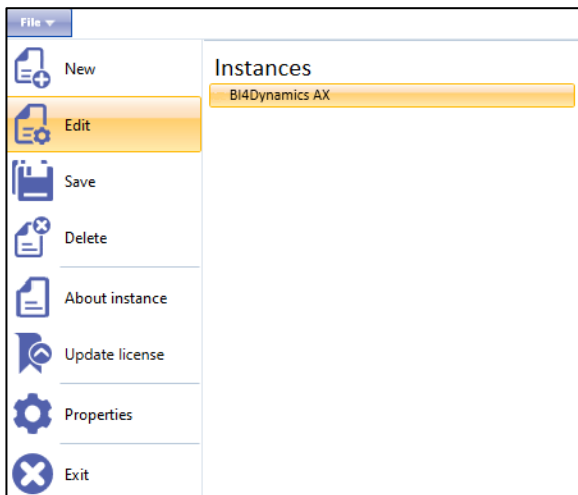
You have successfully installed data warehouse and analytics.

5. Managing instance

5.1. Edit instance

To edit existing BI4Dynamics instance do the following:

1. Open instance
2. Click on **File** and press **Edit**



3. Make changes to instance. For example, in order to move analysis services to Azure change **Authentication** to "Azure Active Directory" and input username and password to Azure portal in the corresponding fields.

 A screenshot of the 'Edit instance' dialog box. It contains several sections:

- Instance properties:** Instance name: BI4Dynamics AX, Language: English (United States).
- Copy Instance:** Copy current instance:
- SQL Server:** Database Name: BI4Dynamics AX, SQL Server Name: ALEXW10, Authentication: Windows, Username: NPS-GROUP\alex, Password: [masked].
- SQL Database File Locations:** Data: D:\SQL2019\MSSQL15.MSSQLSERVER\MSSQL\, Log: D:\SQL2019\MSSQL15.MSSQLSERVER\MSSQL\, SQL Database Collation: Latin1_General_CI_AS.
- Analysis Services:** Analysis Database Name: BI4Dynamics AX, SQL Analysis Server Name: asazure://eastus.asazure.windows.net, Authentication: Azure Active Directory, Username: apa@bi4dynamics.com, Password: [masked], SQL Analysis Server Option: Tabular, Model: Import.
- Integration Services:** SQL Integration Service: , SSIS Server name: ALEXW10, Ver: 15.0.

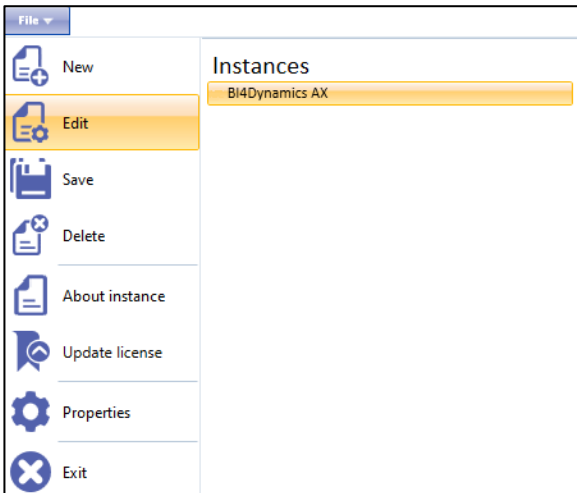
 At the bottom, there are buttons for 'Refresh', 'Test Connectivity', and 'Save & Restart Instance' (highlighted with a red box).

4. Click **Save & Restart Instance**.

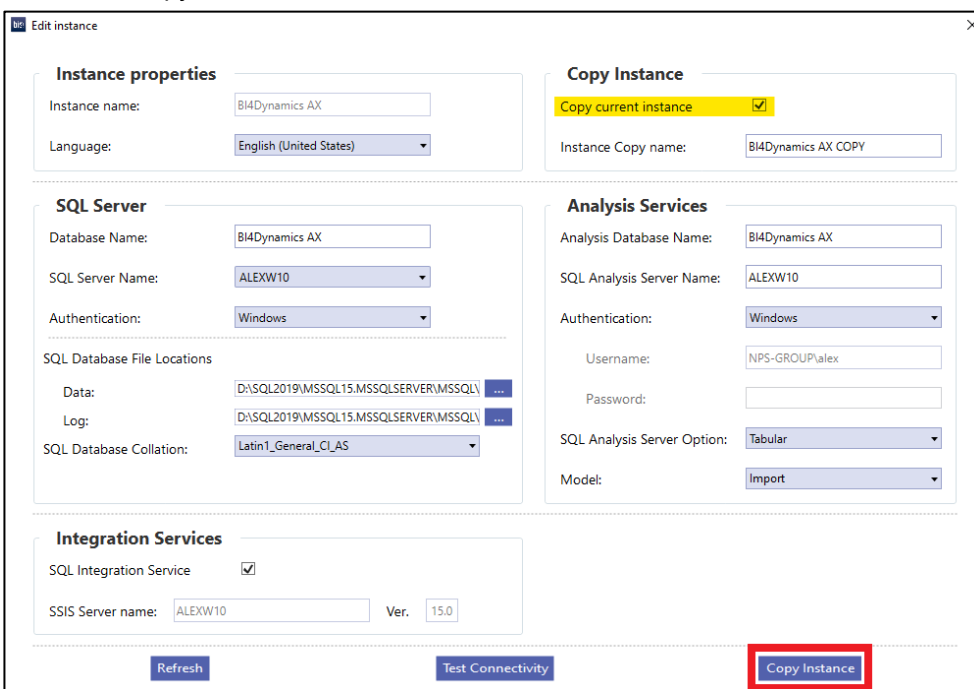
5.2. Copy instance

To copy an existing BI4Dynamics instance do the following:

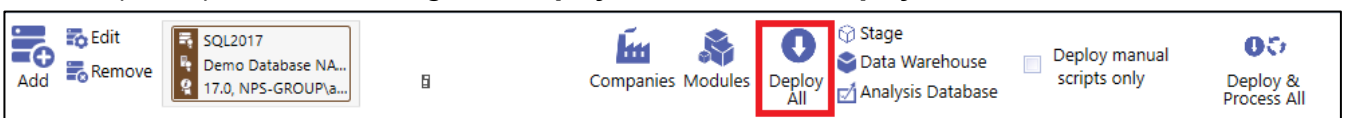
5. Open instance
6. Click on **File** and press **Edit**



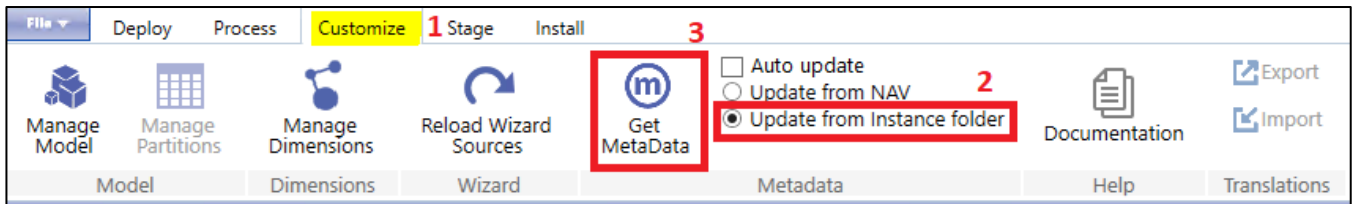
7. Check **Copy current instance** and enter name for the instance that you create.
8. **Note:** copy name and all other modifications, i.e. database name, analysis database name are saved to the copy, not current instance.



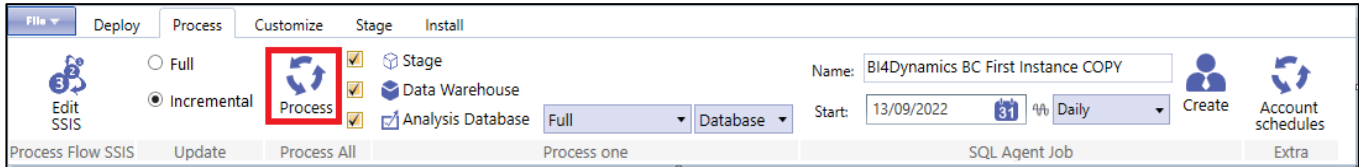
8. Press **Copy Instance** button, button is disabled when entered settings are not valid - instance with such name already exists, connection to servers cannot be established, etc.
9. Open copied instance, navigate to **Deploy** tab and Click on **Deploy All**.



10. Once the instance is successfully deployed open **Customize** tab, make sure **Update from Instance folder** is selected, and **Get Metadata**.



11. As a last step, Open **Process** tab and click **Process**.

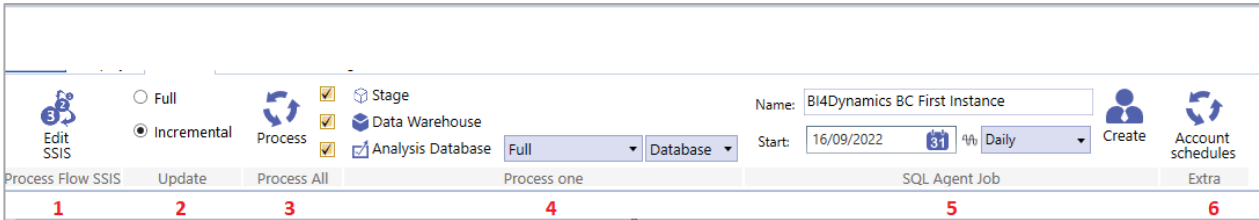


You have successfully copied an instance.

5.3. Edit process flow

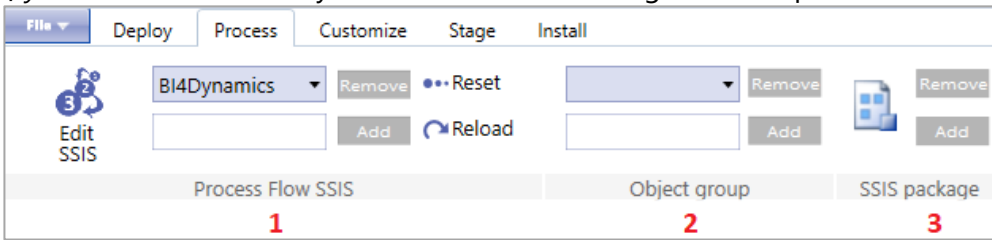
Process flow is used to determine the sequence of execution of stored procedures when processing data with BI4Dynamics. Editing process flow is completely optional and it is usually connected with custom development.

5.3.1. Explanation of process flow top form functionality



1. **Edit existing** Process flow or **Add** a new one
2. Select **Full** or **Incremental** Processing type
3. Process **All (Stage, Data Warehouse and Analysis Database)**
4. Process **just one** on the above
5. Create **SQL Agent Job** (with the specified periodicity and start date)
6. Process only **Account Schedules** instead of entire Analysis Database

If you click on **Edit SSIS**, you will have the following tab and options on it:



1. **Reset** the Process flow (return to original state) or **Reload** Process flow (include stored procedures saved in BI4Dynamics folder structure)
2. Create a new **Object Group** (standard 1-13)
3. Add or Remove a **SSIS package** from file

5.3.2. Explanation of process flow table functionality

Object group 1										Process steps 4			Rename 5	
No	Name	Custom	Include	Order	Process	Object Name	Object subgroup	Executed	Custom	Last exec time (sec)	Object subgroup			
0	SSIS	✓	✓	166	Run	[fact],[TruncateExecutionLog]	CubeFramework	✓		0	Current	AccountSchedule		
1	SnapshotDate		✓	167	Run	[fact],[TruncateEmployeeAbsence]	EmployeeAbsence	✓	✓	0	New			
2	Snapshot		✓	168	Run	[fact],[LoadEmployeeAbsence]	EmployeeAbsence	✓	✓	0	Update			
3	DimDate		✓	169	Run	[fact],[TruncateFAEntry]	FAEntry	✓	✓	0				
4	DimHelp		✓	170	Run	[fact],[LoadFAEntry]	FAEntry	✓	✓	0				
5	DimLoadBefore		✓	171	Run	[fact],[TruncateMaintenanceEntry]	MaintenanceEntry	✓	✓	0				
6	DimLoad		✓	172	Run	[fact],[LoadMaintenanceEntry]	MaintenanceEntry	✓	✓	0				
7	DimLoadAfter		✓	173	Run	[fact],[TruncateMaintenanceRegistration]	MaintenanceRegistration	✓	✓	0				
8	FactDropConstraintIndex		✓	174	Run	[fact],[LoadMaintenanceRegistration]	MaintenanceRegistration	✓	✓	0				
9	FactHelp		✓	175	Run	[fact],[TruncateAccountSchedule]	AccountSchedule	✓	✓	0				
10	FactLoadBefore		✓	176	Run	[fact],[LoadAccountSchedule]	AccountSchedule	✓	✓	0				
11	FactLoad		✓	177	Run	[fact],[LoadAccountScheduleMany]	AccountSchedule	✓	✓	0				
12	FactLoadAfter		✓	178	Run	[dim],[UpdateCustomRollupCalculation]	AccountSchedule	✓	✓	0				
13	FactCreateConstraintIndex		✓	179	Run	[fact],[TruncateAccountScheduleCostAccounting]	AccountScheduleCostAccounting	✓	✓	0				

1. **Object group name.**

All stored procedures **within** object group are executed before the next Object group is executed. Each Object group forms a separate **SSIS package** which is executed on processing.

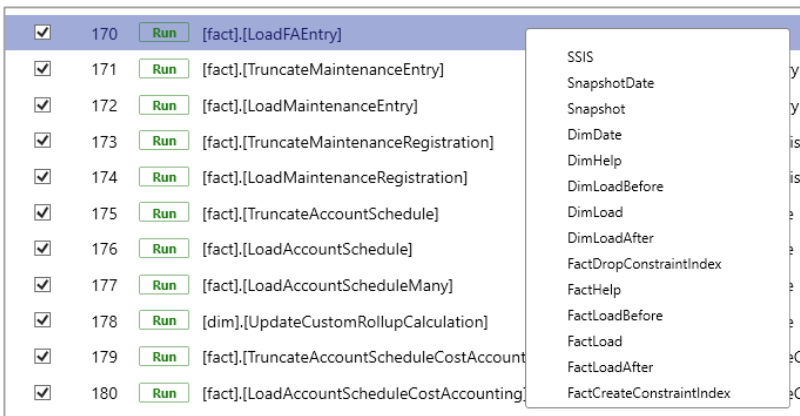
2. **Select/unselect** a stored procedure to be executed on processing

3. **Run** the stored procedure manually from the application

4. **Object subgroup name.** Stored procedures within an Object subgroup are executed **successively**, while different Object subgroups within same Object group are executed **in parallel**.

5. **Rename** Object Subgroup option

5.3.3. Moving stored procedure from one object group to another



Right-click on a stored procedure gives you an option to **move** it to a different **Object group** if needed (on reset Process flow the stored procedure will be moved back to original Object subgroup).

5.3.4. Setting up process flow property manually in stored procedure

Permanently moving a stored procedure to a different Object group is possible by adding a **DECLARE** clause in the stored procedure itself:

```
EXEC dbo.DropObject 'fact.LoadInventoryState', 'P'
GO

CREATE PROCEDURE fact.LoadInventoryState
    @InsertedRowCount int = 0 OUTPUT,
    @Output nvarchar(max) = NULL OUTPUT
AS
    DECLARE @ObjectGroup nvarchar(255)='FactLoadAfter'
```

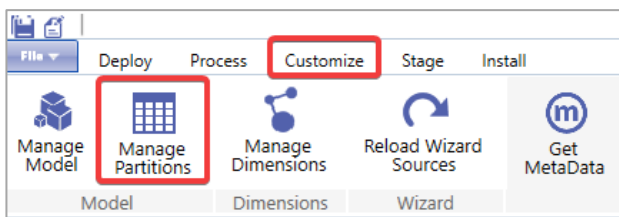
By adding or changing declare statement store procedure's execution flow is determined.

5.4. Manage Partitions

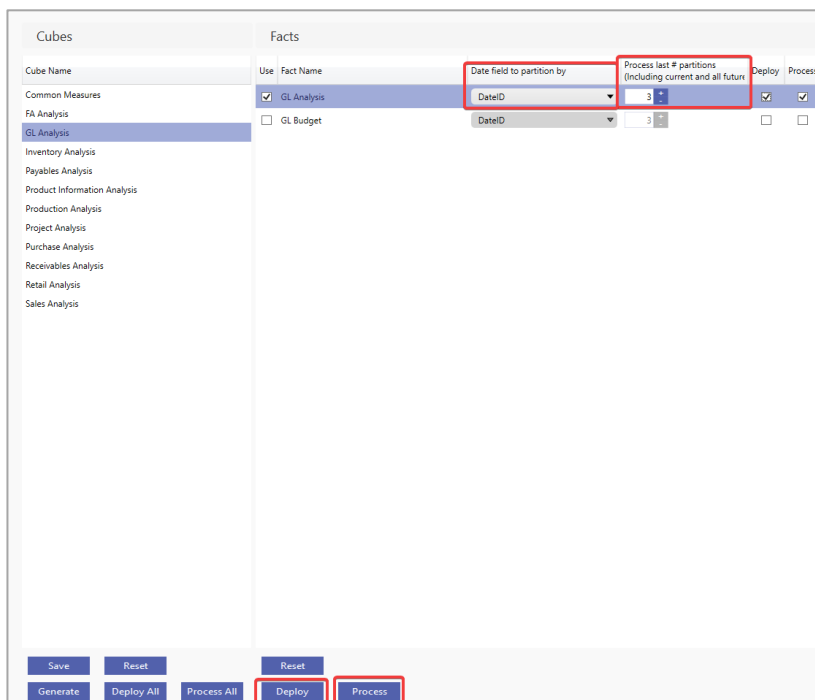
Partitions divide portions of data you need to process (refresh) frequently from data that can be processed less frequently. For example, a fact table may include certain row sets that contain data that rarely changes, but other row sets have data that changes often. There's no need to process all of the data when only a portion of it needs to be processed.

Partitions work by dividing a table into logical partition objects. Individual partitions, each containing a unique segment of data, can then be incrementally processed either sequentially or in parallel independent of other partitions, or excluded from processing operations altogether.

This feature can be only used with SQL server enterprise edition or with PowerBI Premium.



1. Open the **Customize** ribbon
2. Select **Manage Partitions**



1. Select the Cube
2. Select the **Fact**
3. Select the **Date field to Partition by**
4. Select the **number of last partitions processed** (this is determined by how much backdating is done)
5. **Deploy** the fact
6. **Process**

5.5. Setup BI4Dynamics precision

Numeric data types can be stored in SQL with different precision, scale, and length. Precision is the total number of digits that can be stored both to the left and right of the decimal place. Scale is the number of digits to the right of the decimal point in a number. Length is the number of bytes that are used to store the number.

In SQL the default maximum precision and scale for a particular length is the following:

- 19,5 = 9 bytes
- 27,10 = 13 bytes
- 38,20 = 17 bytes

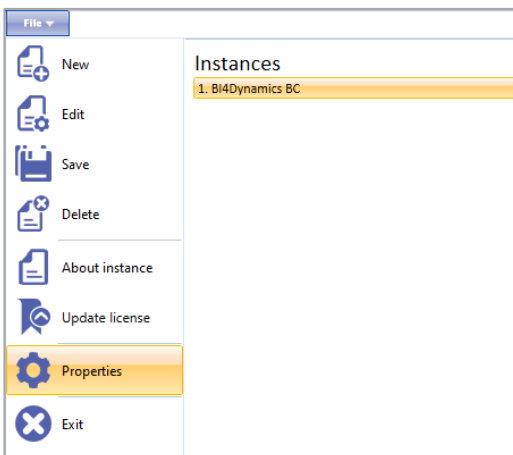
During the installation, the following error might occur on stage:

Some errors occurred during executing package SSIS Stage: [G_L Entry].[dtsx].
Detail msg: Arithmetic overflow error converting numeric to data type numeric.!

It should be addressed by increasing the precision (e.g. from 19 to 38) and scale (e.g. from 5 to 20). The default maximum precision of numeric and decimal data types is 38.

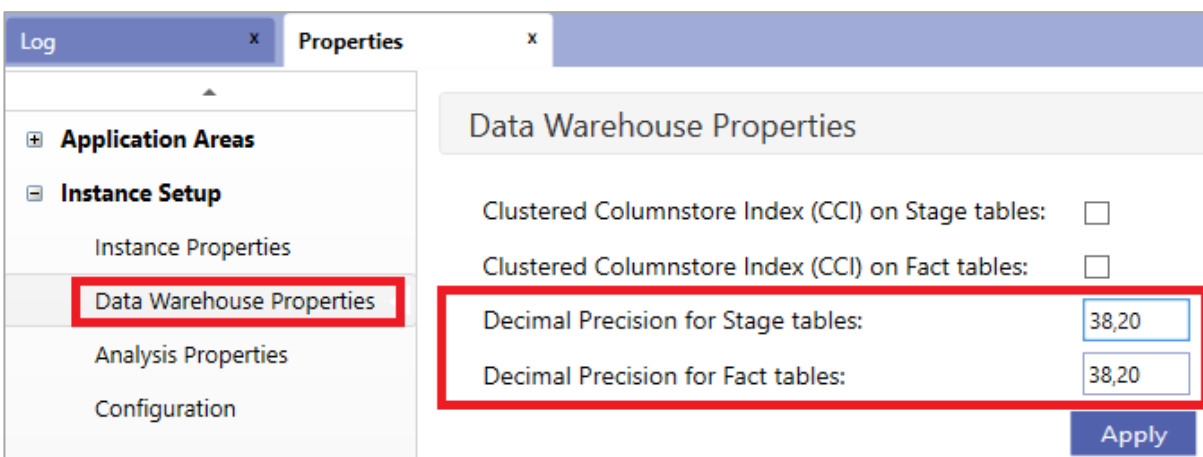
To change it in application you need to:

1. Open the instance and click **File > Properties**.



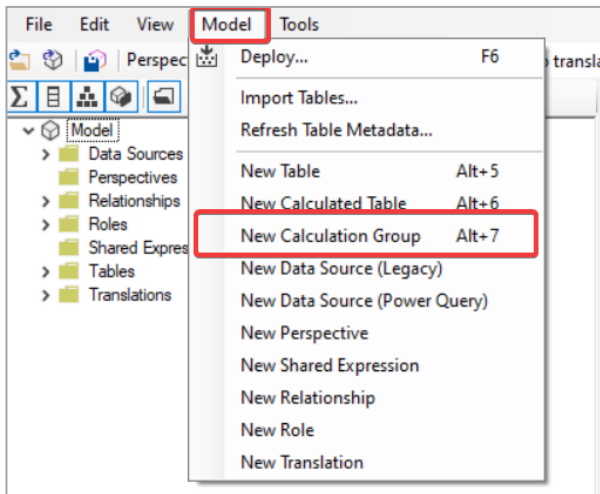
2. Under **Instance Setup > Data Warehouse Properties** precision could be set up for:

- Stage tables
- Datawarehouse tables

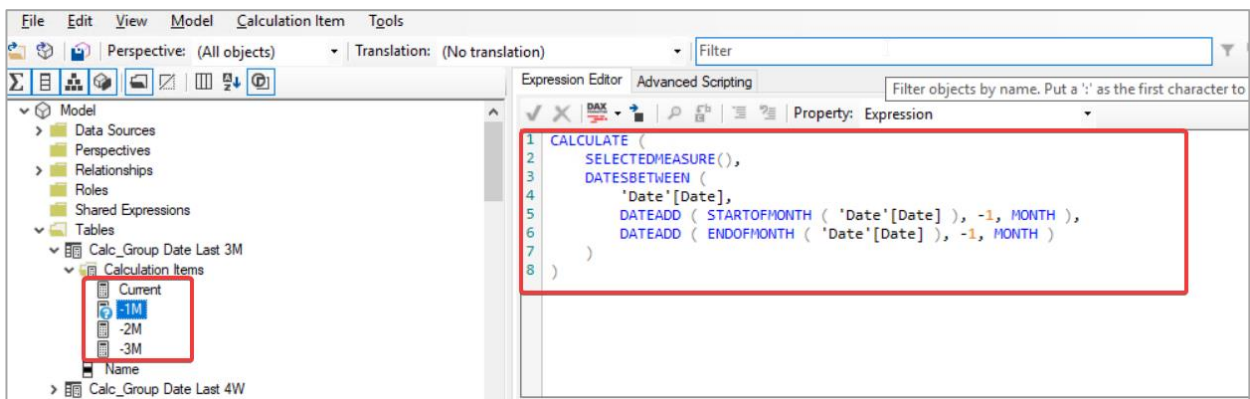


5.6. Adding Calculation groups

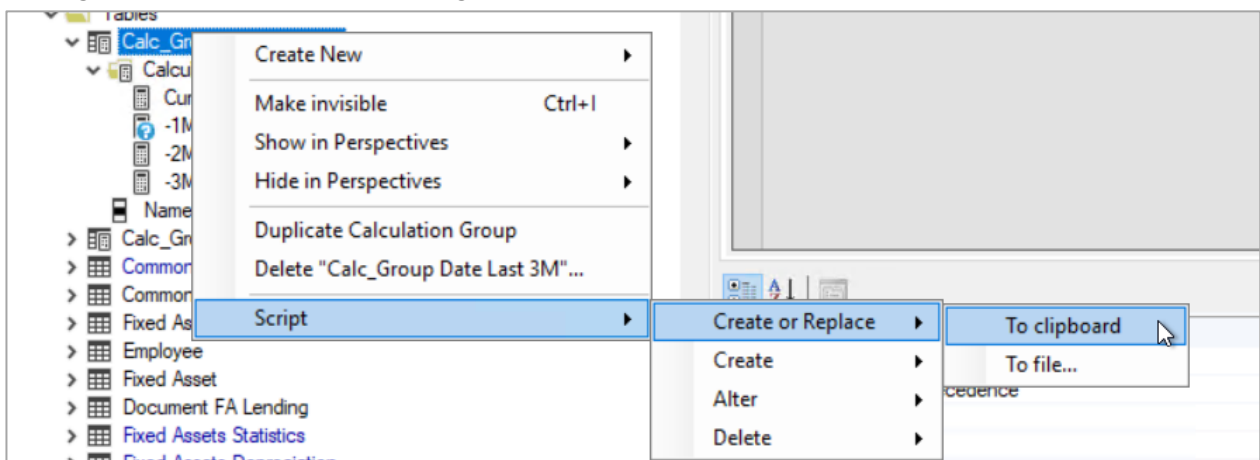
1. Open **Tabular editor**
2. Go to **File > Open > From DB**
3. Select the **Server** and **Instance** where you want to create calculation groups
4. Select **Model** and **New Calculation group**



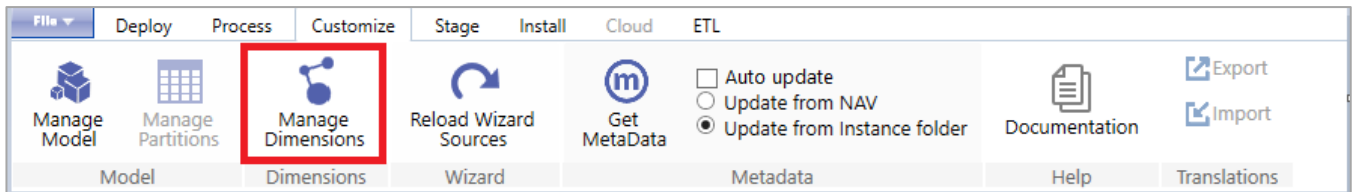
5. Add **new Calculation items** with DAX query



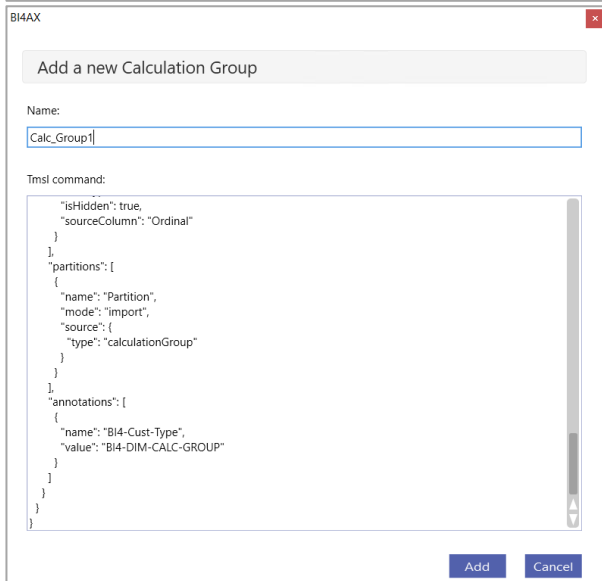
6. Right click the new Calculation group, select **Script > Create or Replace > To Clipboard**



- Open **BI4Dynamics application** and **open instance**
- Go to **Customize** tab > **Manage Dimensions**



- Select **New Calc. Group**, add a **name** and copy the **script**



- Update** and **Generate all** under Calculation groups
- Deploy** and **Process analysis database**

5.7. Deleting instance

- Open the instance you would like to delete by clicking **File** and selecting the instance in the list on the right.
- Click **File > Delete**.
- Click **Yes** to confirm the action.

IMPORTANT! When deleting an instance, the Data Warehouse and Analysis Database will be deleted.

Note: BI4Dynamics Instance folders and the log file are not removed during the delete process.

Uninstalling BI4Dynamics

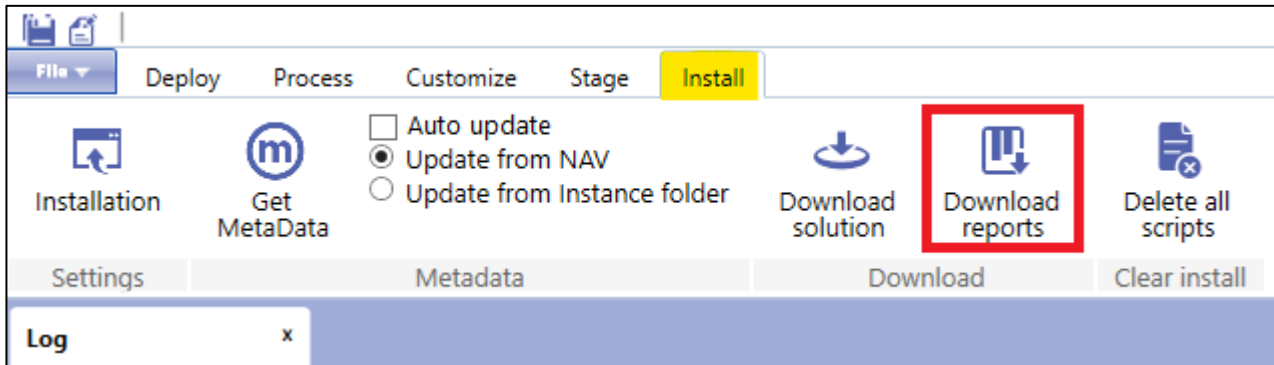
- Click **Start > Settings > Control Panel**.
- Click **Add or Remove Programs**.
- From the list of installed programs, select **BI4Dynamics**.
- Click **Remove**.
- Follow the instructions on screen.

IMPORTANT! User files will not be removed when uninstalling the solution.

6. Connecting Excel and Power BI reports

6.1. Downloading Excel and PowerBI reports

1. **Open** Instance
2. Go to **Install** tab and click **Download reports**

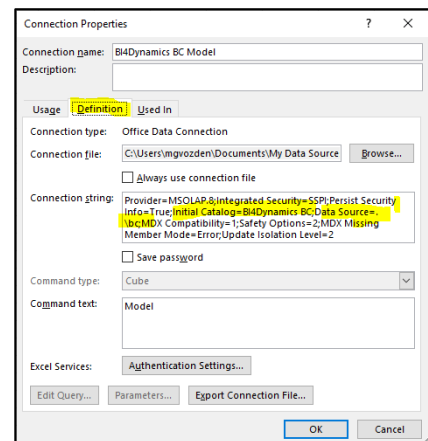


3. Select the destination
4. **Standard reports** that are included with BI4Dynamics will be downloaded

6.2. Connecting Excel reports

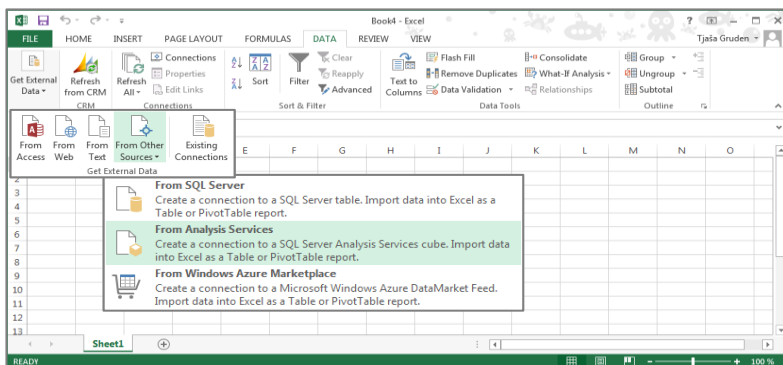
6.2.1. Changing connection

1. **Open** Excel report
2. Click **Data > Connections > Properties > Definition**
3. Type the **database name** to the **Initial Catalog** property of the **Connection string**. Type the **Server name** to the **Data Source** property of the **Connection string**.

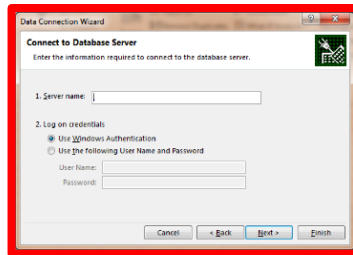
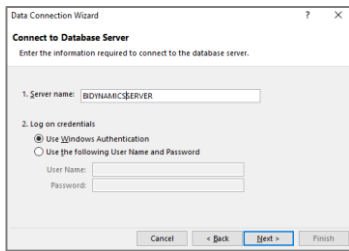


6.2.2. Creating a new connection

4. **Open** Microsoft Excel
5. Click **Data > Get External Data > From other Data Source > From Analysis Services**.



6. Insert a **Server name**

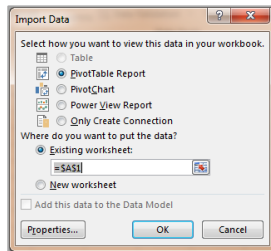
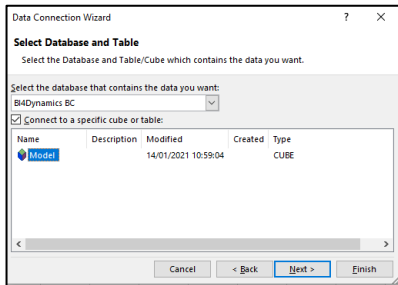


Do not enter "." for local server as this connection will not work on another PC.

If you have installed analytics on Azure Analysis Services or Power BI workspace, paste the in the field Server name.

If analytical database is installed in Azure or Power BI workspace use connection link instead of Server name. Examples:
 Azure Analysis Services: asazure://westeurope.asazure.windows.net/bi4dynamicsybrid
 Power BI Premium: powerbi://api.powerbi.com/v1.0/myorg/BI4Dynamics%20PPU%

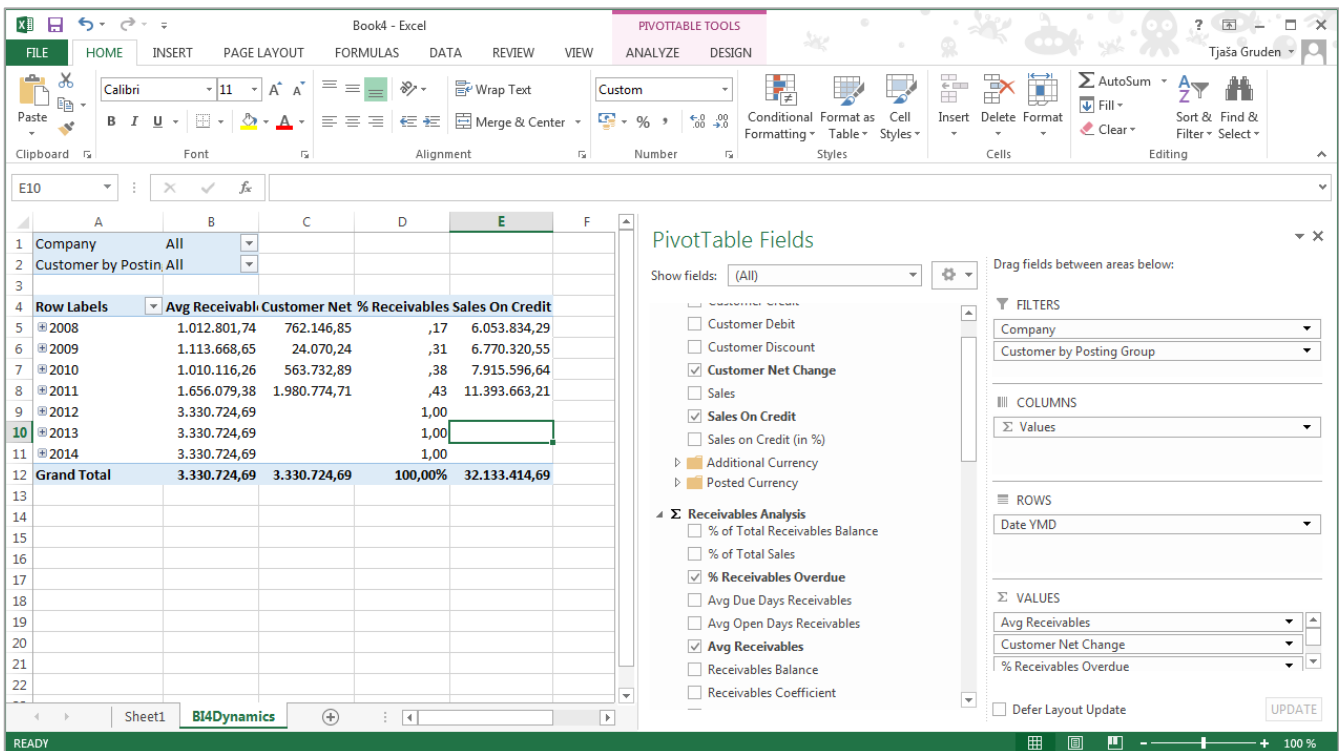
7. Click **Next** and select **Analysis database** from the dropdown menu and select **Model**



8. Click **Finish** and **OK** on next form.

You have successfully connected Excel to Analysis Services model.

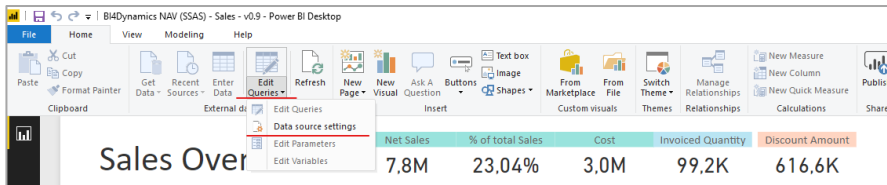
9. Start exploring your data by dragging and dropping dimensions and measures in pivot table



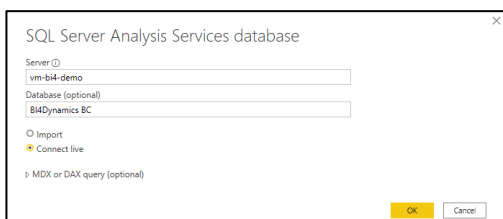
6.3. Connecting Power BI reports

6.3.1. Changing connection

1. **Open** Power BI report
2. Click **Edit Queries > Data source settings**

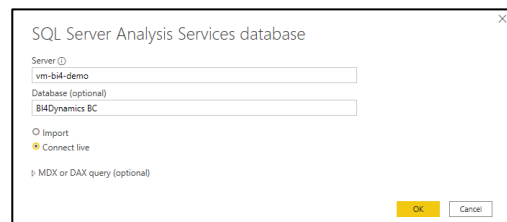


3. Type the **Server name** to the **Server** field. Type the **Database name** to the **Database** field



6.3.2. Creating a new connection

4. **Open** Power BI Desktop
5. Click Get data
6. Choose **Analysis Services**
7. Type the **Server name** and **Database name**
8. Choose **Connect live**



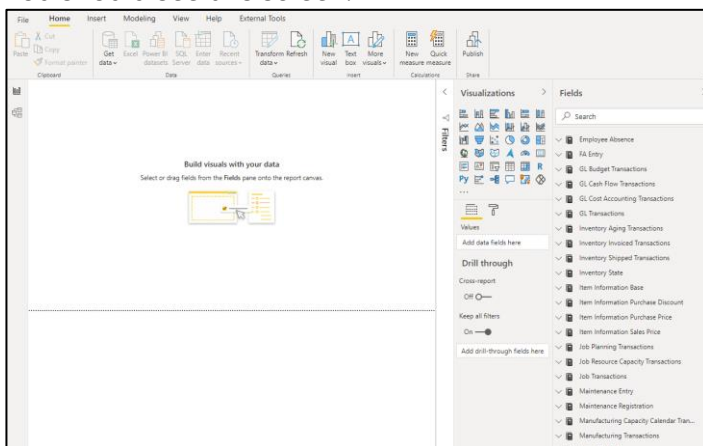
If analytical database is installed in Azure or Power BI workspace use connection link instead of Server name. Examples:

Azure Analysis Services: [asazure://westeurope.asazure.windows.net/bi4dynamicshybrid](https://westeurope.asazure.windows.net/bi4dynamicshybrid)

Power BI Premium: [powerbi://api.powerbi.com/v1.0/myorg/BI4Dynamics%20PPU%](https://api.powerbi.com/v1.0/myorg/BI4Dynamics%20PPU%20)

9. Click **OK** and start exploring your data

You should see this screen:



You have successfully connected Power BI to Analysis Services model.