COMARCH
BI Point

Comarch BI Point
User Manual

Version: 2023.2

Contents

1 Comarch BI Point

BI Point is a web application run on a dedicated reporting server. Such architecture provides significant simplification in implementing the tool to work with data – installation on endpoint environments is not required and the entire work load resulting from database queries and operation of the application is directed to the server. Upon installing the tool, a module supporting the reporting part together with handling of manager panels (dashboards) is available for the user.

Automatic calibration, responsivity of page element layout and support for mobile devices technology allows for creation and preview of reports without limits imposed by the platform.

2 Hardware and software requirements

Configuration	Server	Client
Operating System*	Microsoft Windows Server 2012 Microsoft Windows Server 2012 R2 Microsoft Windows Server 2016 Microsoft Windows Server 2019 Microsoft Windows Server 2022 Microsoft Windows 8.1 Microsoft Windows 10 Microsoft Windows 11 CentOS 7 Ubuntu Focal 20.04 (LTS) Ubuntu Eoan 19.10 Ubuntu Bionic 18.04 (LTS) Ubuntu Xenial 16.04 (LTS) Debian 9 Debian 10 Fedora 30 Fedora 31 Windows Docker: Windows 10 Professional	Any operating/mobile system supporting one of the following Internet browsers in the latest available version: - Firefox version 3.6 and higher - Google Chrome – the latest available version - Safari – the latest available version ***Recommended browser providing the best performance is Google Chrome**
Processor	Up to 10 **simultaneous users** – 4x2.4GHz minimum (recommended 8x2.4GHz), additional core for each subsequent 5 users	
RAM Capacity Requirements	Minimum 16 GB for maximum 4 simultaneous (using BI at the same time) users + 0. 5GB for each additional user. RAM must be increased in dependence of assigning memory for PostgreSQL.	
Additional Requirements	1. .NET Framework 4.7.2 or higher (full installation, apart from FTP) 2. Internet Information Services version 7.5 or higher (all components of "Web Server", "Management Tools" and "FTP Server") 3. PostgresSQL 10.4 for migration	

	PostgresSQL 12.3 or later for new installation 4. SQL Server: 2012, 2014, 2016, 2017, 2019 5. PostGIS 2.4.4 6. Key Manager 2022.2.1 or later 7. Computer/server name on which BI Point instance will be configured cannot be more than 15 characters long	

* Selection of the system depends on maximum quantity of RAM which is supported. BI Point is supported only in 64-bit systems.

3 BI Point configuration

Comarch BI Point application can be installed and configured with the use of a setup wizard and a configuration tool.

Below are the following steps of Comarch BI Point installation:

1. Running of a setup wizard
2. Selection of the installer language
3. Acceptance of the license agreement
4. Selection of installation path
5. Installation summary

Below are the following steps of Comarch BI Point configuration:

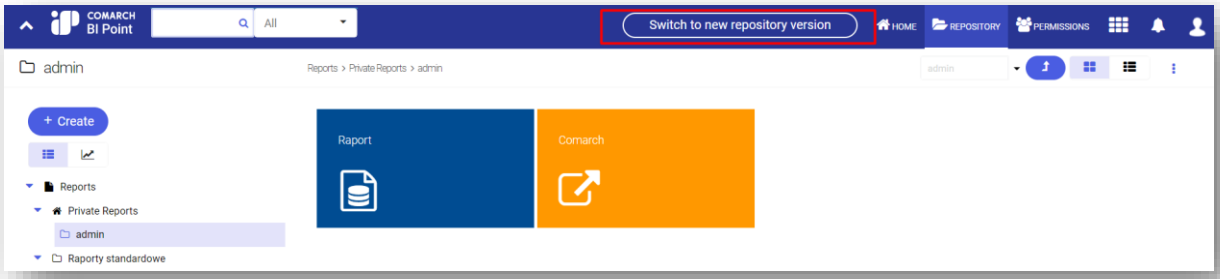
1. Running of the configuration tool
2. Selection of a product to install (BI Point Standalone, XL BI Point Start, XL BI Point, ERP Standard BI Point, Optima BI Point, BI Point CEE, BI Point CEE Smart)
3. Selection of installation mode
4. Selection of source database and OLAP database
5. Selection of a geological database
6. Configuration of a mail server
7. Configuration summary

Below are the following steps of Comarch BI Point upgrade:

1. Running of the configuration tool
2. Selection of an upgrade method
3. Selection of a META database
4. Upgrade summary

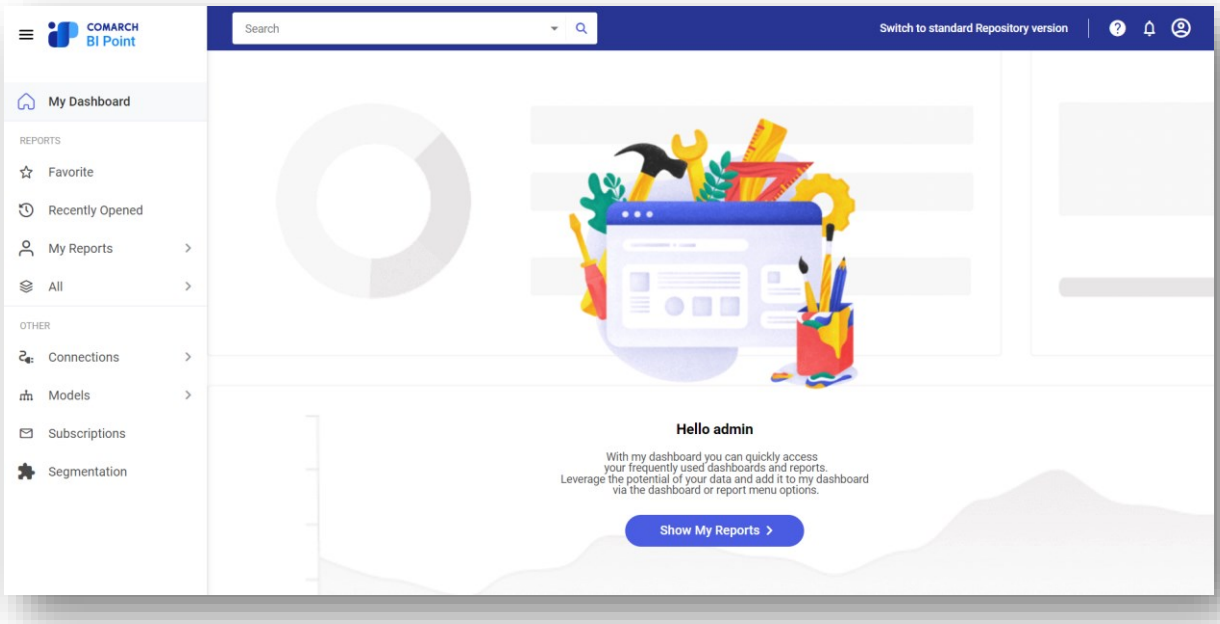
4 Comarch BI Point 2023 repository

As of version Comarch BI Point 2023, there is a new application repository available upon selecting [**Switch to new repository version**] button in the upper application pane. The new repository is described under: http://bi.krakow.comarch/pl/

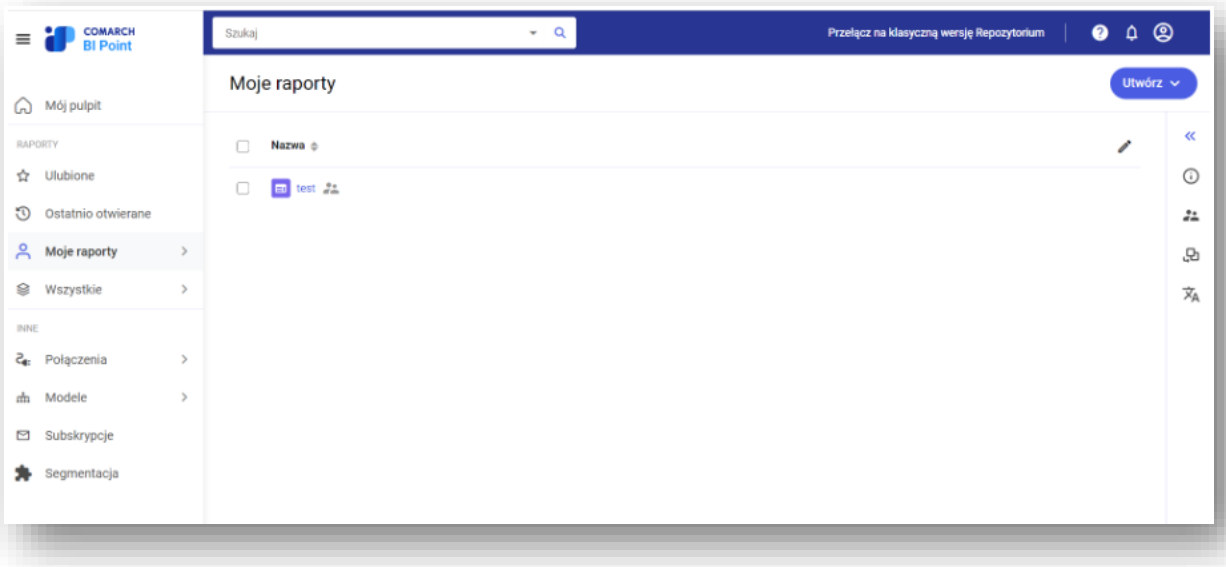


4.1 Home screen

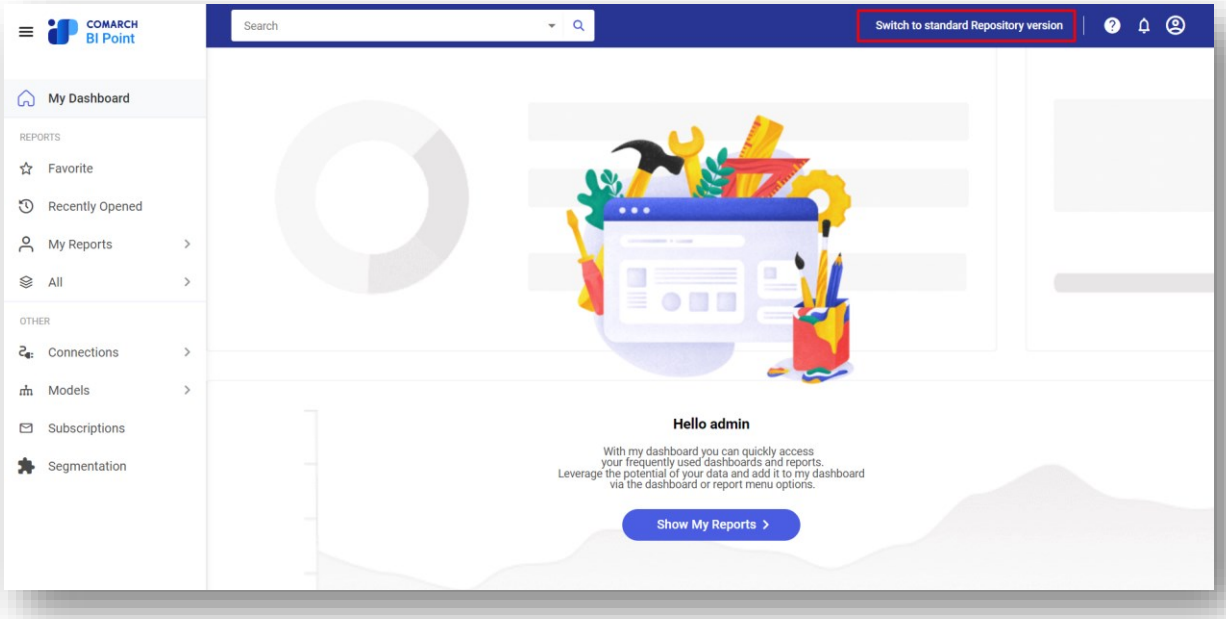
Once you have logged in to the application properly, you will be redirected to the home page.



Selecting [**Show My Reports**] will redirect you to the new repository.

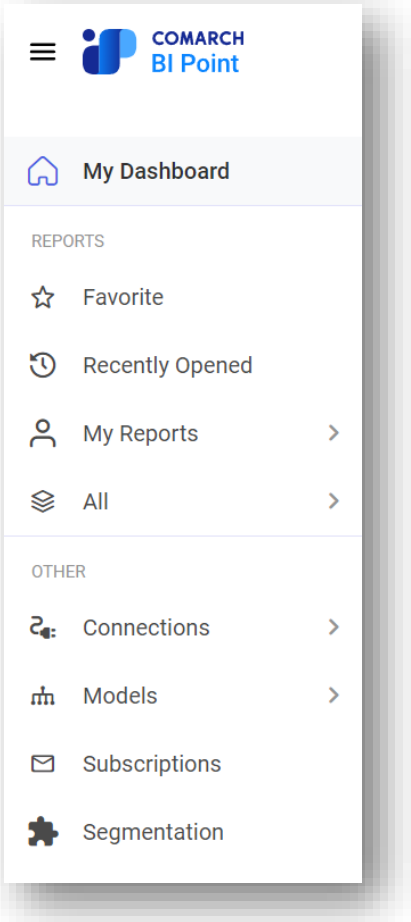


You can restore the standard layout of the application at any time during work with the new repository by selecting [**Switch to standard repository version**] in the upper panel.



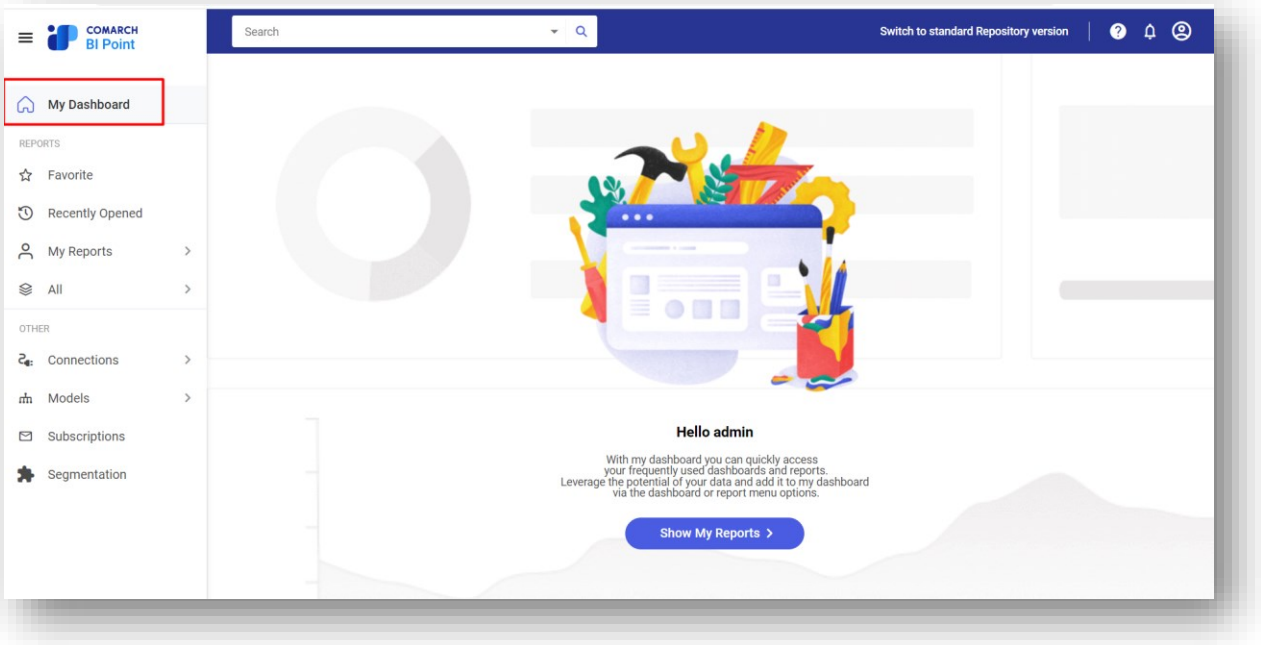
4.2 Left repository panel

The left panel of the repository can be divided into 3 sections:



1. **My Dashboard**
2. **Reports**
3. **Other**

1. **My Dashboard** section is a quick access tab, where you can add a specific report/dashboard such as the most frequently used one.



2. **Reports** section is divided into 4 tabs:

- **Favorites**

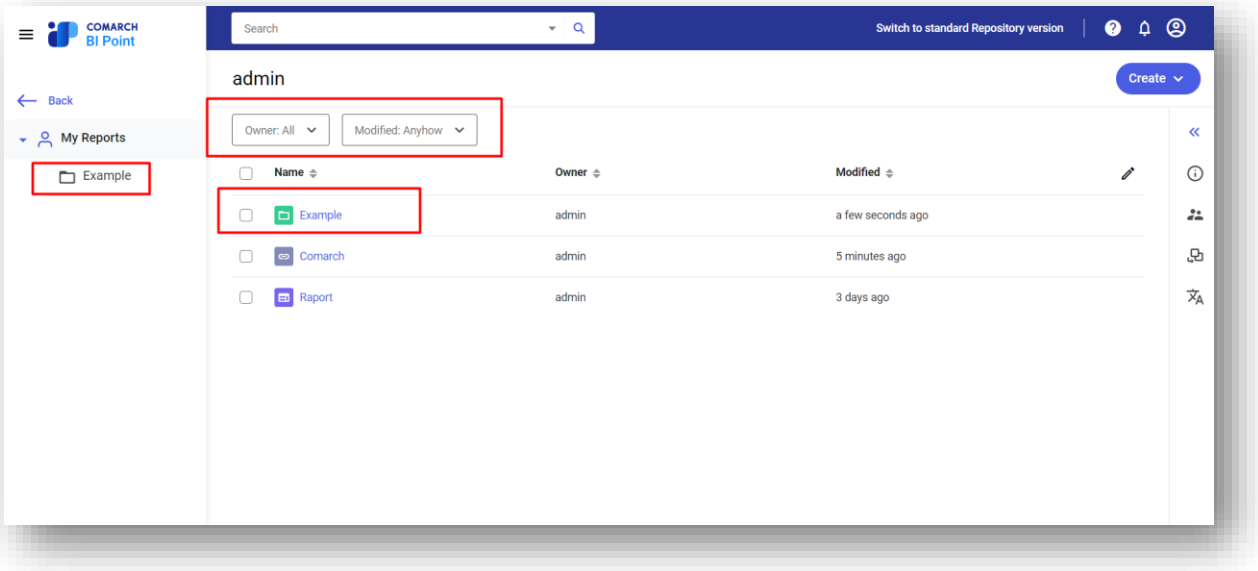
This tab includes dashboards, reports, external links, XLS files or RS reports that were marked as “favorite” in the *Reports* tab. In this tab, you can add the most frequently used reports/dasboards, for instance, in order to easily and quickly access them.

- **Recently** Opened

Recently opened reports, dashboards etc.

- **My Reports**

Selecting this tab redirects you to a user-dedicated directory.



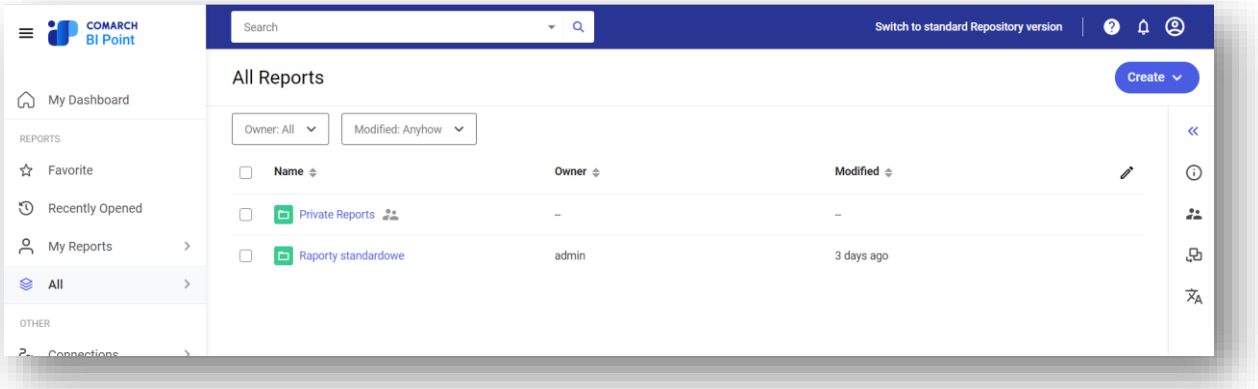
The layout of the left panel is then adapted to the currently opened view. As shown in the figure above, folders available under a specific path are displayed in the left panel.

The main part of the screen, on the other hand, displays everything that can be found under this path. In the above example, it is a “test” folder and a report named “example”.

To return to the main section of the left tab, just select [**Back**] in the upper left part of the screen.

- **All**

This tab redirects to the mail repository folder, where all child folders can be found, such as *Private Reports* and *Standard Reports*.



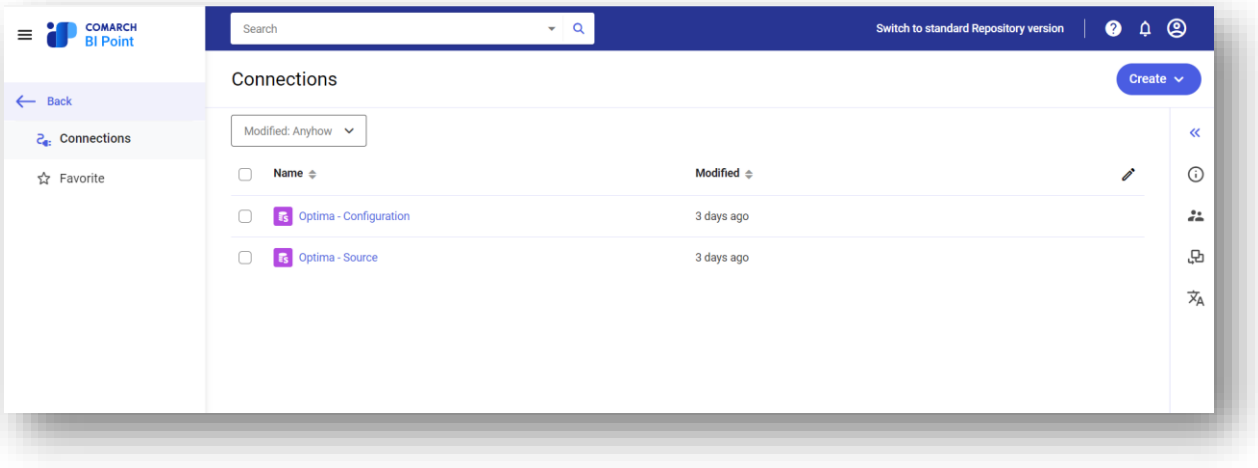
The *Private Reports* folder stores reports/dashboards created and saved by an individual user, whereas the *Standard Reports* folder stores reports/dashboards created during installation of a specific product.

However, this does not make it impossible to save reports created by users in folders other than *Private Reports.*

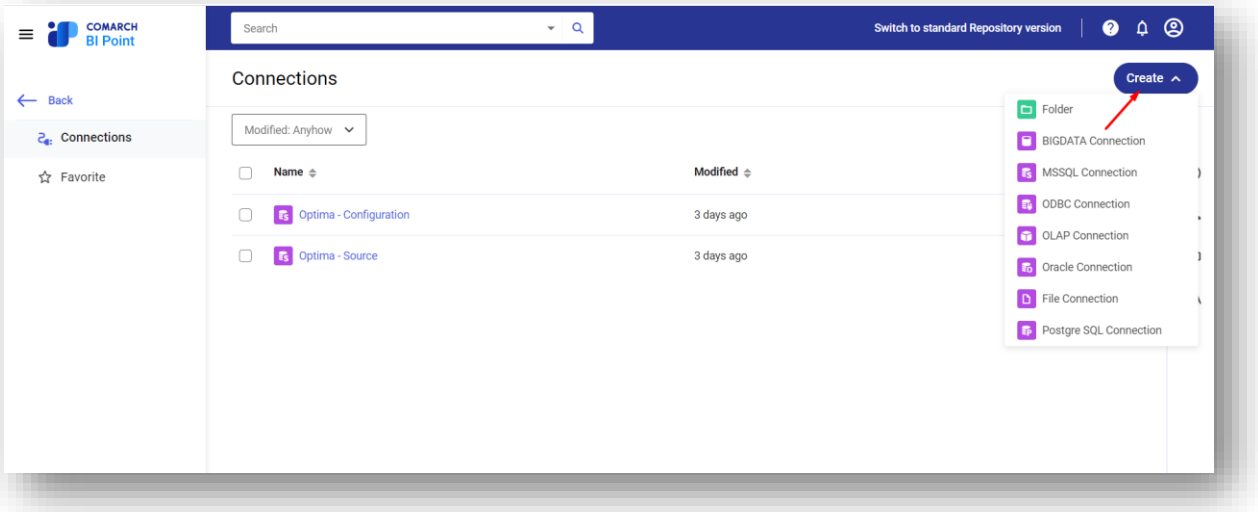
3. **Other** section is divided into 3 tabs:

- **Connections**

This tab contains information about existing connections.



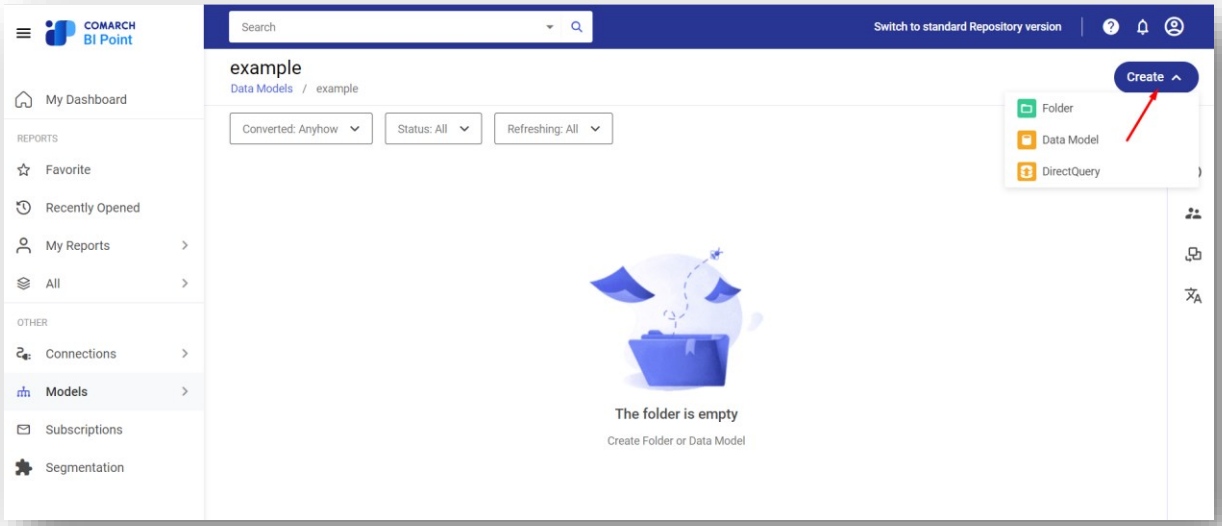
To create a new connection, select [**Create**] in the upper right corner of the screen followed by a selected connection.



For description of available connections, refer to chapter *Connections*.

- **Data Models**

This tab contains information about existing data models. To create a new data model, select [**Create**] in the upper right corner of the screen.

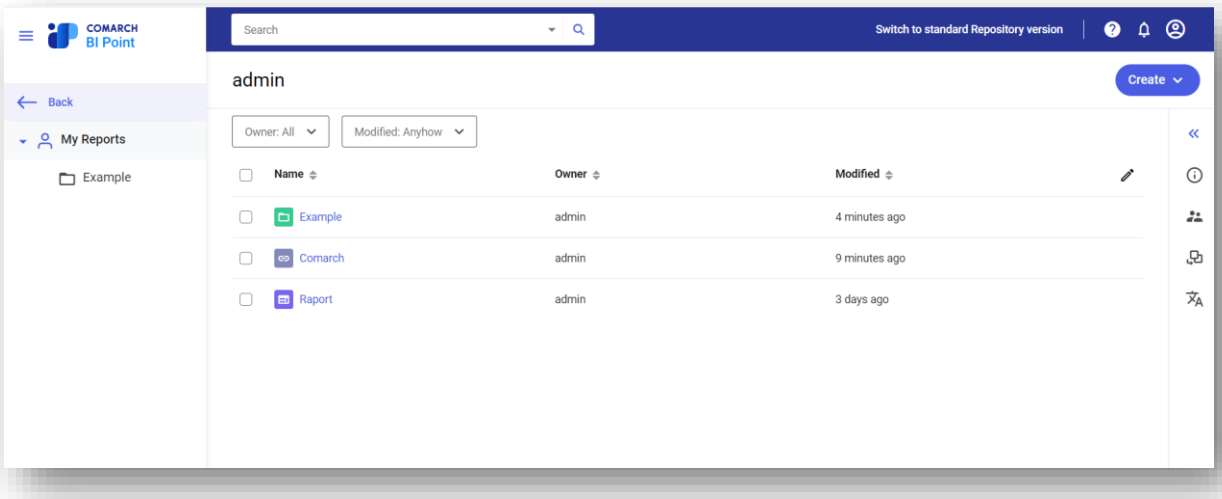


- **Subscriptions**

In this tab, you can find information about defined subscriptions.

4.3 Operations on repository objects

In each selected tab (such as *My Reports*), there are various management options (options for managing reports, folders, main screen) in the main directory.

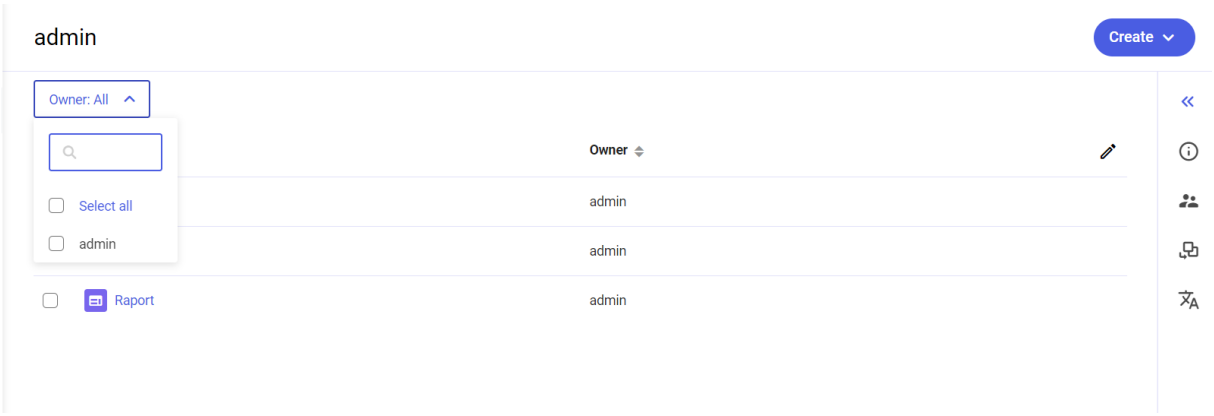


1. **Main panel options**

There are 2 main edit options of the screen displayed.

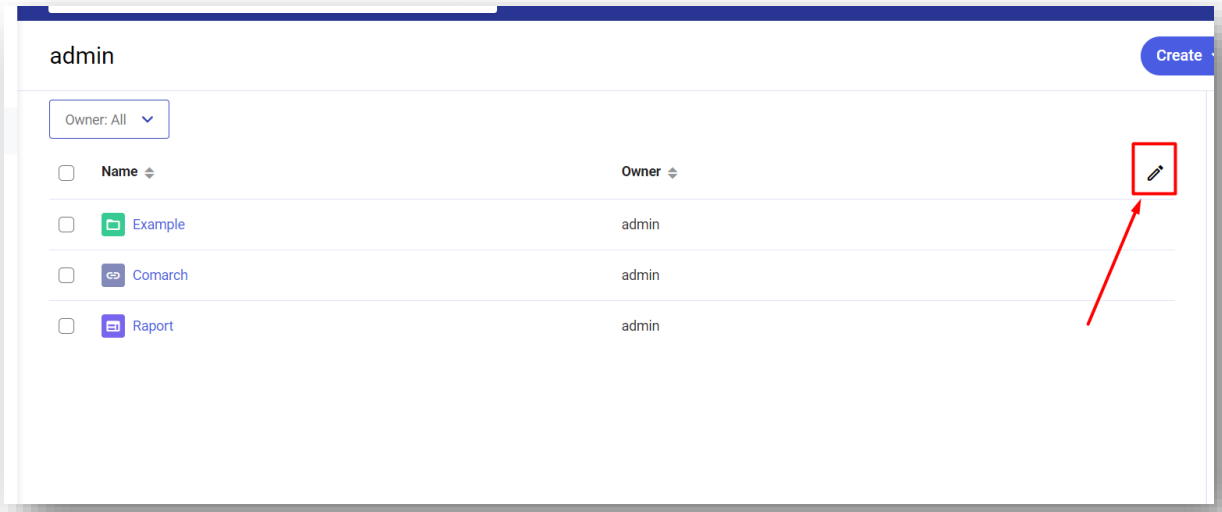
- **Column filters**

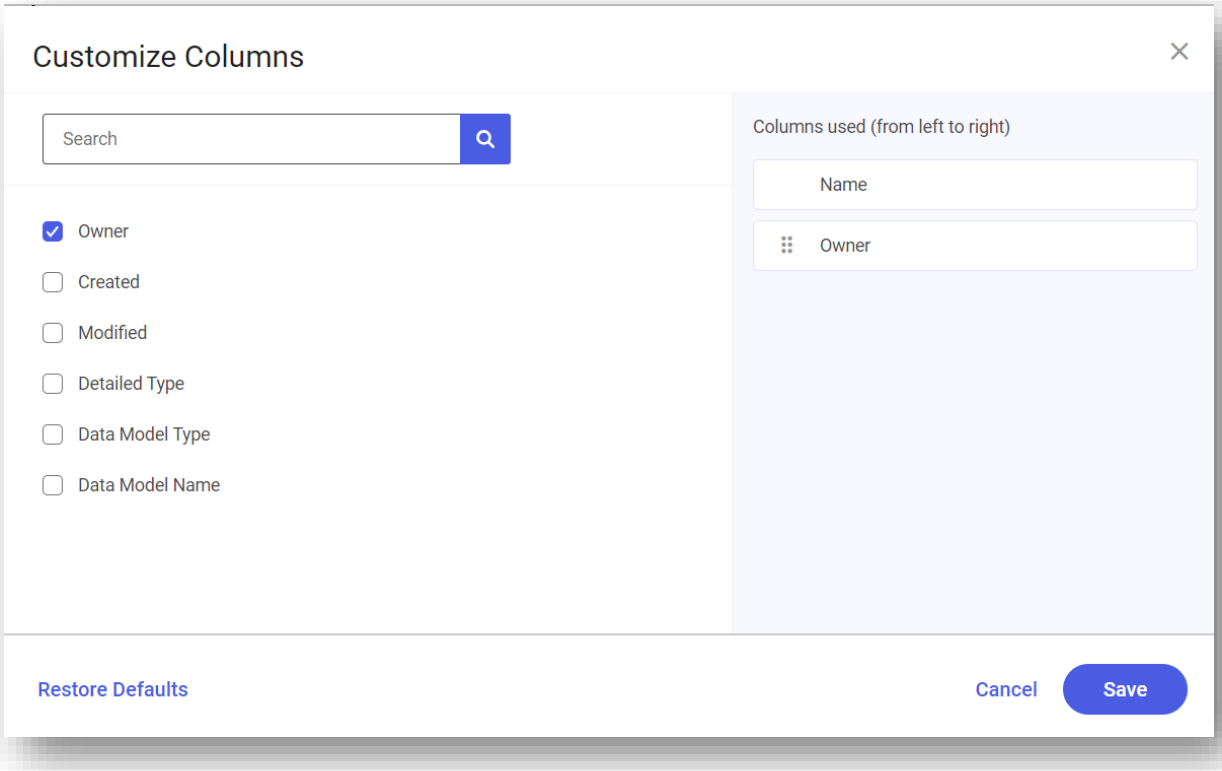
These options are used to filer a specific column according to their purpose. For instance, if you have a single column *Owners*, you can use filters to select a specific owner or group. The number of available filters depends on the adapted columns (see subsequent chapter for more information).



- **Option to view directory/report details**

Selecting the pencil icon in the main panel of the directory, you can set columns which are to be presented in folders.





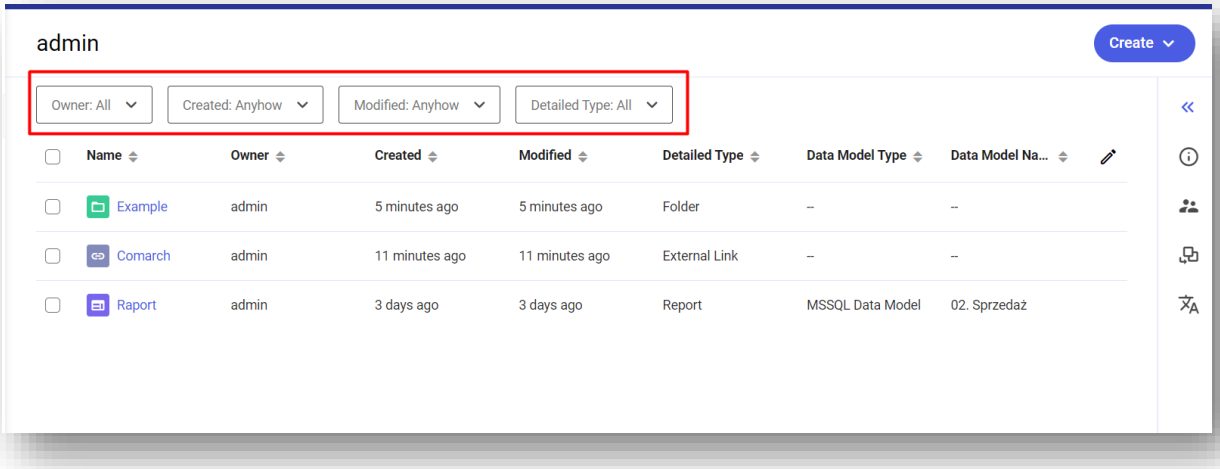
Selectable options:

- **Owner**
- **Created (date created)**
- **Modified (date modified)**
- **Detailed Type (folder, report, ...)**
- **Data Model Type (SQL, Postgres, file model, ….)**
- **Data Model Name**

The number of available columns depends of the location (path) of the user.

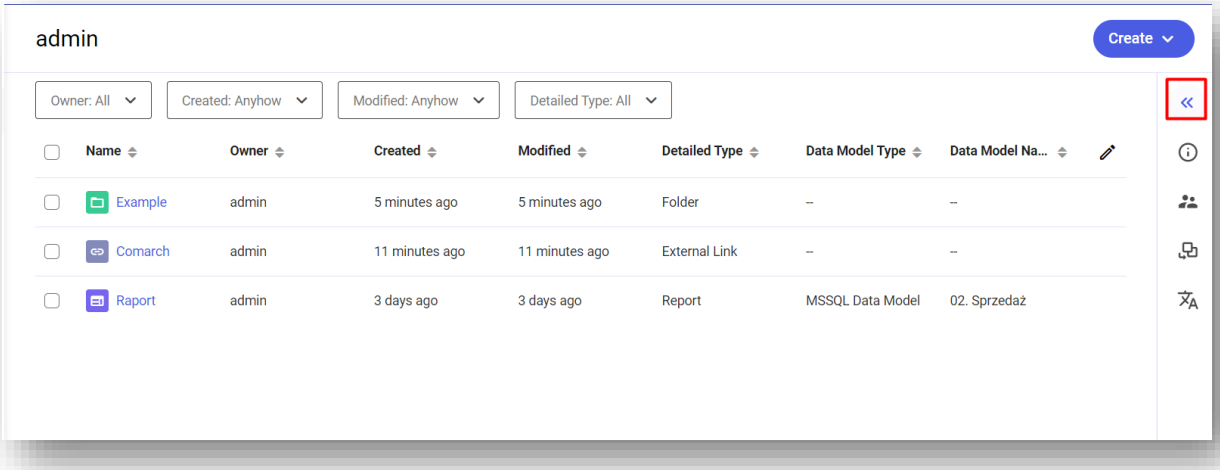
In the right side of “column adjustment”, you can set the order of columns as needed. Columns closest to the left will be arranged on top and columns closest to the right will be arranged at the bottom.

If you select a greater number of columns, additional filter options will become available, as shown in the figure below:



2. **Main panel options**

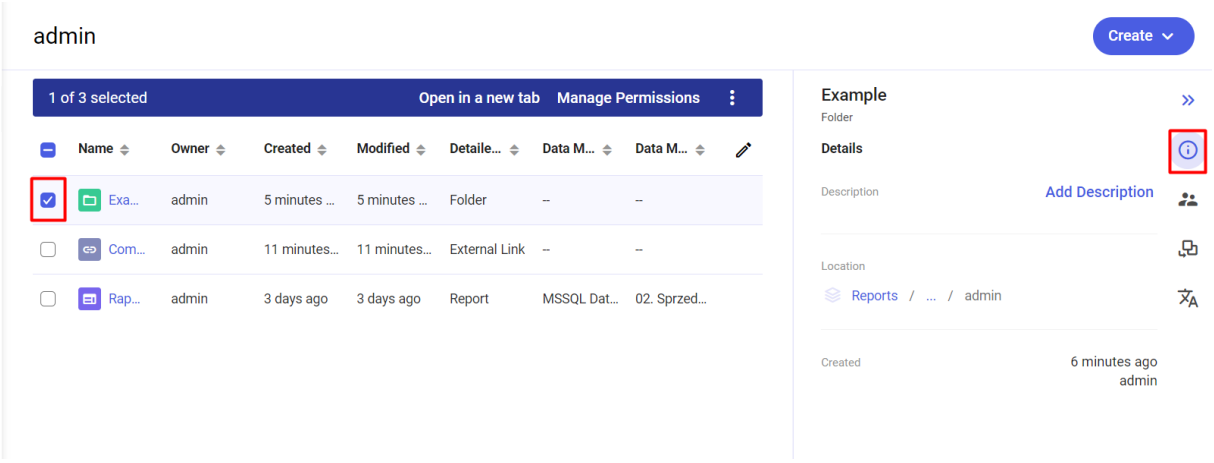
The right panel is available upon selecting **<<** available on the right toolbar on the tabs.



Available options:

- **Details**

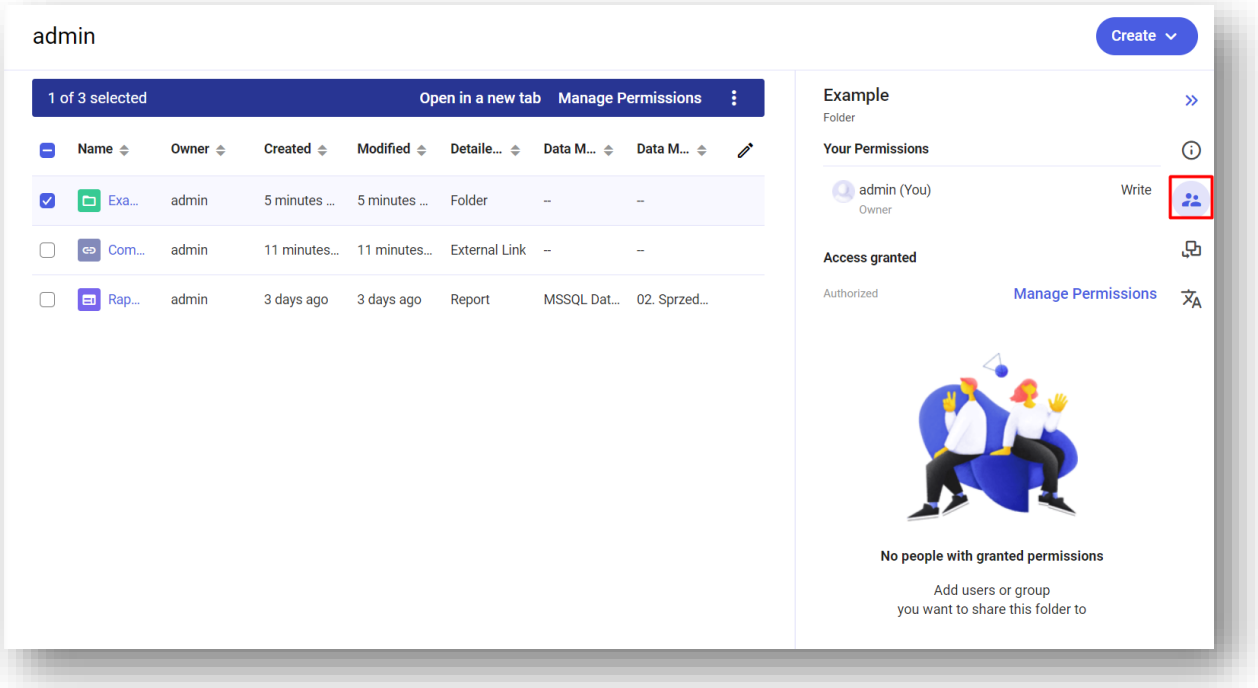
To view the details of a specific object, you need to select it and then click the details icon in the right panel.



Following information is presented on the details screen: object name and type (folder, report, ...), object description (and if missing you can add one), object location, its modification and creation dates. There may be additional information, such as data model for report, depending on the object type.

- **Access rights and authorizations**

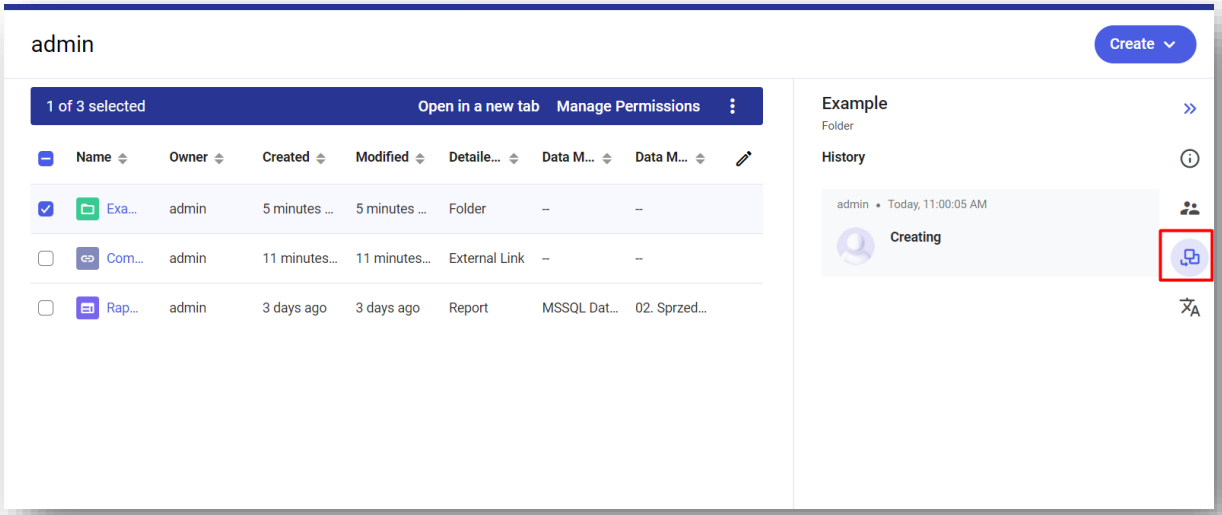
To view access rights and authorization to a specific object, you need to select it and then click the access and authorization icon in the right panel.



On the screen, you can see your authorizations as well as access rights granted to other users. In the right panel, you can also assign authorizations to users by selecting [**Manage Permissions**].

- **History**

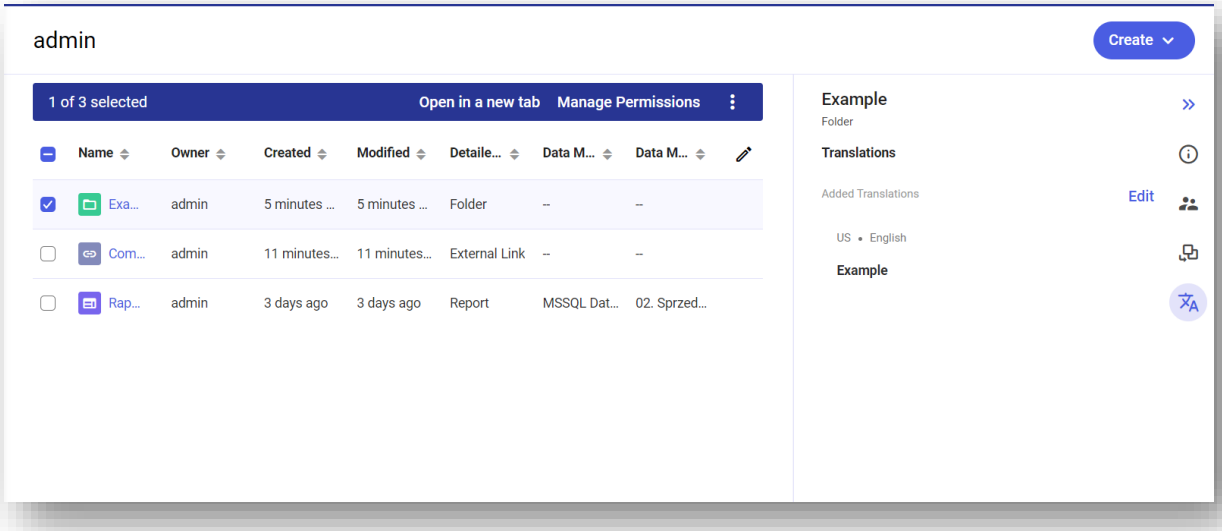
You can access an object history on the screen of report/model repository tree. The history option is available in the right context menu upon selecting a relevant icon.



You can use this option to view the history of actions performed on a given object.

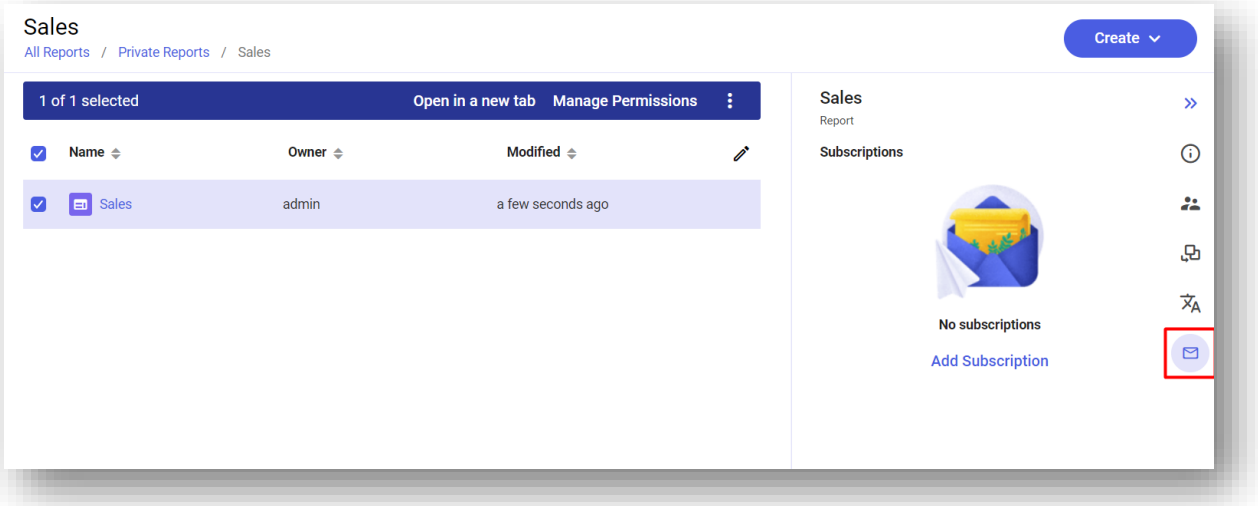
- **Translations**

BI Point application provides the mechanism for adding translations to objects. You can add translations in a selected language. Object names and descriptions are translatable.



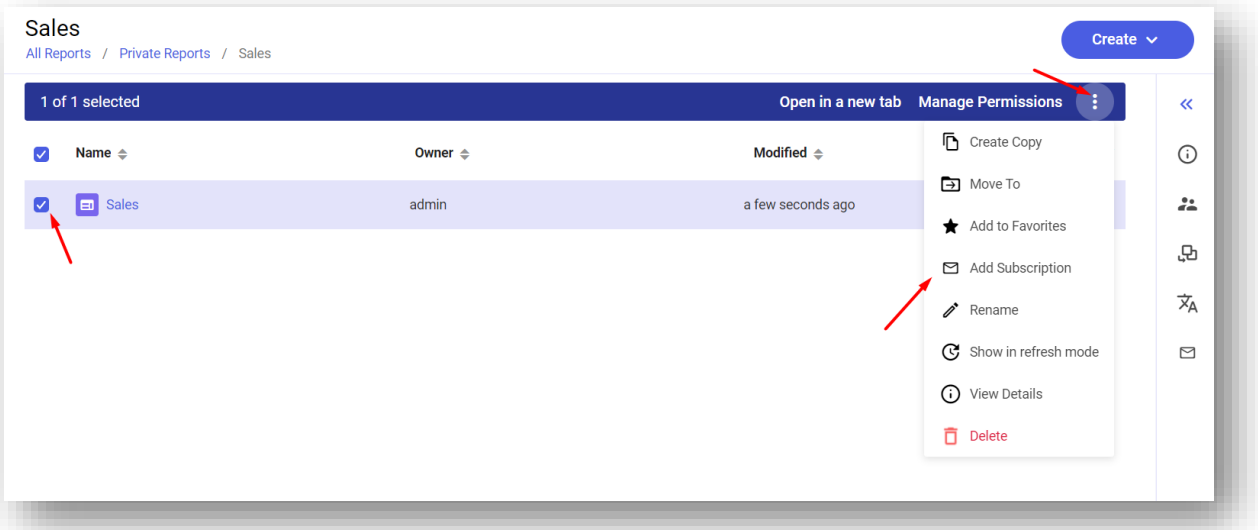
- **Subscriptions**

A subscription option is also available in the right panel, depending on the selected object. This option is available to reports and dashboards.



The panel provides information on existing subscriptions for the object. You can also define a new subscription by selecting [**Add Subscription**].

Some of the options are available by selecting an object and then dropdown kebab menu in the upper right part of the repository, as shown in the figure below.



The other options that are not available in the right panel are: *Open in a new tab* (opens a report in a new browser tab) and *Add to favorites* (adds a report to user's favorites and displays it in the left panel under the *Favorites* tab).

5 Initial start-up and configuration of BI Point

Access to the application requires appropriate access permissions. Verification of permissions starts in the first window – login window. Upon selecting the *Login* button, you will be asked to provide your login and password and for this purpose, you will be transferred to another window, where you can select a welcome window language.

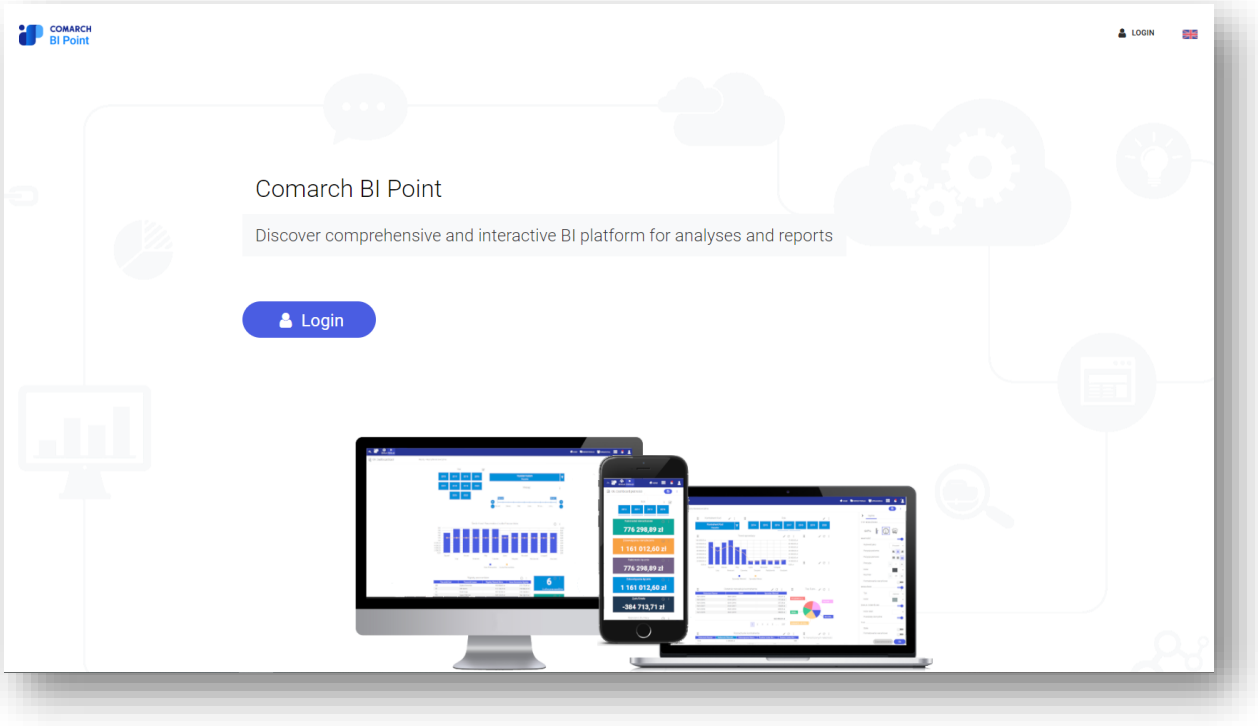


Figure 1 Comarch BI Point welcome window

In order to log on to the application for the first time, you must provide a login and a password according to the authentication mode selected during application configuration (domain-based authentication/login: password). The password can be changed upon logging in. Description of how to change a password can be found further in this manual.

The login option after several unsuccessful login attempts is set to blocked temporarily, by default.

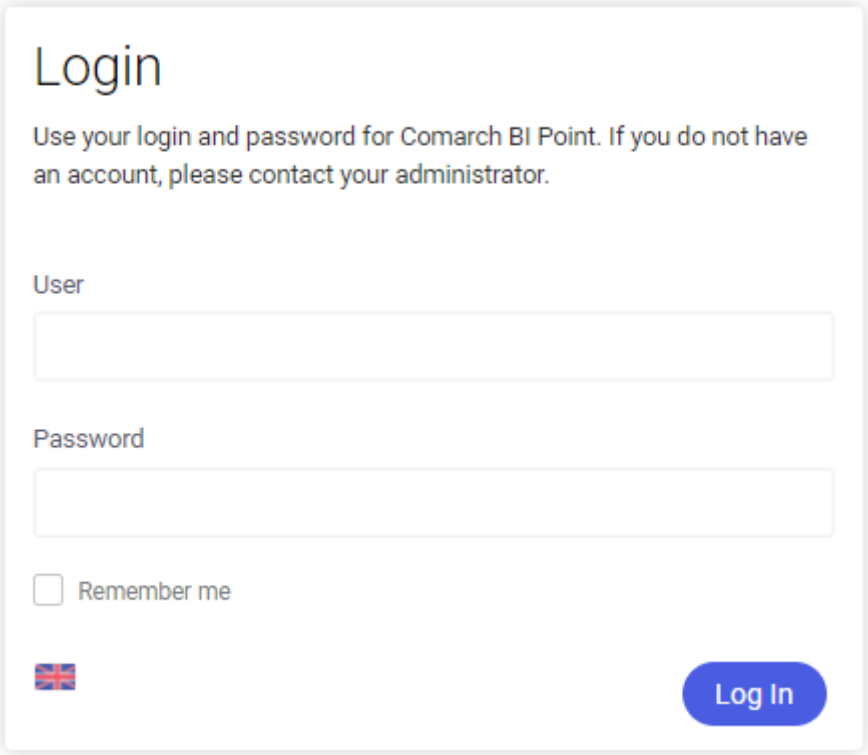


Figure 2 User login window

Upon logon, you are automatically transferred to the home screen – visible on the top bar as *Home*. By default, the predefined presentation dashboard is displayed there. When working with the application, you can define own Home dashboard that will be displayed on the start screen. In the application top bar, you can find shortcuts that can take you to the section, where you can manage access to the application.

Figure 3 Upper bar

If you used BI Point application version older than 7.0, then you need to create again the saved link opening the application in a Web browser or to install a Rewrite Module on IIS server: https://www.iis.net/downloads/microsoft/url-rewrite. Next, in BI Point setup folder, in the web.config file, you need to add the following:

```
<rewrite>
      <outboundRules>
      </outboundRules>
      <rules>
        <clear />
           <rule name="RewriteWebPagesToMVC" stopProcessing="true">
          <match url="^(.*)$" />
          <conditions logicalGrouping="MatchAll">
```

```
        <add input="{PATH_INFO}" pattern="^(.*?)(\/Views)(.*)(\.aspx)$" />
      </conditions>
      <action type="Redirect" url="{C:1}/Pages{C:3}{C:4}" />
    </rule>
   </rules>
</rewrite>
```

```
<?xml version="1.0" encoding="utf-8"?>
<configuration>
  <!--Istniejąca zawartość pliku-->
  <rewrite>
    <outboundRules>
    </outboundRules>
    <rules>
      <clear />
      <rule name="RewriteWebPagesToMVC" stopProcessing="true">
        <match url="^(.*)$" />
        <conditions logicalGrouping="MatchAll">
          <add input="{PATH_INFO}" pattern="^(.*?)(\/Views)(.*)(\.aspx)$" />
        </conditions>
        <action type="Redirect" url="{C:1}/Pages{C:3}{C:4}" />
      </rule>
    </rules>
  </rewrite>
</configuration>
```

Figure 4 Example of how to paste the script to the web.config file

You can customize the logo that is displayed before and after logging on to the application. The logo can be customized in the PromoPageConfiguration.json file that can be found under C:\Program Files (x86)\Comarch\BI Point\instances\INSTANCE NAME\bipoint\AdditionalConfiguration.

You can add a custom logo to the promo page by changing the values of the paths: HeaderLogo, FooterLogo and NavidationLogo, depending on which logo is to be changed.

To add a custom logo to the main BI Point application (the one in the upper left corner after logging on to the application), you need to change the values of the following paths:

- **BIPointLogo (for applications used on a computer)** – the image size must be the following: width = 112px, height = 30px (if the image size is different, it will be scaled accordingly)
- **BIPointMobileLogo (for applications used on a phone)** – the image size must be the following: width = 30px

Note: The image paths should only contain a file name: {filename with a file format} to ensure that BI Point reads them properly.

The required image file extension is .png.

The image files should be added to the folder: AdditionalConfiguration to ensure that BI Point loads them correctly.

To change an address in the footer, type the appropriate values in the *Address* field:

AdressFirm – company name (default name is “Comarch SA”)

AdressStreet – street number (default address is al. Jana Pawła II 39 A)

AdressPostalCode – zip code and city (default value is 31-864 Kraków).

To change the main title, type appropriate values and translations to PromoScreenErpMainTitle and PromoScreenErpTitle. All translations to the provided keys are retrieved only when they are provided in configuration – if no translations are provided in the configuration, they are retrieved from BI Point resources. If all the keys are empty, then the default values are retrieved.

5.1 Permissions

The standard *Permissions* tab is divided into several subtabs.

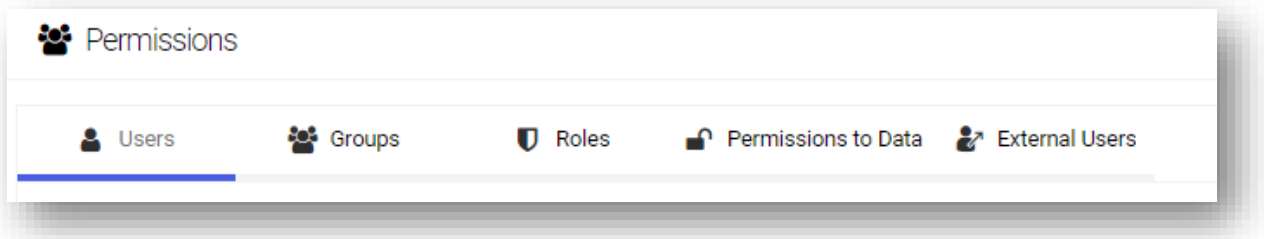


Figure 5 Tab *Permissions*

Information on the number of available and used licenses can be found under the *Permissions* tab.

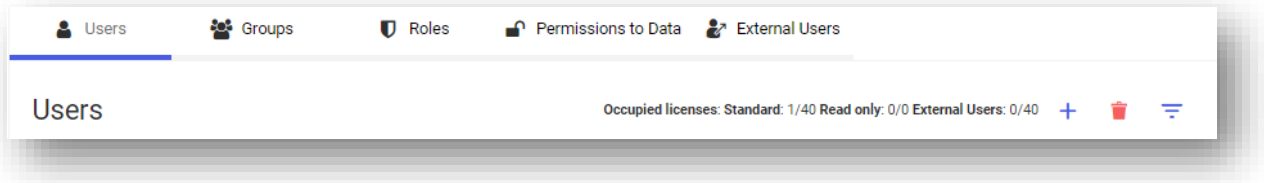


Figure 6 Information on the number of used licenses

Licenses are divided by type:

- Standard licenses
- Read-only licenses (licenses available for dedicated BI Point solutions)
- Subscription licenses for external users

Subtab *Users* allows for creating accounts for new users and editing already existing accounts. In order to add an account, click on the button + . Then, specify login which has not been used yet and fill in data in tab *Profile*.

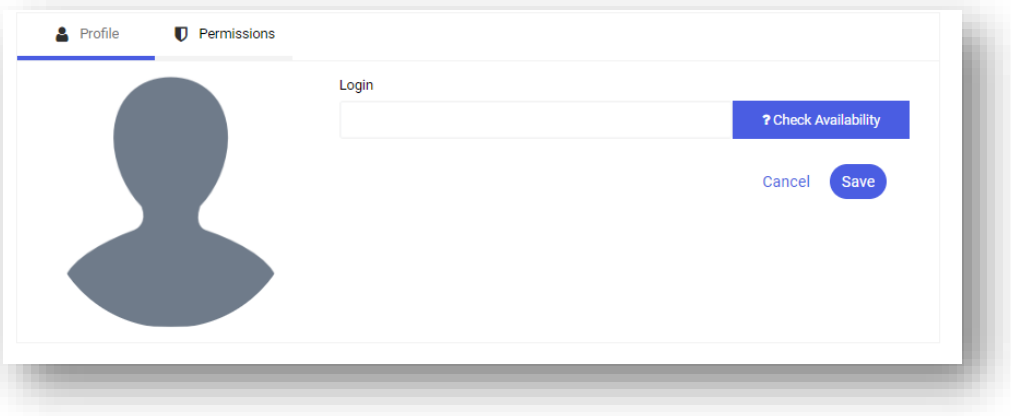


Figure 7 Creating an account

After the login availability is verified, you can enter the other data:

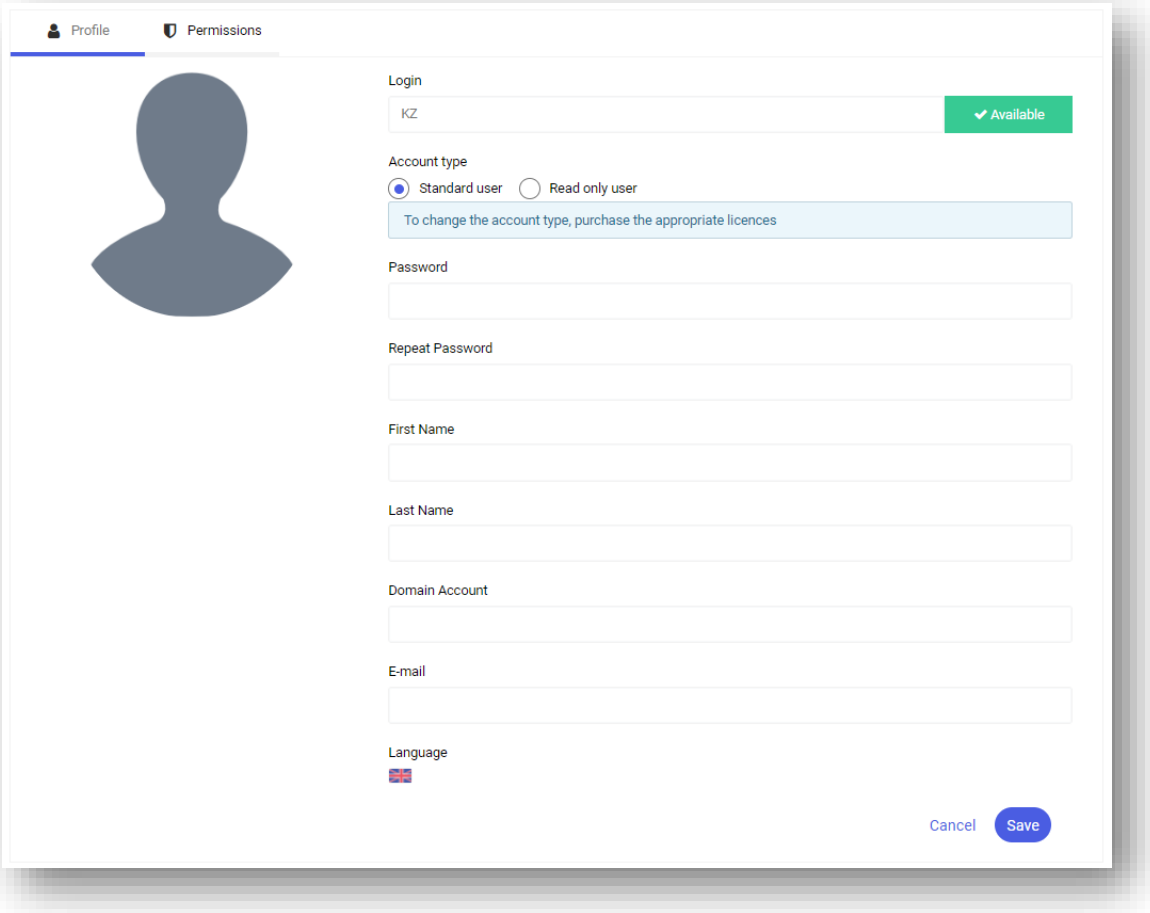


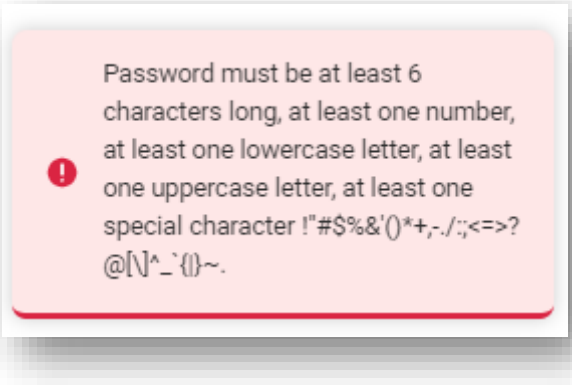
Figure 8 Creating a profile

In the above window, it is possible to enter a domain user who has a role assigned in OLAP.

In the case of such license, it is also possible to select whether the user must get the standard license or the read-only license.

Note: In case the application is configured with a domain-based authentication, a user login cannot then contain Polish characters.

Note: If login/password are used to log in, the password must contain 6 characters minimum, including at least one digit, at least one lowercase letter, at least one uppercase letter, at least one special character. If any of these conditions are not met, a relevant message is then displayed in the upper right corner.



In the *Permissions*, it is possible to assign users to roles and groups. Clicking [**Save**] completes the account creation process.

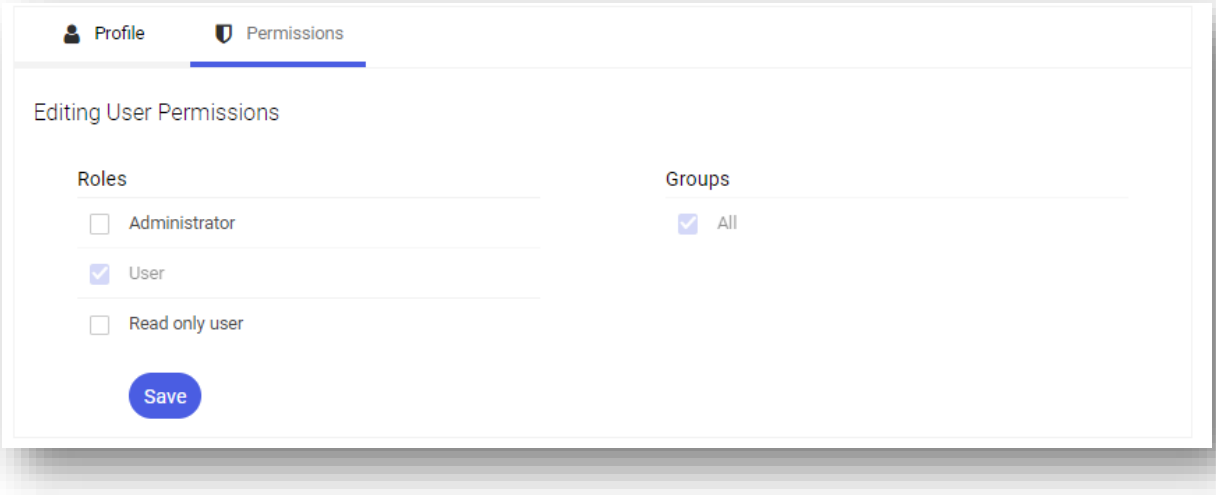


Figure 9 User account permissions

In order to edit an existing account, click on [**Edit**] button in tab *Users*. From this level, it is possible to change roles and groups to which a user is assigned and change password to the account.

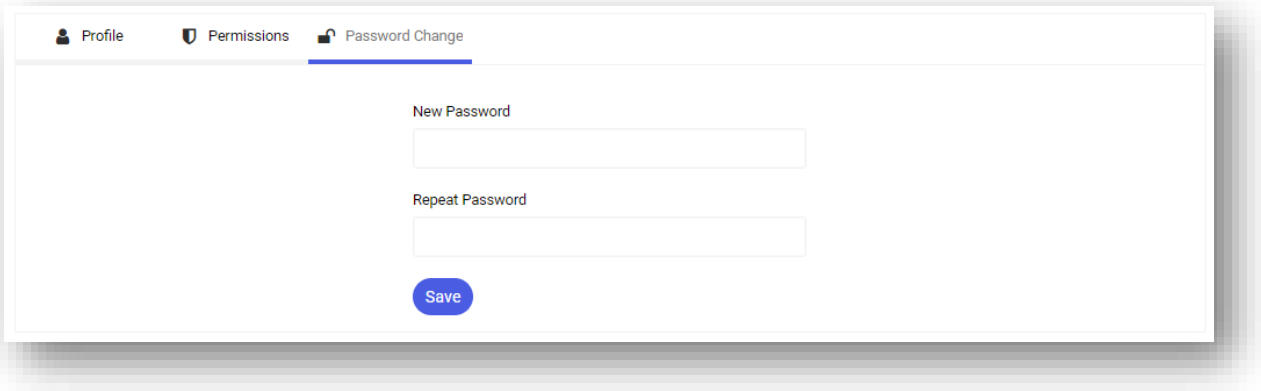


Figure 10 Changing password

In the second subtab *Groups*, it is possible to create groups for users. These are used, e.g., in a subscription.

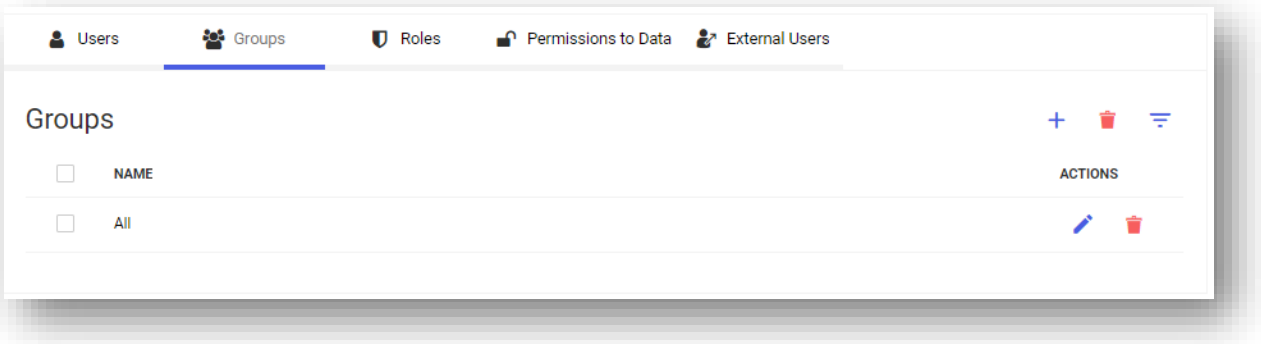


Figure 11 Subtab *Groups*

The third subtab is *Roles*. It this tab you can create, delete and edit the roles containing user permissions. The following permissions are available for selection:

- **Connection User** – a BI Point user has access to the connection repository
- **BI Point Administrator** with access to all the application frameworks
- **Access to BI Point** – a user has access to the repository elements (connections, data models, reports) according to the access levels assigned to particular objects (no access, preview, restricted access, edition)
- **Subscription Administrator** – access to the subscription module for BI Point user (a user can manage and create own subscriptions, but has no access to subscriptions of other users)
- **Data Model User** – a BI Point user has access to the data model repository
- **Read Only User** – a BI Point user can only view the reports and dashboards

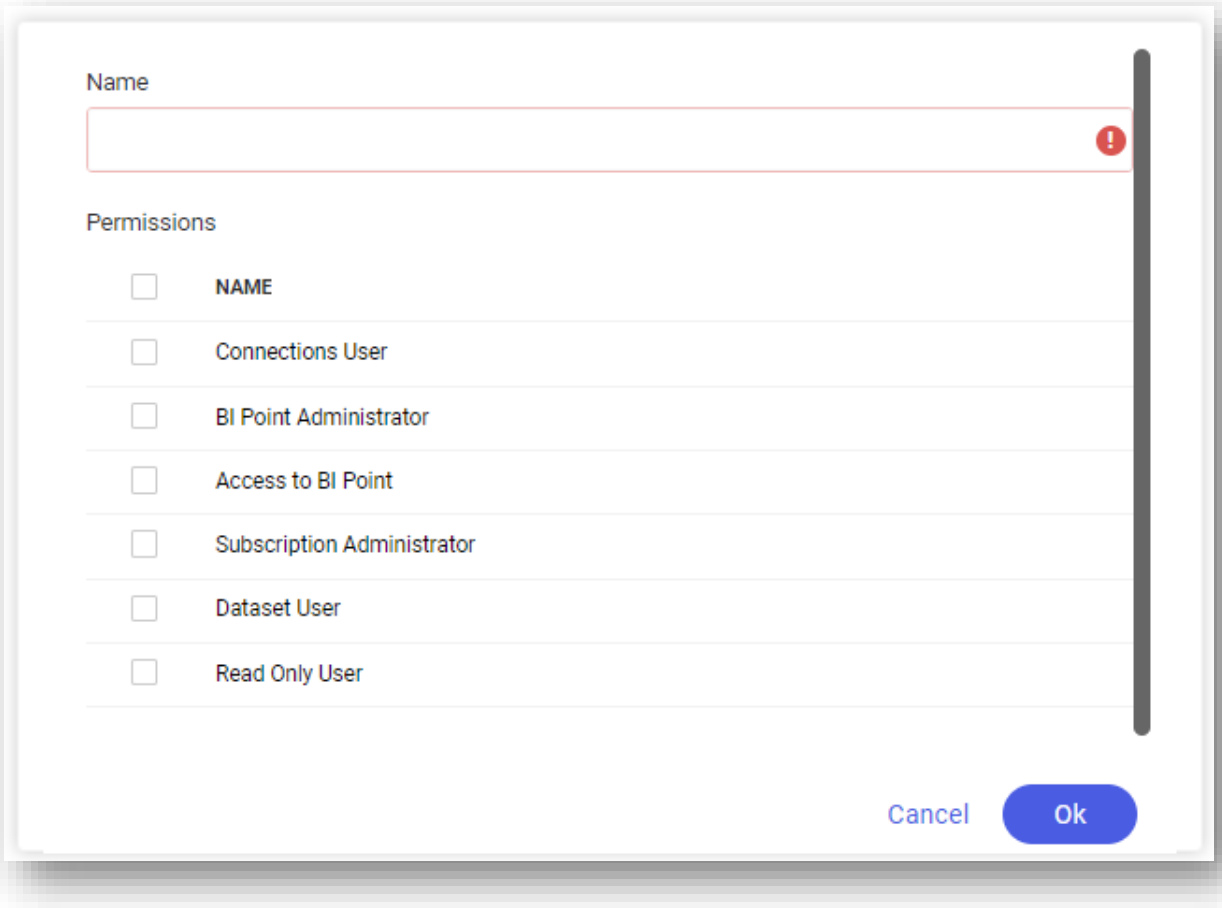


Figure 12 User permissions

The last subtab is *External Users*.

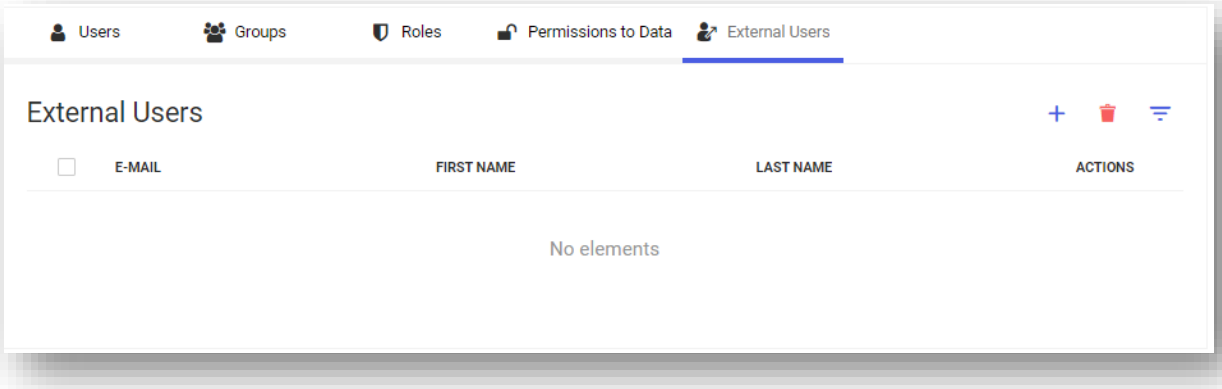


Figure 13 External users

An external user can be added upon selecting the button + . To add an external user, it is necessary to provide the user's e-mail address and personal details.

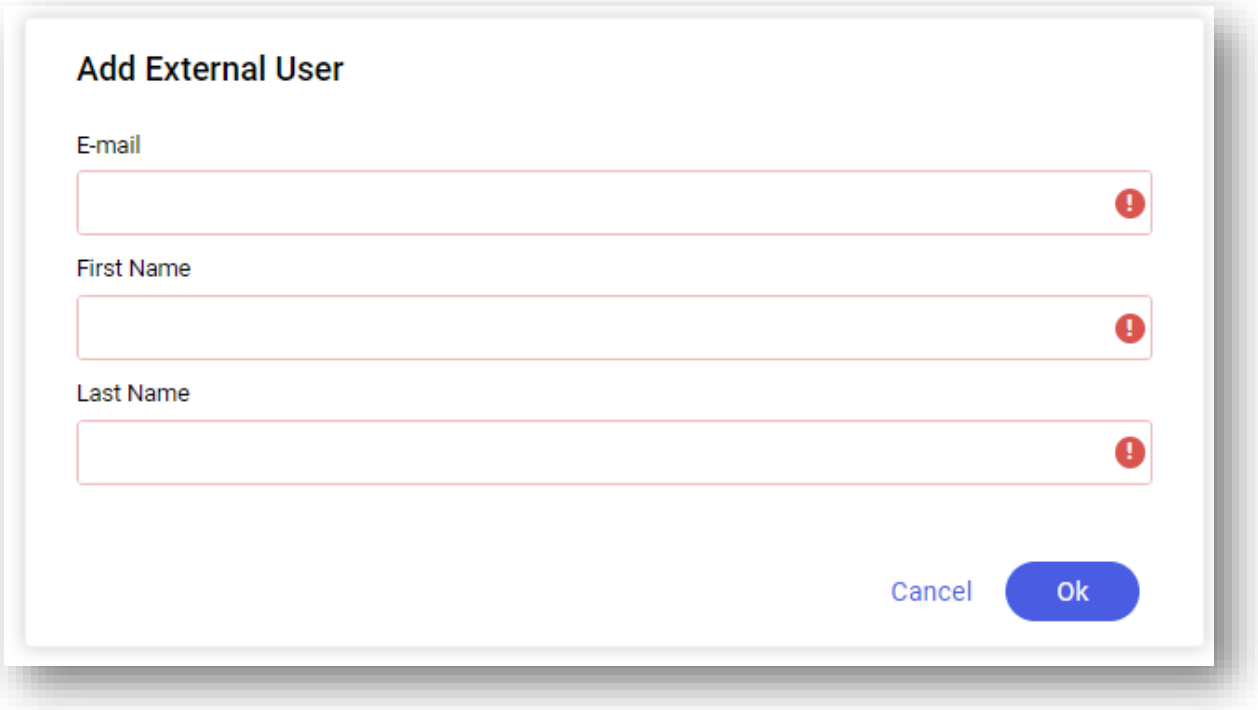


Figure 14 Adding an external user

Note: BI Point supports the mechanism for transferring roles from an OLAP database to reports and dashboards. For the mechanism to work properly, it is necessary to revoke the user's administrator rights on the server with OLAP database.

In the *Data Permissions* tab, it is possible to grant permissions to specific measures and dimensions on data models for individual users.

Note: The tab is hidden, by default. Visibility of data permissions at the interface is controlled with the true/false value in the PROD_RestrictRolesManagementEnabled column of the rb.Products table.

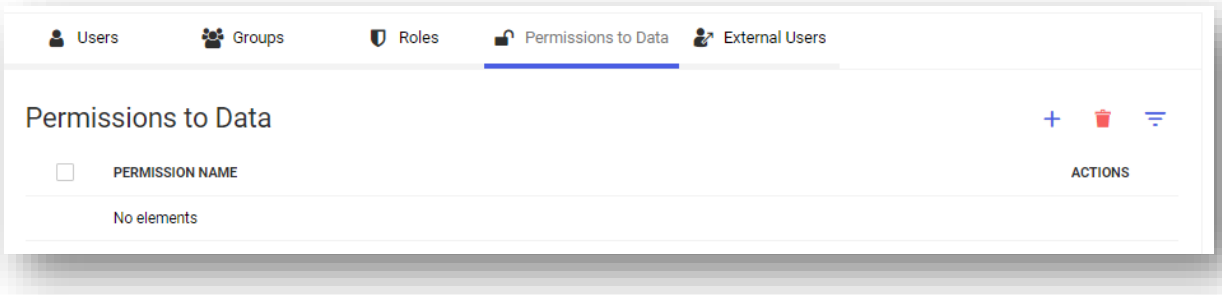


Figure 15 Visible *Data Permissions* tab

A new permission is created by selecting a data model (or models) from the list.

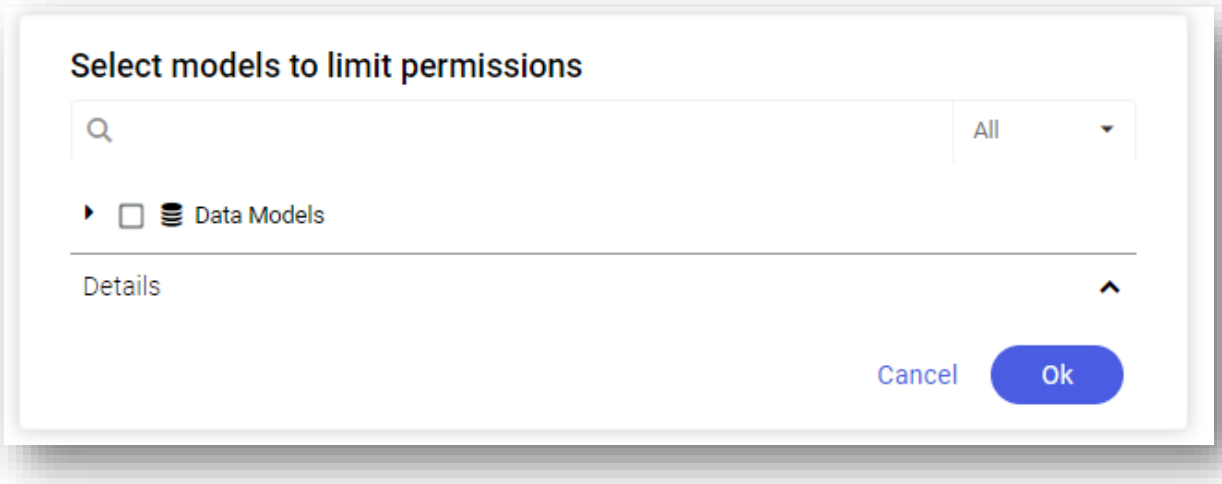


Figure 16 Selecting a data model to limit permissions

Selecting a data model activates a permission configuration field containing a drop-down list with model elements (measures and dimensions) in the first tab.

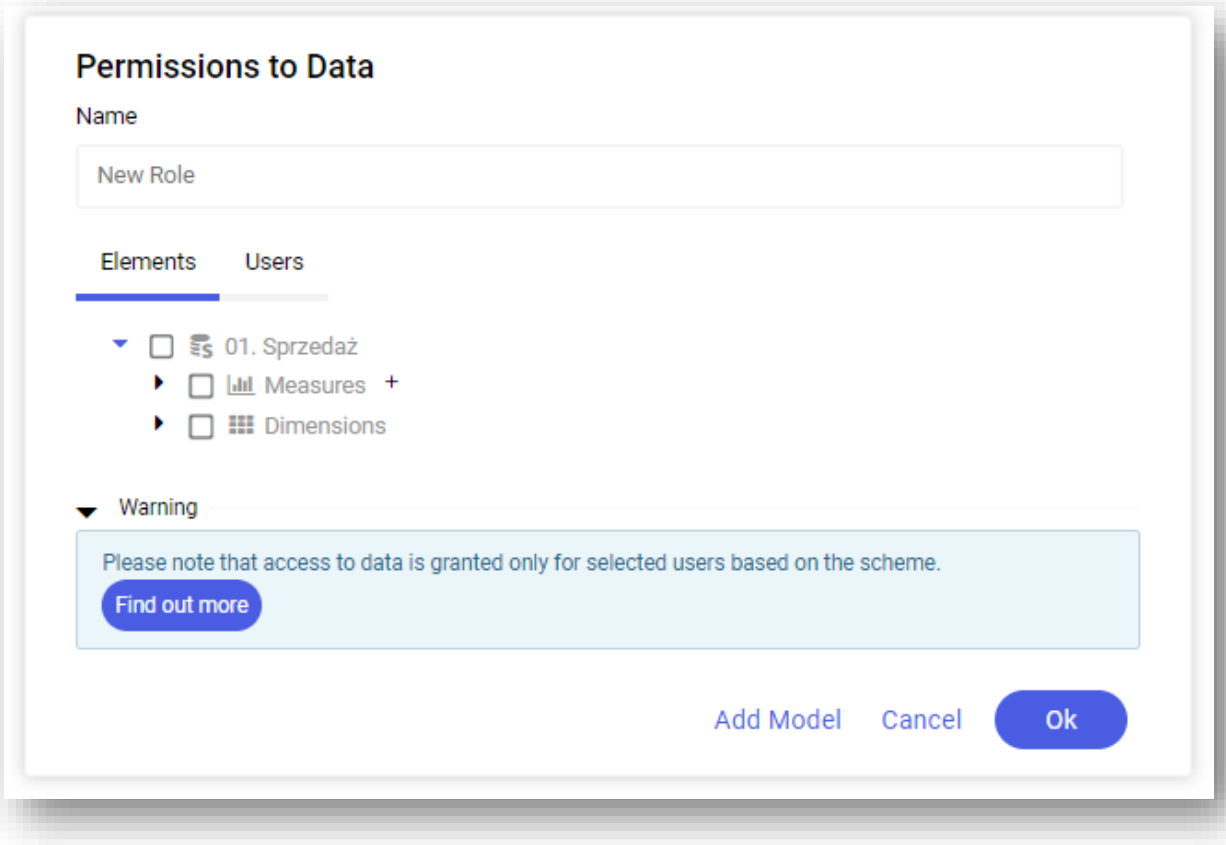


Figure 17 Loaded measures and dimensions of data model

By selecting the checkboxes available by individual elements, the permission in set according to the legend available under the [**Find out more**] button.

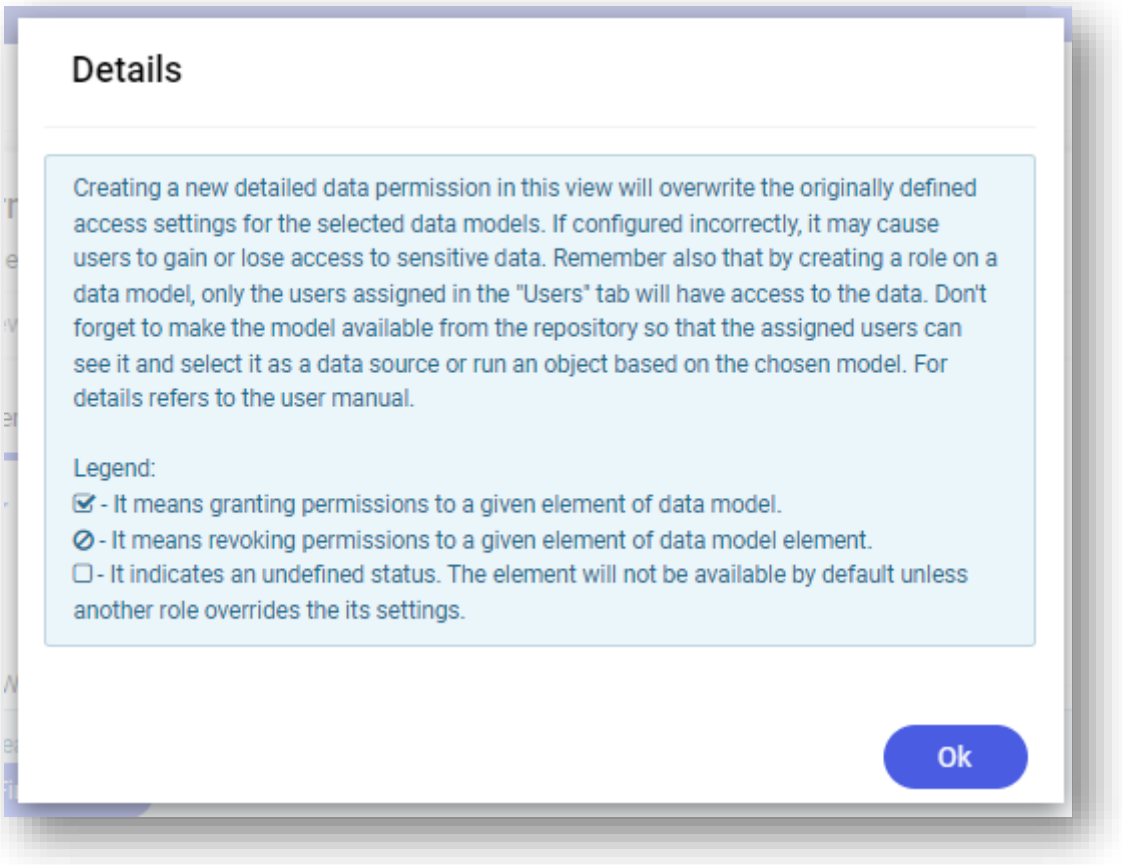


Figure 18 Details window content

Expanding a given dimension opens a new window with a list of all values of that dimension. That list can be next be filtered to the values to be available (or unavailable) for the user, for whom the role is being created.

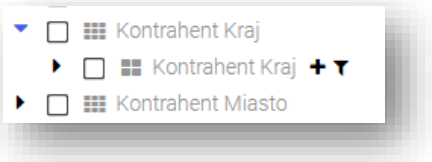


Figure 19 Listed values

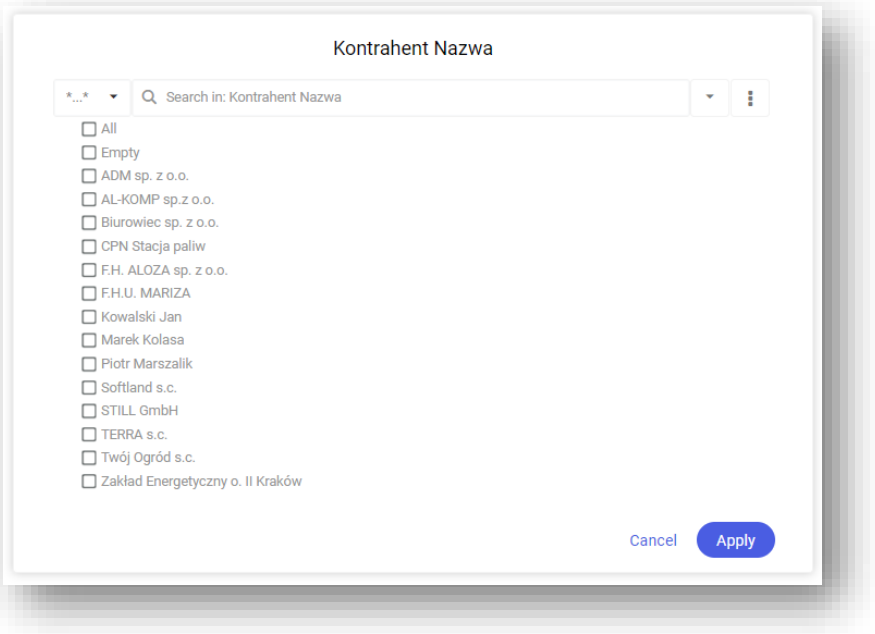


Figure 20 Expanded dimension *Customer Name*

If several elements are selected, upon confirmation and back to the entire model, they will be displayed on the element list, whereas the filter icon (funnel) by the dimension name will turn blue. It means that despite the selected dimension (with a checkbox by its name), not all its elements will be added to the user permissions. Selected checkbox by the dimension name will refer to only those elements that have been added to the list beneath the dimension.

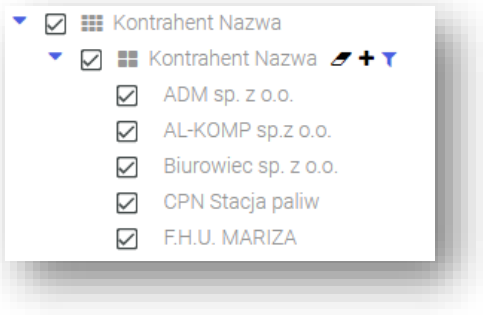


Figure 21 Expanded dimension *Customer Name*

The initially applied filtering can be quickly removed with the rubber button.

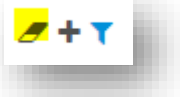
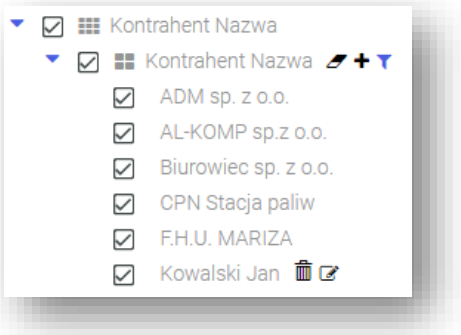


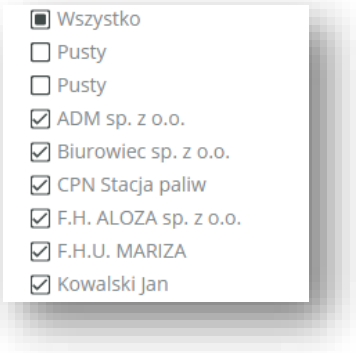
Figure 22 Expanded dimension *Customer Name*

The “+” button is used to enter the name of a given dimension element, e.g. in case permissions are created prior to reloading the model.



Note: When typing a dimension name manually, its unique name must be used (not, e.g. its translated version).

After the model is reloaded, the element will already be presented as selected after expanding the values of the dimension elements.



In case of granting permissions to hierarchical elements, first it is necessary to select which elements are to be added to the measure and dimension tree visible on the element form.

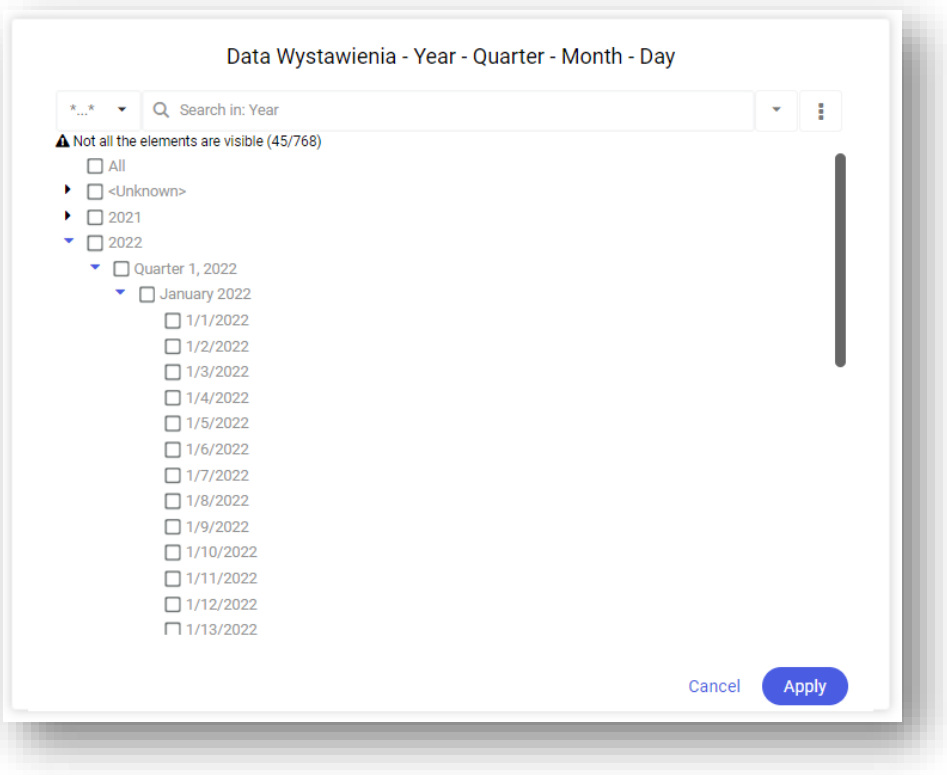


Figure 23 Permissions to a hierarchical model

Then, select the levels to which the permissions must apply.

Using the rubber icon, it is possible to specify whether the user will be working with a full filtered set or a full set to which additional elements can still be added (to which the same permissions will be added automatically).

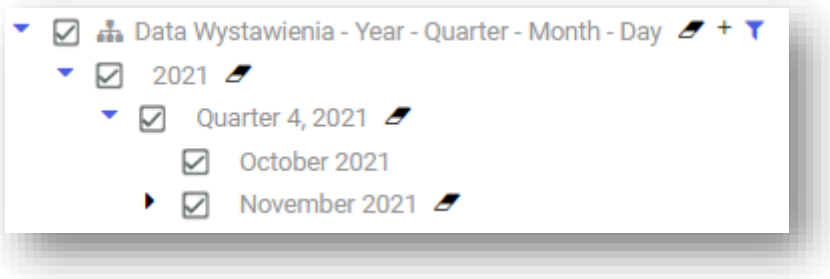


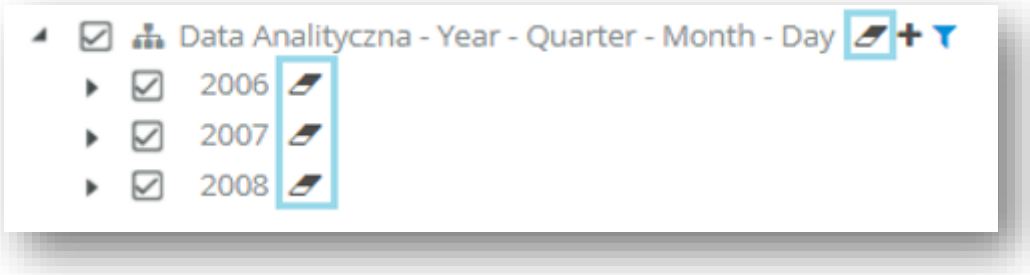
Figure 24 Access to all elements of the October level and access to the selected elements of the November level

When creating a new role, it is possible to attach to is a greater number of models using the [**Add Model**] button.

It is possible to create several roles that will refer to the same data model. If the user is entitled to use a given element in the same model on one role, whereas these permissions are denied on another role, then the effective permissions will result from the user's minimum permissions – in this example, that element will not be accessible for the user.

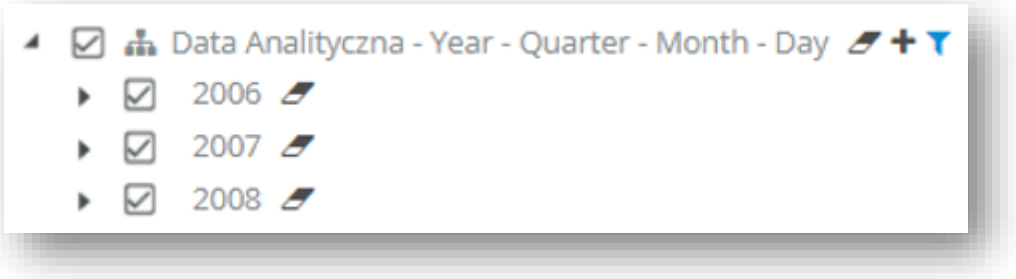
It is important how permissions are granted to hierarchical elements – in the case of permissions to data, it affects significantly the performance of loading filters.

When modifying or creating permissions to data so that it is not accessible in hierarchical dimensions, the rubber button should be used (for optimization purposes):

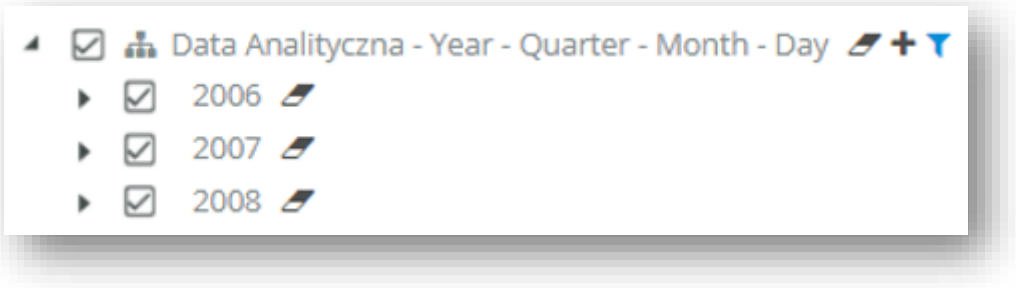


The use case below is to add limited access to data in the period of 2006 – 2008.

If all these years are selected as shown below, their child elements (meaning all days) are also selected. If this being the case, when editing such permission (when attempting to access the filter of that dimension), the engine service will filter all child elements, which may result in a timeout.



After using the rubber icon, all the child elements will be cleared and the filter will apply only to the three parent elements, thus the engine works much faster.



Note: When granting permissions, parameterized models are called up with the default parameters.

Note: In multi-source models, permissions to component models will not transfer to the final multi-source model. Models with already added permissions cannot be used within multi-source models.

Note: After granting the user permissions to a data model, the user will not be able to use that model in multi-source models. In order to restore such a possibility, it is necessary to remove the entire permission (from measures and dimensions). Removing itself the model from the permissions will not restore the possibility of using the model.

Comarch BI Points provides four permission levels that can be defined for each user group/user in reference to both folders and reports. Permissions by importance in ascending order are the following: *Edit*, *Limited*, *Preview*, *None*. Permission *None* is the most important and superior to other permissions. Thus, if a user is entitled to read and the user group to which that user is assigned has no access to a given object, then that object will not be visible to the user on the report tree. If no permissions to the object are assigned directly for the user or the user group, they are retrieved from the from the very first parent element under the hierarchy of folders and reports, for which they have been defined. Permissions to a report or folder that the user actually holds can be checked in the *Effective Permissions* tab.

5.2 Administrator dashboard

Clicking the  icon drops down the menu with options making possible to proceed to the administrator dashboard, where it is possible to view both application and SQL logs.

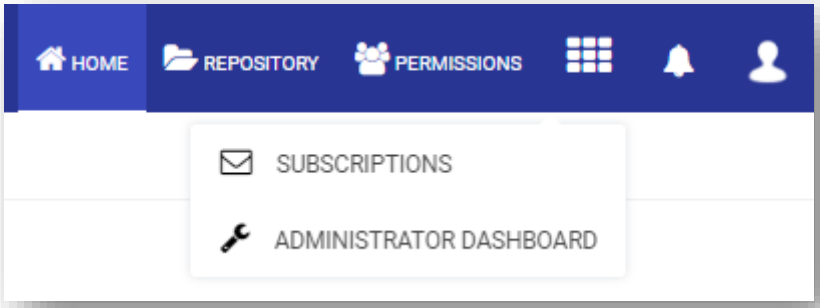


Figure 25 Administrator dashboard

The administrator dashboard can be accessed by users with administrator privileges.

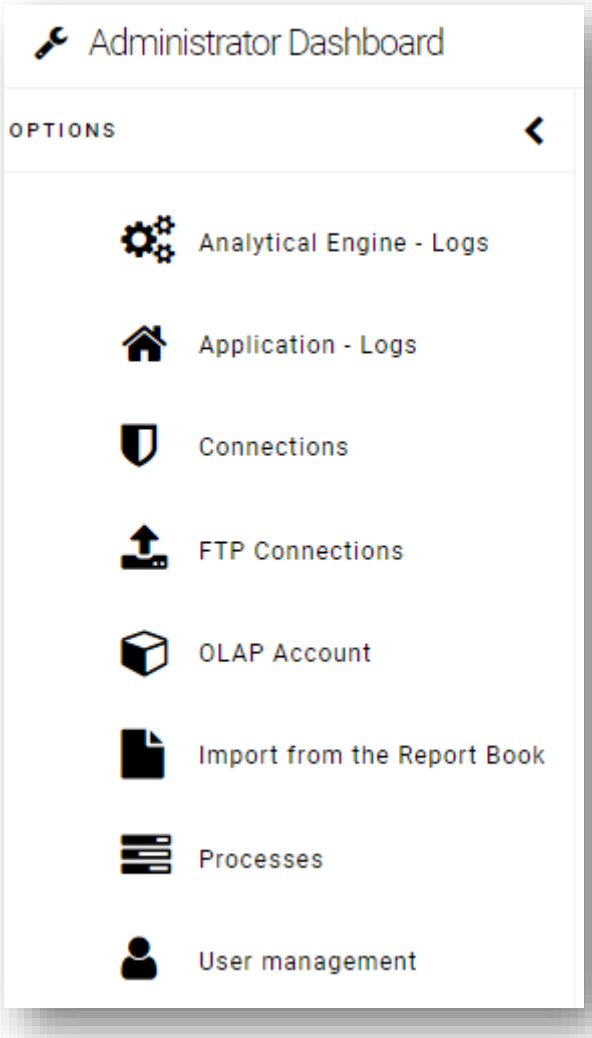


Figure 26 Administrator dashboard

In tabs *Analytical Engine* and *Application*, there are logs that register all the information about errors.

In the *Administrator Dashboard*, in sections *Connections* and *FTP Connections*, it is possible to set details of:

- e-mail connection
- geolocation database
- analytical engine
- segmentation database

Note: As of 11.2 release, after e-mail is completed/changed in the administrator dashboard, it is no longer necessary to restart the service.

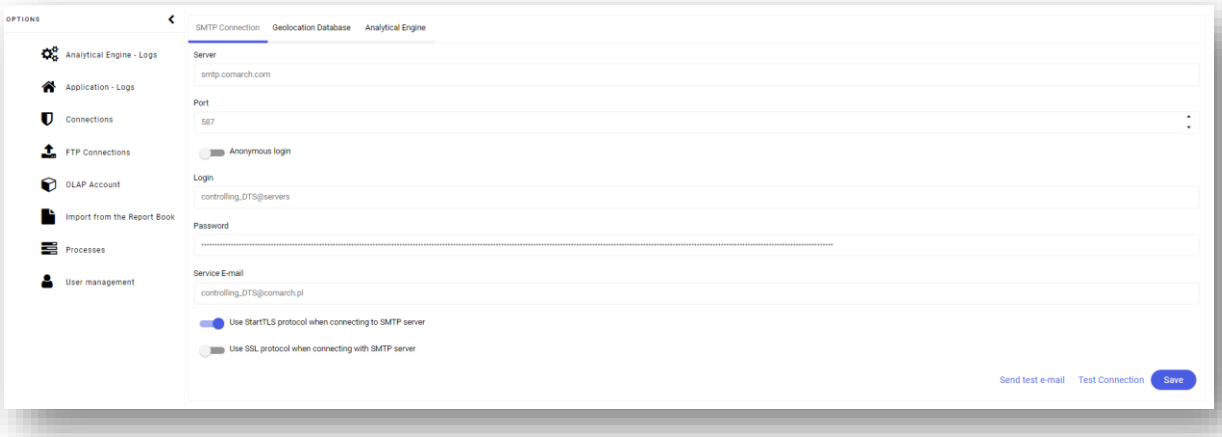


Figure 27 SMTP Connection settings

In *E-mail Connection* tab, there is a button *Send text e-mail*:

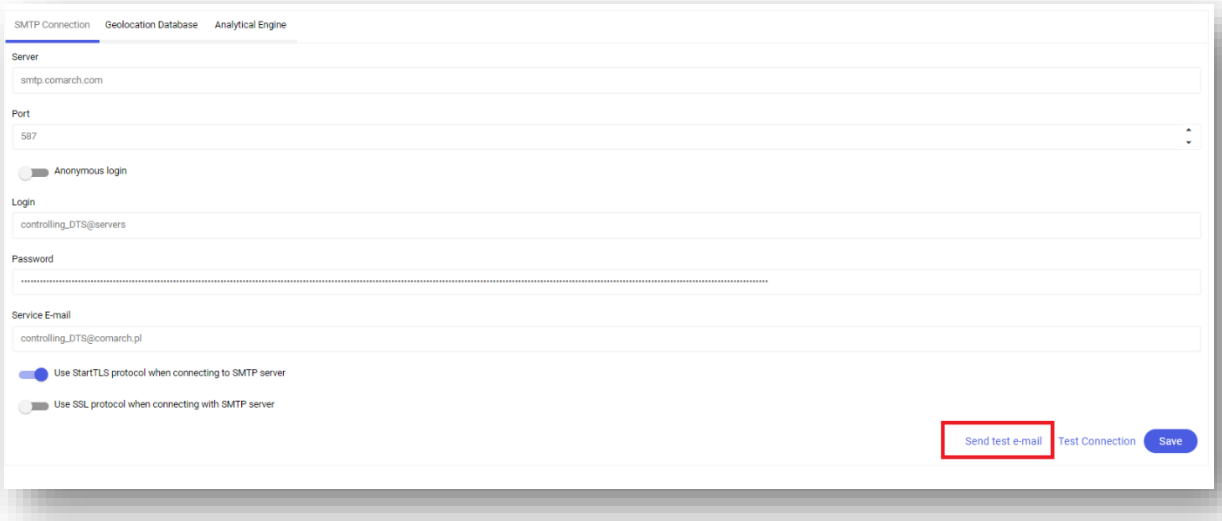


Figure 28 *Send test e-mail* button

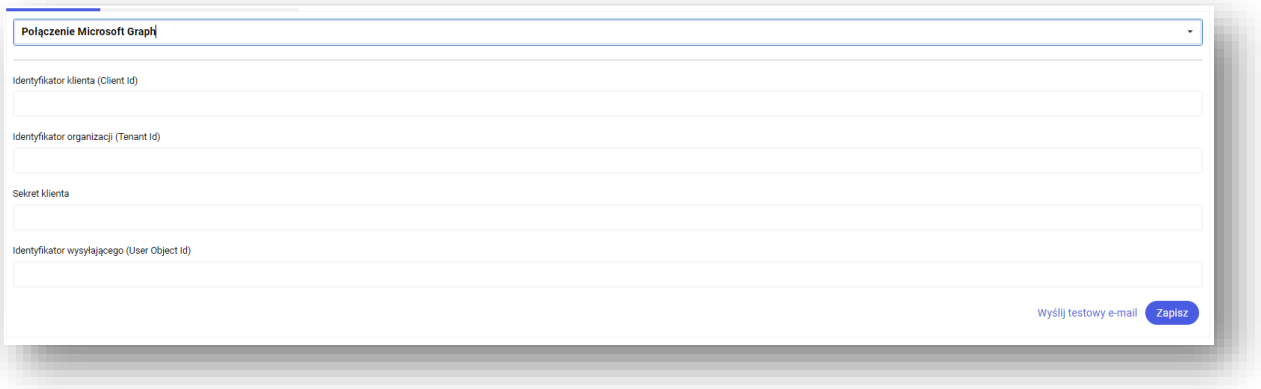
Selecting this button opens a modal window to enter the recipient of a test e-mail and to type a message:

Figure 29 E-mail address verification

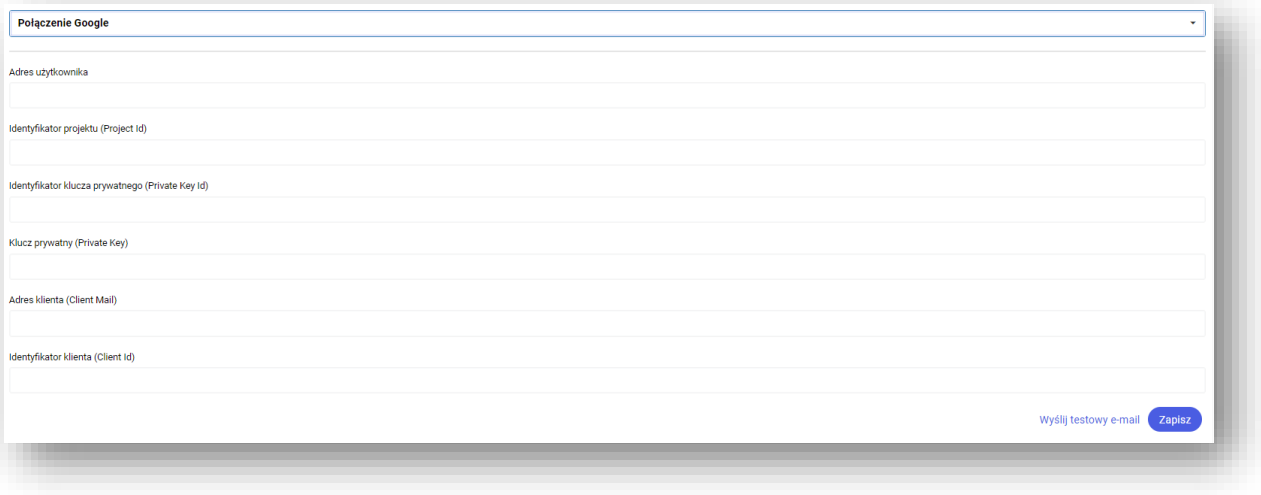
Based on the sent test message you can verify correct settings of the mail server.

There are two methods of mail authentication available:

- **Microsoft Graph**



- **Google**



Logs in the administrator dashboard are by default displayed from the most recent to the oldest.

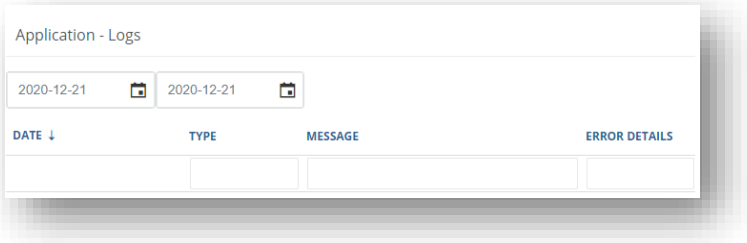


Figure 30 Sorting logs

Description of the option of importing from the report book can be found in a separate document – *Reports Exporter User Manual*.

In the administrator dashboard, it is also possible to access the section *Processes*.

A record of the process list provides such information as process name, its type, status, start time and possible end time of a given process. That list can be filtered by all the fields. It is also possible to search for a specific process by its name.

From this level it is also possible to invoke process recalculation, start its edition and proceed to its history.

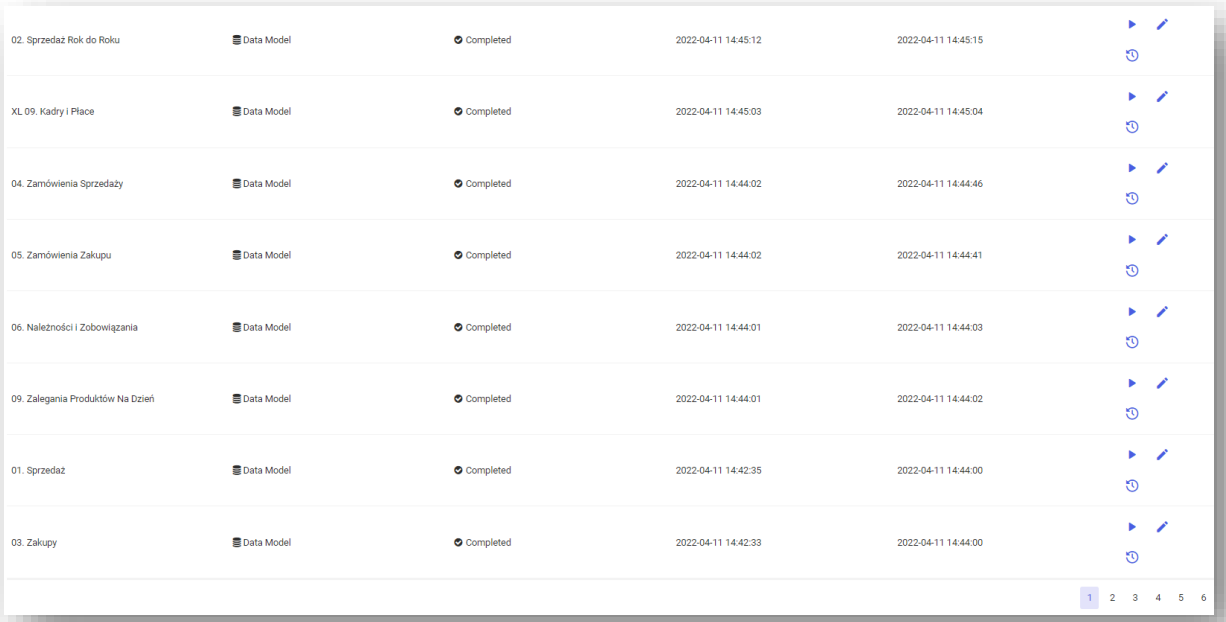


Figure 31 Process list

5.3 Repository in the eyes of a user

The repository can be previewed by the system administrator in the way a given user sees it. In the main menu, there is a drop-down list next to a collective context menu, from which the administrator can select any user in order to view the user's repository. At the top of the list, there is a login of a currently logged-in user. Below, under the section "All", are available users listed in an alphabetical order. A user login is accompanied with an icon and in brackets the user's full name is given.

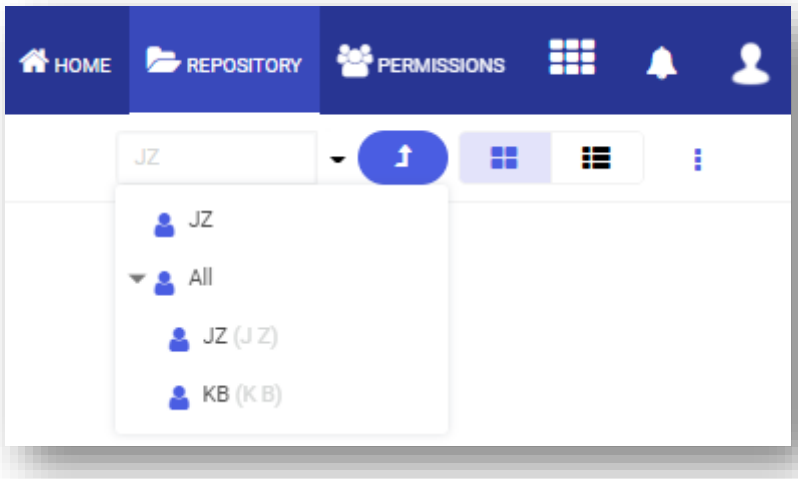
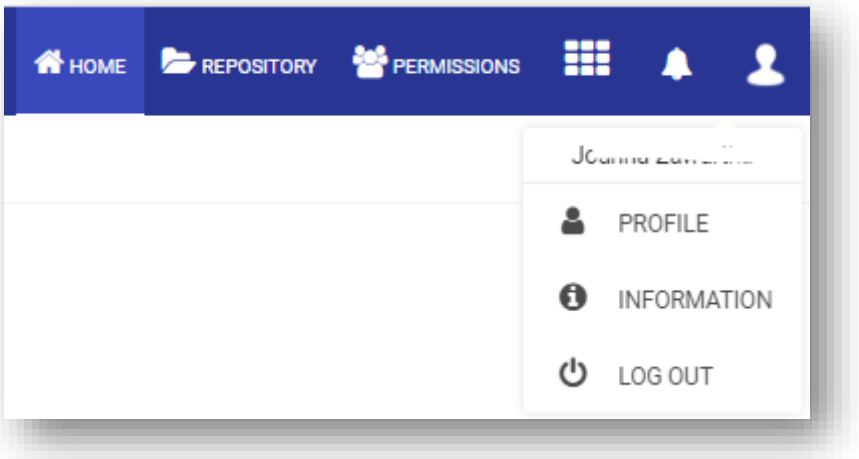


Figure 32 Repository in the eyes of a user

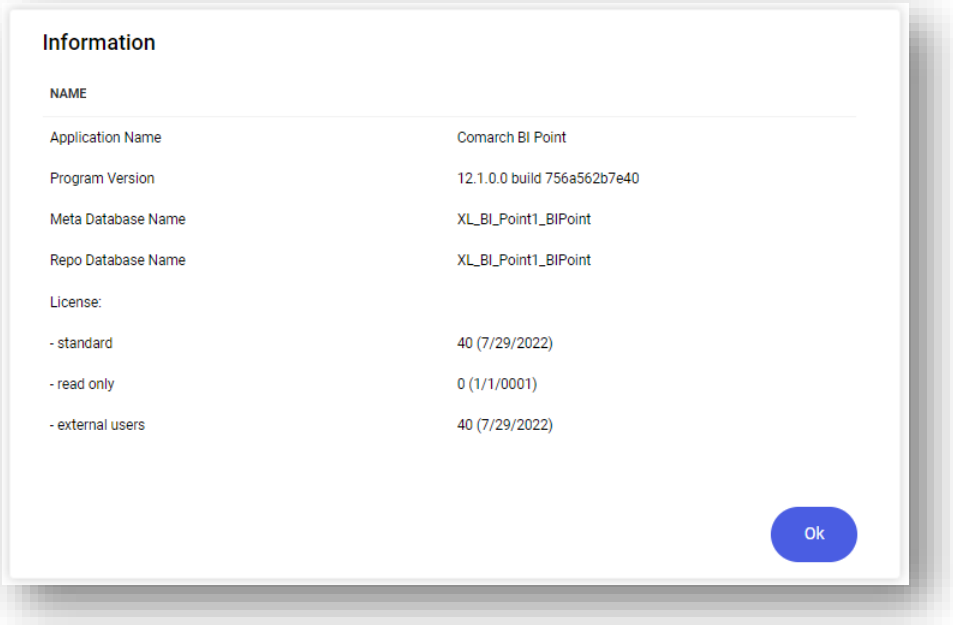
5.4 Program details

The application user can preview all the basic information about the program.

That information is available under the option INFORMATION in the administration dashboard.



The user can view both the program-related information, the meta database name, the repo database name, as well as the server details, on which the application is installed.



6 Using BI Point application

BI Point is now available in nine language versions: Polish, German, English, French, Spanish, Japanese, Portuguese, Italian and Russian.

Figure 31 BI Point language versions

6.1 Sharing objects in BI Point reports

From the level of the repository, it is possible to share dashboards, reports and Excel reports. To provide a user with access to data in a report or dashboard, it is necessary to share also (with at least the right to preview) the data models used by a given report or dashboard.

Objects are shared in BI Point by selecting option *Share* in the report repository tree. For single elements, this option is available in the context menu of a tile; for several elements, it can be selected from the toolbar. If none object is selected on the toolbar, the option *Share Folder* is available and is used to share a folder along with its entire content.

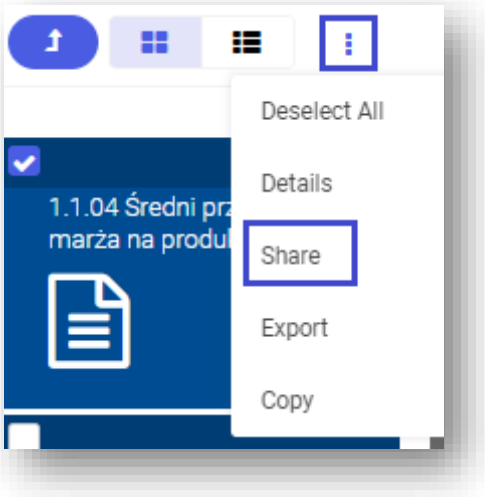


Figure 34 The option of sharing several elements

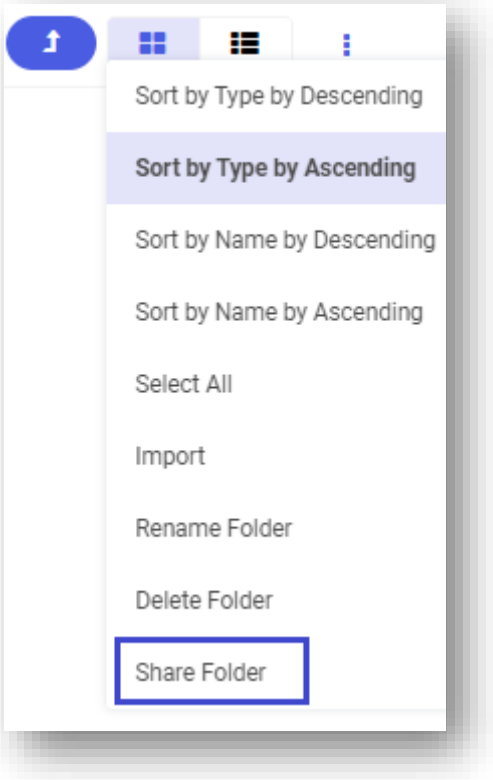


Figure 32 The option of sharing folder available in the toolbar

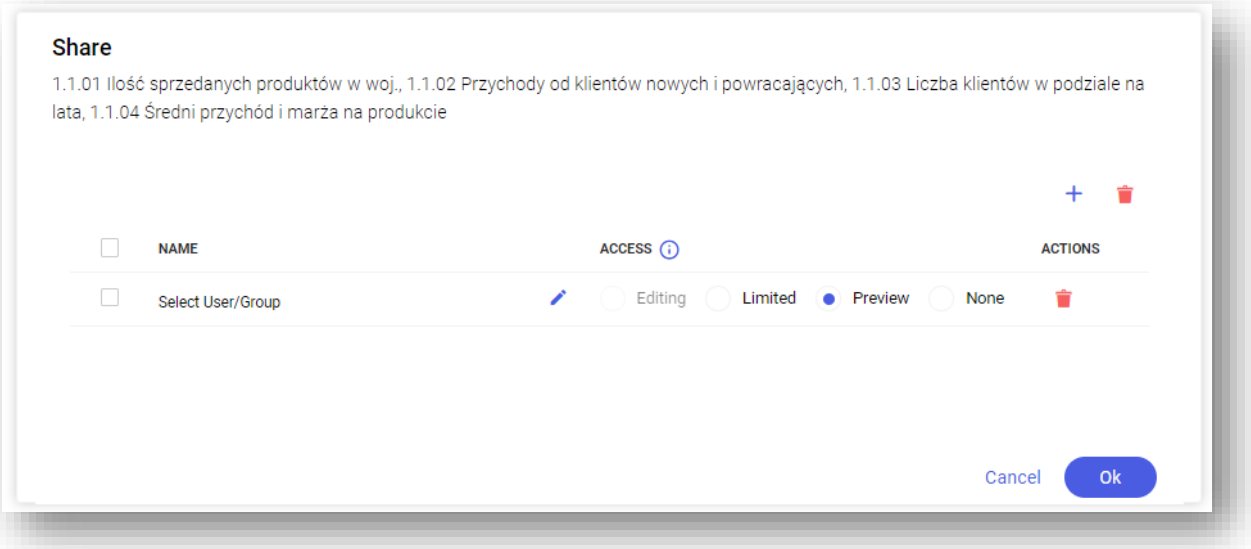


Figure 33 Share - configuration

In order to share an element to a user, select the button + , then select a user from the list, assign a right to him/her and finally select “Apply”.

Available rights to grant are the following:

- Edit

- Limited
- Preview
- None

Detailed information about access will appear after hovering the mouse cursor over the icon .

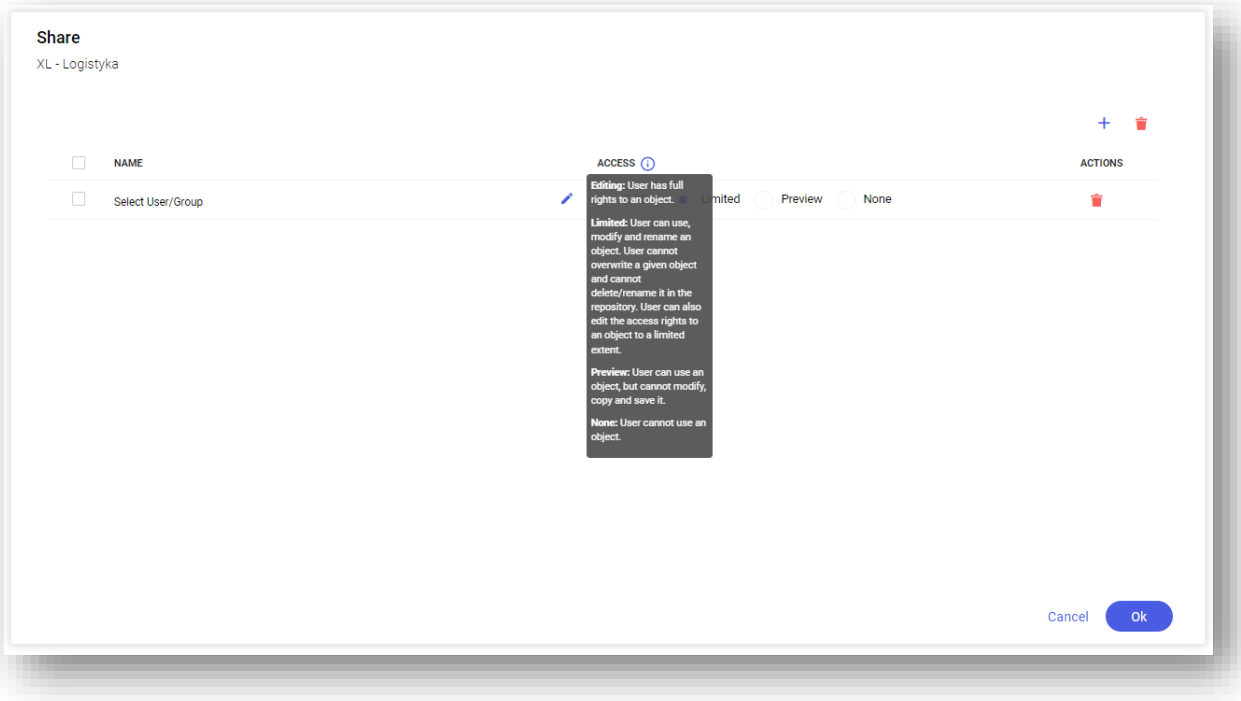


Figure 34 Information about access rights to a repository element

Permissions to a user or a user group are denied by selecting the red icon on the list in section *Actions*.

When attempting to delete a shared object, a message window is displayed informing that a given object was earlier shared to another user.

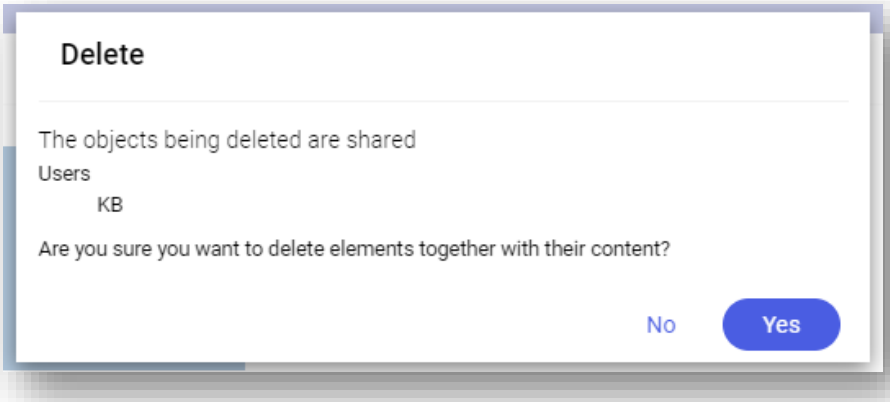


Figure 35 Deleting of a shared report/dashboard

In order to delete entirely a report or dashboard, it is necessary to confirm the object deletion.

6.2 Historicity of objects

The history of objects can be accessed from the level of the report repository tree. The history option is available in the context menu that is expanded after selecting the tile.

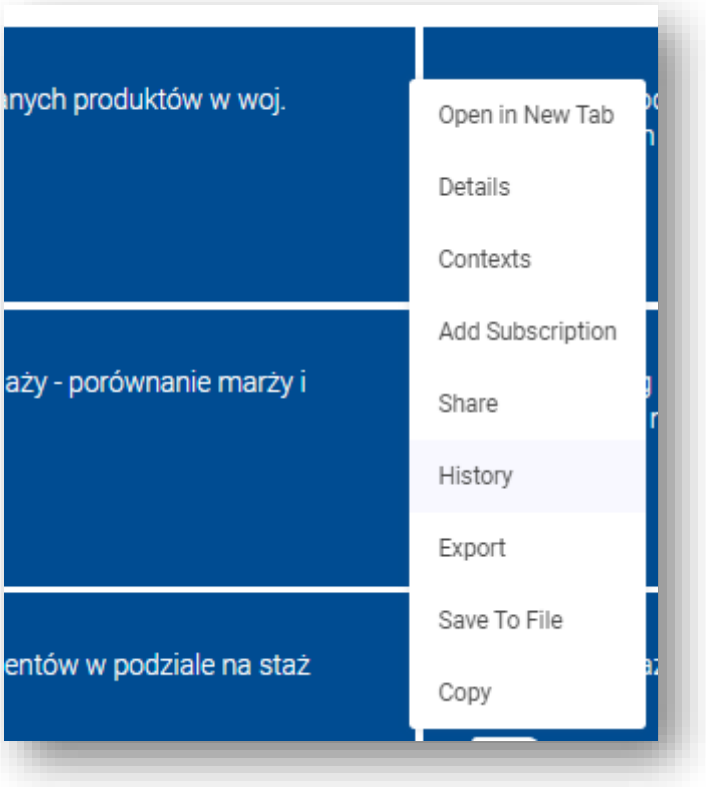


Figure 36 Object's context menu

In the object history it is possible to check object-related events, such as:

- Creation
- Opening
- Update
- Export

Events are, additionally, described with start time, end time, duration time and the name of action performer, that is provided in the column *Details*.

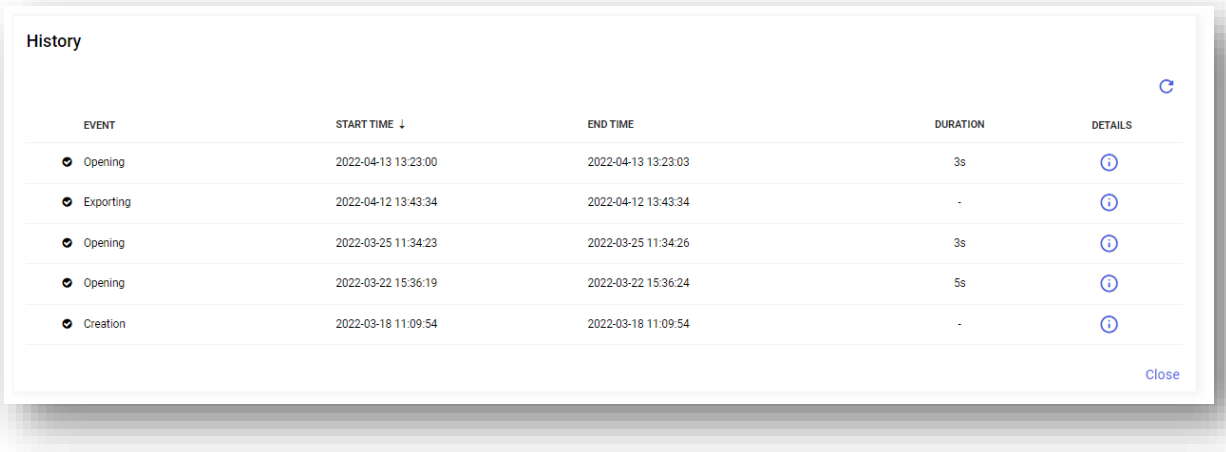


Figure 40 Object history window

6.3 How to import and export reports and dashboards

BI Point allows for importing and exporting definitions of reports and dashboards. A user can export a definition of a report or a dashboard to .bipoint format from one instance of BI Point and import it to another instance. Owing to that, it is not necessary to define the same report several times.

Export and import of a report definition is possible by using option *Export* or *Import* available in report repository tree window. For single elements this option is visible in context menu of a tile, for several elements selected, the option can be found in the tool bar.

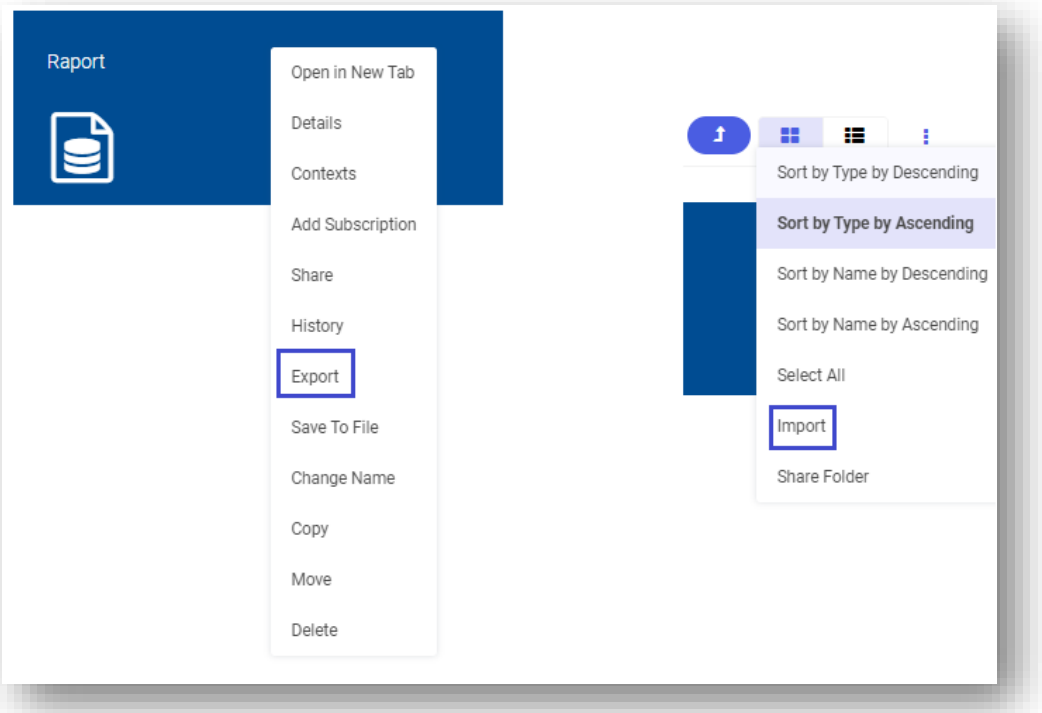


Figure 41 Export and import of reports

A .bipoint file will be saved in the *Downloads* folder as `Bi_Point_Export_[year][month][day][hour][minute][second]`**.bipoint**.

After selecting option *Import*, it will be possible to indicate an exact location where the exported report is saved.

Using the option *Save To File*, it is possible to save a report to a file in the following format:

- PDF Table
- XLSX Table
- XLS Table
- PNG Table
- HTML Table
- PDF Chart
- PNG Chart

Dashboard can be saved in format:

- PDF
- PNG

Note: To properly save files, you need to allow pop-ups under the browser settings.

Sample popup setting details for google chrome: chrome://settings/content/popups

When exporting the report, the following parameters can be set:

- **Fit to page width** – adjusts a report or dashboard to the page width
- **Expand report** – determines whether to expand or export the report in the same form as it is presented in BI Point
- **Include filters** – prints out all the filters used on the report at the end of the exported file
- **Generate parameter values** – saves an additional file with parameter values
- **Merge cells** – merges the cells that present the same dimension elements
- **Export headers** – specifies whether the exported report must have the column headers
- **Export footer** – specifies whether the exported report must have a footer
- **Landscape** – sets the report/dashboard orientation to page horizontal orientation

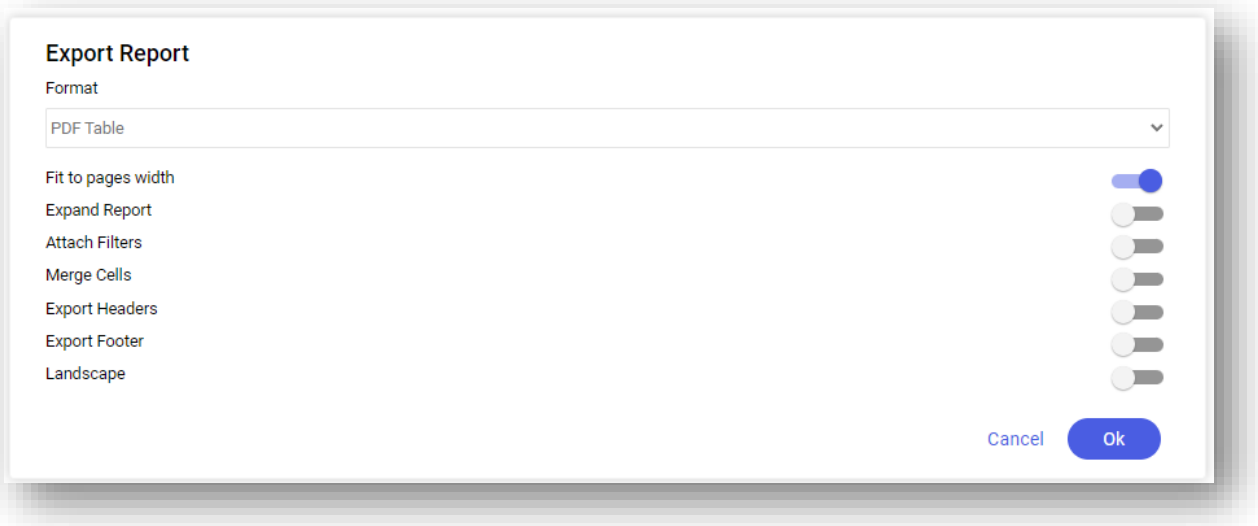


Figure 42 Export to a file

When exporting a report, from the level of report edition, that is created on a data model with parameters provided in the report, there is no need to provide again the values of those parameters. A report exported in such a way will be saved with the parameters that were specified while starting it.

Upon selecting an appropriate format and selecting the button [**OK**], a new browser window along with a file creation progress bar will open. It is important to allow the browser to open pop-ups on a given Web site. Once it closes, generation of file is completed.

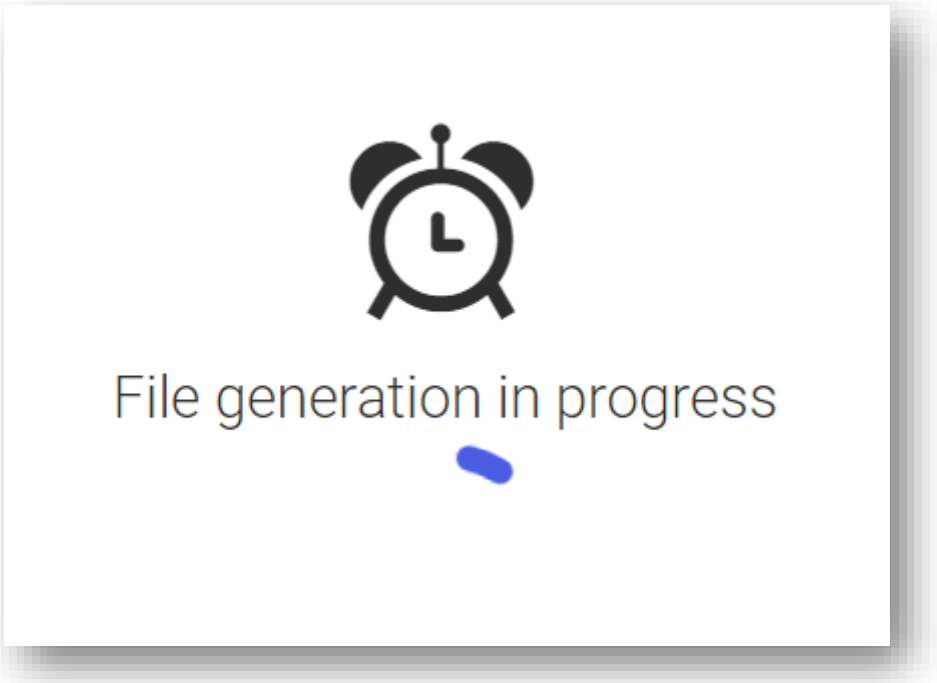


Figure 43 File creation progress bar

After selecting *Details* option from the context menu, information about server and database will be displayed. Using Details option, it is possible to view the information about a repository element.

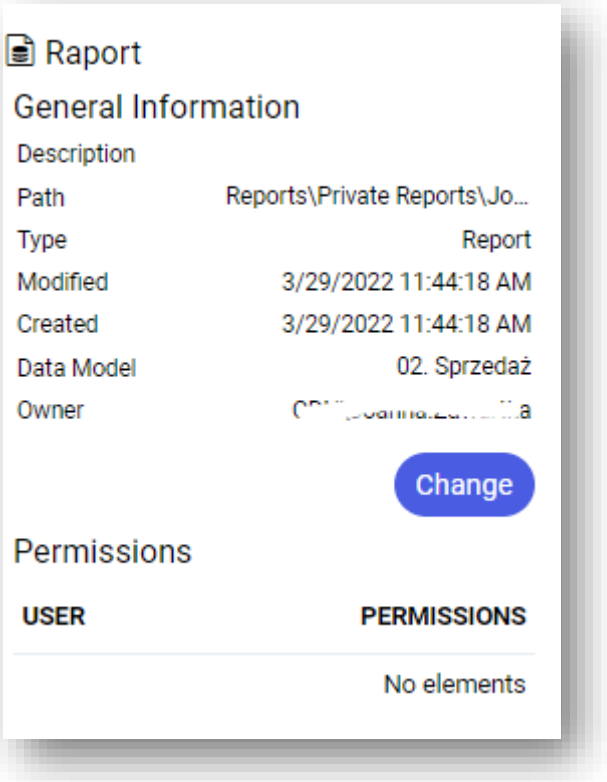


Figure 44 Information view upon selecting *Details*

It is possible to create a custom logo in the footer during export. For configuration purposes, add a file named Comarch_BI_SubscriptionFooter.png into the folder *AdditionalConfiguration* (it can be found under C:\Program Files (x86)\Comarch\BI Point\instances\INSTANCE NAME\bipoint\). After the file is added/changed, restart the application. The added logo will be scaled to the footer sizes, the ideal high size is 14 pixels and width size is 73 pixels.

6.4 Reports and context dashboards

In order to create a report/context dashboard, select option *Contexts*. It is possible to add a context only from database's side and it is composed of name, translations and mapping.

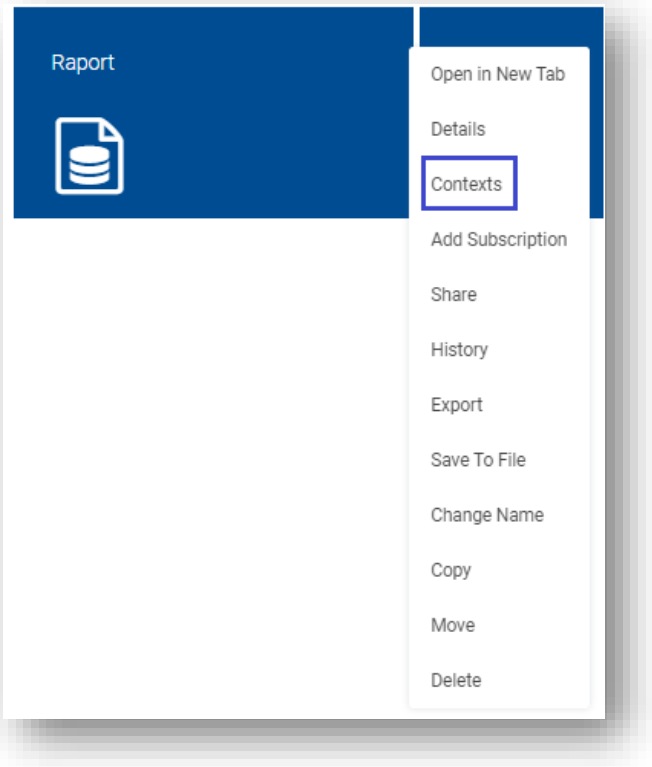


Figure 45 Contexts

In a newly created window, select context and what source it should filter. Source selection is optional. Doing so will additionally enable opening of report/dashboard with filtered elements. Upon selecting a source, it must also be chosen what dimension should be filtered on that source.

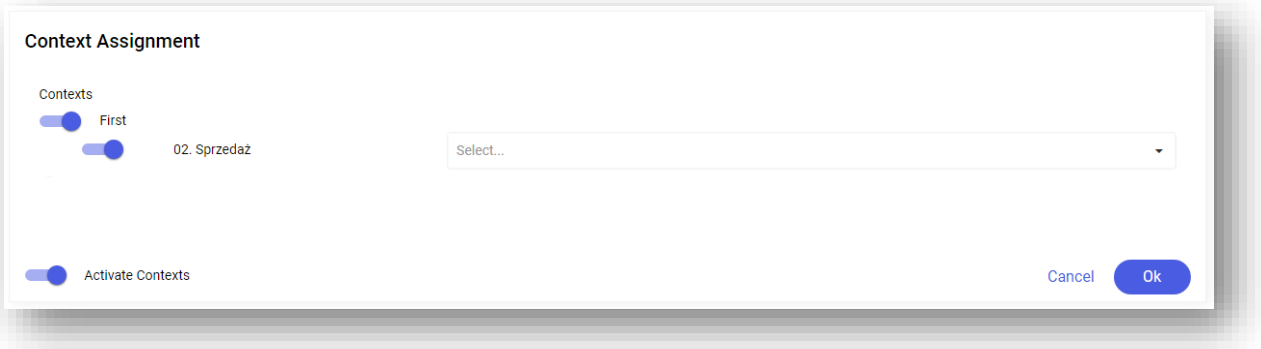


Figure 46 Configuration of contexts

A defined report/context dashboard can be invoked in dependence of defined context with the use of external API.

6.5 Creating reports

New objects are created by selecting appropriate option from the list available upon clicking [**Open**]. It is possible to create folders, reports, dashboards, attach Excel and Reporting Services reports as well as external links in a

currently selected place in the repository. If no folder is selected in the repository, the new report/dashboard will be created in the user's private folder.

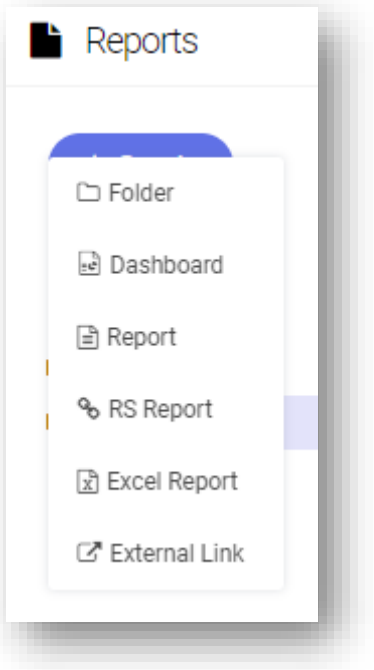


Figure 47 Menu with objects which can be created in the repository

Selecting the option *Report* redirects to a window in which data source for report must be indicated. A report is based on the selected data model.

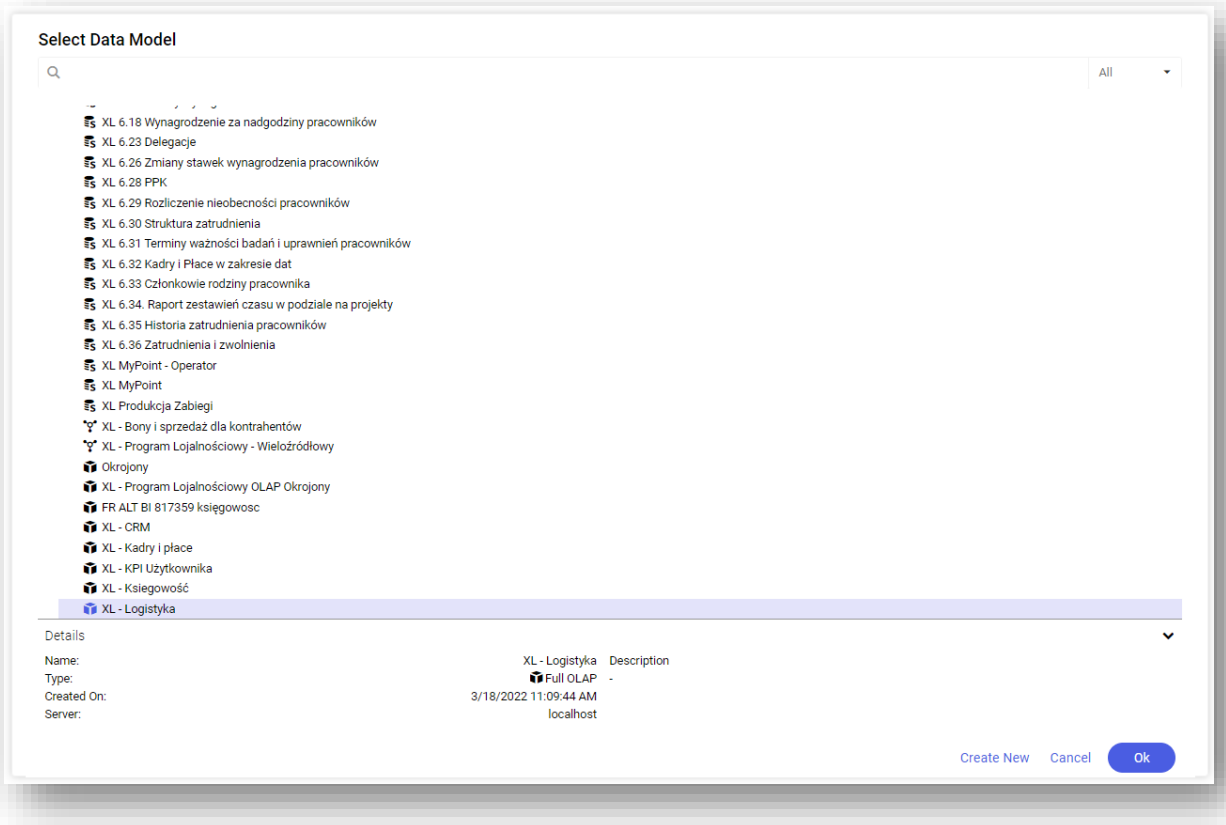


Figure 48 Selecting a data model

6.5.1 Options for creating reports

The scheme of creating reports is based on pivot table operation method. Additionally, when editing a report, it is possible to switch between its form as a table, chart or table and chart simultaneously by using button  . All the changes referring to selection of measures and dimensions, as well as graphic form of presenting table and chart, are made with the use of side tool panels. Once they are slid, the work space adjusts to new sizes, reacting also to minimizing of panels by a user. Each of the two panels can be minimized with the use of button  .

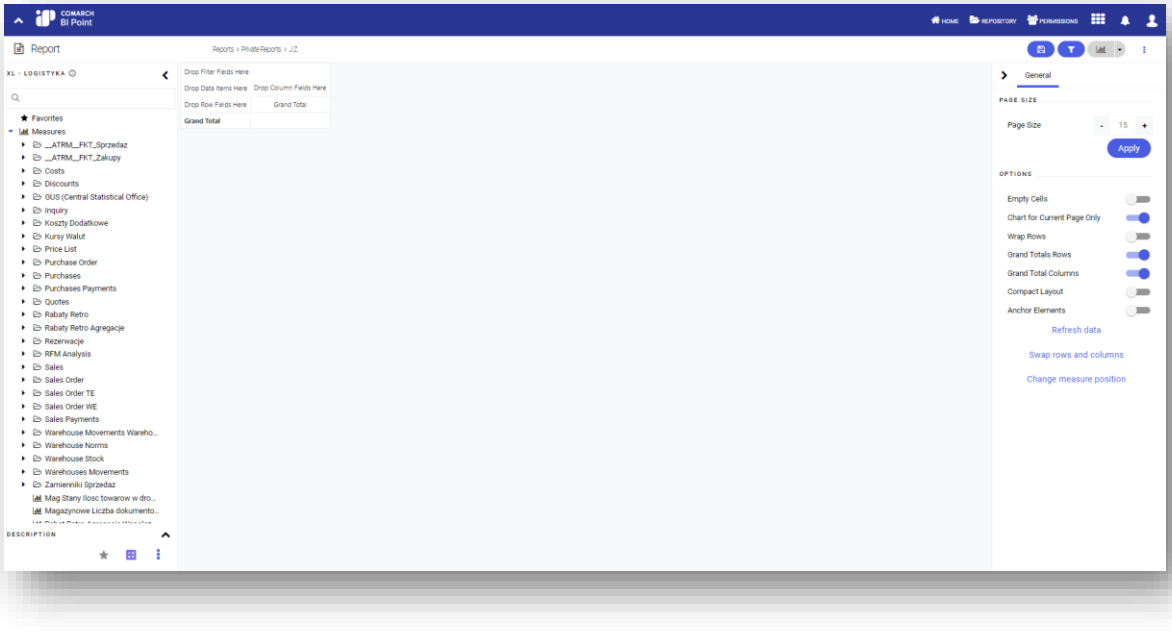


Figure 49 Window of newly created OLAP report

A newly created report allows, by default, for working with pivot table and presenting data on a chart. The left panel contains a list of fields which can be located within table area. The list is divided into two main subareas – measures and dimensions. Measures include numeric values which describe available dimensions. The most often used measures and dimensions can be added to *Favorites* and will be contained in a special tab, owing to which using them will be faster and more convenient.

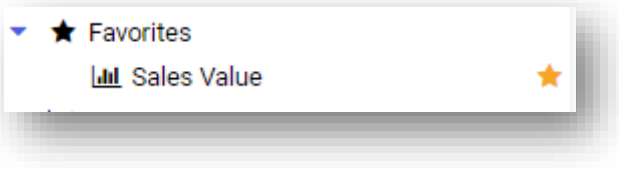


Figure 50 A favorite measure

Each control of dynamic measures and dimensions is displayed as a separate element, so it will be easy to find them (how to create and use these controls is described later in the document).

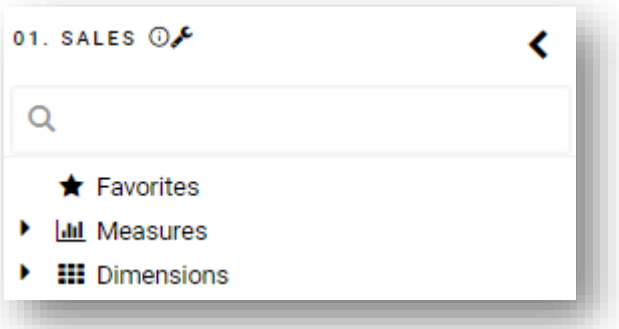


Figure 51 Dynamic elements on the list of fields

In order to find an appropriate measure, search field can be used. Upon selecting a measure or a dimension on the list of fields, description referring to the marked element is displayed.

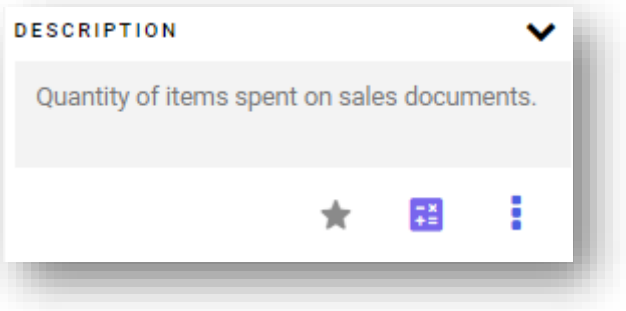


Figure 52 Element description on the list of fields

A selected measure must always be placed within data area – in the table, there will be labels available, describing where given data elements should be dragged to and where other elements. Dimensions can be located on rows, columns or in table filter field. In order to appropriately locate a given element, use *'drag& drop'* method. While doing so, a user gets hints in forms of arrows indicating possible areas to which an element can be dragged. In order to remove an element from a report, drag it beyond work space.

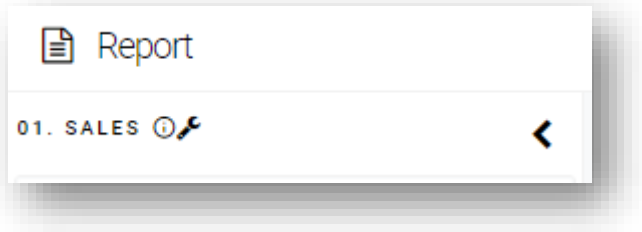
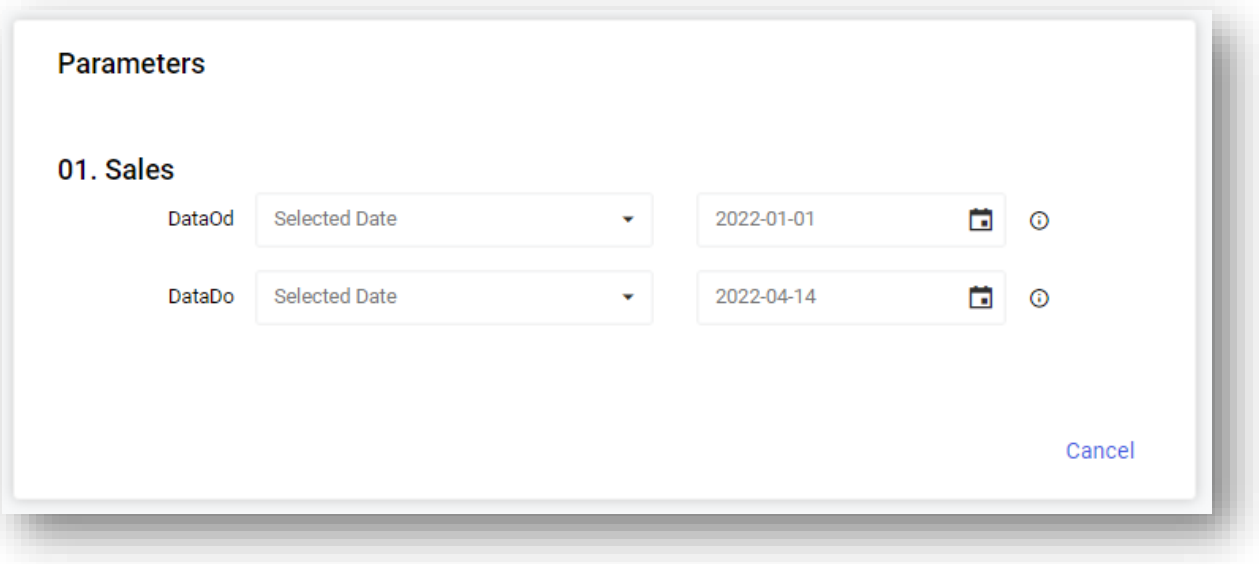


Figure 53 Left tool panel – information on data model and parameters

In the left tool panel, it is also possible to check the parameters for which a report was generated (in the case of parameterized reports) by clicking on the icon .



6.5.1.1 The right tool panel

The right panel is a tool panel. In tab *General*, a user decides which elements should be included in a report content. The following settings are available within this panel:

- **Empty cells** – parameter enabling/disabling displaying of elements not describing values of measures in dimensions used in a report (dimension elements for which measures have empty values are shown/hidden)
- **Chart only for current page** – data displayed on a chart will refer only to data form visible report page
- **Wrap Rows** – data in a cell is wrapped so that it fits column width
- **Grand Total Rows** – shows/hides grand total of rows
- **Grand Total Columns** – shows/hides grand total of columns
- **Compact Layout** – names of dimensions are hidden and cells are adjusted to content
- **Anchor Elements** – size of a report is adjusted to work space area
- **Refresh data** – uploads data to a report again
- **Swap rows and columns** – switches location of dimensions used in rows and columns of a pivot table
- **Change measure position** – allows for selecting position of measures – rows or columns

Subsequent tabs in the dashboard – *Table* and *Chart* – are used for specifying details of graphic aspects of pivot table and chart. Therefore, purpose of these tabs is to adjust visual layer of a report to characteristics and requirements of its recipient. In case of table, it is possible to increase works space and modify measures and dimensions used in headers and values. In case of chart, default settings refer to its size, type, available elements and their characteristics.

The tool panel changes its content in dependence of elements selected in the work space. For a selected element it is possible to set parameters regardless of their default values, as well as additional options characteristic for given element.

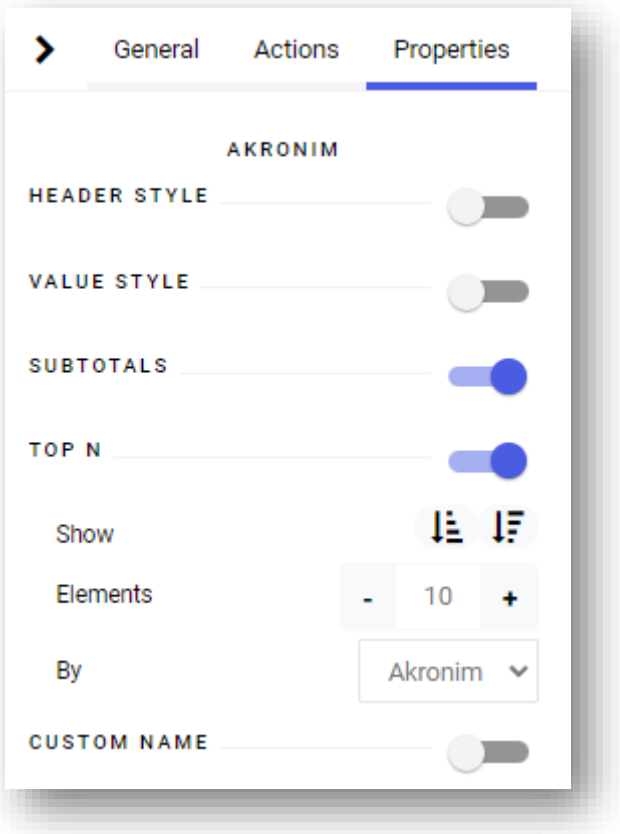


Figure 55 Tools for editing dimension with enabled *TOP N* filter

TOP N filter lists all elements with the highest values – e.g., top 10 values. This filter can be used for both measures and dimensions, which is specified in the cell *Based On/By*.

Selecting a measure in a pivot table makes possible to specify data format – number precision; selecting a dimension will additionally allow for enabling *TOP N* filter – indicating top/bottom values from a range and managing visibility of subtotals.

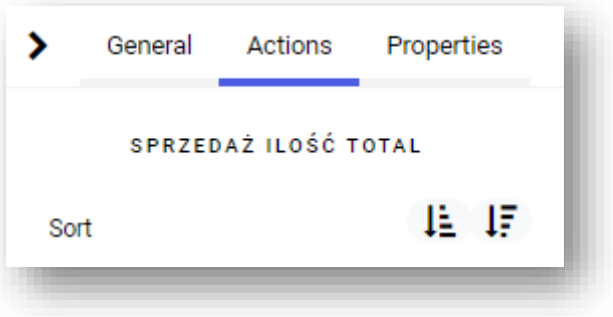


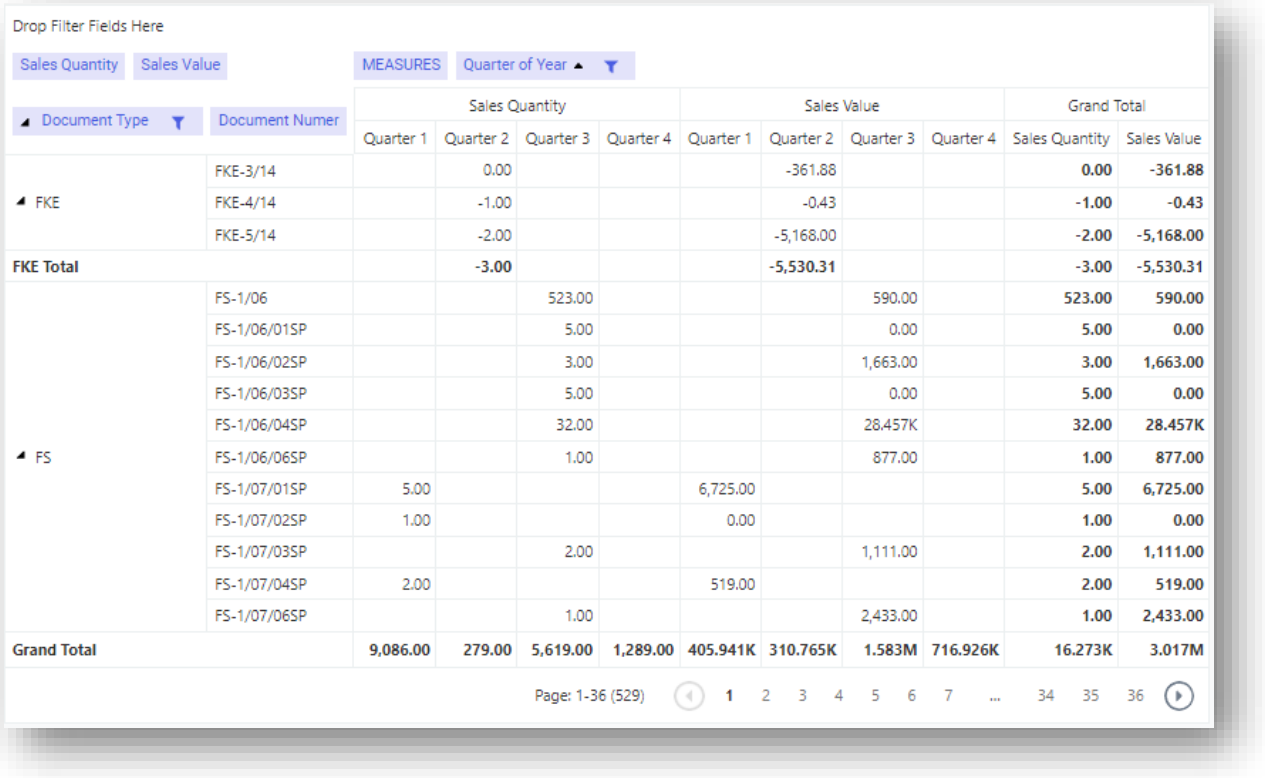
Figure 56 Tab *Actions* for a measure

In tab *Actions* of measure properties, there are options referring to sorting of elements (by ascending and descending) and hiding an element.

Note: The sort option is not available in columns to sort by dimension elements.

If a lower level of a dimension is selected, the tool panel is additionally equipped with options available for the selected level. Apart from these options, it is also possible to show/hide only selected elements on a given level. Button [**Clear Selection**] deselects all elements. Other options refer to expanding a level and/or levels below. Option *Expand All/Collapse All* expands/collapses a report to the lowest available level in all the areas.

In report properties, it is also possible to switch to read only mode and automatically update the data in a given time interval, without the need to open the report again, which allows for using it in various live presentations.



Document Type	Document Numer	Sales Quantity Quarter 1	Sales Quantity Quarter 2	Sales Quantity Quarter 3	Sales Quantity Quarter 4	Sales Value Quarter 1	Sales Value Quarter 2	Sales Value Quarter 3	Sales Value Quarter 4	Grand Total Sales Quantity	Grand Total Sales Value
FKE	FKE-3/14		0.00				-361.88			**0.00**	**-361.88**
	FKE-4/14		-1.00				-0.43			**-1.00**	**-0.43**
	FKE-5/14		-2.00				-5,168.00			**-2.00**	**-5,168.00**
FKE Total			**-3.00**				**-5,530.31**			**-3.00**	**-5,530.31**
FS	FS-1/06			523.00				590.00		**523.00**	**590.00**
	FS-1/06/01SP			5.00				0.00		**5.00**	**0.00**
	FS-1/06/02SP			3.00				1,663.00		**3.00**	**1,663.00**
	FS-1/06/03SP			5.00				0.00		**5.00**	**0.00**
	FS-1/06/04SP			32.00				28.457K		**32.00**	**28.457K**
	FS-1/06/06SP			1.00				877.00		**1.00**	**877.00**
	FS-1/07/01SP	5.00				6,725.00				**5.00**	**6,725.00**
	FS-1/07/02SP	1.00				0.00				**1.00**	**0.00**
	FS-1/07/03SP			2.00				1,111.00		**2.00**	**1,111.00**
	FS-1/07/04SP	2.00				519.00				**2.00**	**519.00**
	FS-1/07/06SP			1.00				2,433.00		**1.00**	**2,433.00**
Grand Total		**9,086.00**	**279.00**	**5,619.00**	**1,289.00**	**405.941K**	**310.765K**	**1.583M**	**716.926K**	**16.273K**	**3.017M**

Page: 1-36 (529) 1 2 3 4 5 6 7 ... 34 35 36

Figure 57 Report run in display mode

Standard keyboard shortcuts are supported on a report:

Ctrl+S – saves

[**Enter**] – confirms the sending of current form

[**Escape**] – cancels a current form/stops a currently performed work

6.5.1.2 Filtering dimension elements

The option of filtering dimension elements is available upon selecting the icon next to the name of a dimension used in a report (dragged to rows/columns of a pivot table). Upon clicking on the icon, a user is redirected to the filtering window.

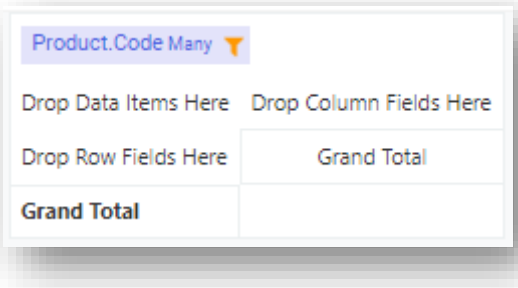


Figure 58 Filtering icon for a sample dimension (Product Code)

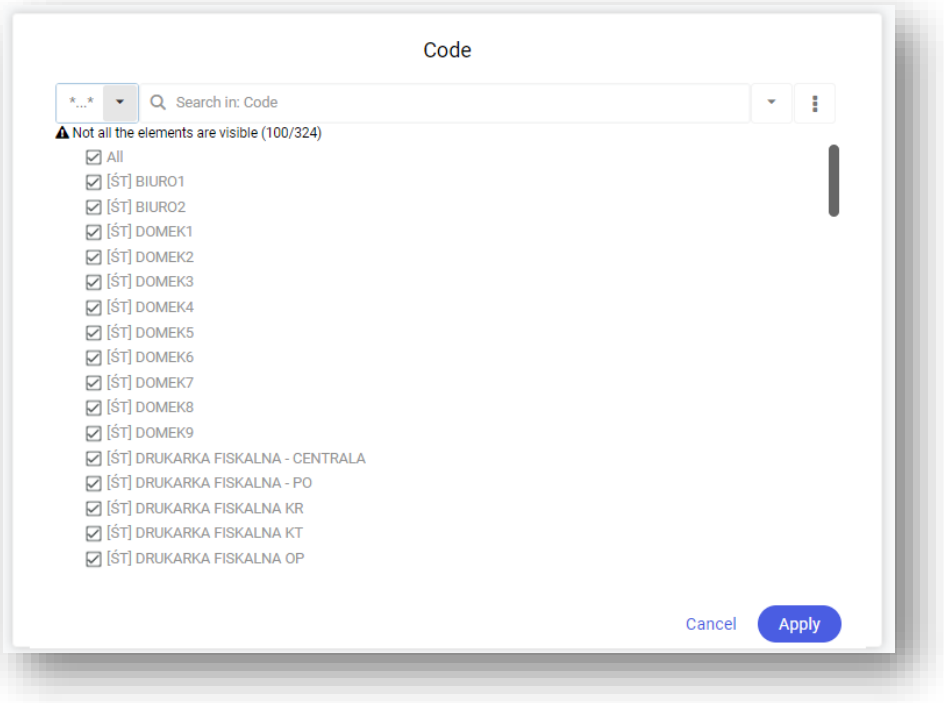


Figure 59 Filtering of dimension elements (for instance Product Code)

To make it easier to search for desired elements, a search bar has been added to the filtering windows, which is located in the upper part of the screen. The search engine operates in *ad hoc* mode, thus filters the elements on the ongoing basis by the entered phrase.

Elements can be searched for also by predefined conditions:

- Starts with
- Ends with
- Contains – default condition

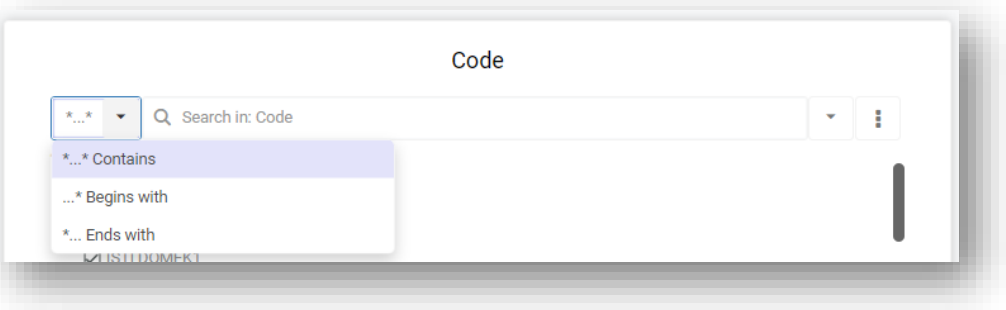


Figure 60 Filtering conditions

Selecting any of the options in the search engine will apply that condition to filter the elements.

Searching can also be facilitated with the help of the icon available on the search bar. In the case of hierarchical dimensions, a range can as the sample Time.Calendar mi limited to one year, quarter or month.

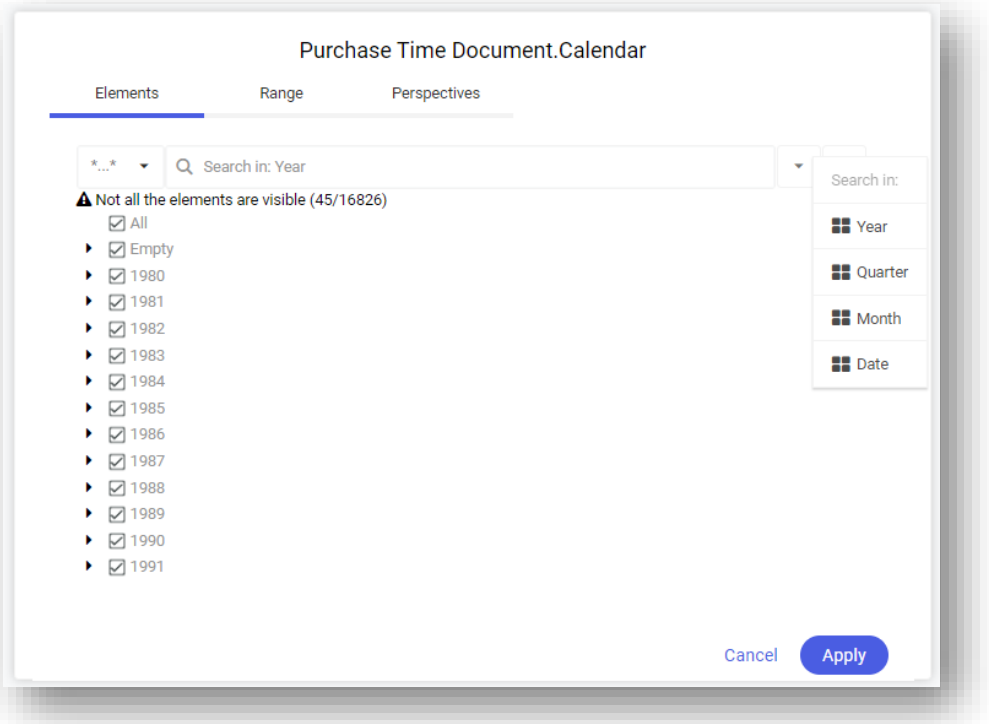


Figure 61 Dimension filter

In the search engine field, there are search options for listing elements of a given type. Those options are: *Show All*, *Show Only Selected*, *Show Only Deselected*, as well as *Expand All*, *Collapse All*, *Revert Selection*.

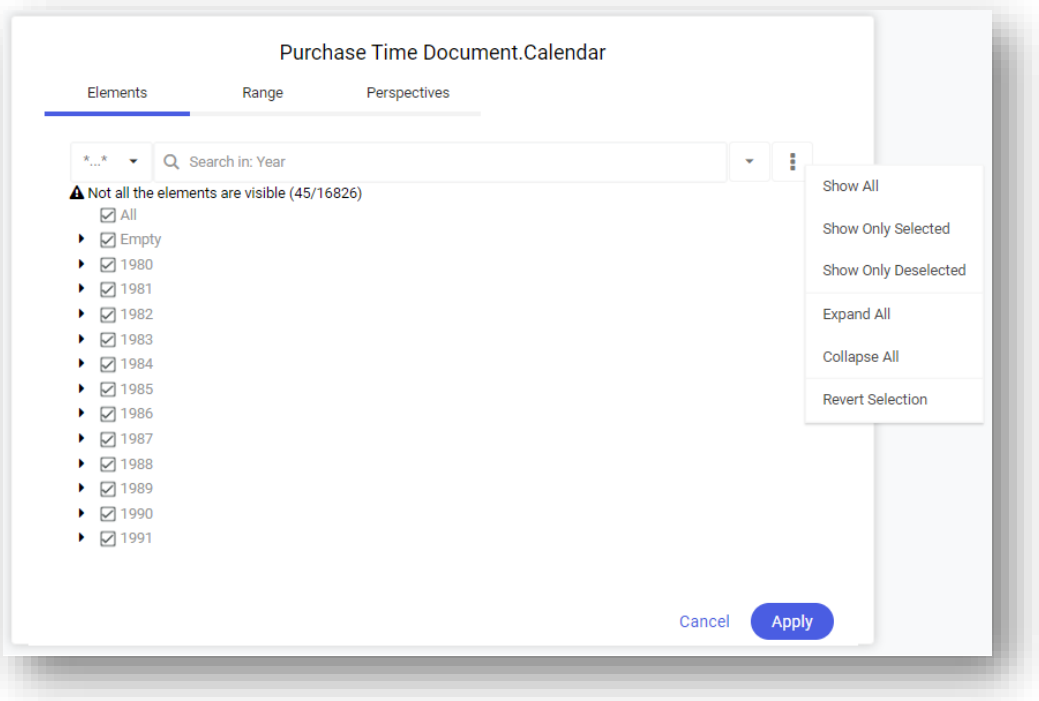


Figure 62 Dimension filter

A view in the filter window changes depending on the selected search option, but data presented in a report does not change. Data in a report is updated upon selecting the button Apply, on the basis of the elements tagged with a selected check box ☑.

All the search options are presented below on the basis of *Purchuase Time* dimension.

- **Show All** – filters all elements from within the displayed set

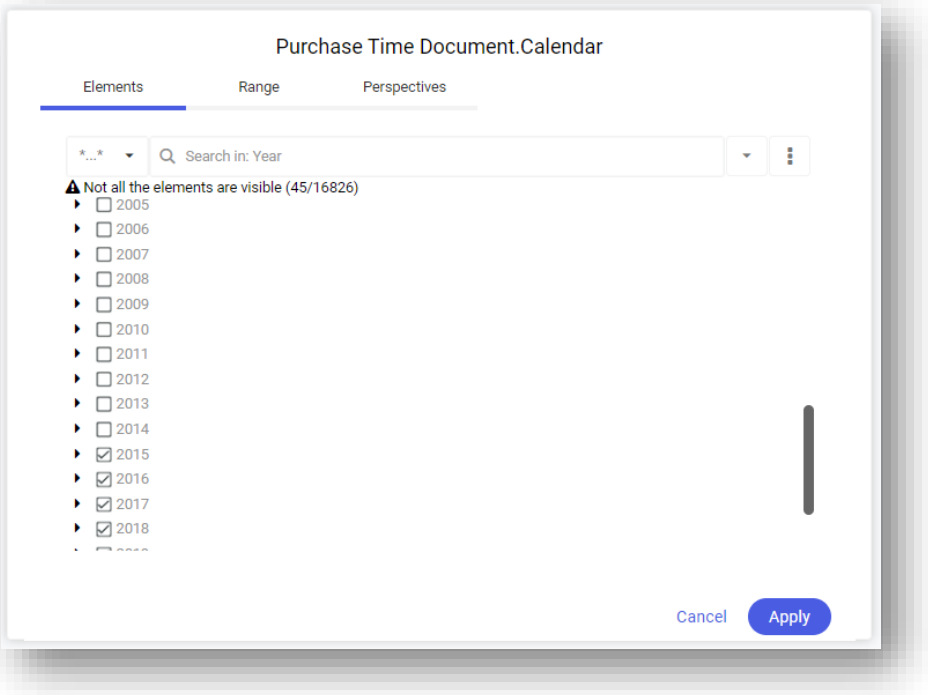


Figure 63 *Show All* search option

Selecting the button Show All will, in the case of the *Purchuase Time* dimension, present all the elements of that set.

Show Only Selected – filters only selected elements from within the displayed set

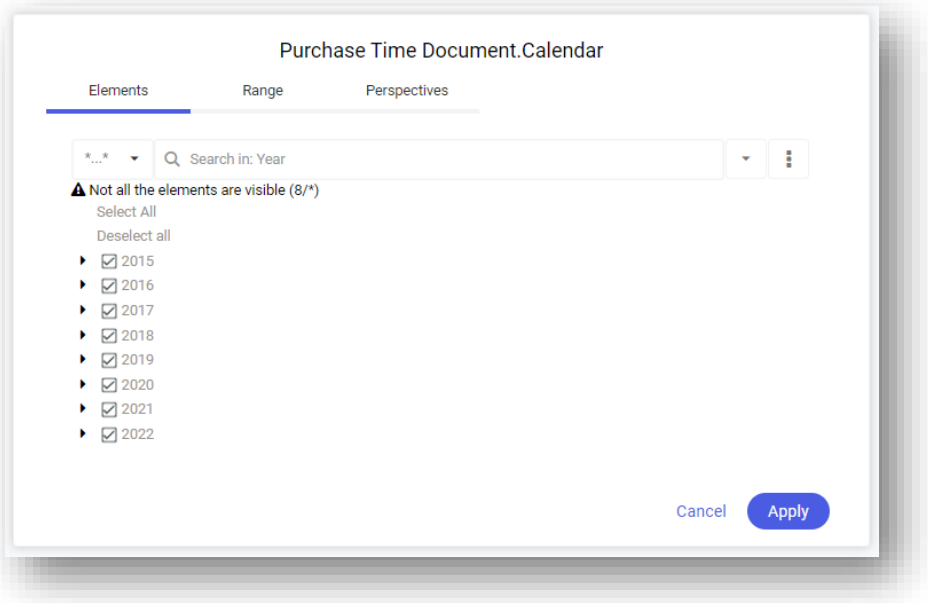


Figure 64 *Show Only Selected* search option

Selecting the button Show Only Selected will, in the case of the *Purchuase Time* dimension, present all the selected elements of the entire set. Based on the *Purchuase Time* example, the searched elements will be the years from 2015 to 2022.

Show Only Deselected – filters only deselected elements from within the displayed set

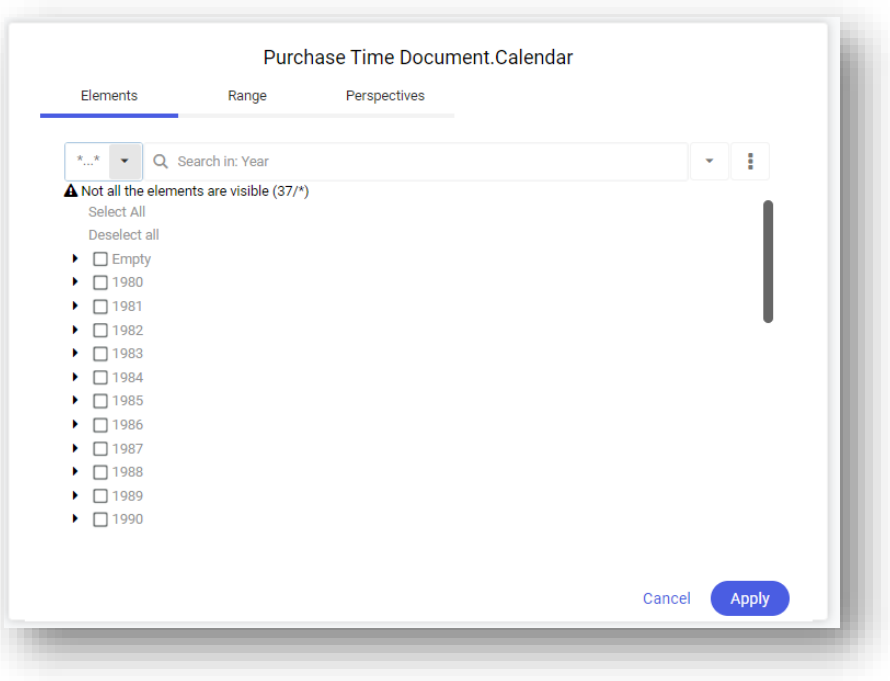


Figure 65 *Show Only Deselected* search option

Selecting the button Show Only Deselected will, in the case of the the *Purchuase Time* dimension, present all the deselected elements of the entire set. Based on the *Purchuase Time* example, the searched elements will be the element *Empty* and a period of *1980* and *2014*.

Expand All – loads the entire dimension.

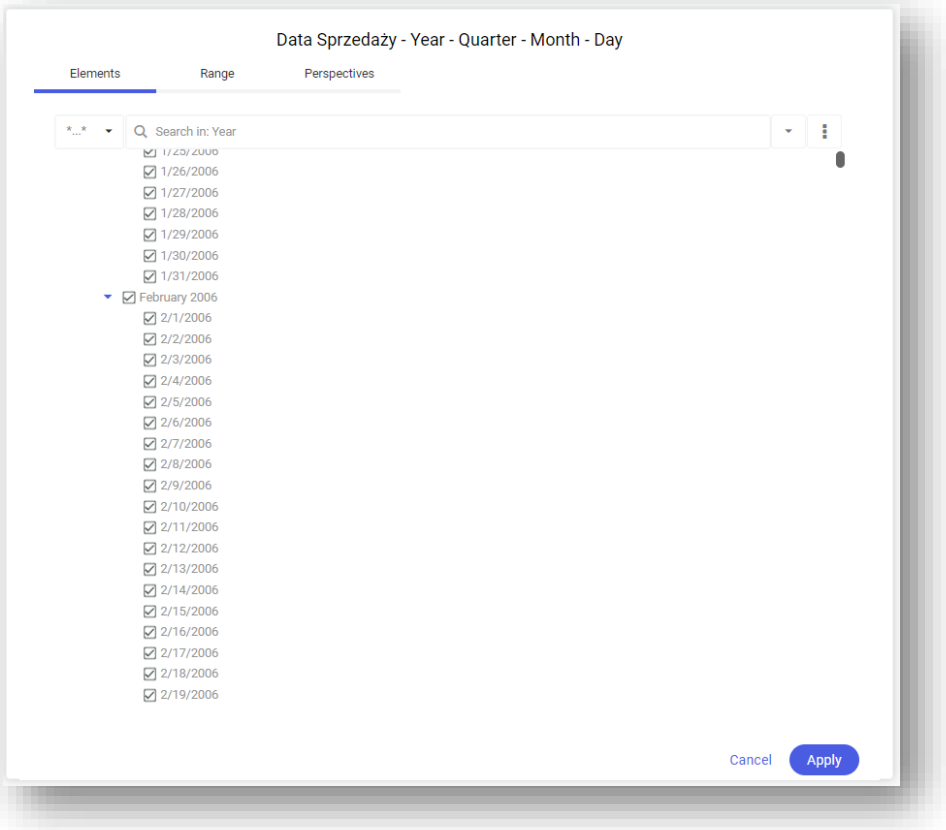


Figure 66 *Expand All* search option

Before using this option, the operation should be confirmed by accepting a relevant message presenting the number of elements in the dimension "*The dimension contains n elements. Are you sure you want to load them all?*"

In the case of the *Date of Sale* dimension, 6502 of the dimension elements will be loaded.

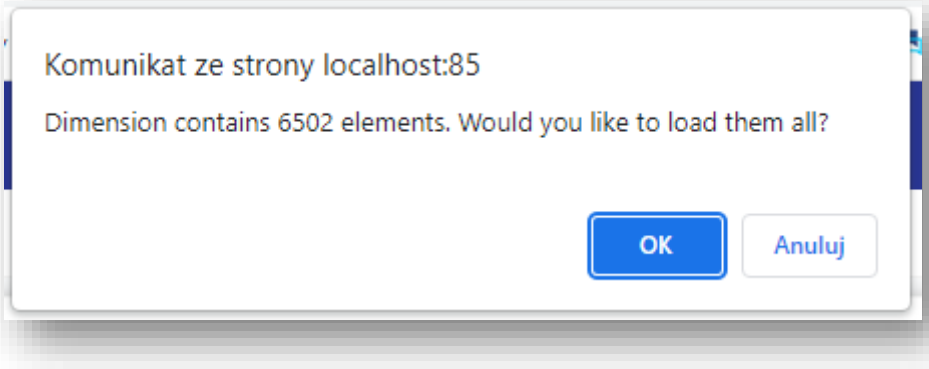


Figure 67 *Expand All* option

When the number of dimension elements exceeds the limit of elements, a relevant message will be displayed: "*The dimension contains n elements, which is too many. Would you like to load the first n elements?*" Elements will then be loaded up to the available limit and a warning message will be displayed as it is displayed when not all dimension elements are presented.

Collapse All – hides the entire dimension.

Selecting the button Collapse All will, in the case of the *Date of Sale* dimension, present all the dimension elements that were visible before they had been collapsed.

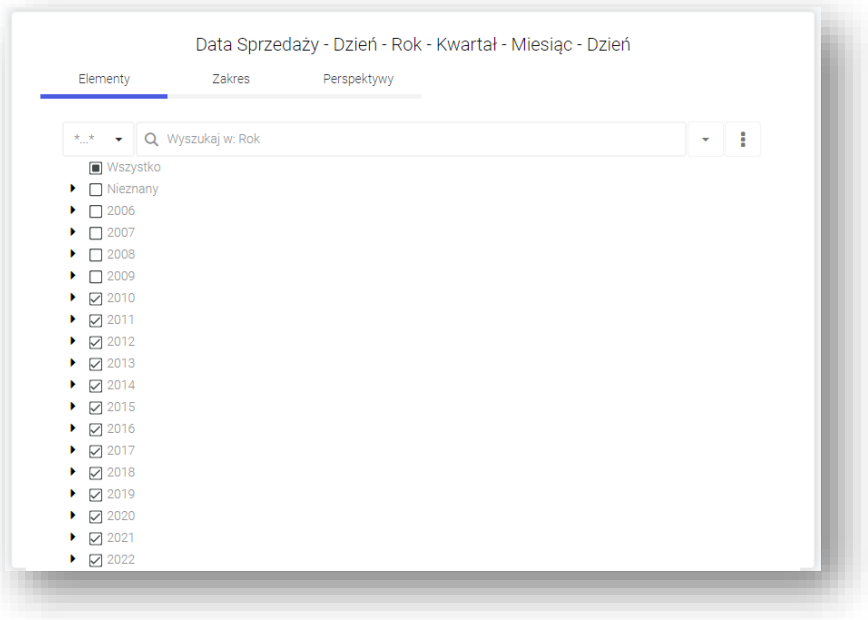


Figure 68 *Collapse All* search option

Revert Selection – changes the selection of dimension elements.

Selecting the button Revert Selection will, in the case of the *Date of Sale* dimension, present all the dimension elements that were not earlier selected, thus the element *Unknown* and a period of *2006* and *2009*.

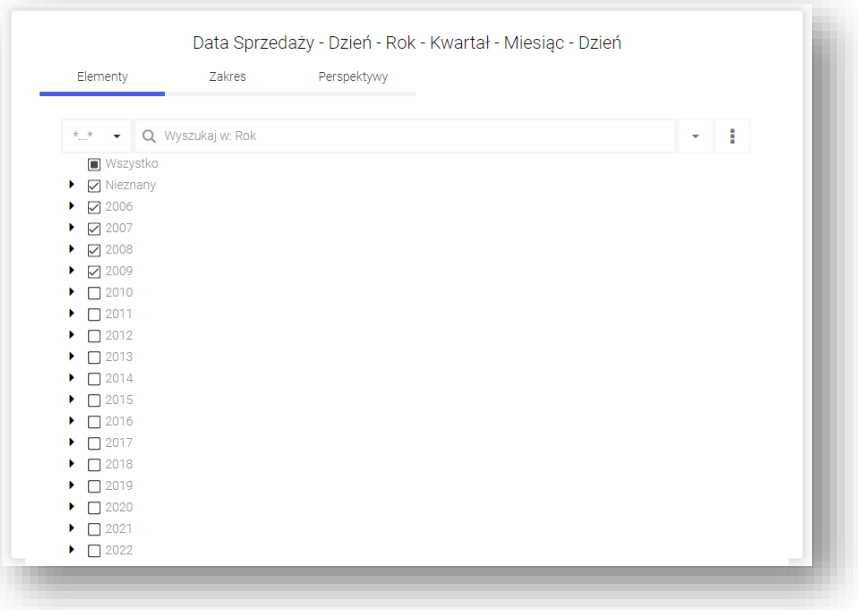


Figure 69 *Revert Selection* search option

6.5.1.3 Filtering dimensions of time type

When filtering dimensions of time type, it is possible to specify a range, that is a time interval, and a perspective, that is the periods for which data must be aggregated.

After selecting a given range of days in the *Range* tab, as presented in the figure below:

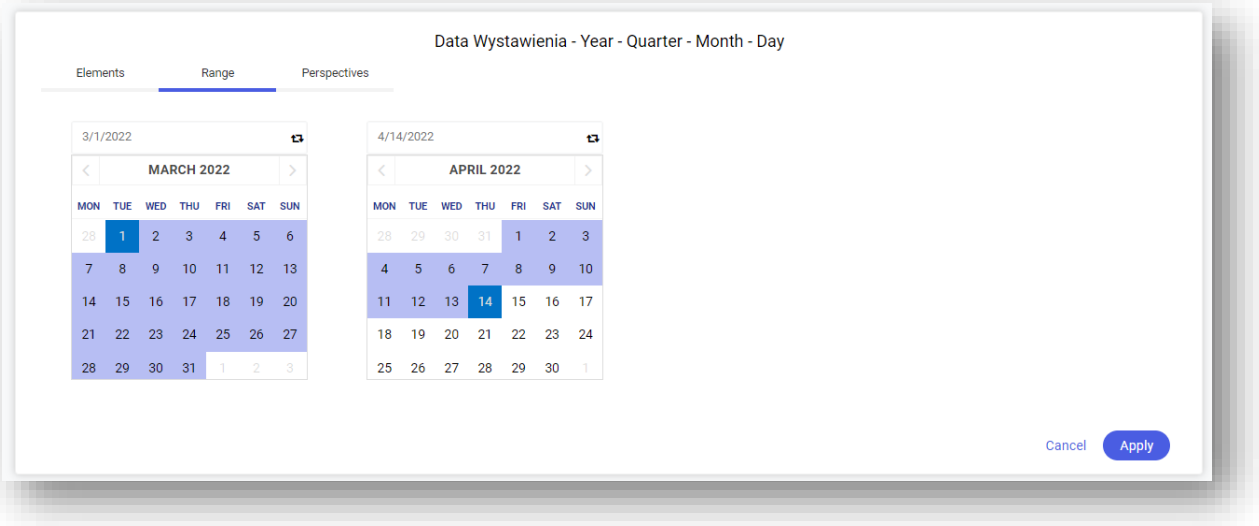


Figure 70 Time filtering – Range

the selected days are presented in the *Elements* tab according to the interval specified in the *Range* tab.

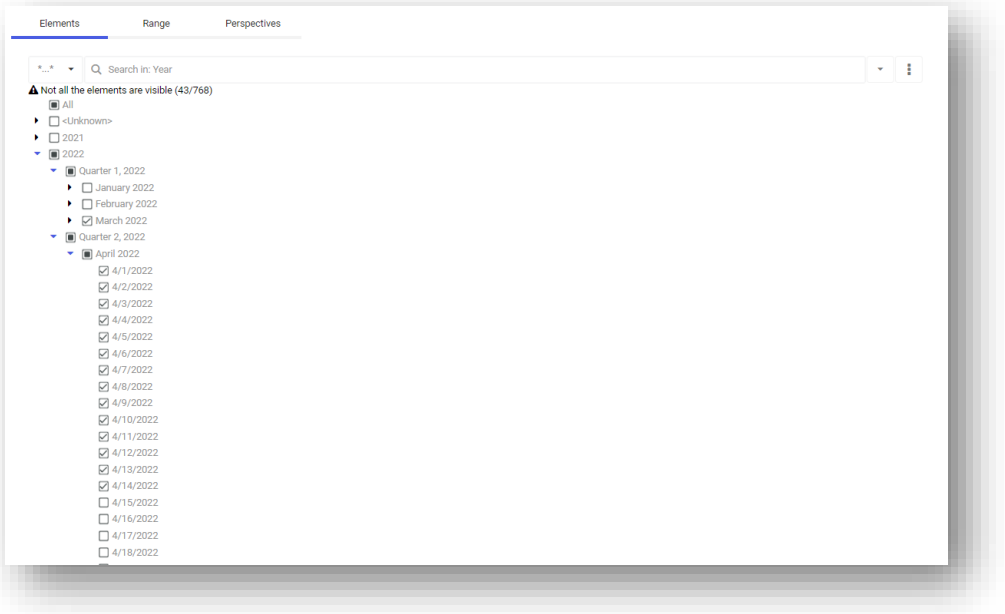


Figure 71 Time filtering – Elements

In the *Perspectives* tab, it is possible to select a given period and its perspective.

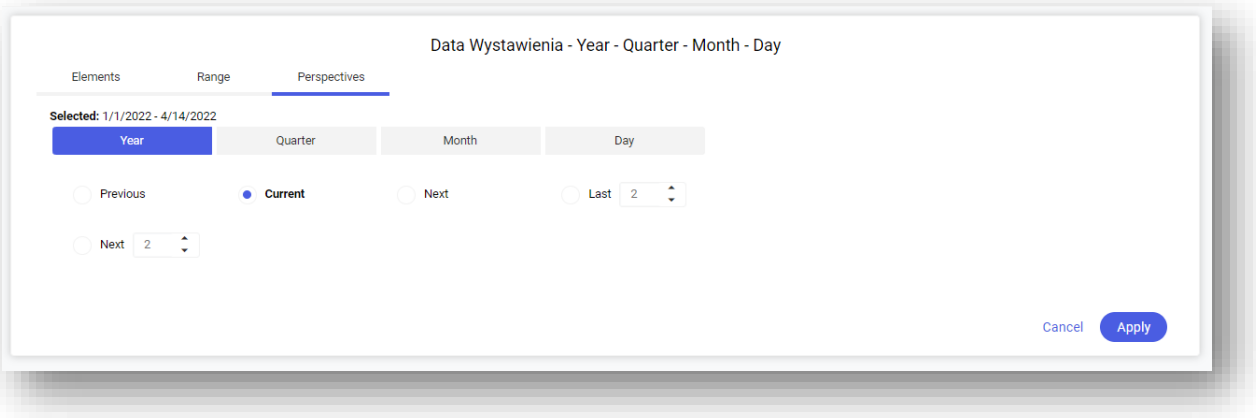


Figure 72 Time filtering – Perspectives

On the right side of the top bar, there are additional options referring to work with a report. The first icon:  is used to save a defined report or save changes made to it; the other one:  is used to start a report configuration tool.

6.5.1.4 Report configuration tool

In the configuration tool of report and controls in dashboards, it is possible to switch the view with names and measures by selecting the button *Display Detailed Names*.

Figure 73 Option presenting detailed names

There are 3 types of name presentation: *Short name*, *Detailed name*, *Technical name*.

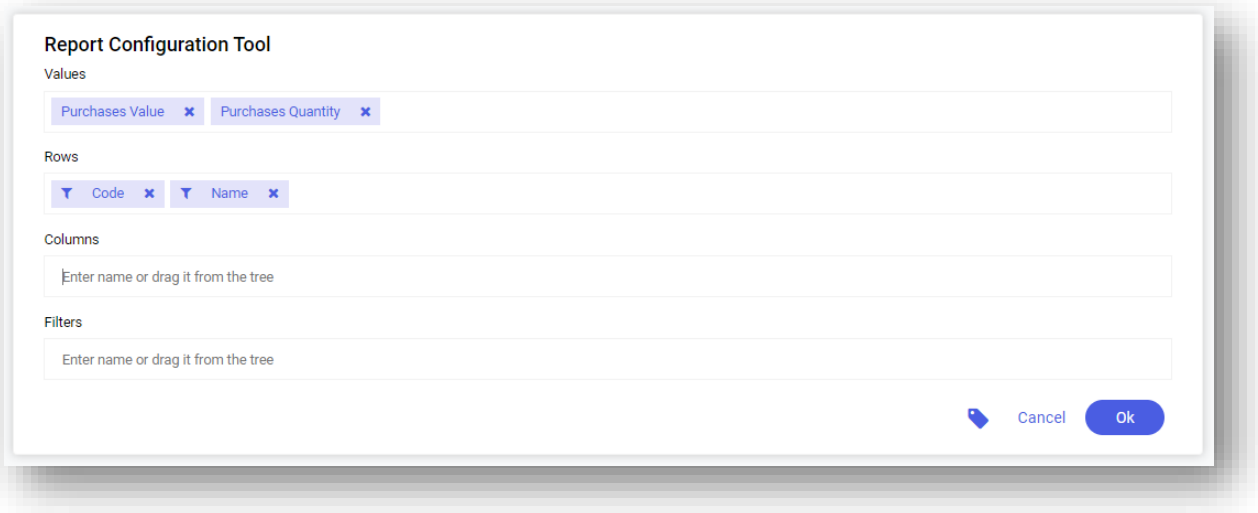


Figure 74 Short dimension name

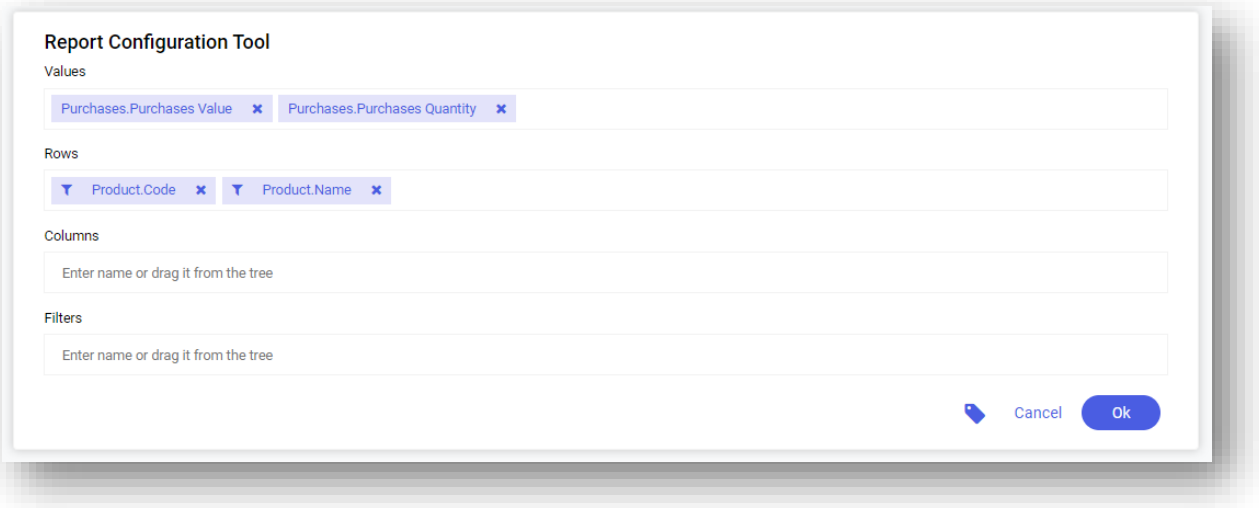


Figure 75 Detailed dimension name

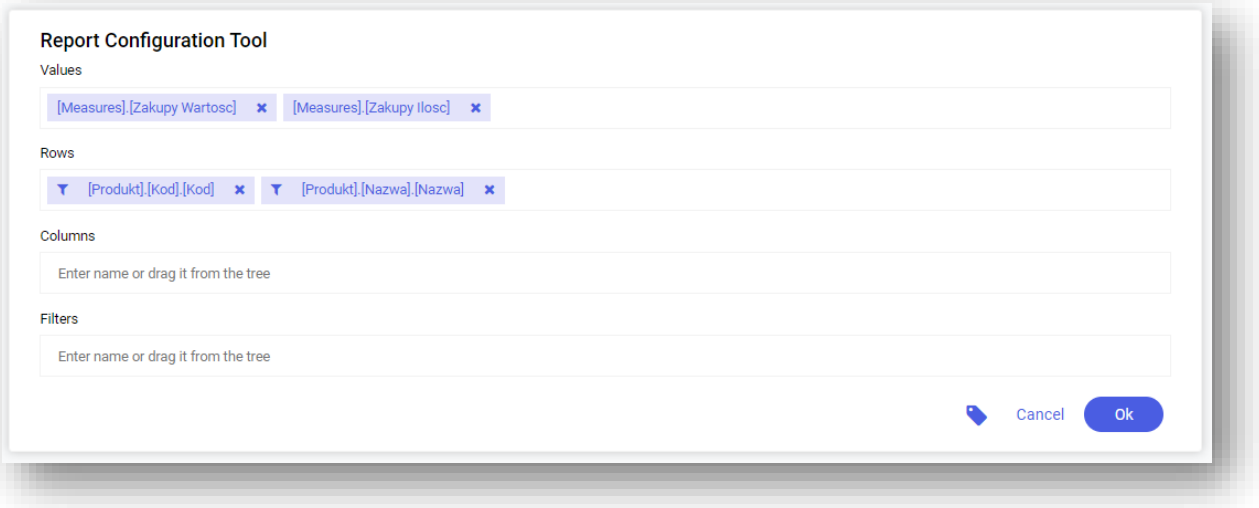


Figure 76 Technical dimension name

The next icon  is used to view a chart/table and the last icon: groups other report options

- **Save To File** – allows for transferring the content of a report to external file in form of table or chart. The most popular file types are available, that is: PDF, XLS, XLSX, PNG and HTML. It is also possible to use how to save the file.
- **Save** – allows for saving a defined report or saving changes made in it
- **Save As** – allows for saving a copy of report under different name, along with selecting location of that copy in the report repository
- **Add Subscription** – allows for creating a subscription of a current report
- **Custom Measure** – apart from standard predefined measures, it is possible to use a tool allowing for making own calculations of measure values. Upon selecting that option, a window for defining new custom measure appears in the tool panel – measure on which definition will be based must be dragged from the list with the use of *'drag&drop'* method to the custom measure window. Measure supports connecting standard

measures and basic arithmetical and logical operators. After changes are confirmed, the measure is automatically added to a report. Custom measures are described in detail in chapter 6.5.3.

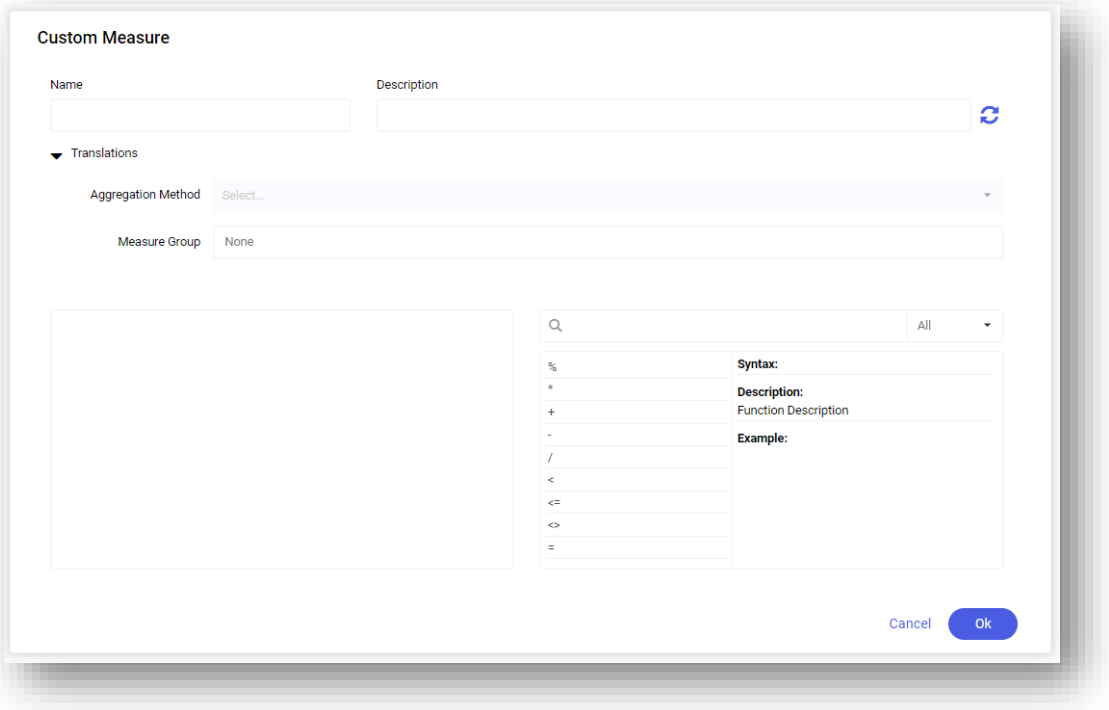
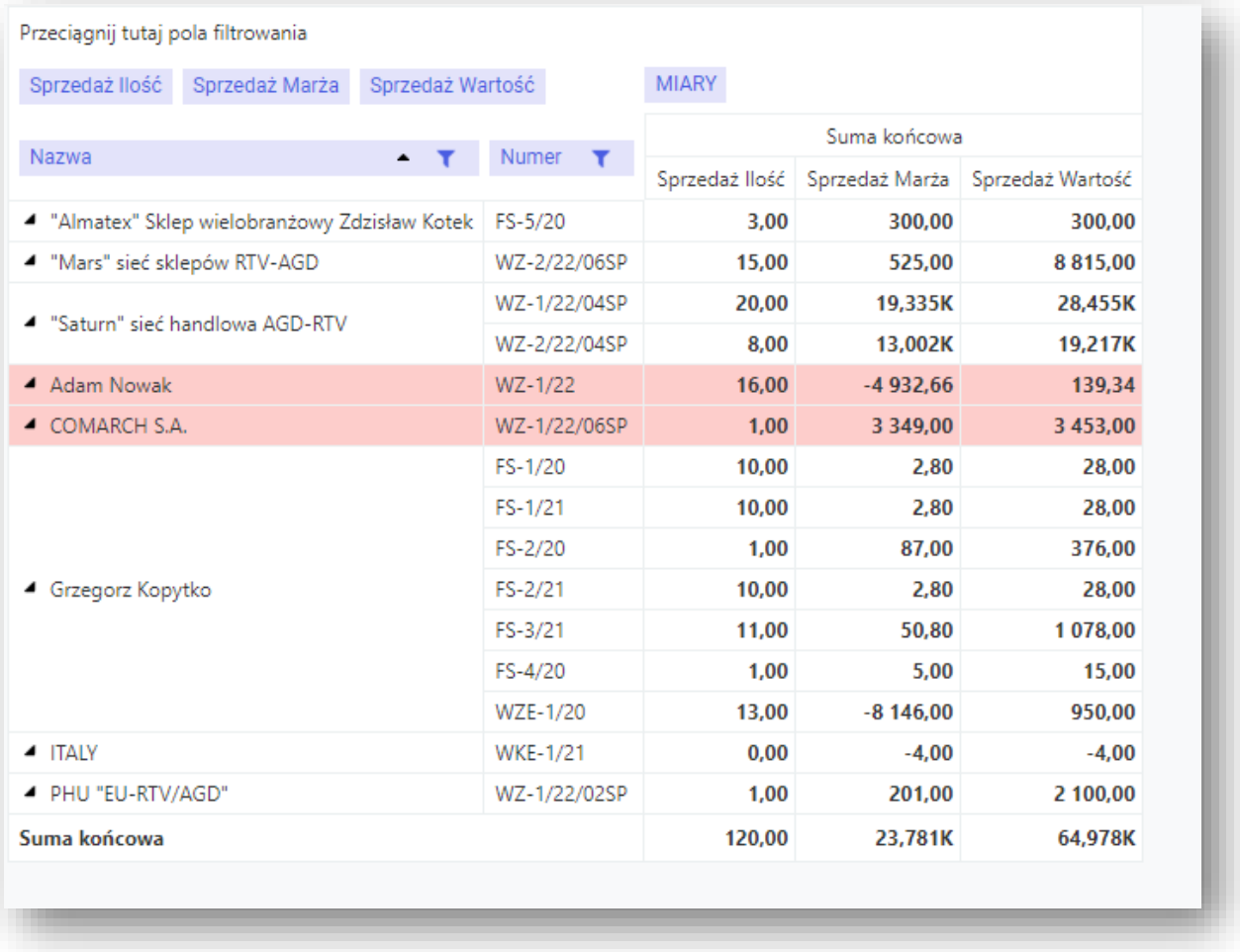


Figure 77 Defining a new custom measure

6.5.1.5 Copy-Paste function

To properly copy a table, just use the mouse to select an area, and then using the keyboard shortcut Ctrl+C, copy the data to the clipboard. The selected area is highlighted in a different color to make sure what exactly is being copied.

Example:

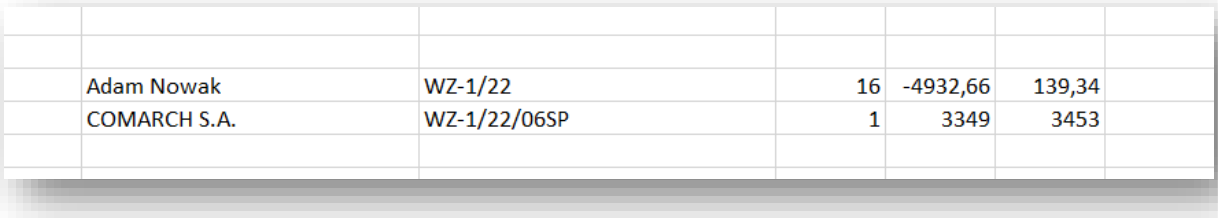


Przeciągnij tutaj pola filtrowania

Sprzedaż Ilość | Sprzedaż Marża | Sprzedaż Wartość | MIARY

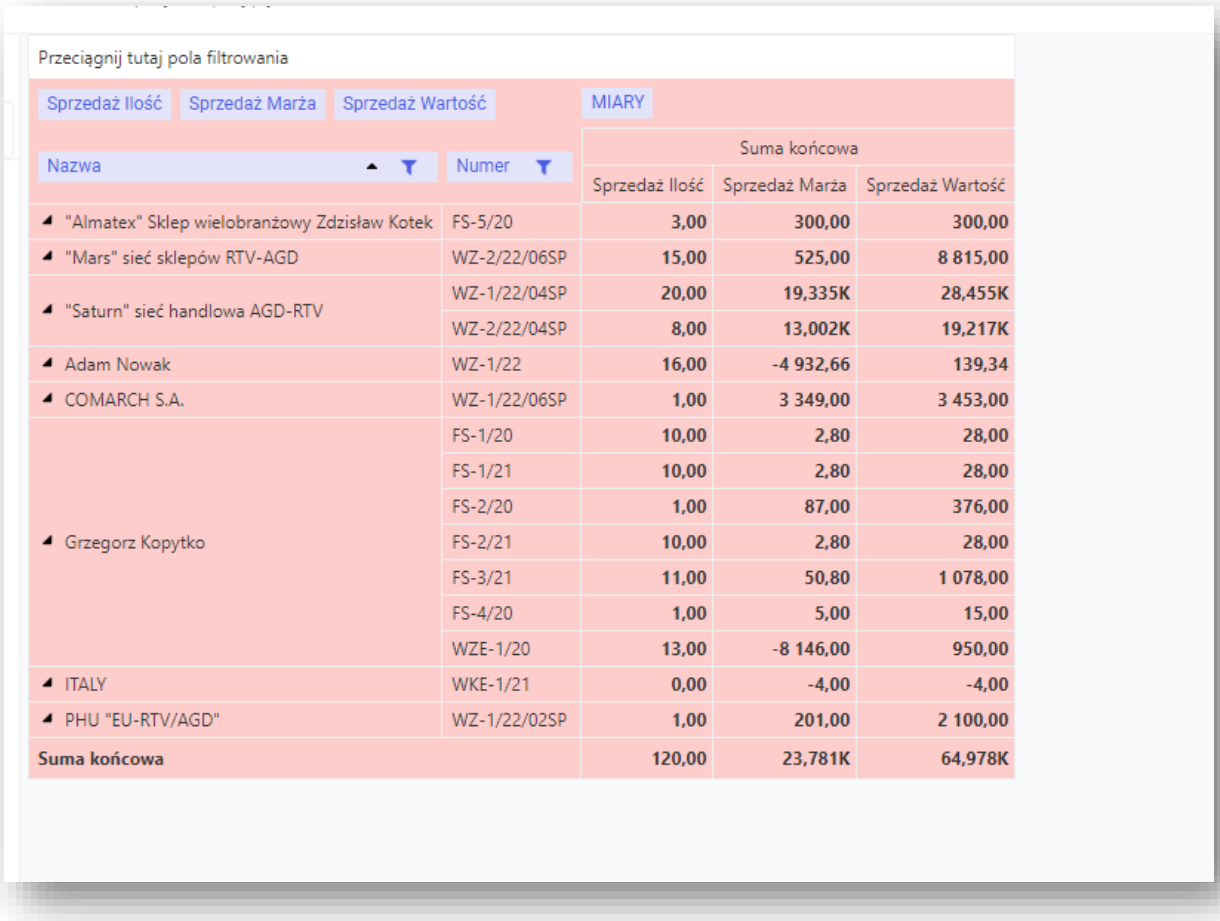
Nazwa	Numer	Suma końcowa		
		Sprzedaż Ilość	Sprzedaż Marża	Sprzedaż Wartość
"Almatex" Sklep wielobranżowy Zdzisław Kotek	FS-5/20	3,00	300,00	300,00
"Mars" sieć sklepów RTV-AGD	WZ-2/22/06SP	15,00	525,00	8 815,00
"Saturn" sieć handlowa AGD-RTV	WZ-1/22/04SP	20,00	19,335K	28,455K
	WZ-2/22/04SP	8,00	13,002K	19,217K
Adam Nowak	WZ-1/22	16,00	-4 932,66	139,34
COMARCH S.A.	WZ-1/22/06SP	1,00	3 349,00	3 453,00
Grzegorz Kopytko	FS-1/20	10,00	2,80	28,00
	FS-1/21	10,00	2,80	28,00
	FS-2/20	1,00	87,00	376,00
	FS-2/21	10,00	2,80	28,00
	FS-3/21	11,00	50,80	1 078,00
	FS-4/20	1,00	5,00	15,00
	WZE-1/20	13,00	-8 146,00	950,00
ITALY	WKE-1/21	0,00	-4,00	-4,00
PHU "EU-RTV/AGD"	WZ-1/22/02SP	1,00	201,00	2 100,00
Suma końcowa		120,00	23,781K	64,978K

After copying, just do the keyboard shortcut Ctrl+V or right mouse button + paste.



	Adam Nowak	WZ-1/22	16	-4932,66	139,34	
	COMARCH S.A.	WZ-1/22/06SP	1	3349	3453	

Instead of using the mouse, you can also select the entire table with the keyboard shortcut Ctrl+A.



Przeciągnij tutaj pola filtrowania

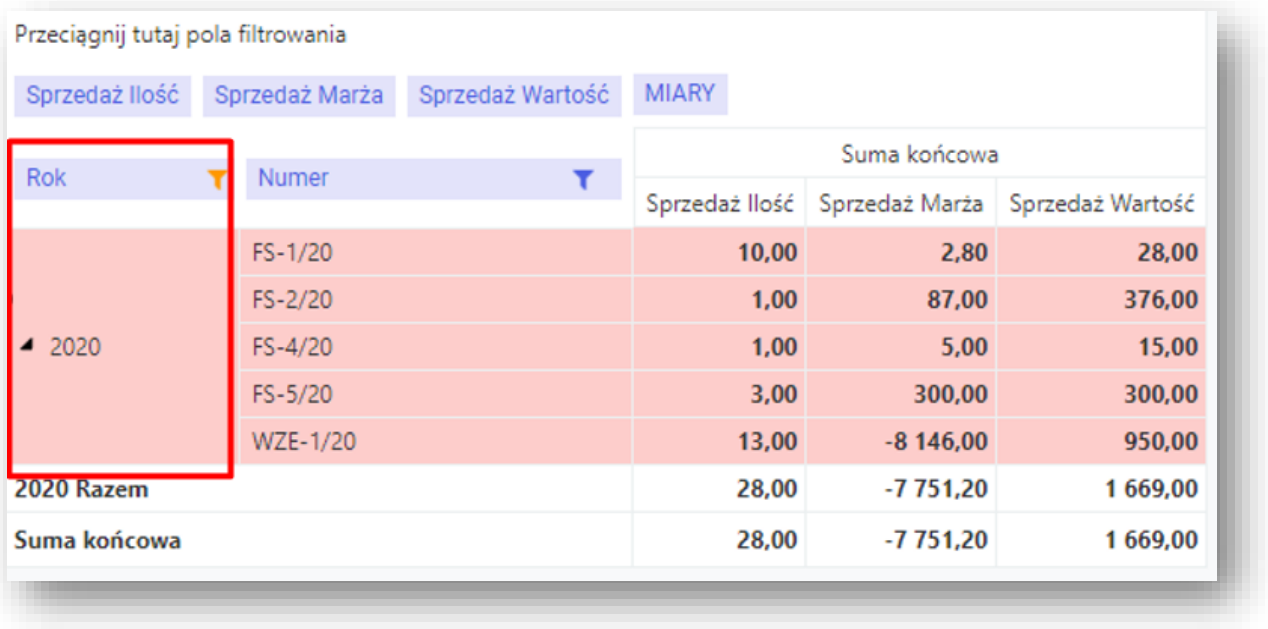
Sprzedaż Ilość | Sprzedaż Marża | Sprzedaż Wartość | MIARY

Nazwa	Numer	Suma końcowa		
		Sprzedaż Ilość	Sprzedaż Marża	Sprzedaż Wartość
"Almatex" Sklep wielobranżowy Zdzisław Kotek	FS-5/20	3,00	300,00	300,00
"Mars" sieć sklepów RTV-AGD	WZ-2/22/06SP	15,00	525,00	8 815,00
"Saturn" sieć handlowa AGD-RTV	WZ-1/22/04SP	20,00	19,335K	28,455K
	WZ-2/22/04SP	8,00	13,002K	19,217K
Adam Nowak	WZ-1/22	16,00	-4 932,66	139,34
COMARCH S.A.	WZ-1/22/06SP	1,00	3 349,00	3 453,00
Grzegorz Kopytko	FS-1/20	10,00	2,80	28,00
	FS-1/21	10,00	2,80	28,00
	FS-2/20	1,00	87,00	376,00
	FS-2/21	10,00	2,80	28,00
	FS-3/21	11,00	50,80	1 078,00
	FS-4/20	1,00	5,00	15,00
	WZE-1/20	13,00	-8 146,00	950,00
ITALY	WKE-1/21	0,00	-4,00	-4,00
PHU "EU-RTV/AGD"	WZ-1/22/02SP	1,00	201,00	2 100,00
Suma końcowa		120,00	23,781K	64,978K

		Suma końcowa	Suma końcowa	Suma końcowa
		Sprzedaż Ilość	Sprzedaż Marża	Sprzedaż Wartość
Almatex Sklep wielobrani	FS-5/20	3	300	300
Mars sieć sklepów RTV-A	WZ-2/22/06SP	15	525	8815
Saturn sieć handlowa AGI	WZ-1/22/04SP	20	19335	28455
Saturn sieć handlowa AGI	WZ-2/22/04SP	8	13002	19217
Adam Nowak	WZ-1/22	16	-4932,66	139,34
COMARCH S.A.	WZ-1/22/06SP	1	3349	3453
Grzegorz Kopytko	FS-1/20	10	2,8	28
Grzegorz Kopytko	FS-1/21	10	2,8	28
Grzegorz Kopytko	FS-2/20	1	87	376
Grzegorz Kopytko	FS-2/21	10	2,8	28
Grzegorz Kopytko	FS-3/21	11	50,8	1078
Grzegorz Kopytko	FS-4/20	1	5	15
Grzegorz Kopytko	WZE-1/20	13	-8146	950
ITALY	WKE-1/21	0	-4	-4
PHU EU-RTV/AGD	WZ-1/22/02SP	1	201	2100
Suma końcowa	Suma końcowa	120	23780,54	64978,34

In a situation where a specific dimension contains multiple sub-dimensions in the table, for example,

the *Year* dimension contains multiple documents from the *Document Number* dimension,

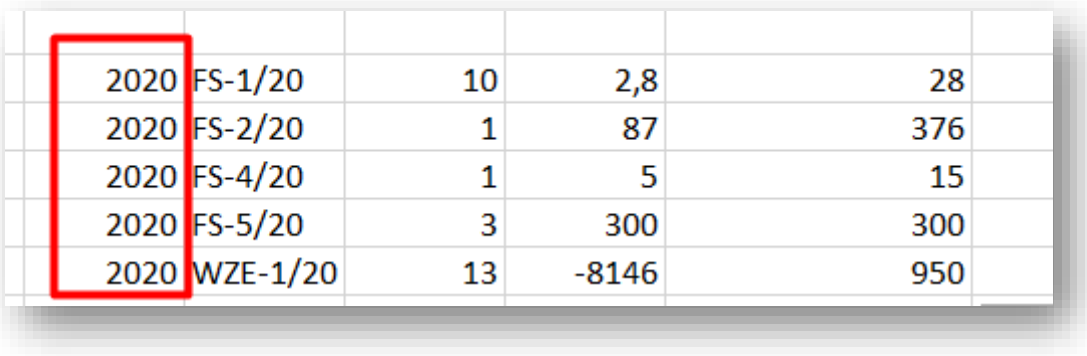


Przeciągnij tutaj pola filtrowania

Sprzedaż Ilość | Sprzedaż Marża | Sprzedaż Wartość | MIARY

Rok	Numer	Suma końcowa		
		Sprzedaż Ilość	Sprzedaż Marża	Sprzedaż Wartość
2020	FS-1/20	10,00	2,80	28,00
	FS-2/20	1,00	87,00	376,00
	FS-4/20	1,00	5,00	15,00
	FS-5/20	3,00	300,00	300,00
	WZE-1/20	13,00	-8 146,00	950,00
2020 Razem		**28,00**	**-7 751,20**	**1 669,00**
Suma końcowa		**28,00**	**-7 751,20**	**1 669,00**

the *Copy* function will split the *Year* dimension into each document number from the table (the column with year is not merged):



2020	FS-1/20	10	2,8	28
2020	FS-2/20	1	87	376
2020	FS-4/20	1	5	15
2020	FS-5/20	3	300	300
2020	WZE-1/20	13	-8146	950

In a situation where dimensions are presented differently in the table, as in the case below:

- *Year* dimension is expanded
- *Document Number* dimension is expanded for one document only
- *Product Code* dimension is only expanded for one document that is expanded in the *Document Number* dimension

			Sprzedaż Ilość	Sprzedaż Marża	Sprzedaż Wartość
2022	WZ-1/22		16,00	-4 932,66	139,34
	WZ-1/22/02SP		1,00	201,00	2 100,00
	WZ-1/22/04SP	AIIPHILITRYMER	5,00	390,00	565,00
		AKLWHIRL ARG585	10,00	8 490,00	12,39K
		RVTSAMSU LE32S71B	5,00	10,455K	15,5K
	WZ-1/22/04SP Razem		20,00	19,335K	28,455K
	WZ-1/22/06SP		1,00	3 349,00	3 453,00
	WZ-2/22/04SP		8,00	13,002K	19,217K
	WZ-2/22/06SP		15,00	525,00	8 815,00
2022 Razem			61,00	31,479K	62,179K

the table will look as follows after pasting the data:

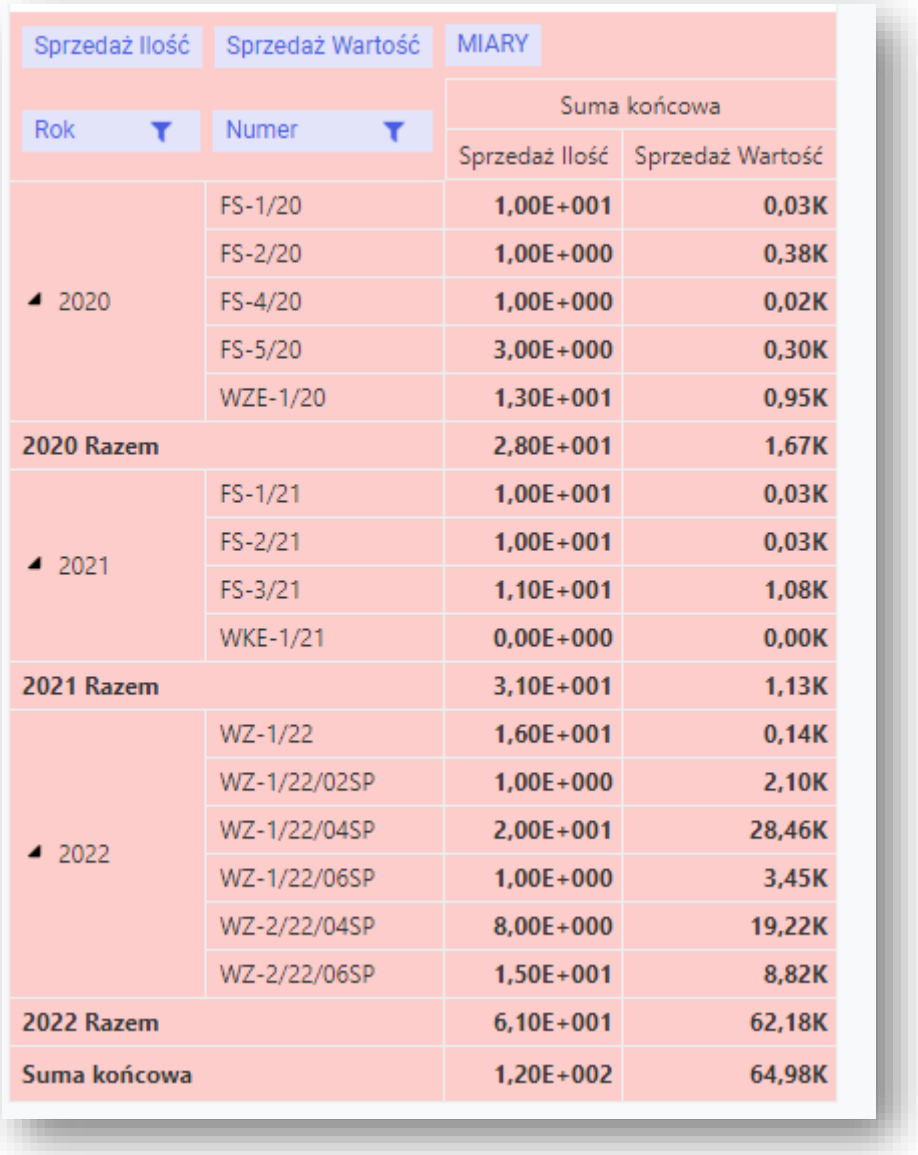
2022	WZ-1/22	WZ-1/22	16	-4932,66	139,34
2022	WZ-1/22/02SP	WZ-1/22/02SP	1	201	2100
2022	**WZ-1/22/04SP**	**AIIPHILITRYMER**	5	390	565
2022	**WZ-1/22/04SP**	**AKLWHIRL ARG585**	10	8490	12390
2022	**WZ-1/22/04SP**	**RVTSAMSU LE32S71B**	5	10455	15500
2022	**WZ-1/22/04SP Razem**	**WZ-1/22/04SP Razem**	20	19335	28455
2022	WZ-1/22/06SP	WZ-1/22/06SP	1	3349	3453
2022	WZ-2/22/04SP	WZ-2/22/04SP	8	13002	19217
2022	WZ-2/22/06SP	WZ-2/22/06SP	15	525	8815

As shown in the above screenshot, when there is no product expanded for other dimensions, the corresponding column is copied from the previous dimension (in this case, these are the red document numbers framed in red).

As far as the format of copied data is concerned, the data is always pasted in **numerical format** after copying. Example:

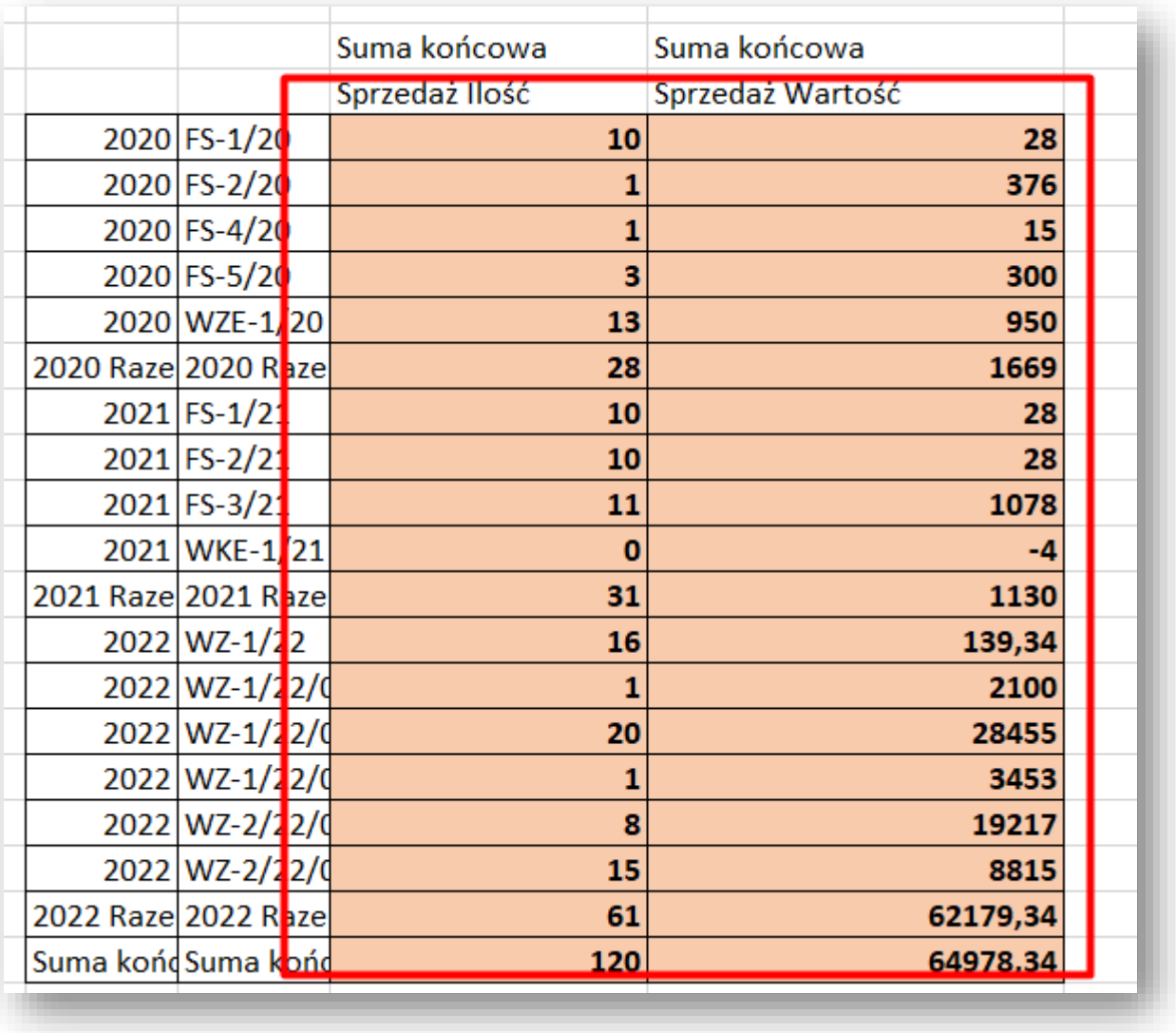
Comarch BI Point

- Measure “Sales Value” in *thousands* format
- Measure “Sales Quantity” in *Scientific notation* format



Sprzedaż Ilość	Sprzedaż Wartość	MIARY	
Rok	Numer	Suma końcowa	
		Sprzedaż Ilość	Sprzedaż Wartość
2020	FS-1/20	1,00E+001	0,03K
	FS-2/20	1,00E+000	0,38K
	FS-4/20	1,00E+000	0,02K
	FS-5/20	3,00E+000	0,30K
	WZE-1/20	1,30E+001	0,95K
2020 Razem		2,80E+001	1,67K
2021	FS-1/21	1,00E+001	0,03K
	FS-2/21	1,00E+001	0,03K
	FS-3/21	1,10E+001	1,08K
	WKE-1/21	0,00E+000	0,00K
2021 Razem		3,10E+001	1,13K
2022	WZ-1/22	1,60E+001	0,14K
	WZ-1/22/02SP	1,00E+000	2,10K
	WZ-1/22/04SP	2,00E+001	28,46K
	WZ-1/22/06SP	1,00E+000	3,45K
	WZ-2/22/04SP	8,00E+000	19,22K
	WZ-2/22/06SP	1,50E+001	8,82K
2022 Razem		6,10E+001	62,18K
Suma końcowa		1,20E+002	64,98K

Microsoft Excel



		Suma końcowa Sprzedaż Ilość	Suma końcowa Sprzedaż Wartość
2020	FS-1/20	10	28
2020	FS-2/20	1	376
2020	FS-4/20	1	15
2020	FS-5/20	3	300
2020	WZE-1/20	13	950
2020 Raze	2020 Raze	28	1669
2021	FS-1/21	10	28
2021	FS-2/21	10	28
2021	FS-3/21	11	1078
2021	WKE-1/21	0	-4
2021 Raze	2021 Raze	31	1130
2022	WZ-1/22	16	139,34
2022	WZ-1/22/0	1	2100
2022	WZ-1/22/0	20	28455
2022	WZ-1/22/0	1	3453
2022	WZ-2/22/0	8	19217
2022	WZ-2/22/0	15	8815
2022 Raze	2022 Raze	61	62179,34
Suma końc	Suma końc	120	64978.34

6.5.2 Conditional formatting in a report

Conditional formatting option allows for formatting of report layout according to specified conditions. Upon marking a measure used in a report, option *Conditional Formatting* appears in the right panel.

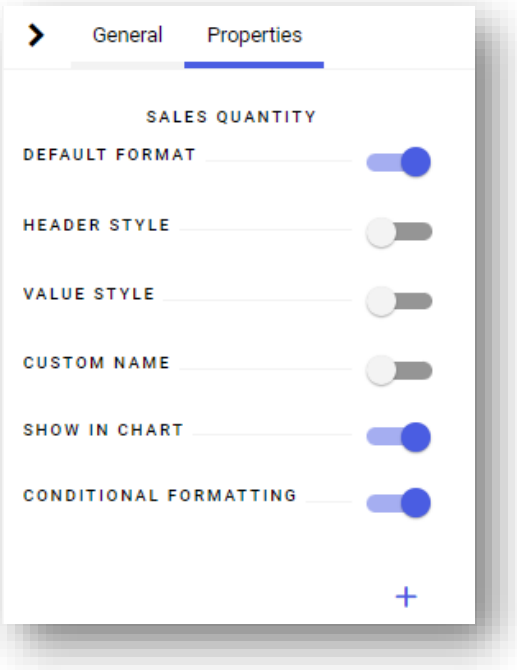


Figure 78 Conditional formatting

Upon clicking [**Add**], a user is redirected to conditional formatting configuration.

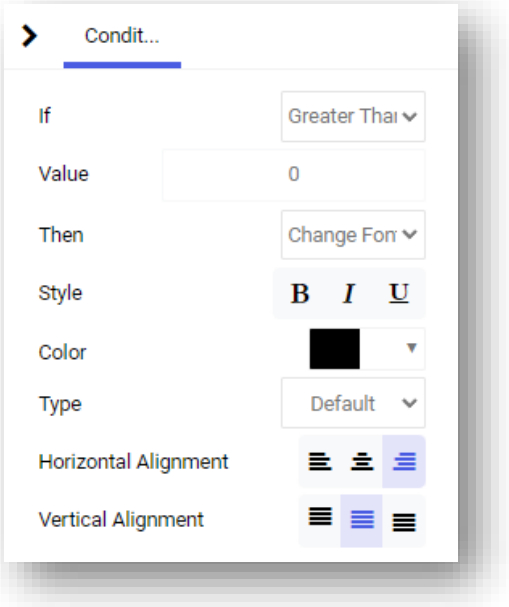


Figure 79 Conditional formatting configuration

The first option is condition *If*. The following values are available for selection: *Equal To*, *Less Than*, *Greater Than*, *Less or Equal To*, *Within Range* and *Out of Range*.

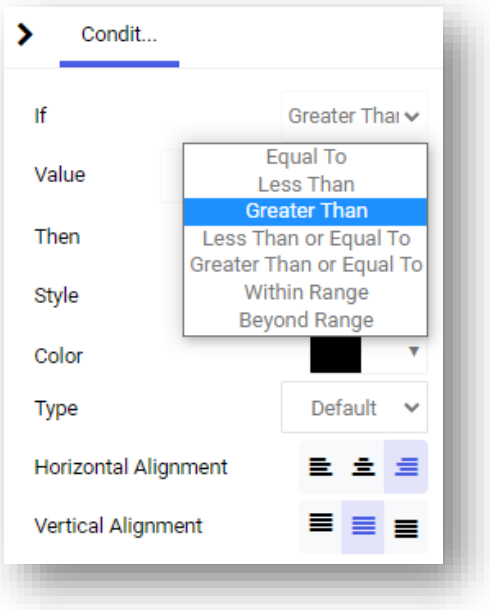


Figure 80 Condition *If*

In the next step, it is necessary to enter value which will be a threshold for condition *If*.

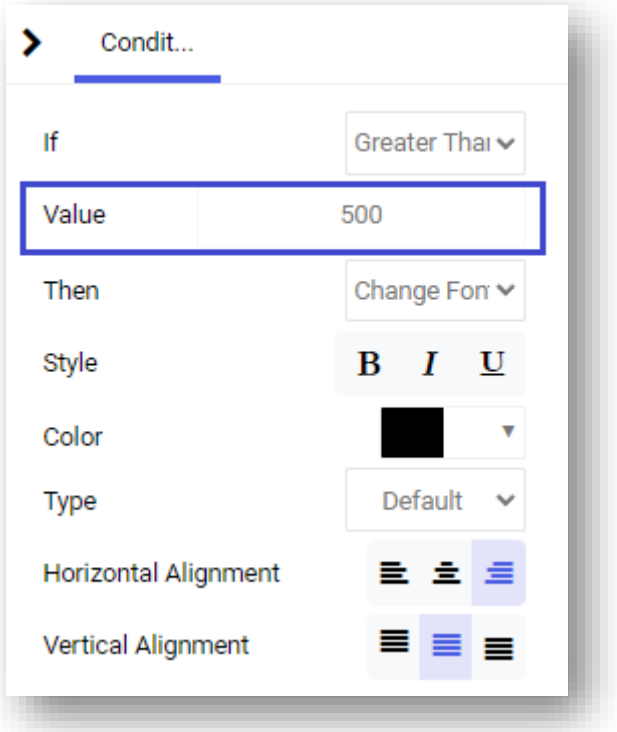


Figure 81 Field *Value*

Option Then allows for selecting what element should be changed – font or background color.

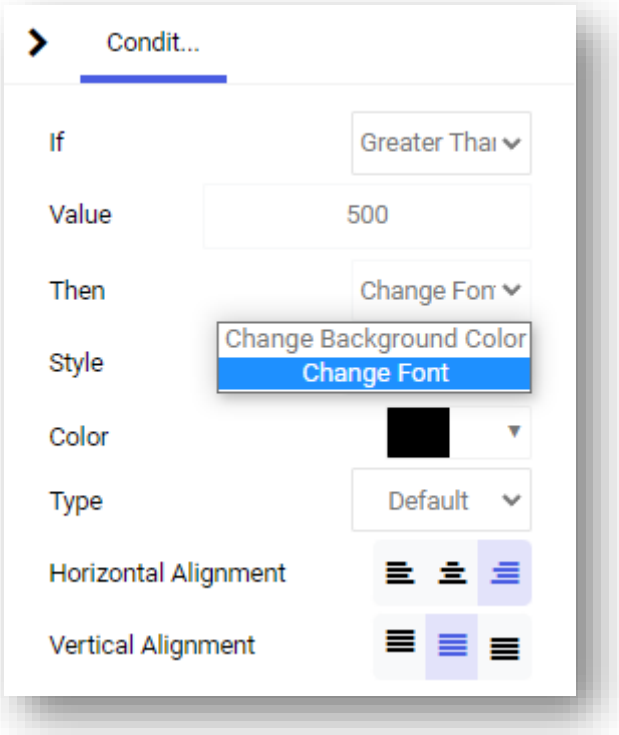


Figure 82 Option *Then*

When option *Change Background Color* is selected, the last step is selection of background color.

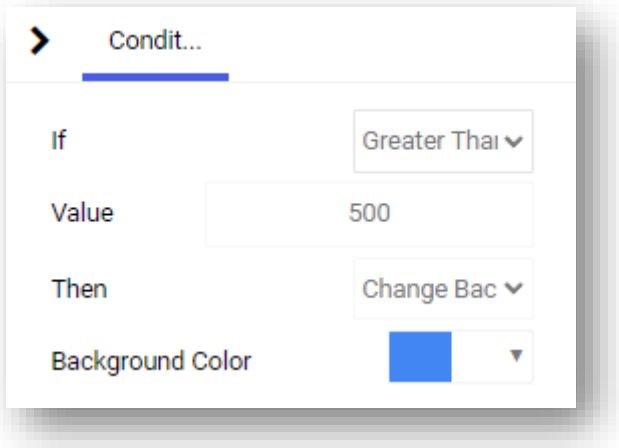


Figure 83 Background color

Selecting option *Change Font* allows for changing:

- Font style (bold, italics, underline)
- Color
- Type (default, Arial, Courier New, Times New Roman, Verdana)
- Vertical alignment

- Horizontal alignment

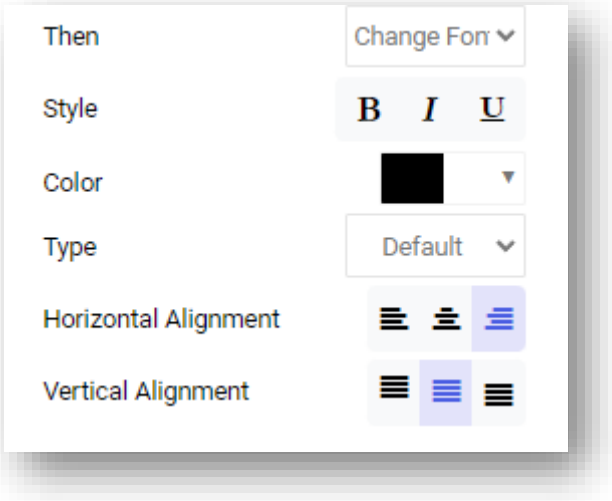


Figure 84 Font formatting

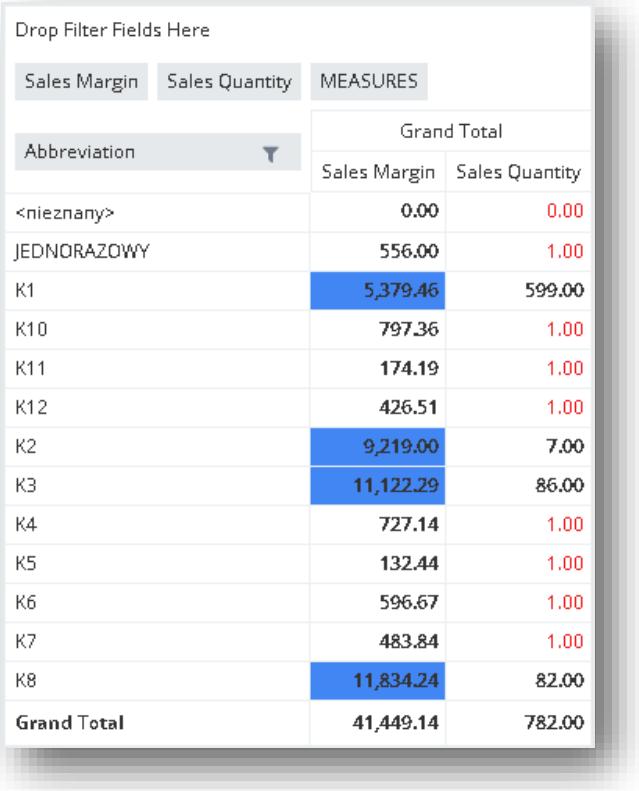


Figure 85 Exemplary use of conditional formatting

In the application it is possible to export reports with a used conditional formatting.

6.5.3 Custom measures

Custom measures are constructed according to a specially prepared language; defining them may significantly streamline work with reports, however, basic knowledge about that language is required. Description of its syntax is presented below:

Names of measures, dimensions and hierarchies must be unique. Measures, attributes and hierarchies can be distinguished. In case of a single dimension, a name will be the name of that dimension, whereas in case of hierarchies, the name will be a combination of individual dot-separated level names. If name of a measure, dimension or level includes a space, the entire name must be put in square brackets. In other cases, using square bracket is optional.

Syntax:

```
Measure, [Measure], [Measure with a space], Dimension, [Dimension], [Dimension].[Level], [Dimension].[Hierarchy].[ Level]
```

Example of use:

```
Cos, [Sales Value], [Sales Purchase Cost], [State], [Customer/Vendor Code], [Time].[Calendar].[Year]
```

The language supports standard operators: + - * / (). Round brackets ( ) have the same role as in SQL language for instance – they separate and group mathematical operations.

Syntax:

```
+ – * / ()
```

Example of use:

```
[Sales Value] + [Sales Purchase Cost] [Sales Discount] \ ([Sales Discount] + [Sales Value])
```

Many basic functions, e.g. of filter type, require using a specific attribute element.

Syntax:

```
[Attribute].[Element] [Dimension].[Hierarchy].[Level].[Element]
```

Example of use:

```
[Customer/Vendor Code].[ABC], [Time].[Calendar].[Year].[2014]
```

Range of a given attribute elements on the basis of a key. There are additional functions supported, retrieving the range from beginning or end of a dimension.

Syntax:

```
RANGE([Attribute].[Element1],[                              Attribute].[Element2]), RangeFrom([Atrybut].[Element]) RangeTo([Atrybut].[Element])
```

It is possible to filter a set by condition. Filter function, the same as range and set functions, return a set of elements. In case of the filter function, it is a set of elements fulfilling the filtering condition. Filter function verifies each element of a given set in the first argument for logic condition specified in the second argument.

Syntax:

```
FILTER([Attribute], [Condition])
```

Use case:

```
FILTER ( [Date of Issue], [Sales Value] > 5000 )
```

The "filter" syntax must be dataset-based, so the only correct way to filter it, is through dimension. This allows to create a dynamic dimension such as:

Use case:

```
FILTERBY ([SO- Quantity], Filter([Product - Name],[SO- Quantity Processed Quantity]=0 ) )
```

Function “filterby” is used to filter measures. It returns value of a measure/expression upon filtering to a specific set.

Syntax:

```
FILTERBY([Measure], [Set])
```

Use case:

```
FILTERBY ( [Sales Value], SET([Year].[2010]) )
```

It is possible to change the default aggregation function for a measure by using the following functions:

Syntax:

```
Avg([Measure])
Count([Measure])
DistinctCount([Measure])
Max([Measure])
Min([Measure])
Sum([Measure])
```

Use case:

```
Avg([Sales Margin])
DistinctCount([Discount])
```

Aggregating functions return an aggregation (e.g. a total) of numerical expression (measure) calculated by specific set determined in additional arguments. The following aggregation functions are supported: Sum, Max, Avg, Min.

Note: Assigning an attribute to measures activates the *Count* syntax and the aggregation method can be changed to *DistinctCount* in the attribute settings. To prevent from losing the information about the dimension being dragged, e.g. customer, the attribute must be added twice in the query.

Syntax:

```
Function (Measure [, Set1, Set2, …, SetN ])
```

Example of use:

```
SUM( [Sales Value] , SET( [Document Type].[Sales Invoice], [Document Type].[Sales Invoice Correction] ) )
```

```
Sum([Purchase Quantity])
```

It is possible to operate on sets. This concerns operations of addition or subtraction type.

Syntax:

```
Union([Set1],                                …,                                [SetN])
Except([Set1],                                                                 [Set2])
Intersect([Set1], [Set2] )
```

Example of use:

```
Except([State], set([State].[Mazowieckie]))
```

There are functions which aggregate incrementally:

Syntax:

```
RunningSum([Measure],    [Dimension])    RunningAvg,    RunningMin,    RunnningMax,
RunningCount
```

Example of use:

```
RunningSum([Sales Value], [State])
```

It aggregates the measure incrementally according to dimension given.

Logic conditions can be used, for example, in IF functions. The most popular logic conditions are comparisons of a measure to a mathematical constant or NULL and comparisons to text values.

Supported logical operators:

```
= , > , < , <= , >=, <>
```

Supported logic functions:

```
NOT, AND , OR
```

All of the above-mentioned operators use numeric values. Additionally, operators = and <> can be used to compare elements by text, e.g. [Product Code] = ‘22345’

Any name or pattern known from SQL:

% - any string of characters

? – exactly one character

can be used as text.

Example of use:

```
[Sales                                                                  Value] = 0
[State] = ‘M%’
AND( [Sales Quantity] > = 0 , [Sales Quantity] < 10 )
```

Another important condition is the verification if a given value does not equal NULL.

Syntax:

```
IsEmpty([Expression])
```

Example of use:

```
IsEmpty ( [Sales Value] )
```

Names:

```
IsEmpty(), IfEmpty()
```

IIF function:

Syntax:

```
IIF ( Condition, True, False )
```

Example of use:

```
IIF ( [Sales Value] = 0, 0 , [Sales Discount] / [Sales Value] )
```

In version 6.1, `PriorPeriod([measure])` function is also supported, which displays value of a given measure in a previous period, as well as function `PeriodPriorYear([measure])` displaying value of a measure in a given period in a previous year.

Note: This function works on the source of InMemory type; otherwise, MDX function should be used in the "Custom Measure" control.

It is possible to filter by top/bottom elements of a dimension.

Syntax:

```
TOP ( Set, quantity, measure )
```

Example of use:

```
TOP ( [Customer/Vendor Code], 10, [Sales Value] )
```

The BOTTOM function works in the same way.

There is also a new module function available.

Syntax:

```
[Measure] % [Numeric expression]
```

Example of use:

```
[Sales Quantity] % 10
```

For models based on OLAP connection, in the field when a calculated measure is created, a message informing about the source and reminding to use the MDX language is displayed.

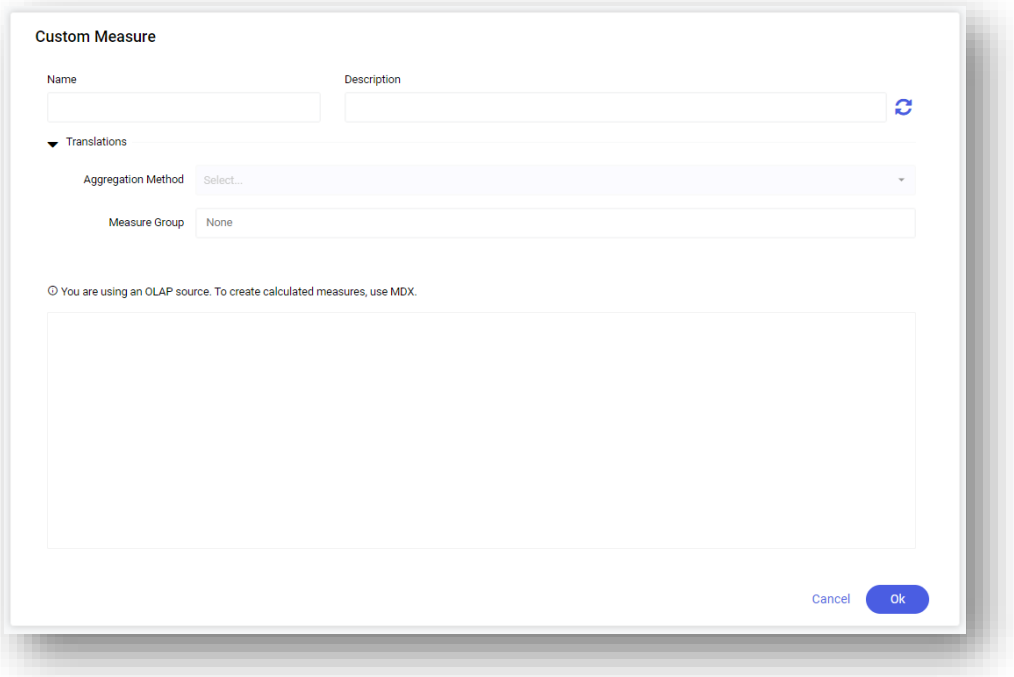


Figure 86 Custom measures

6.5.4 Reports of Excel type and Reporting Services

Reports of Excel type are used to store in a database a definition of Microsoft Excel spreadsheets (XLS and XLSX files) and share their content to other users. Starting an Excel report results in downloading it from the database, saving in a temporary file and opening it in Microsoft Excel application.

Upon clicking [**Create – Excel Report**], a form for selecting Excel report from file opens.

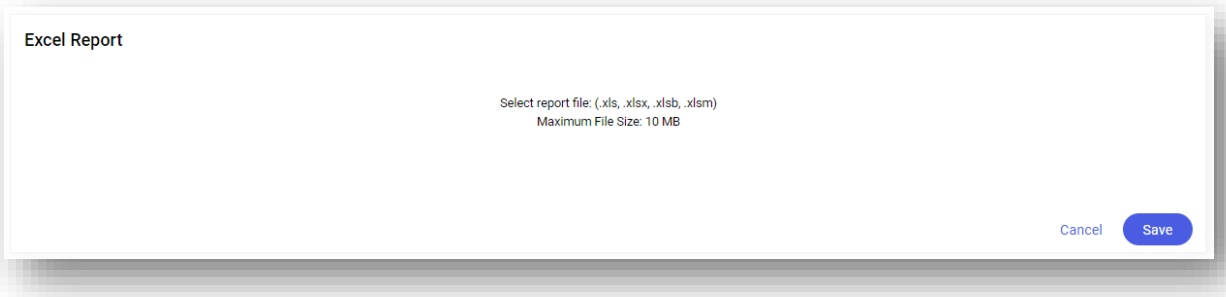


Figure 87 Adding a report of Excel type

Upon clicking on [**Create – RS Report**], a form appears for entering report name and direct link to the report from Reporting Services. Reports of RS type allow for storing in a database a direct link to a report which is available on RS server.

Figure 88 Adding a report of RS type

An administrator can determine addresses for which RS report can be created. The following section was added to config.json file:

```
},
 "ExternalDomainsConf": {
   "AllowedRSDomains": "value",
   "AccessControlAllowOrigin": "*"
 },
```

Attribute *value* should contain addresses of pages, separated by a comma, for which RS reports can be created.

The previously defined addresses can be previewed under the button.

Figure 89 Information on allowed addresses

6.5.5 Reports in multisourcing

A user can select a data model in a report and dashboard. The list is presented in the form of a tree and reports can be searched for by data model name and type.

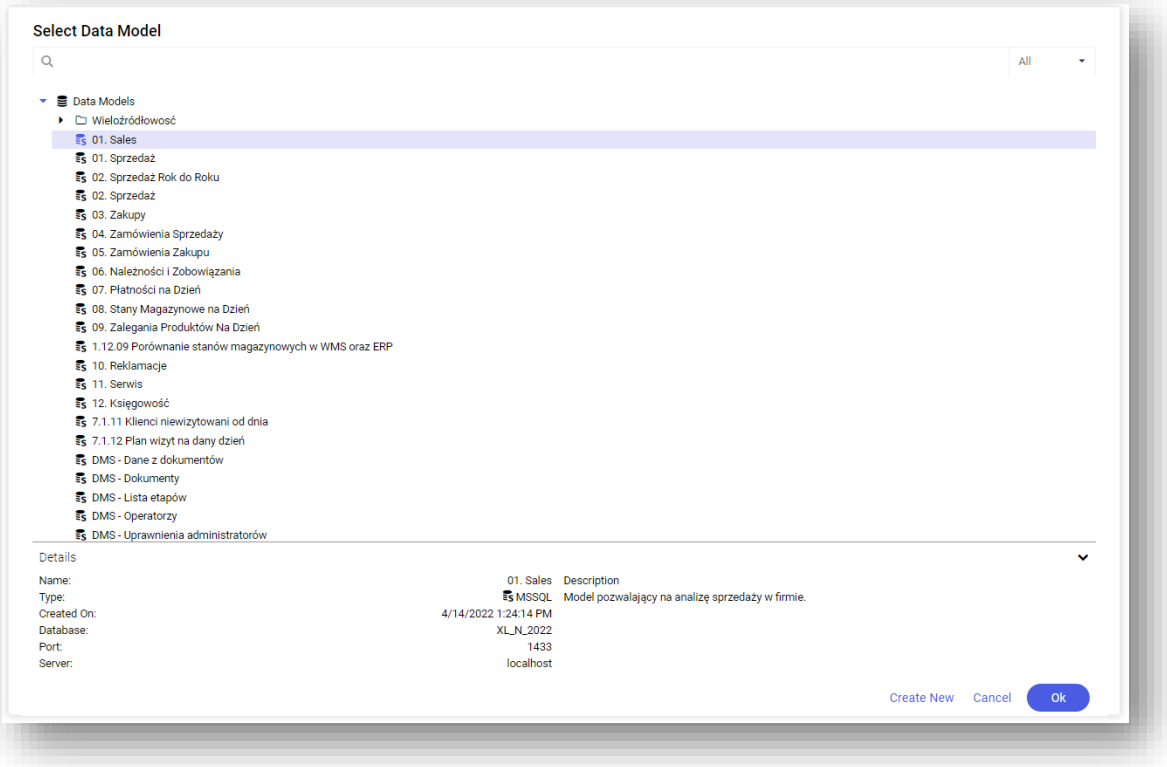


Figure 90 Selecting a data model when creating controls in a report

In the configuration tool, it is possible to navigate to adding a new data model by selecting the Create New button.

Description of the permissions to reports in multisourcing can be found here.

6.5.6 Comments to reports

A notification icon informs about each newly added comment or about a shared report of dashboard.

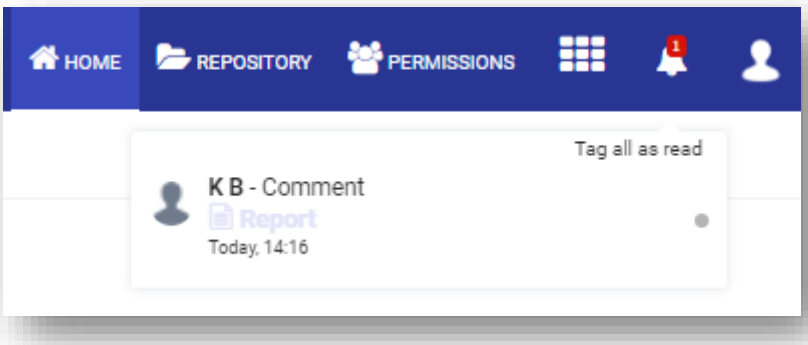


Figure 91 Notifications

Upon selecting the bell icon in the main menu, it is possible to preview new comments added by users to reports and dashboards.

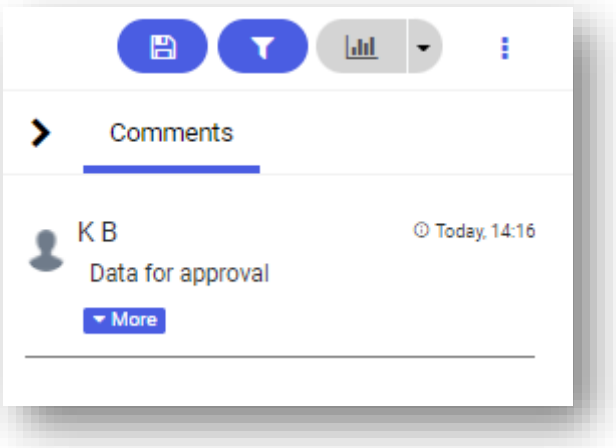


Figure 92 Comments

Selecting the button [**Comments**]  will activate the right panel presenting comments.

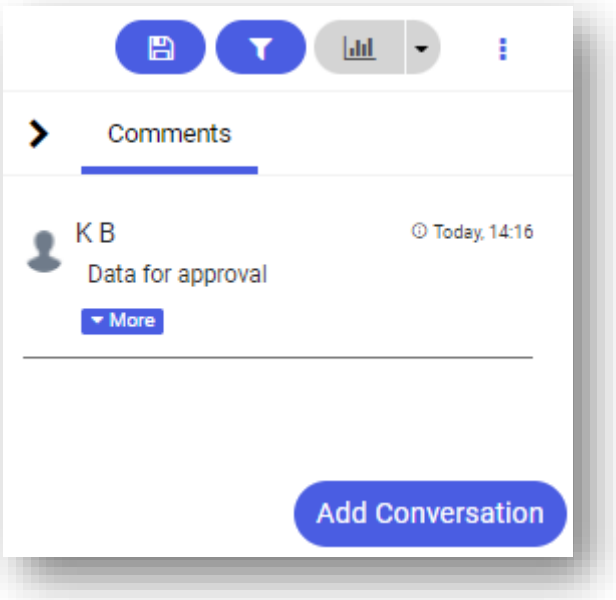


Figure 93 Panel with comments

To add a new conversation, select the button 

. A window presented below will then open.

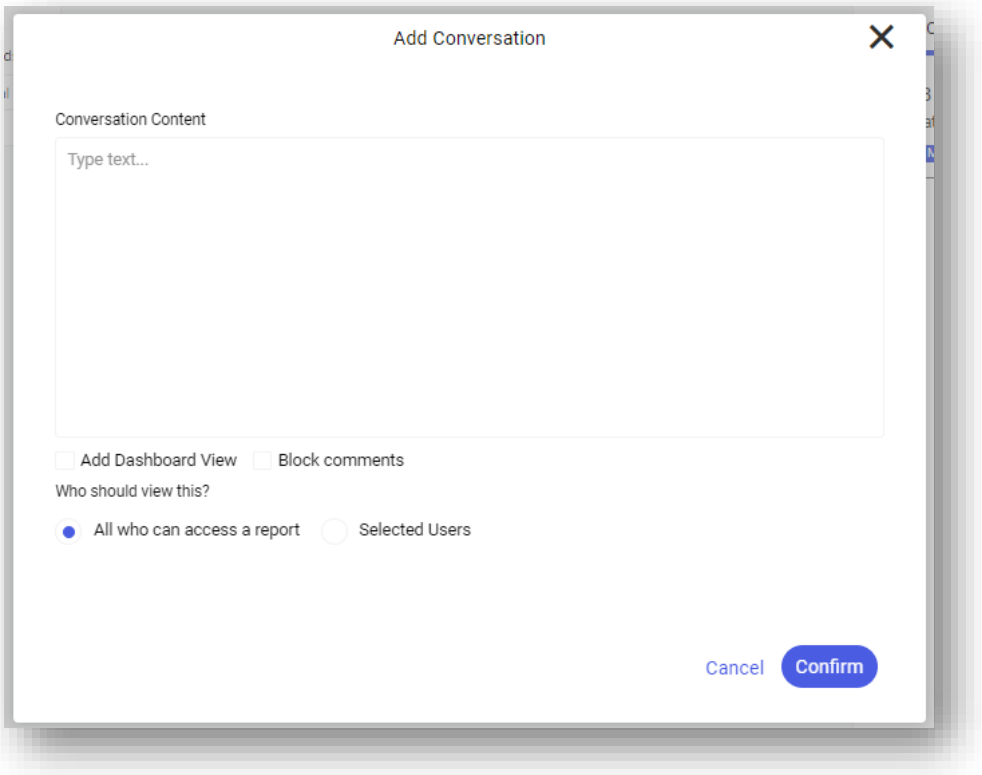


Figure 94 New conversation window

It is also possible to attach a current view so that other users could see the same data.

Another thing which can also be specified are permissions for recipients.

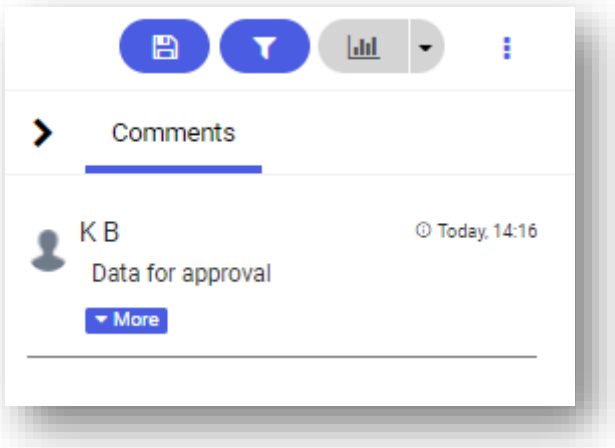


Figure 95 Comment view

Before adding a reply, a user can preview the attached view by selecting the button .

A reply can be added by typing a text into the *Reply* box. A reply can be edited by selecting the button Edit .

6.6 External link

This option allows for adding any external link to the repository, in form of a tile.

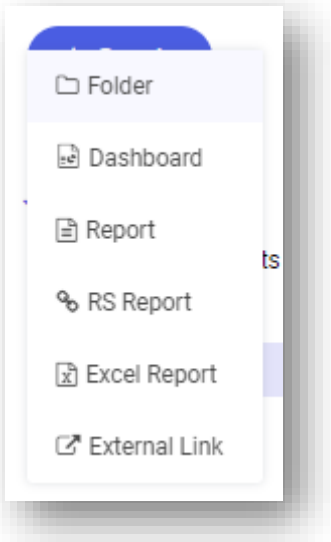


Figure 96 External link

In order to add such link to the repository, its name must be specified, path to that file defined and link type selected.

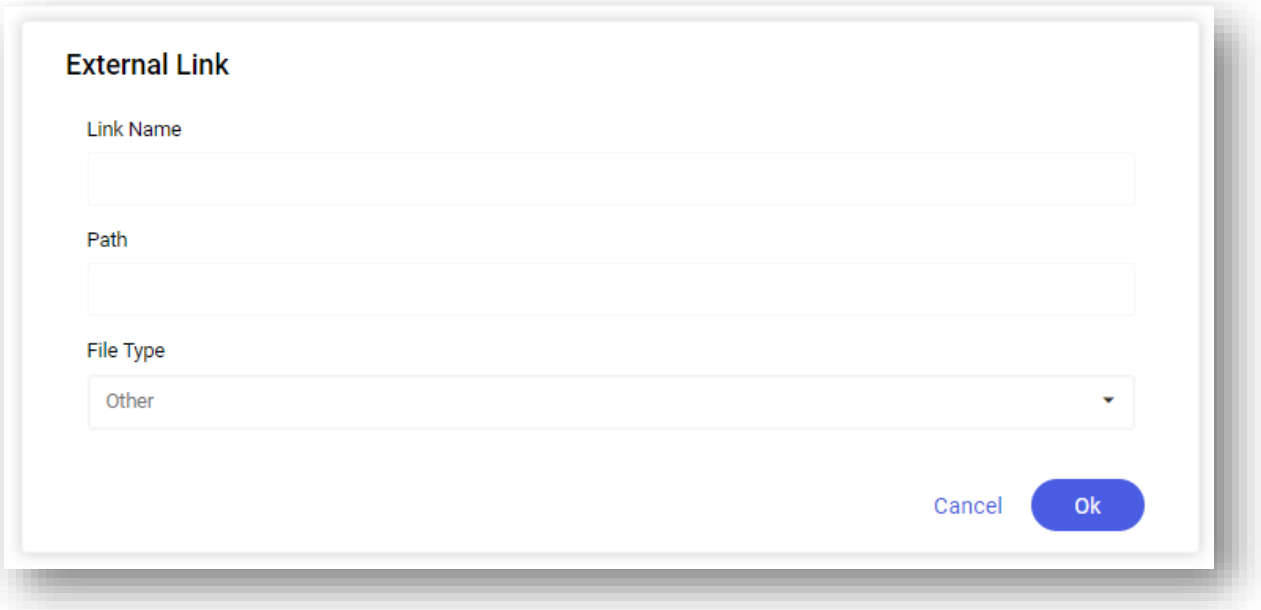


Figure 97 Creating an external link

After filling in the data and clicking [**Apply**], tile with assigned link appears in the repository. Upon clicking on it, a new tab is created with link specified in the path.

Figure 98 Tile with link to PDF document

6.7 Subscriptions

Note: The maximum number of external users that can be added to a subscription is defined by the number of users for whom a subscription license was purchased.

Note: External users are counted per all subscriptions and are managed from the level of a single subscription or the permission screen.

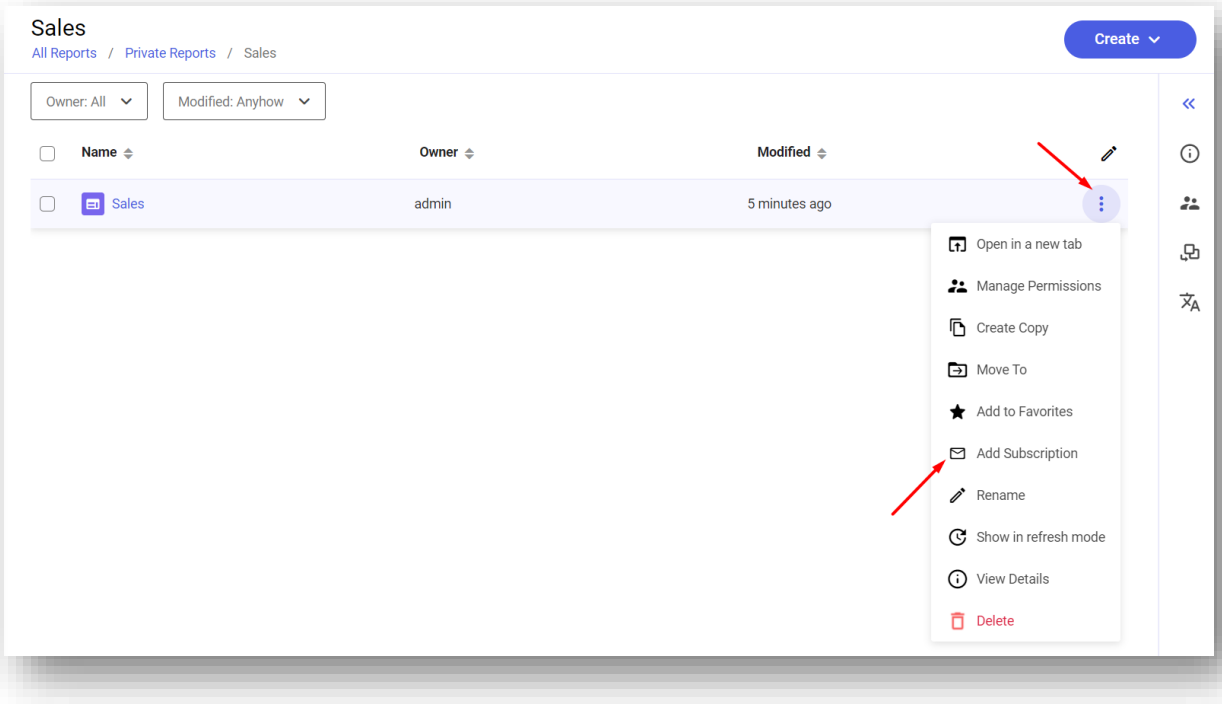
The number of external users and application users is validated when sending a subscription – a subscription is generated when the unique number of users does not exceed the number of users available in a given key.

If the number of users is greater that the number of users available in the key, subscriptions will be sent provided that they contain only external users.

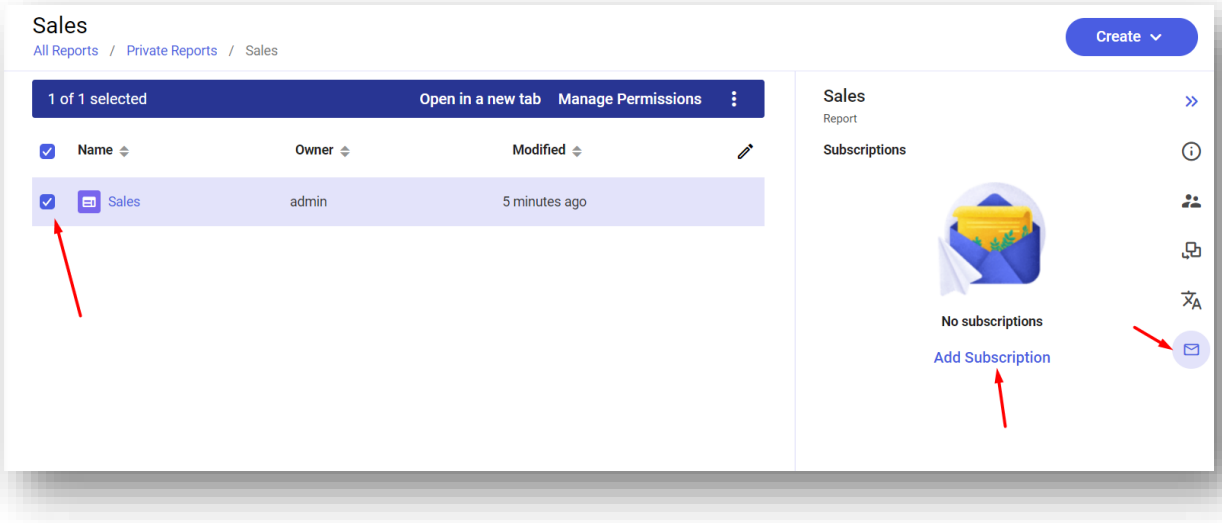
1. How to create a subscription

To create a new subscription, you can do one of the following:

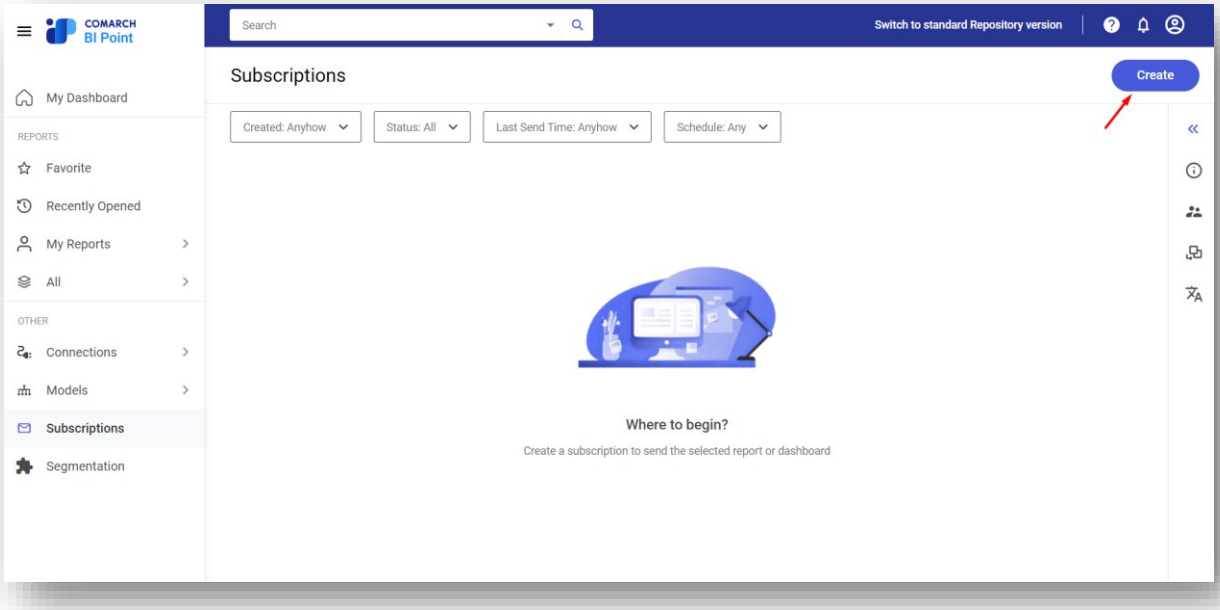
- select a report/dashboard and then the option *Add Subscription*

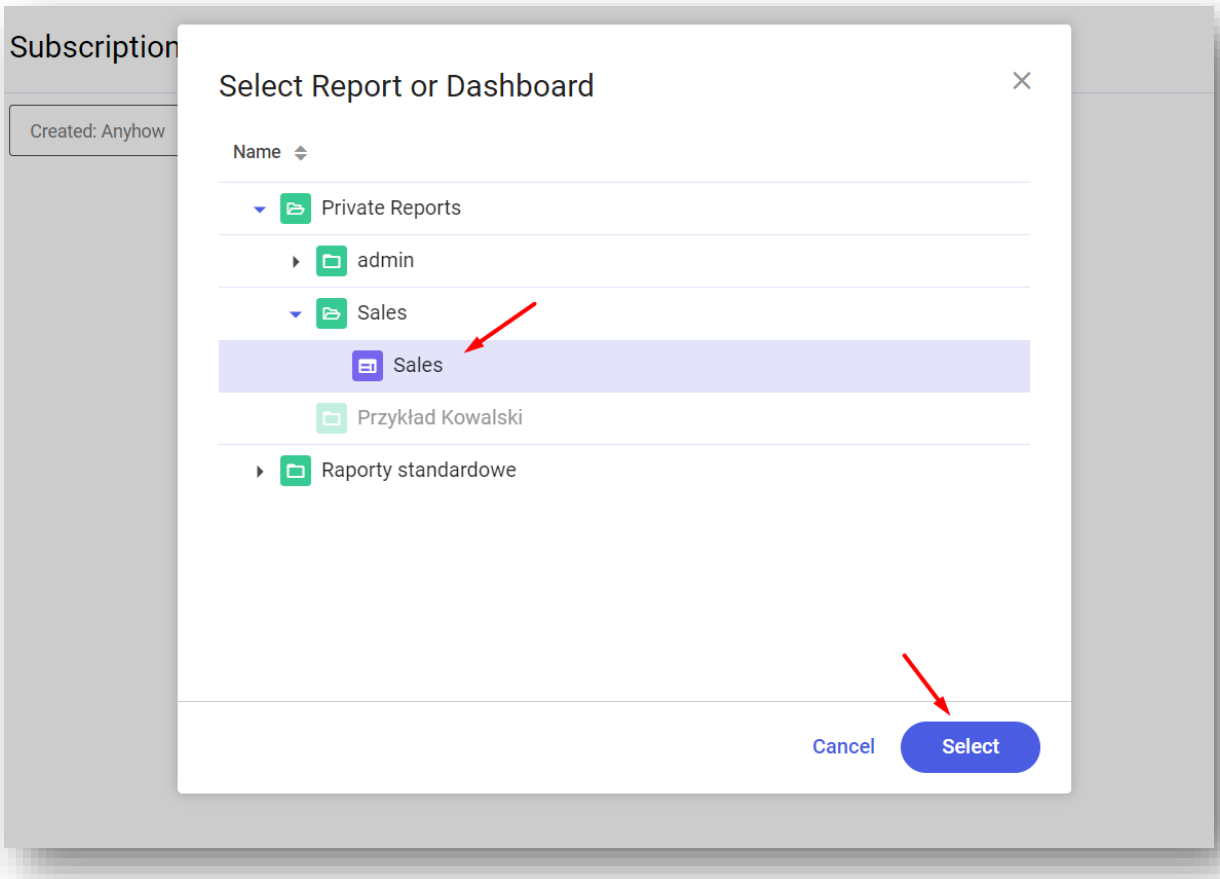


select a report/dashboard and then the subscription icon > *Add Subscription* from the panel on the right

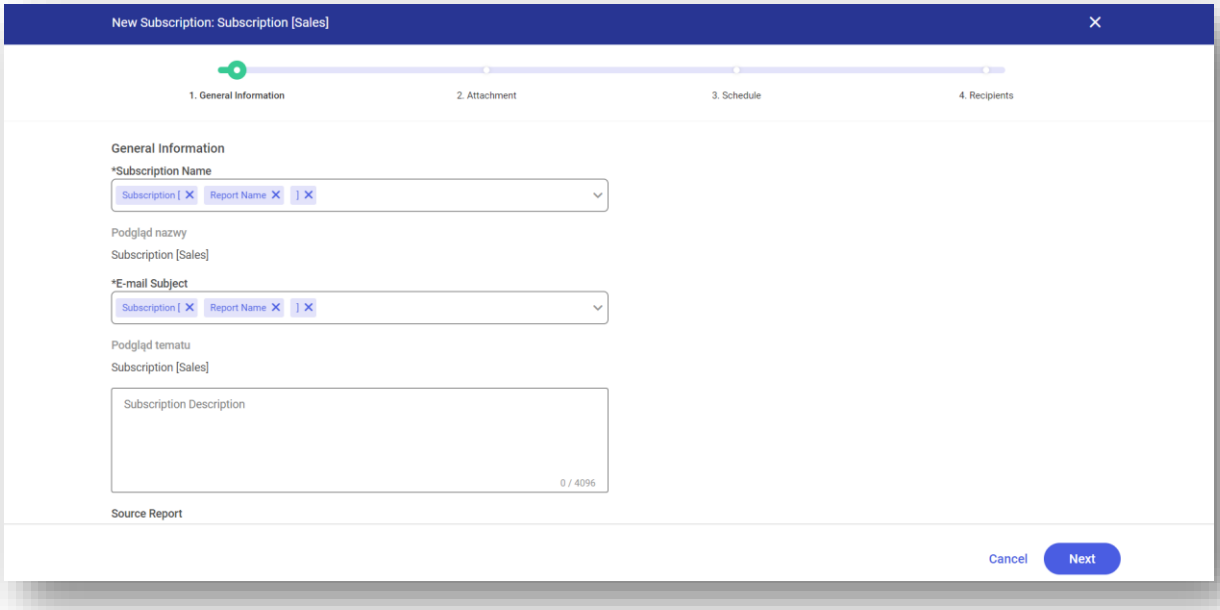


select *Subscriptions* in the left panel and then the button [**Create**]

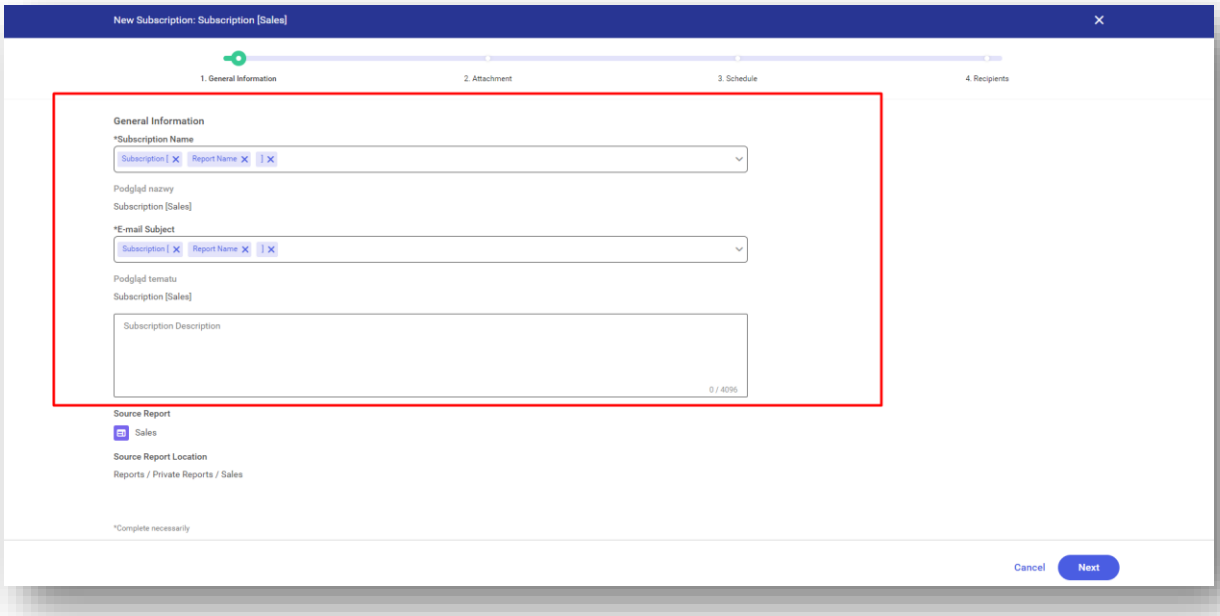




2. General information

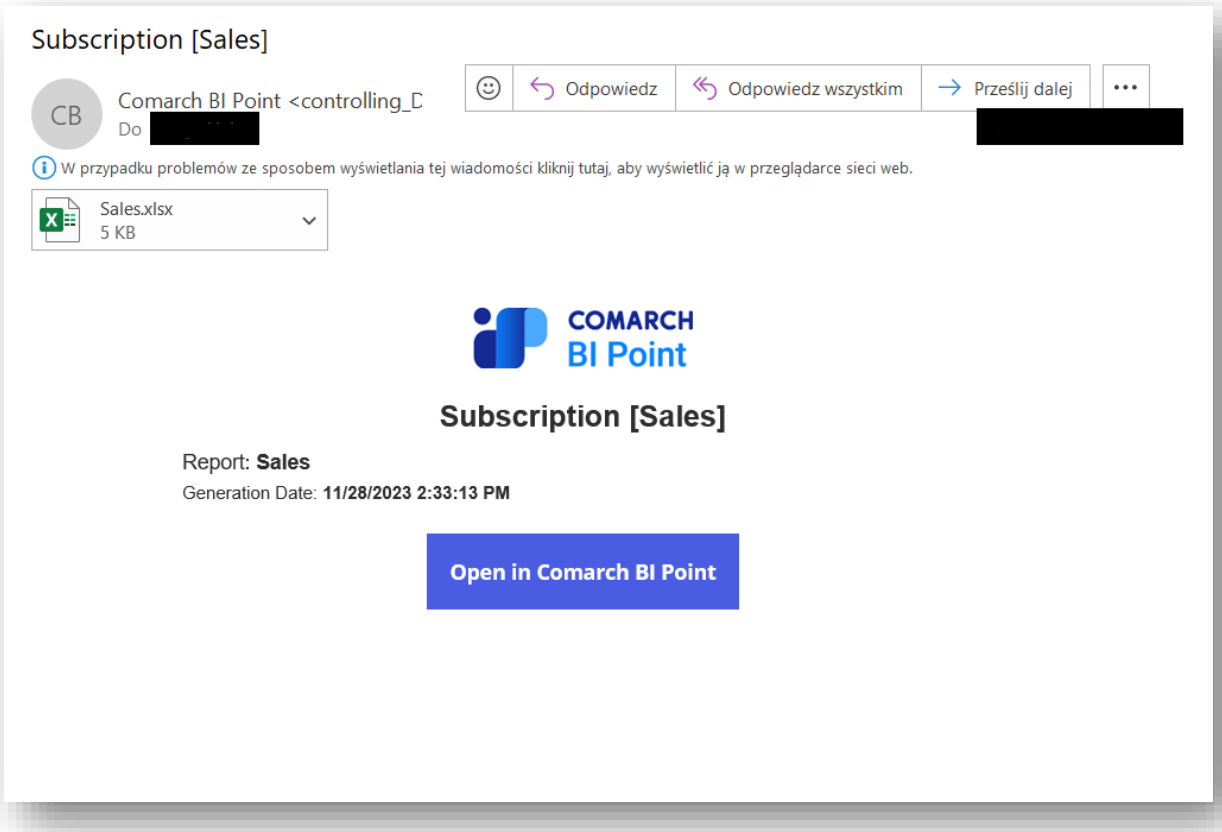


In the first step of defining a subscription, you can add a subscription name, an e-mail subject that will be displayed for the recipient and a subscription description.

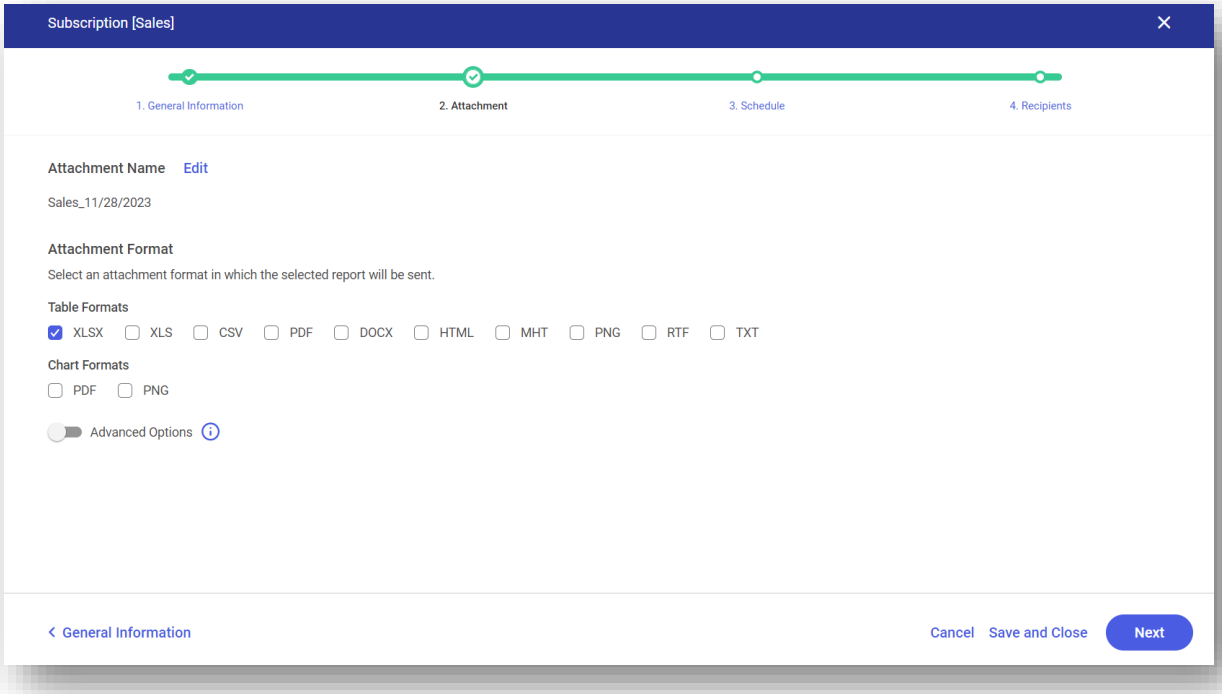


The user also sees the source report (selected when creating a subscription) and the report location.

Recipient's view:



3. Attachment



In the second step, you can define the parameters of the e-mailed attachment. You can rename the e-mailed attachment, set the format of the e-mailed table and chart. Available formats:

- Table
  - XLSX
  - XLS
  - CSV
  - PDF
  - DOCX
  - HTML
  - MHT
  - PNG
  - RTF
  - TXT
- Chart
  - PDF
  - PNG

Advances options:

Availability of the options below depends on the selected attachment format.

- Fit tables to page width
- Expand all report levels
- Add filter descriptions
- Merge the same row/column headings
- Export headers
- Export footers
- Generate table horizontally
- Generate also parameter values

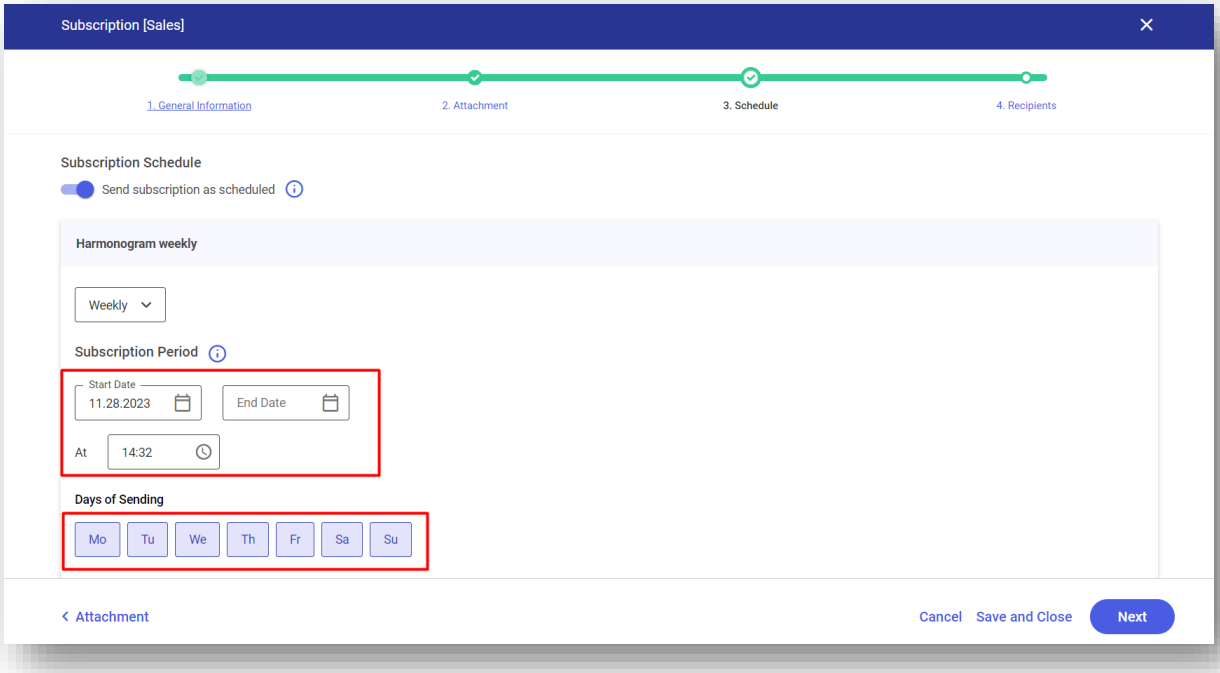
4. Schedule

A schedule is used to set how often the subscription is to be sent. Selectable options:

- One-time
- Hourly
- Weekly
- Monthly

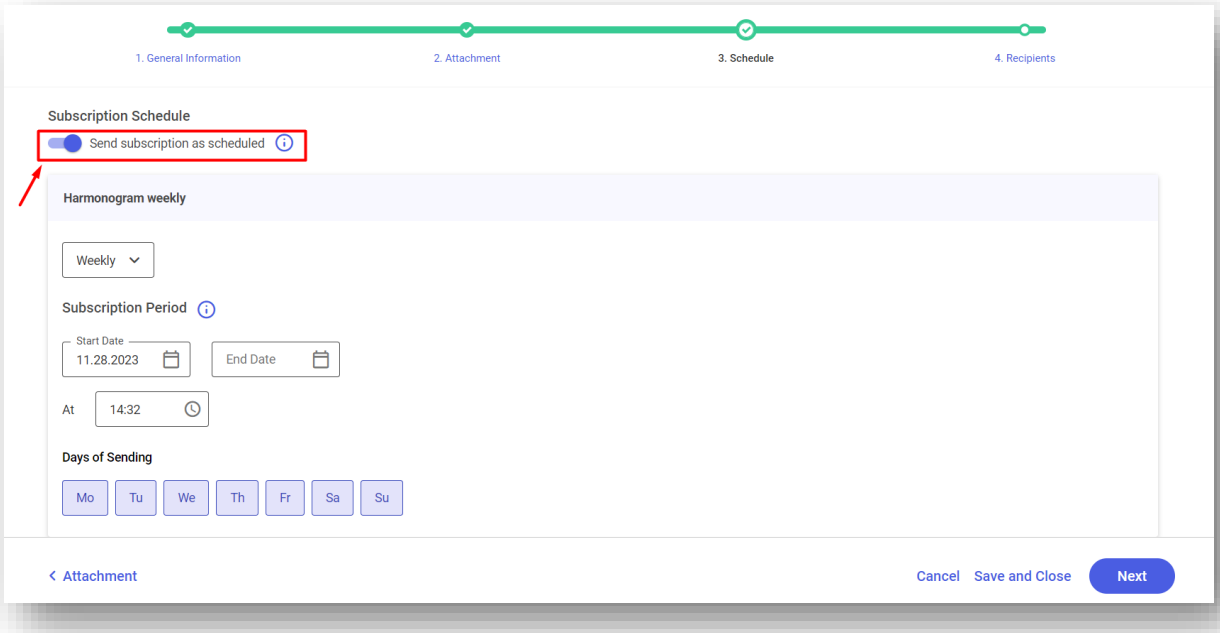
Note that selecting the option *One-time* will save the subscription for future use; thus, it will still be available although it was sent only once. Depending on the selected schedule, full subscription time-based scheduling options become available.

The start date and end date options are used to specify a time range during which the subscription will be sent.



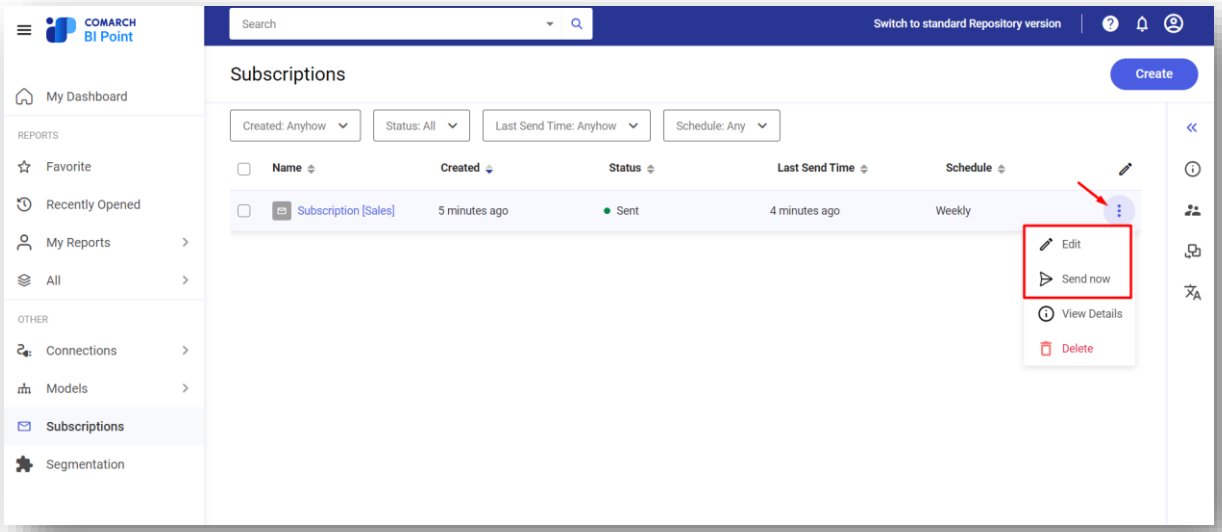
Setting the subscription end date does not mean that the subscription is deleted from the list afterwards.

The option of sending scheduled subscription can also be deactivated by deselecting:



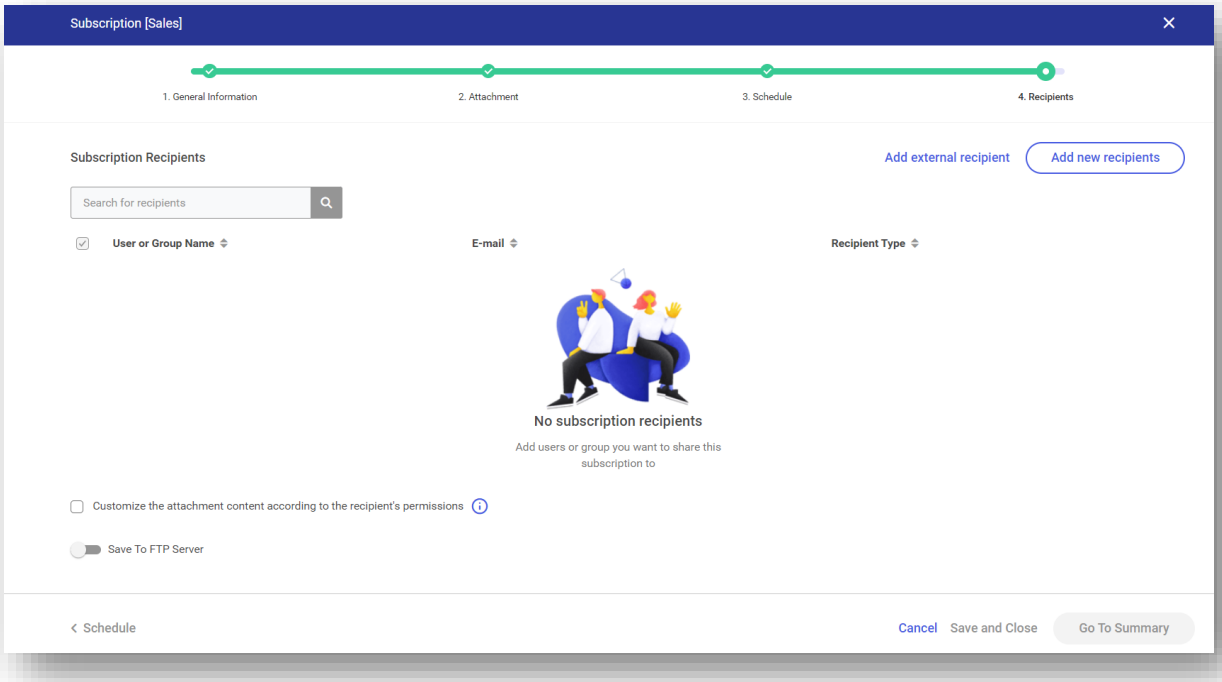
Deselecting this option will create a subscription properly (will be available on the subscription list) but will not send it.

Such a created subscription can be **edited** any time or sent manually using the *Send now* option.



5. Recipients

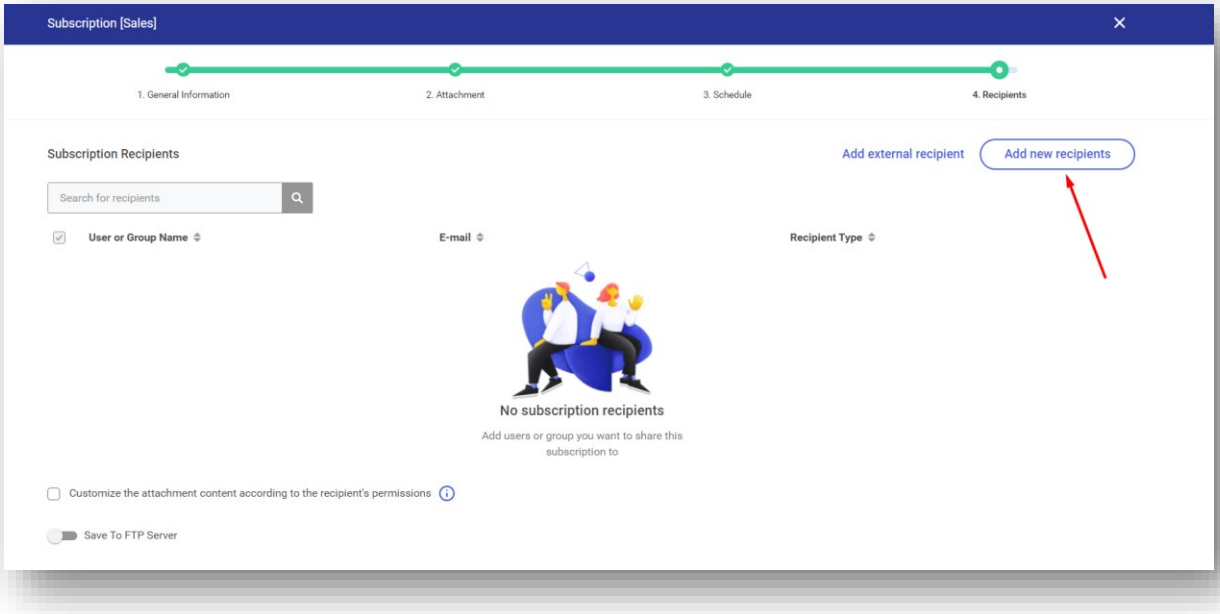
In



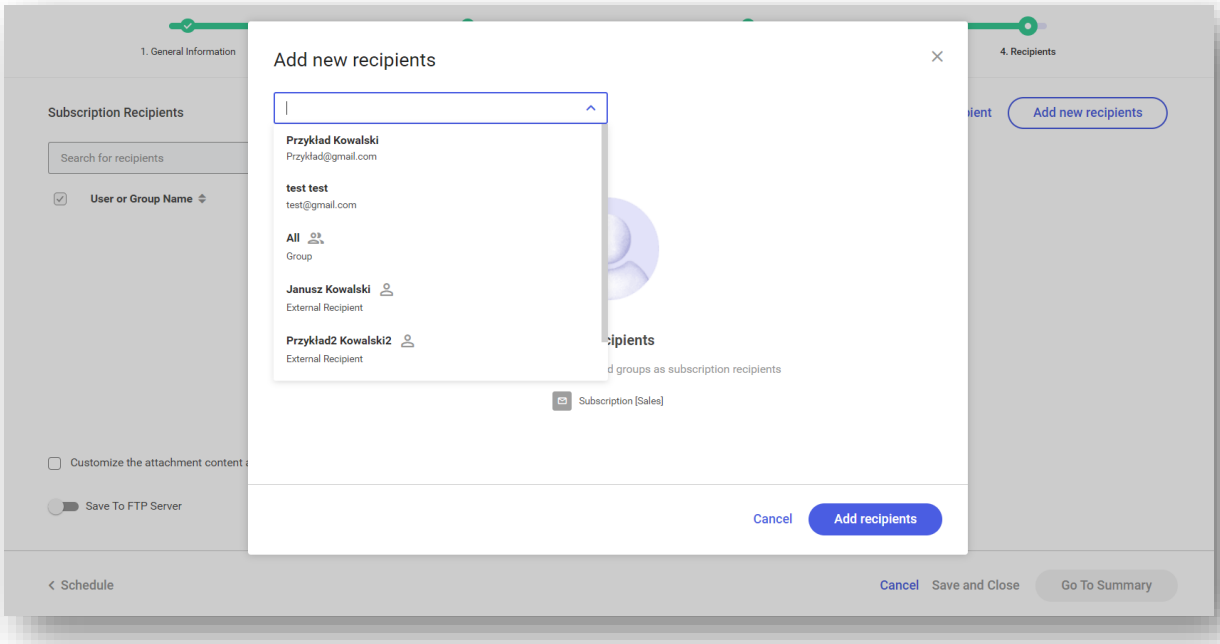
In the *Recipients* section, you need to add subscription recipients.

There are two options for adding a new recipient:

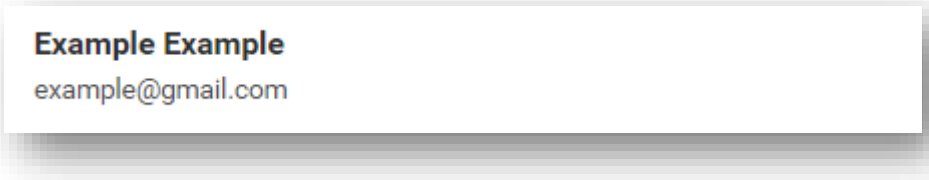
- Add new recipients



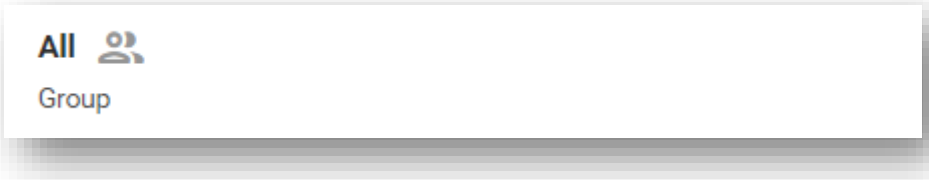
This option allows the selection of recipients from the list of Comarch BI Point users, user groups or previously defined external users.



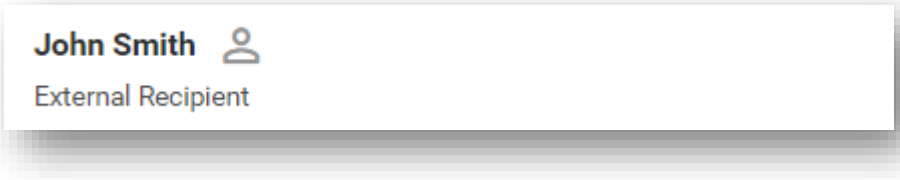
In the case of Comarch BI Point user, the **user's full name** will be displayed followed by the user's e-mail address underneath.



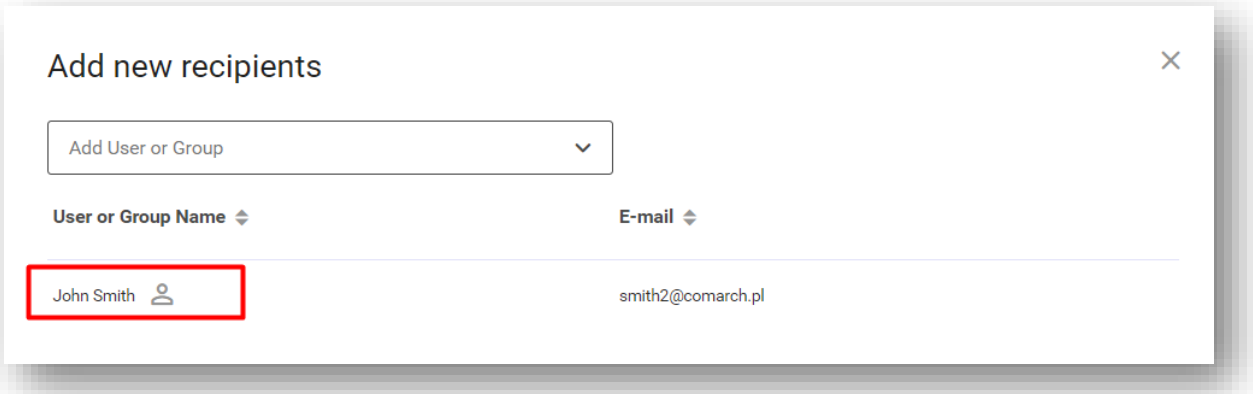
In the case of a user group, the **name of the selected user group** will be displayed along with the information underneath that this is a user group.

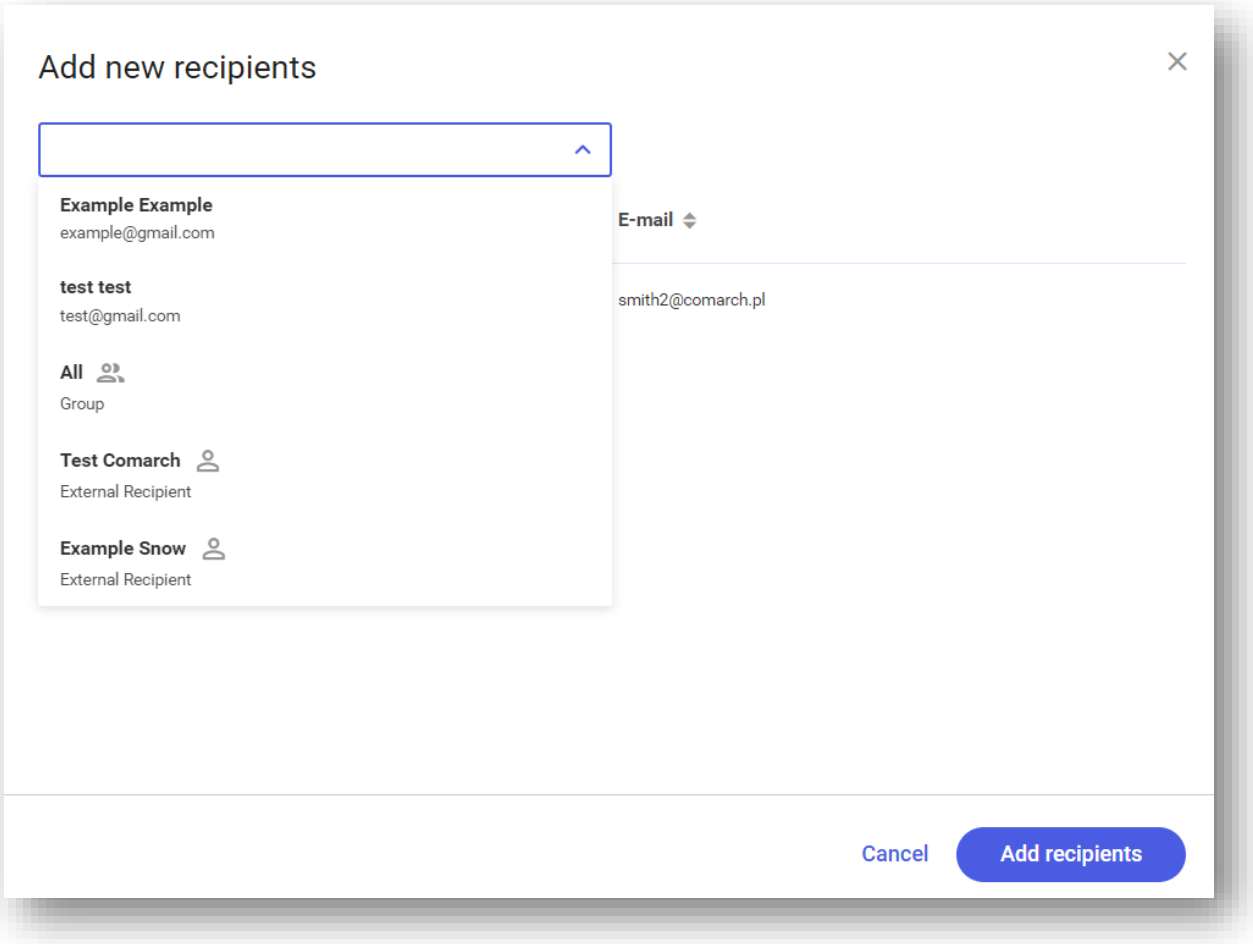


In the case of an external user, the **user's full name** will be displayed along with the information underneath that this is an external user.



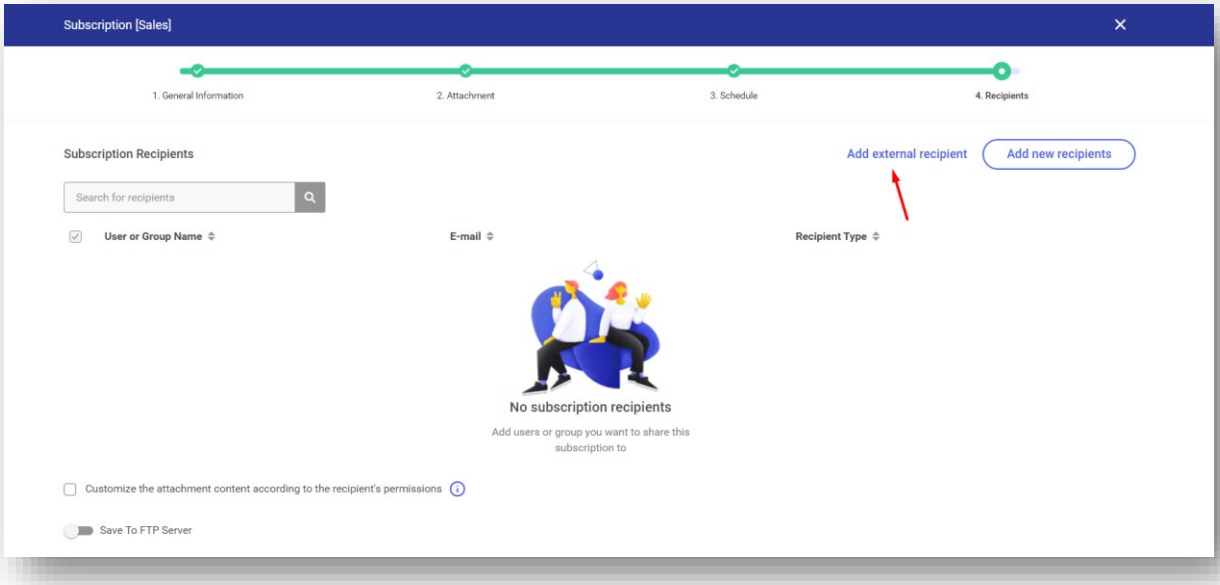
Once a user is added as a recipient, the user will be removed from the list of available users.

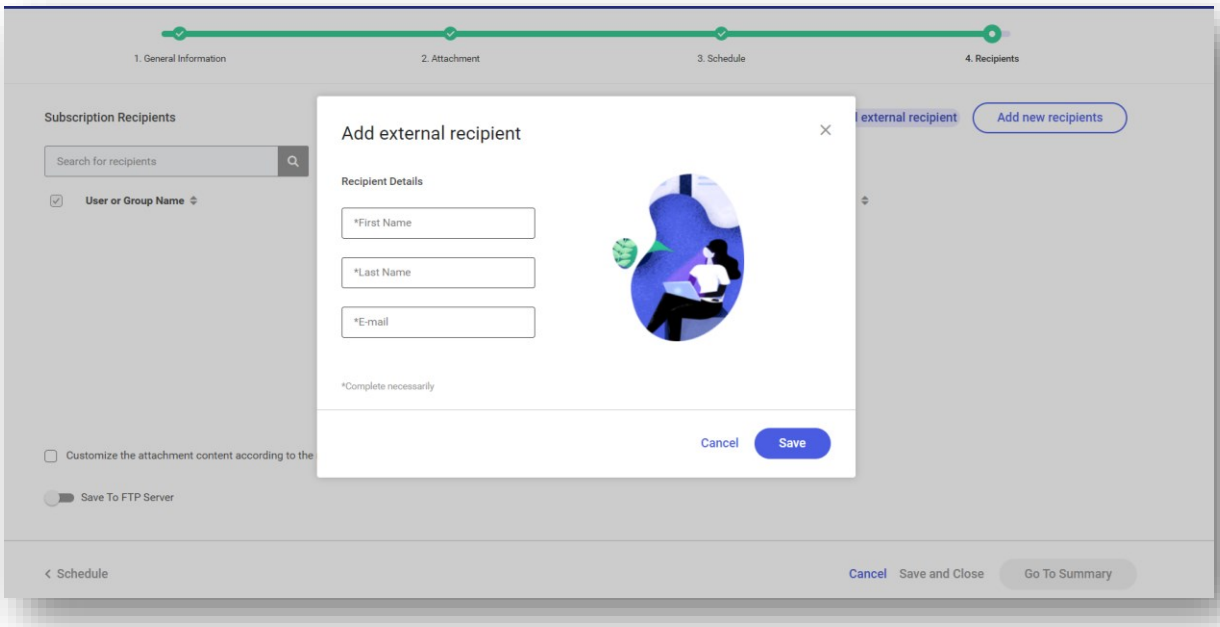




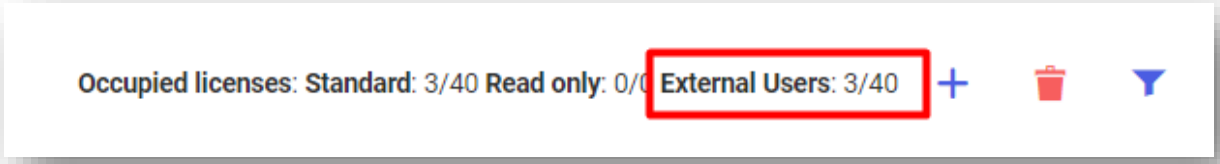
Add external recipient

This option allows the addition of a subscription recipient who is not Comarch BI Point user.

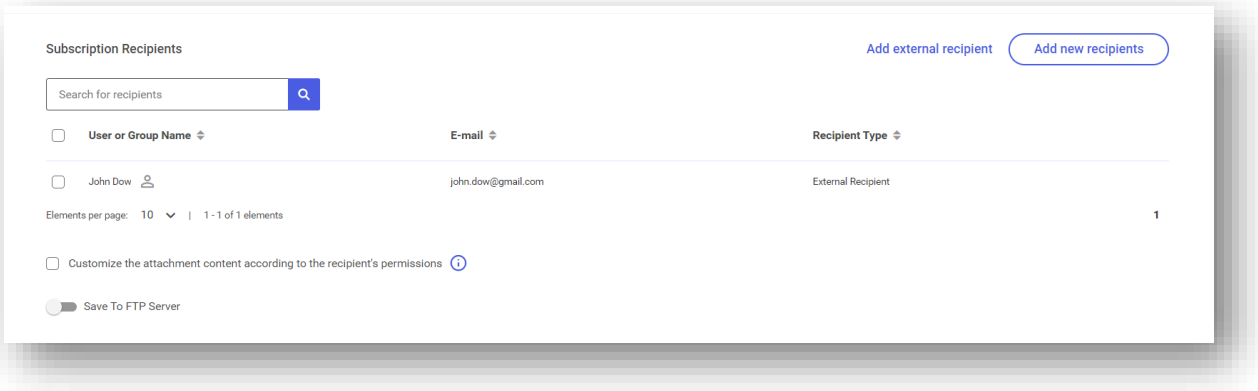




This option depends on the number of owned licenses for *External users*.

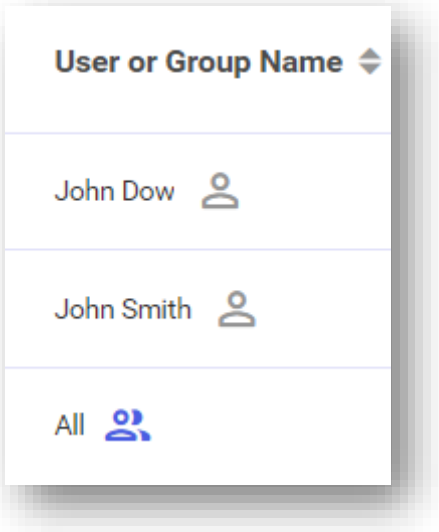


After the recipients are added, the defined subscription recipients will be listed in the main dashboard view.

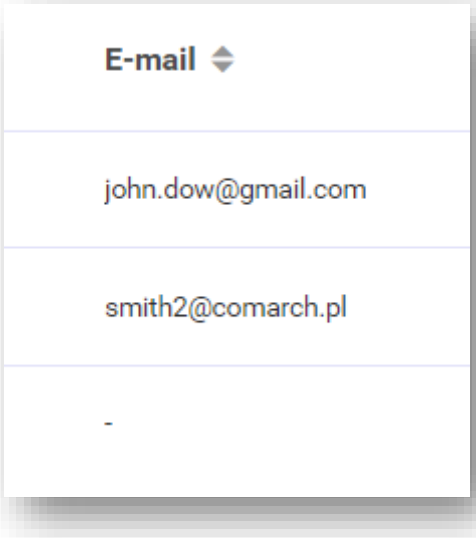


Recipient information is presented in three columns:

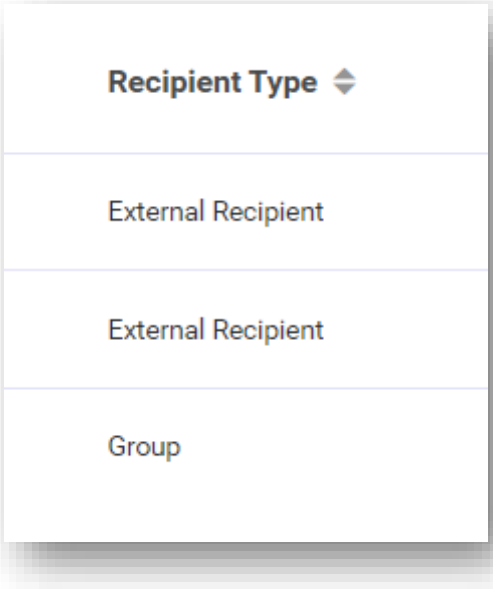
- User of User Group



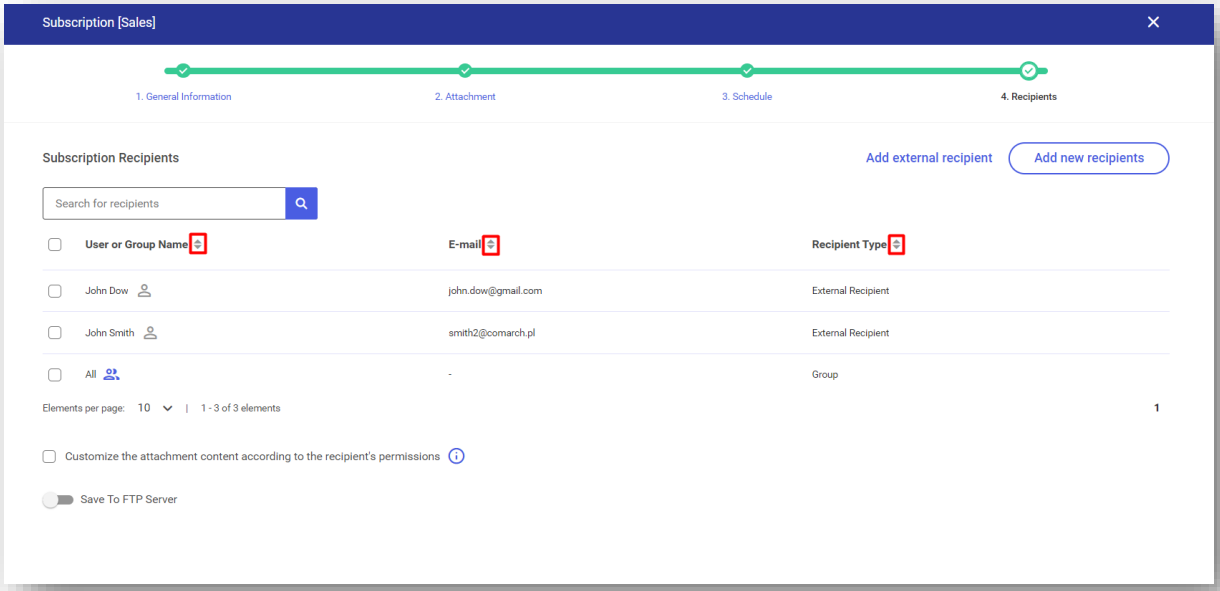
- E-mail



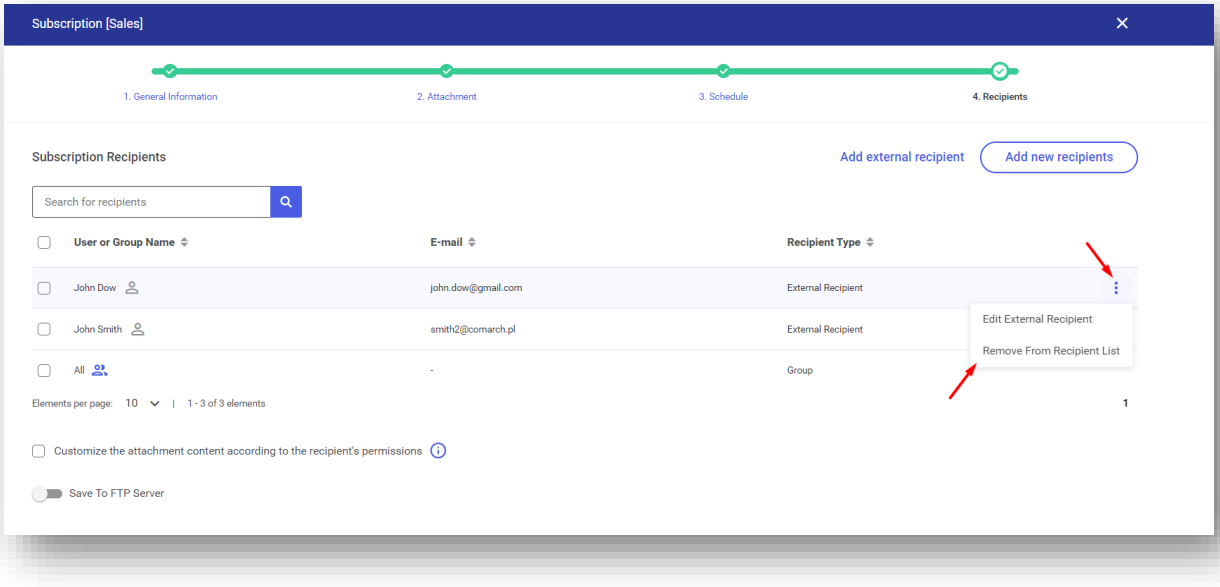
- Recipient Type



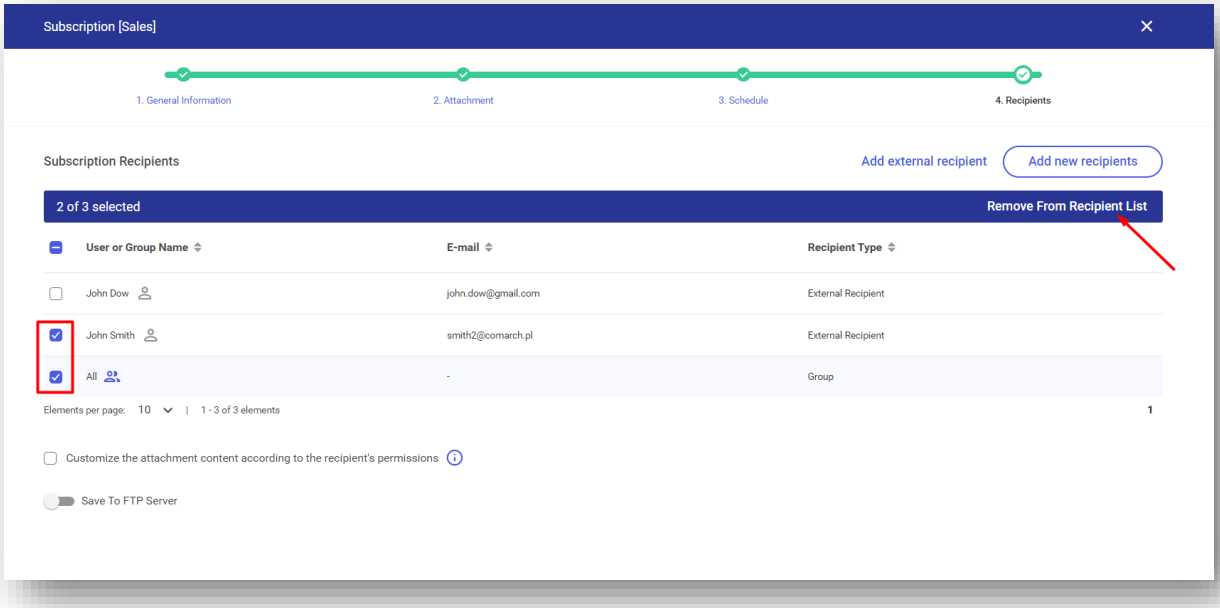
Subscriptions can be sorted by ascending or descending by each of the above-mentioned columns.



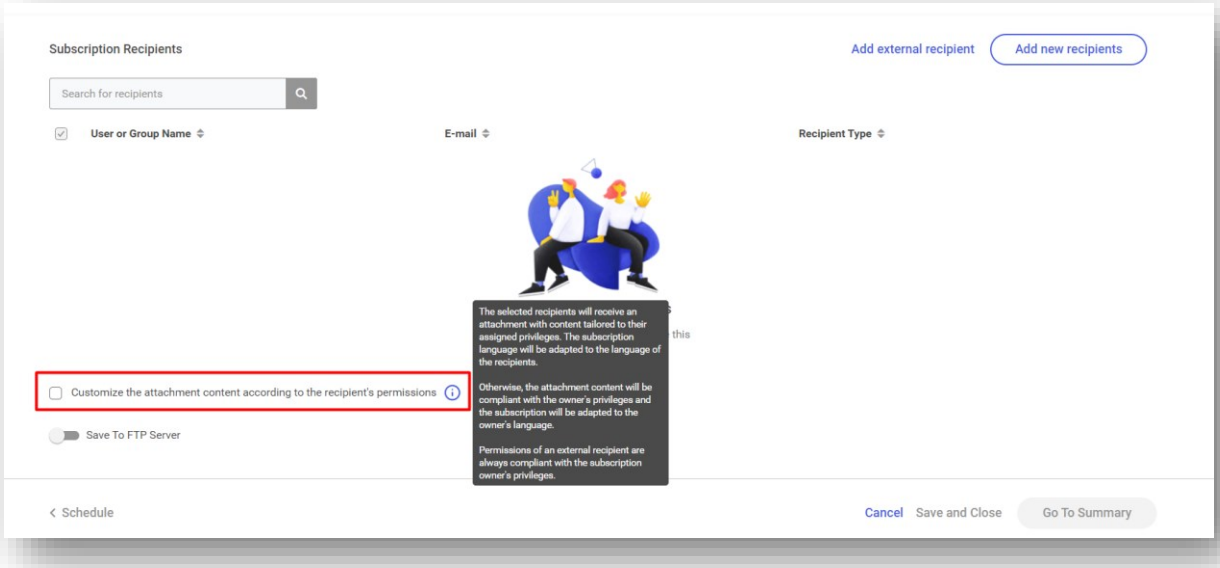
To remove a subscription recipient, select the option *Remove From Recipient List* as shown in the figure below:



If you want to remove more recipients, you can select **multiple** users and then the option *Remove From Recipient List* to remove them from the list as shown in the figure below:



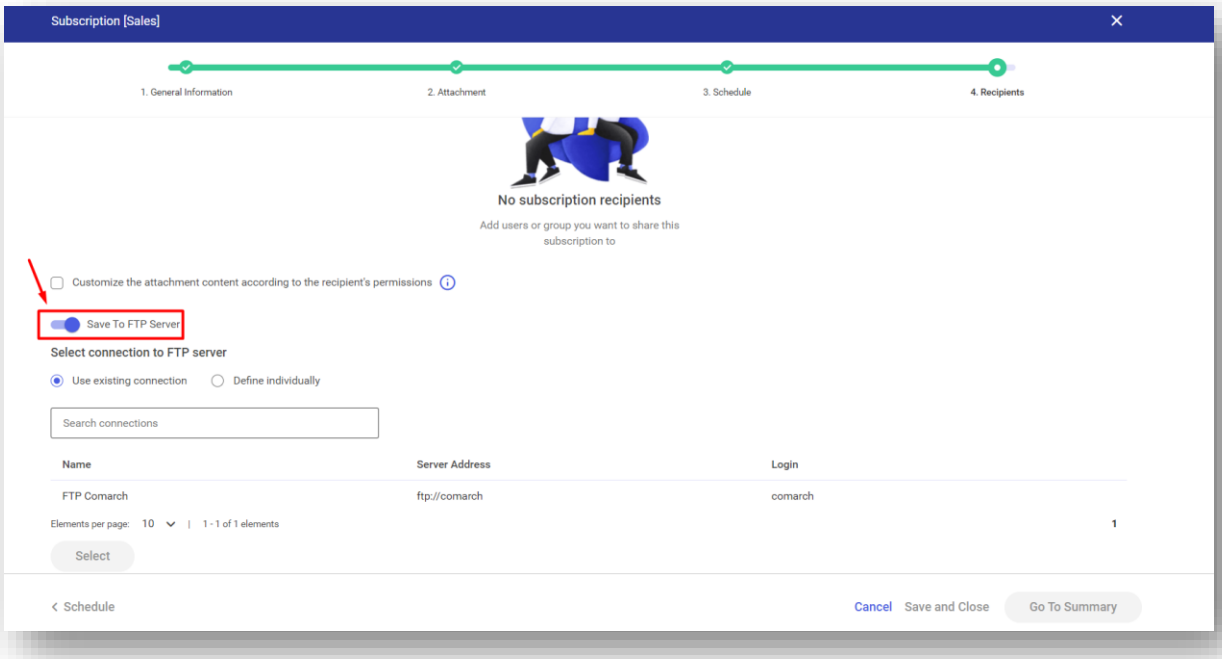
Customize attachment content according to recipient's permissions



This option is used to generate a subscription according to the permissions assigned to an individual subscription recipient (this works only for recipients who are Comarch BI Point user).

Save to FTP server

Report and dashboard subscriptions can also be saved on FTP server by selecting the respective option.



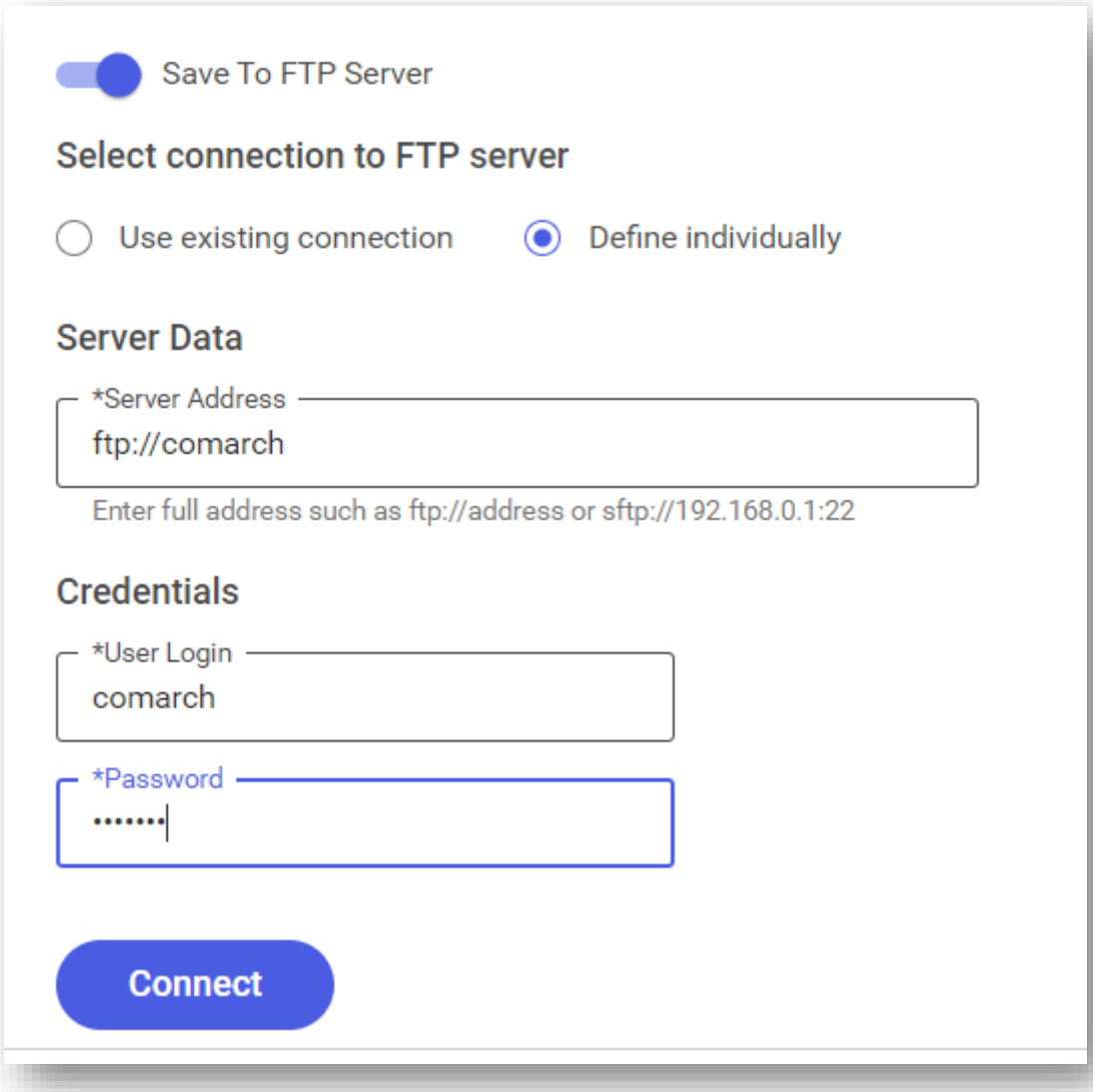
There are two selectable options to connect to FTP server:

Use existing connection

This option allows the selection of a previously defined FTP connection (*Administrator Dashboard/FTP Connections*)

Define individually

With this option you can define such connection directly when creating a subscription.



Note: In case dashboards are being rendered for a long time, it is advisable to verify the value of the *PuppeteerTimeout*parameter in the instance's config.json file.

6.8 Creating dashboards

Creation of dashboards is started in the same place as creation of reports, that is in the report repository. Here, upon going to appropriate folder in which a user wants to create a dashboard, option *Dashboard* must be selected after clicking [**Create**].

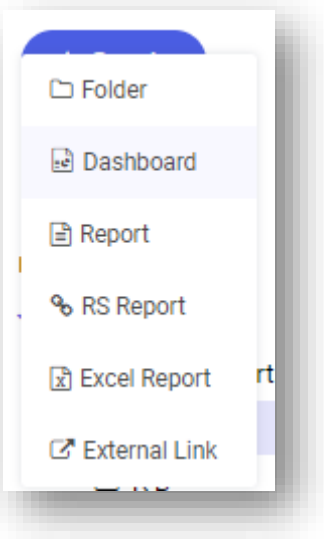
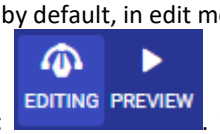


Figure 112 Creating a new dashboard from the repository level

Then, a screen the same as when adding a new report is displayed – it is composed of the work space and two tool panels. A new dashboard is opened, by default, in edit mode, and, similarly as in case of a report, the mode can be changed with the use of icons: 

. The upper bar contains options for saving such dashboard:  as well as an icon grouping other options:  which is in this case option of saving an edited dashboard with different name and/or location in the report repository ([**Save As**]).

In the preview mode, there is information available on controls about used measures, dimensions and filters. This information is also displayed upon hovering or clicking on icon  on a control. Here, also descriptions of controls are available, which can be added when editing a selected one (*Advanced Options*).

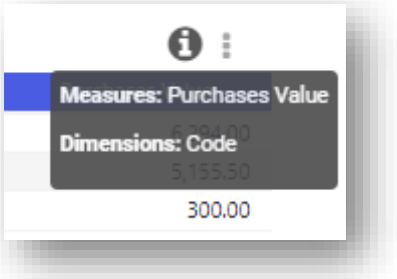


Figure 113 Information on controls about used fields

Controls downloading data in the edit mode provide option of delaying data upload. This enables faster creation of dashboards, because once this parameter is checked, data is refreshed only when switching the dashboard mode to preview mode.

Figure 114 Delay data loading

In order to analyze data included in a control, it is possible to select option *Open Data in Report* from the level of dashboard preview mode. Then, a new report opens with all measures and dimensions used when creating a given control. Such option streamlines data analysis.

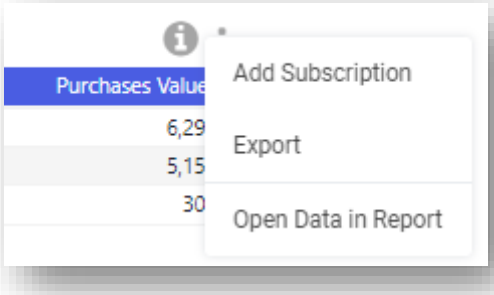


Figure 115 Open data in report

Figure 116 New dashboard creation window

The left panel contains all available icons which can be used to create a dashboard compliant with user requirements. Each of them will be described later in this document. A control is added by clicking on a given element. Selecting an element adds a tile with default size, which can be modified by expanding a given tile.

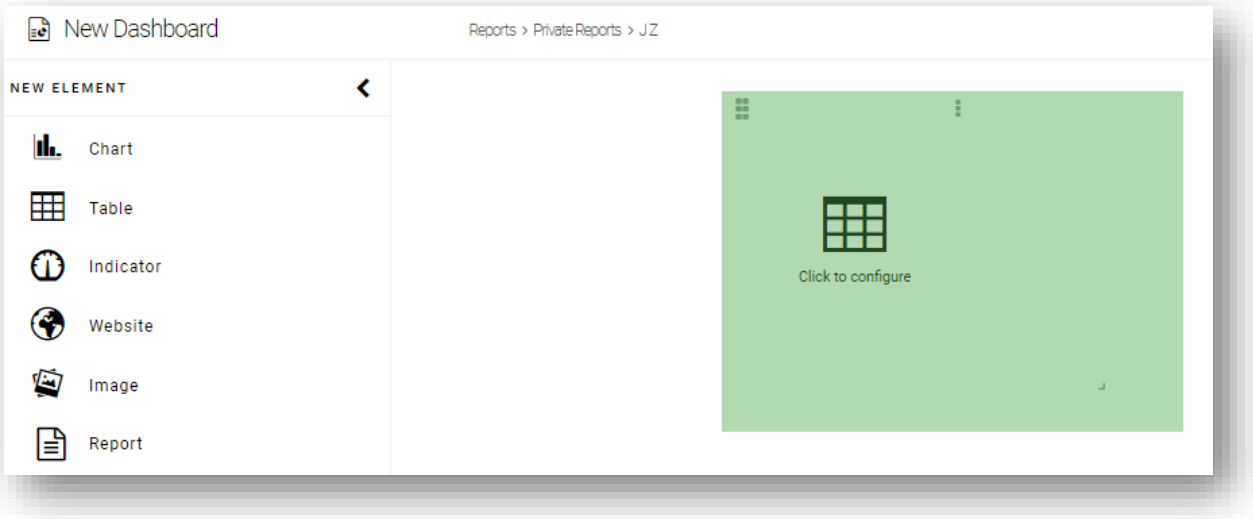


Figure 117 Setting size of a tile

The size is changed by dragging the lower right corner of a tile using icon. Size can be modified at any moment when working with a control, other controls located in the work space are automatically rearranged to maintain their visibility. Layout of elements adjusts to user actions by relocating coinciding tiles. This behavior can be changed upon clicking on empty space within the work space and changing setting of *Responsivity* option in the right tool panel. In the same place it is possible to modify number of columns (5, by default), which enables adding them without such limitation.

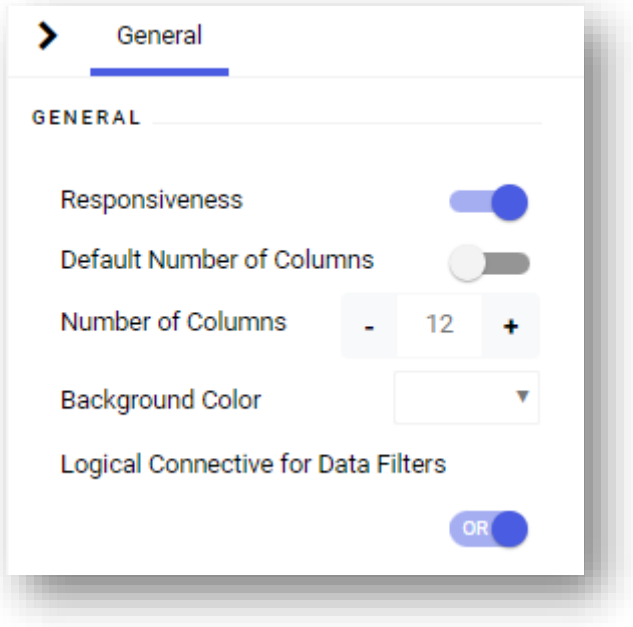


Figure 118 Option for changing number of columns on a dashboard

The last option regards setting the background color for work space. Individual elements of a dashboard can be configured upon clicking on that element.

Logical connective for data filters allows for setting, both inside a filter and in entire dashboard whether logical operators by which data is filtered have connectives OR and AND between them, for instance:

```
Filter 1 [measure1>1000 OR measure1<500] AND Filter 2 [measure2>5000]
```

Or

```
Filter 1 [measure1>1000 OR measure1<500] OR Filter 2 [measure2>5000]
```

6.8.1 Responsivity and interaction

Responsivity of view on a dashboard is a functionality adjusting layout of used elements of a dashboard to size of screen on which it is started. Enabling this option provides automatic optimization of the layout so that tiles are visible on the work space not only during creation (arranging of elements), but also after changing the size of browser window, refreshing a page, starting the dashboard itself on different screens and upon modifying size of used tiles. On smaller screens, to maintain clear view of a dashboard, tiles wider than screen width are located in columns one under another.

Interaction means that an element harmonizes, for instance, with filtering of data through global filter or selecting particular series in a table, referring to data related with chart. This functionality operates on the basis of dimensions located in filter fields of dashboard elements. Selecting individual filter values on several dashboard tiles narrows down the data of these controls to their common part (e.g. selecting year 2012 and 2012 on one element and year 2012 on another reduces them both to the year 2012). If a common part is missing, empty values are displayed. The selection is performed by indicating a piece of element in its graphic presentation on a dashboard preview. Example of such operation can be observed on default dashboard which appears during the first start of BI Point on the application home page.

After attaching a dashboard to the control below the lightning icon, a tooltip presenting the name of the attached dashboard should appear like: *Open the dashboard: <dashboard name>"*.

6.8.2 Chart

Chart is a control used for locating single data charts on a manager's dashboard. From the functional point of view, chart is implemented similarly to the charts available from report level.

Figure 119 Creating a new chart

Upon clicking on tile with chart, chart wizard is started and a user is asked to fill in the required fields according to his needs. It is necessary to select data source (upon selecting option *Other…*, it is possible to connect to any OLAP or SQL database). or selecting a data source from EXCELCSV file.

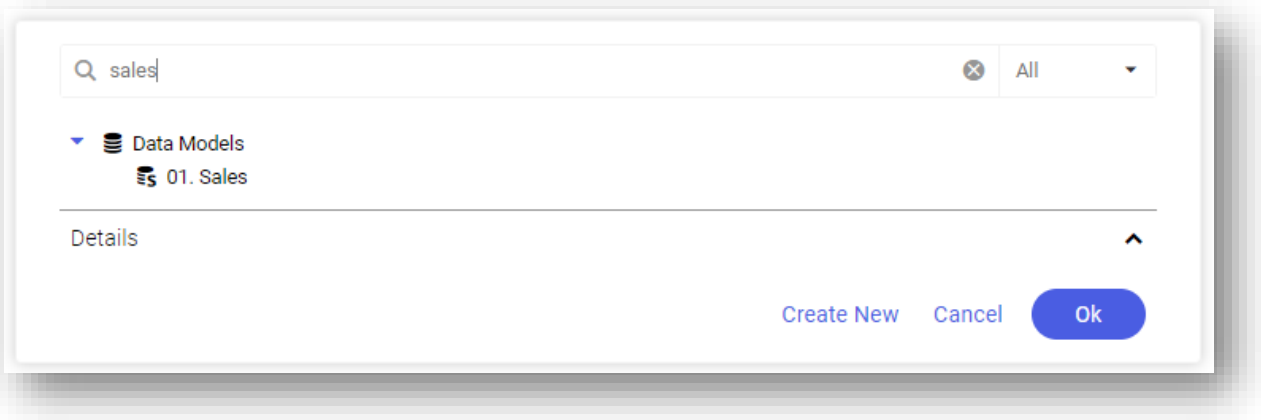


Figure **120** Changing chart's data source

Next, it is necessary provide chart name which will be automatically set as chart title, and locate at least one measure, selected from the fields list available in the left panel, on the Y-axis. On the X-axis, splitter and in filter field a user can locate dimensions which will appropriately group or cut the range of measures presented on a chart.

It is possible to add any number of measures and dimensions; not needed elements are removed by clicking on the cross displayed on a dragged element: 

. Icon 

on the left side allows for additional filtering of dimension elements. At the bottom of the screen there is [**Advanced Options**] button which expands additional fields. These fields enable applying of *TOP N* filter and activating the display of empty elements. Section *Include Filters* is also available here and it allows for disabling dimensions for which it is not necessary to use interaction. Changes are confirmed upon clicking [**OK**].

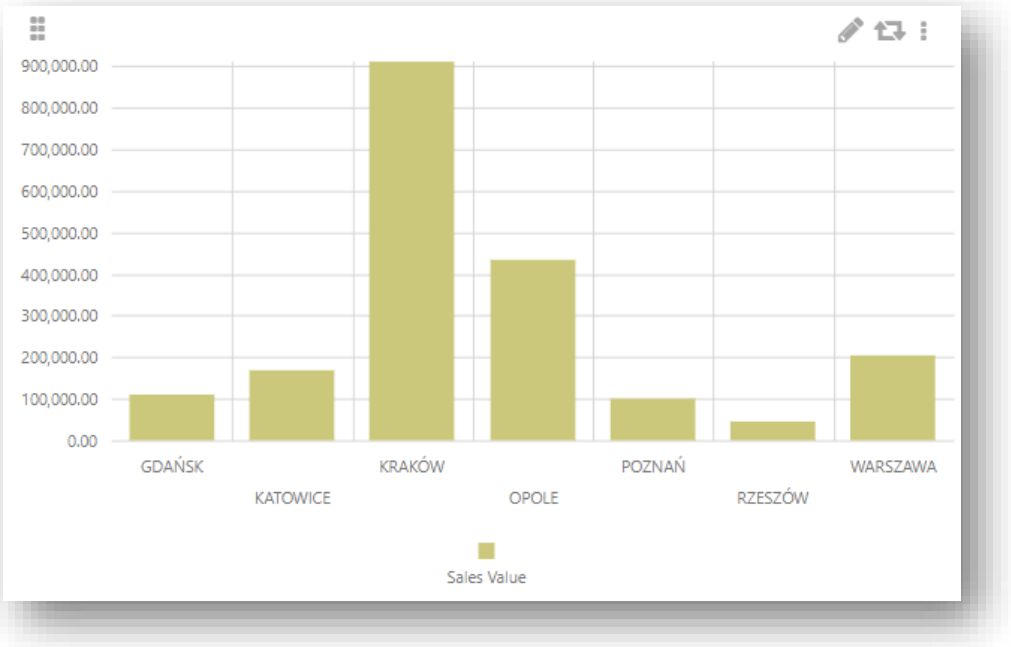


Figure 121 Exemplary chart

An element can be re-edited by clicking , to remove a defined element, select the [**Delete**] option. .

When editing a chart, the right tool panel is filled in with options. Modifications available there refer both to the graphic layer and operation of chart. Chart is one of elements which can respond to changes made in other elements of a dashboard. This property is called *Interaction* and is enabled, by default.

Other options of chart control allow for, among others: changing its type, displaying labels, elements, formatting fonts, color, selecting color palette and displaying tooltips.

In the side panel, it is also possible to define currency which will be displayed on a chart. In order to do so, deselect the switch by the default format and in the newly shown options set field *Format* to *Currency* and select appropriate type of currency.

Selecting the currency format activates the section *Use Symbol*, where PLN or EUR symbol is selected – depending on the language of BI Point application.

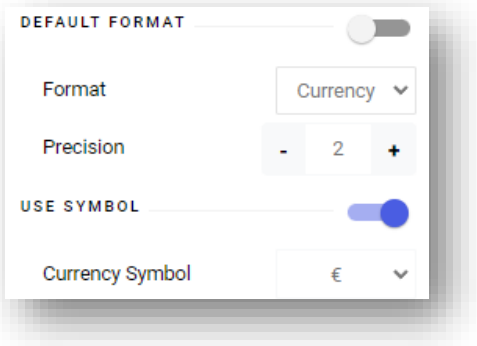


Figure 122 Currency symbol in development objects

In the preview mode, it is possible to sort data in a bar chart. In the upper menu of the control, select by which measure/dimension the chart should be sorted. Upon reselecting the same measure/dimension, sorting order will change (by ascending-by descending).

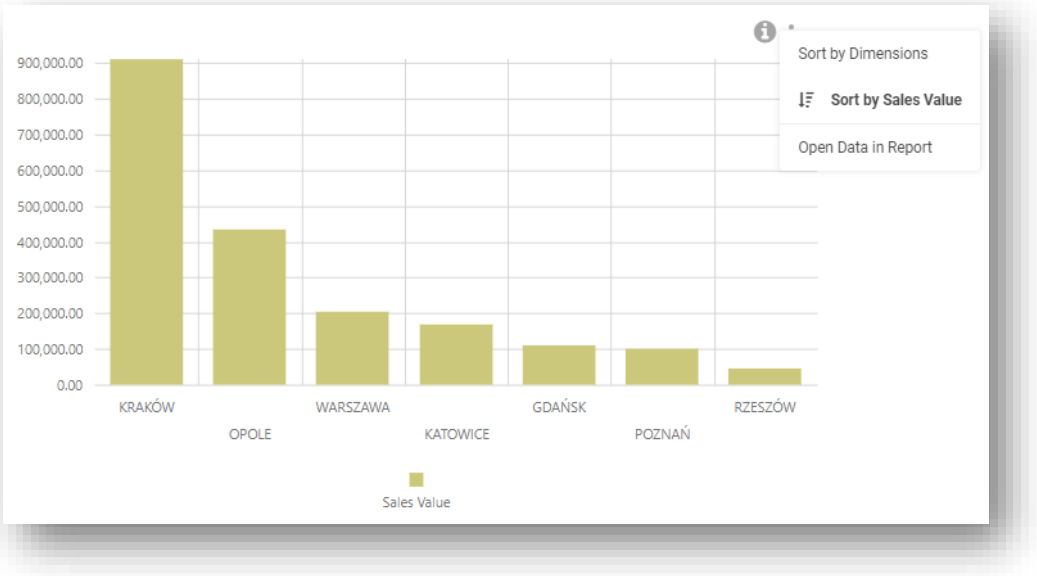


Figure 123 Sorting a chart

6.8.3 Table

Table is a control organizing data on a dashboard in form of a regular table. Configuration of an element in this case consists in providing its name, selecting measures and dimensions which will be set in columns and, optionally, filtering the data by selected range.

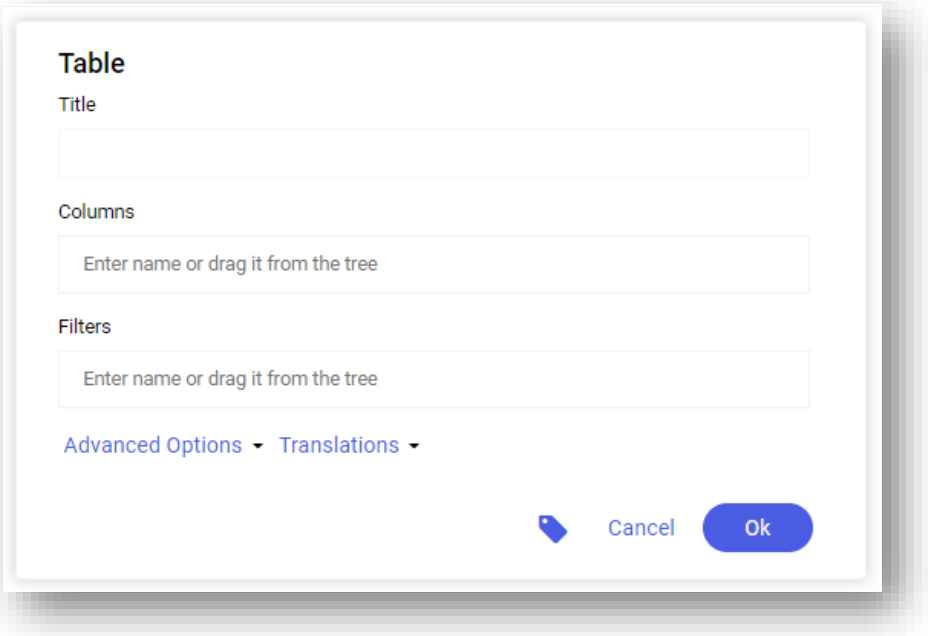


Figure 124 Table configuration window

Working with the configuration window is the same as in case of chart configuration window. The changes are saved upon clicking [**OK**].

Editing a table, removing a tile or changing its size is the same for all the elements, so it is performed in the way described in the chapter concerning charts.

So far, it has only been possible to format each column separately. In version 6.2, it was enabled to set style of headers and values for entire table at the same time. When a table is marked, options *Header Style* and *Value Style* are available in the right tool bar. The following elements can be changed:

- Font style (bold, italics, underline)
- Font color
- Background color
- Font size
- Font type
- Vertical alignment
- Horizontal alignment

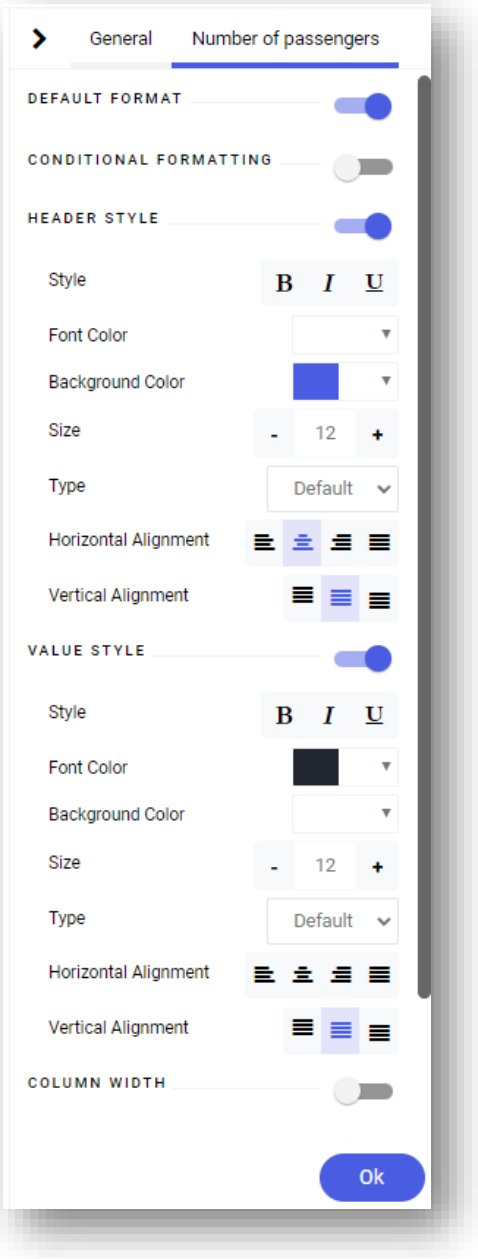
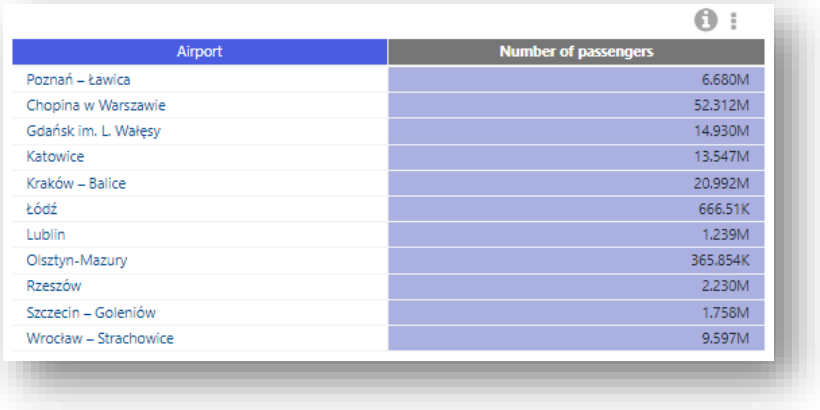


Figure 125 Header style/value style

Example of a formatted table control:



Airport	Number of passengers
Poznań – Ławica	6.680M
Chopina w Warszawie	52.312M
Gdańsk im. L. Wałęsy	14.930M
Katowice	13.547M
Kraków – Balice	20.992M
Łódź	666.51K
Lublin	1.239M
Olsztyn-Mazury	365.854K
Rzeszów	2.230M
Szczecin – Goleniów	1.758M
Wrocław – Strachowice	9.597M

Figure 126 Table control

In BI Point 7.0 version, there is a table paginating option. Default presentation of empty records in tables and empty series in charts has been changed to deactivated.

A user sees a summary record in a dashboard table. Sum is calculated in terms of the entire set, including the aggregation used for a measure. It should be possible to export a summary to files. And formatting should be applied to a record presenting total or to a cell.

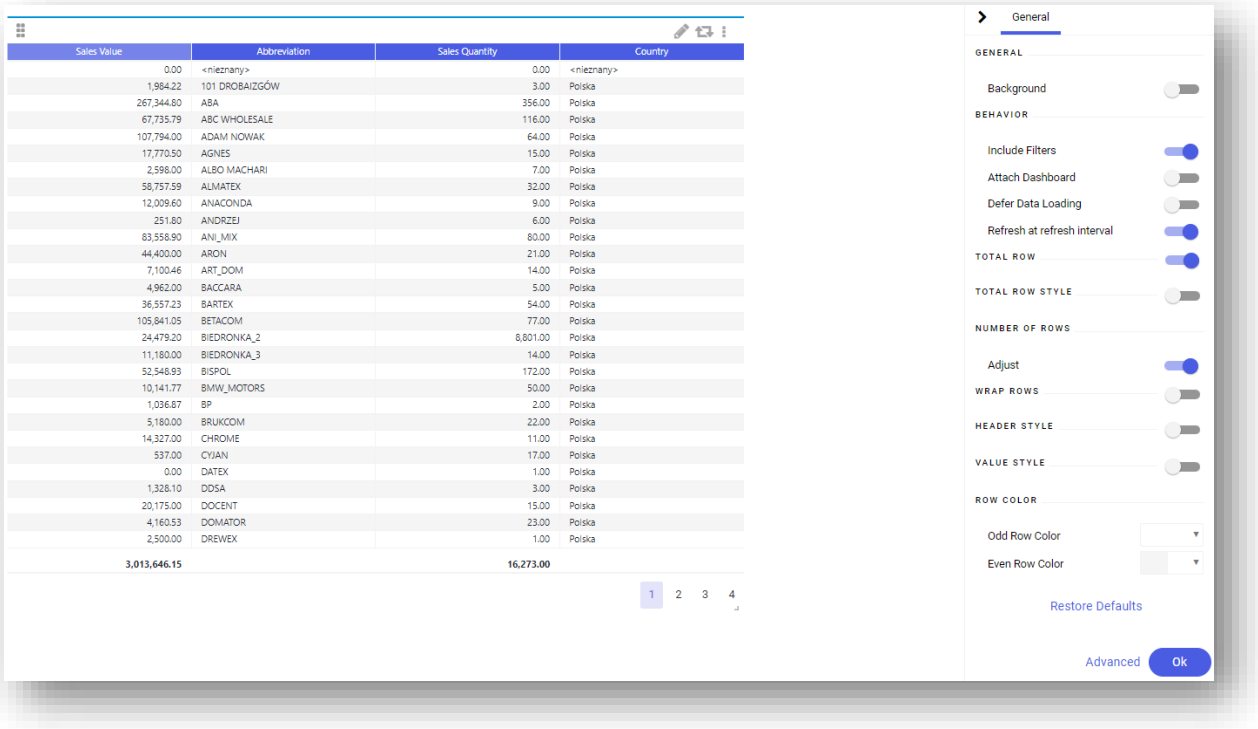
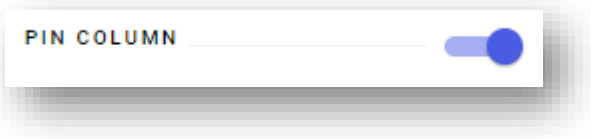


Figure 127 Table summary record and pagination

In 10.1 version, there is an option of freezing/attaching a column in a table. Owing to that, in wide tables it is possible to pin a column or columns that will be visible continuously, even when you move the table.



Data can be exported from a table to CSV, Excel and PDF file. Option of exporting to PDF and Excel files is blocked for larger data sets. If this being the case, a relevant message is then displayed. Data is exported from the level of dashboards for a specific control. Option *Save To File* will activate in the context menu in reference to a given control. A file format, to which a file is to be exported, must then be selected. Additional options (PDF – dashboard tables, Excel – dashboard tables, CSV – dashboard table) activate for dashboard subscriptions.

As of version 10.1.1, there is an option of adding a subscription of a table element only. This option can be used to quickly configure the upload of a flat table without having to render the entire dashboard. It is shown in the figure below.

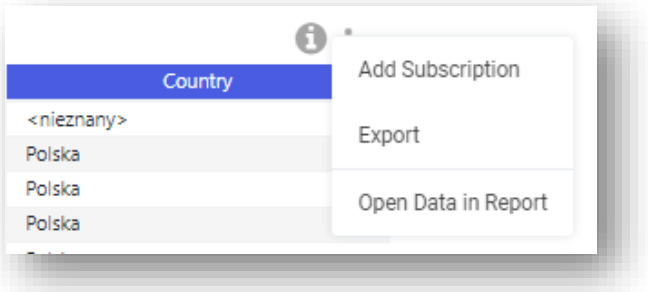


Figure 128 *Add Subscription* option

6.8.4 Indicator

Indicator is a control aimed at presenting specific values which can be controlled by a user. An indicator can display data from analytical database in comparison with expected value specified by a defining person, as a value resulting from calculations based on standard measures or as a value determined manually.

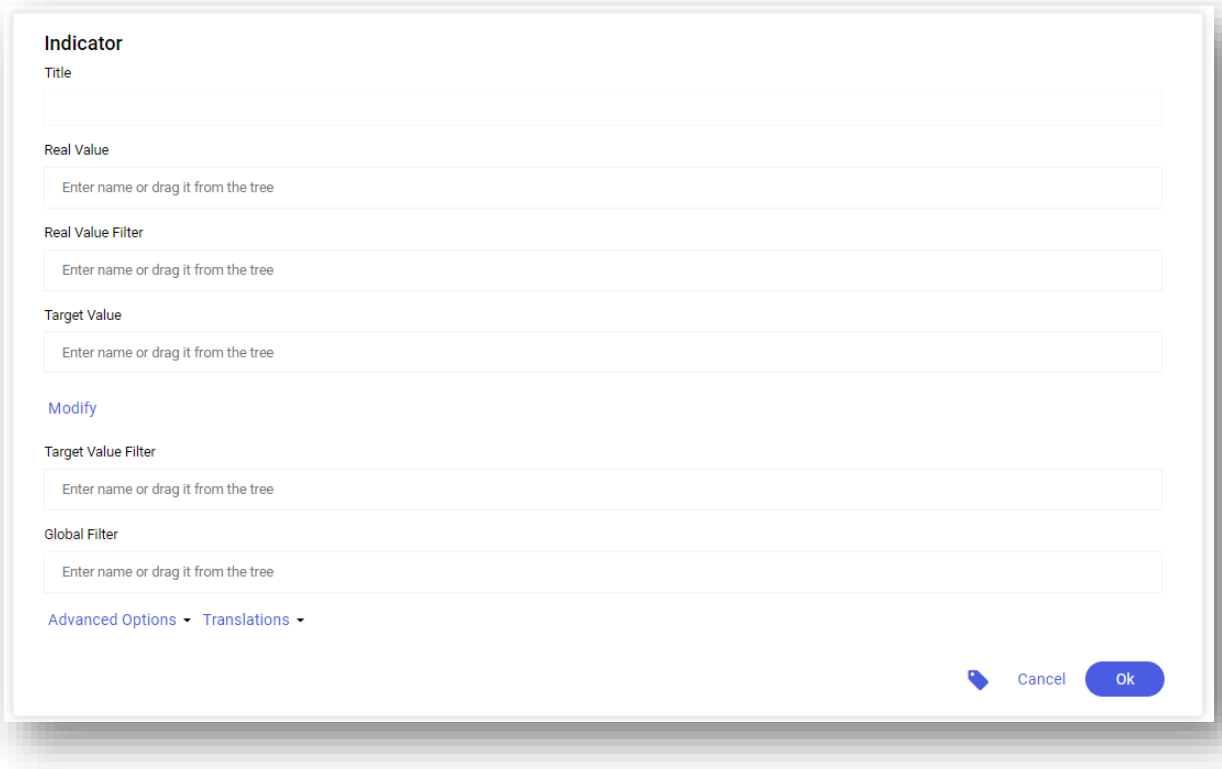


Figure 129 Window for defining an indicator

Indicators allow for uploading of data from any OLAP cube, using it for calculating the expected value and presenting the comparison of real and expected values on selected graphic type of indicator. Both values can be narrowed down according to user needs. It is also possible to enable or disable a description which will be displayed directly on a control as well as determine what ranges are critical for an indicator and, through percentage formatting, adjust layout for them according to user needs.

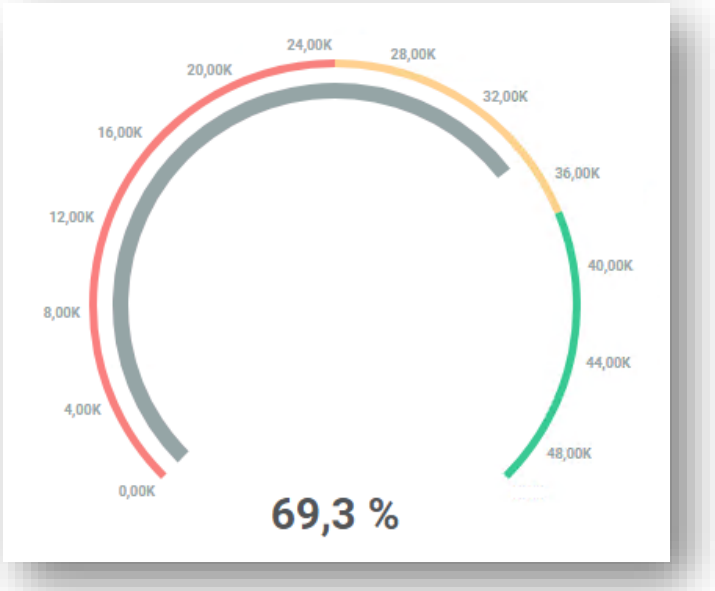


Figure 130 Exemplary indicator

Indicator look can be changed in many ways, percentage formatting of ranges has been provided. It is also possible to use conditional formatting for indicator controls. Configuration menu is available upon setting the cursor on the right side of indicator, upon checking parameter *Conditional Formatting*.

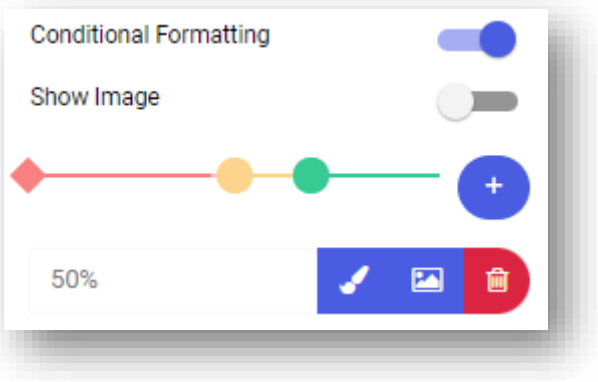


Figure 131 Conditional formatting

Configuring an indicator in such a way causes that:

- Values below 80% are marked in red
- Values above 80% and below 120% are marked in orange
- Values above 120% and below 200% are marked in blue
- Values above 200% will be marked in green

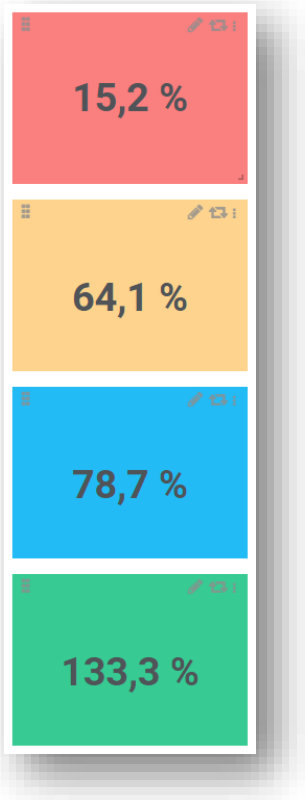


Figure 132 Appearance of exemplary indicators

Such formatting is possible both for numeric and percentage indicator. In case of percentage indicator, ranges are defined in percentage format and for value type, they are provided in form of value. When switching between the types of indicators, ranges are dynamically recalculated.

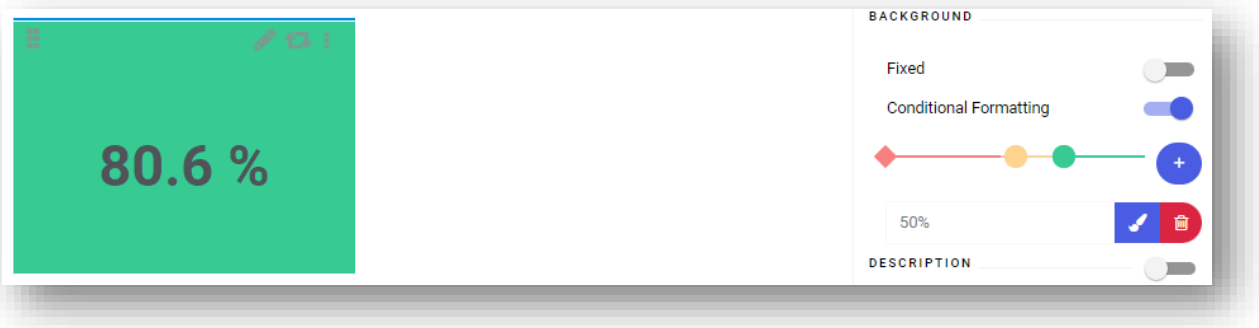


Figure 133 Example of conditionally formatted indicator

6.8.5 Website

This element is aimed at anchoring on a dashboard the links to external sources of data which are websites. The control allows for entering any Internet address which is uploaded as a website with size limited by a tile.

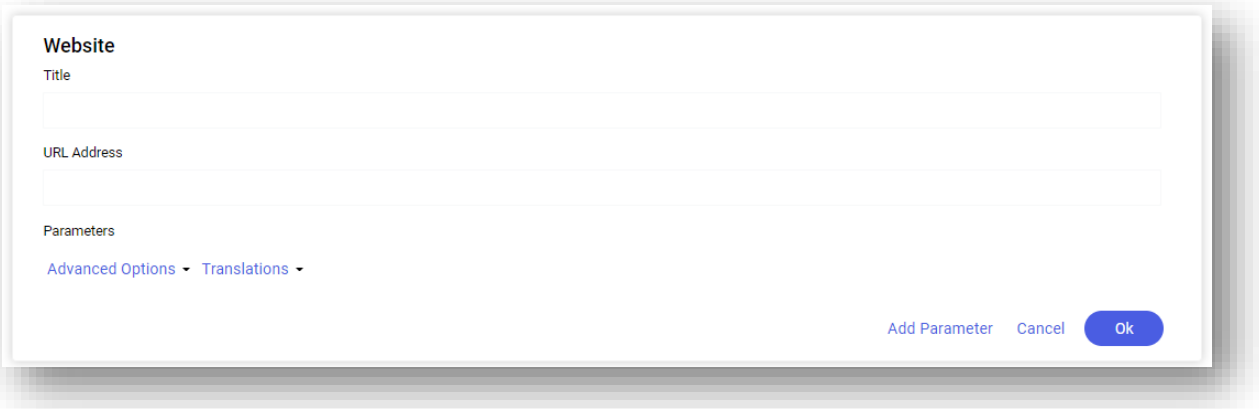


Figure 134 Website configuration

Content of website is displayed only in preview mode. Options in the tool panel allow for disabling a title, changing color and editing background.

Figure 135 Exemplary tile containing link to a website

In the application, it is also possible to add parameters to a website. In the example below, parameter *@CustomerCountry* was added with possibility to select a given country. The link refers to Wikipedia with the parameter applied:

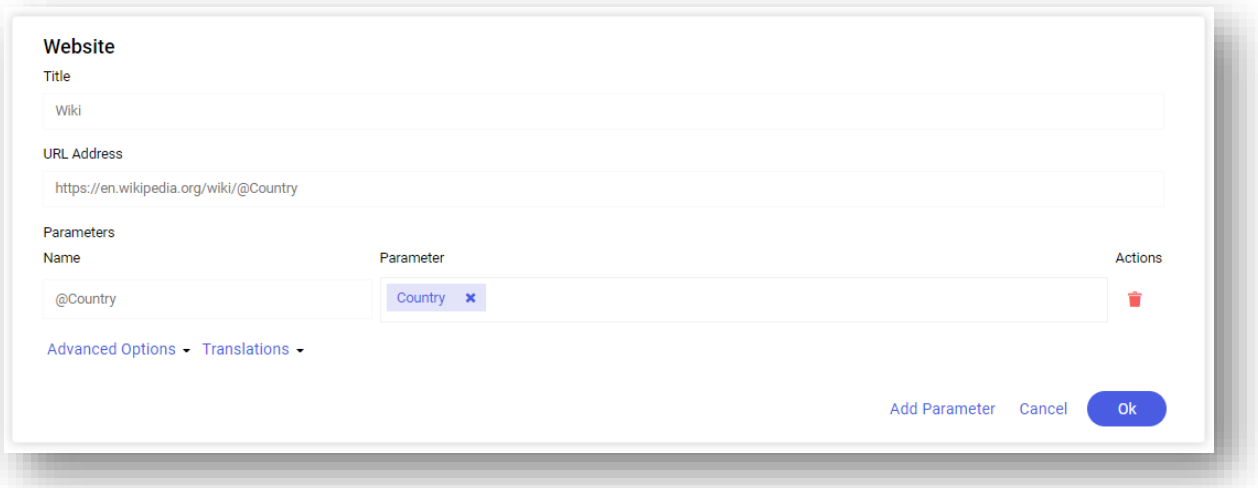


Figure 136 Inserting parameter - part 1

To be able to apply the parameter, attribute used in the above window must be selected in other control, e.g., in table.

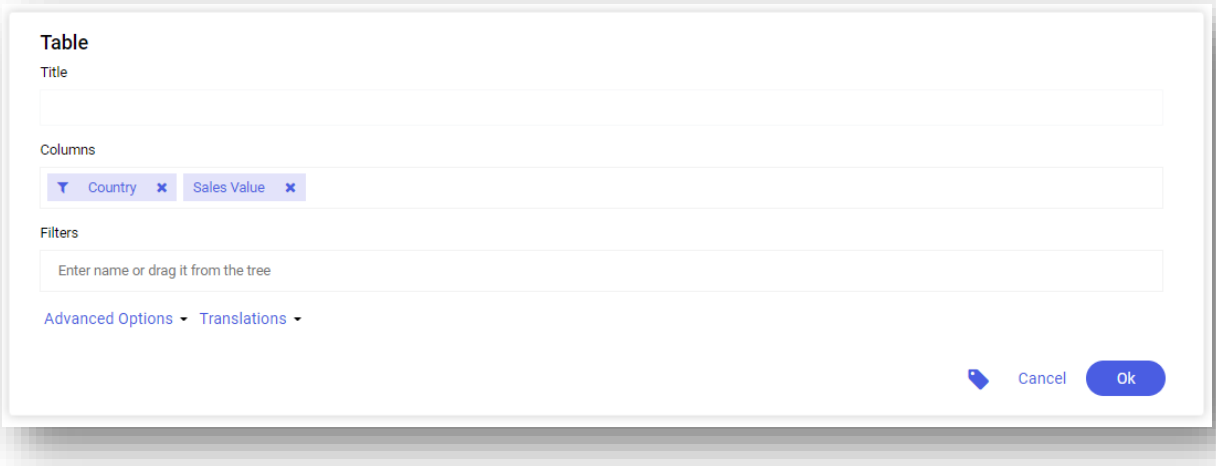


Figure 137 Inserting parameter – part 2

Then, in the preview window, the website is refreshed in a relevant manner, in dependence of selected element (country name):

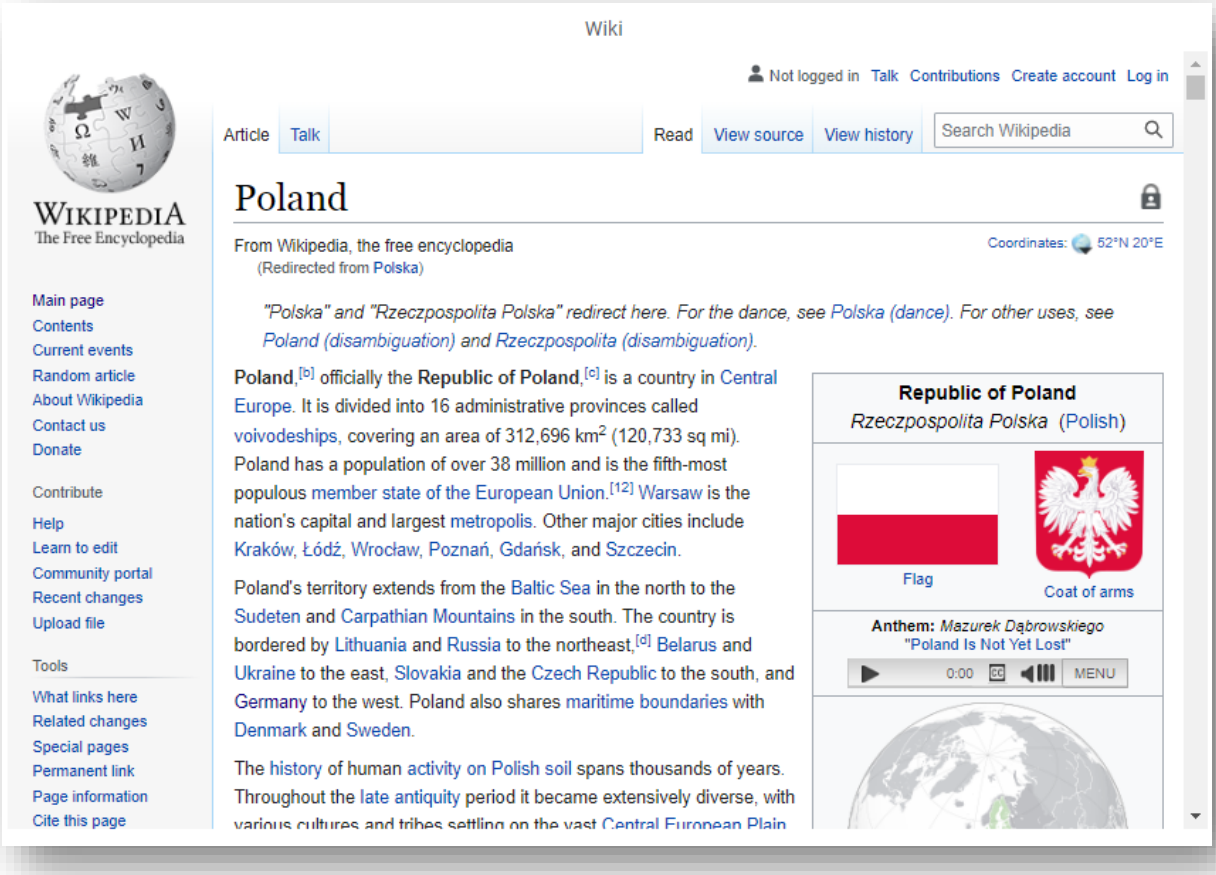


Figure 138 Refreshed website after selecting country *Poland*

6.8.6 Image

A dashboard allows for adjusting graphic appearance of a work space, but it is also possible to insert external images which are uploaded directly form external source (website). Owing to that, a dashboard can be supplemented with company logo, address from website or any other image from network resources (local sources, e.g. external disk, are not supported). Configuration of the element is similar to that of website – a user provides image title and its Internet address. Moreover, in *Advanced Options* it is possible to add a description which will be visible upon hovering or clicking on icon on a control.

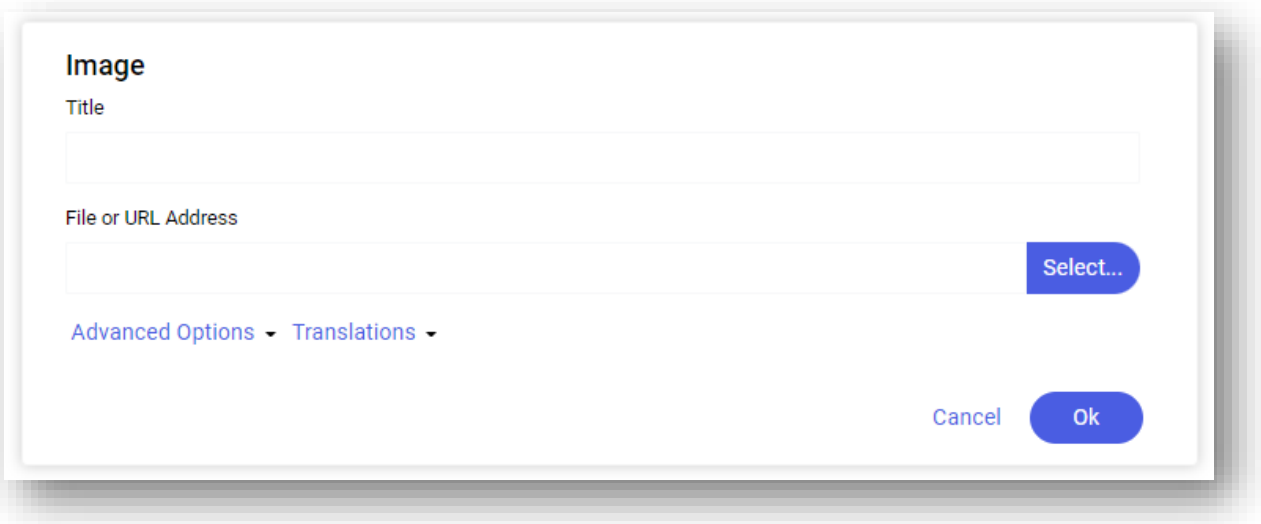


Figure 139 Image control configuration

Figure 140 Exemplary element with image

In order to improve presentation of images, it is possible for this element in the tool panel to disable displaying of title.

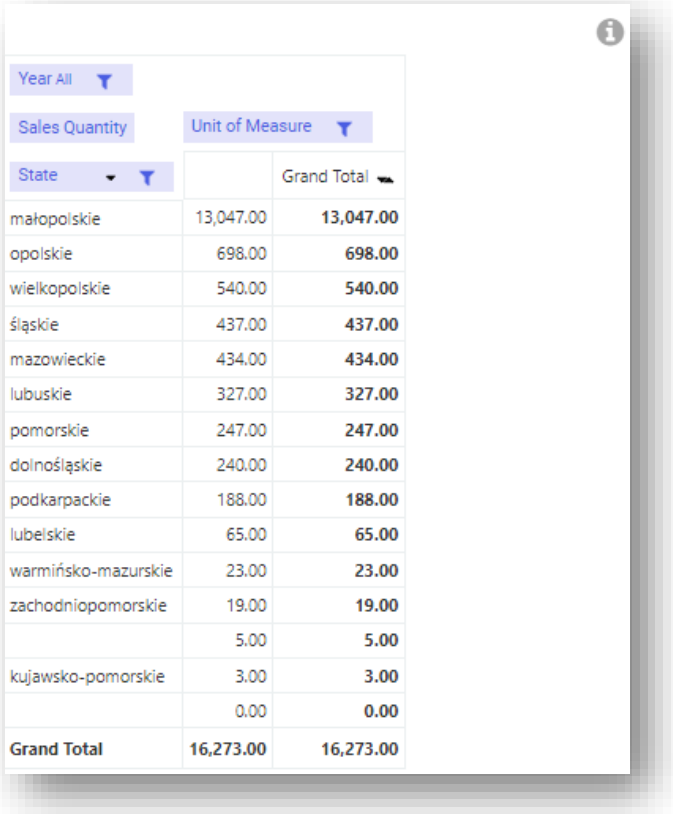
6.8.7 Report

This element supplements a dishoard in an easy and quick manner by a previously defined report saved in the report repository. Configuration of the control requires providing report title and selecting it. For the purpose of

easier searching for a report in the repository, configuration window contains the list of folders and reports as well as a search engine.

Figure 141 Configuration of report element on dashboard

After appropriate report is found, it is necessary to select it from the list and confirm the changes by clicking [**OK**]. The report will be rendered with adjustment to physical size of a tile. If the report has predefined parameters, then when adding a control the system will request to specify its value.



Year All

Sales Quantity | Unit of Measure

State		Grand Total
małopolskie	13,047.00	**13,047.00**
opolskie	698.00	**698.00**
wielkopolskie	540.00	**540.00**
śląskie	437.00	**437.00**
mazowieckie	434.00	**434.00**
lubuskie	327.00	**327.00**
pomorskie	247.00	**247.00**
dolnośląskie	240.00	**240.00**
podkarpackie	188.00	**188.00**
lubelskie	65.00	**65.00**
warmińsko-mazurskie	23.00	**23.00**
zachodniopomorskie	19.00	**19.00**
	5.00	**5.00**
kujawsko-pomorskie	3.00	**3.00**
	0.00	**0.00**
Grand Total	**16,273.00**	**16,273.00**

Figure **142** Report embedded on a dashboard

Selected report can be changed by selecting the button . You can also proceed to the selected report by selecting the button *Edit Report*.

Figure 143 Report object configuration

6.8.8 Global filter

Global filter is responsible for limiting the analyzed data in all the elements that have the same dimension provided in their definitions in the *Filter* field as the one defined for the element *Global Filter*.

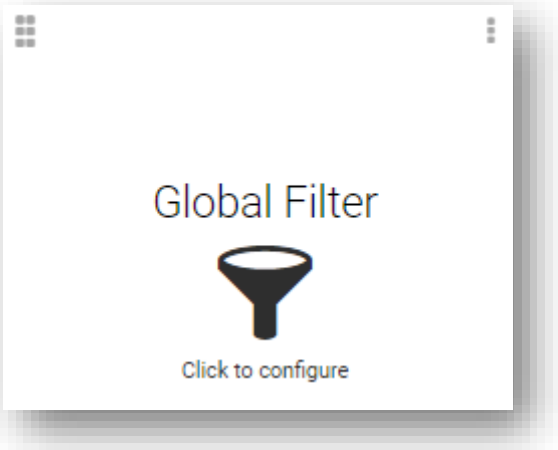


Figure 144 Global filter control

Using the global filter is tantamount to filtering the data within the entire dashboard in places where it was planned. Indicator, however, constitutes an exception in this case – filtering of that element requires filling in Global Filter field with a dimension which will be narrowed down. Configuration of the element consists in providing its title and indicating a dimension it will work with.

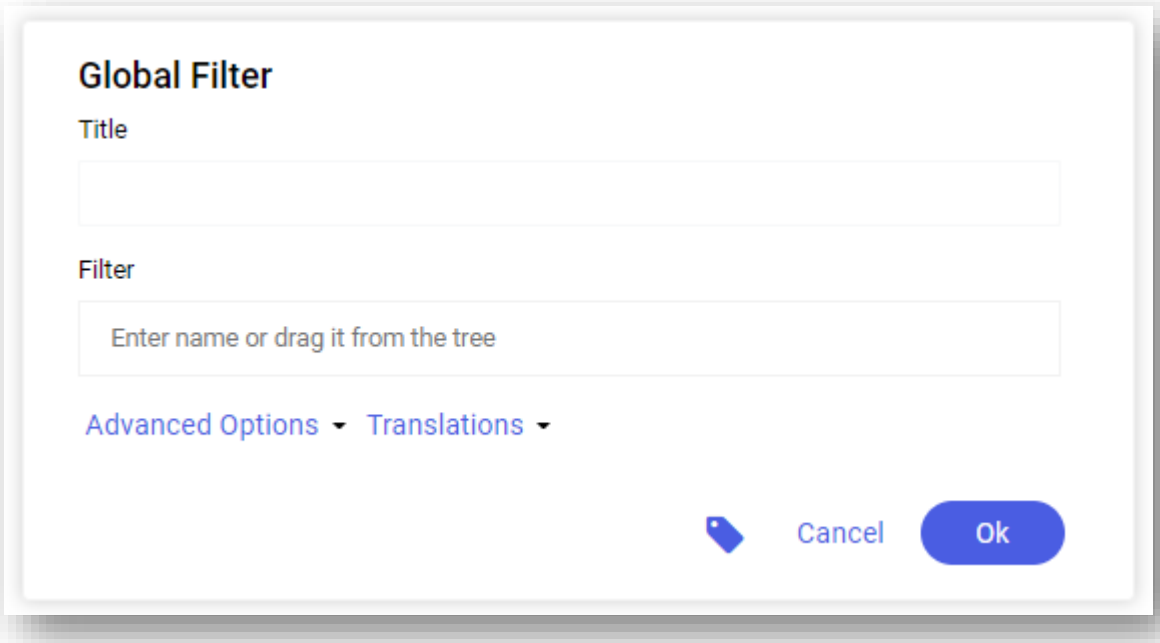


Figure 145 Global filter configuration tool

Data can be previewed only in preview mode.

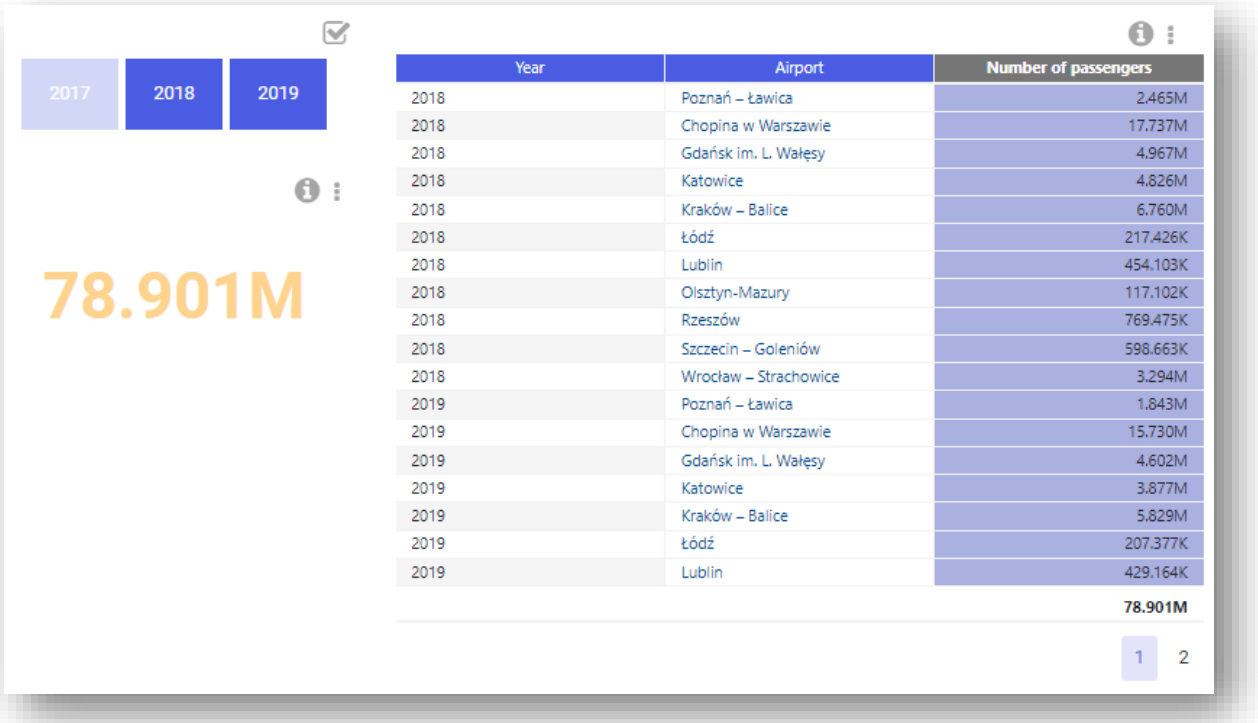
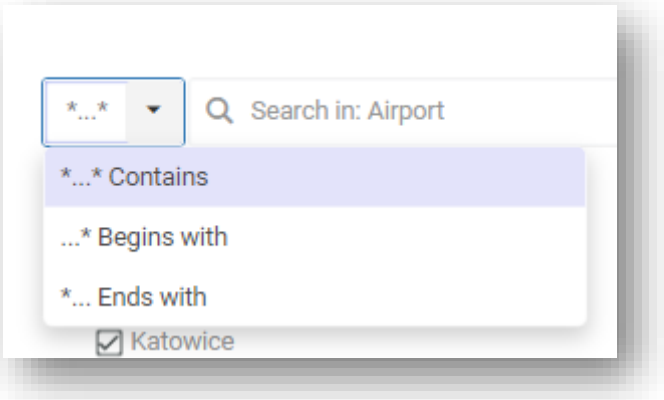


Figure 146 Global filter results

In preview mode, there is a variety of options for filtering data. Data can also be filtered by predefined conditions, as in the of case of reports:

- Starts with
- Ends with
- Contains – default condition



In the search engine field, there are also the search options for listing elements of a given type. The available search options are:

- **Show all** – filters all elements from within the displayed set
- **Show only selected** – filters only selected elements from within the displayed set
- Show only deselected – filters only deselected elements from within the displayed set

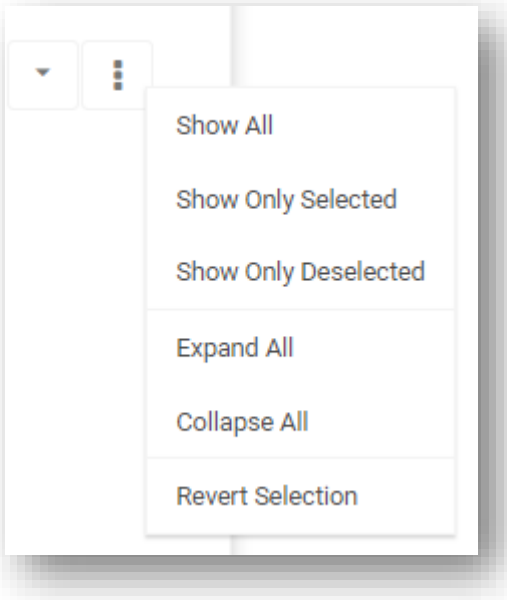


Figure 147 Available filter options

In the slider filter, it is also possible to specify an upper and lower ranges. In case of a large amount of data, you can specify the ranges – by typing. This option is available in the preview mode.

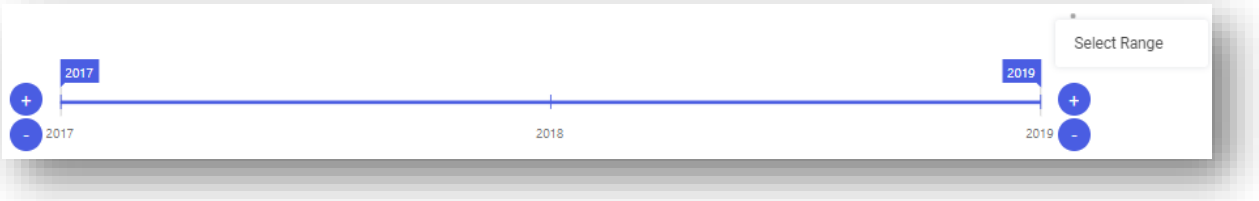


Figure 148 Specifying a range for a slider filter

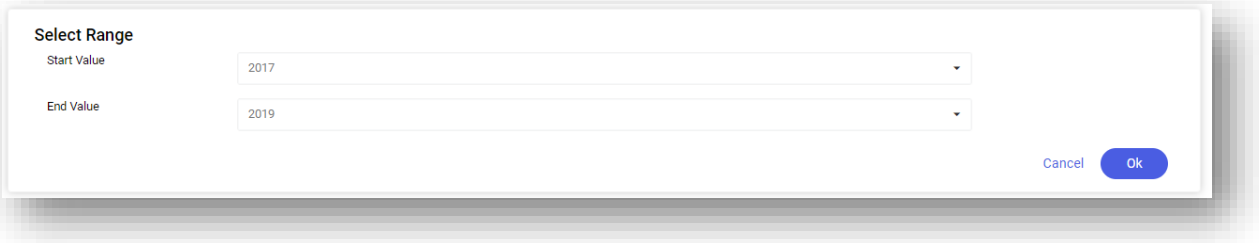


Figure 149 Range configuration field for a slider filter

Back in edit mode, it is possible to select in the right tool panel one of three filter types: simple filter, range selection and filter with buttons, which can be adjusted graphically by changing a background, a font and by adding images.

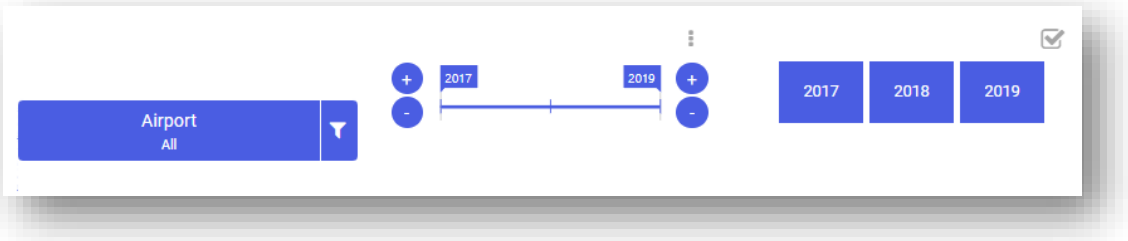


Figure 150 Different types of global filter

Upon clicking on *Select All* checkbox, all elements are displayed.

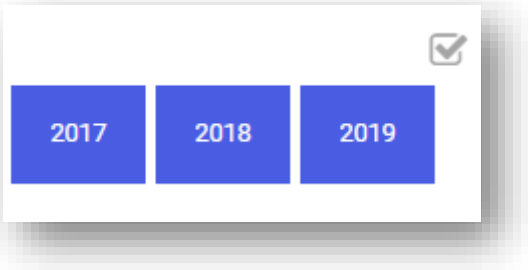


Figure 151 *Select All* checkbox in global filter

Global filter allows also for using a hierarchy – filtered elements show result consistent with specified conditions from both elements.

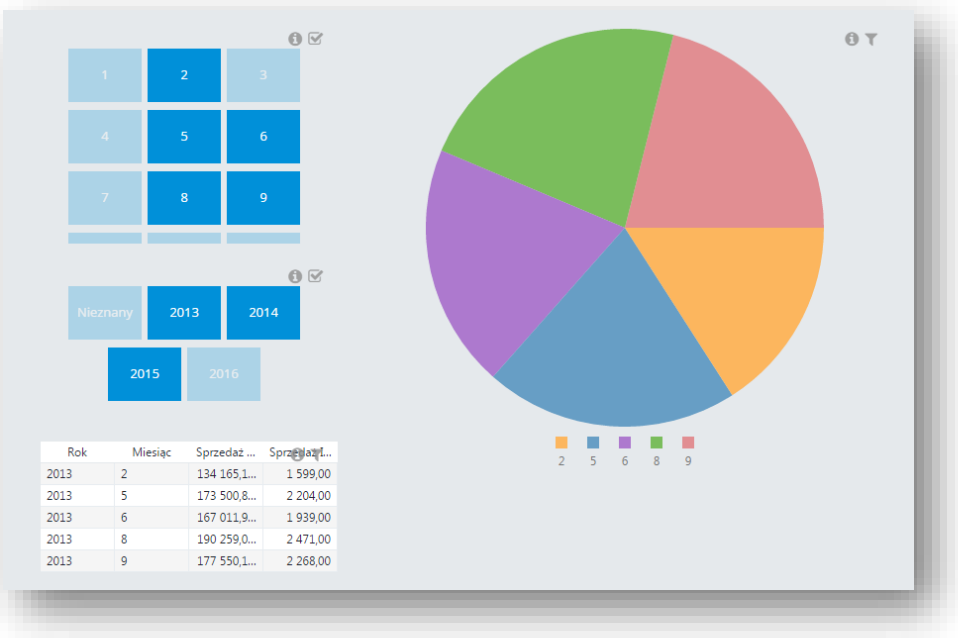


Figure 152 Sorting with hierarchical elements

6.8.9 Text

Control *Text* is provided to create all types of titles, headers and text fields. The following formatting is allowed in it:

- Bold
- Italics
- Underline

Moreover, it is possible to adjust color of font and background, as well as background size and alignment (both horizontal and vertical).

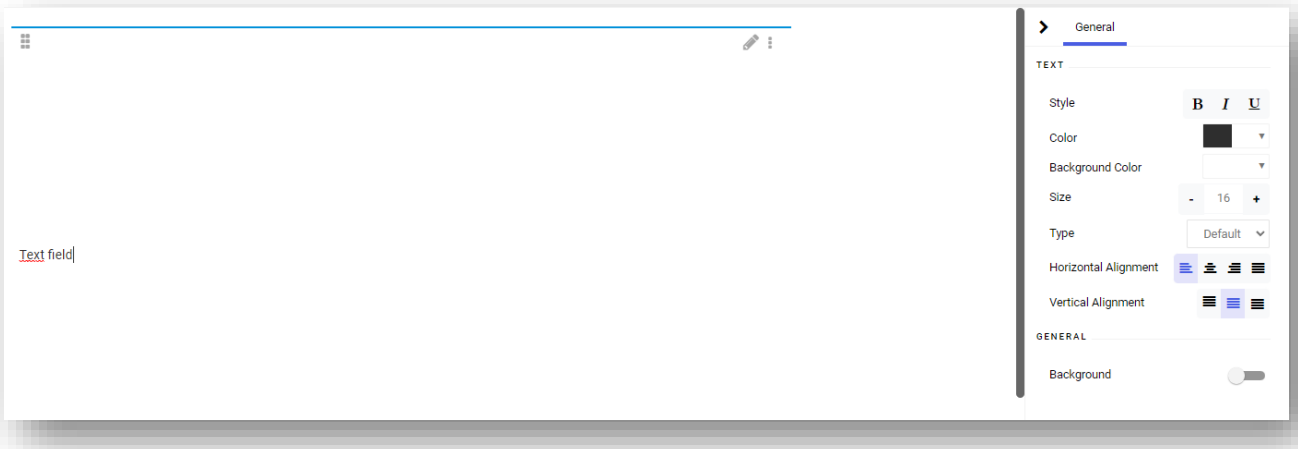


Figure 153 Text field

6.8.10 Dynamic measure/dimension

Controls *Dynamic Dimension* and *Dynamic Measure* are provided to create an element which changes without reloading of a dashboard. Select appropriate option from the menu on the left side to create such control:

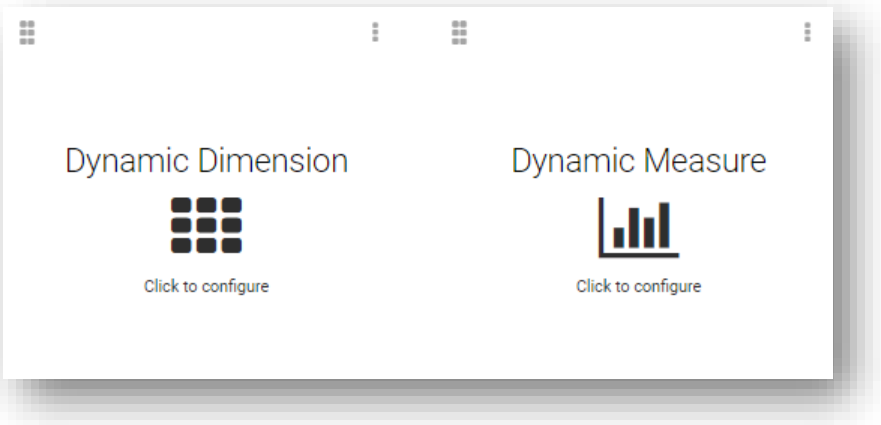


Figure 154 *Dynamic Measure* and *Dynamic Dimension* options

Next, in the control configuration, select element which should change dynamically:

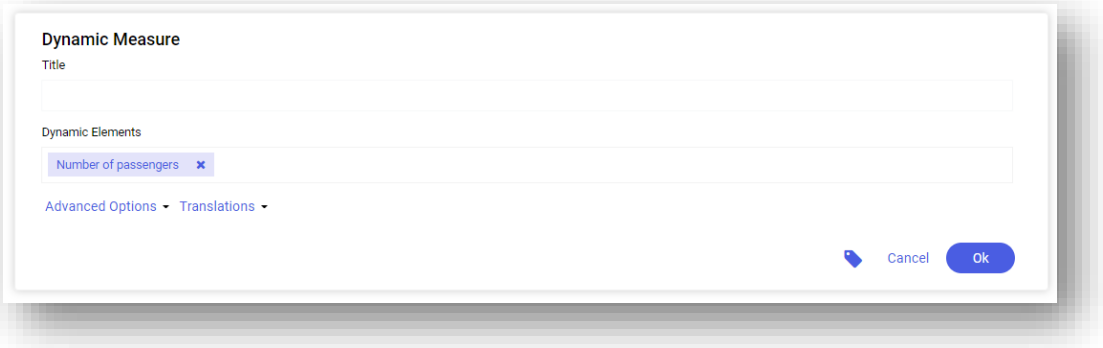
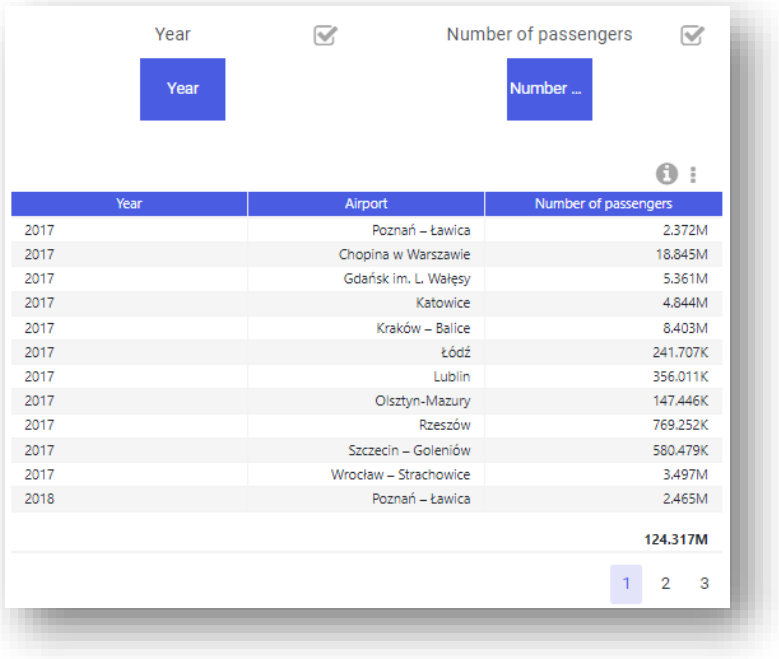


Figure 155 Dynamic measure definition

After the configuration is completed, select the element which is to change in dependence of specified parameters. An exemplary table is presented below, in which created elements in form of dynamic measure and dynamic dimension have been previously added:

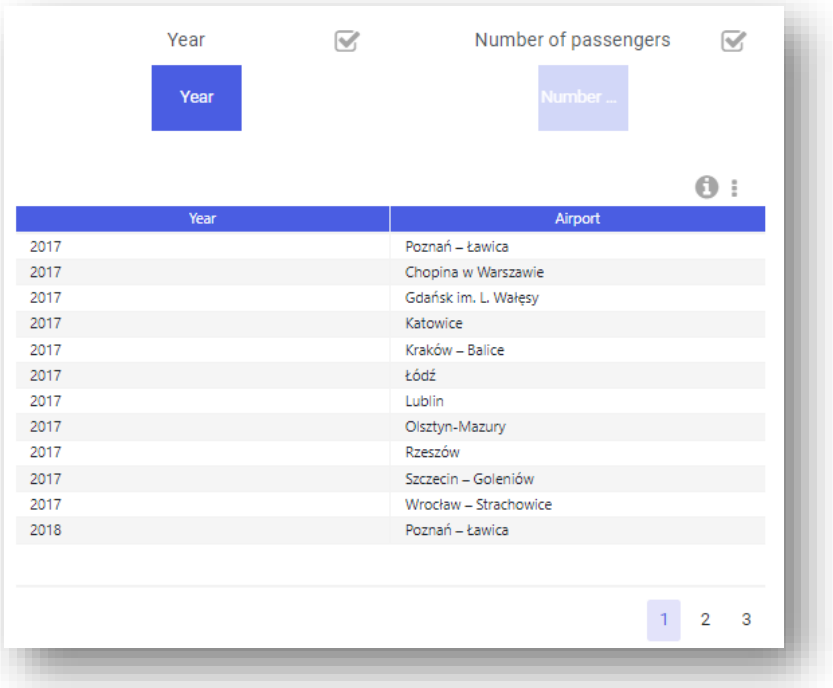


Year	Airport	Number of passengers
2017	Poznań – Ławica	2.372M
2017	Chopina w Warszawie	18.845M
2017	Gdańsk im. L. Wałęsy	5.361M
2017	Katowice	4.844M
2017	Kraków – Balice	8.403M
2017	Łódź	241.707K
2017	Lublin	356.011K
2017	Olsztyn-Mazury	147.446K
2017	Rzeszów	769.252K
2017	Szczecin – Goleniów	580.479K
2017	Wrocław – Strachowice	3.497M
2018	Poznań – Ławica	2.465M
		124.317M

1 2 3

Figure 156 Presenting dynamic elements

Then, in dependence if appropriate elements are selected or deselected, aspects of our interest can be presented accordingly:



Year	Airport
2017	Poznań – Ławica
2017	Chopina w Warszawie
2017	Gdańsk im. L. Wałęsy
2017	Katowice
2017	Kraków – Balice
2017	Łódź
2017	Lublin
2017	Olsztyn-Mazury
2017	Rzeszów
2017	Szczecin – Goleniów
2017	Wrocław – Strachowice
2018	Poznań – Ławica

1 2 3

Figure 157 Presenting a dynamic measure

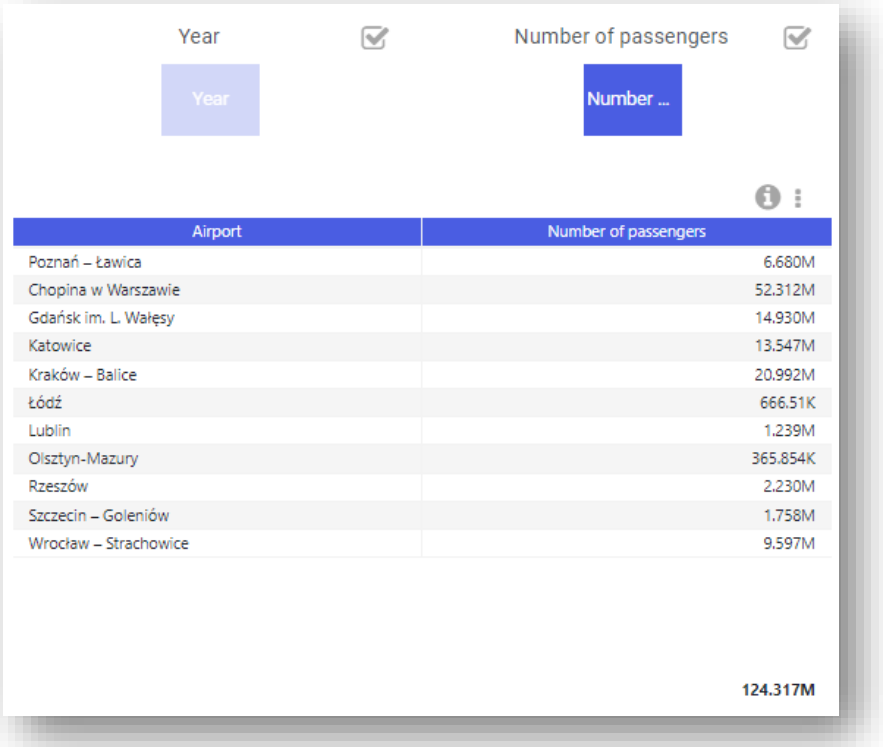


Figure 158 Presenting a dynamic dimension

6.8.11 Link to the repository

Oftentimes, when creating a data presentation, there is a need to show other repository including a related analysis – to satisfy this expectation, control *Link to Repository* is provided, which is a cross-reference. Upon selecting it in the left menu for creating dashboards, an intuitive menu is displayed, in which the repository to which a user wants to refer must be selected:

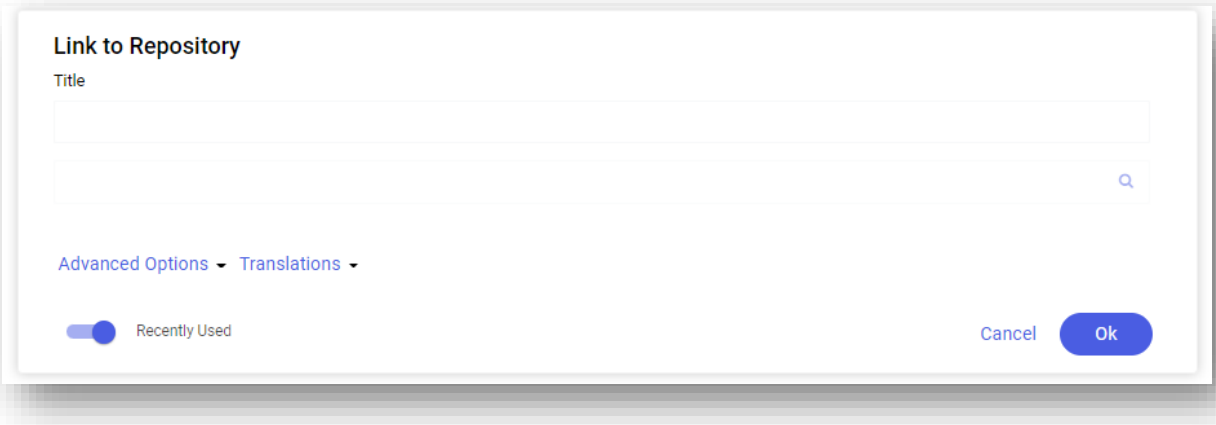


Figure 159 Creating a link to repository

Marking option *Recently Used* shows a link to repositories which have been opened recently. After selecting appropriate elements, they will be available in a dashboard in form of tiles being links.

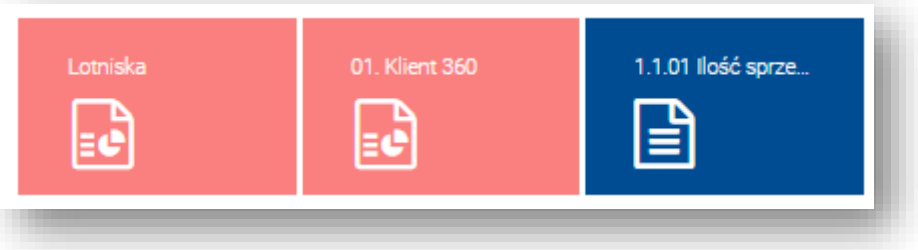


Figure 160 Created link to repository

6.8.12 Data filter

In order to create an element separating data, use control *Data Filter*. To create it, select appropriate tile from menu on the left side in a dashboard. An element will be added then, which opens an intuitive menu once it is expanded:

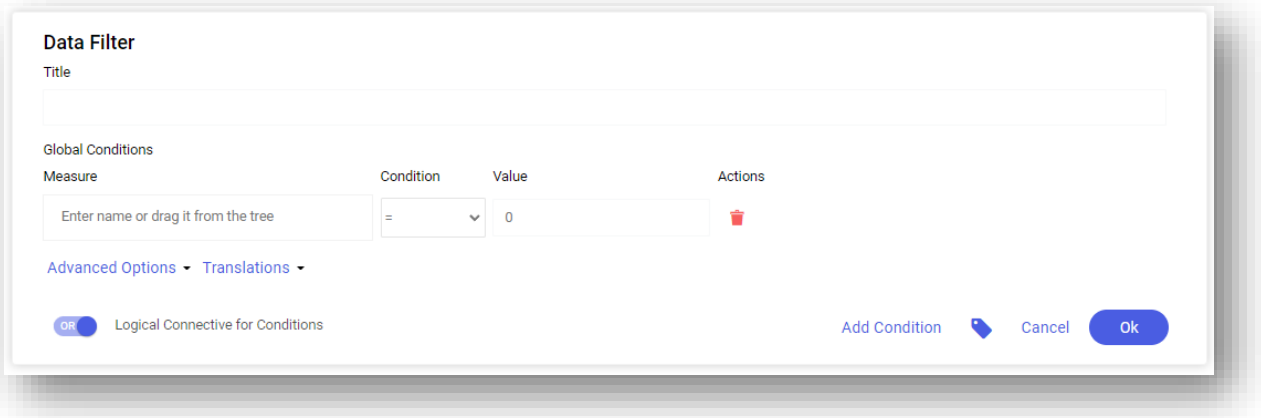


Figure 161 Data filter configuration

Upon filing in the fields, the element is created, which can be edited as any other control by means of selecting appropriate option from menu on the right side.

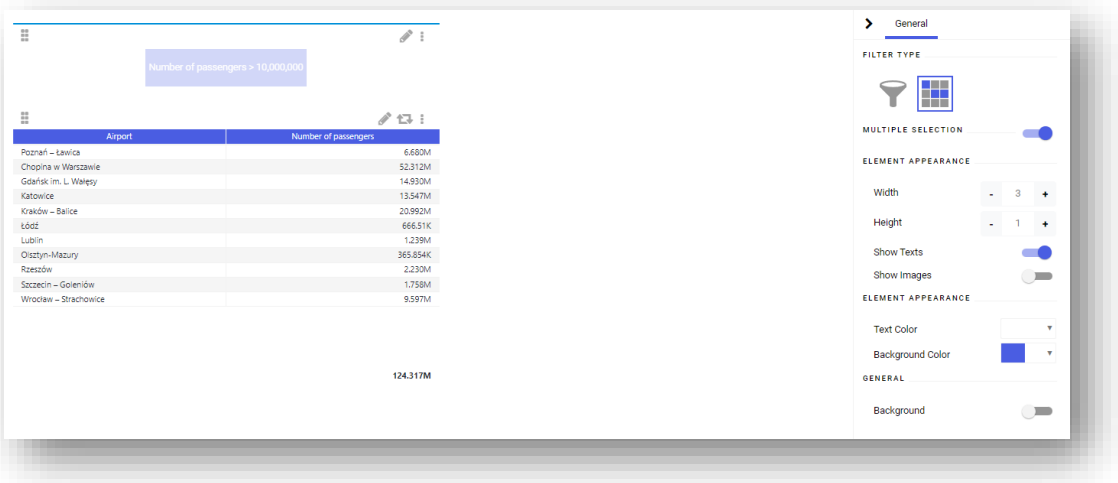


Figure 162 Data filter in dashboard edit mode

To notice separation of elements not fulfilling filter conditions, an element subject to filtering, e.g. a table, must be created:

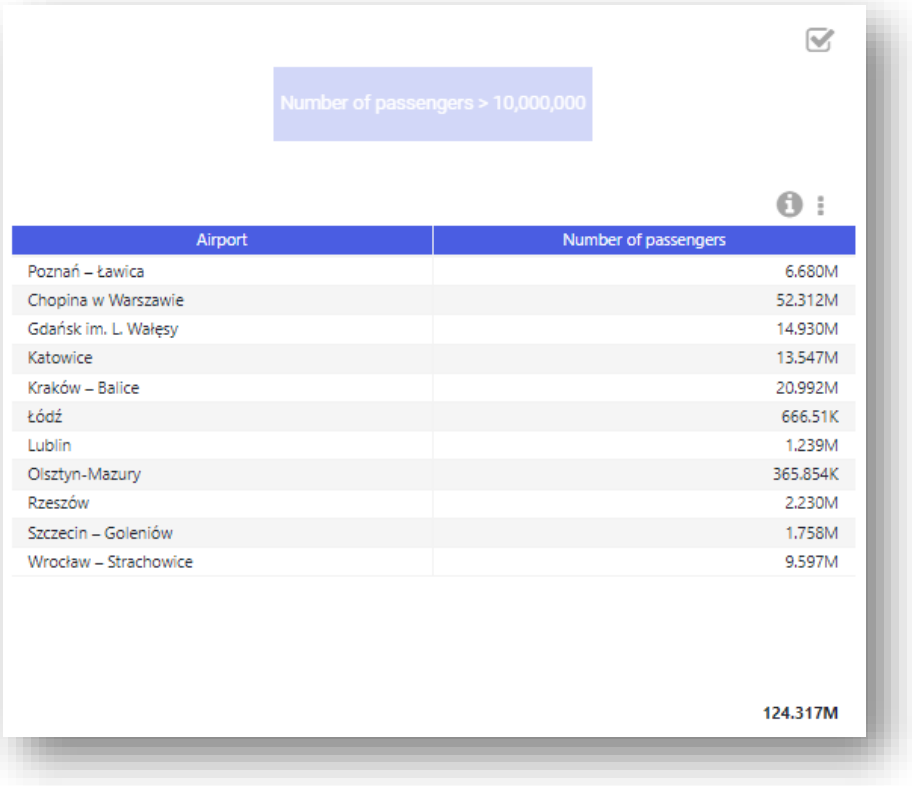


Figure 163 Table with inactive filter

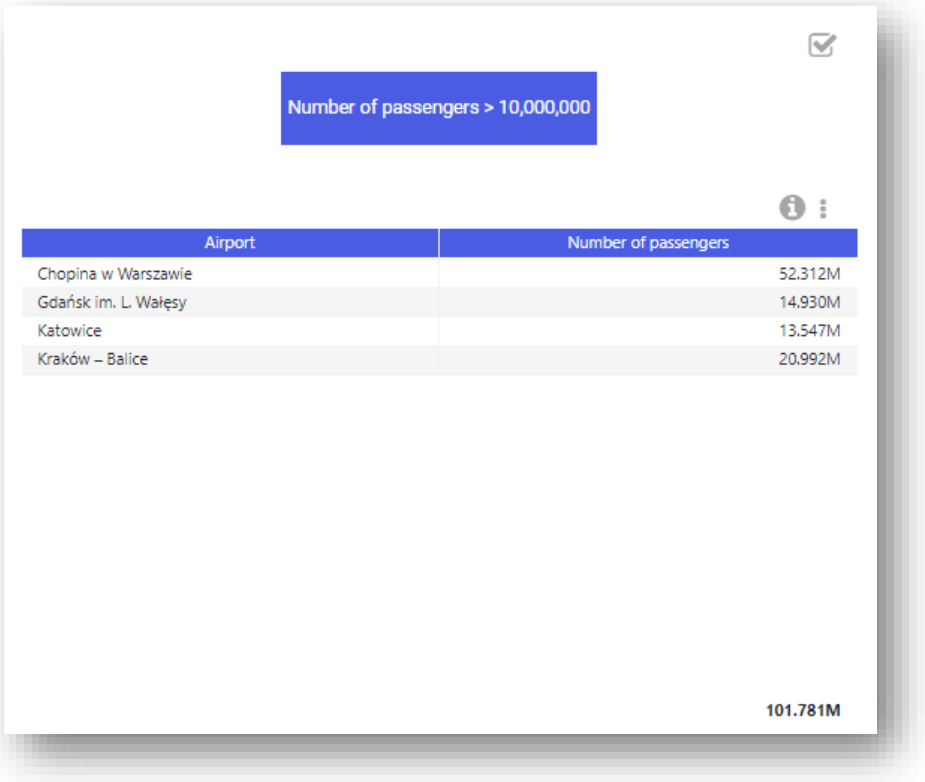


Figure 164 Table with active filter

6.8.13 Interaction between dashboards

This functionality allows for starting subsequent dashboards with the use of global filters from a currently opened report. The interaction can be activated on elements *Chart* and *Table*. To do so, enable the option *Attach Dashboard* in the right drop-down menu in *Behavior* section.

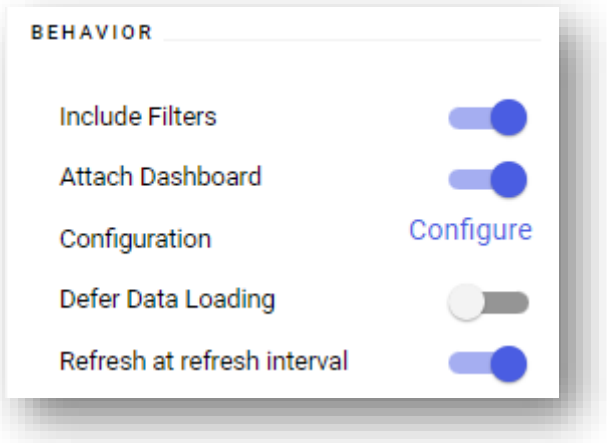


Figure 165 Option *Attach Dashboards*

Next, select *Configure* option which opens a separate window for selecting a target dashboard.

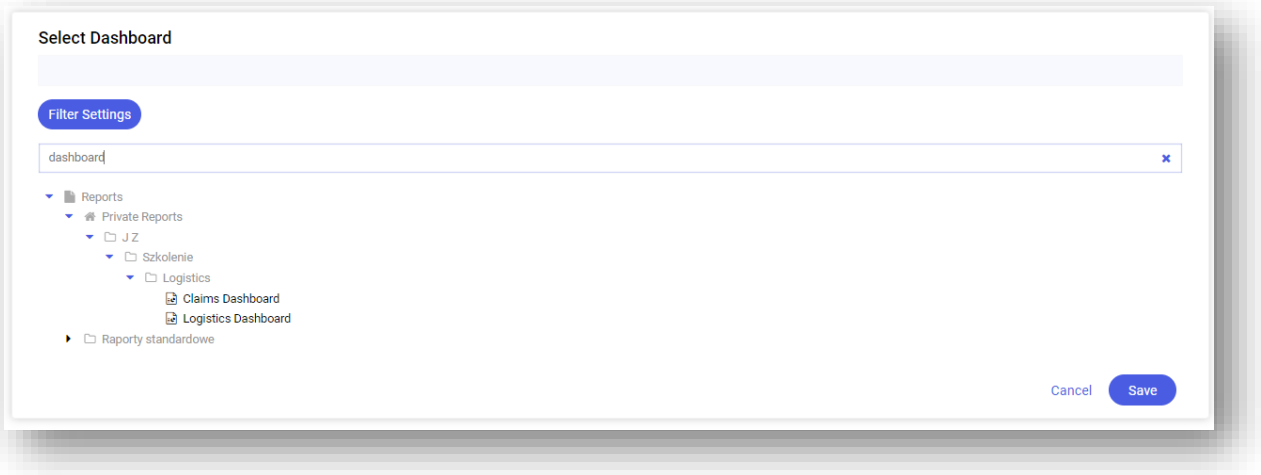


Figure 166 Configuration of interaction between dashboards

In this window it is also possible to select which elements in the target dashboard will be filtered. This can be done by using button [**Filter Settings**].

Figure 167 Filter settings

Upon saving the settings and proceeding to *Preview* mode, a thunderstorm icon will be visible in the upper right corner of an element. Clicking on that icon displays the associated dashboard with filtered data.

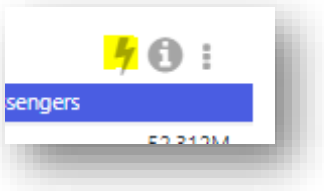


Figure 168 Calling the interaction between dashboards

6.8.14 Map

In order to use dashboard element of Map type, PostgreSQL server and parameters of geolocation database must be previously appropriately defined (PostGIS, an add-on to PostgreSQL, is necessary for that) from the level of configuration tool.

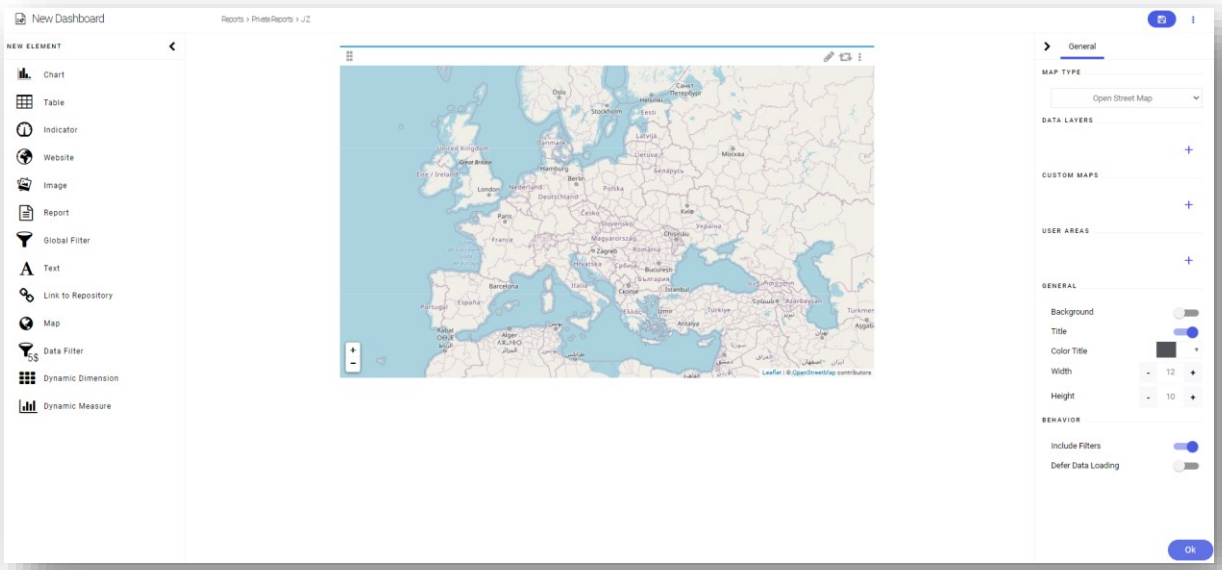


Figure 169 Clear map

Upon clicking on the control for the first time, configuration window opens in which it is necessary to select measures, dimensions and geographical dimensions of user's interest. After saving, it is possible to return to the configuration window by clicking on icon on the control.

Figure 170 Map control configuration window

In tab *General* it is possible to specify basic settings, such as background color or reactions to filters. It is also possible to attach a dashboard with the use of [**Configuration**] button. There are two types of maps available for selection: *Contour Map* and *Open Street Map* which requires the application to be connected to the Internet.

Tab *Data* contains a list of data layers visible on a map. By clicking , it is possible to add a new layer. When editing existing layers or upon adding new ones, a window allowing for their modification is provided.

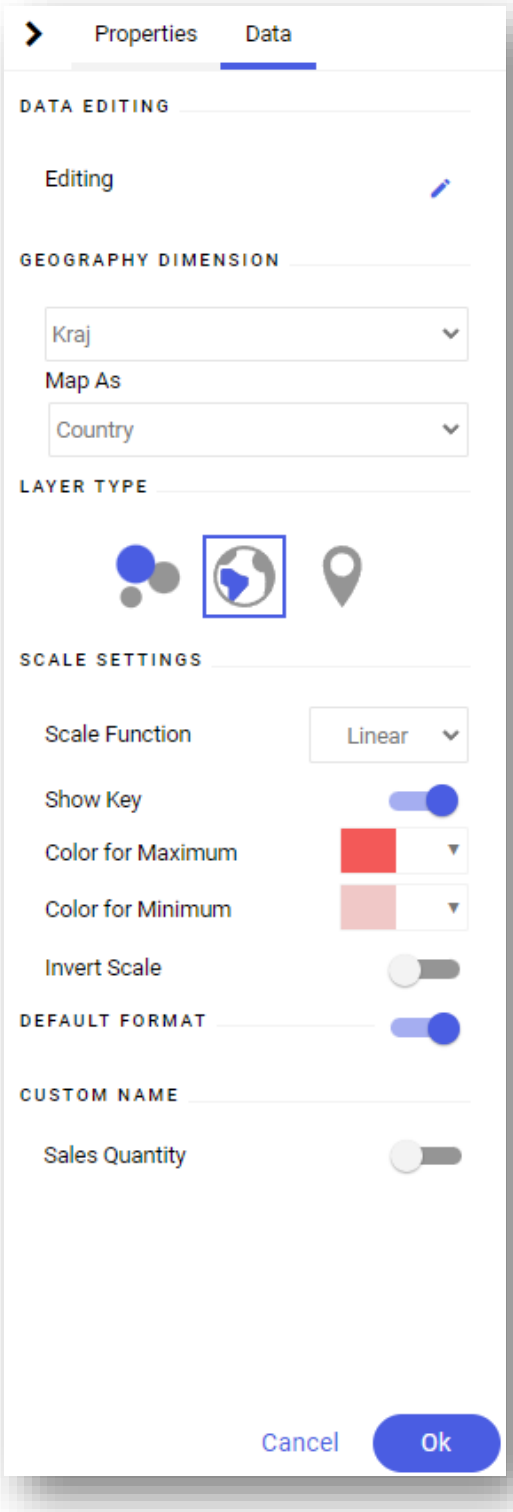


Figure 171 Exemplary window with layer settings modification

Upon clicking , it is possible to convert the map control into table, chart or indicator.

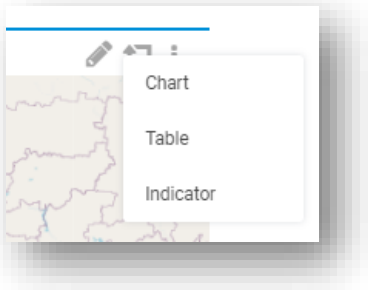


Figure 172 Map conversion

In the layer of indicator type, it is possible to add a label to particular regions by selecting the option 'Show text on the map'.

In a map, it is possible to use more than one layer of data, owing to which *Map* control can be used in more diversified analyses. It was also made possible to perform interaction from map level. Upon selecting areas in this control, they will operate as dashboard filters and, for instance, in *Table* control only those areas will be shown, which were selected in a map (country/county/city, etc.). The interaction operates on the outermost map layer only.

To add own area on the map, select the map control followed by the option of adding own areas in the right panel. The format of the added file with an area on the map must be .geojson.

Below is an example:

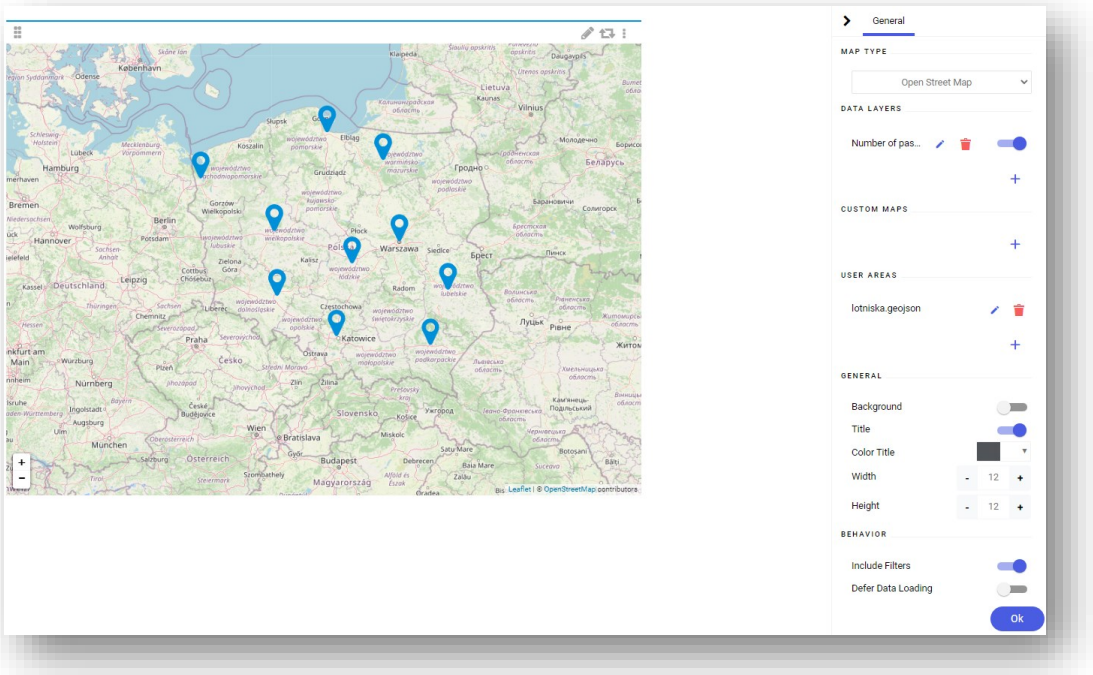
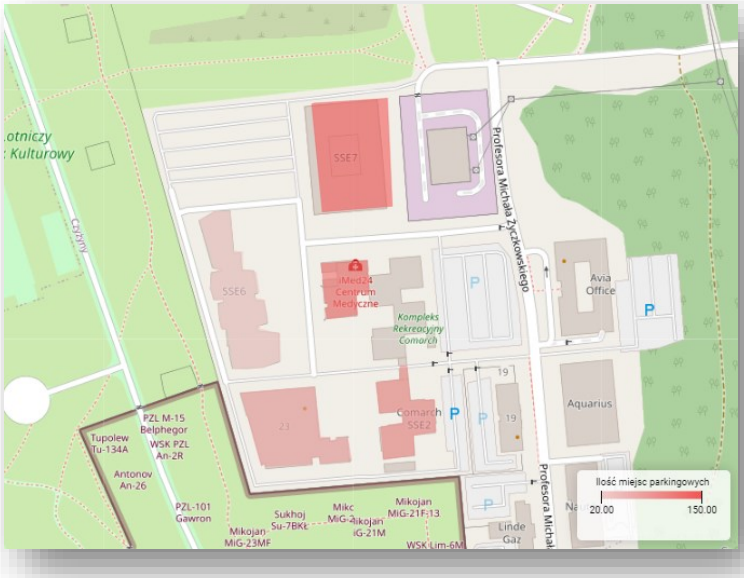


Figure 173 Map example

6.8.14.1 How to add a custom map

In BI Point application, it is possible to add a custom map using a .geojson file. A .geojson file can be created with the help of any application selected by the user.

Below is an example of how to prepare a .geojson file in the application.



A new map is added in the configuration pane by selecting first a file in .geojson format and then selecting the button  .

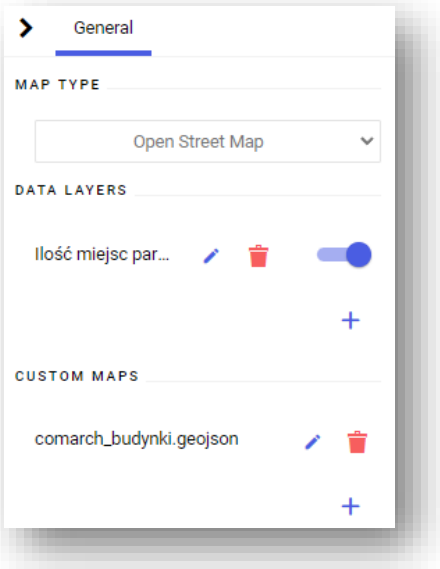


Figure 174 Custom map add menu

After the map is added, it is possible to change its name. The map can be renamed using the [**Edit**] button  . The button  is used to delete a given map.

Below is an exemplary custom map loaded into the application:

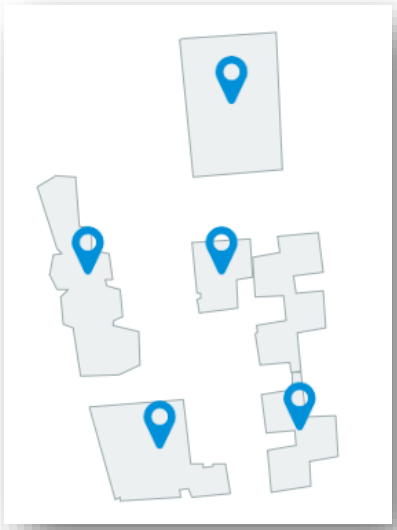


Figure 175 Custom map example

If an analytical dimension has a hierarchy, then it is possible to prepare a dynamic relation of two attributes for a given object of that hierarchy, which creates a new property for the object of that dimension.

6.8.15 Dashboards in multisourcing

A user can select a data model in a report and dashboard. The list is presented in the form of a tree and dashboards can be searched for by data model name and type.

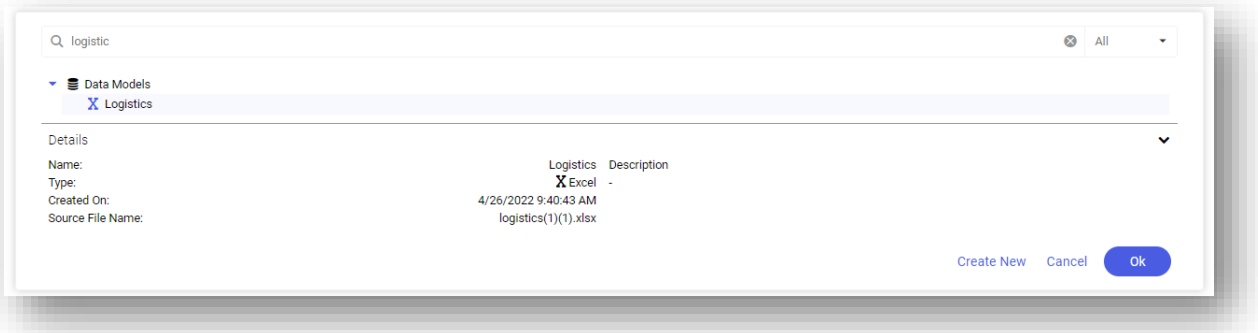


Figure 176 Selecting a data model when creating controls in a dashboard

In the configuration tool, it is possible to navigate to adding a new data model by selecting the button Create New .

Description of the permissions to dashboards in multisourcing can be found here.

6.8.16 Comments to dashboards

In the current program version, it is possible to add comments to dashboards. A comment can be added to a dashboard with the help of the button available in the right bottom corner of the window.

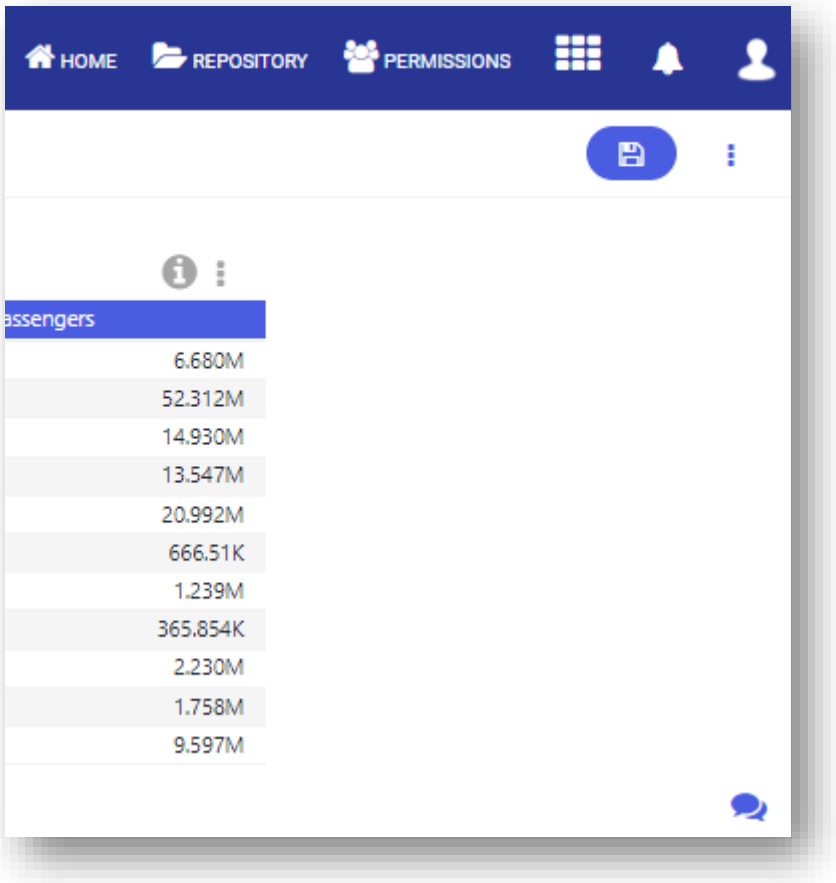


Figure 177 Comments to dashboards

Selecting the previously mentioned button will open a window presenting a previous comment history. A new comment is added by selecting the button Add Conversation.

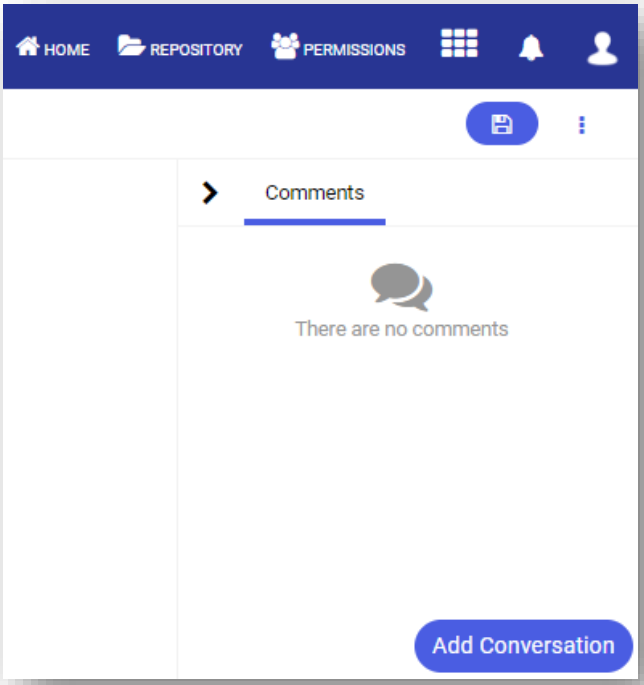


Figure 178 Add conversation button

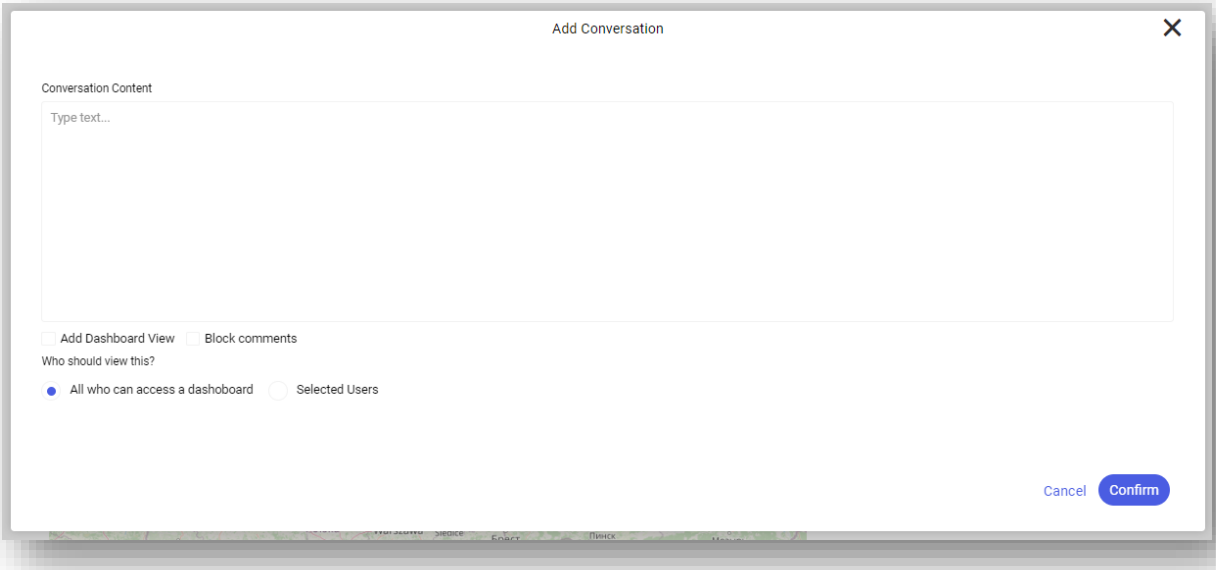
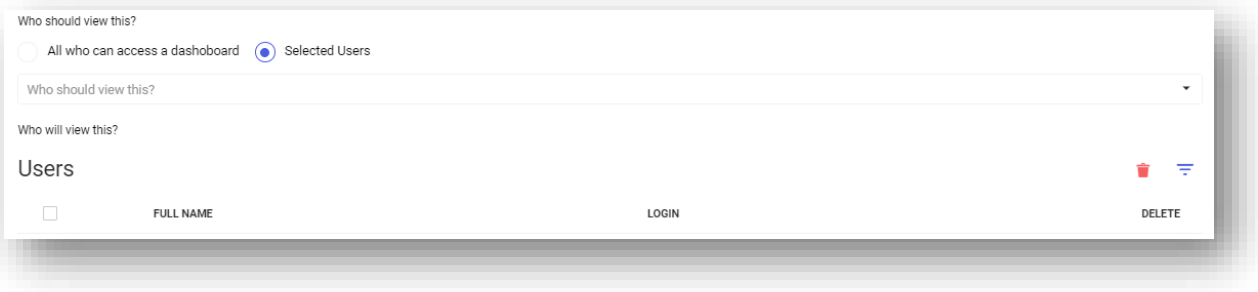


Figure 179 Conversation Content

In the conversation addition window, there is an option for blocking the addition of comments. To block comment addition, select the parameter *Block comments*. A given comment can be dedicated to a selected group of recipients. To do it, search for a specific user and add that user to the list.



A comment is confirmed with the button [**Confirm**].

It is also possible to attach a current view so that other users can see the same data.

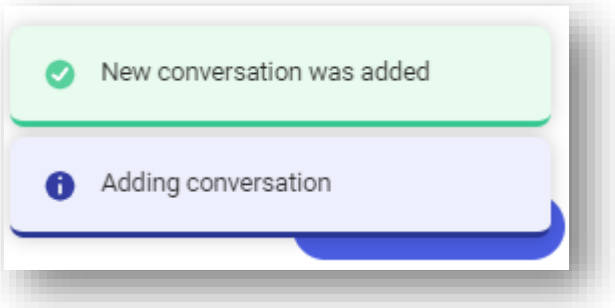


Figure 180 Comment view

Before adding a reply, a user can preview the attached view by selecting the button 

A reply is be added by typing a text into the *Reply* box. A reply can be edited by selecting the button 

. After adding a comment to a dashboard, other users receive a relevant notification.

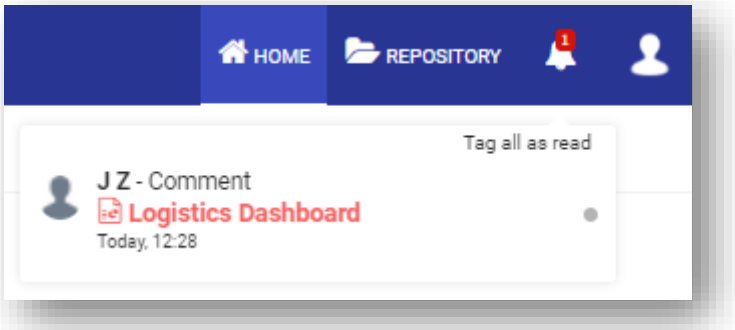


Figure 181 New comment notifications

A given comment can be viewed by clicking into the field 

, which will open the view of a given dashboard.

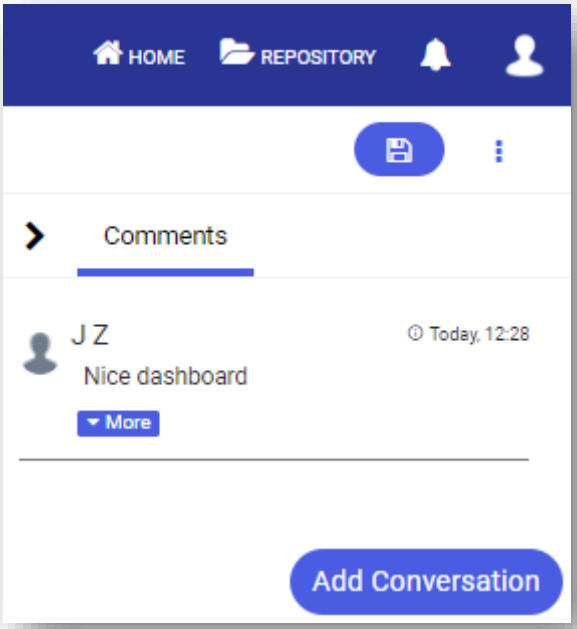
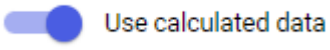


Figure 182 Comment preview

6.8.17 *Enter Parameters* window when running a dashboard

Running a dashboard opens a window, where it is possible to specify the data refresh parameters or to use the previously calculated data.

The switch button 

is used to run a report on a dashboard, which is based on the previously calculated data.

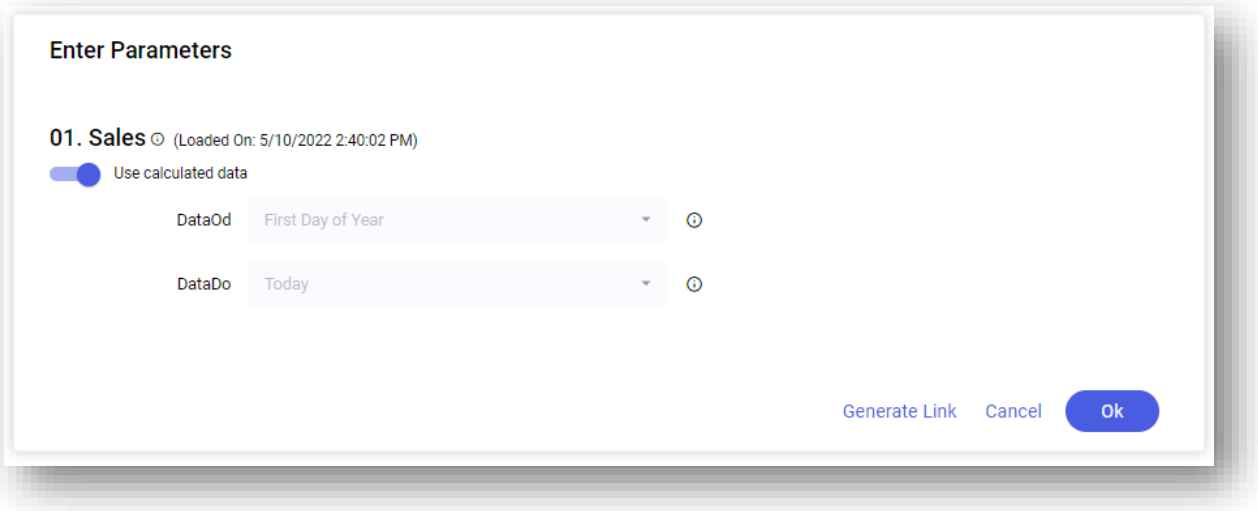


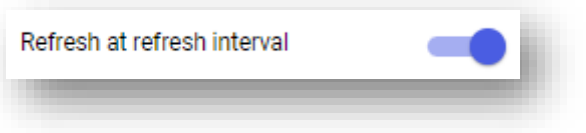
Figure 183 *Enter Parameters* window

The parameter *Code* is not active for models with refresh mode set to *Load on startup*, because data is always recalculated on program startup.

- Reloaded data can be used when a model was reloaded from a schedule or if it was at least once reloaded with selected parameter *Use calculated data*. Only then is the calculated data stored.
- Reloading a model without the parameter selected does not reload the stored data and does not delete the previously stored data. After reopening the model with the parameter selected, the previously stored data will then be used.
- It is not important that the model with the parameter selected was earlier reloaded on default parameter values.

6.8.18 Refreshing data in real time

To ensure that data is refreshed in the dashboard in real time, the following formula must be added to the link: „?refreshInterval=X" – where x is a value in milliseconds indicating the data refresh interval. It must also be verified whether the refresh at refresh interval option is activated for a specific dashboard element:



As of 12.2 release, the data refresh option has been extended. It is possible to specify data refresh settings in a new window by selecting respectively the option:

- For report

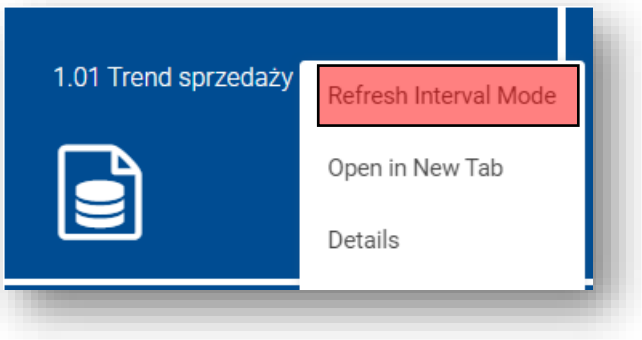


Figure 184 *Refresh Interval Mode*

- For dashboard

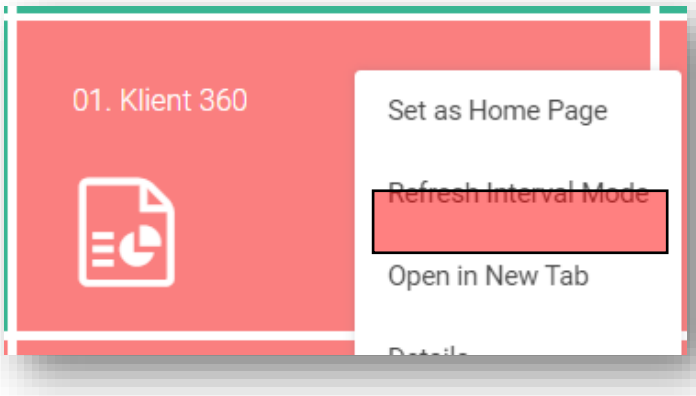


Figure 185 *Refresh Interval Mode - dashboard*

In the new window, you can set the value in milliseconds individually:

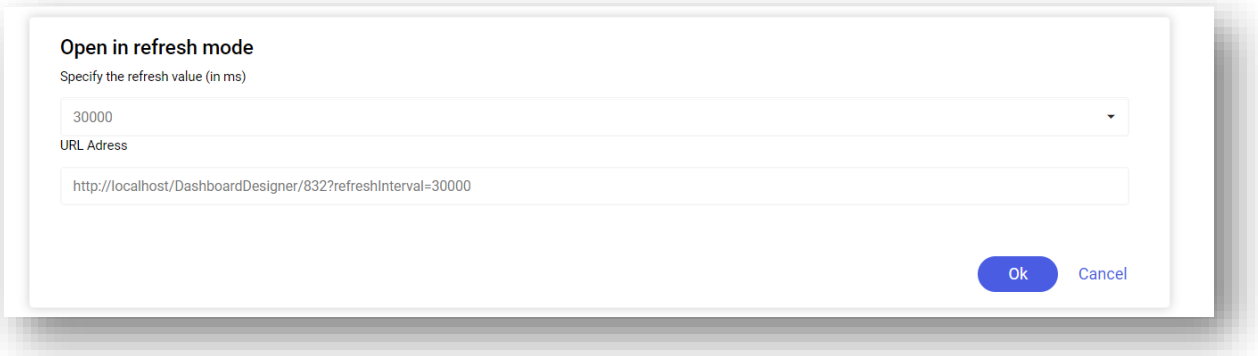


Figure 186 *Open in refresh mode*

You can also select a refresh value from the available list:

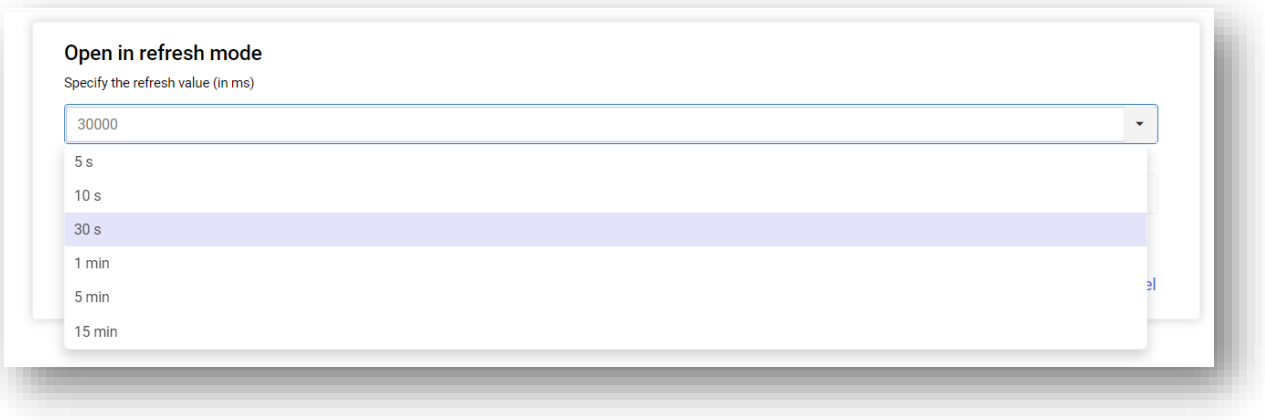
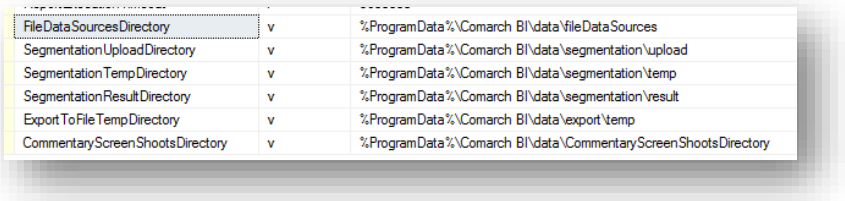


Figure 187 *Refresh mode parameters*

6.9 Temporary folders

In BI Point application, it is possible to change folders into temporary files by editing entries on META database in dbo.settings table.



FileDataSourcesDirectory	v	%ProgramData%\Comarch BI\data\fileDataSources
SegmentationUploadDirectory	v	%ProgramData%\Comarch BI\data\segmentation\upload
SegmentationTempDirectory	v	%ProgramData%\Comarch BI\data\segmentation\temp
SegmentationResultDirectory	v	%ProgramData%\Comarch BI\data\segmentation\result
ExportToFileTempDirectory	v	%ProgramData%\Comarch BI\data\export\temp
CommentaryScreenShootsDirectory	v	%ProgramData%\Comarch BI\data\CommentaryScreenShootsDirectory

Figure 188 Temporary folder location

Subsequent fields are indicated by the specified paths:

FileDataSourcesDirectory – specifies the path to a folder, where the copies of files used to file connections will be stored.

SegmentationUploadDirectory – specifies the path to a folder to which CSV files, that were used to define a micro segment, will be uploaded.

SegmentationTempDirectory – specifies the path to a folder, in which the temporary files, used by the segmentation engine to calculate the process result, will be stored.

SegmentationResultDirectory – specifies the path to a folder in which the output files of the segmentation process will be stored.

ExportToFileTempDirectory – specifies the path to a folder in which a temporary file, that is created during export, is stored.

CommentaryScreenShootsDirectory – specifies the path to a folder in which the screenshots used in comments will be stored.

6.10 Repository object translations

BI Point application provides a mechanism for translating objects into other languages. It is possible to add a translation to the application objects in a selected language.

6.10.1 Managing translations when defining a new column name

When creating a new custom name for a given dimension element, it is possible to add a translation for the selected element.

Below is an example that is based on the *Area* dimension containing such elements as: central, southern, northern, eastern, and western.

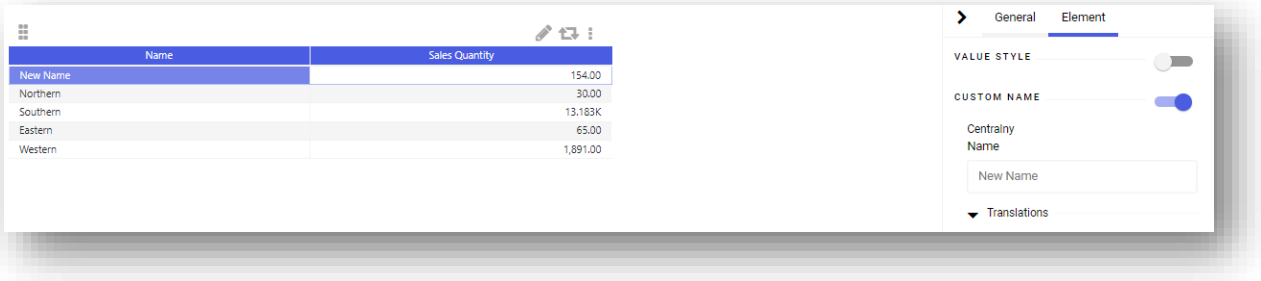
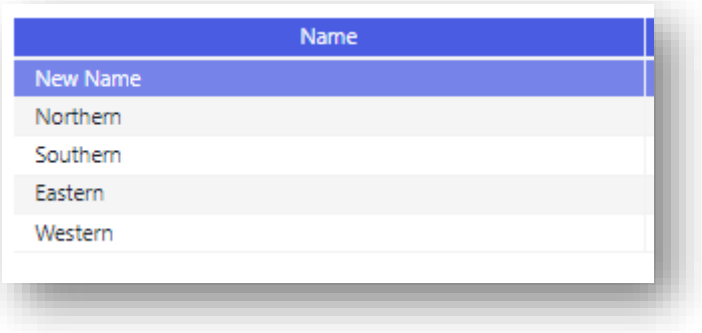


Figure 189 Adding a custom name

After defining a new custom name, the renamed element will replace the previous name:



Moreover, in the workspace on the right, dedicated to this element, an English translation of the new element name has been added:

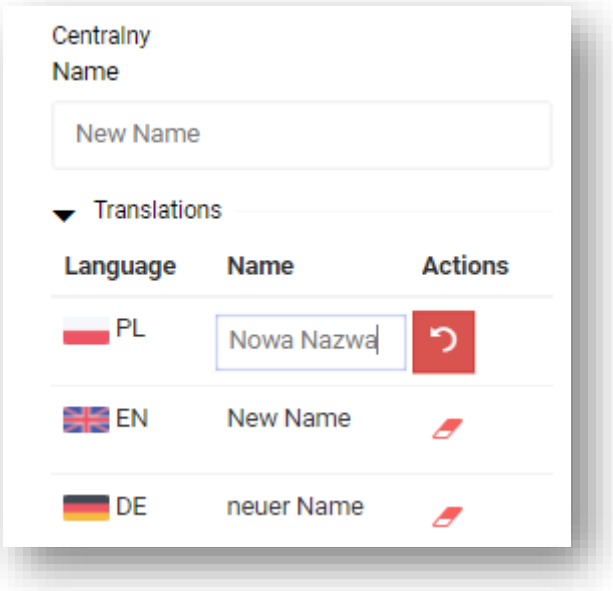


Figure 190 Custom name translations

After switching the application language in the *Profile* tab, the new name defined for the given element will be presented in the selected language by a given value.

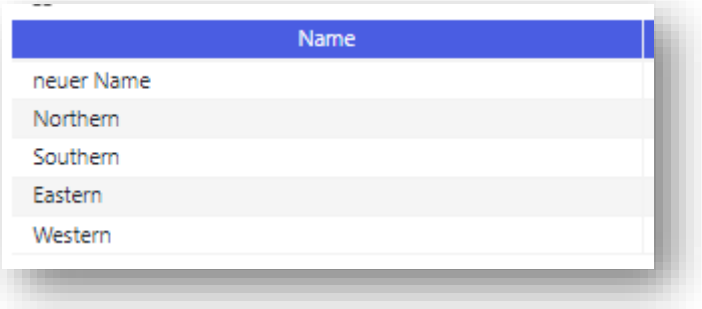


Figure 191 Custom name translations

6.10.2 Adding translations when creating a custom measure

When creating a custom measure, it is possible to add a translation in a selected language. A translation is added by completing the *Name* field with a relevant translation.

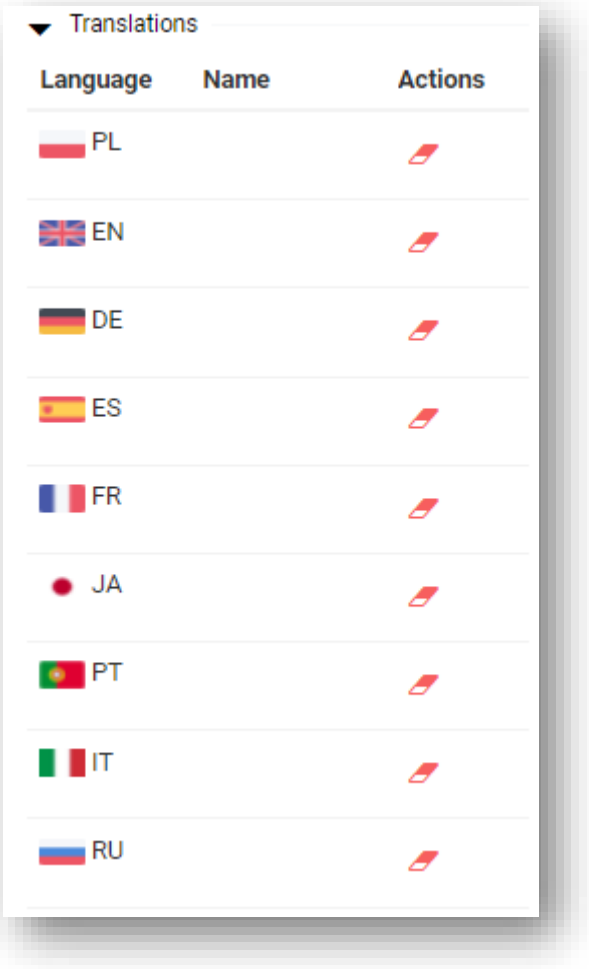


Figure 192 Adding custom name translations

7 Multisourcing

The option of multisourcing was developed for the purpose of creating analyses on the basis of a greater number of data sources. The multisourcing option makes possible to prepare a data model from various sources, such as SQL, CSV/EXCEL, OLAP, BIGDATA, ODBC, but it can also be used to combine data from several sources so that a model with information provided from several places could finally enhance the reporting perspective.

Multisourcing is mainly applied in units having a multi-company structure, where particular companies are related with one another. No additional work is needed and none external analyses are required in order to consolidate the data concerning various entities.

Multisourcing makes it possible to easily create pooled analyses of data from different areas, for instance, from the sales area of several entities, as well as to create analyses for each entity separately.

Below is a scheme of the described multisourcing:

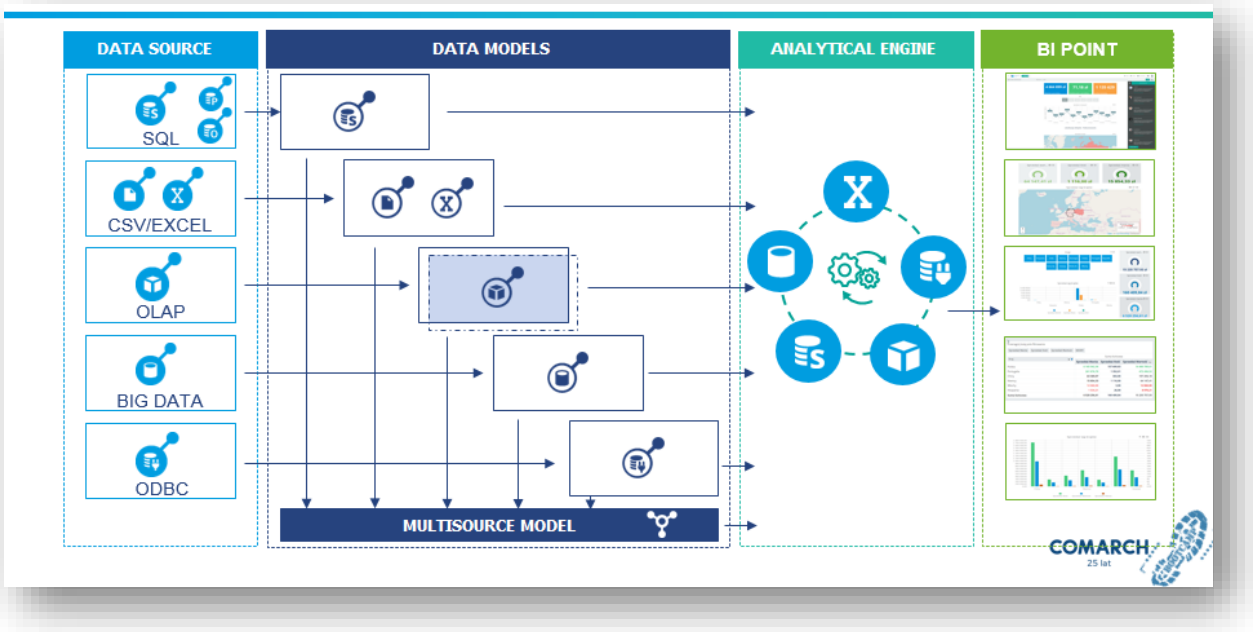


Figure 193 Multisourcing

7.1 Connections

BI Point makes possible to prepare connections to data on the basis of various data sources.

In order to create a new connection in BI Point, in the repository select a folder *Connections* and then the button [**Create**]. A list of connection types possible to create will then open:

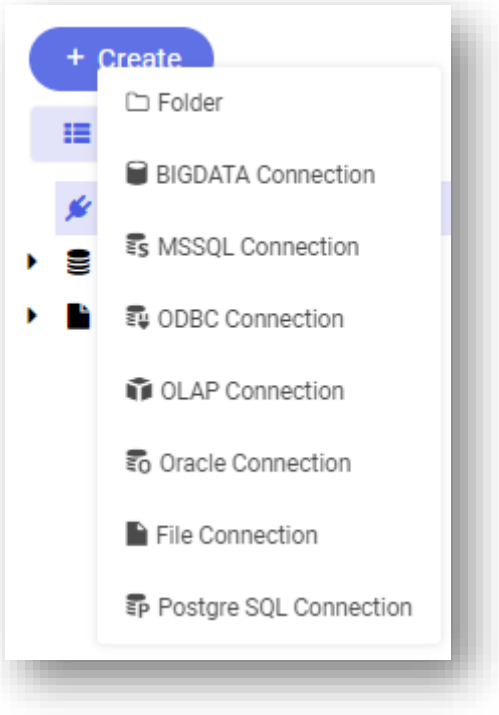


Figure 194 Connection types to multisourcing

In the repository, it is possible to add and edit a connection definition. In the connection definition, it is possible to save the connection or rename it. There is also a repository path provided, which navigates to an appropriate folder. In the repository, it is possible to transfer a connection, rename or copy it. A connection can be defined in a data model, edited and added to the connection repository. It is also possible to change a connection for a data model and if this being the case, a relevant message is the displayed, which informs that the entire model definition has been cleared.

7.1.1 PostgreSQL

In order to create a PostgreSQL connection, from the list of available connections, select PostgreSQL and then complete the following fields:

5 Connection Name – any name provided by a user

6 Description – not mandatory field

7 Name or IP of PostgreSQL sever name

8 Port which is by default set to 5432

9 Login and password of SQL user

10 After the server data is properly completed, a list of databases available on that server will appear in the *Database* field, one of which must be selected.

The last two parameters are connected with connection timeout and query execution timeout. Normally, they are set to 5 and 600 seconds. It means that a standard connection can take 5 seconds, whereas a query can take up to 600 seconds. A user can decide whether to change these values.

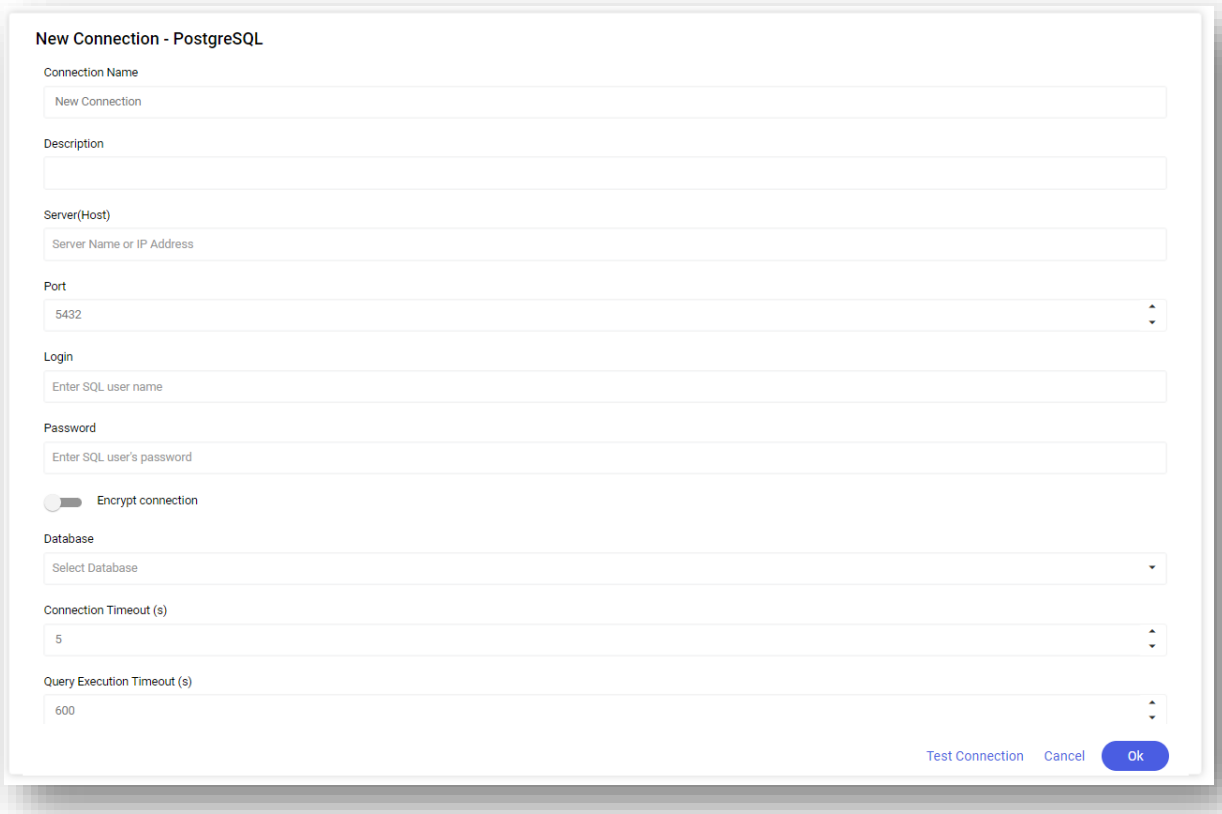


Figure 195 PostgreSQL connection wizard

To check whether the connection is properly established, select *Test Connection*. If it is created correctly, a message below will then appear:

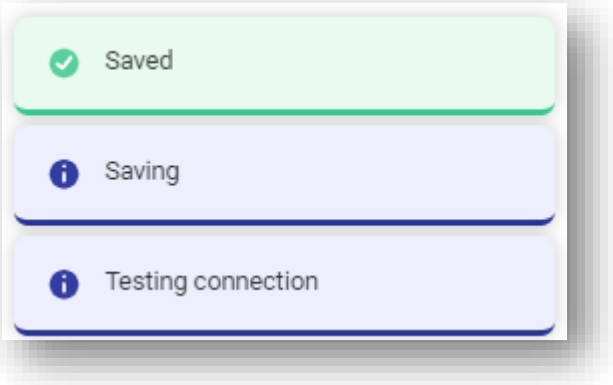


Figure 196 Message about a properly created connection

After the connection is saved, a data model to create will be suggested:

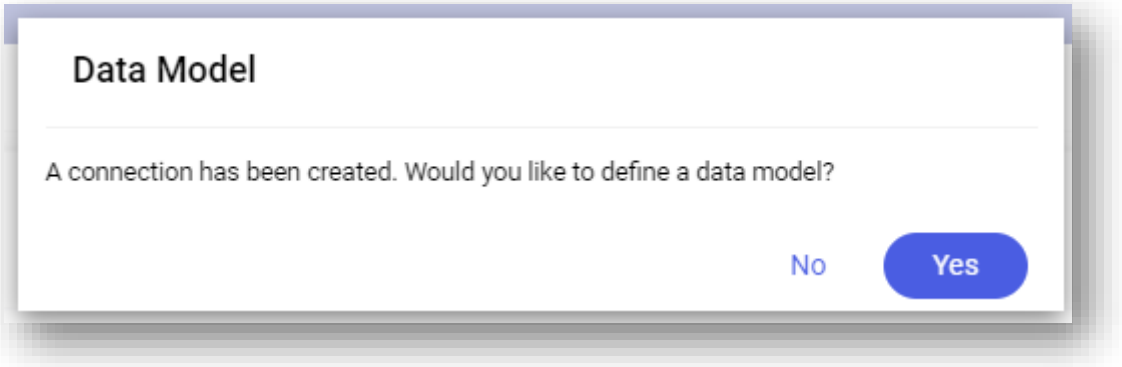


Figure 197 Suggestion to create a data model

7.1.2 Oracle

When creating an Oracle connection, it is necessary to provide the following:

11 Connection Name – any name provided by a user

12 Description – not mandatory field

13 Sever name

14 Port 1521 is set as a default port

15 Login and password of SQL user

SID Service – a SID identifier must be typed manually. It is used to distinguish Oracle instances supporting a database and stored on the selected machine. This identifier is available in each released version of Oracle. To create an Oracle connection, it is necessary to use SID naming when configuring a detector for the database.

16 The last two parameters are connected with connection timeout and query execution timeout. Normally, they are set to 5 and 600 seconds, but these values can be changed by the user.

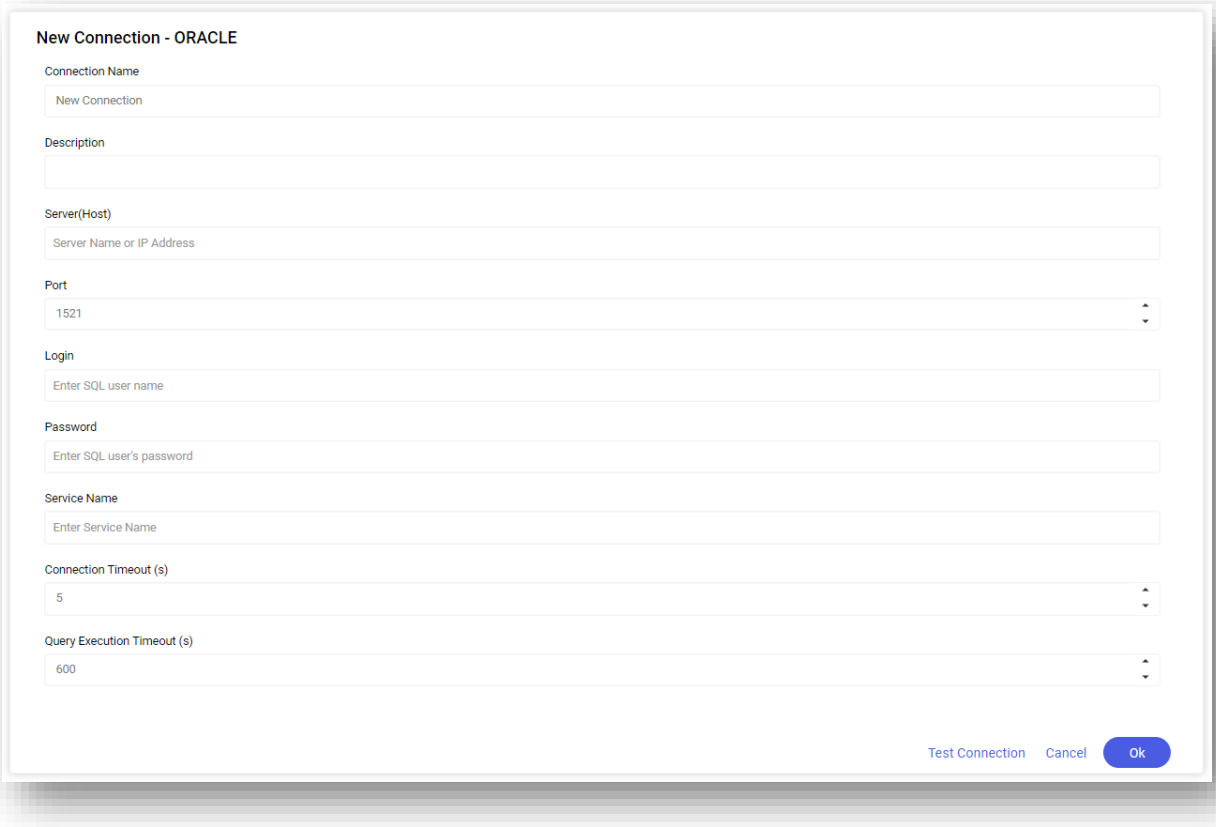


Figure 198 Oracle connection wizard

Note: As of 11.2 release semicolons will no longer be removed automatically from Oracle models, because they must be used in queries that use, inter alia, cursors.

7.1.3 OLAP

When creating an OLAP connection, it is necessary to provide the following:

17 Connection Name – any name provided by a user

18 Description – not mandatory field

19 Sever name

20 Database name

21 The last two parameters are connected with connection timeout and query execution timeout. Normally, they are set to 5 and 600 seconds, but these values can be changed by the user

The step of selecting a connection port is omitted in this type of connection.

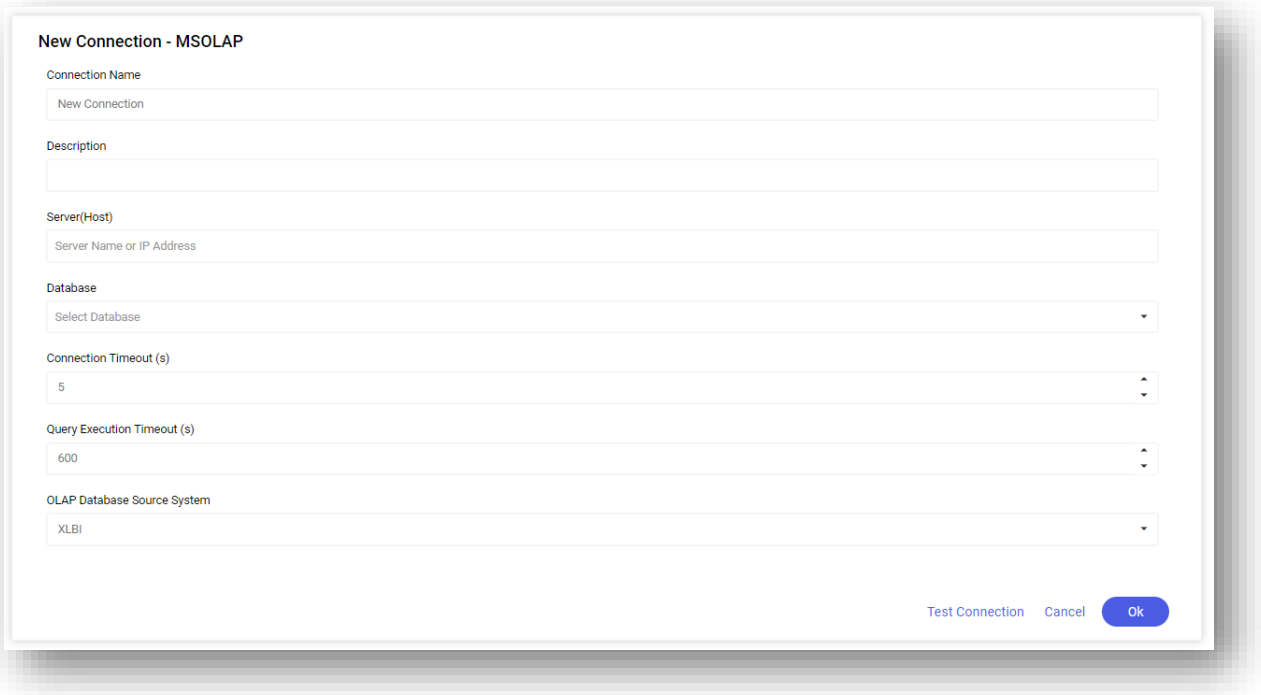


Figure 199 OLAP connection wizard

7.1.4 MSSQL

When creating a MSSQL connection, the following needs to be provide:

22 connection name – any name provided by a user
23 description – not mandatory field
24 *Windows credentials* switch used to change a credential type from SQL to domain
25 sever name
26 port which is by default set to 1433
27 user login and password
28 database name
29 the last two parameters are connected with connection timeout and query execution timeout. Normally, they are set to 5 and 600 seconds, but these values can be changed by the user

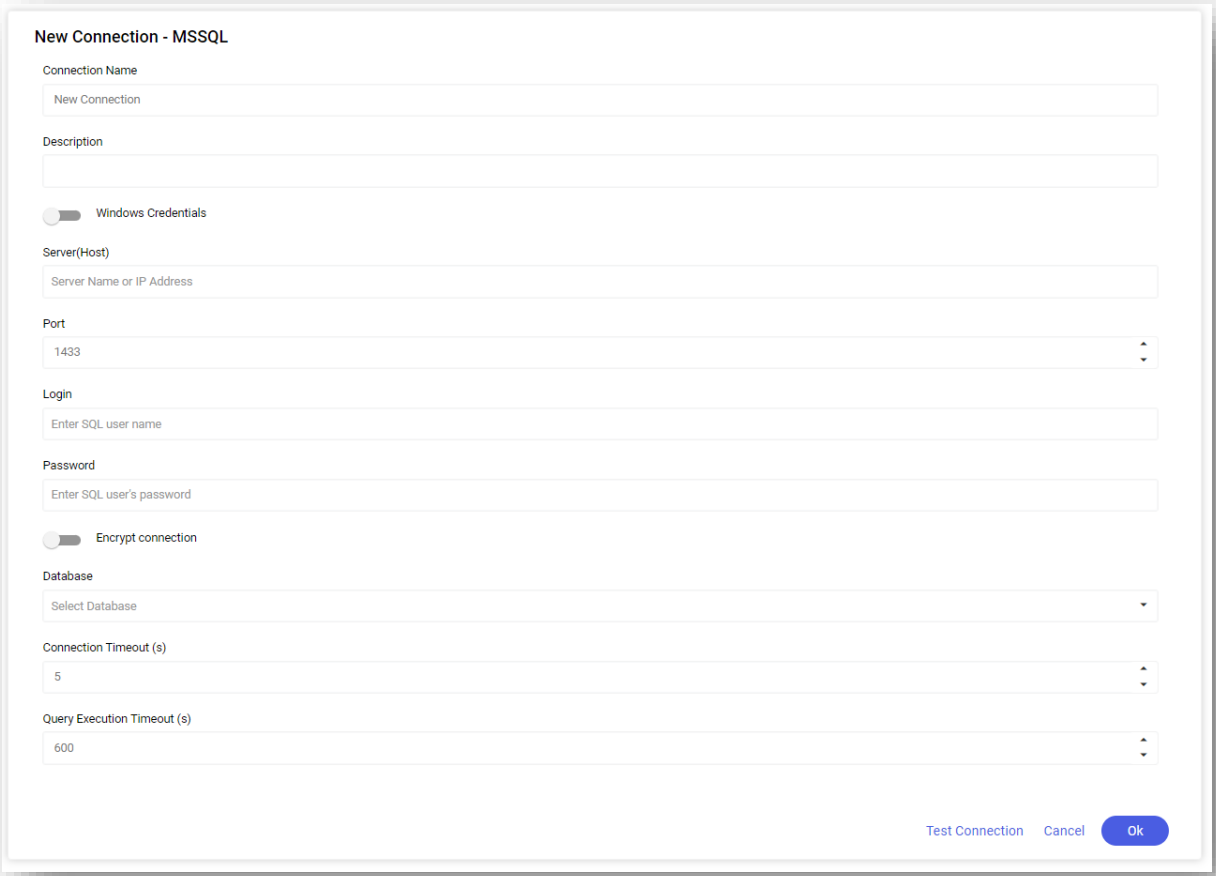


Figure 200 MSSQL connection wizard

Note: Aliases for MSSQL are not supported in the application running version .NET Core (as of version 10.0).

7.1.5 BigData and ODBC

When creating an ODBC and BigData connection, the only thing you need to do is to select a connection name and ODBC name. This is the name of ODBC connection defined on the computer with the engine.

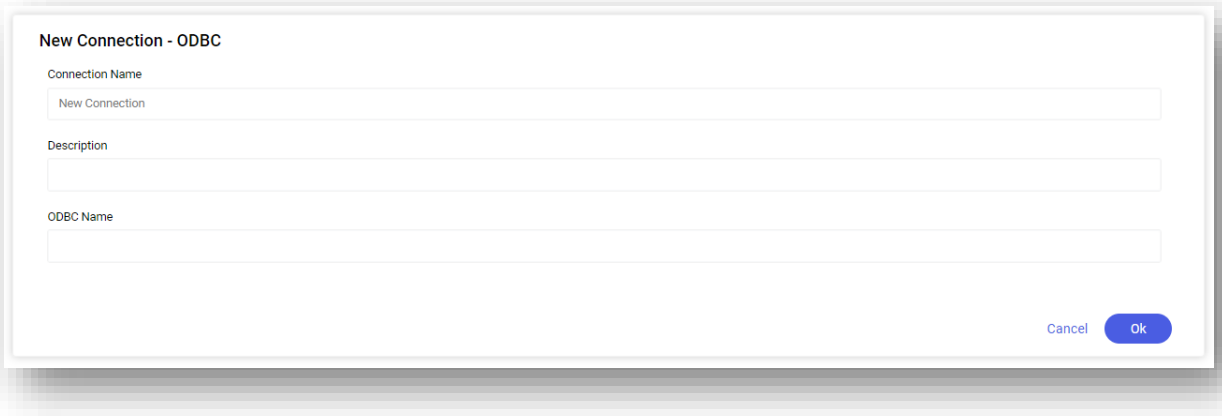


Figure 201 ODBC connection wizard

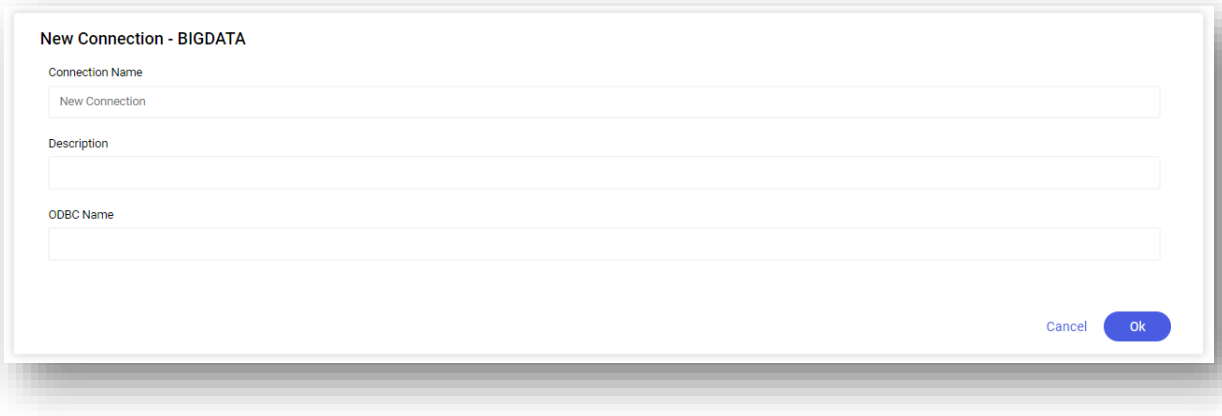


Figure 202 BigData connection wizard – ODBC

7.1.6 File connections

BI Point makes possible to create connections on the basis of files, such as csv or xls (Excel).

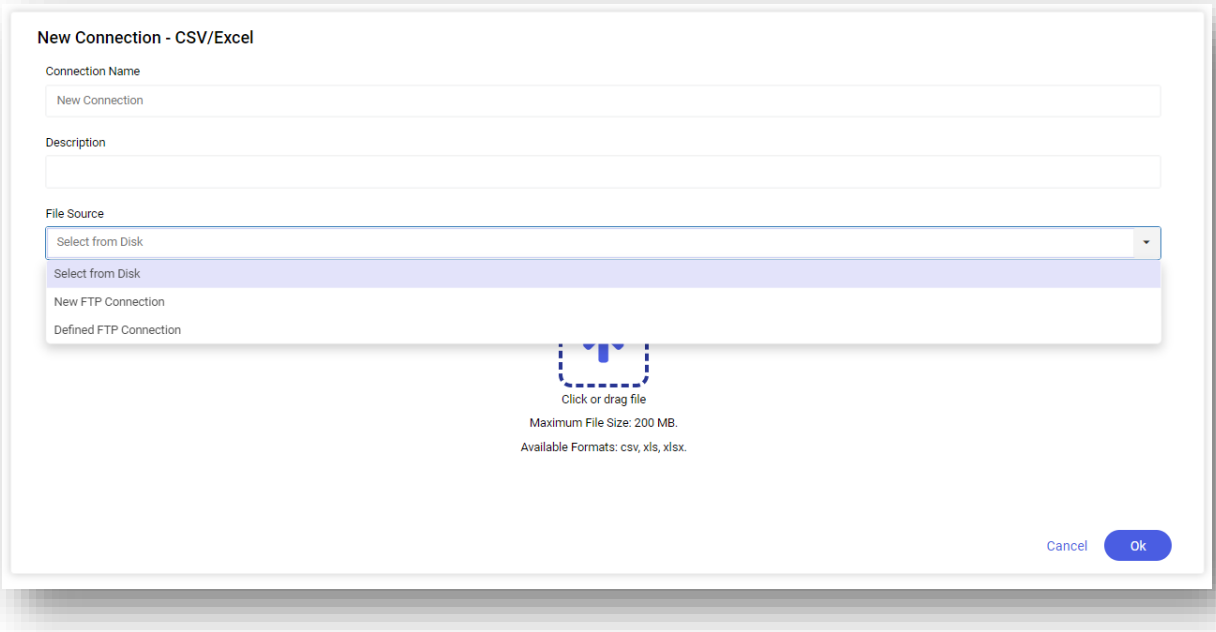


Figure 203 File connections

A file source can be downloaded from

- disk
- FTP connection

7.1.6.1 Selecting a file source from disk

In this type of connection, it is necessary to provide:

- connection name
- description – not mandatory field
- and to select a file from disk by clicking in the field at the bottom of the window or by dragging the file into the selected field.

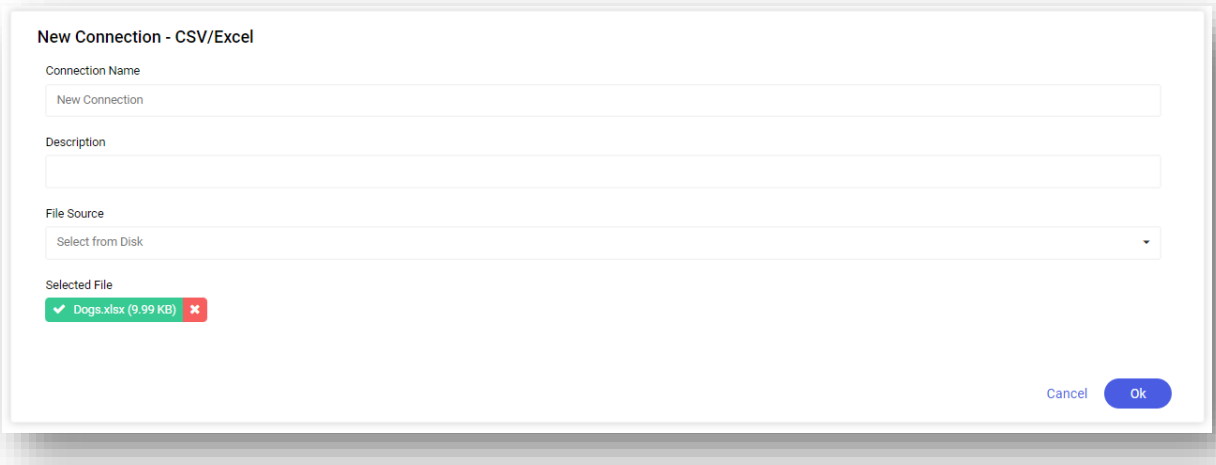


Figure 204 File connection wizard from disk

7.1.6.2 Defined FTP connection

When configuring defined FTP connections, it is necessary to provide:

- connection name
- description – not mandatory field
- file source that is a defined FTP connection selected from a drop-down list
- FTP connection selected from a drop-down list, that is defined in the Administrator Dashboard
- *Address*, *Login* and *Password* fields are used only for preview

At the bottom of the window, there is a switch *Always select the most recent file in selected location*:

- If the switch **is not activated**, a user should connect to FTP server using the button *Connect* and then selecting a file (with .csv, .xls or .xlsx extension
- If the switch **is activated**, a user should connect to FTP server using the button *Connect* and then select a folder. In the field above, it is necessary to select a name format, which is a regular expression determining the file name along with a file extension. Owing to this, when creating a connection in modelling or reporting, the latest file adjusted to the specified name format is downloaded from the folder.

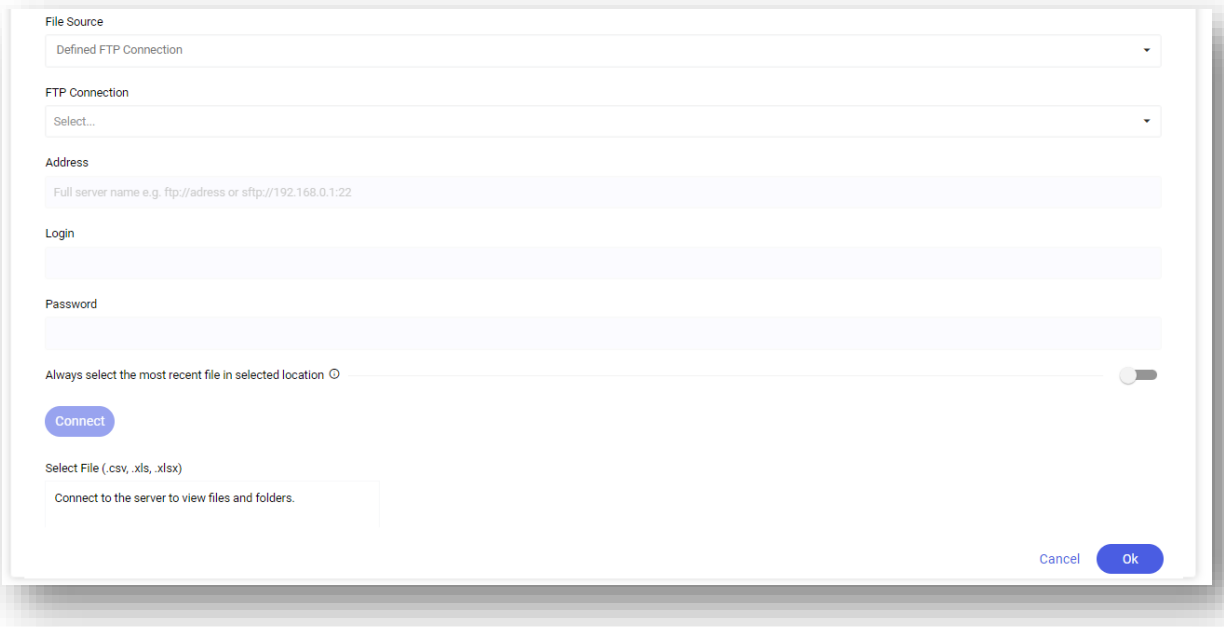


Figure 205 Defined FTP connection wizard

For instance, there are two files in the folder:

- FORECAST2009_AAA.csv (older)
- FORECAST2009_BBB.csv (newer)

A user can type the name format as "^FORECAST2009.*$" and the file *FORECAST2009_BBB.csv* will be selected.

If the files in the folder were the following:

- FORECAST2009_AAA.csv (older)
- FORECAST2009_BBB.csv (newer)

and if we wanted to use an .xls file, then the name format "^FORECAST2009.*$" will not select a relevant file, because it ignores the file extensions. A name format to be used would have to be: "^FORECAST2009.xls$".

7.1.6.3 New FTP connection

When creating a new FTP connection, it is necessary to provide: connection name, file source, FTP connection name, address, login and password. Regular expressions are types in a similar way as expressions provided when defining a FTP connection.

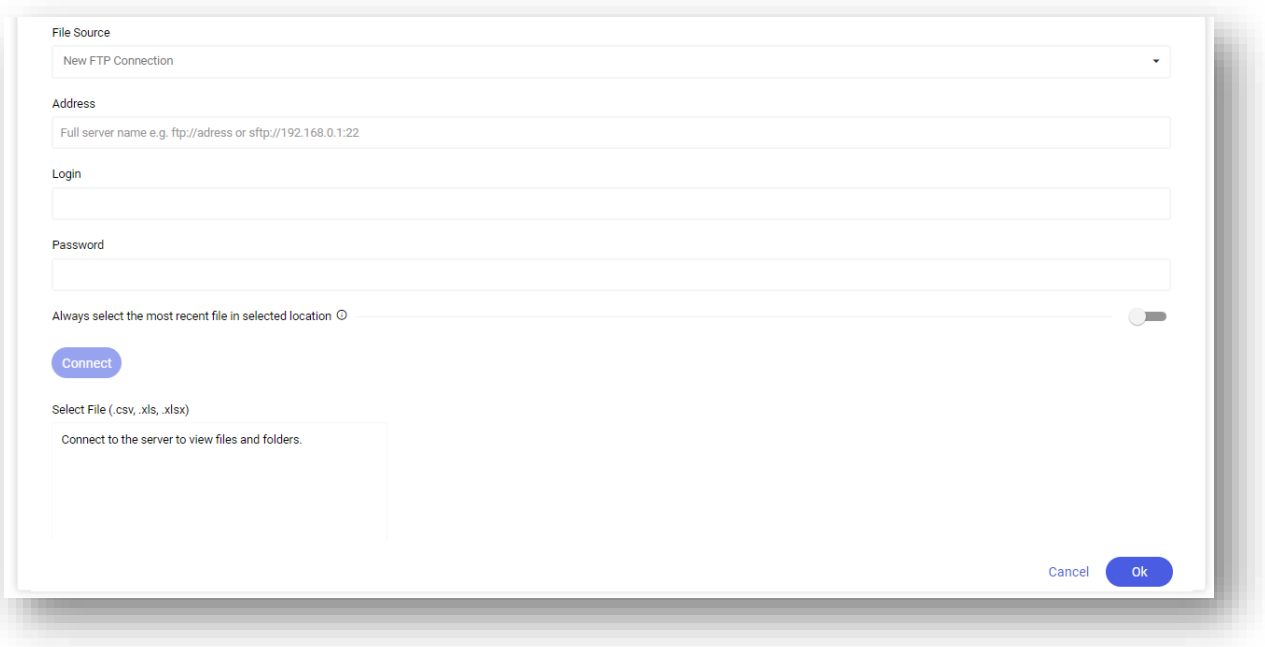


Figure 206 New FTP connection

7.2 Data models

Data models can be single-source or multisource models.

A model that is created on the basis of either of the mentioned connection is called a single-source model, whereas the one built on a combination of models is a multisource model.

From the level of the repository, it is possible to add and edit data models.

A multisource model can be composed of:

- a file model, both a local file (either Excel or CSV file) and FTP
- SQL model based on the connection of Postgre, MSSQL or ORACLE type
- a simplified model of OLAP type
- a multisource model composed **only and exclusively** of simple models, that is the ones mentioned above

A multisource model **cannot** be composed of:

- a model of full OLAP type
- a SQL model based on ODBC connection
- a multisource model containing another multisource model

7.2.1 Single-source model definition

In order to create a single-source data model, go to the repository, select *Data Models* in the panel on the left and finally select the button [**Create** – **Data Model**].

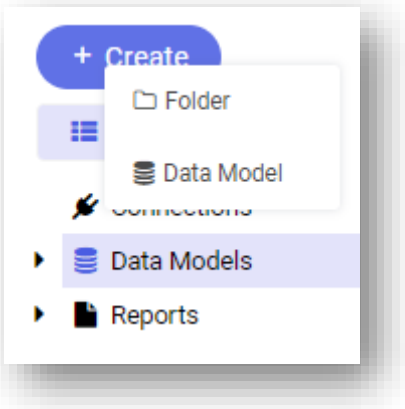


Figure 207 *Create Data Model* option

A data model wizard will open, that is composed of the following tabs: *Connections*, *Query*, *Headers*, *Refreshing*, *Permissions*, *Save*. When defining a model, proceed to the following steps by selecting [**Next**] or by navigating to the wizard tabs.

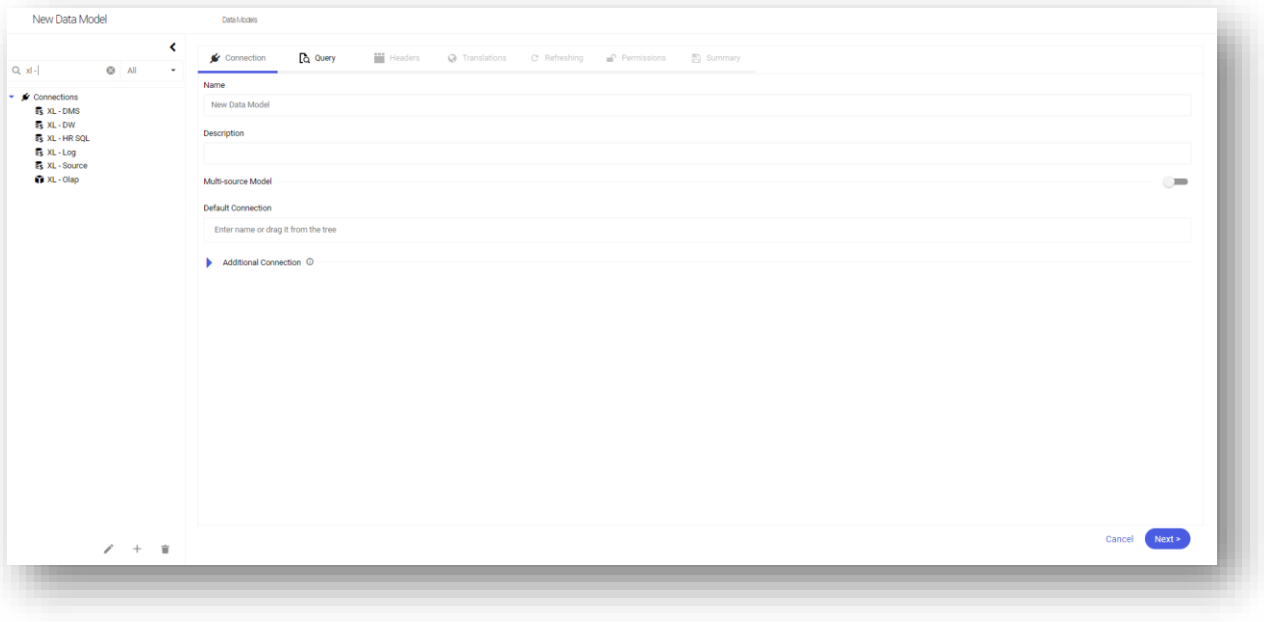


Figure 208 Model addition – data model wizard window

On the left side of the wizard, there is a panel with connection tree presenting all types of connections a user is entitled to.

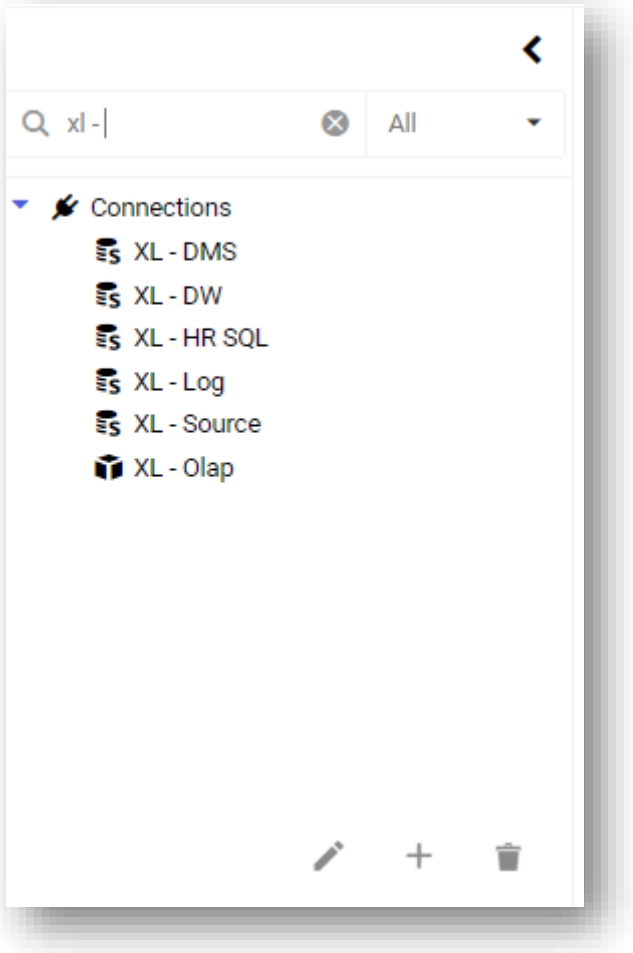


Figure 209 Model addition – left panel wit connection tree

In that panel, there is a connection search engine. A user can limit the search results by typing a full or partial connection name into the search field or by selecting it from the drop-down list:

- OLAP connection
- MSSQL connection
- ODBC connection
- ORACLE connection
- PostgreSQL connection
- BIGDATA connection
- CSV file connection
- Excel file connection

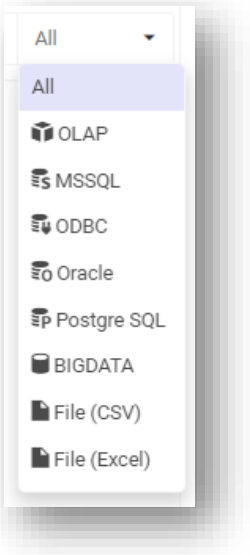


Figure 210 Model addition – list of connection types to filter the search results

A user can edit or delete a given focused connection using the following context options:

delete connection

edit connection

add connection – this option is available by hovering a mouse cursor over both a selected folder on the connection tree and a connection. A new connection will be created in the selected folder as a connection neighbor.

The wizard window is composed of 7 tabs. In most tabs, the way of defining and configuring particular elements of a model is the same for all model types.

Each specific configuration for a given model is distinguished in this chapter.

Particular model creation paths are presented in the table below:

MODEL TYPE	Connection tab	Query tab	Headers tab	Translations	Refresh	Permissions tab	Summary tab
SQL (MSSQL, ORACLE, POSTGRESQL)							
PARED OLAP							
FULL OLAP			–				
FILE (EXCEL)							
FILE (CSV)							

For BIG DATA and ODBC model, all model data is generated automatically.

7.2.1.1 Connection tab

This tab is composed of a left panel with a connection tree and a search engine as well as the main connection configuration tool, where the following must be provided:

- Name
- Description
- Default Connection – this connection is treated as default connection; a user has two options: to type a connection name or to drag a given connection from the connection tree.
- Additional Connection – in case of using a created data model, this connection will be treated as a subsequent connection available for selection.

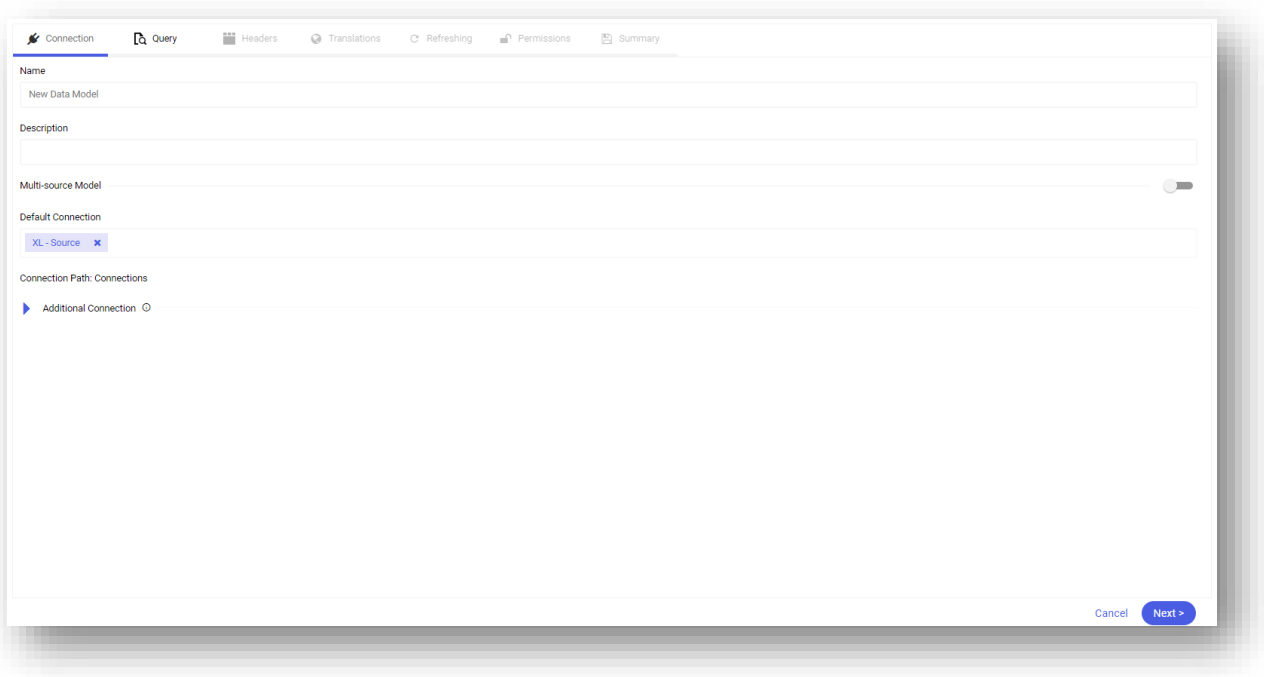


Figure 211 Connection

It is possible to create a data model on the basis of the default connection and to add additional connections to it.

Note: In the case of such created data model, it is possible to precisely indicate the connection to be used. When creating reports or dashboards based on such created data model, a window is opened, in which it is possible to select the parameter, that is the selected connection.

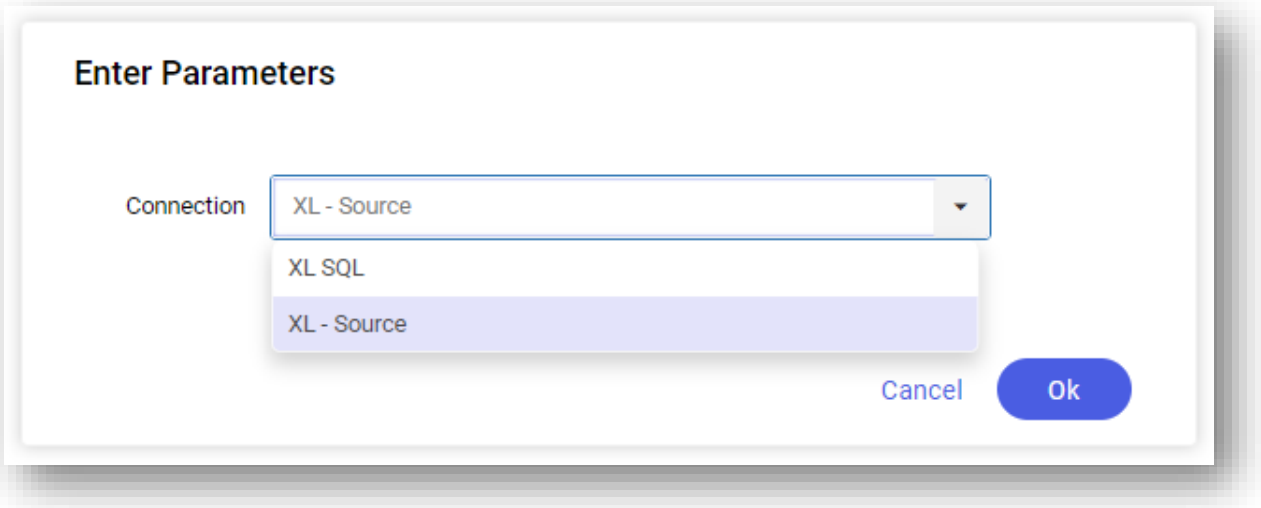
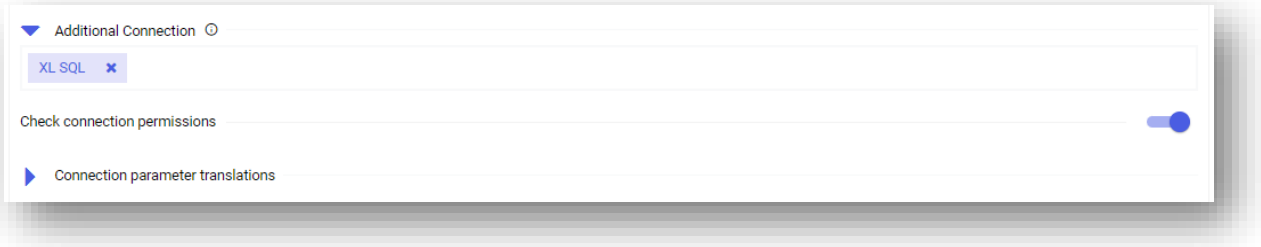


Figure 212 Selecting a connection

In case users have limited permissions to certain connections in a data model that is based on many connections, in order to block for them the option of selecting a connection to which they have limited access, select the switch *Check connection permissions*.



7.2.1.2 Query tab

This tab is composed of different fields for each type of data model. Thus, it has been described independently for each model.

Note: The length of the dragged column should not exceed 60 characters in queries.

7.2.1.2.1 SQL models: MSSQL, ORACLE, POSTGRESQL

In the case of SQL model, there are three types of connections available: MSSQL, Oracle or Postgres.

In tab *Query*, there is a panel on the left with a database scheme. From the level of that panel, it is possible to build a SQL query by drag elements into the query area.

This tab is divided into three sections: query pane, parameters and preview.

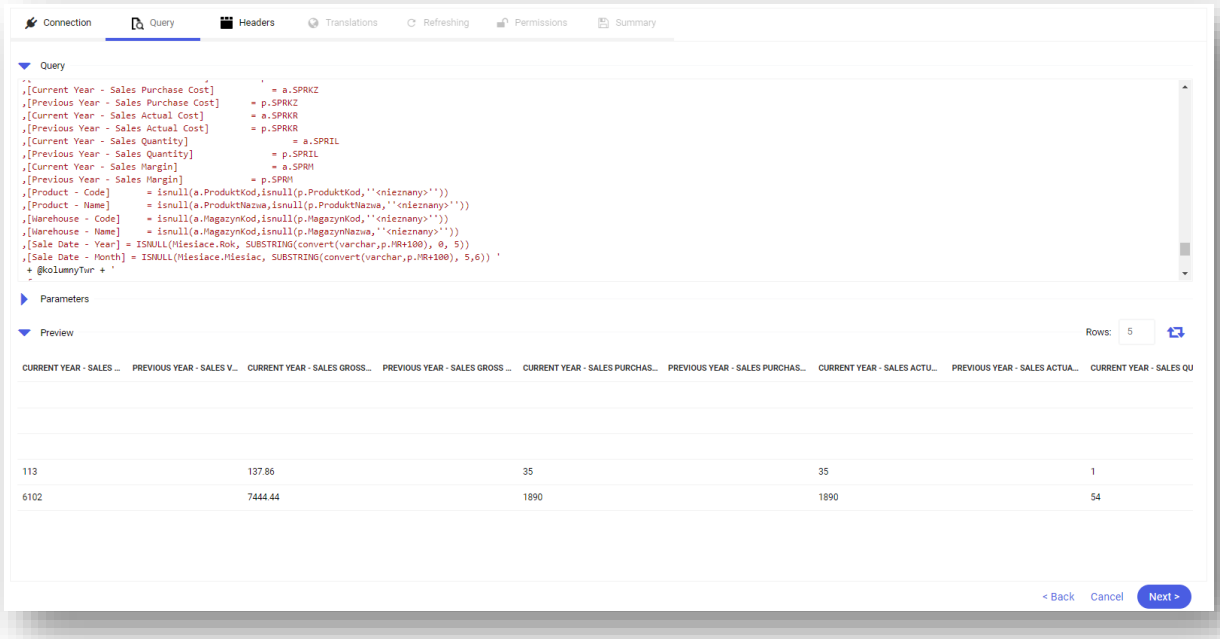


Figure 213 Tab *Query* of MSSQL model

In section *Parameters*, it is possible to:

- define new parameters
- edit parameters
- delete previously defined query parameters

Figure 214 Parameter edition window

When defining a new parameter, the following must be provided:

- name
- description
- type from a drop-down list

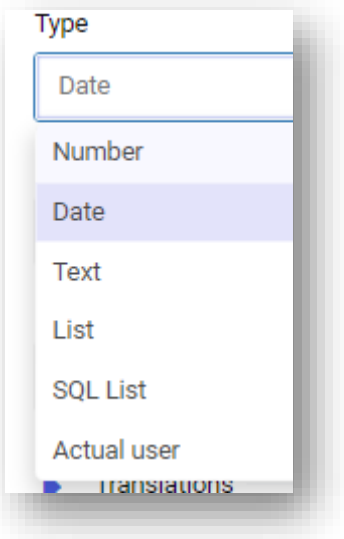


Figure 215 List of parameter types

In the parameter of *Text* type, it is also possible to specify the maximum text length and change the letter size using the switch *Change To Uppercase Letters*. Option *Allow null value* (available also for parameters of *Date* and *Number* type) is used to enter an empty value when opening a data model-based object. This option displays all data from a database.

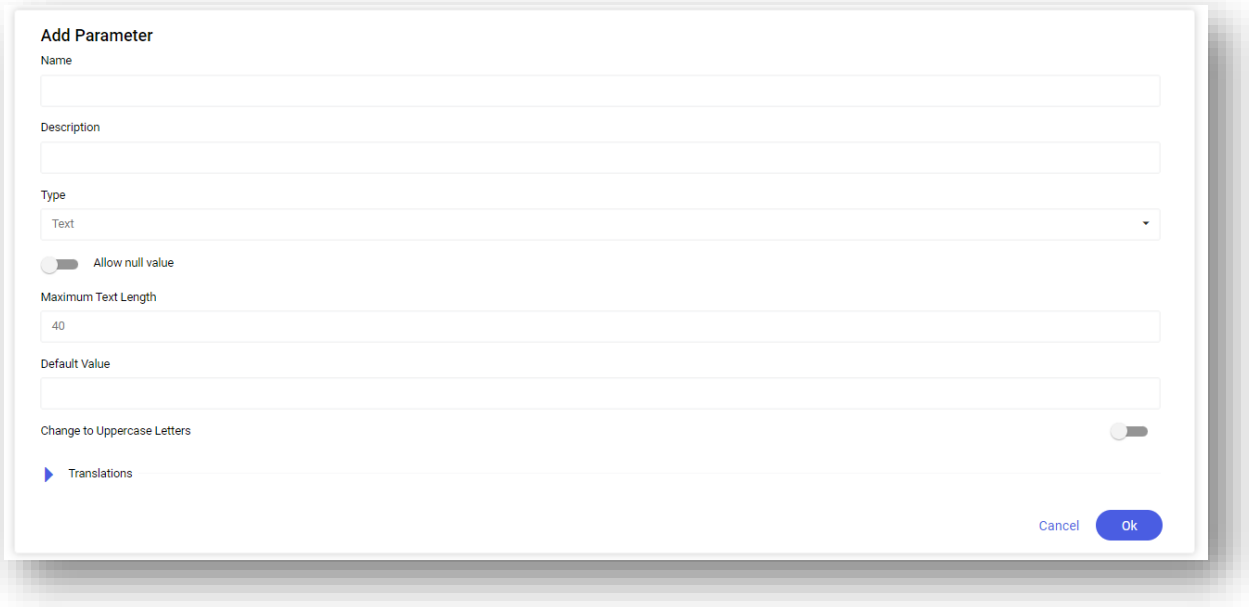


Figure 216 Text parameter edition window

The parameter of *Actual user* type is used to create a model that will block sensitive data from accessing it by other users of the same model. In the edition window of this parameter, you can also specify how to verify the users.

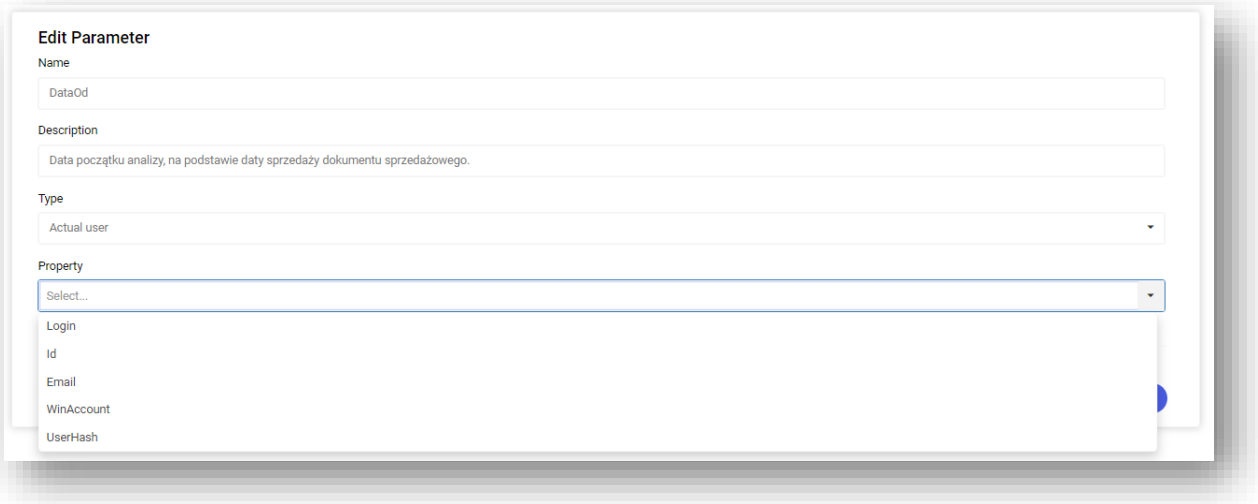


Figure 217 Current user's parameter

Note: In the parameters of *List* and *SQL List* type it is possible to select multiple elements at the same time and to select in a query how to generate a list of selected dimension elements.

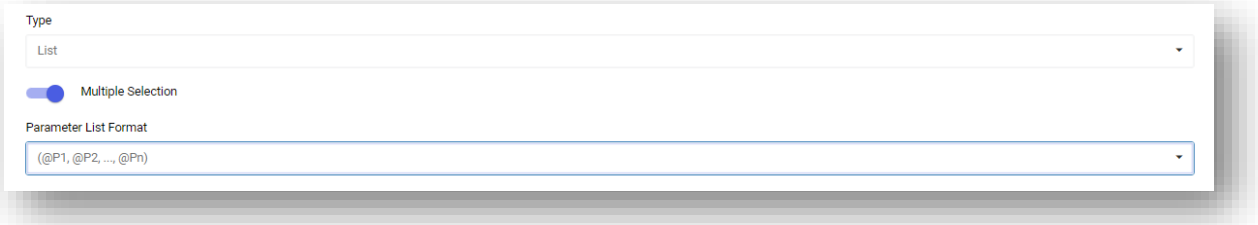


Figure 218 Multiple Selection

Note: When creating a parameter of *SQL List* type, the application displays a sample query. The query of a postres model contains the parameters: *Pattern*, *Take* and *Skip*.

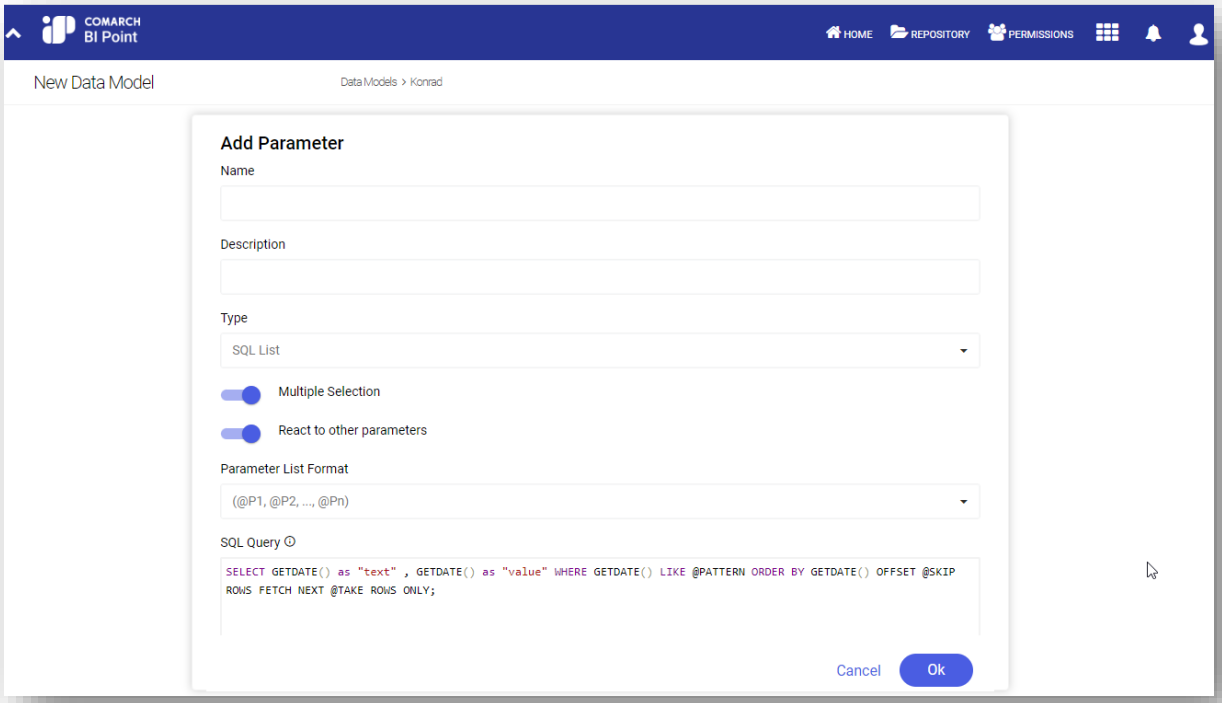
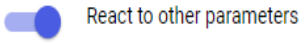


Figure 219 React to other parameters

From now after selecting the appropriate "check" from the parameter edition level 

- SQL list type parameter may contain other parameters defined in the data model in the query (excluding other parameters of the sql list type and date parameters of the sql query type). This parameter will dynamically refresh the values on the parameter selection tab when other parameters are changed.

For example:

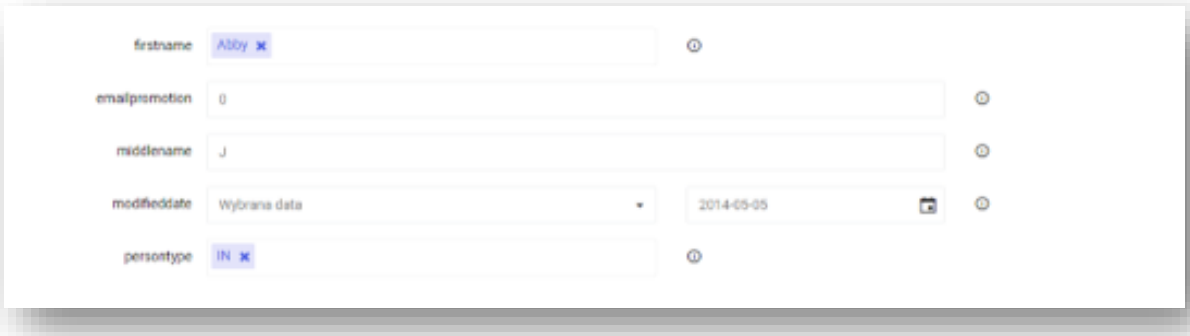


Figure 220 React to other parameters – example 1

After changing the value of the "persontype" parameter:

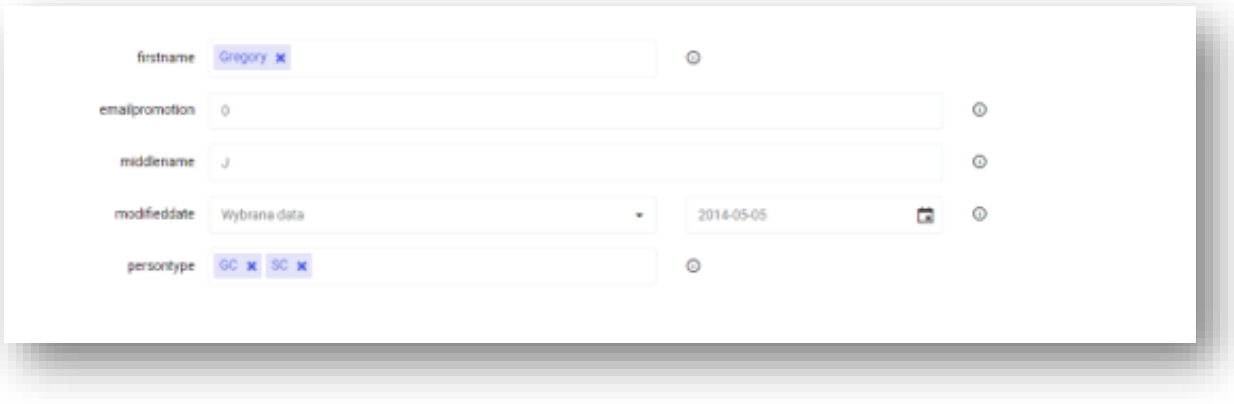


Figure 221 React to other parameters – example 2

On the above screenshot, a change to the "persontype" parameter forced a change to the "firstname" parameter due to the condition that was specified in the query.

Once the parameters are defined, the effect of the query can be previewed by clicking on the preview load icon  . A window for determining parameters will then open:

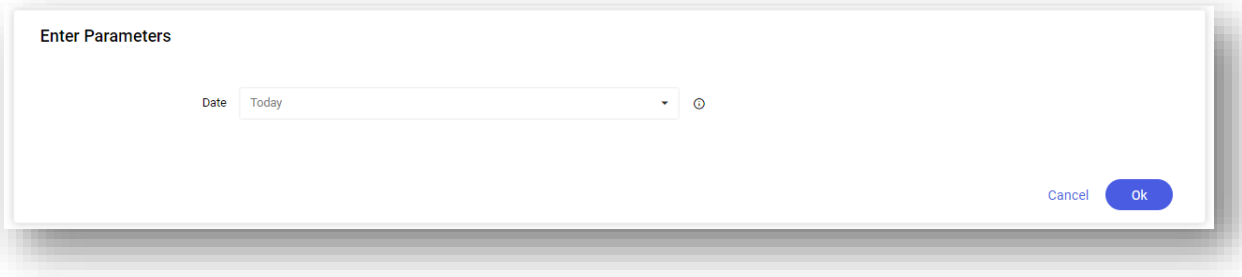


Figure 222 Defining parameters

After the selected parameters are confirmed, data resulting from the query will appear in the preview field.

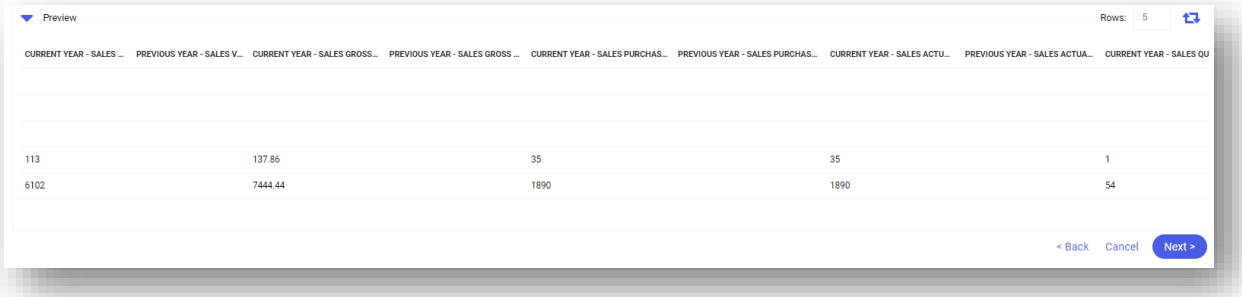


Figure 223 Preview of the used parameters

Note: As of Comarch BI Point 12.2 release, a parameter mapping is required for data model of ORACLE type. For instance, if you have the two parameters defined **":Date from"** and **":Date to"**, you need to add **"to date(:Date from)"** and **"to date(:Date to)"** mappings – these mappings are required in places where date is converted to string type (**"to char()"** function).

7.2.1.2.2 Pared OLAP model

In the case of a pared down OLAP, in tab *Query* it is necessary to type the credentials (user authentication by providing account name and password) to establish connection with OLAP and then to select an analytical area from the list.

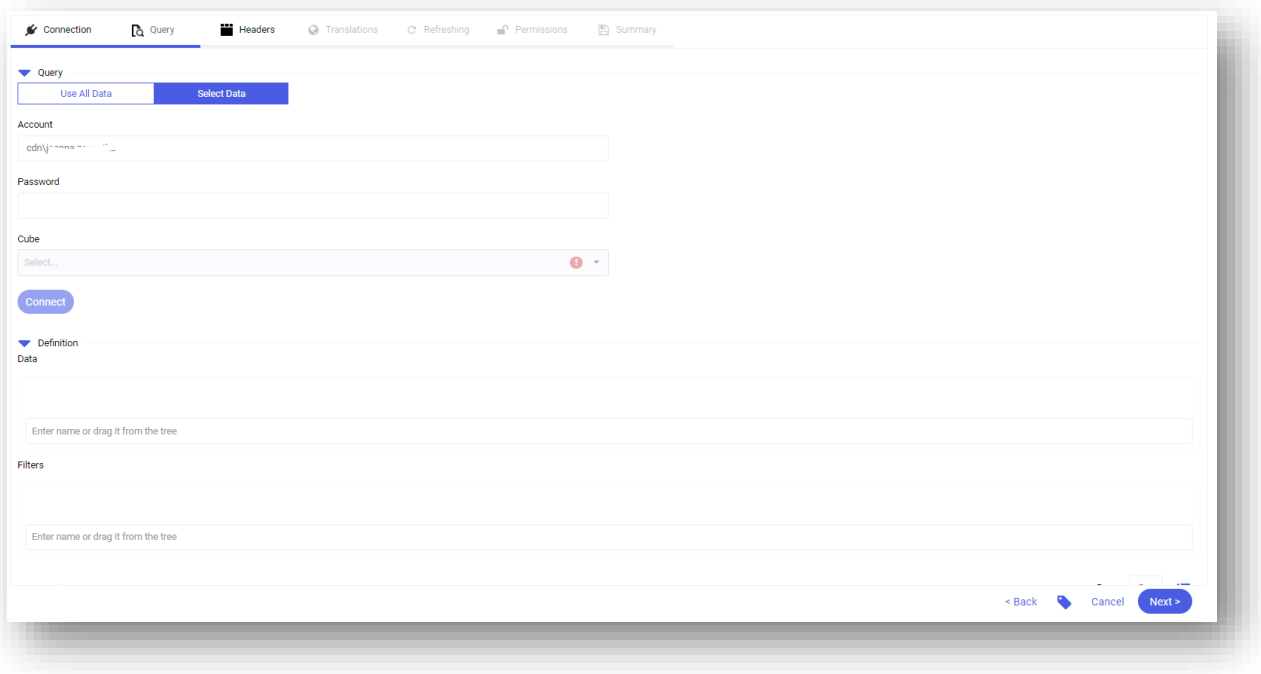


Figure 224 Selecting an analytical area

Upon selecting the button Connect, data from the selected cube will be retrieved and available measures and dimensions will appear in the panel on the left.

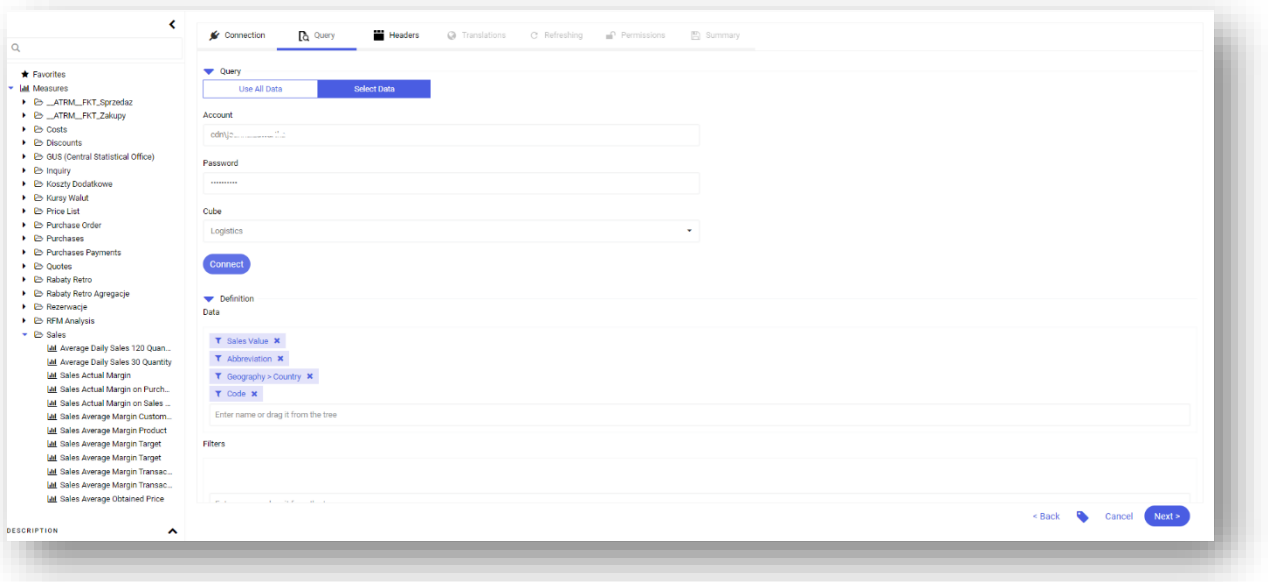


Figure 225 Query – left panel

In a pared OLAP definition, a user decides which measures and dimensions must be used in the model. They are selected by typing the name of a dimension or a measure or by dragging the selected elements from the tree into the field *Data*.

It is also possible to define filters.

Filters can be specified in a dimension by navigating to the list of values of a given dimension  . The second method is to drag a given dimension from the left panel to the *Filters* field.

It is not possible to defined here the top values (e.g. top 10).

Using the button [**Display Detailed Names**]  it is possible to change the displayed names of measures and dimensions. There are three types of name display format: *Short Name*, *Detailed Name* and *Technical Name*.

7.2.1.2.3 Full OLAP model

In the case of full OLAP model, it is necessary to choose *Use All Data* and then select an analytical cube. All dimensions and measures from the selected cube will become available.

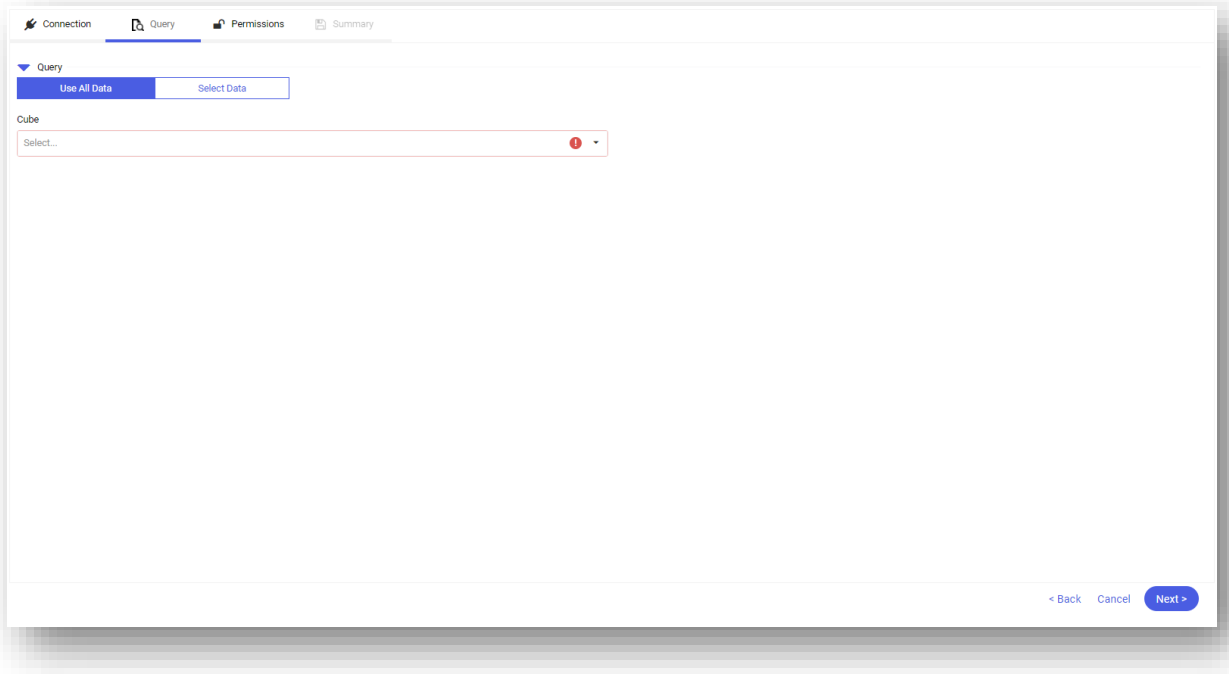


Figure 226 Query – *Use All Data* option

7.2.1.2.4 EXCEL file model

In tab *Query* in the case of an Excel file model, first it is necessary to select a sheet from which data must be loaded.

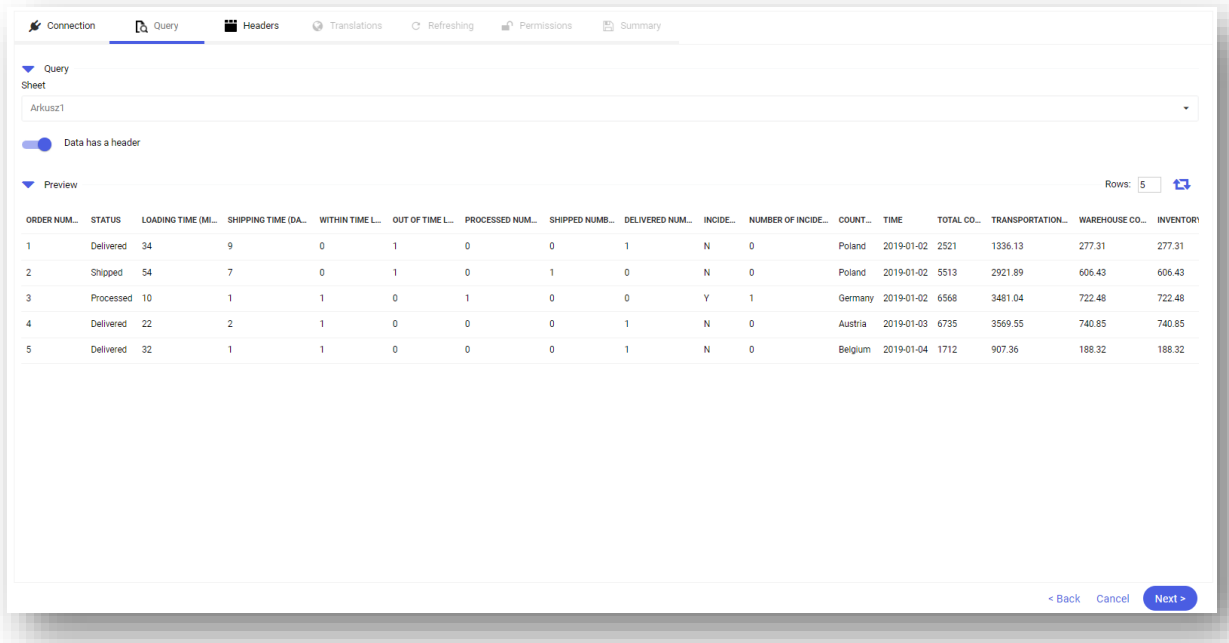
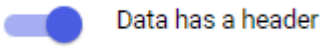


Figure 227 Tab *Query* in the case of EXCEL file model

Switch *Data has a header* 

:

- if **activated**, the first record from the source is presented in the column headers
- if **deactivated**, a column name [column number] is presented in the column headers

The loaded data can be previewed as the last step.

7.2.1.2.5 CSV file model

In tab *Query* in the case of an CSV file model, it is necessary to select an encoding value. Encoding is set by default to UTF-8, but this can be changed by selecting a different value available from the list.

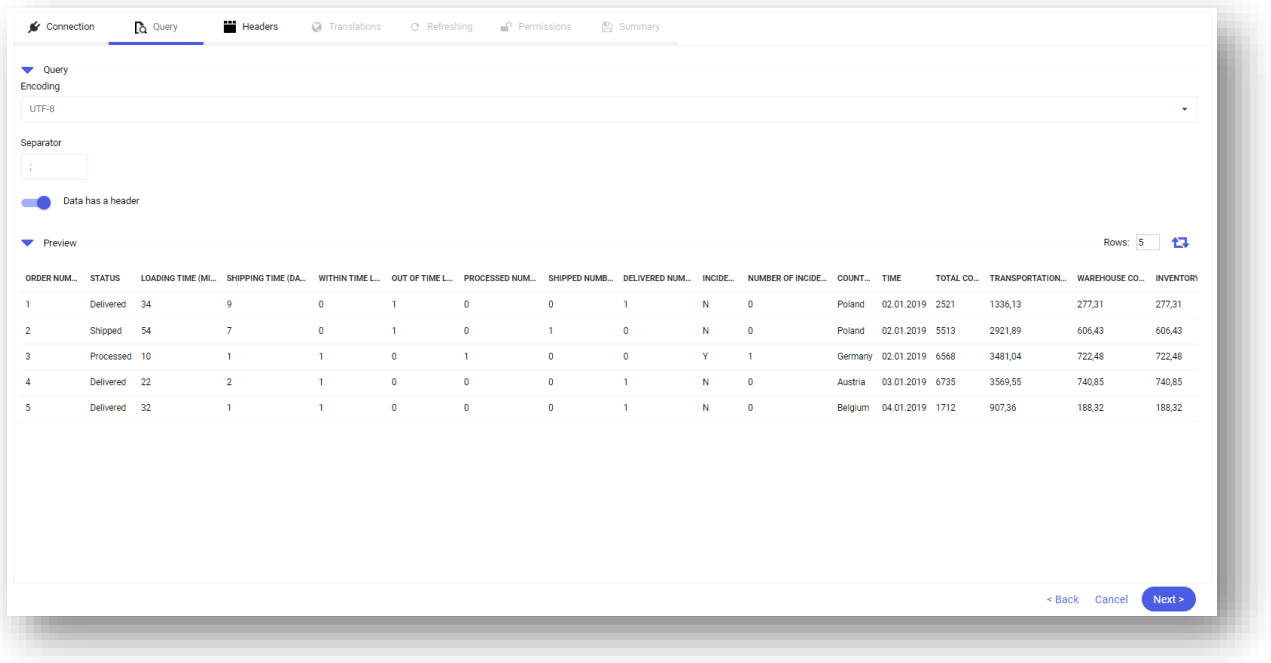
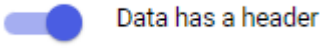


Figure 228 Tab *Query* in the case of CSV file model

A separator is recognized automatically, but it is possible to change it.

Switch *Data has a header* 

:

- if **activated**, the first record from the source is presented in the column headers
- if **deactivated**, a column name [column number] is presented in the column headers

The loaded data can be previewed as the last step.

7.2.1.2.6 DirectQuery

The Direct Query model gives the chance to perform SQL queries directly on the data source without the need to reload the model by the analytical engine - so no calculations are performed by the analytical engine which in some cases reduces the time needed for the query result. If data is read fast from the database, it is recommended to use Direct Query. Since queries are executed directly in the database, any translations of elements are retrieved by the language culture in the database, they are not translated into other languages.

The Direct Query model in its structure does not differ from the regular SQL model.

This model can be created by clicking on the "Create" button and then selecting "DirectQuery".

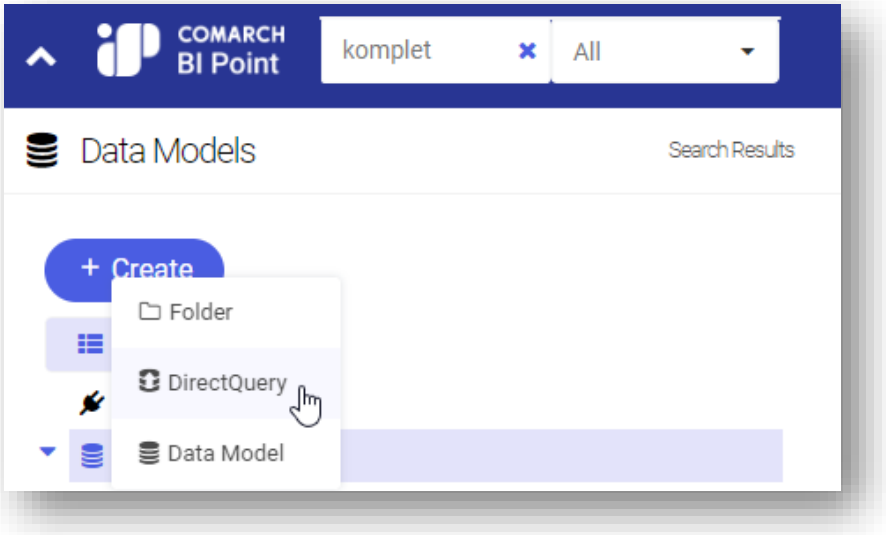


Figure 229 DirectQuery

When creating a new connection to the data model only those connections will be shown which could be used with Direct Query model. Creating the query looks the same as for models based on SQL (Postgres, Oracle and MSSQL supported).

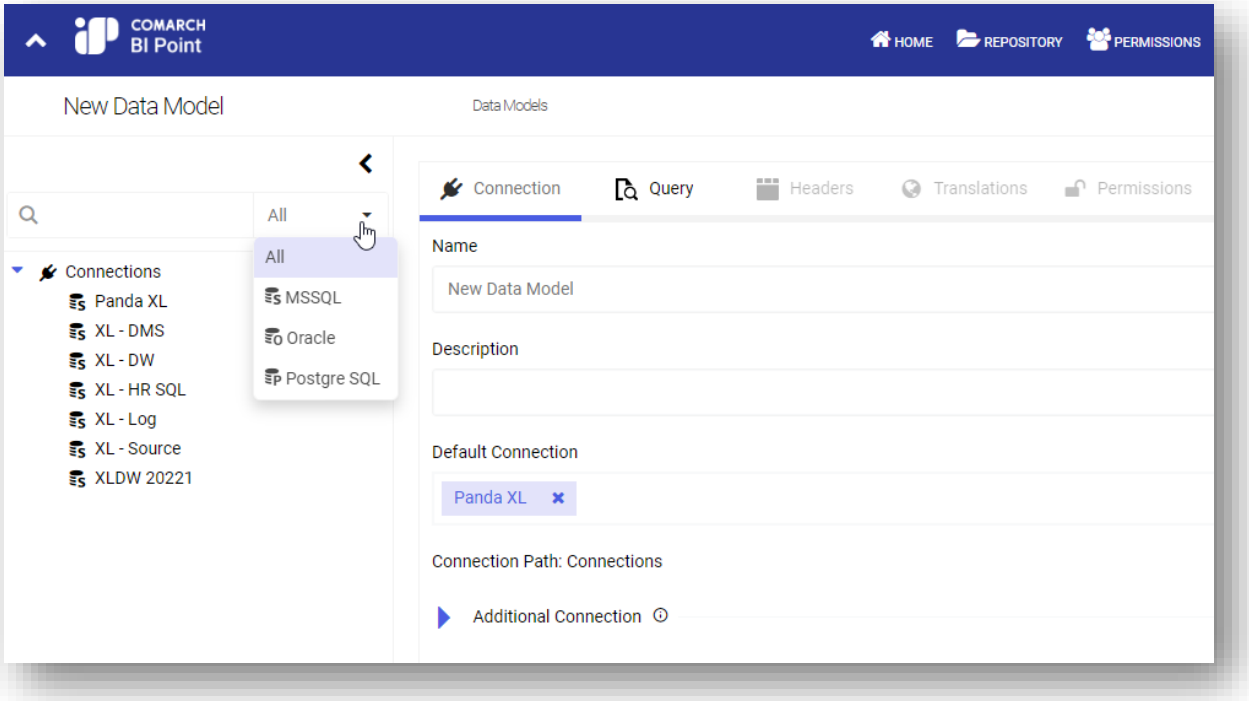


Figure 230 DirectQuery- databases

The Direct Query model can also be used and combined with other model types when building a multi-source model. It can also be used within one dashboard, between other Direct Query models but all Diretc Query models need to have matching attribute names. In terms of creating parameters, Direct Query model works in the same way as in other standard models.

Examples of using Direct Query:

- Showing billing data, i.e. periodical summaries - e.g. a list of calls made, a list of transactions, a list showing e.g. points that a given user used during a given period of time
- Show data refreshed more frequently, such as readings from sensors
- Operation on large dimensions - optimization of the data volume to be pumped through the engine

Building a Direct Query model has several limitations in the context of its creation. The SQL query must be in a form that allows it to be included as a subquery in another query. Otherwise the mechanism supporting Direct Query will not be able to correctly generate the result query sent directly to the database.

Acceptable query format (possibility using select):

SELECT * FROM (<query provided in data model>) T

Other restrictions:

- Support for selected levels of time hierarchies (year, quarter, month, week, day)
- Unsupported time hierarchies with gaps in dates
- Unable to limit the generated dates
- Unable to create indexes
- No support for time and incremental functions
- Unable to use data permissions
- No ODBC connection suport
- Oracle version 12 and higher

7.2.1.3 Headers tab

There is no *Headers* tab in the case of full OLAP model.

The only option is this tab, that is available for all the models, is the edition of a column alias using which it is possible to define own aliases.

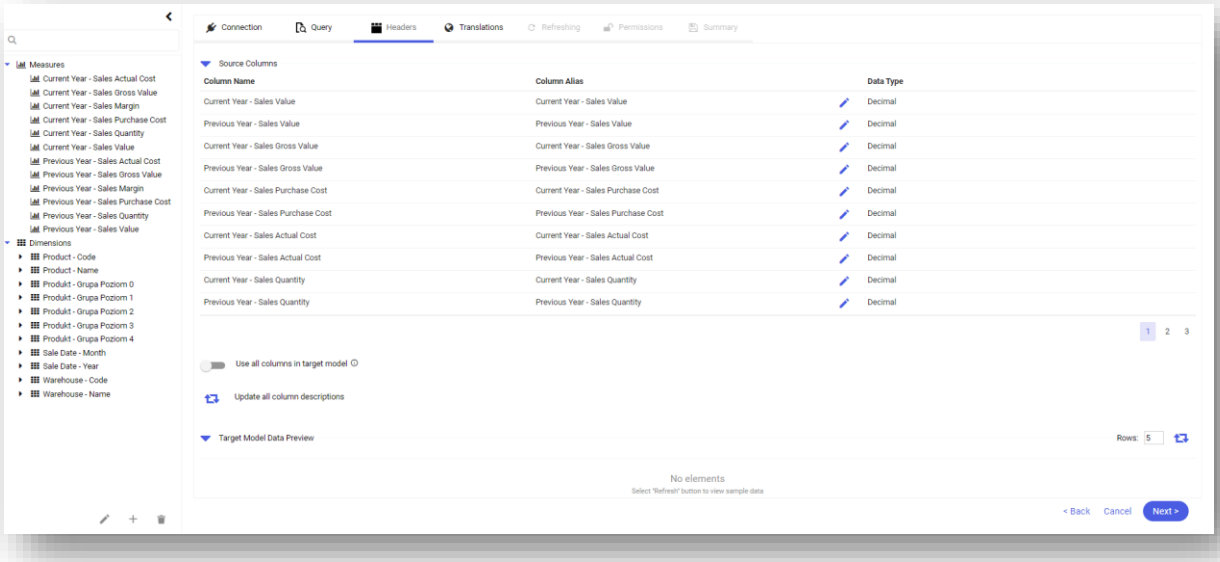
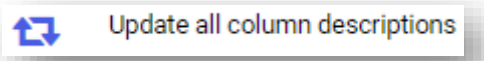
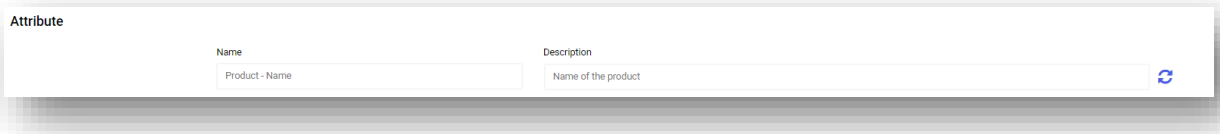


Figure 231 Tab *Headers*

For SQL, Oracle, Postgres models, descriptions of columns defined via a query can be retrieved/updated directly from the database structure.





7.2.1.3.1 Excel/CSV file models

In the case of EXCEL and CSV file models, in tab *Headers* it is possible to edit a column alias and data type.

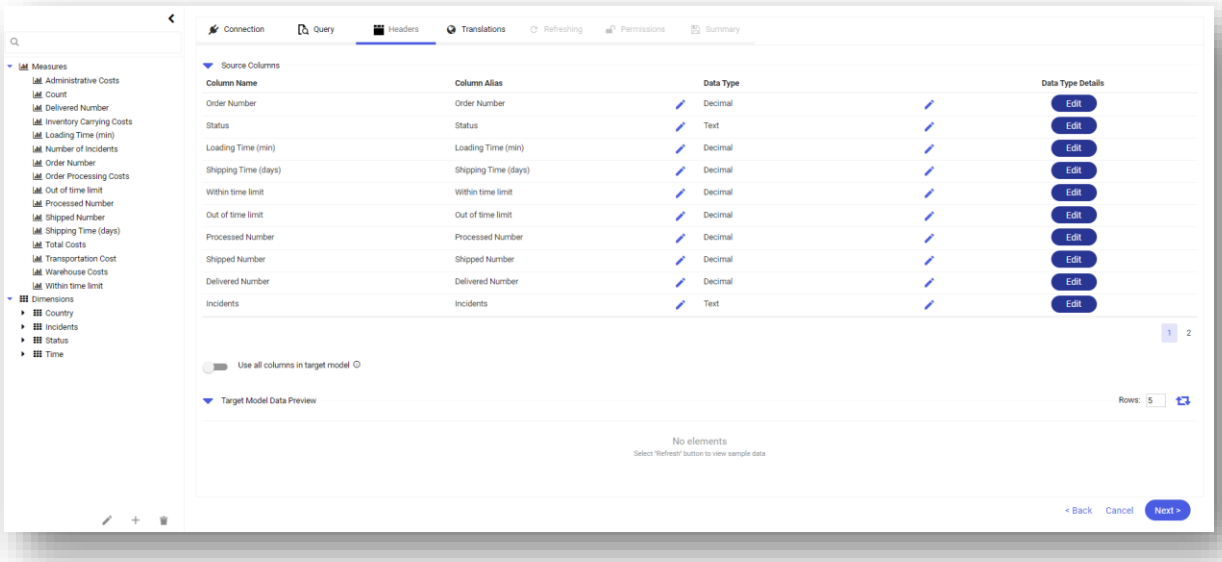


Figure 232 Headers in Excel/CSV model

Data type can be edited by expanding the list in the column *Data Type*.

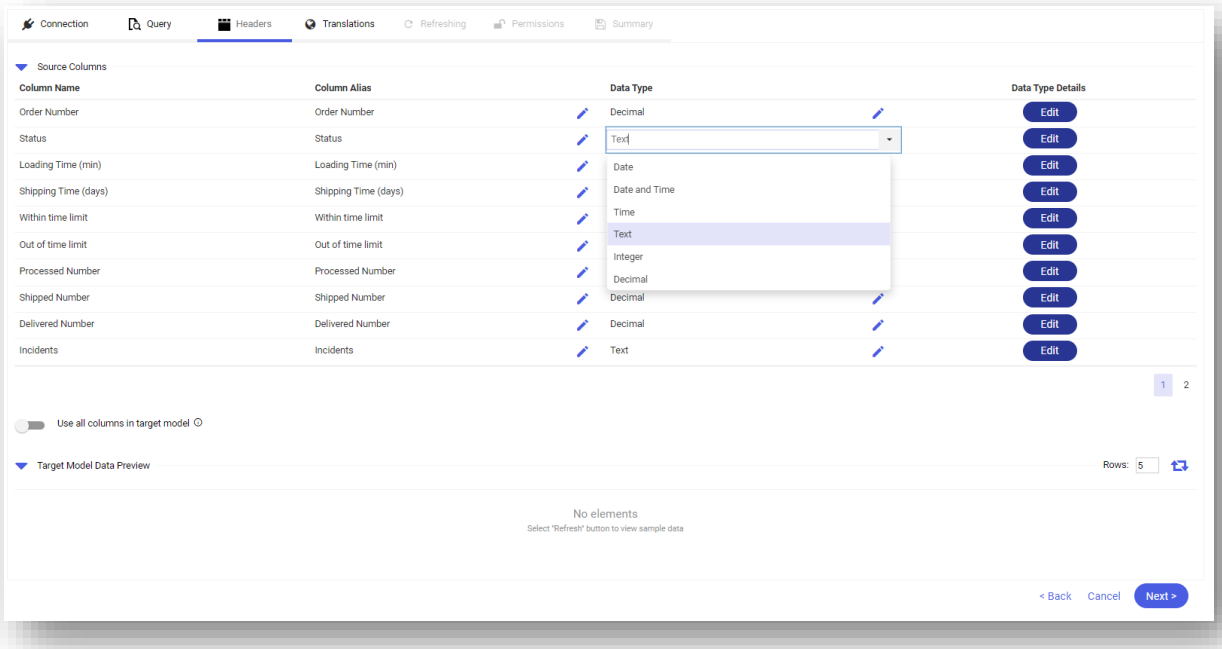
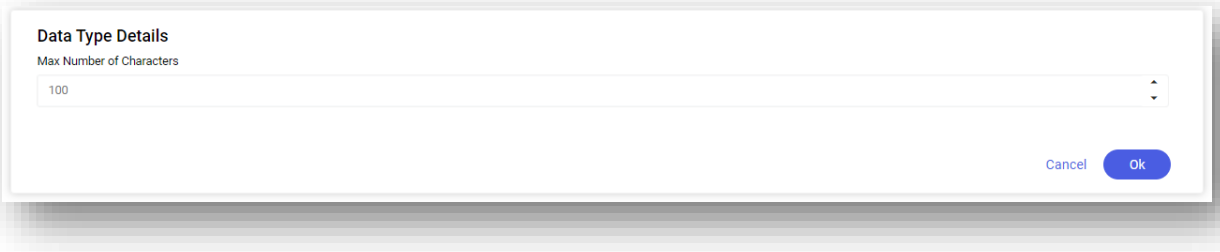


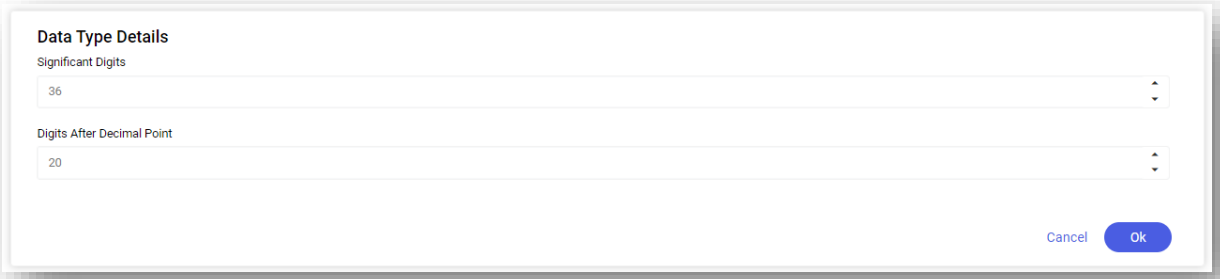
Figure 233 Editing data type

Selecting the button  opens an edit window of data type details:

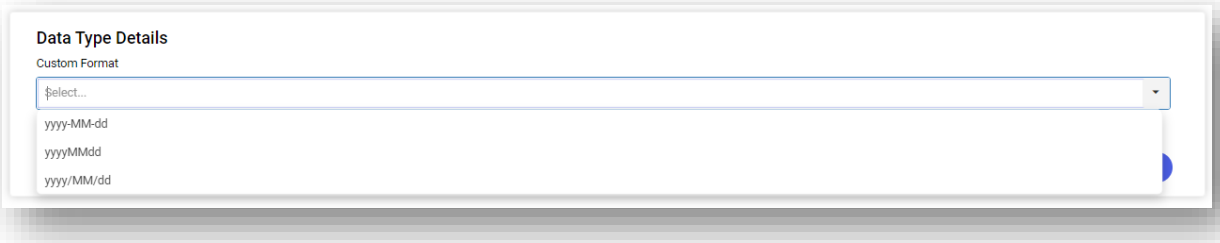
For data of *Text* type, it is possible to change the maximum number of characters.



In the case of a decimal number, significant digits and digits after decimal point are specified.



In the case of date, it is possible to specify own format.



7.2.1.3.2 Measures, dimensions, attributes, hierarchies – new elements

When defining a model, it is possible to define own dimensions, measures, attributes and hierarchies.

In models containing the *Headers* tab (not available in OLAP models), it is possible to hide an already created measure by selecting the parameter *Show on the field list*.

7.2.1.3.2.1 Measure groups

An own measure group can be created by selecting the button + in reference to the *Measures* element and then the option *New Measure Group*. When defining a new group, it is possible to include already defined measures in that group by dragging them into a relevant field in the definition. A measure can also be added to a measure group by dragging an element on the model tree. All dimensions in the model are insensitive. A measure extracted from a different group is removed from that group.

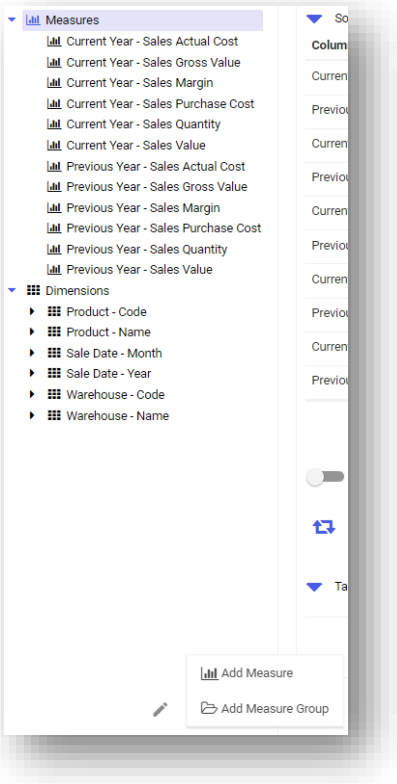


Figure 234 Measure groups

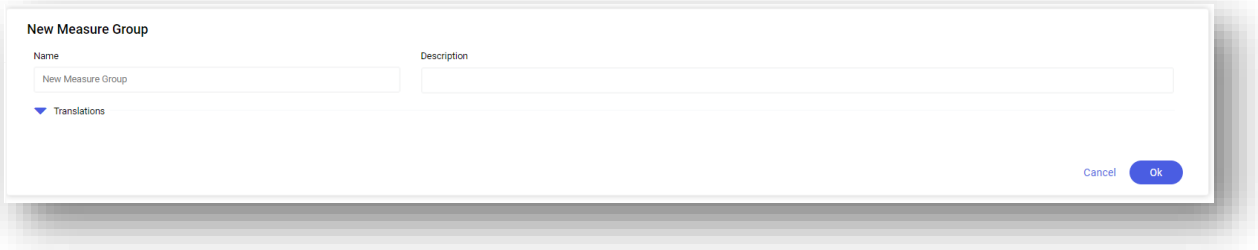


Figure 235 Creating measure groups

7.2.1.3.2.2 Measures – regular measures

Using a query, it is possible to view measures built on the basis of numeric columns, maintaining the previous mapping logics. A new measure can be created from the level of the tree by selecting + in reference to the *Measures* element or a specific measure group followed by the option *New Measure*. It is possible to define a simple measure.

When constructing a simple measure, the measure tree on the left side is insensitive.

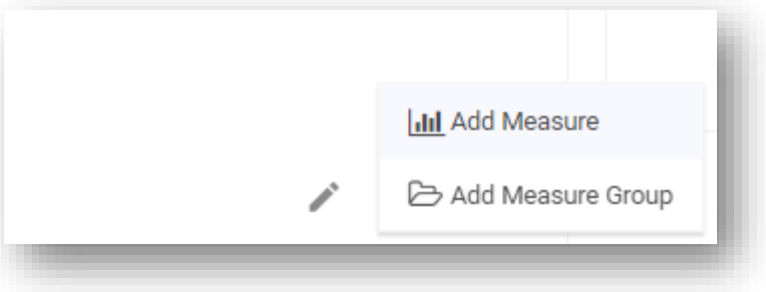


Figure 236 *Add Measure* option

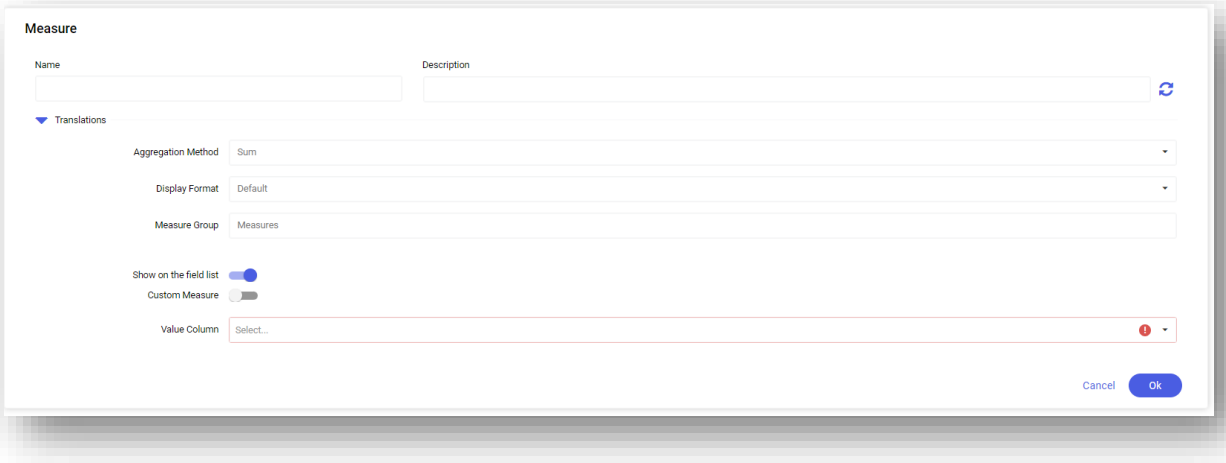


Figure 237 Creating a measure

Measures are always added from among the measures that were not previously used from the source. Names of those columns are available in the *Value Column*, whereas all columns from the source are available in the *Sort Column*.

7.2.1.3.2.3 Measures – custom measure

A custom measure definition is built with the use of appropriate operators. Numeric and value-based operators are used for measures, whereas text operators are used for attributes.

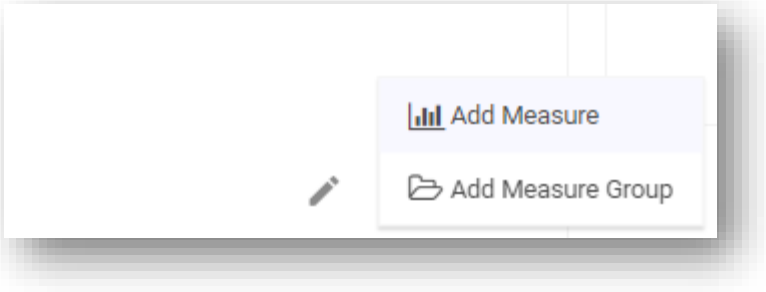


Figure 238 *Add Measure* option

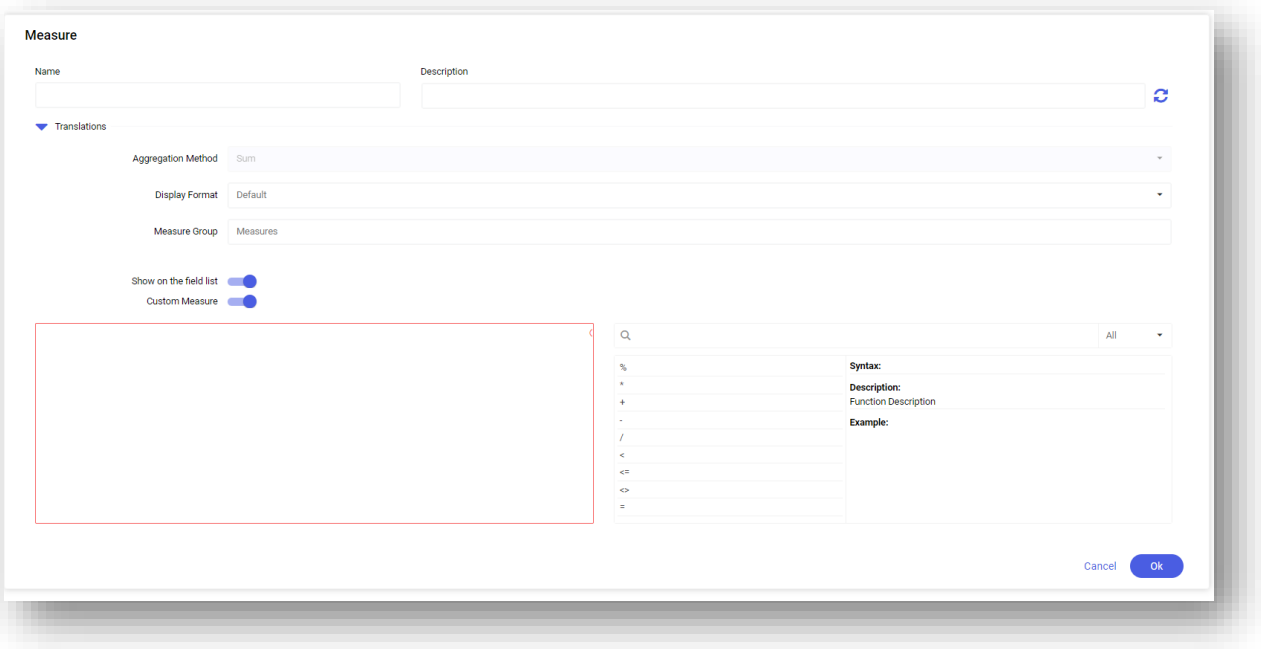


Figure 239 Creating a custom measure

Below listed are available logic functions:

Function	Category	Description	Example
AVG	Aggregation	Returns an average value	AVG([Sales Margin])
COUNT	Aggregation	Returns a number of elements fulfilling the specified criteria	COUNT([Sales Margin])
DISTINCTCOUNT	Aggregation	Returns a number of unique elements of a set	DISTINCTCOUNT([Sales Margin])
MAX	Aggregation	Returns the 185argest element	MAX([Sales Margin])
MIN	Aggregation	Returns the lowest element	MIN([Sales Margin])
SUM	Aggregation	Returns the sum of elements	SUM([Purchases Quantity])
SUMBY	Aggregation	Calculates the sum of elements of a numeric expression for a defined set of elements	SUMBY([Sales Quantity], SET([State].[Małopolskie], [State].[Mazowieckie))
MINBY	Aggregation	Returns the lowest value of a numeric expression for a defined set of elements	MINBY([Sales Quantity], SET([State].[Małopolskie]))
MAXBY	Aggregation	Returns the largest value of a numeric	MINBY([Sales Quantity], SET([State].[Małopolskie]))

Function	Category	Description	Example
		expression for a defined set of elements	
AVGBY	Aggregation	Returns an average value of a numeric expression for a defined set of elements	AVGBY([Sales Quantity], SET([State].[Małopolskie], [State].[Mazowieckie], [State].[Wielkopolskie]))
RUNNINGSUM	Aggregation	Aggregates incrementally the measure for subsequent elements of the specified set using the sum value	RUNNINGSUM([Sales Value], [Year])
RUNNINGAVG	Aggregation	Aggregates incrementally the measure for subsequent elements of the specified set using the average value	RUNNINGAVG([Sales Value], [Year])
RUNNINGMIN	Aggregation	Aggregates incrementally the measure for subsequent elements of the specified set using the minimum value	RUNNINGMIN([Sales Value], [Year])
RUNNINGMAX	Aggregation	Aggregates incrementally the measure for subsequent elements of the specified set using the maximum value	RUNNINGMAX([Sales Value], [Year])
ABS	Mathematical	Returns an absolute value from the specified expression	ABS([Sales Value])
TOTAL	Mathematical	Return a total for the specified measure, including or excluding filters	TOTAL([Sales Value], TRUE/FALSE)
DATEADD	Time	Returns a date greater by a specified number of days/months/years in reference to the date specified as an argument	DATEADD(date_part, interval, date), DATEADD(day, data1, 100)

Function	Category	Description	Example
DATEDIFF	Time	Returns the difference of years/months/days between the specified dates	DATEDIFF(date_part, date1, date2,), DATEDIFF(year, data1, data2)
TODAY	Time	Returns a current date	TODAY()
PriorMonth	Time	Returns the value of measure in a previous month	PriorMonth([Sales Value], 1)
PriorQuarter	Time	Returns the value of measure in a previous quarter	PriorQuarter([Sales Value], 1)
MonthPriorYear	Time	Returns the value of measure for a given month a year earlier	MonthPriorYear([Sales Value], 1)
QuarterPriorYear	Time	Returns the value of measure for a given quarter a year earlier	QuarterPriorYear([Sales Value], 1)
PriorYear	Time	Returns the value of measure in the previous year	PriorYear([Sales Value], 1)
PriorDay	Time	Returns the value of measure on the previous day	PriorDay([Sales Value], 1)
DayPriorYear	Time	Returns the value of measure for a given day a year earlier	DayPriorYear([Sales Value], 1)
FILTER	Filtering	Filters the set by a specified filter condition and returns the set of elements fulfilling the given condition	FILTER ([Date of Issue], [Sales Value] > 5000)
FILTERBY	Filtering	Returns the values of measure (expression) after filtering by a specified set	FILTERBY ([Sales Value], SET([Year].[2010]))
=	Logical	Elements equality operator	[Sales Value]=[Purchase Value]
<>	Logical	Compares elements – different from	[Sales Value]<>[Purchase Value]
<	Logical	Less than	[Sales Value]<[Purchase Value]
<=	Logical	Less than or equal to	[Sales Value]<=[Purchase Value]
>=	Logical	Greater than or equal to	[Sales Value]>=[Purchase Value]
>	Logical	Greater than	[Sales Value]>[Purchase Value]

Function	Category	Description	Example
NOT	Logical	Logical operator “DIFFERENT FROM”	NOT([Geography].[Country] = ‘Poland’)
AND	Logical	Combines logical condtions	AND([Sales Quantity] >= 0 , [Sales Quantity] < 10)
OR	Logical	Logical operator “OR”	OR([Sales Quantity] > 100 , [Sales Value < 100000)
LIKE	Logical	Compare text with a default template. % replaces any character	LIKE([State] , ‘M%’)
ISEMPTY	Logical	Checks whether a defined set is not empty	ISEMPTY([Sales Value])
CASE	Logical	Estimates a defined expression and, depending on the result, assigns one of the defined variants to it	CASE [Region] WHEN ‘West’ THEN 1 WHEN ‘East’ THEN 2 ELSE 3 END
CURRENTLEVEL	Logical		
IF	Logical	Checks whether the specified condition is true and, depending on the results, returns the expression specified in the function arguments (if true, if false)	IF ([Customer] = ‘ABC’, [Discount] = 0.1, [Discount] = 0.05)
+	Operators	Plus operator	[Purchase Cost]+[Distribution Cost]
-	Operators	Minus operator	[Total Cost]-[Purchase Cost]
*	Operators	Multiply operator	[Unit Price]*[Quantity]
\	Operators	Divide operator	[Sales Value]\[Quantity]
SET	Sets	Funkcja pozwala utworzyć zbiór elementów wykorzystywany najczęściej do filtrowania	SET([Document Type].[Sales Invoice], [Document Type].[Sales Invoice Correction])
RANGE	Sets	Creates a set of elements of a given attribute based on a key	RANGE([Year].[2001], [Rok].[2010])
RANGEFROM	Sets	Creates a set of elements of a given attribute based on a key starting from the selected dimension element	RANGEFROM([Year].[2001])
RANGETO	Sets	Creates a set of elements of a given	RANGETO([Year].[2010])

Function	Category	Description	Example
		attribute based on a key from the beginning to the selected dimension element	
UNION	Sets	Combines elements of two or more sets	UNION([Clients].[Group1], SET([Clients].[Group2], [Clients].[Group3]))
EXCEPT	Sets	Returns the difference of sets	EXCEPT([Clients].[Group 1], SET([Clients].[Group2]))
INTERSECT	Sets	Returns the product (common part) of sets	INTERSECT([Customer].[Target Customer], SET([Customer].[Real Customer]))
COMPLEMENT	Sets	Returns elements not contained in the set (complement of the set)	COMPLEMENT([Time].[Year])
TOP	Sets	Returns the specified number of maximum elements from a given set in terms of the value of a given measure	TOP [Customer Name], 10, [Sales Value])
BOTTOM	Sets	Returns the specified number of minimum elements from a given set in terms of the value of a given measure	BOTTOM([Customer Name], 10, [Sales Value])
SPLIT	Sets	Gets elements from the end. A minus sign in an element number means that the elements is retrieved from the end and not from the beginning.	For instance, for values A-B-C-D-E-F of an attribute [category] Split([category], '-', 1) returns A Split([category], '-', -1) returns F

Equivalents of the logic functions are also available in Polish.

7.2.1.3.2.4 Dimensions

In simple models, dimensions are added on the basis of a query – a user receives a dimension list and attributes that are part of those dimensions, by default. Dimensions are composed of text columns and maintain the previous mapping logic. A new dimension can be added from the level of the tree by selecting the button + (Add) in reference to *Dimensions* element.

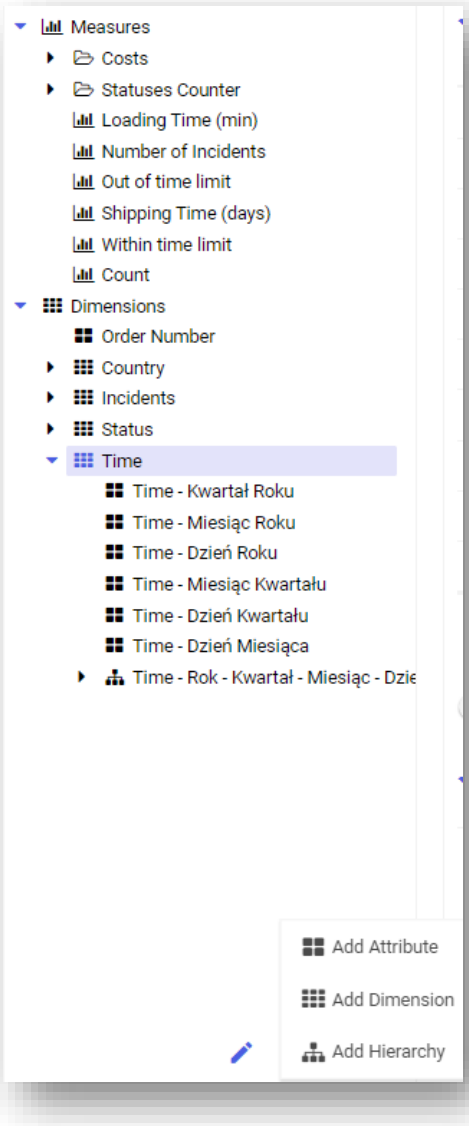


Figure 240 *Add Dimension* option

Upon selecting the option [**Add Dimension**], a dimension creation field will appear:

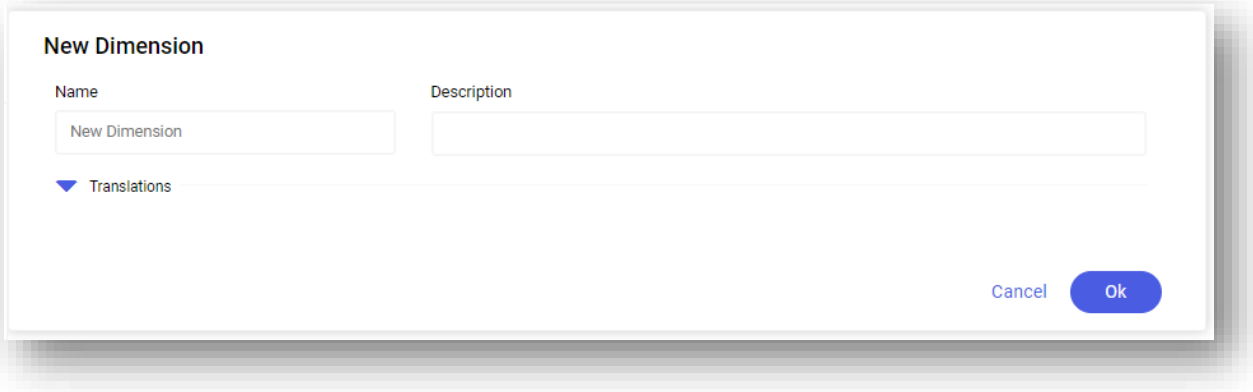


Figure 241 Creating a new dimension

7.2.1.3.2.5 Regular attribute

Selecting the option [**Add Attribute**]:

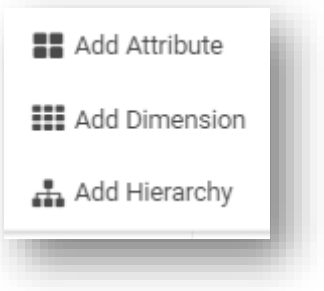


Figure 242 *Add Attribute* option

activates an attribute creation field:

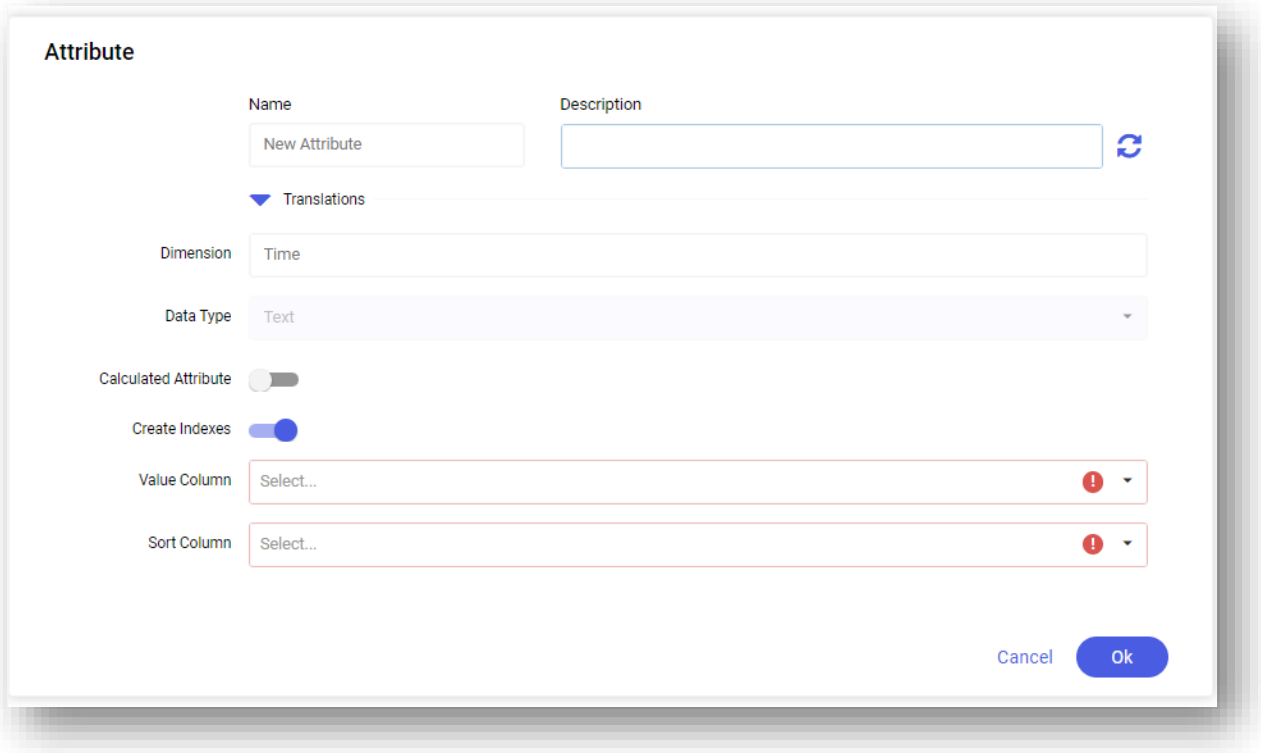


Figure 243 Adding an attribute

It is possible to select an attribute data type.

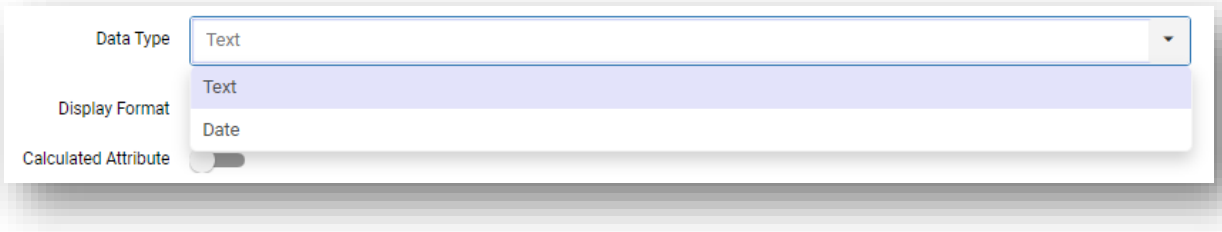


Figure 244 Attribute data type

It the wizard window, it is necessary to specify also the name of value column and a sort column, which are selected from drop-down lists.

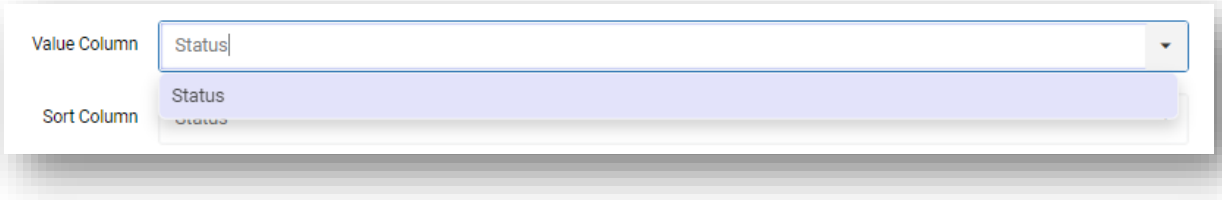


Figure 245 Value column

Time hierarchy

A **time hierarchy** is a specific type of attribute. Time dimensions are presented by default in the time hierarchy and are sorted by the key.

In the exemplary model below, which is based on MSSQL connection, dates have been used:

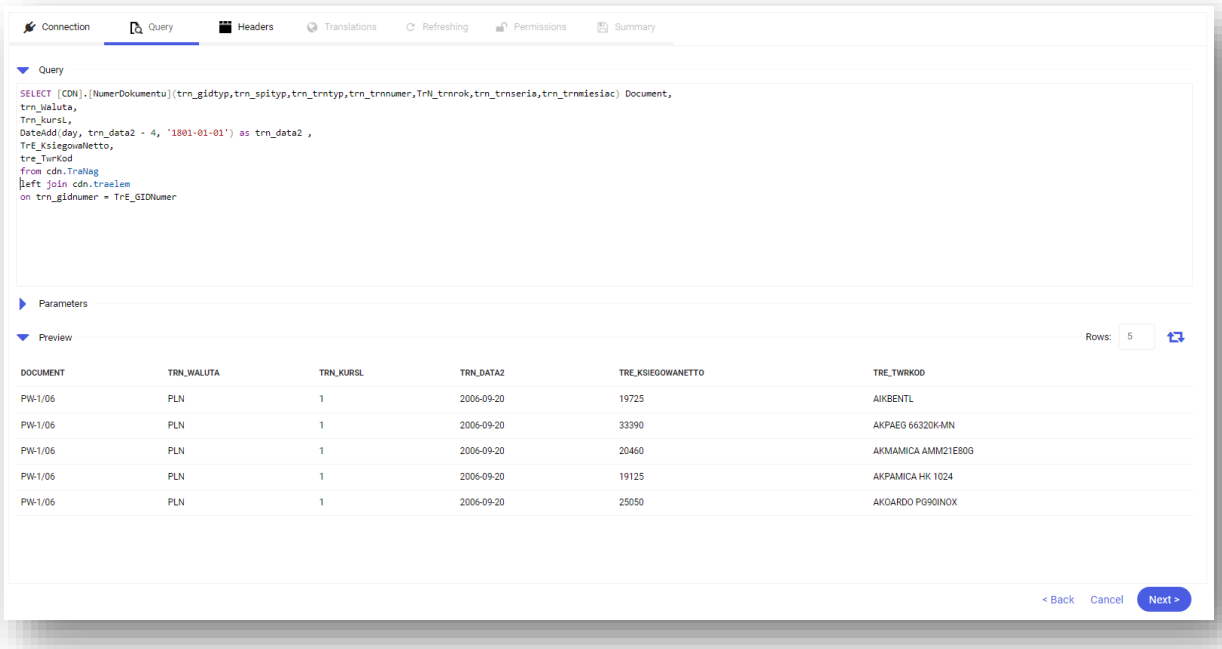


Figure 246 Time hierarchy – sample data model with time hierarchy – query

BI Point created automatically a time hierarchy presented in the panel on the left. Upon refreshing, data was recalculated automatically for each element of the time hierarchy.

Figure 247 Time hierarchy – automatic recalculation of date in hierarchies

A time attribute can be edited after clicking on the time attribute in the reports tree.

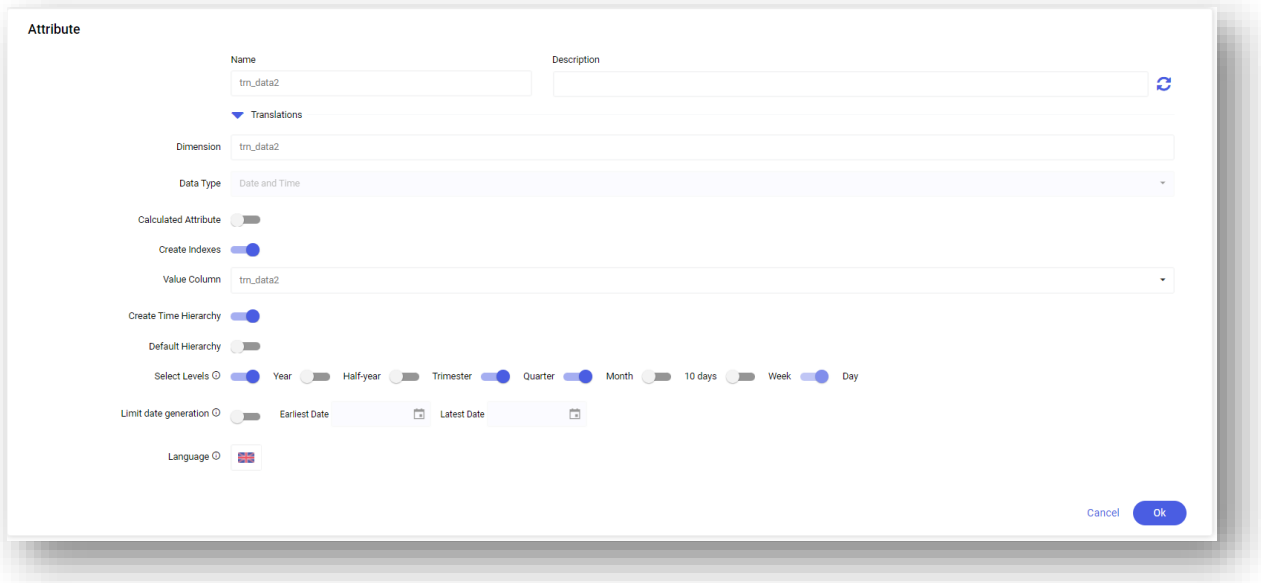


Figure 248 Time hierarchy – attribute edition

It is possible to use here a calculated attribute.

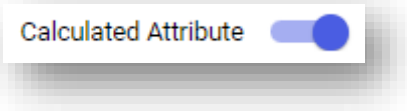


Figure 249 Time hierarchy – calculated attribute

When editing an attribute, it is also possible to create indexes with a value column and a sort column. Then, after activating the switch *Create time hierarchy* it is possible to select the following levels:

- Year
- Half-year
- Trimester
- Quarter
- Month
- 10 days
- Week

These settings relate to the entire model.

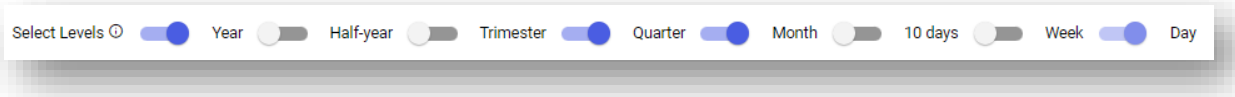
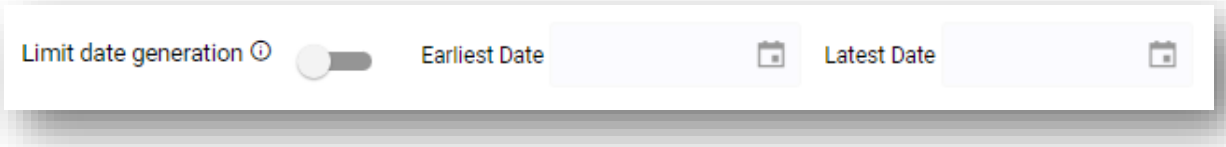
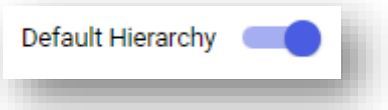


Figure 250 Time hierarchy levels

After selecting the option *Limit date generation*, you can specify a date range for which a time hierarchy will be generated.



In the case of several time hierarchies, you can also specify which of them is to applied for default calculations of model recalculation.



7.2.1.3.2.6 Calculated attribute

It is possible to define a calculated attribute that is presented on a single row level.

An attribute is calculated and displayed during model recalculation.

Selecting the option [**Add Attribute**]:

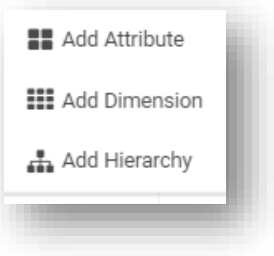


Figure 251 *Add Attribute* option

activates an attribute wizard field:

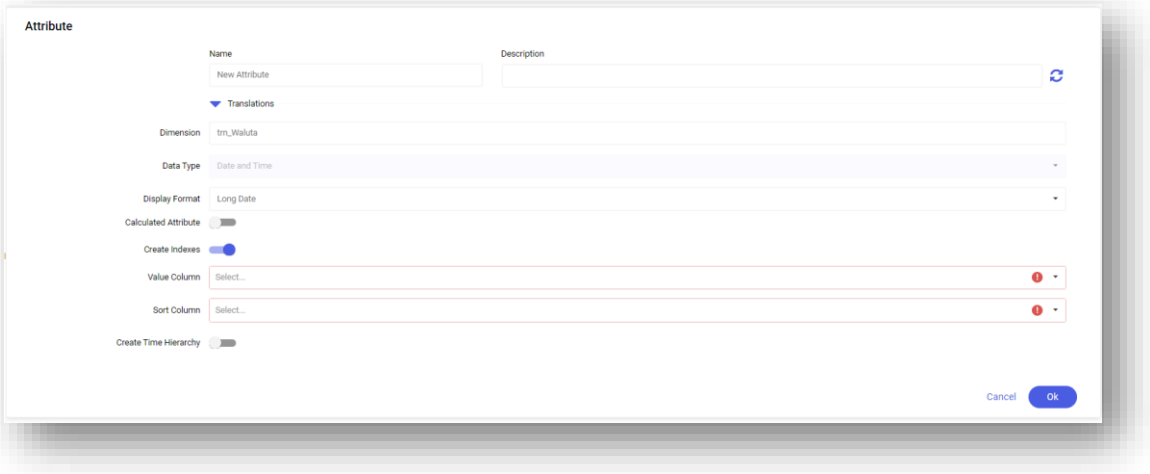
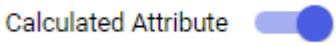


Figure 252 Creating an attribute

It is necessary to activate here the switch 

[**Calculated attribute**].

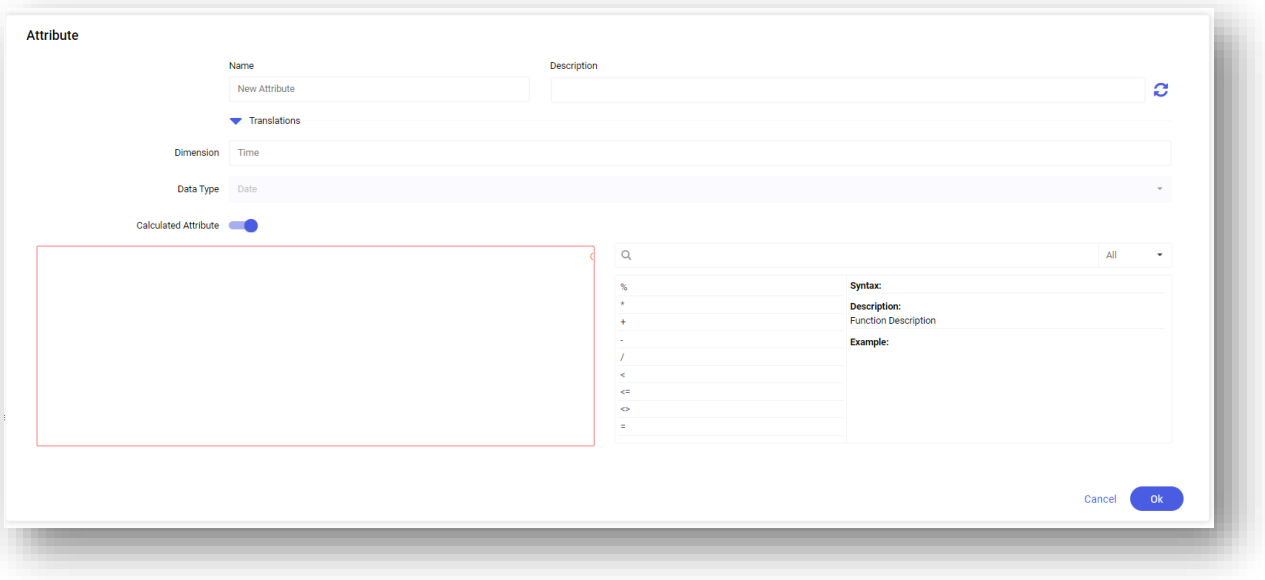


Figure 253 Calculated attribute

An attribute definition is built with the use of appropriate operators. Numeric and value-based operators are used for measures, whereas text operators are used for attributes.

The *Language* option refers to the entire model.

7.2.1.3.2.7 Hierarchies

An own hierarchy can be defined by selecting the attributes of which it will be composed. A new hierarchy is added by selecting the + button in reference to a specific dimension. A hierarchy can be composed only and exclusively of attributes that are included in the same dimension. A hierarchy can be moved to another dimension using the options available in the dimension definition or by dragging it on the tree. The order of levels can be changed by changing the elements in the definition or by operating on a model tree.

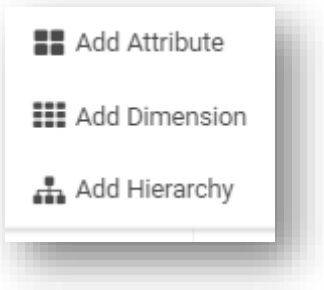
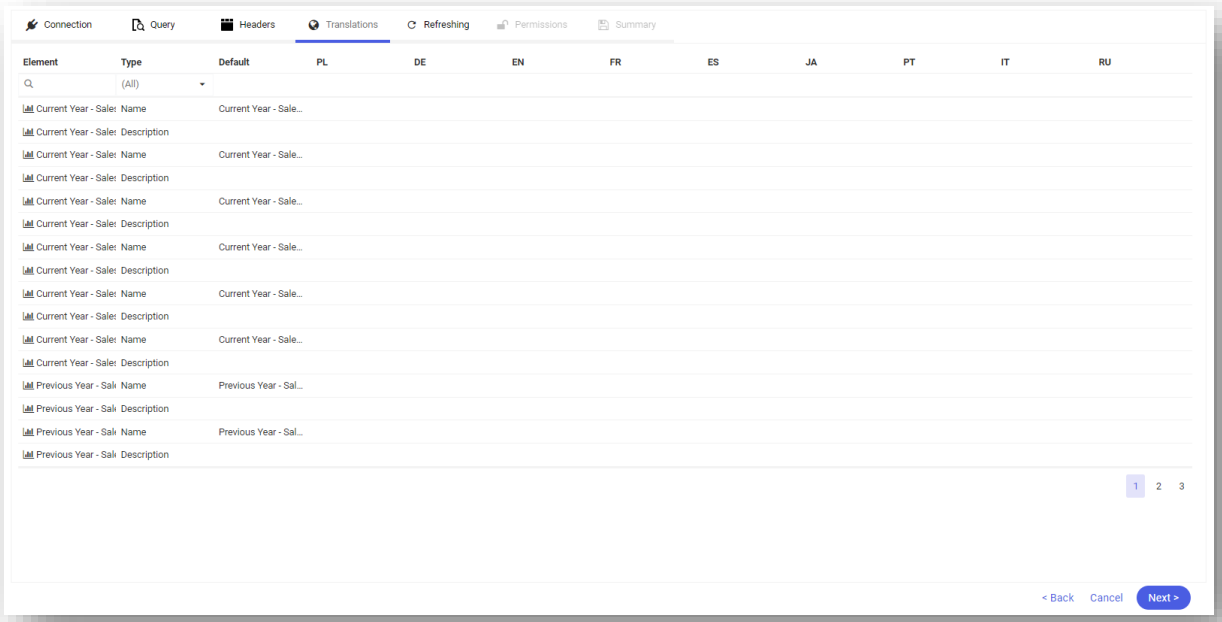


Figure 254 *Add Hierarchy* option

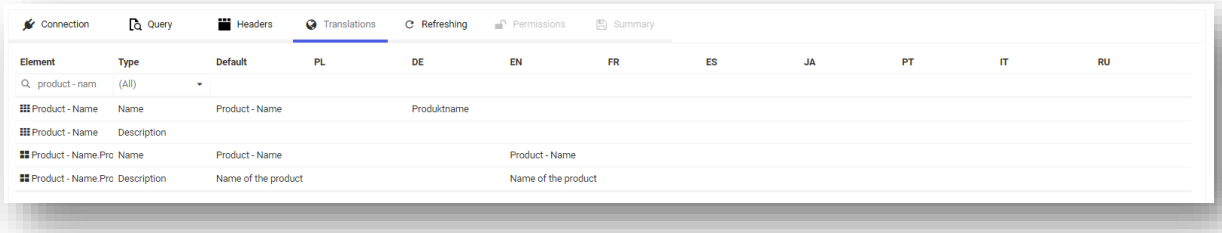
7.2.1.4 Translations tab

In the *Translations* tab, it is possible to add a translation to any dimension or any measure.



To do so, it is necessary to properly complete the window assigned to a given language.

The example below presents data for the *Product Name* dimension:



After creating a report and a dashboard (on the basis of the prepared data model), relevant translations are displayed for measures, dimensions and descriptions, depending on the set language.

7.2.1.5 Refresh tab

In this tab it is possible to define a schedule for updating data from the source.

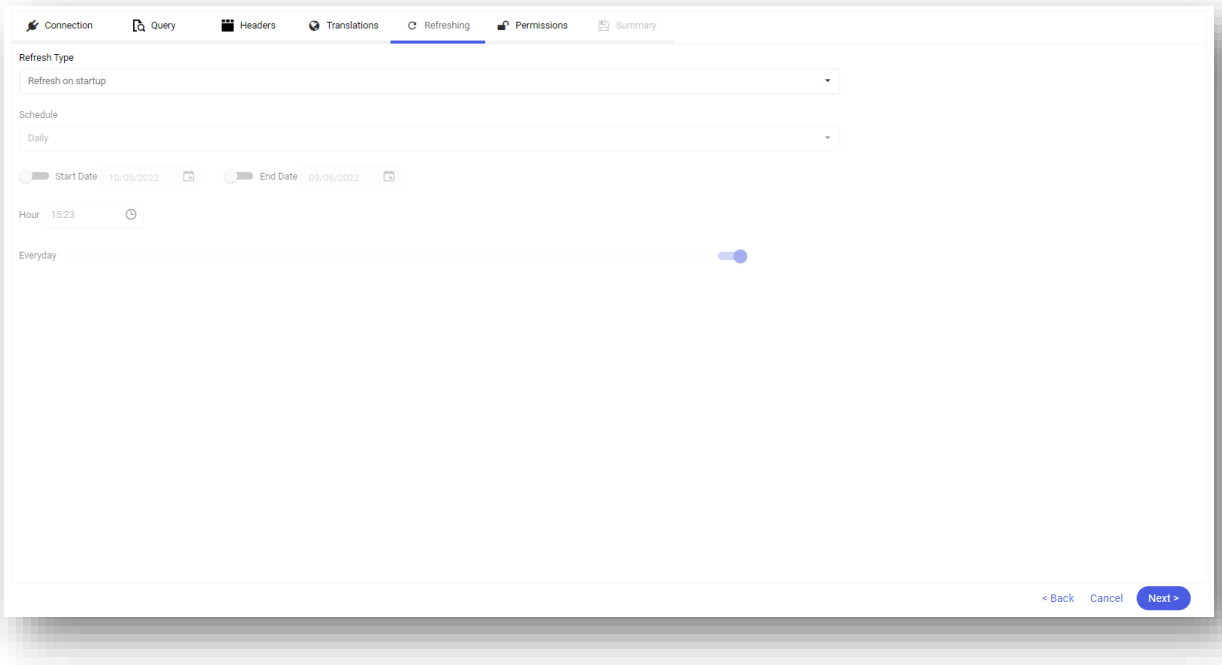


Figure 255 *Refreshing* tab

Refreshing means recalculation or loading from the source.

There are three different modes of recalculating a data model:

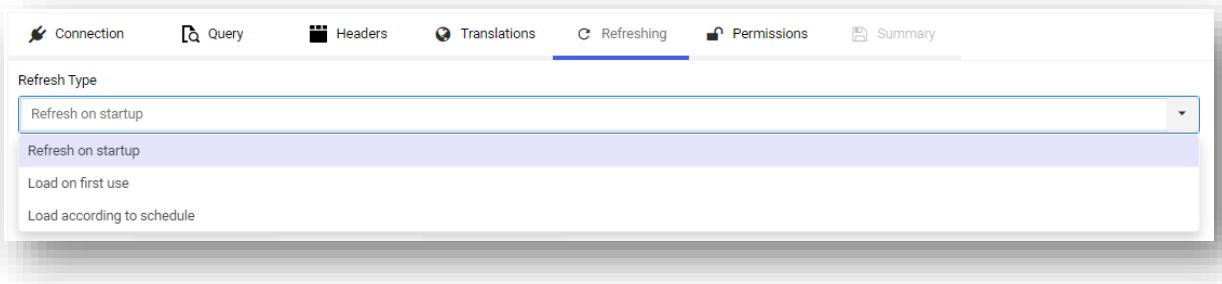


Figure 256 Data loading modes

- **Refresh on startup** – data is loaded each time a report or a dashboard is loaded
- **Load on first use** – data is loaded the first time a data mode is used
- **Load according to schedule** – data is loaded always at a specified time

When loading data according to a schedule, it is possible to define whether data must be loaded with an hourly, daily, monthly or one-time interval.

Note: In each schedule, data is usually cleared every 3 hours. This means that by setting the time of data loading in the schedule to 02:00, the data will be cleared at 05:00. The parameter dedicated to data clearing can be modified in the file Comarch.BI.AnalysisEngine.Service.exe.config that is available in C:\Program Files (x86)\Comarch BI Point\instances\instance_name\engine. In that file, it is necessary to add a

line <add key="GCIdleTimeout" value="3" /> under the section <appSettings> and to restart the analytical engine. The value is presented in hours.

One-time schedule

When defining a one-time data update according to a schedule, it is possible to specify a date and time of refreshing data.

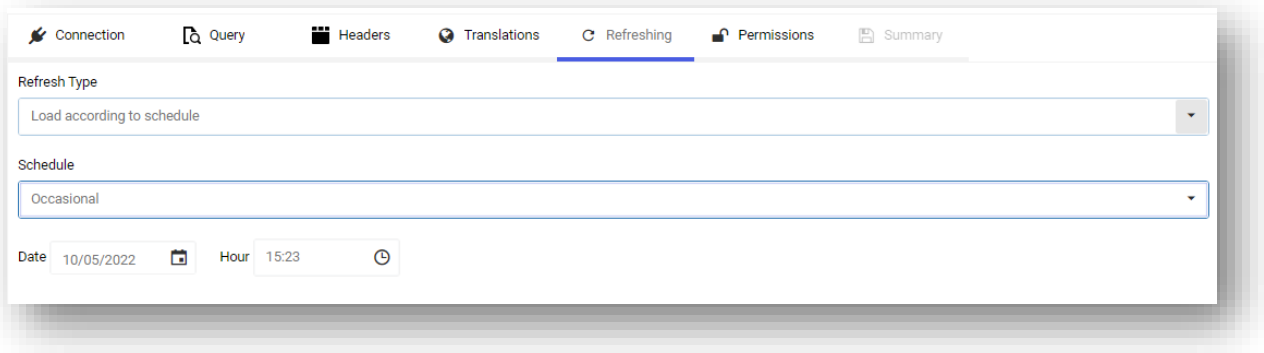


Figure 257 Refreshing by one-time schedule

Hourly schedule

When defining an hourly schedule, it is possible to specify start and end dates of data loading, starting from the time interval between consecutive loadings.

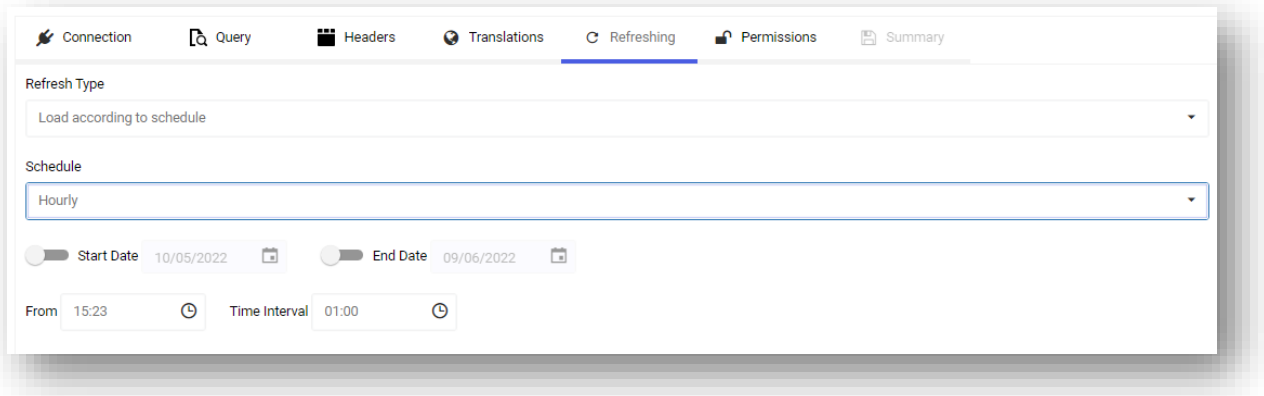


Figure 258 Refreshing by hourly schedule

Daily schedule

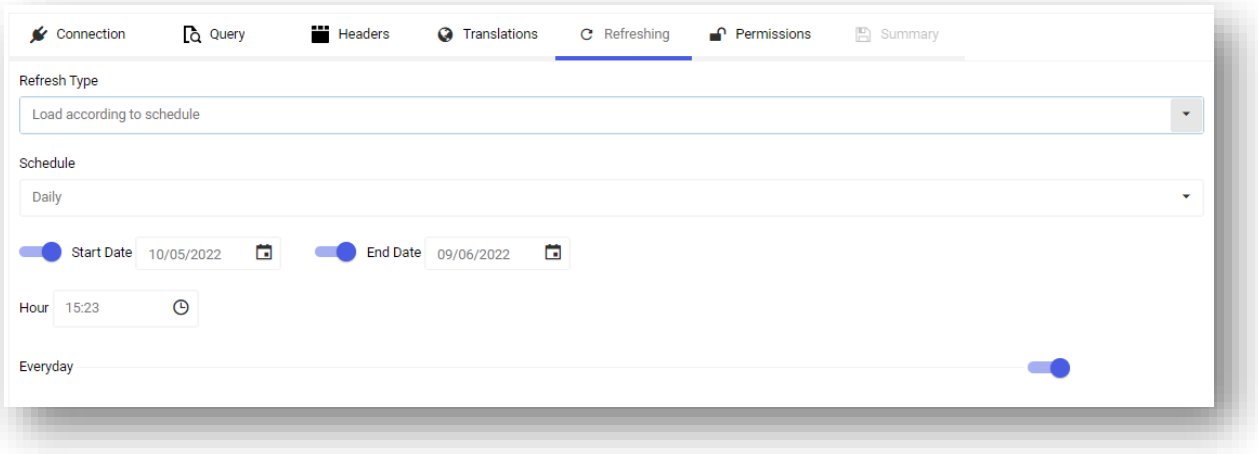


Figure 259 Refreshing by daily schedule

In the case of a daily schedule, it is necessary activate a switch *Everyday* for data to be loaded every day.

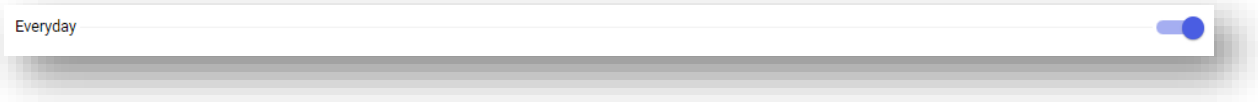


Figure 260 *Everyday* switch

A user can define start and end dates as well as time of refreshing. It is also possible to specify weekdays on which data must be loaded – this option is available when the switch *Everyday* is deactivated.

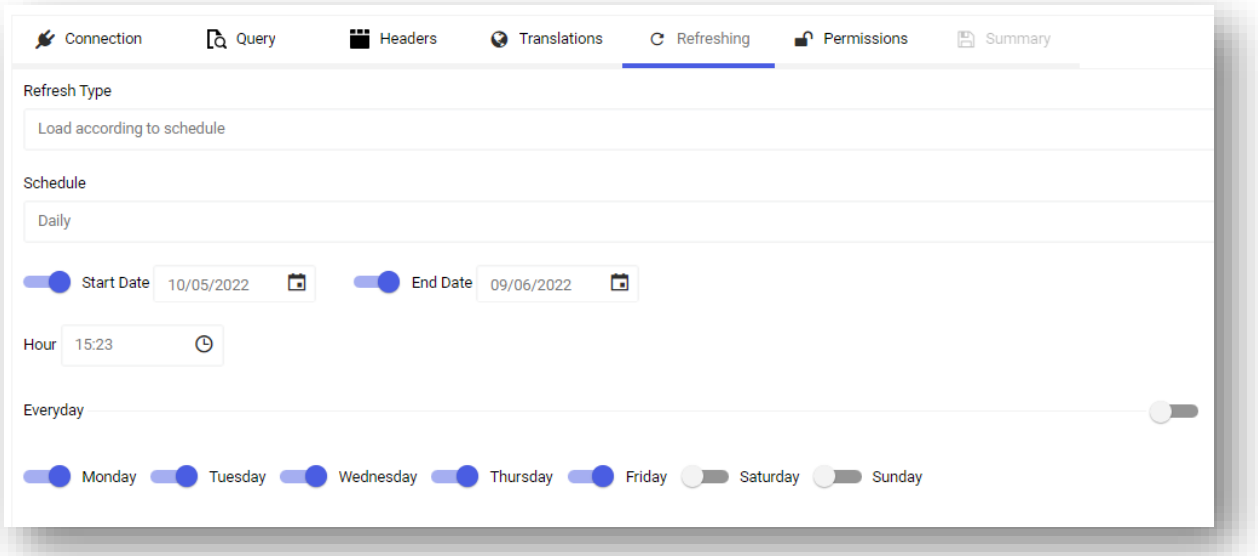


Figure 261 Refreshing by daily schedule with selected weekdays

Monthly schedule

When defining a monthly schedule, it is possible to specify start and end dates as well as time of data loading.

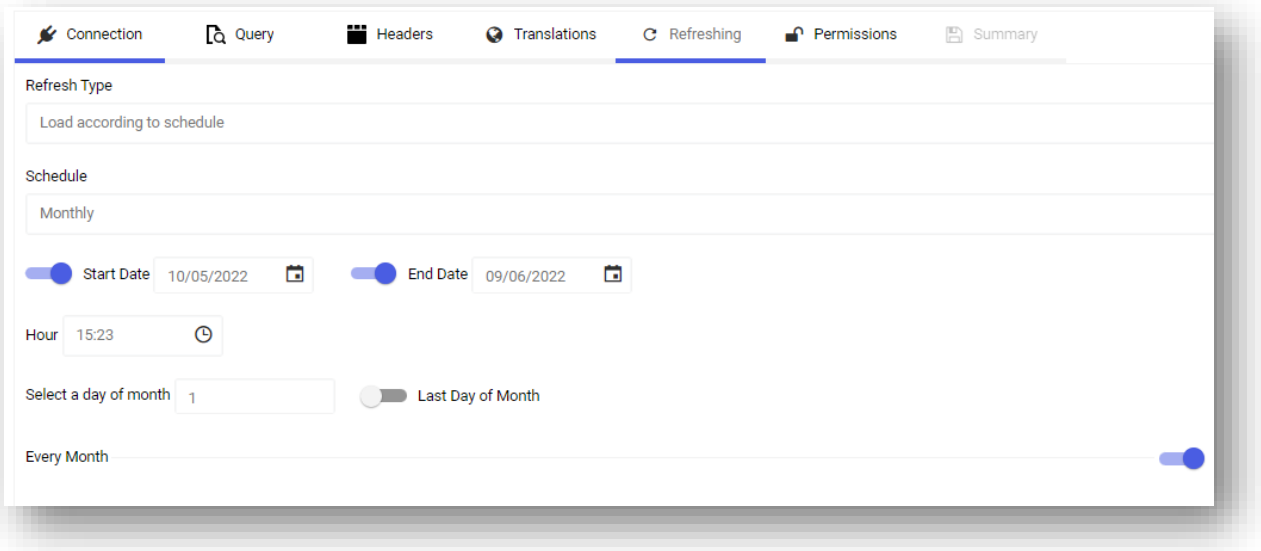


Figure 262 Refreshing by monthly schedule – start and end dates

It is possible to specify a day of each month, on which data loading is planned – this option becomes available upon deactivating the switch *Last Day of Moth*. With activated switch *Last Day of Month*, data will always be loaded on the last day of a month.

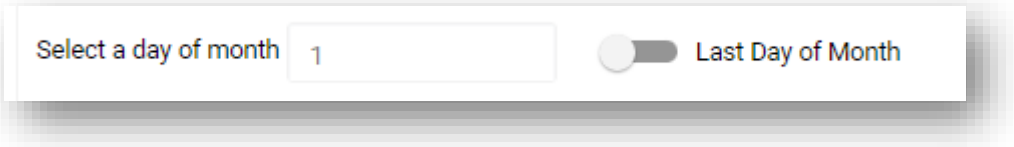


Figure 263 *Select a day of month* and a switch *Last Date of Month*

Next, it is possible to specify whether data must be loaded each month. To do so, a switch *Every Month* must be activated.

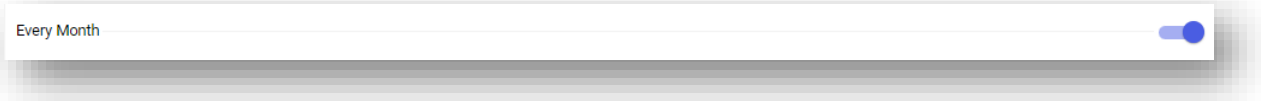


Figure 264 Switch *Every Month*

In order to define the month in which data must be loaded, it is necessary to deactivate the switch *Every Month*.

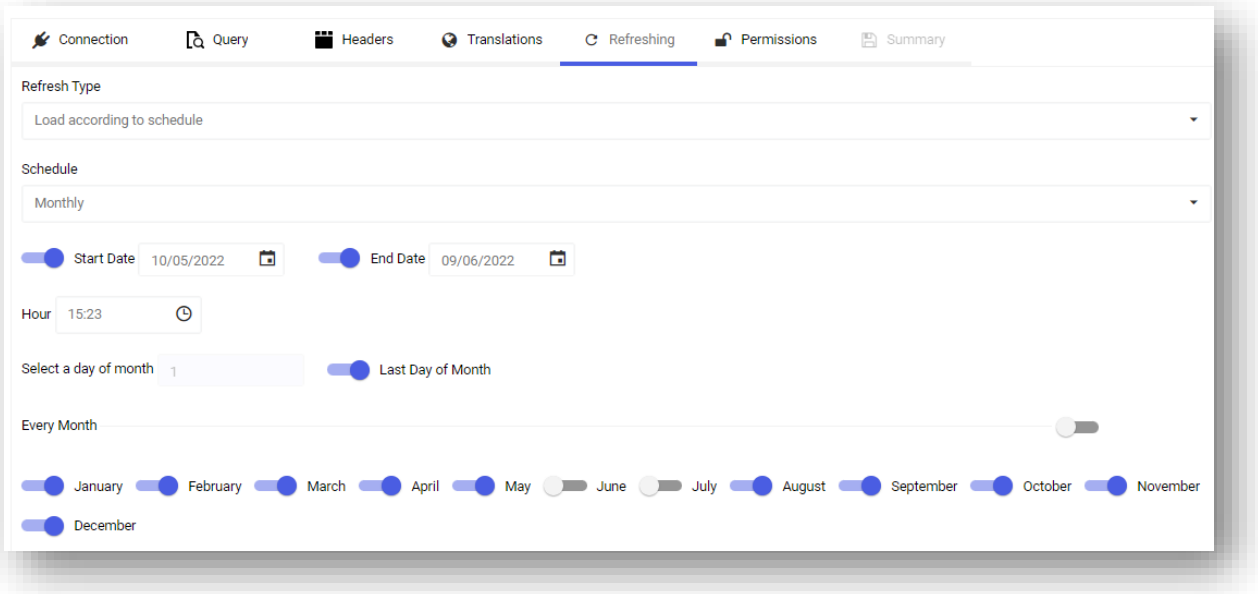


Figure 265 Refreshing by monthly schedule in selected months

7.2.1.6 Permissions tab

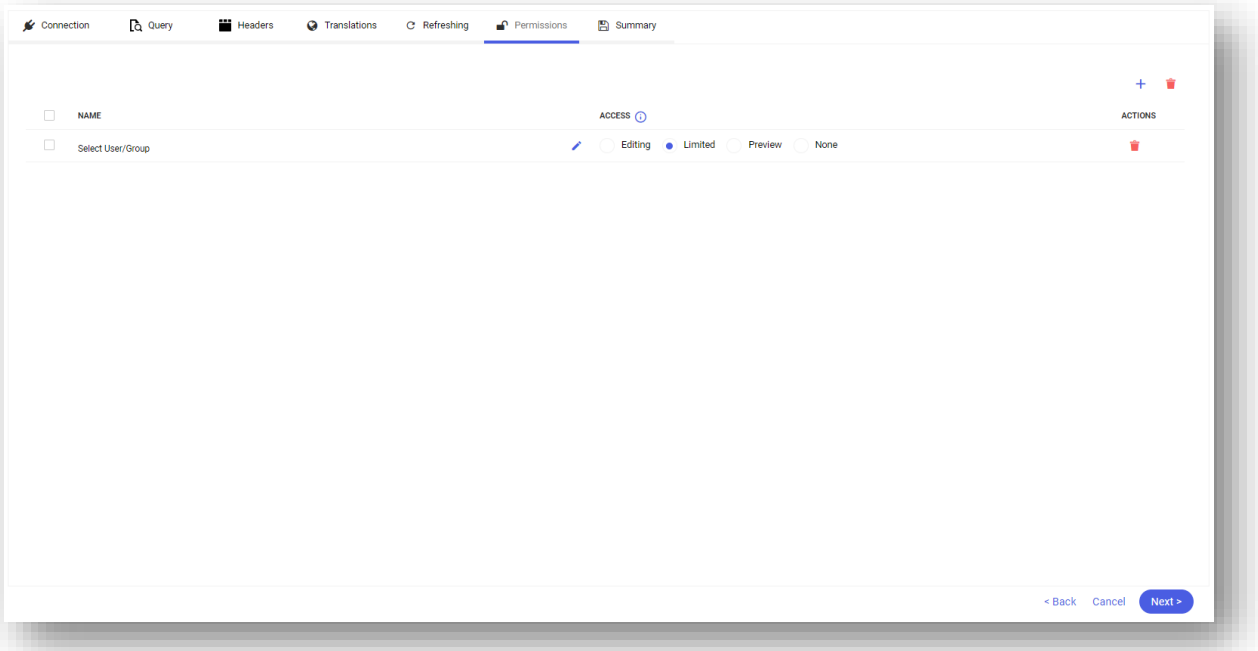


Figure 266 *Permissions* tab

In the *Permissions* tab, it is possible to define user permissions to a data model.

Permissions can also be defined from the level of the repository level.

Users can be granted the following types of access rights:

- Edit

- Limited
- Preview
- None

	Connection	Data Source	Report/Dashboard
None	User cannot use the object	User cannot use the object	User cannot use the object
Read-only /Preview	User can use the object, but cannot modify, copy and save it.	User can use the object, but cannot modify, copy and save it.	User can use the object, but cannot modify, copy and save it. This is a read-only mode without an option of switching to the edition mode for dashboards, without a field list for reports.
Limited access	User can use, modify and rename an object. User cannot overwrite a given object and cannot delete/rename it in the repository. User can additionally edit the access rights to an object to a limited extent.	User can use, modify and rename the object. User cannot overwrite a given object and cannot delete/rename it in the repository. User can additionally edit the access rights to an object to a limited extent.	User can use, modify and rename the object. User cannot overwrite a given object and cannot delete/rename it in the repository. User can use the option “Open in Report”. User can additionally edit the access rights to an object to a limited extent.
Full access/Edition	User has full rights on the object.	User has full rights on the object.	User has full rights on the object.

7.2.1.7 Summary tab

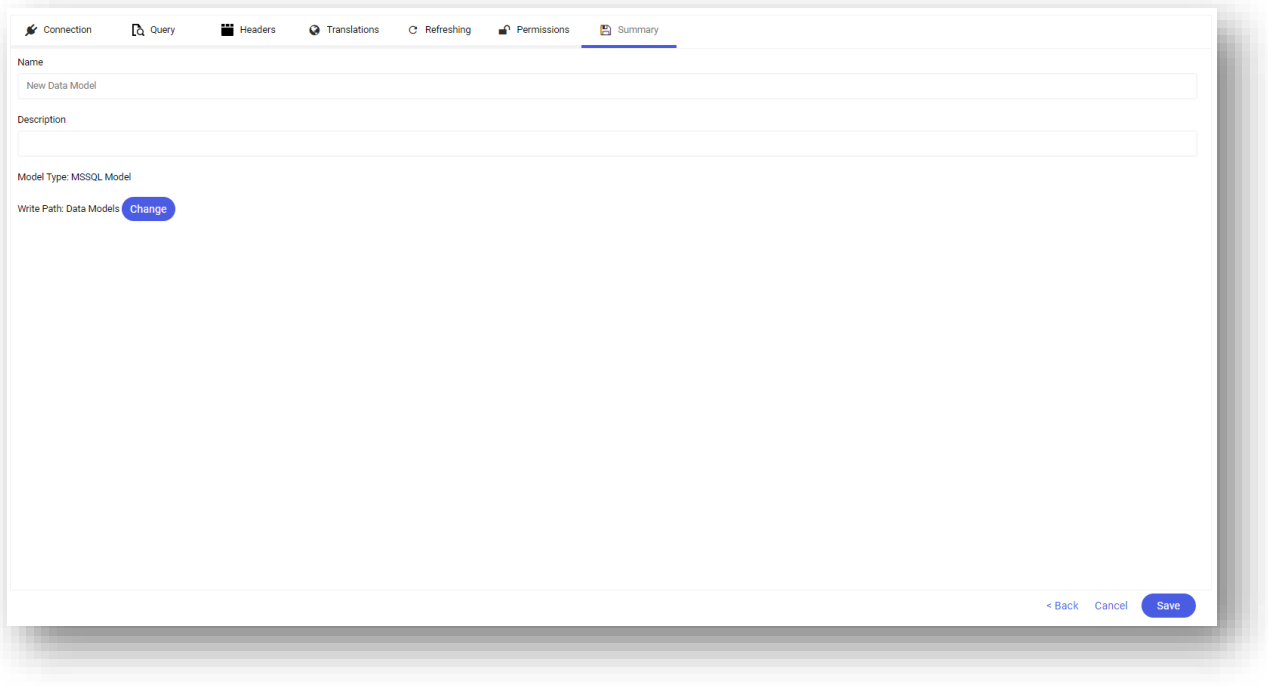


Figure 267 *Summary* tab

The *Save* tab contains a summary of the most important information.

7.2.2 Multisource model creation path

The wizard window is composed of 7 tabs described in the subsequent sub chapters.

A multi-source model can be composed of:

- File model, both local file (Excel or CSV) and FTP
- SQL model based on the connection of Postgres, MSSQL or ORACLE type
- Pared model of OLAP type
- Multi-source model composed of only simple models, that this those mentioned above

A multi-source model **cannot** be composed of the following:

- Full model of OLAP type
- SQL model based on ODBC connection
- Multi-source model containing a multi-source model

7.2.2.1 Connection tab

In order to create a multi-source model, in tab *Connections* it is necessary to type a model name and activate a switch *Multi-source Model*.

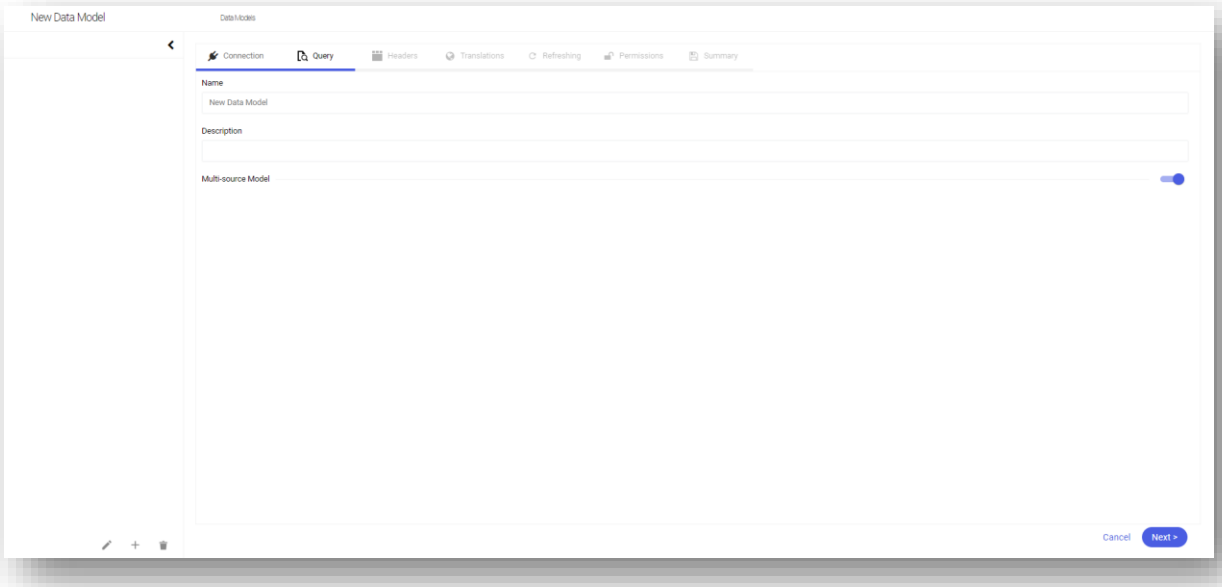


Figure 268 Connection – view when creating a multi-source model

Upon filling in the fields with model name and description, it is necessary to navigate to the next tab.

7.2.2.2 Query tab

In the *Query* tab, there is an area for building a scheme of a multi-source model. Blocks *Start* and *Stop* appear by default in this place and are used to indicate a direction of linking blocks.

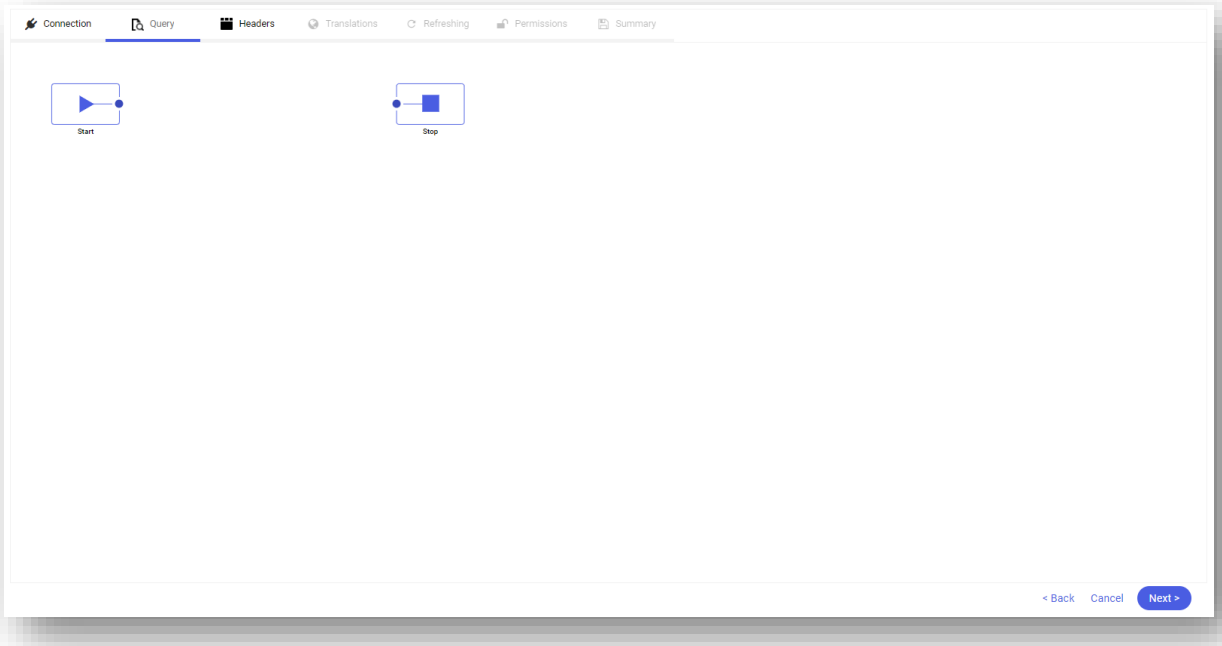


Figure 269 *Start* and *Stop* blocks

Models of which a scheme is to be built must be dragged into this area from the left panel.

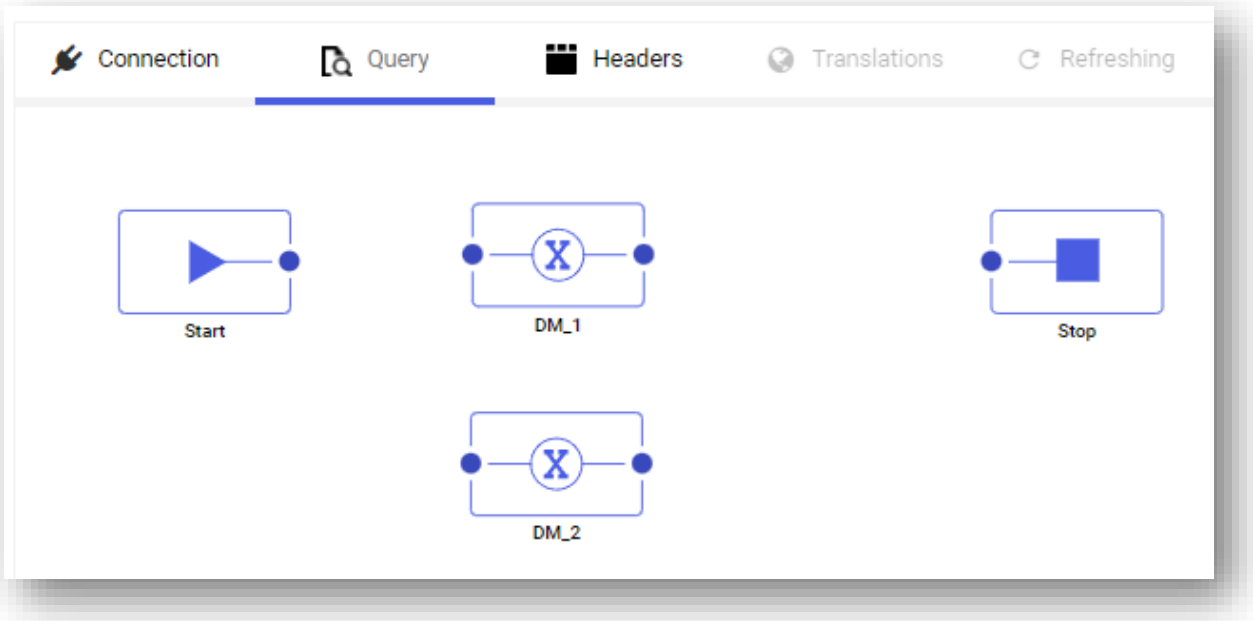


Figure 270 Model blocks dragged into a scheme field

Then, link the *Start* block with model blocks using the line (by clicking on the *Start* block dot and dragging it into the model block dot).

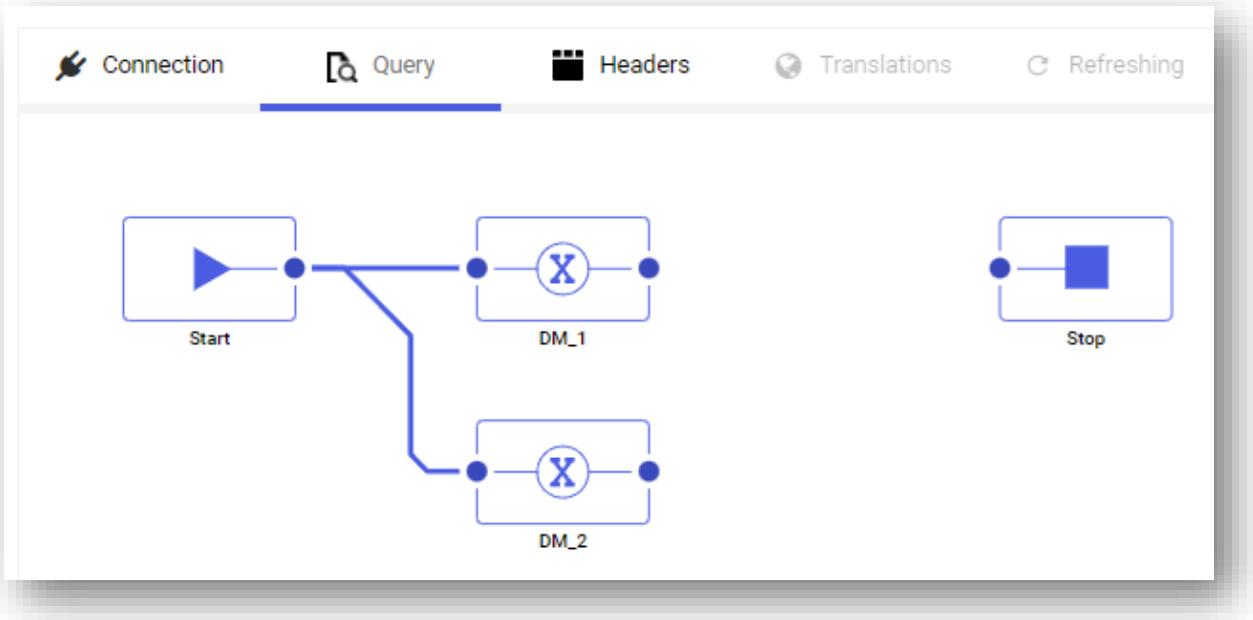


Figure 271 Linking blocks

In the next step, using the functions below, a method of combining data from component models is defined:

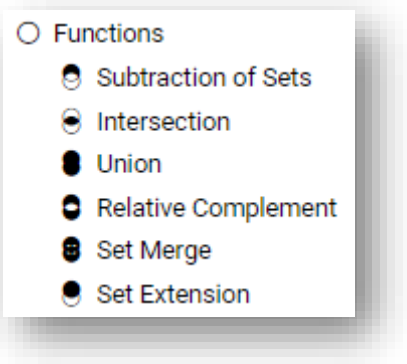


Figure 272 Logic functions

7.2.2.2.1 Examples of how to combine sets in a multisource model

Below are the examples of how to use all types of set combinations that are useful when creating multisource models.

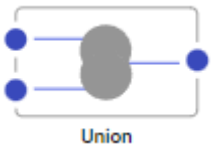
The source files are arranged as follows:

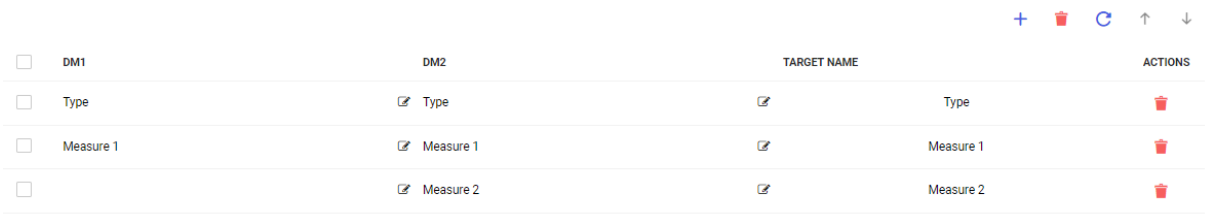
Type	Measure 1
a	1
b	2
c	3
d	4
e	5

Type	Measure 1	Measure 2
d	6	11
e	7	12
f	8	13
g	9	14
h	10	15

A key that will be used to combine is **type**.

Union

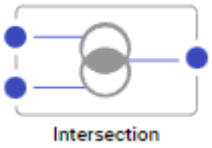




In the case of a union, the combination results will be the following:

TYPE	MEASURE 1	MEASURE 2
a	1	
b	2	
c	3	
d	10	11
e	12	12
f	8	13
g	9	14
h	10	15

Intersection

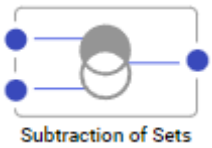


	DM1	DM2	TARGET NAME	JOINING COLUMN	JOIN NULLS	ACTIONS
☐	Type	Type	Type	☑	☐	
☐	Measure 1	Measure 1	Measure 1	☐	☐	
☐		Measure 2	Measure 2	☐	☐	

In the case of an intersection, the combination results will be the following:

TYPE	MEASURE 1	MEASURE 2
d	4	11
e	5	12

Subtraction of Sets



	DM1	DM2	TARGET NAME	JOINING COLUMN	JOIN NULLS	ACTIONS
☐	Type	Type	Type	☑	☐	
☐	Measure 1	Measure 1	Measure 1	☐	☐	
☐		Measure 2	Measure 2	☐	☐	

In the case of a subtraction of sets, the combination results will be the following:

TYPE	MEASURE 1	MEASURE 2
a	1	
b	2	
c	3	

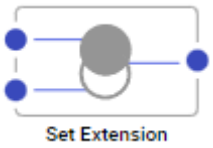
Relative Complement

	DM1	DM2	TARGET NAME	JOINING COLUMN	JOIN NULLS	ACTIONS
	Type	Type	Type	☑	☐	
	Measure 1	Measure 1	Measure 1	☐	☐	
		Measure 2	Measure 2	☐	☐	

In the case of a relative complement, the combination results will be the following:

TYPE	MEASURE 1	MEASURE 2
a	1	
b	2	
c	3	
f	8	13
g	9	14
h	10	15

Set extension

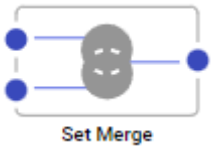


	DM1	DM2	TARGET NAME	JOINING COLUMN	JOIN NULLS	ACTIONS
	Type	Type	Type	☑	☐	
	Measure 1	Measure 1	Measure 1	☐	☐	
		Measure 2	Measure 2	☐	☐	

The results of linking in the case of set extension are the following:

TYPE	MEASURE 1	MEASURE 2
a	1	
b	2	
c	3	
d	4	11
e	5	12

Set Merge



DM1	DM2	TARGET NAME	JOINING COLUMN	JOIN NULLS	ACTIONS
Type	Type	Type	☑	☐	
Measure 1	Measure 1	Measure 1	☐	☐	
	Measure 2	Measure 2	☐	☐	

The results of linking in the case of set merging are the following:

TYPE	MEASURE 1	MEASURE 2
a	1	
b	2	
c	3	
d	4	11
e	5	12
f	8	13
g	9	14
h	10	15

After specifying the method of linking sets, blocks must be linked with logic functions using lines.

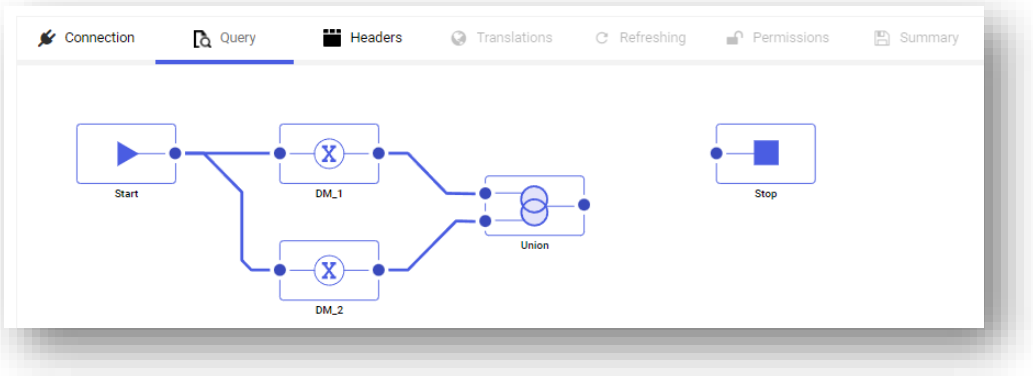


Figure 273 Linking models with the use of logic functions

Both logic functions must consecutively be linked with a common function.

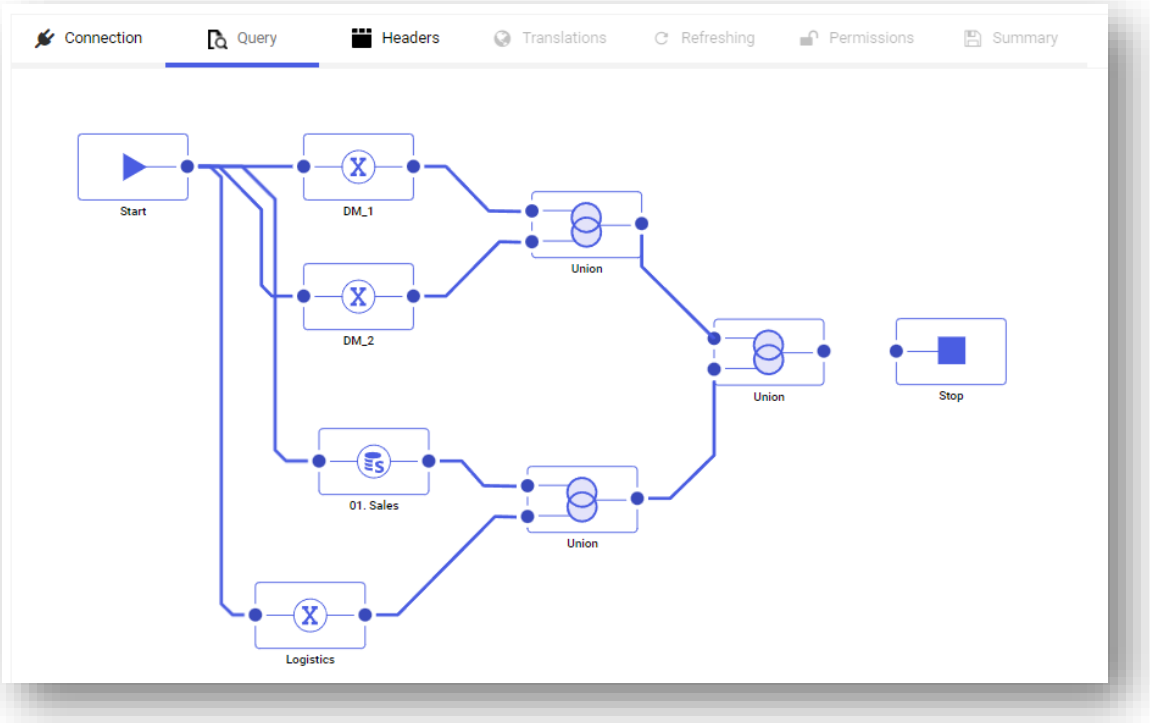


Figure 274 Combining logic functions

The last step of defining a query of multi-source model is linking the last block of the logic function from the scheme with a *Stop* block.

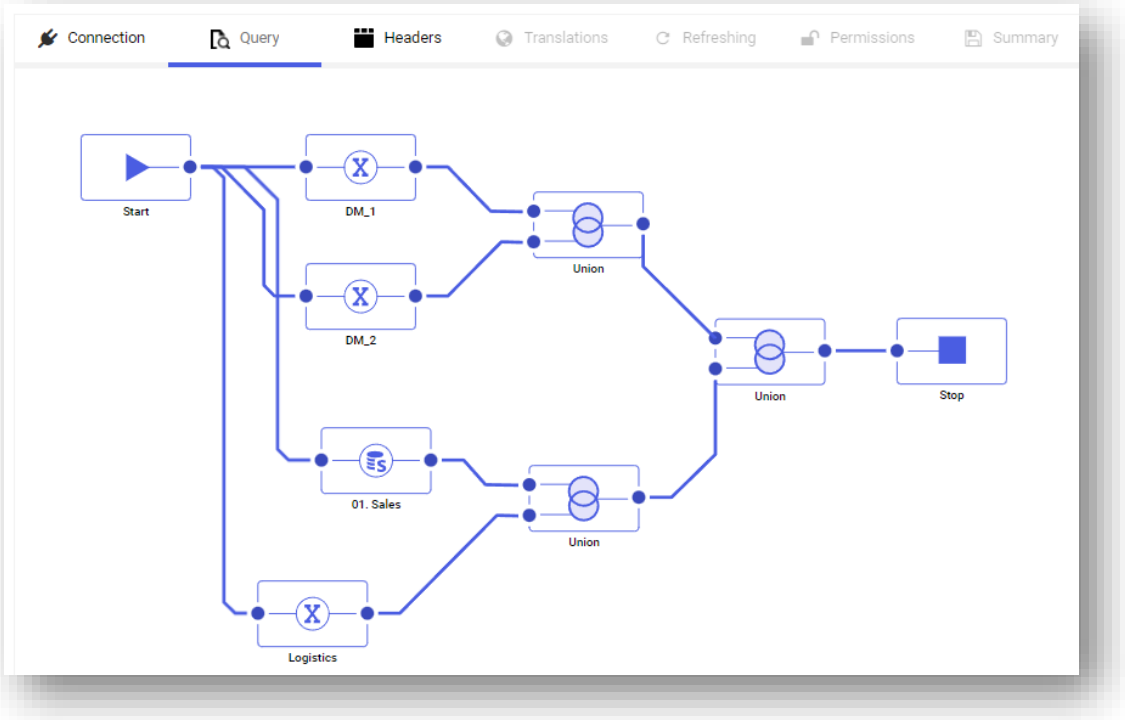


Figure 275 Linking with *Stop* block

By hovering the mouse cursor over the eye icon it is possible to switch to the block preview.

Figure 276 Block preview option

In the preview mode, a window presenting measures and dimensions used in the model and its parameters (provided that they were added) will open. It is possible to preview data for a specified number of rows and to proceed to editing the selected model.

In section *Parameters*, it is possible to define parameters or keep the default settings in the currently edited block.

In the opened window, it is possible to proceed to editing the entire model by selecting the button [**Edit**].

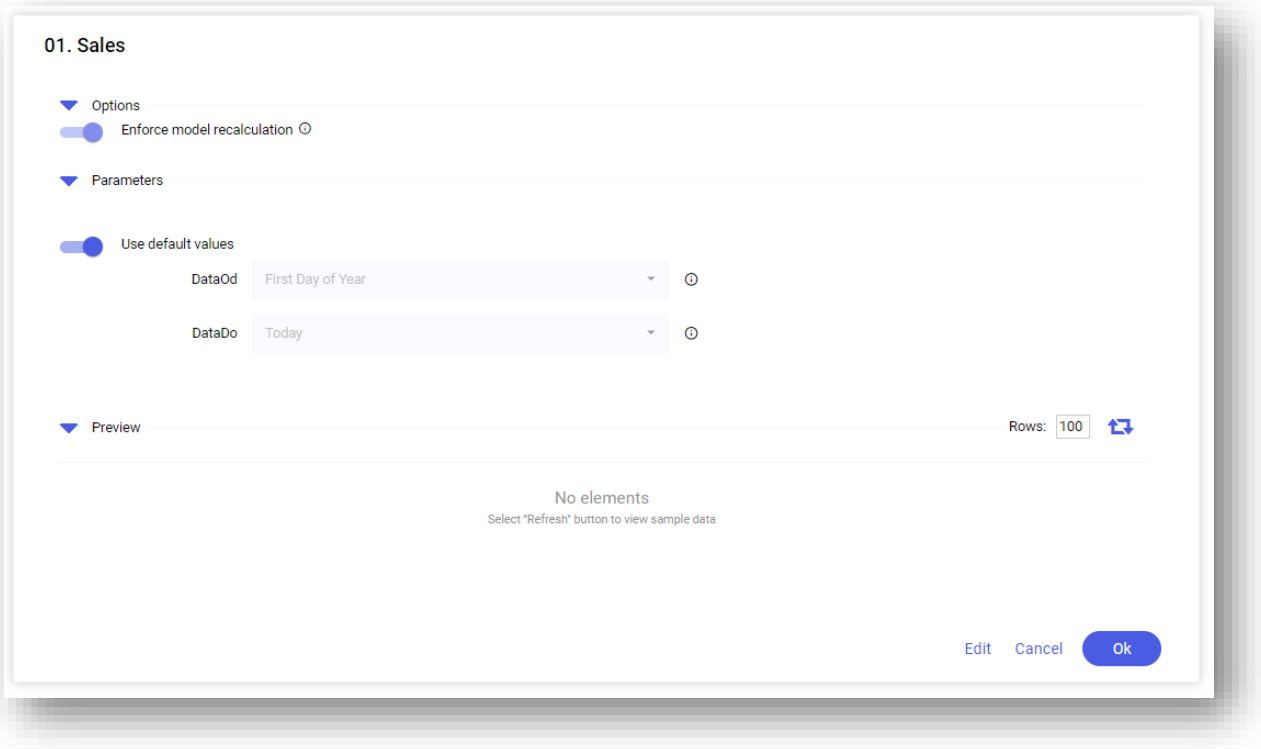


Figure 277 Preview of a component model

For more complex multisource models, if a multisource model was used as a component of another process, make sure to select the *Enforce model recalculation* option.

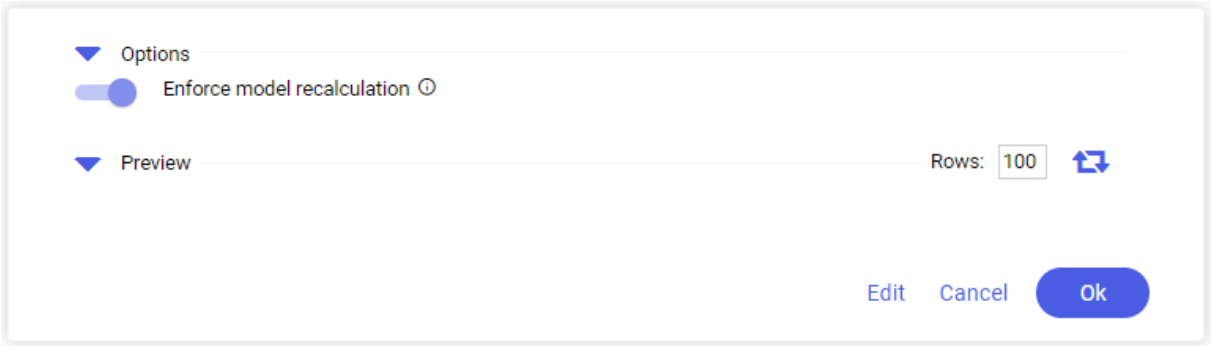


Figure 278 *Enforce model recalculation* option

Logic functions can be edited after hovering the mouse cursor over the icon  in the function block.

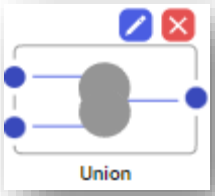


Figure 279 Editing a function block

In the preview mode, a window presenting data from the models, which are a combination of the used logic function, will appear. Options available in that window are the following:

adds new columns – unused data is available

deletes columns

refreshes column status

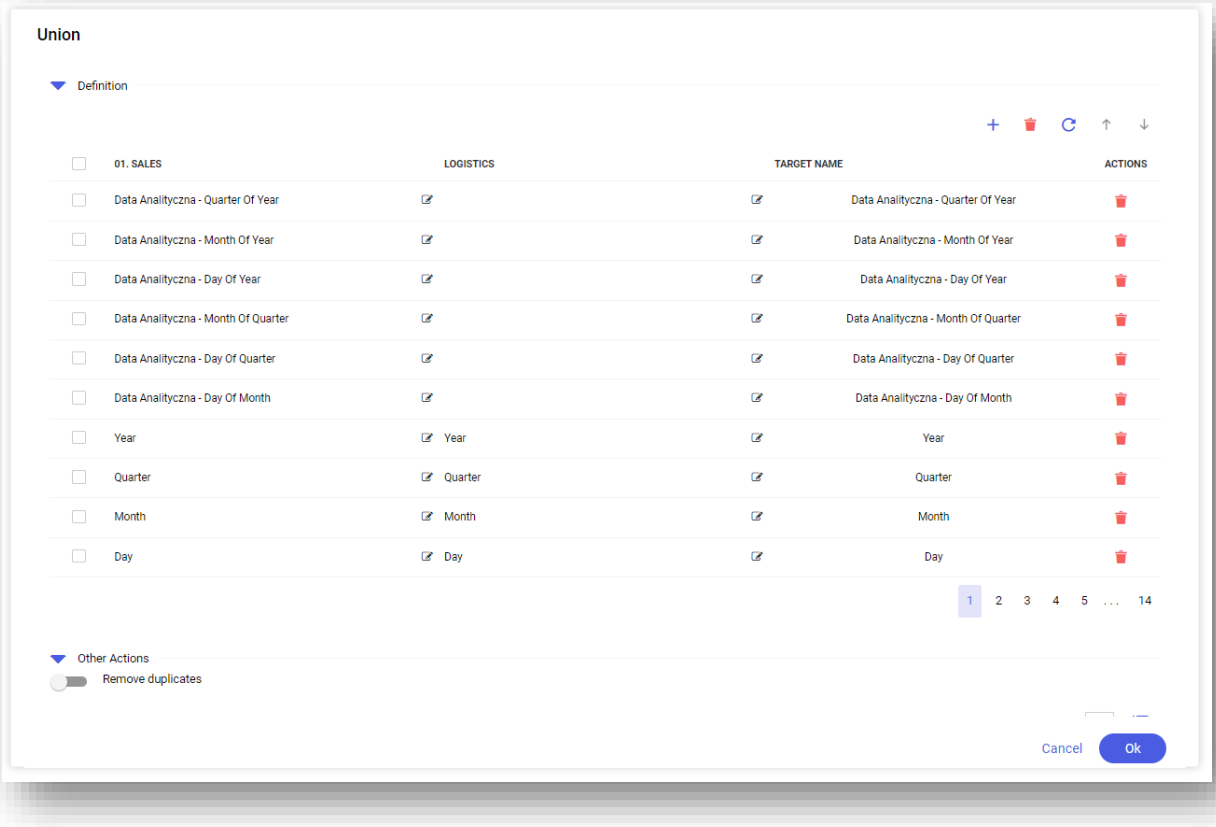
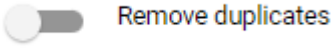


Figure 280 Editing a union

At the bottom of the window, there is a switch *Remove Duplicates* 

.

Using the sets below:

A: 1, 5, 10
B: 5. 10, 500

the results of the used functions are the following:

- union without duplicates: 1, 5, 10, 50, 500
- union with duplicates: 1, 5, 5, 10, 50, 500
- When attempting to navigate to the next tab, a validation process will be initiated in terms of the multi-source model correctness.
- Model correctness is verified when:
- navigating to the *Query* tab from the level of the edited model
- always before navigating to the *Headers* tab

If the created scheme contains incorrectly added elements, an error message will appear on the screen, where the invalid blocks will be highlighted in red.

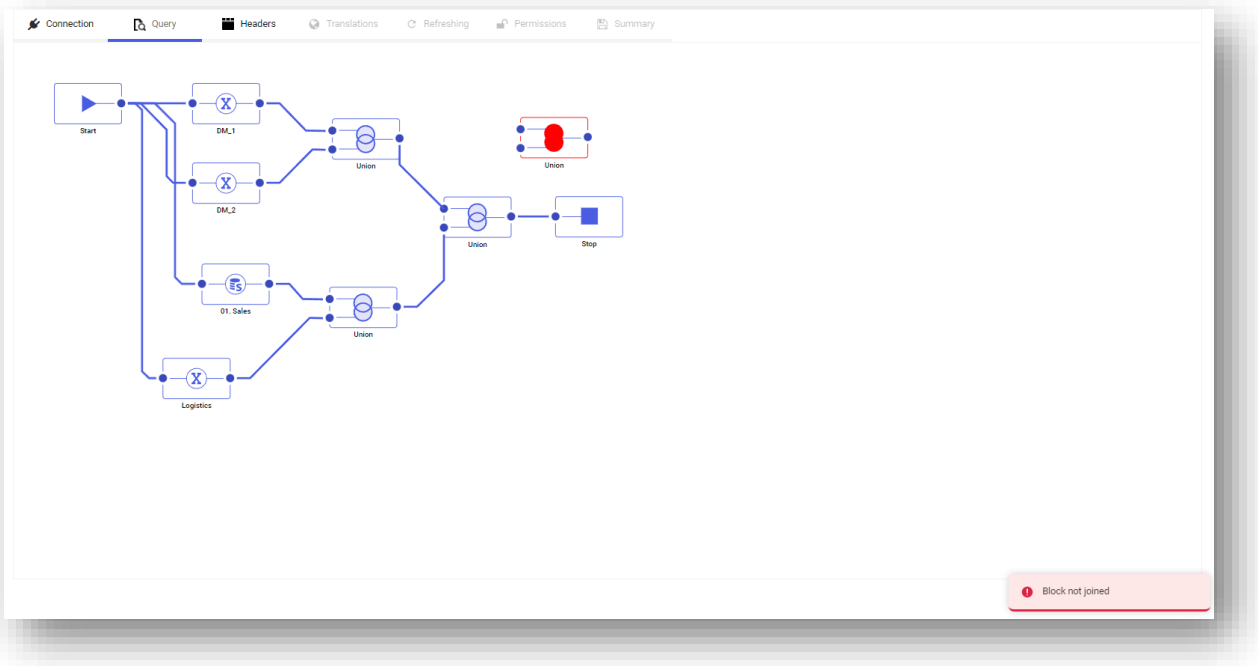


Figure 281 Message about an incorrect scheme

In the function edition window opened in a multisource model, there is a button used to display detailed names of dimension attributes – especially useful when two dimensions have the same attributes – it distinguishes which attributes exactly you are referring to.

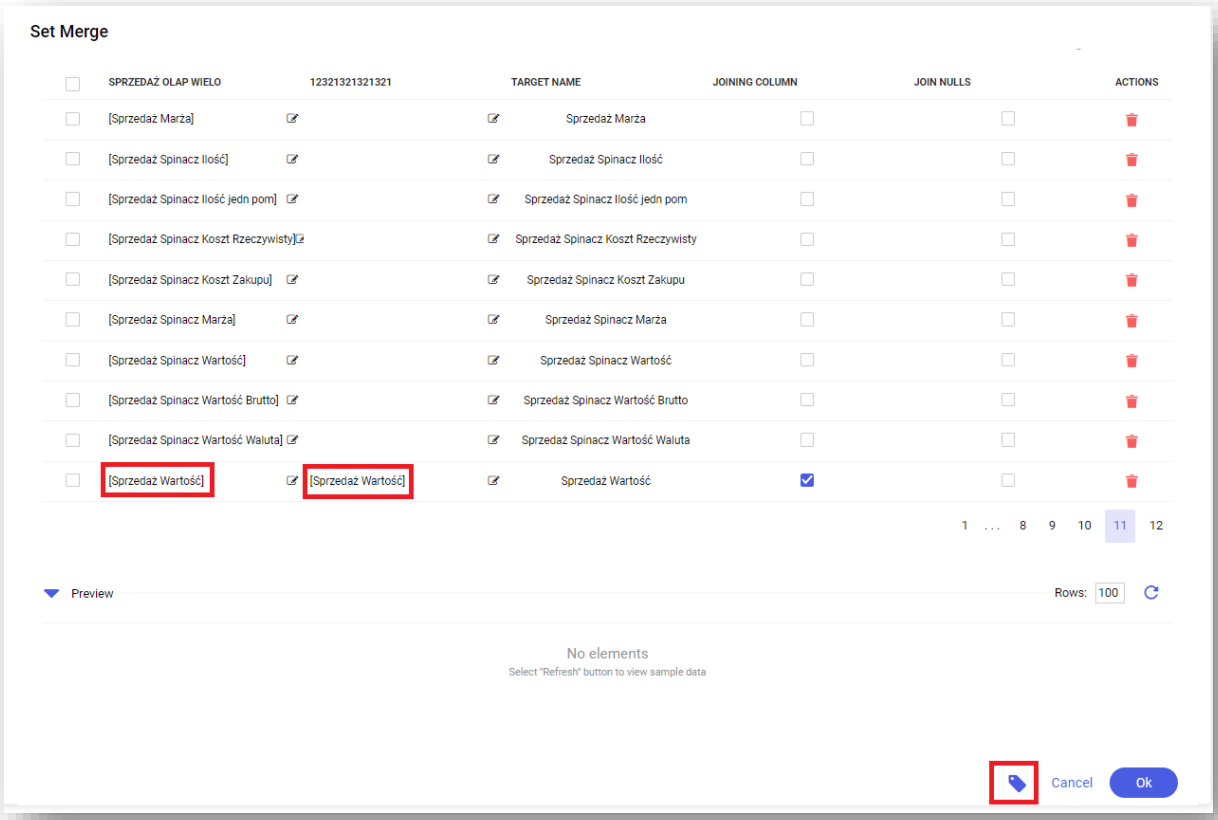


Figure 282 Display detailed name

Note: The Microsoft Edge browser does not support dragging a table when editing a query.

7.2.2.3 Headers tab

On the left side of the screen, there is a panel with measure and dimension tree, resulting from the scheme defined in the *Query* tab.

The tab is divided into two sections:

6 Source columns

7 Preview of target model's data

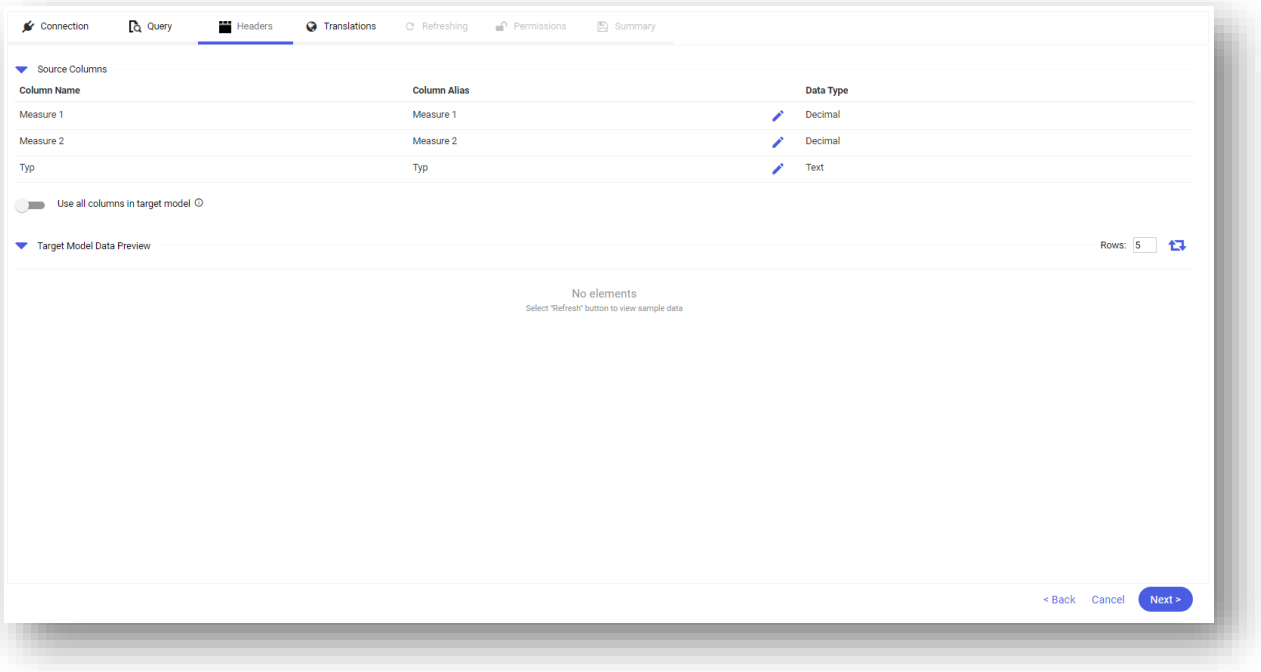


Figure 283 *Headers* tab in a multi-source model

Section *Source Columns* present the following:

8 Column Name – original name from data source

9 Column Alias – name representative instead of the original name from the source

10 Data type

In the second section, it is possible to preview data using the icon for a specified number of records.

7.2.2.3.1 Measures, dimensions, attributes, hierarchies – new elements

When defining a model, it is possible to define own dimensions, measures, attributes and hierarchies.

7.2.2.3.1.1 Measure groups

An own measure group can be created by selecting the button + in reference to the *Measures* element and then the option *New Measure Group*. When defining a new group, it is possible to include already defined measures in that group by dragging them into a relevant field in the definition. A measure can also be added to a measure group by dragging an element on the model tree. All dimensions in the model are insensitive. A measure extracted from a different group is removed from that group.

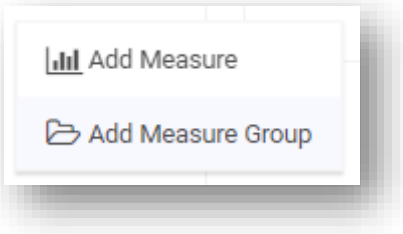


Figure 284 Measure groups

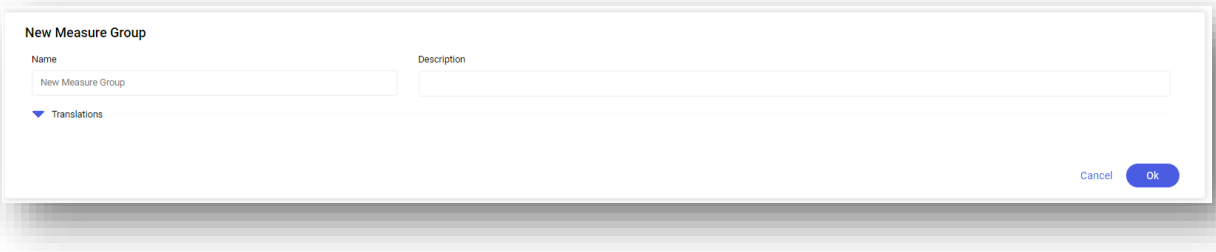


Figure 285 Creating measure groups

7.2.2.3.1.2 Measures – regular measures

Using a query, it is possible to view measures built on the basis of numeric columns, maintaining the previous mapping logics. A new measure can be created from the level of the tree by selecting + in reference to the *Measures* element or a specific measure group followed by the option *New Measure*. It is possible to define a simple measure.

When constructing a simple measure, the measure tree on the left side is insensitive.

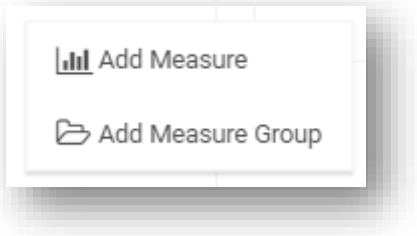


Figure 286 *Add Measure* option

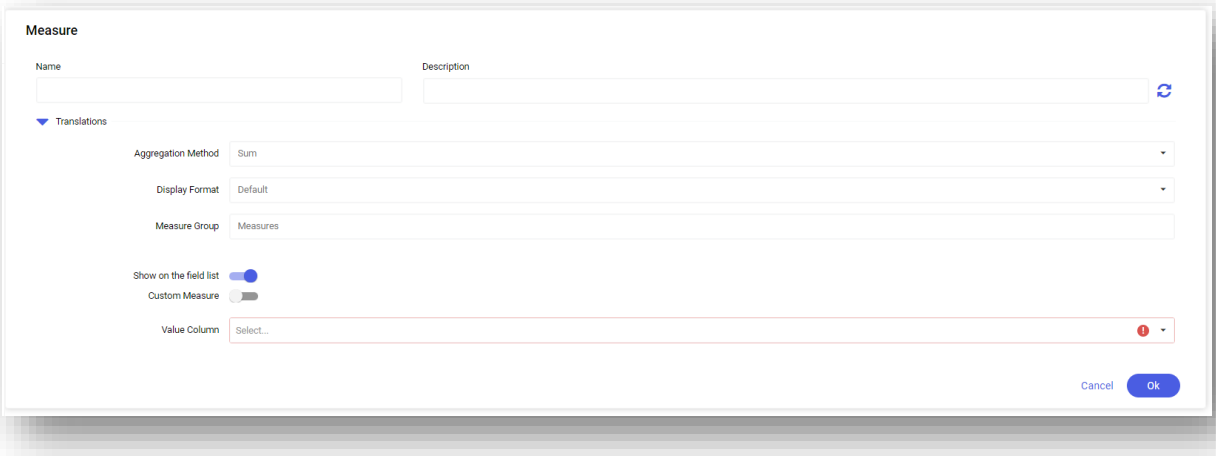


Figure 287 Creating a measure

Measures are always added from among the measures that were not previously used from the source. Names of those columns are available in the *Value Column*, whereas all columns from the source are available in the *Sort Column*.

7.2.2.3.1.3 Measures – custom measure

A custom measure definition is built with the use of appropriate operators. Numeric and value-based operators are used for measures, whereas text operators are used for attributes.

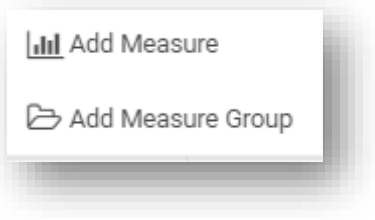


Figure 288 *Add Measure* option

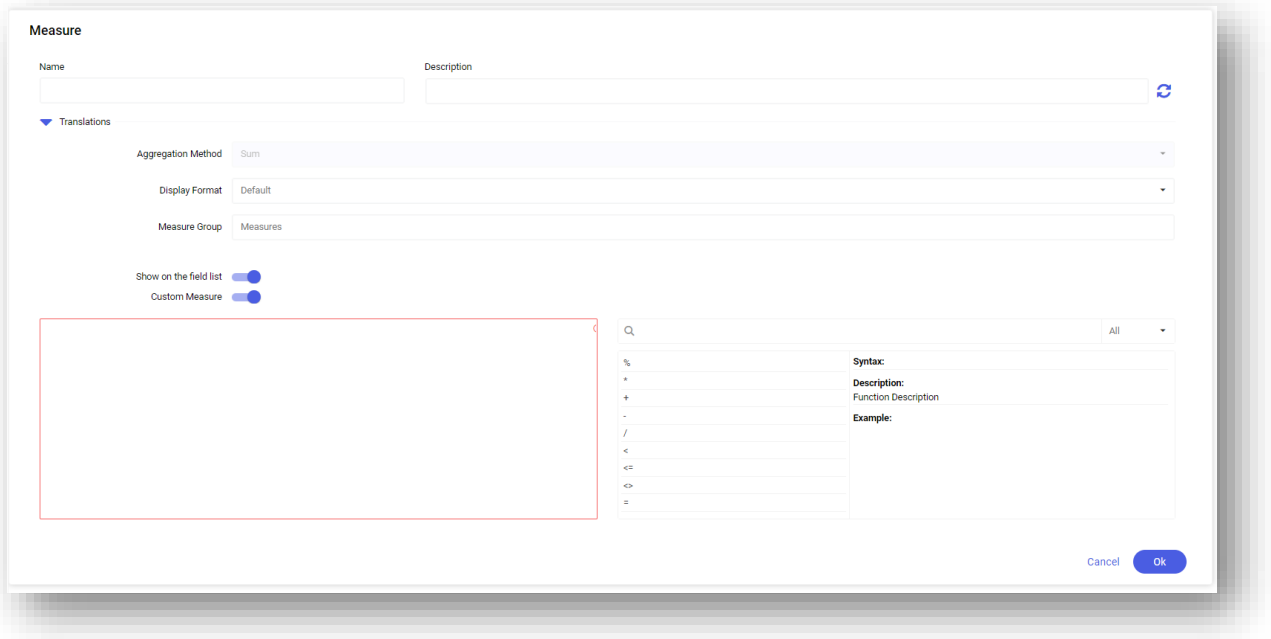


Figure 289 Creating a custom measure

7.2.2.3.1.4 Dimensions

In simple models, dimensions are added on the basis of a query – a user receives a dimension list with attributes that are part of those dimensions, by default. Dimensions are composed of text columns and maintain the previous mapping logic. A new dimension can be added from the level of the tree by selecting the button + (Add) in reference to *Dimensions* element.

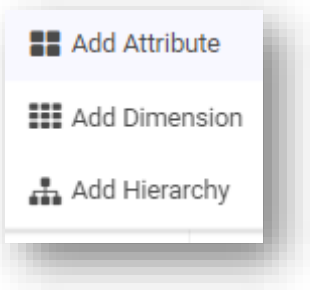


Figure 290 *Add Dimension* option

Upon selecting the option [**Add Dimension**], a dimension creation field will appear:

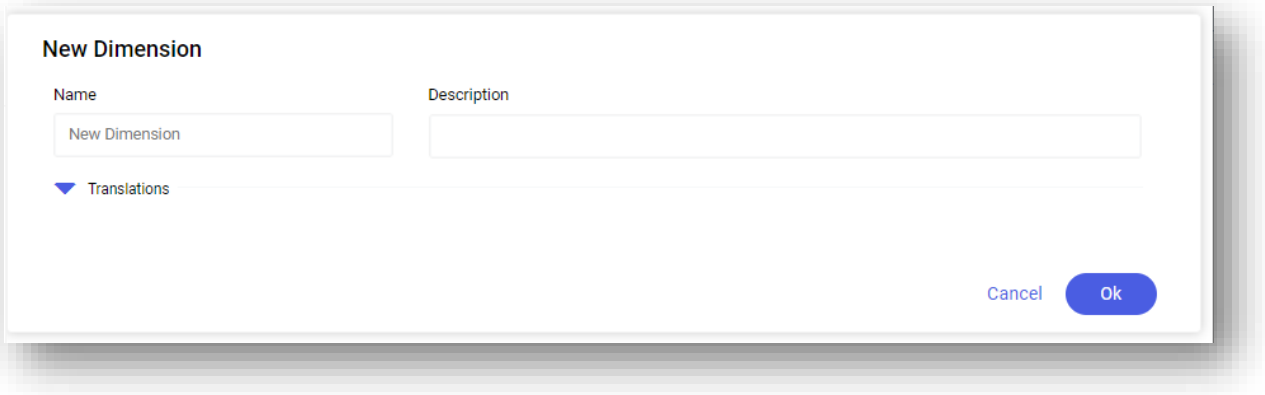


Figure 291 Creating a new dimension

7.2.2.3.1.5 Regular attribute

Selecting the option [**Add Attribute**]:

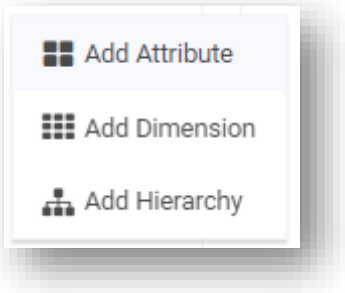


Figure 292 *Add Attribute* option

activates an attribute creation field:

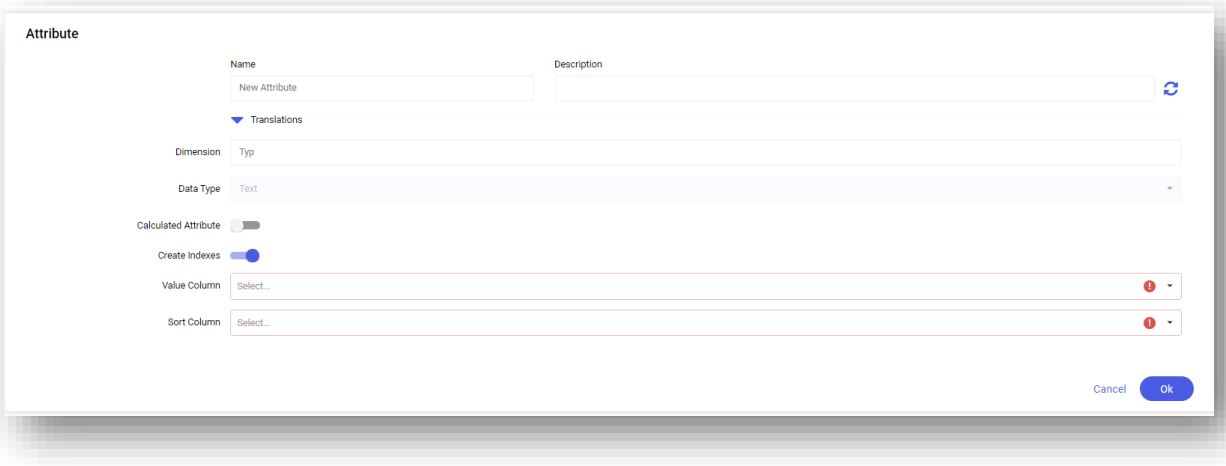


Figure 293 Adding an attribute

It is possible to select an attribute data type.

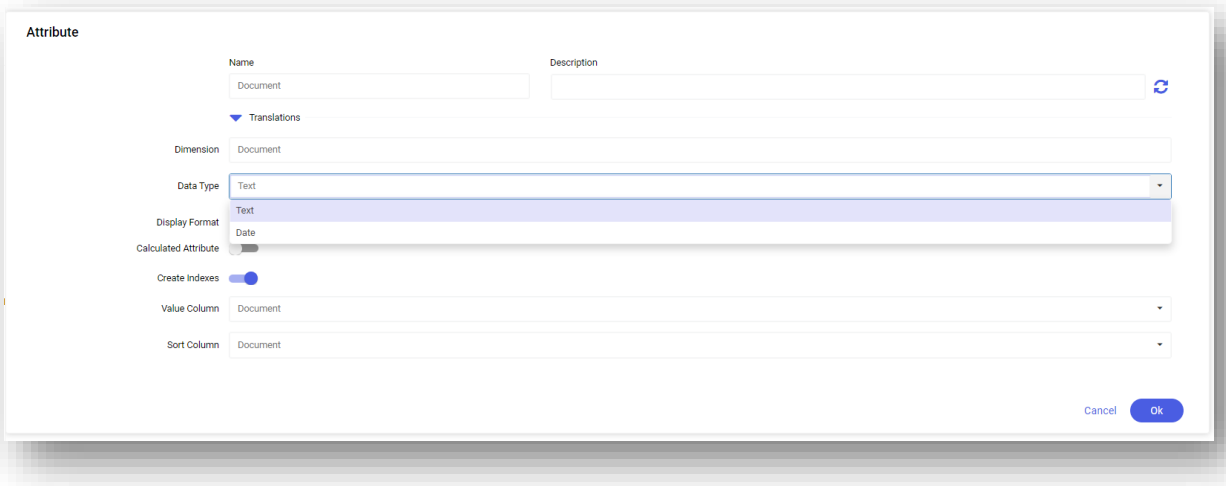


Figure 294 Attribute data type

It the wizard window, it is necessary to specify also the name of value column and a sort column, which are selected from drop-down lists.

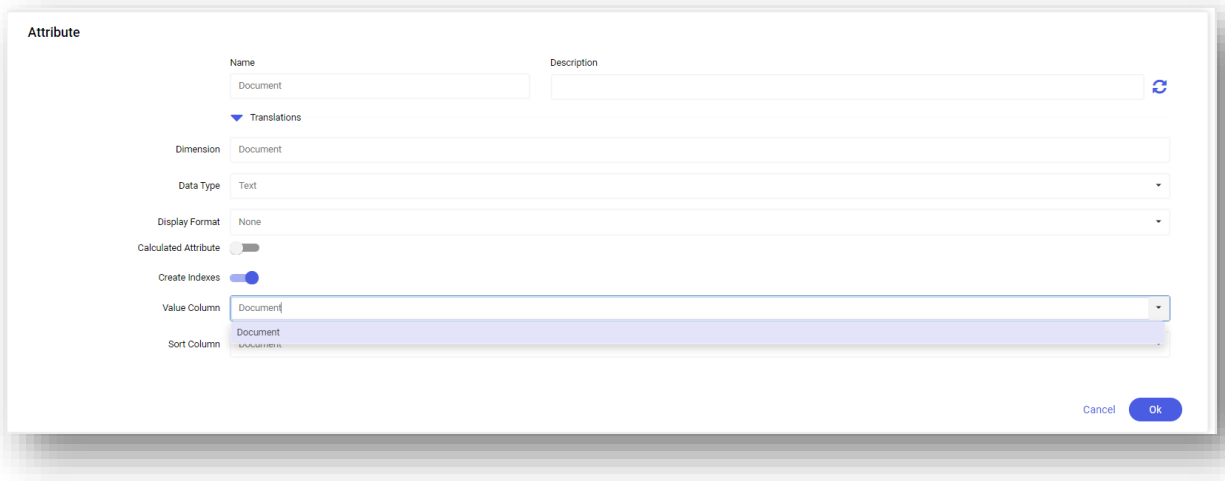


Figure 295 Value column

Time hierarchy

A **time hierarchy** is a specific type of attribute. Time dimensions are presented by default in the time hierarchy and are sorted by the key.

In the exemplary model below, which is based on MSSQL connection, dates have been used:

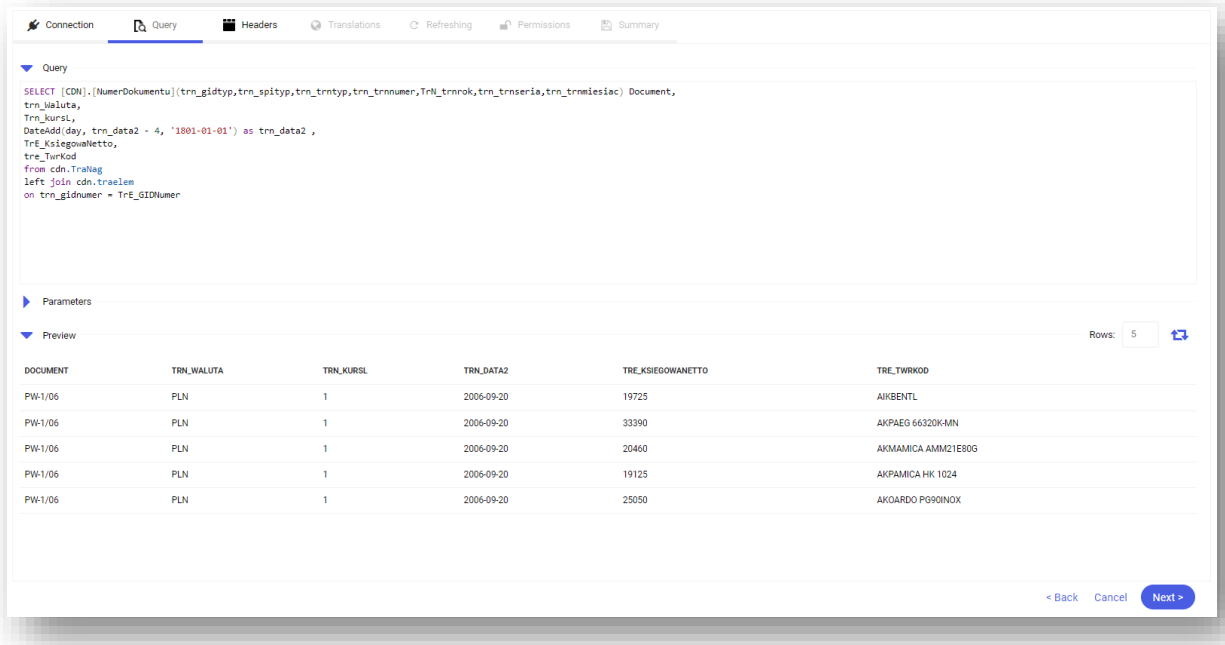


Figure 296 Time hierarchy – sample data model with time hierarchy – query

BI Point has created automatically a time hierarchy presented in the panel on the left. Upon refreshing, the data was recalculated automatically for each element of the time hierarchy.

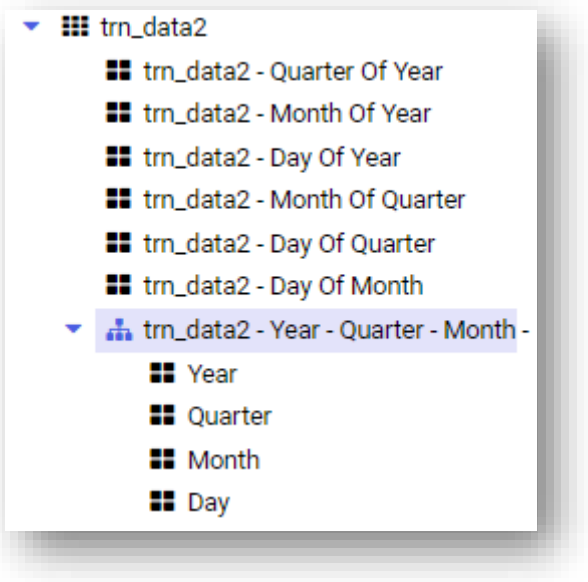


Figure 297 Time hierarchy – automatic recalculation of date in hierarchies

A time attribute can be edited after clicking on the time attribute in the report tree.

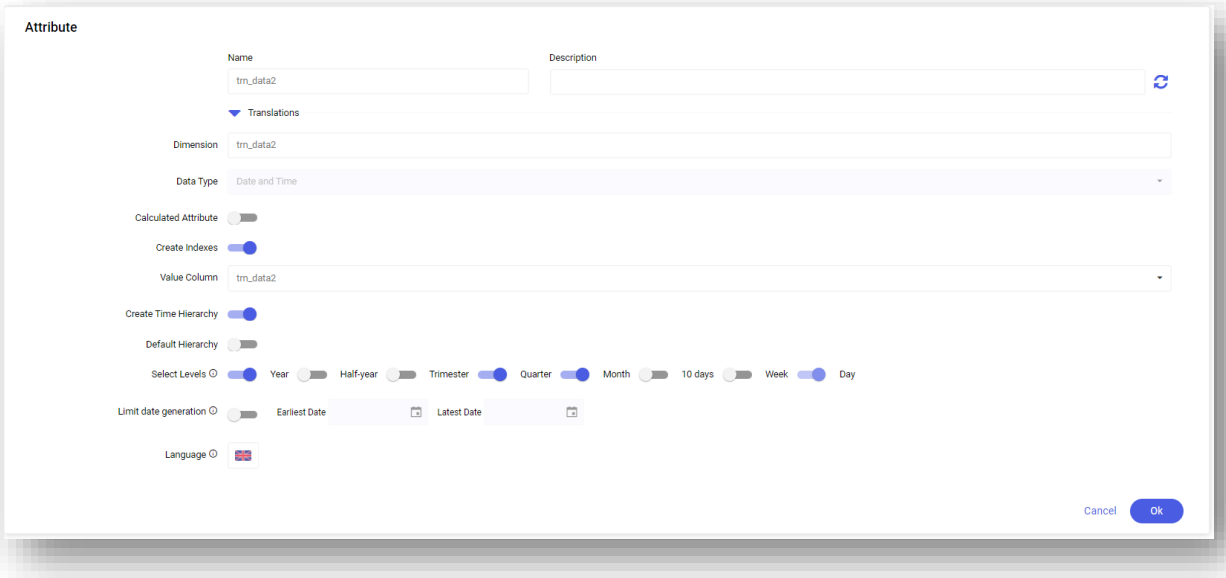


Figure 298 Time hierarchy – attribute edition

It is possible to use here a calculated attribute.

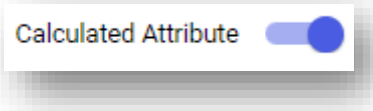
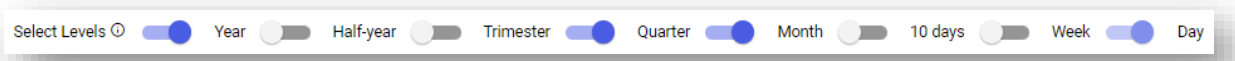


Figure 299 Time hierarchy – calculated attribute

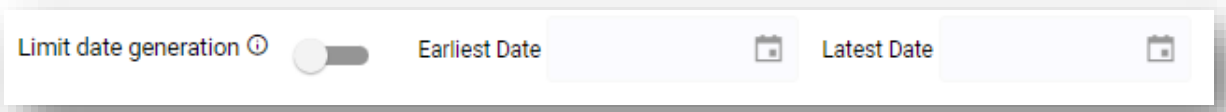
When editing an attribute, it is also possible to create indexes with a value column and a sort column. Then, after activating the switch *Create time hierarchy* it is possible to select the following levels:

- Year
- Half-year
- Trimester
- Quarter
- Month
- 10 days
- Week

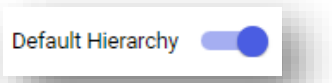
These settings relate to the entire model.



When *Limit time generation* option is selected, it is possible to indicate the time range for which a time hierarchy will be generated.



If several time hierarchies are used, it is also possible to select which of them to use when for default model recalculations.



7.2.2.3.1.6 Calculated attribute

It is possible to define a calculated attribute that is presented on a single row level.

An attribute is calculated and displayed during model recalculation.

Selecting the option [**Add Attribute**]:

Figure 300 *Add Attribute* option

activates an attribute wizard field:

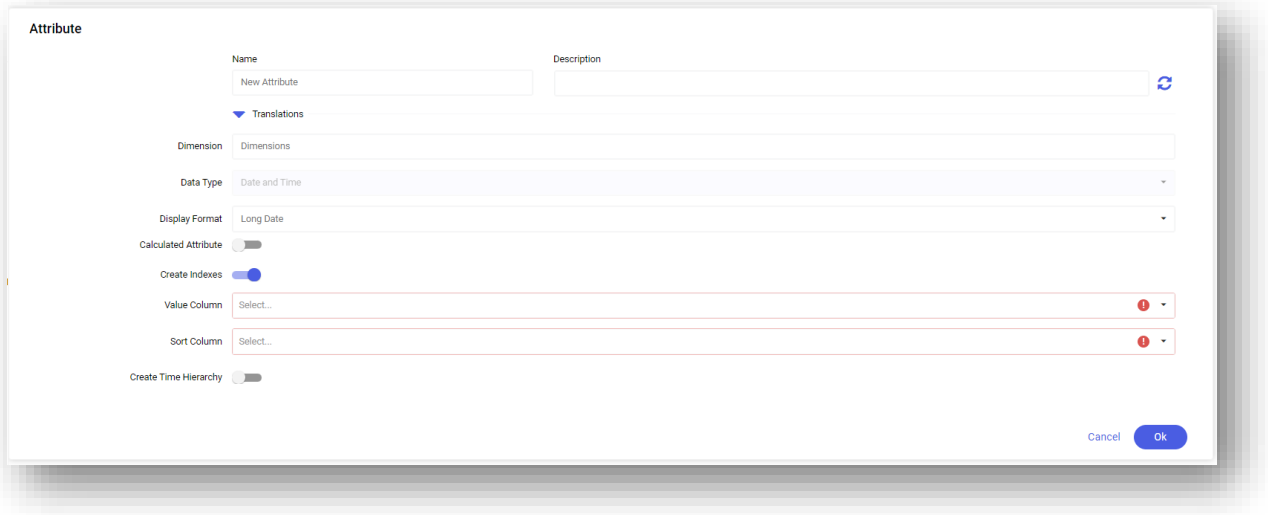
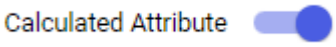


Figure 301 Creating an attribute

It is necessary to activate here the switch 

[**Calculated attribute**].

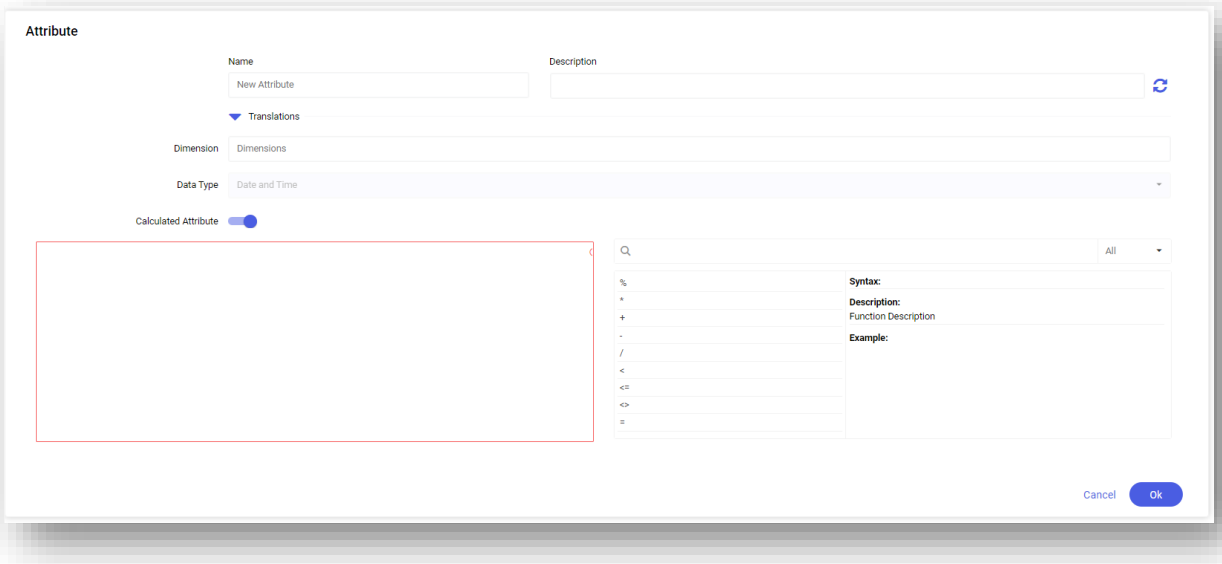


Figure 302 Calculated attribute

An attribute definition is built with the use of appropriate operators. Numeric and value-based operators are used for measures, whereas text operators are used for attributes.

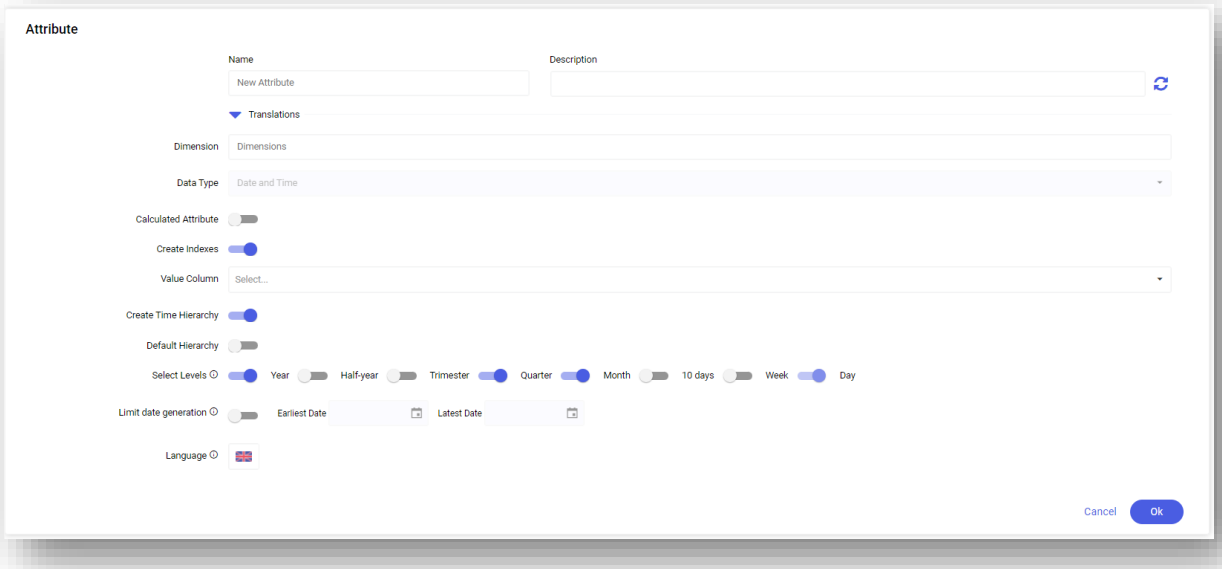


Figure 303 Time hierarchy level

The *Language* option refers to the entire model.

7.2.2.3.1.7 Hierarchies

An own hierarchy can be defined by selecting the attributes of which it will be composed. A new hierarchy is added by selecting the + button in reference to a specific dimension. A hierarchy can be composed only and exclusively of attributes that are included in the same dimension. A hierarchy can be moved to another dimension

using the options available in the dimension definition or by dragging it on the tree. The order of levels can be changed by changing the elements in the definition or by operating on a model tree.

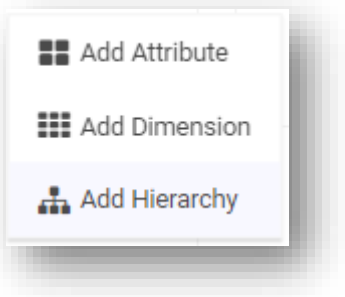


Figure 304 *Add Hierarchy* option

7.2.2.3.1.8 Logical functions

Function	Category	Description	Example
AVG	Aggregation	Returns an average value	AVG([Sales Margin])
COUNT	Aggregation	Returns a number of elements fulfilling the specified criteria	COUNT([Sales Margin])
DISTINCTCOUNT	Aggregation	Returns a number of unique elements of a set	DISTINCTCOUNT([Sales Margin])
MAX	Aggregation	Returns the largerst element	MAX([Sales Margin])
MIN	Aggregation	Returns the lowest element	MIN([Sales Margin])
SUM	Aggregation	Returns the sum of elements	SUM([Purchases Quantity])
SUMBY	Aggregation	Calculates the sum of elements of a numeric expression for a defined set of elements	SUMBY([Sales Quantity], SET([State].[Małopolskie], [State].[Mazowieckie))
MINBY	Aggregation	Returns the lowest value of a numeric expression for a defined set of elements	MINBY([Sales Quantity], SET([State].[Małopolskie]))
MAXBY	Aggregation	Returns the largest value of a numeric expression for a defined set of elements	MINBY([Sales Quantity], SET([State].[Małopolskie]))
AVGBY	Aggregation	Returns an average value of a numeric expression for a defined set of elements	AVGBY([Sales Quantity], SET([State].[Małopolskie], [State].[Mazowieckie], [State].[Wielkopolskie]))

Function	Category	Description	Example
RUNNINGSUM	Aggregation	Aggregates incrementally the measure for subsequent elements of the specified set using the sum value	RUNNINGSUM([Sales Value], [Year])
RUNNINGAVG	Aggregation	Aggregates incrementally the measure for subsequent elements of the specified set using the average value	RUNNINGAVG([Sales Value], [Year])
RUNNINGMIN	Aggregation	Aggregates incrementally the measure for subsequent elements of the specified set using the minimum value	RUNNINGMIN([Sales Value], [Year])
RUNNINGMAX	Aggregation	Aggregates incrementally the measure for subsequent elements of the specified set using the maximum value	RUNNINGMAX([Sales Value], [Year])
DATEADD	Time	Returns a date greater by a specified number of days/months/years in reference to the date specified as an argument	DATEADD(date_part, interval, date), DATEADD(day, data1, 100)
DATEDIFF	Time	Returns the difference of years/months/days between the specified dates	DATEDIFF(date_part, date1, date2,), DATEDIFF(year, data1, data2)
TODAY	Time	Returns a current date	TODAY()
PriorMonth	Time	Returns the value of measure in a previous month	PriorMonth([Sales Value], 1)
PriorQuarter	Time	Returns the value of measure in a previous quarter	PriorQuarter([Sales Value], 1)
MonthPriorYear	Time	Returns the value of measure for a given month a year earlier	MonthPriorYear([Sales Value], 1)

Function	Category	Description	Example
QuarterPriorYear	Time	Returns the value of measure for a given quarter a year earlier	QuarterPriorYear([Sales Value], 1)
PriorYear	Time	Returns the value of measure in the previous year	PriorYear([Sales Value], 1)
PriorDay	Time	Returns the value of measure on the previous day	PriorDay([Sales Value], 1)
DayPriorYear	Time	Returns the value of measure for a given day a year earlier	DayPriorYear([Sales Value], 1)
FILTER	Filtering	Filters the set by a specified filter condition and returns the set of elements fulfilling the given condition	FILTER ([Date of Issue], [Sales Value] > 5000)
FILTERBY	Filtering	Returns the values of measure (expression) after filtering by a specified set	FILTERBY ([Sales Value], SET([Year].[2010]))
=	Logical	Elements equality operator	[Sales Value]=[Purchase Value]
<>	Logical	Compares elements - different from	[Sales Value]<>[Purchase Value]
<	Logical	Less than	[Sales Value]<[Purchase Value]
<=	Logical	Less than or equal to	[Sales Value]<=[Purchase Value]
>=	Logical	Greater than or equal to	[Sales Value]>=[Purchase Value]
>	Logical	Greater than	[Sales Value]>[Purchase Value]
NOT	Logical	Logical operator "DIFFERENT FROM"	NOT([Geography].[Country] = 'Poland')
AND	Logical	Combines logical condtions	AND([Sales Quantity] >= 0 , [Sales Quantity] < 10)
OR	Logical	Logical operator "OR"	OR([Sales Quantity] > 100 , [Sales Value < 100000)
LIKE	Logical	Compare text with a default template. % replaces any character	LIKE([State] , 'M%')
ISEMPTY	Logical	Checks whether a defined set is not empty	ISEMPTY([Sales Value])
CASE	Logical	Estimates a defined expression and,	CASE [Region] WHEN 'West' THEN 1 WHEN 'East' THEN 2 ELSE 3 END

Function	Category	Description	Example
		depending on the result, assigns one of the defined variants to it	
CURRENTLEVEL	Logical		
IF	Logical	Checks whether the specified condition is true and, depending on the results, returns the expression specified in the function arguments (if true, if false)	IF ([Customer] = 'ABC', [Discount] = 0.1, [Discount] = 0.05)
+	Operators	Plus operator	[Purchase Cost]+[Distribution Cost]
-	Operators	Minus operator	[Total Cost]-[Purchase Cost]
*****	Operators	Multiply operator	[Unit Price]*[Quantity]
****	Operators	Divide operator	[Sales Value]\[Quantity]
SET	Sets	Funkcja pozwala utworzyć zbiór elementów wykorzystywany najczęściej do filtrowania	SET([Document Type].[Sales Invoice], [Document Type].[Sales Invoice Correction])
RANGE	Sets	Creates a set of elements of a given attribute based on a key	RANGE([Year].[2001], [Rok].[2010])
RANGEFROM	Sets	Creates a set of elements of a given attribute based on a key starting from the selected dimension element	RANGEFROM([Year].[2001])
RANGETO	Sets	Creates a set of elements of a given attribute based on a key from the beginning to the selected dimension element	RANGETO([Year].[2010])
UNION	Sets	Combines elements of two or more sets	UNION([Clients].[Group1], SET([Clients].[Group2], [Clients].[Group3]))
EXCEPT	Sets	Returns the difference of sets	EXCEPT([Clients].[Group 1], SET([Clients].[Group2]))
INTERSECT	Sets	Returns the product (common part) of sets	INTERSECT([Customer].[Target Customer], SET([Customer].[Real Customer]))
COMPLEMENT	Sets	Returns elements not contained in	COMPLEMENT([Time].[Year])

Function	Category	Description	Example
		the set (complement of the set)	
TOP	Sets	Returns the specified number of maximum elements from a given set in terms of the value of a given measure	TOP [Customer Name], 10, [Sales Value])
BOTTOM	Sets	Returns the specified number of minimum elements from a given set in terms of the value of a given measure	BOTTOM([Customer Name], 10, [Sales Value])
SPLIT	Sets	Gets elements from the end. A minus sign by element number means that the element if retrieved from the end and not from the beginning.	For instance, for values A-B-C-D-E-F of an attribute [category] Split([category], '-', 1) returns A Split([category], '-', -1) returns F

7.2.2.4 Translations tab

In the *Translations* tab, it is possible to add a translation to any dimension or any measure.

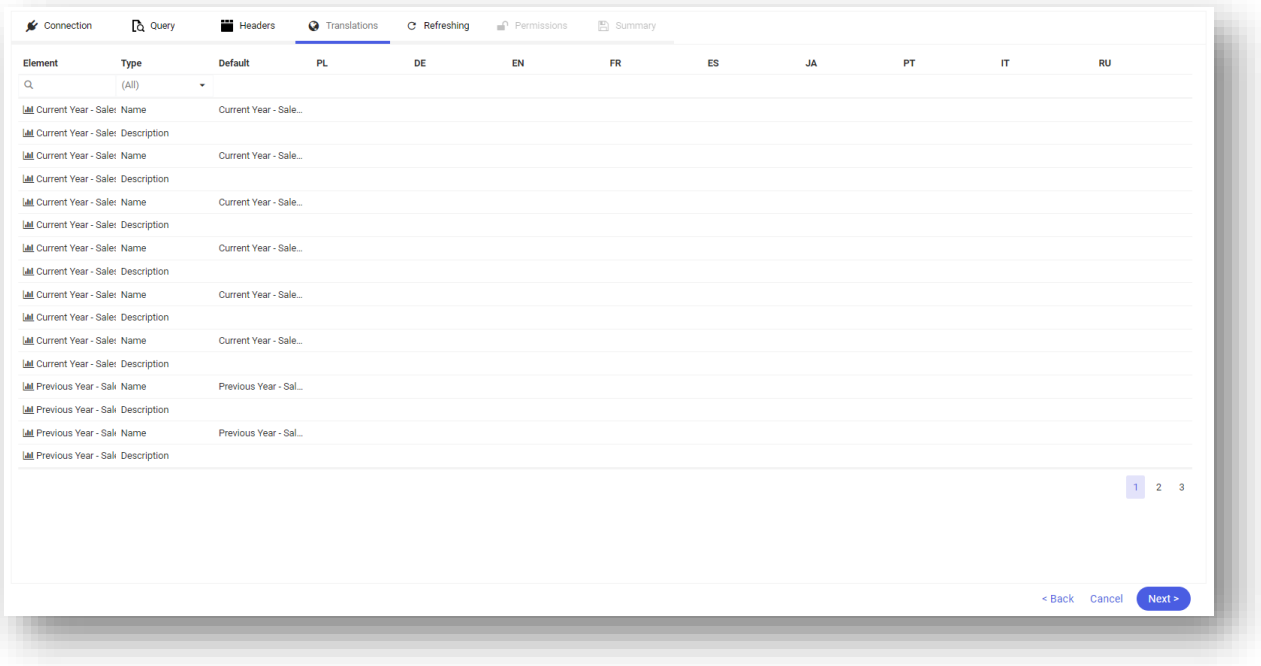
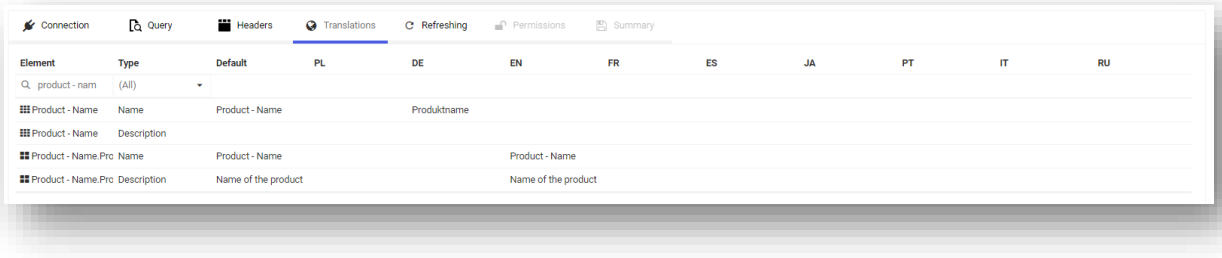


Figure 305 *Translation* tab

To do so, it is necessary to properly complete the window assigned to a given language.

The example below presents data for the *Product Name* dimension:



After creating a report and a dashboard (on the basis of the prepared data model), relevant translations are displayed for measures, dimensions and descriptions, depending on the set language.

7.2.2.5 Refresh tab

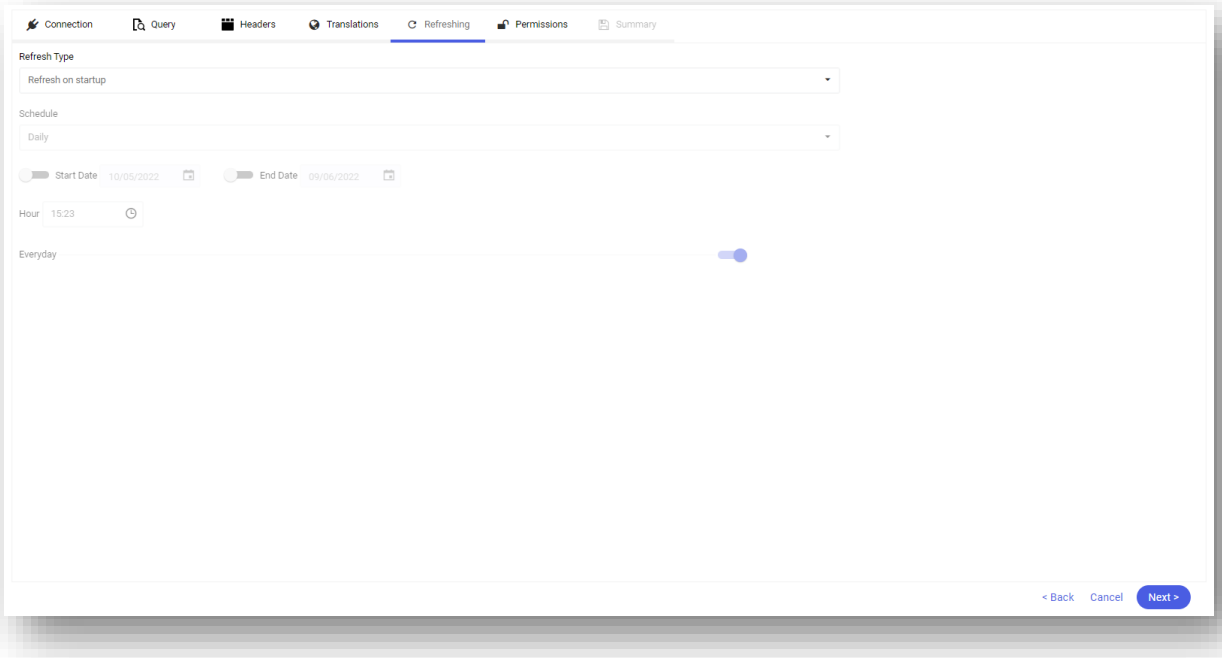


Figure 306 *Refresh* tab

Refreshing means recalculation or loading from the source.

There are three different modes of recalculating a data model:

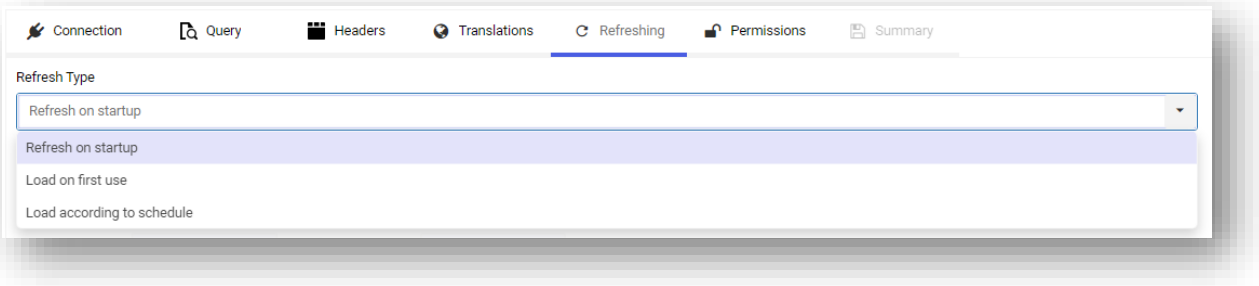


Figure 307 Data loading modes

- **Refresh on startup** – data is loaded each time a report or a dashboard is loaded
- **Load on first use** – data is loaded the first time a data mode is used
- **Load according to schedule** – data is loaded always at a specified time

When loading data according to a schedule, it is possible to define whether data must be loaded with an hourly, daily, monthly or one-time interval.

One-time schedule

When defining a one-time data update according to a schedule, it is possible to specify a date and time of refreshing data.

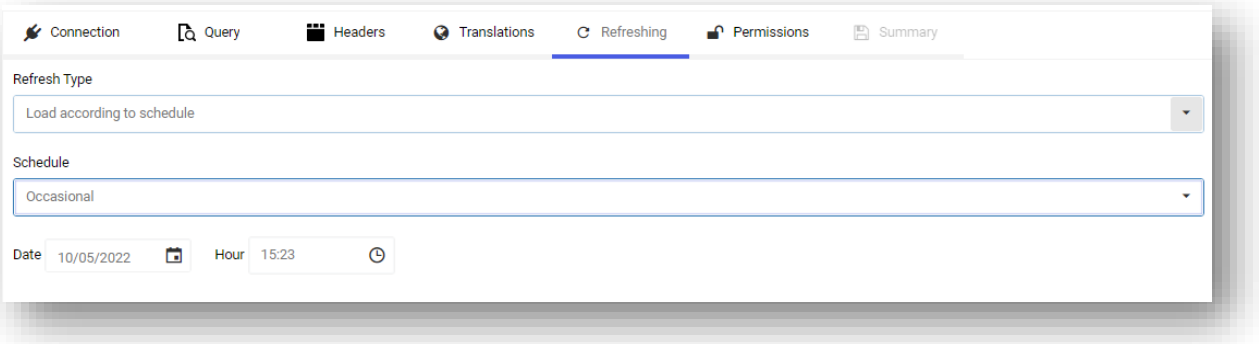


Figure 308 Refreshing by one-time schedule

Hourly schedule

When defining an hourly schedule, it is possible to specify start and end dates of data loading, starting from the time interval between consecutive loadings.

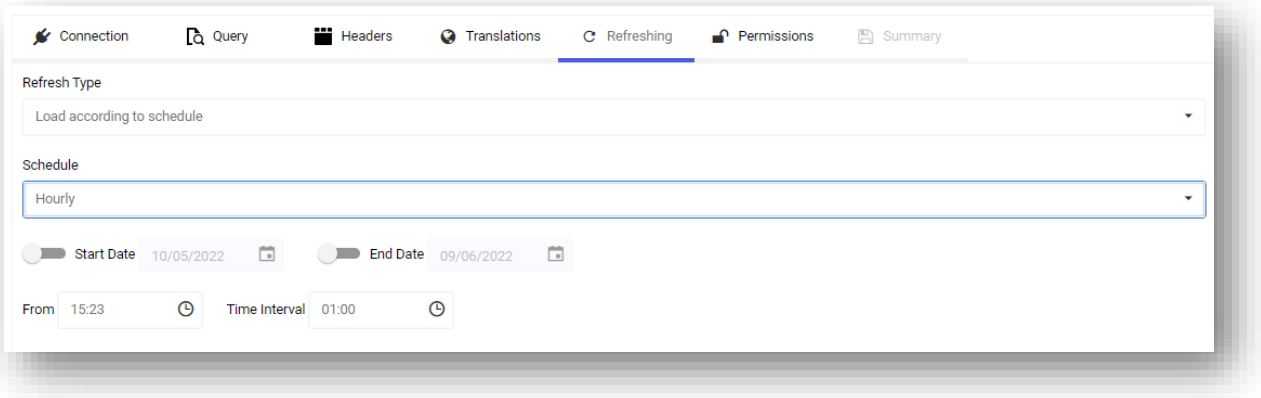


Figure 309 Refreshing by hourly schedule

Daily schedule

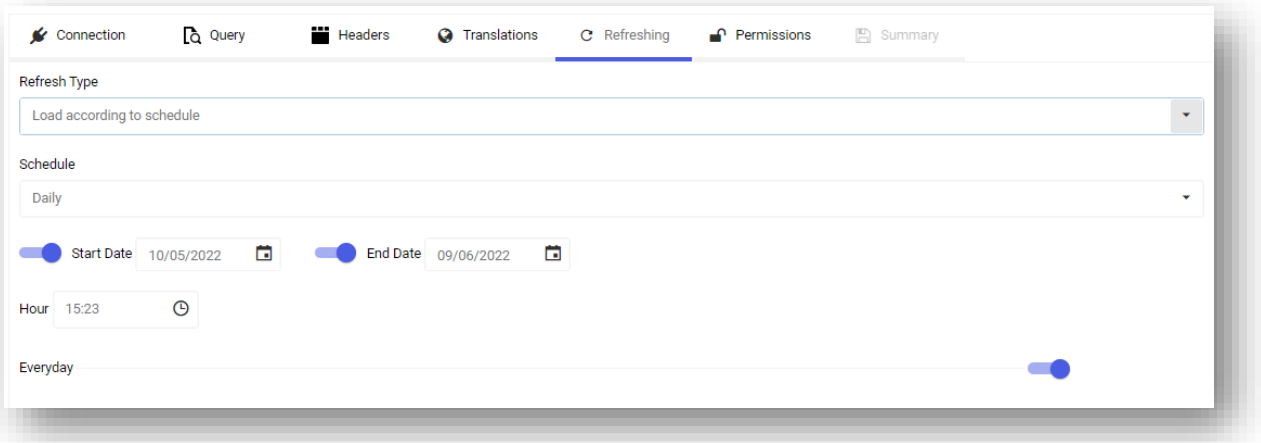


Figure 310 Refreshing by daily schedule

For a daily schedule, it is necessary activate a switch *Everyday* for data to be loaded every day.

Figure 311 *Everyday* switch

A user can define start and end dates as well as refresh time. It is also possible to specify weekdays on which data must be loaded – this option is available when the switch *Everyday* is deactivated.

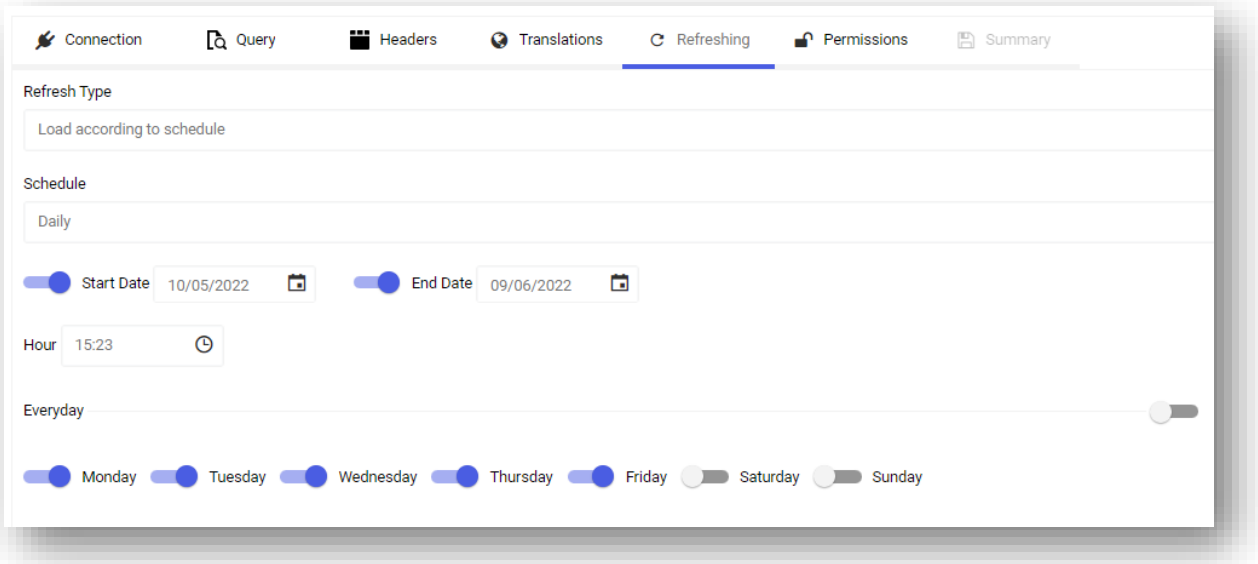


Figure 312 Refreshing by daily schedule with selected weekdays

Monthly schedule

When defining a monthly schedule, it is possible to specify start and end dates as well as time of data loading.

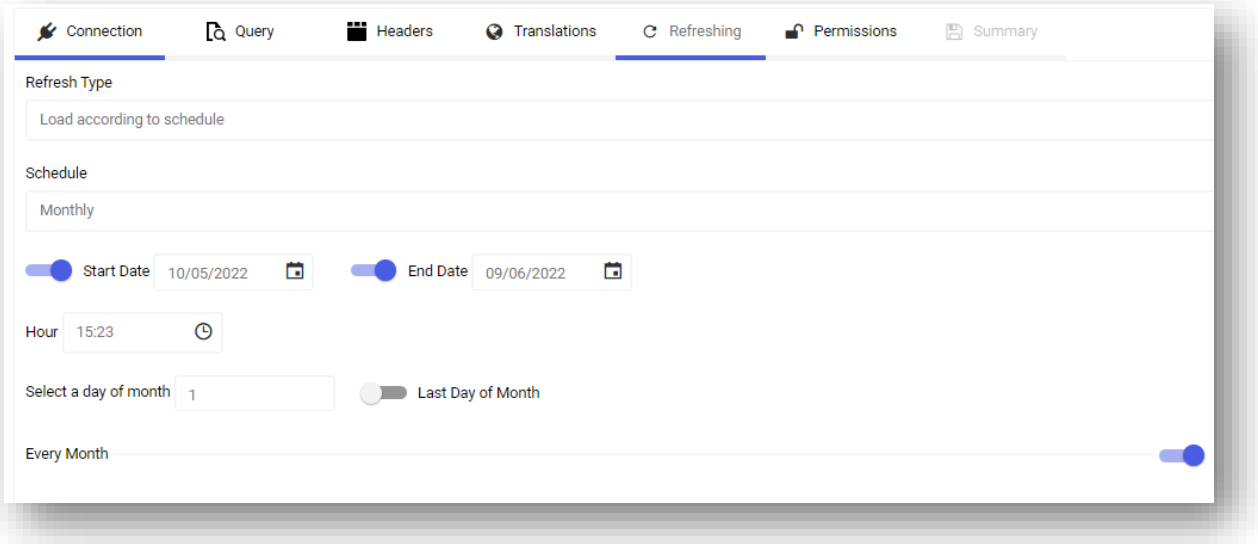


Figure 313 Refreshing by monthly schedule – start and end dates

It is possible to specify a day of each month, on which data loading is planned – this option becomes available upon deactivating the switch *Last Day of Moth*. With activated switch *Last Day of Month*, data will always be loaded on the last day of a month.

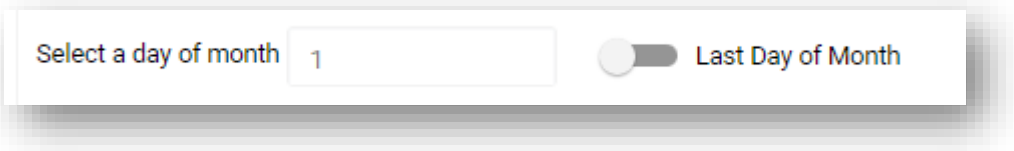


Figure 314 *Select a day of month* and a switch *Last Day of Month*

Next, it is possible to specify whether data must be loaded each month. To do so, a switch *Every Month* must be activated.

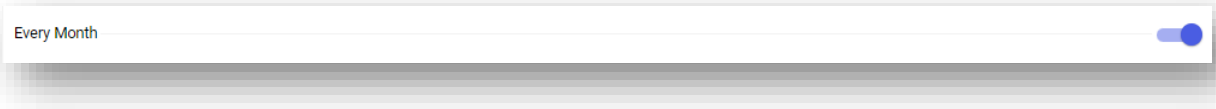


Figure 315 Switch *Every Month*

In order to define the month in which data must be loaded, it is necessary to deactivate the switch *Every Month*.

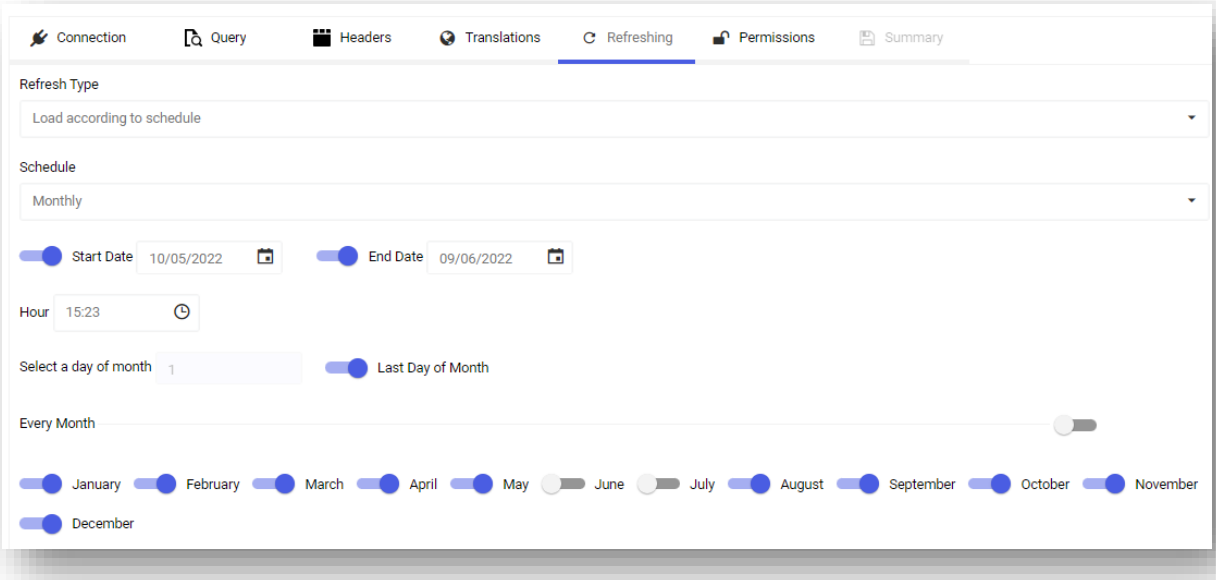


Figure 316 Refreshing by monthly schedule in selected months

7.2.2.6 Permissions tab

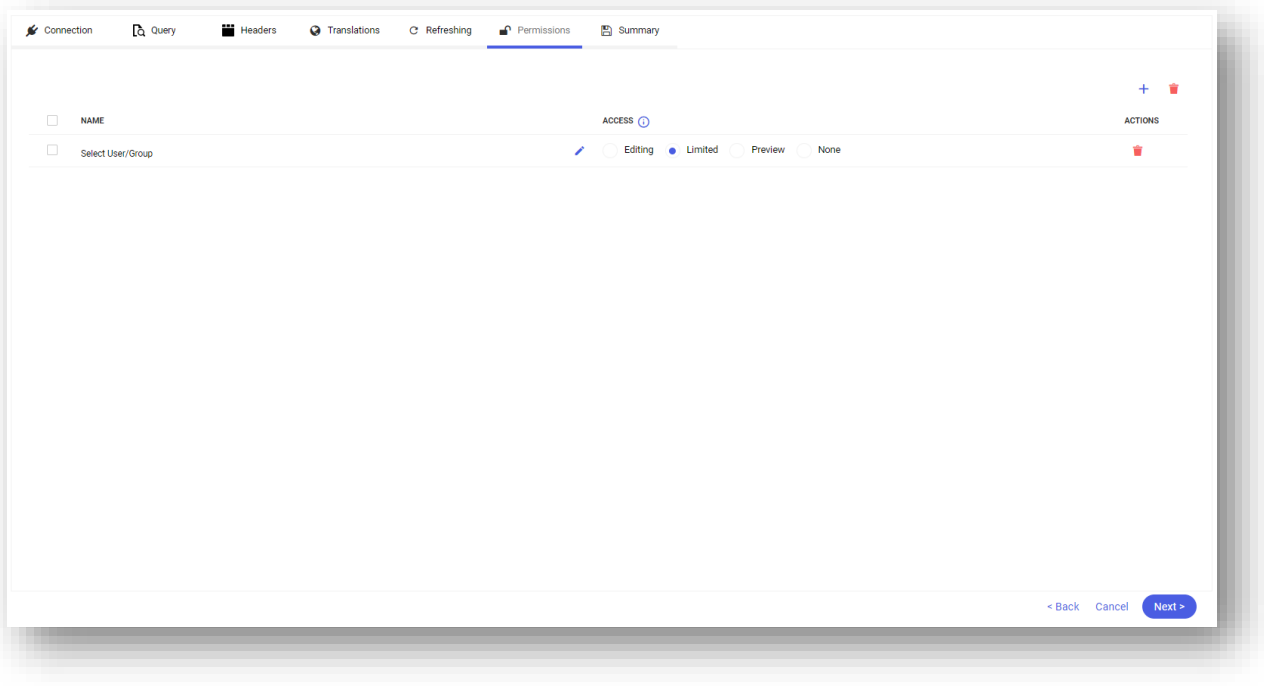


Figure 317 *Permissions* tab

In the *Permissions* tab, it is possible to define user permissions to a data model.

Permissions can also be defined from the level of data model and the repository. Permissions are included in the repository on the tree and when selecting a model in report and dashboard definition. Permissions are verified when opening a report and dashboard.

Users can be granted the following types of access rights:

- Edit
- Limited
- Preview
- None

	Connection	Data Source	Report/Dashboard
None	User cannot use the object	User cannot use the object	User cannot use the object
Read-only /Preview	User can use the object, but cannot modify, copy and save it.	User can use the object, but cannot modify, copy and save it.	User can use the object, but cannot modify, copy and save it. This is a read-only mode without an option of switching to the edition mode for dashboards, without a field list for reports.
Limited access	User can use, modify and rename the object. User cannot overwrite a given object and cannot	User can use, modify and rename the object. User cannot overwrite a given object and cannot	User can use, modify and rename the object. User cannot overwrite a given object and cannot

	Connection	Data Source	Report/Dashboard
	delete/rename it in the repository.	delete/rename it in the repository.	delete/rename it in the repository. User can use the option “Open in Report”
Full access/Edition	User has full rights on the object.	User has full rights on the object.	User has full rights on the object.

7.2.2.7 *Summary* tab

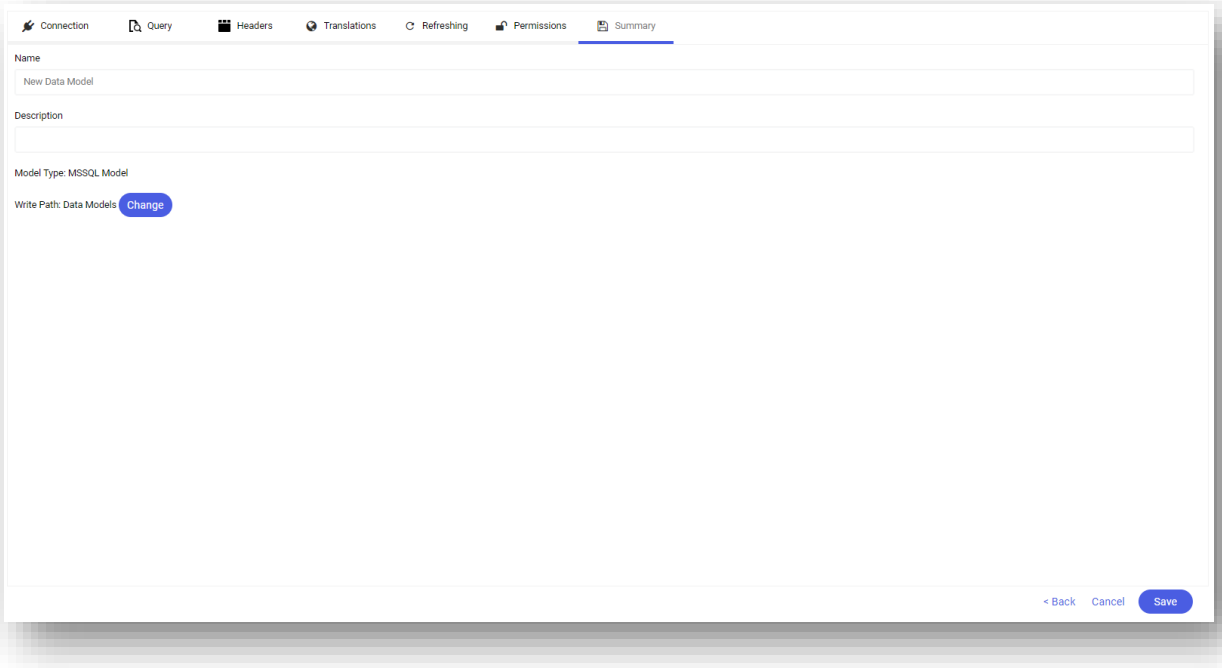


Figure 318 *Summary* tab

The *Summary* tab contains the summary of the most important information.

Figure 318 *Summary* tab – Select Folder

8 Figure Index

No table of figures entries found.