



# Datacenter User Guide

Version 2.0



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### **Created on**

2023/11/02

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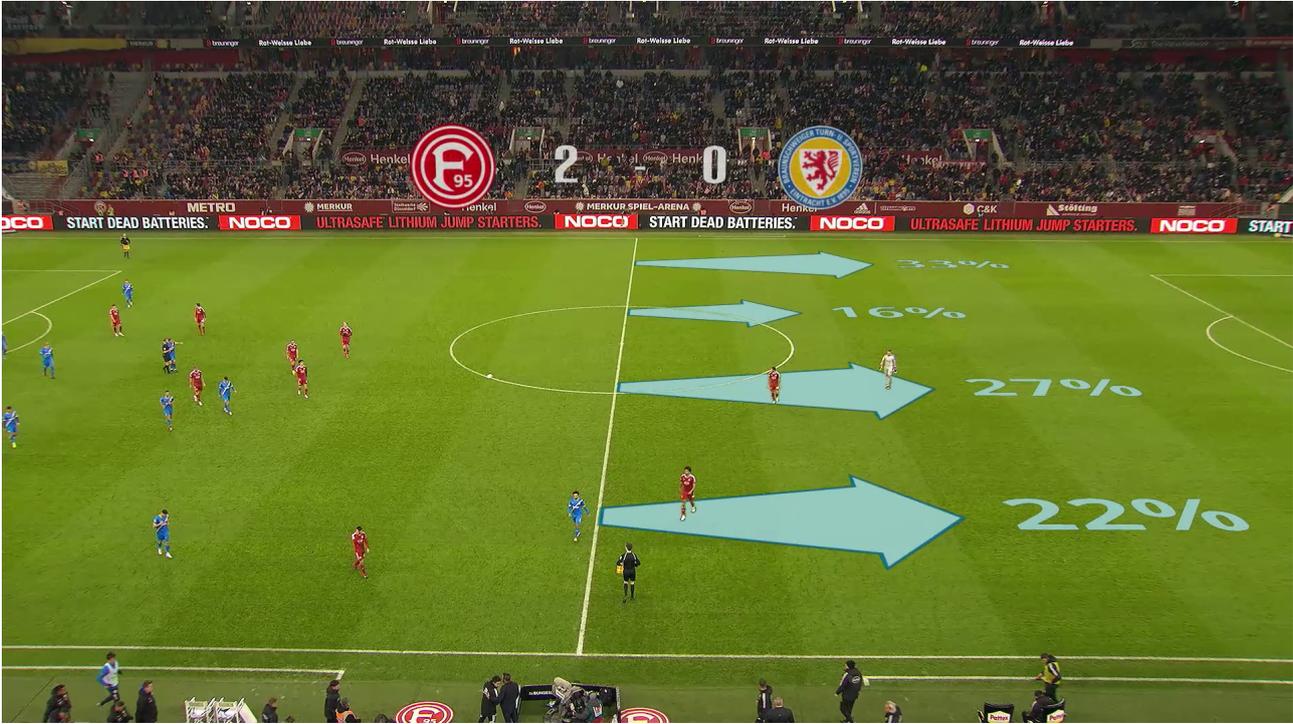
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# 1 Introduction

Datacenter is an end to end solution that allows you to connect live data sources to fields in your graphics, without the need of any special knowledge of the data at hand.



Therefore, Datacenter acts as the gateway between data providers and the Viz ecosystem, automatically translating data coming from heterogeneous sources to format(s) understood by various Viz applications.

Its main purpose is to connect incoming live data, whether from a local source or an online data provider, to fields in your scenes, handling updates in real time. It is ideal to connect to, for instance, a scoreboard on a venue to clock-and-score graphics, or scene effects to data updating in real time.

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## 1.1 Feedback

We welcome your feedback on Vizrt products and documentation. Please contact your local Vizrt customer support team at <http://www.vizrt.com>.

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## 1.2 Support

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- [www.vizrt.com](http://www.vizrt.com)
- [Vizrt Documentation Center](#)
- [Vizrt Training Center](#)
- [Vizrt Forum](#)

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## 2 Overview

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### 2.1 Accessing Datacenter

Datacenter runs automatically as a service on the host machine. It automatically starts on Windows startup, and its status can be monitored in **Task Manager** → **Services** → **VizrtDataCenter**.

While the service is always running in the background, the main user interface can be opened using a browser on the same machine hosting the service, using one of the following addresses:

- <http://127.0.0.1:5700>. This address is always available, regardless of the service mode being configured (see [HTTPS Certificate](#) configuration).
- <https://127.0.0.1:5701>. This address is only available if a valid HTTPS certificate has been configured (see [HTTPS Certificate](#) configuration).

If the Datacenter is correctly configured to run an HTTPS backend that listens to all network interfaces, then the user interface is also reachable from:

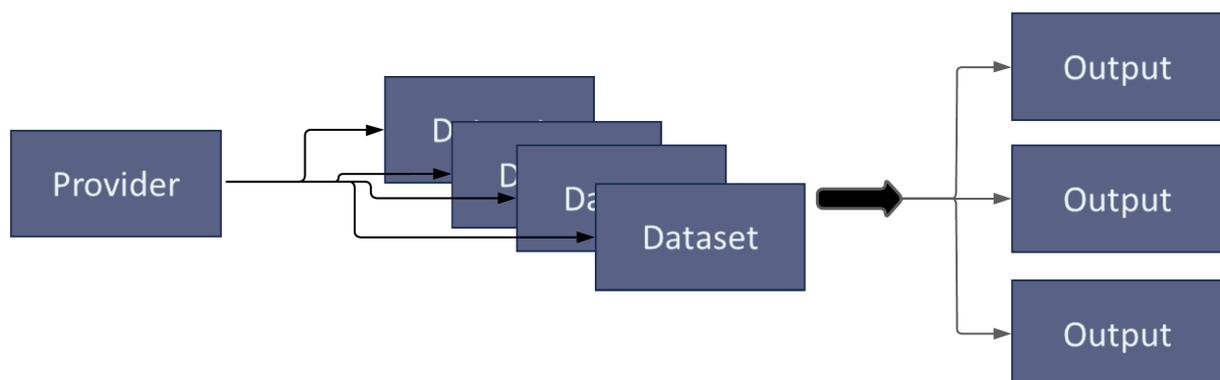
- <https://<host-machine-ip>:5701>, where *<host-machine-ip>* is the public IP of the host machine. This mode allows you to reach and monitor the Datacenter from all machines in the same network, for example.

**Info:** The Admin page is only accessible when the Datacenter user interface is reached using the localhost address option.

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### 2.2 Datacenter Main Entities

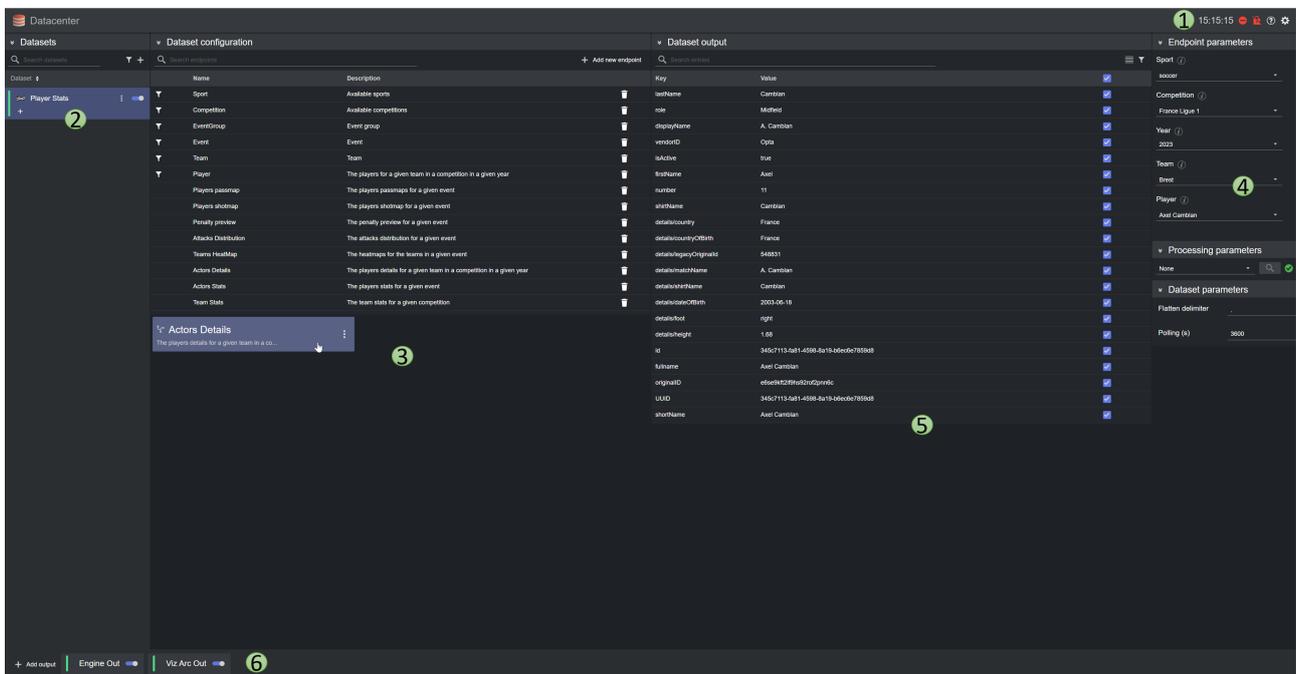
Datacenter connects data **Providers** to application **Outputs**, organizing the data flow into separate and editable **Datasets**. Specifically:



- A data **Provider** represents a data source to which the Datacenter connects to. It can be a local (for example, a file) or a remote resource (for example, a server), and its unique (there is only one Provider of type File).
- A **Dataset** represents a collection of data entries from a specific Provider. It is created by the user, and there is no limit to the number of datasets of a specific provider that can exist. Each dataset holds one or more data entries, all coming from the same provider resource.
- An **Output** represents the sending end of the Datacenter data flow. There exists a finite number of output types (for example, Viz Engine or Viz Arc), but there is no limit to the number of instances.

## 2.3 The Datacenter Main Page

The Datacenter main user interface consist of five sections:



1. **Application Bar:** Use this section to navigate between the **Main** and **Admin** page, check the status of the service, as well as checking the service HTTP(s) mode. The documentation can also be opened from the status bar.
2. **Datasets pane:** Where all the configured datasets are listed. A dataset can be selected and its status is shown on the status line on the left. A dataset can be toggled off from here. It's entry can also be cloned to create a second independent dataset.
3. **Dataset Configuration pane:** In the configuration pane a new dataset can be configured or an existing one edited. Specifically, a dataset source or a provider specific element can be selected in the configuration pane and edited in the Settings Editor. This view changes according to the Provider being used.
4. **Settings Editor:** Allows you to edit specific provider elements or a dataset source parameters (for example, endpoint parameters or refresh rate for a source). This view is dynamic and

adapts according to the Provider being used and the element being selected in the Dataset Configuration pane.

5. **Dataset Output pane:** In this section, the key and value pairs that belong to the currently selected dataset are shown. These values are available in the configured output, they can be toggled, flattened or merged, and in the case of Manual Provider, values can be edited or a keys added/removed.
6. **Viz Outputs footer:** The configured outputs for the incoming data are configured and listed here. Click on an output name to open the edit dialog. The output status is shown on the status line on the left, while the toggle can switch an output ON/OFF.

## 3 Requirements

Datacenter integrates with various Vizrt applications, each with the following requirements:

| Application | Version        | Notes   |
|-------------|----------------|---|
| Viz Engine  | 4.4.1 or newer | Control Plugins supported (these plugins can be fed with live data from the Datacenter): <ul style="list-style-type: none"> <li>· ControlText</li> <li>· ControlParameter</li> <li>· ControllImage</li> </ul> |
| Viz Arc     | 1.7.0 or newer |   |
| Viz Libero  | 8.2.0 or newer |   |

Datacenter has been tested using the following browsers:

| Browser       | Version        |
|---------------|----------------|
| Google Chrome | 115.0.5790.171 |
| Brave         | 1.56.20        |
| Firefox       | 116.0.2        |

---

## 4 Admin System Configurations

This section provides information on how to configure the system running the Datacenter, which includes:

- [Configuring Datacenter](#)
  - [Configuring Outputs](#)
- 

### 4.1 Configuring Datacenter

Datacenter runs as a Windows service, and it starts automatically on startup. The main UI can be accessed by navigating to <http://127.0.0.1:5700>.

If Datacenter is started as an HTTPS service, the UI is reachable at (please note the change of port number):

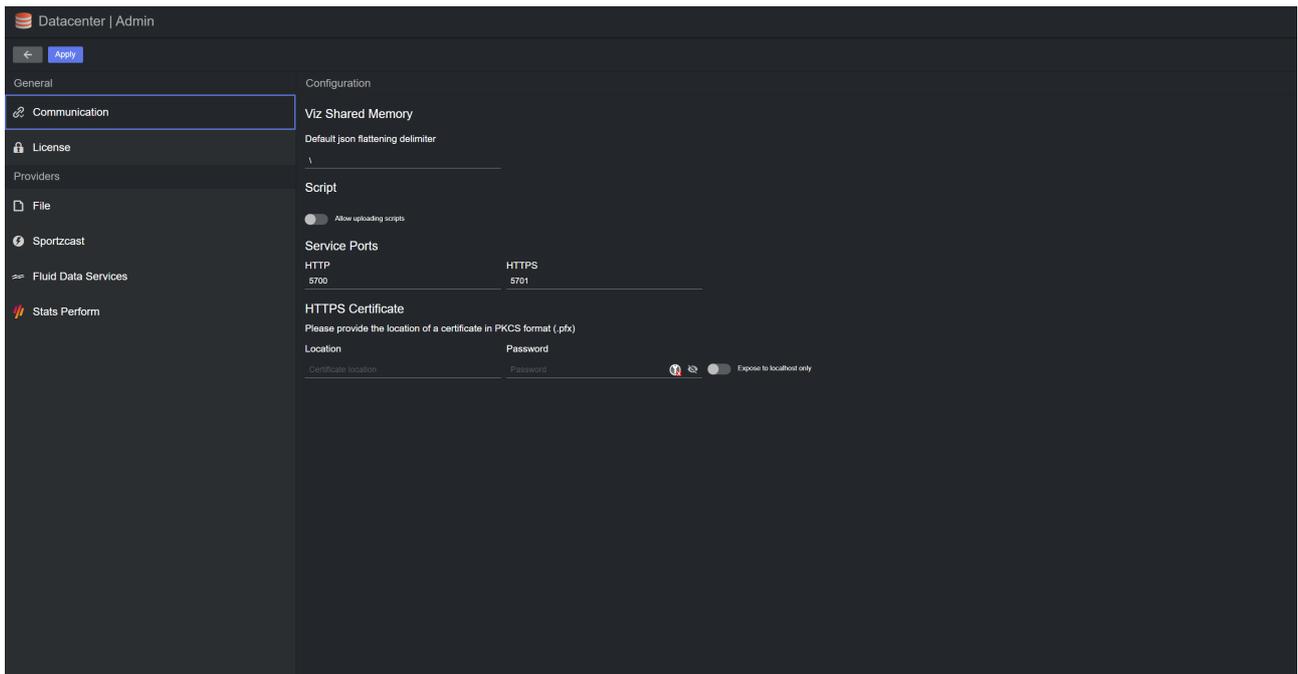
- <https://127.0.0.1:5701>
- <http://<computer-name>:5701> where *<computer-name>* is the name registered in the configured HTTPS certificate for your machine. More information on how to configure a secure HTTPS service can be found in the [General Configuration](#).

When accessing Datacenter via localhost (the same host that runs the Datacenter service, which also corresponds to the 127.0.0.1 IP address), you can also access the Admin page where a variety of options can be configured.

The Admin page can be reached using one of these options:

- Navigating to <http://127.0.0.1:5700/admin> (or alternatively <https://localhost:5701/admin>).
- By clicking on the cogwheel icon  in the main page UI.

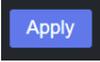
When opening the Admin page, the following window is shown:



**⚠ Accessing the Admin Page:** The Datacenter Admin page can only be accessed via localhost.

To confirm it can be accessed, please make sure the cogwheel icon  is present in the top-right corner of the Datacenter Main page.

**ℹ Applying Changes:** Changes made in the Admin page are not automatically applied. To apply any change made to the configuration, please make sure to press the **Apply** button

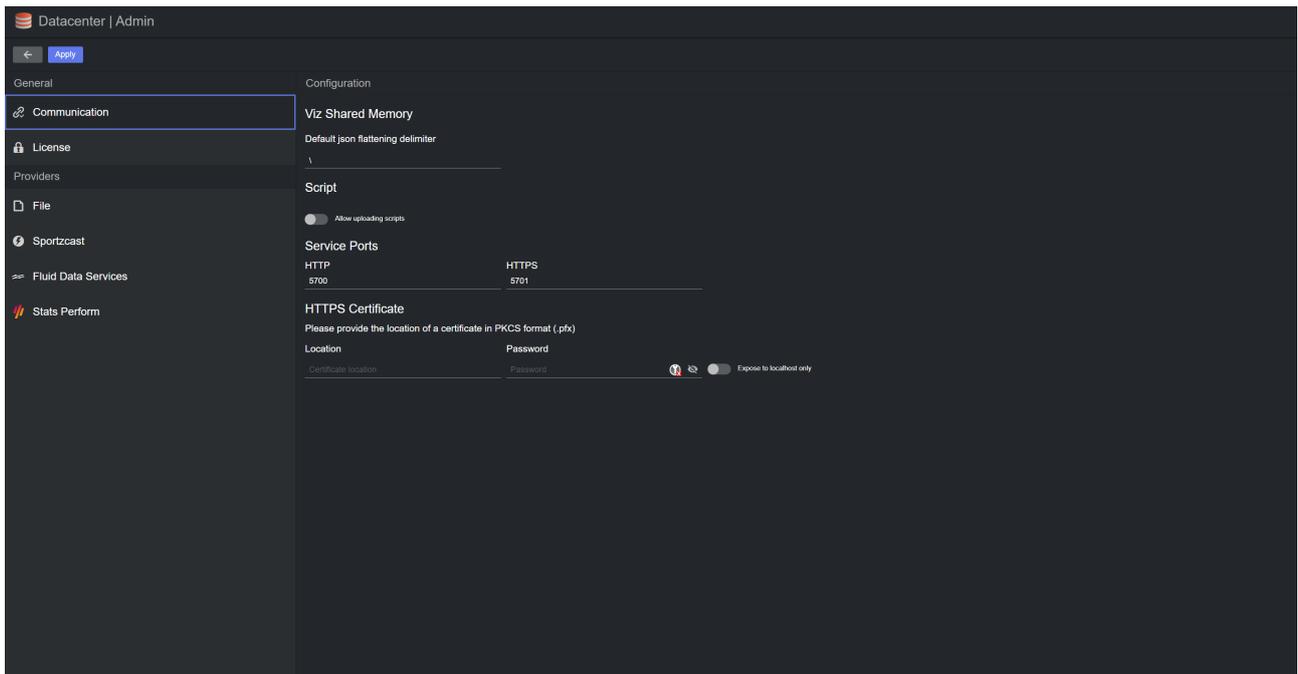
in the top-left corner of the UI .

This section describes how to configure various aspects of the Datacenter, including:

- [General Configuration](#)
- [Providers Configuration](#)

### 4.1.1 General Configuration

This is the General configuration page where you can configure settings related to the Datacenter service:



- [Communication](#)
  - [Viz Shared Memory](#)
  - [Script](#)
  - [Service Ports](#)
  - [HTTPS Certificate](#)
- [License](#)

## Communication

In this section you can configure the shared memory and your HTTPS certificate.

Configuration

### Viz Shared Memory

Default json flattening delimiter

\

### Script

Allow uploading scripts

### Service Ports

| HTTP | HTTPS |
|------|-------|
| 5700 | 5701  |

### HTTPS Certificate

Please provide the location of a certificate in PKCS format (.pfx)

| Location             | Password |
|----------------------|----------|
| Certificate location | Password |

Expose to localhost only

## Viz Shared Memory

The **Json flattening delimiter** specifies the delimiter to use when [flattening an incoming JSON payload](#). The default value is \ .

**Note:** The character \ cannot be used in SHM keys used on Viz Engine with control channels. When control channels are used, nested channels in your scene can be accessed via the . character. Therefore, it can be used as a delimiter to map to control channels in the scene.

## Script

Use the **Allow uploading script** toggle to enable or disable script uploading in the main page. Uploading a script can be useful when you have no access to the machine where Datacenter runs.

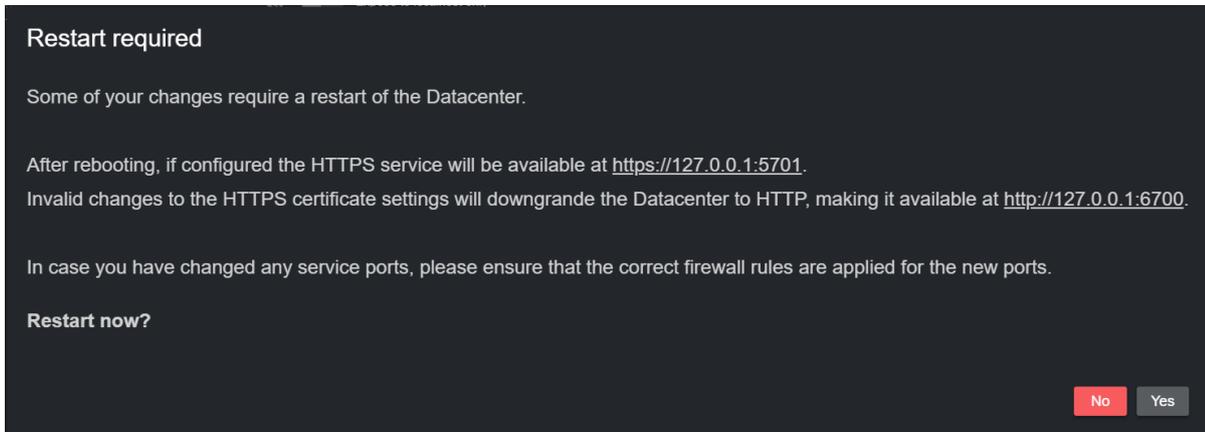
### **Script Uploading**

**Warning:** Datacenter does not vet uploaded scripts, therefore, allowing the upload of arbitrary scripts to Datacenter can pose a security threat. We **strongly recommend** to enable scripts uploading, only when strictly necessary and for the time required.

## Service Ports

By default, Datacenter uses ports 5700 and 5701 for HTTP and HTTPS communication, respectively. Should any of these ports be unavailable for the system, they can be changed in the dedicated text input field.

Upon clicking the Apply button, a dialog prompts you to confirm whether you want to restart the service using the newly configured ports.



Please note the new addresses.

#### Firewall exceptions

**Info:** By default, the Datacenter installer, installs firewall rules for ports 5700 and 5701. When changing the service ports, you must ensure that correct firewall rules are applied for them, otherwise Datacenter may be unreachable.

## HTTPS Certificate

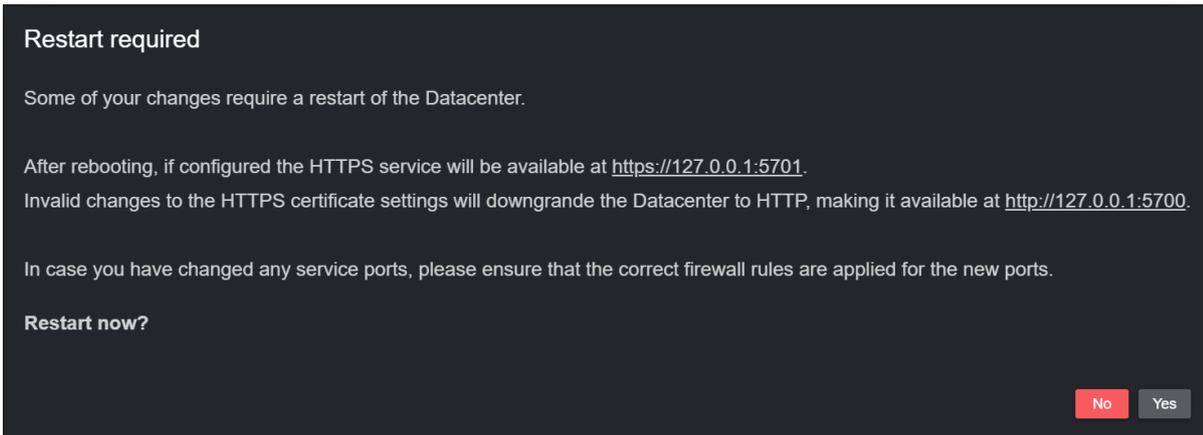
By default, the Datacenter runs an HTTP service that is reachable by localhost only on port 5700. This lowers security risks, and makes sure that unprotected communication is not exposed outside of the service machine.

When running as an HTTP service, a red, broken lock is shown in the top-right corner of the UI



. Although HTTP is the default service, Datacenter is capable of running an HTTPS secure service, which handles communication using the HTTPS protocol on port 5701. To do so, input the location of your signed certificate and its password in the dedicated text input fields, and click on **Apply changes**.

A dialog prompts you to confirm whether you want to restart the service, as it is required to upgrade to HTTPS.



By default, the HTTPS service listens to all network interfaces on port `5701`, as this allows communication in and out of the Datacenter service machine. However, also the HTTPS service can be limited to listen to the localhost only.

Use the **Expose to localhost only** toggle and apply changes if required.

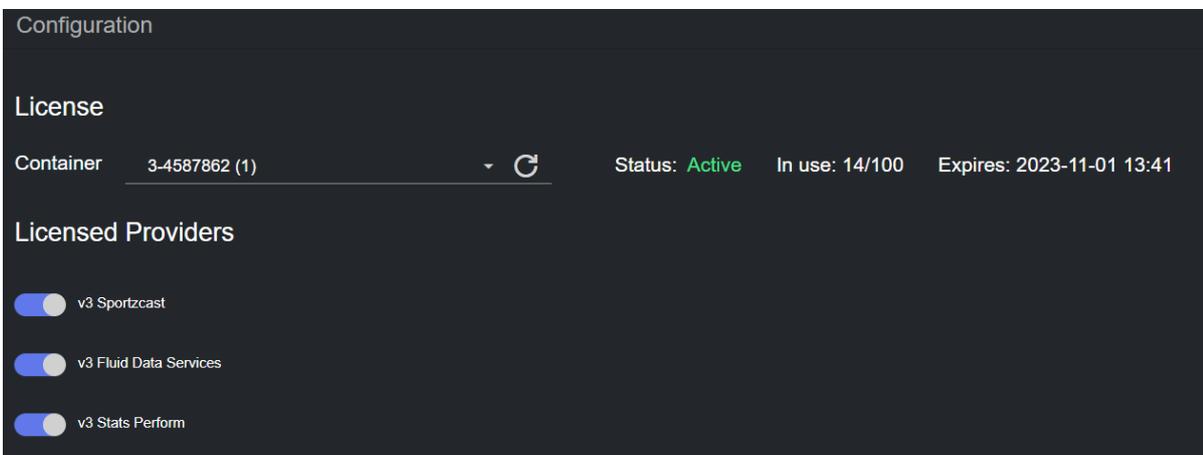
When running Datacenter as an HTTPS service, a green, closed lock is shown in the top-right corner of the UI .

**Note:** To setup Datacenter to run an HTTPS service, a signed certificate in PKCS format must be provided, this can usually be obtained by your system admin. Please note that Datacenter does not provide signed certificates.

**Note:** When running Datacenter as a HTTPS service, a HTTP version of the service is also started on localhost on port 5700. As in the standard HTTP version of Datacenter, this service listens to localhost only.

## License

In this section you can configure the license to use with Datacenter, as well as the licensed providers. Without a valid license, no outputs can be configured, thus no data is streamed out of Datacenter.



Datacenter requires a WIBU based software license. The CodeMeter license service checks for available licenses and present the relevant license containers in a dropdown menu next to the License label. If you do not see your license, please click the refresh button  to trigger a new scan of available licenses. When selecting a license from the list, its information is shown on the right

Please allow the software to fetch the licensed providers, and then select the ones you want to use from the list of toggle buttons that appears next to the Licensed Providers label. When done, click on **Apply changes**.

## 4.1.2 Providers Configuration

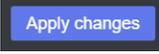
Datacenter supports a variety of data Providers. Some of them have a global configuration that needs configuring.

This section explains how to use such configurations:

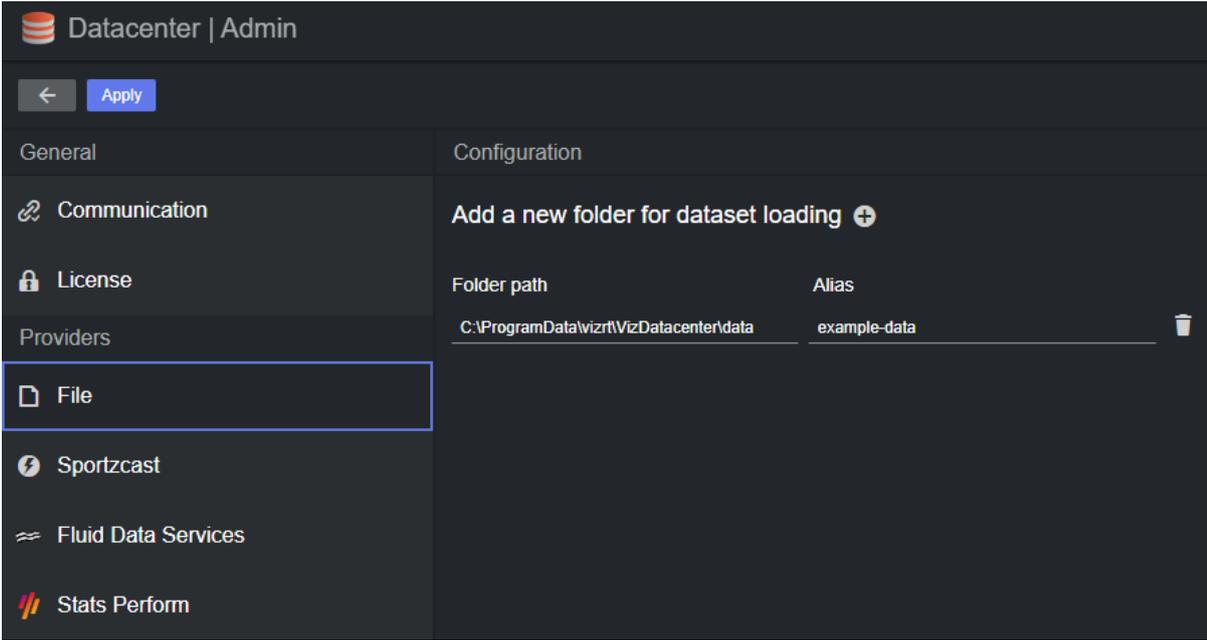
- [File](#)
- [Sportzcast](#)
- [Fluid Data Services](#)
- [Stats Perform](#)

### File

The Datacenter can be configured to read files from specific input folders. To be able to open and monitor files on these locations, those folders need to be added to the File provider configuration using the following steps:

1. Click on the **File** entry in the Provider list in the Admin page.
2. Click on the plus button .
3. Type the path in the **Folder Path** input field.
4. Enter an alias for this path to be used in the application.
5. Click the **Apply changes** button .

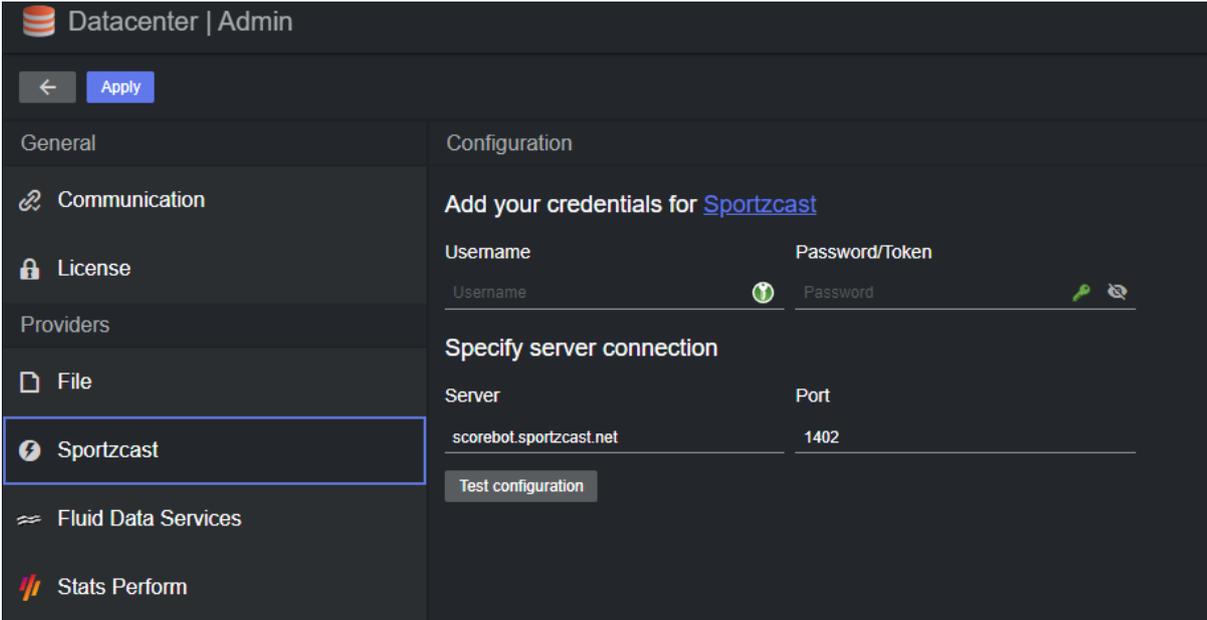
The alias submitted points to the specified folder path when used to create new datasets of type File.



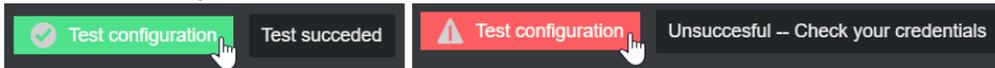
**Note:** Datacenter ships with two example files that can be used to test a File provider. They are located in *C:\ProgramData\vizrt\VizDatacenter\Data\Files*.

### Sportzcast

Datacenter can be configured to fetch data from the [Sportzcast by Genius Sports](#) cloud service. Such service requires a username and password that must be obtained from the data Sportzcast. To be able to fetch data from the [Sportzcast by Genius Sports](#) cloud service, the following configurations must be performed:

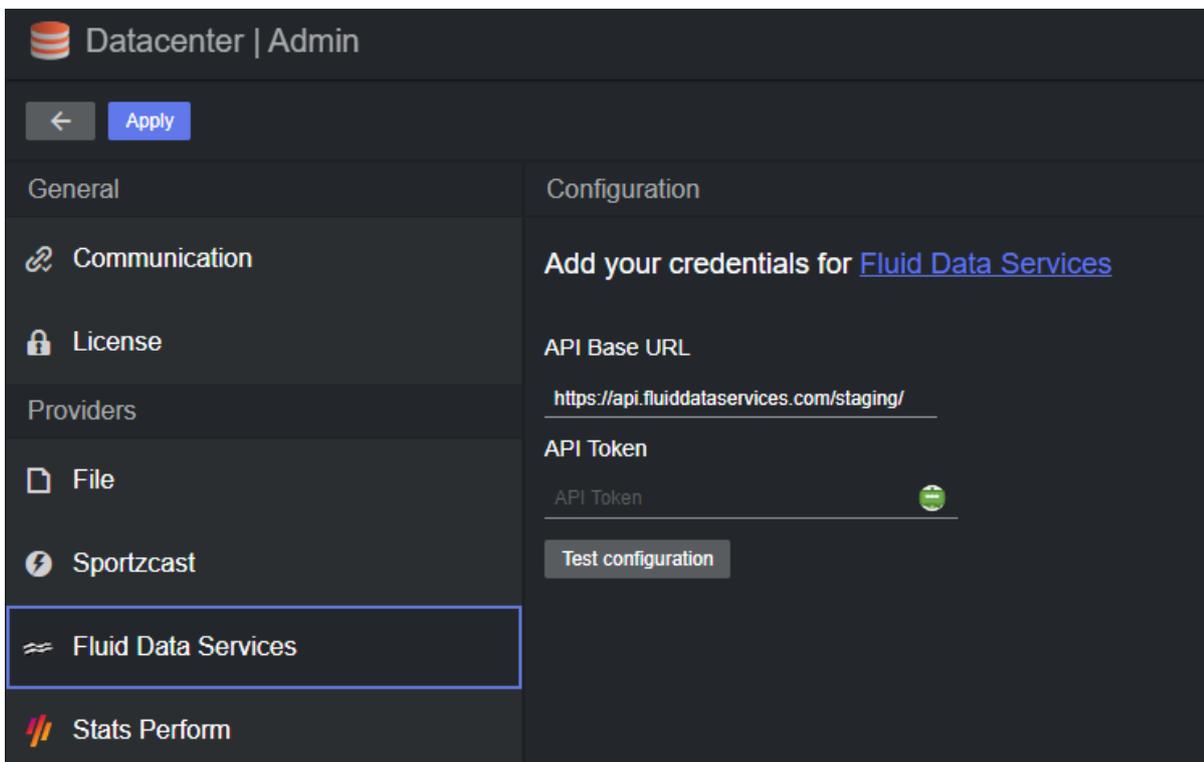


- **Username:** The username obtained by the Sportzcast data provider.
- **Password/Token:** The password (sometimes referenced as token) obtained by the Sportzcast data provider.
- **Server:** The hostname of the provider (use the default [scorebot.sportzcast.net](https://scorebot.sportzcast.net) for the default service, or your own server location).
- **Port:** The port used to communicate with the host configured (default: 1402).
- **Test configuration:** Use this button to test whether the specified configuration is correct. If correct, the button turns green, otherwise it turns red. Hovering over the button reveals the error in a tooltip:



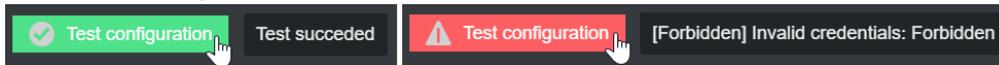
## Fluid Data Services

Datacenter can be configured to fetch data from the [Fluid Data Services](#) data provider. For this integration to work, the following configurations must be performed:



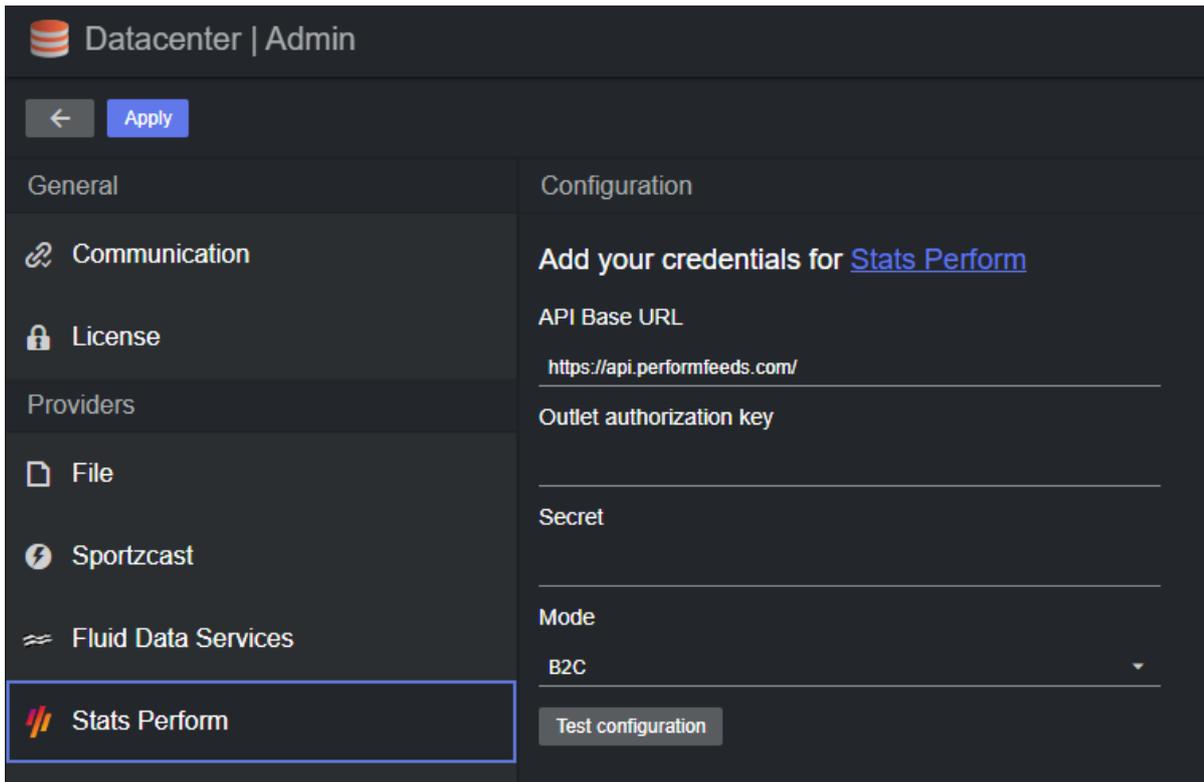
- **API Base Url:** The URL used to fetch data from the desired endpoints (for example, <https://api.fluiddataservices.com/staging/>).
- **API Token:** This input field is to specify the API token required to authenticate with the Fluid Data Services backend. The token must be obtained directly from the provider. When saved, the token is encrypted and its encrypted value is shown rather than the plain value (it is used when issuing HTTP(s) requests to the webserver).
- **Test configuration:** Use this button to test whether the specified configuration is correct. If correct, the button turns green, otherwise it turns red. Hovering over the button reveals the

error in a tooltip:



## Stats Perform

Datacenter can be configured to fetch data from the [Stats Perform](#) data provider. For this integration to work, the following configurations must be performed:



- **API Base URL:** The URL used to fetch data from the desired endpoints, needs to be configured to `api.statsperform-hosted.com.cn` when using the integration from a Chinese IP or domain.
- **Outlet authorization key:** Authorization key provided by StatsPerform.
- **Secret:** Secret provided by StatsPerform (if needed, depending on the account type).
- **Mode:** Business-to-Business (**B2B**) or Business-to-Customer (**B2C**), depends on the account type.
- **Test configuration:** Use this button to test whether the specified configuration is correct. If correct, the button turns green, otherwise it turns red. Hovering over the button reveals the error in a tooltip:



## 4.2 Configuring Outputs

To correctly send data to various Outputs from the Datacenter, the receiving end(s) need to be configured correctly.

This section describes how to configure all of the Outputs in Datacenter, including:

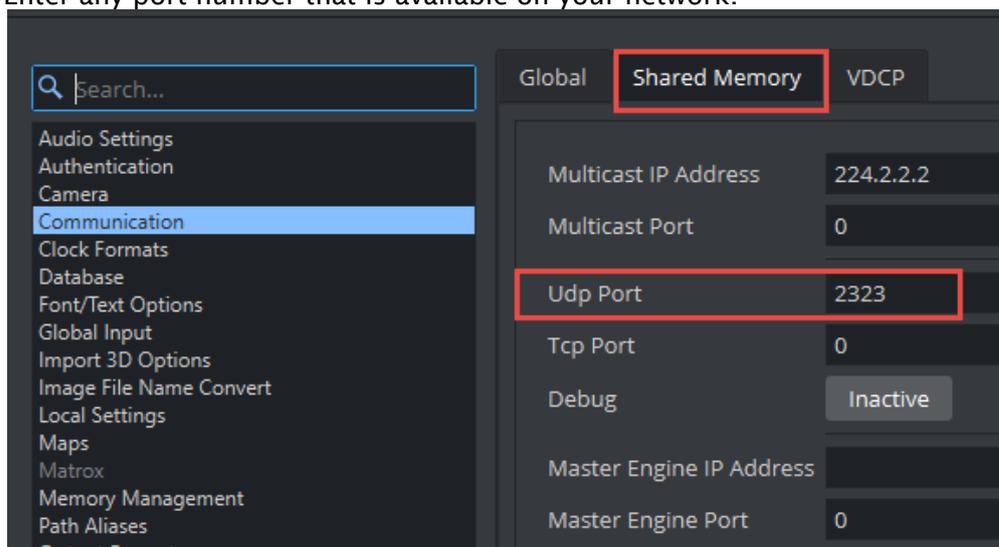
- [Viz Engine Configuration](#)
- [Viz Libero Configuration](#)
- [Viz Arc Configuration](#)

### 4.2.1 Viz Engine Configuration

Each Viz Engine receives live data from Datacenter, and it must be configured to listen to the **Shared Memory** input over **UDP**. This should also be done for any preview Viz Engine that may be in use.

To configure a Viz Engine to receive incoming data from the Datacenter, please follow these steps:

1. Open the Viz Engine configuration.
2. Go to **Communication > Shared Memory > UDP Port**.
3. Enter any port number that is available on your network.



4. Save the configuration and restart.

Your Viz Engine is now ready for the Datacenter live input.

### 4.2.2 Viz Libero Configuration

The outputs required to integrate with Viz Libero are created by Viz Libero upon connection.

Please check the *Viz Libero User Guide* for relevant configuration options.

### 4.2.3 Viz Arc Configuration

Each Viz Arc configured as an output in the Datacenter, receives live data from it. As data is posted to Viz Arc using an HTTP POST protocol, a valid port must be specified for the **Arc Web Server Port** field found in **Setting > General > Communication** of the Viz Arc Configuration panel:



| Communication         |           |
|-----------------------|-----------|
| { } REST Port         | 9004      |
| ☐ Arc TCP Server Port | 9204      |
| 📶 MQTT Broker Port    | 1883      |
| ☐ Arc Web Server Port | 5004      |
| 📄 Whitelist IP Range  | 0.0.0.0/0 |

*Rest service restart required for change to take effect*

When changing the Web server port, restart Viz Arc to make sure the new changes are applied. Your Viz Arc is now configured to received data from the Datacenter.

**⚠ Note:** Take note of the port specified in the Viz Arc configuration panel, as this is required when configuring the relevant port for the output in the Datacenter.

---

## 5 Operating Datacenter

This section provides information on how to operate correctly the Datacenter system:

- [Getting Started](#)
  - [Accessing Datacenter](#)
  - [Creating Datasets](#)
  - [Configuring Datasets](#)
  - [Outputs](#)
- 

### 5.1 Getting Started

To add live data to your graphics with Datacenter, follow these simple steps:

1. [Configure your output\(s\)](#) application to be ready to receive incoming data. Make sure to configure or load a [correct Viz Engine scene](#) that works with Datacenter.
2. [Access](#) the Datacenter main UI and [configure](#) it to add information, such as provider APIs or folders to monitor.
3. [Create one or more datasets](#) and [configure them](#).
  - a. Each data set contains a list of key/value-pairs that you can [filter](#), [edit](#) and [control](#) in real-time, deciding which values should be sent to your output(s) to populate their graphics.
4. [Create and configure one or more Outputs](#) to receive live data.

 **Note:** Viz Libero configures the necessary datasets upon installation and creates the necessary output upon connection. Therefore, only the relevant provider access tokens need to be configured.

---

### 5.2 Accessing Datacenter

#### 5.2.1 Accessing Datacenter

The Datacenter runs automatically as a service on the host machine. It automatically starts on Windows startup, and its status can be monitored in **Task Manager > Services > VizrtDataCenter**.

While the service is always running in the background, the main user interface can be opened by navigating, using a browser on the same machine hosting the service, to one of the following addresses:

- <http://127.0.0.1:5700>. This address is always available, regardless of the service mode configured (see [HTTPS Certificate](#) configuration).
- <https://127.0.0.1:5701>. This address is only available if a valid HTTPS certificate has been configured (see [HTTPS Certificate](#) configuration).

If Datacenter is correctly configured to run an HTTPS backend that listens to all network interfaces, then the user interface is also reachable from:

- <https://<host-machine-ip>:5701>, where *<host-machine-ip>* is the public facing IP of the host machine. This mode allows you to reach and monitor Datacenter from all of the machines in the same network.

**Info:** The Admin page is only accessible when the Datacenter user interface is reached using the localhost address option.

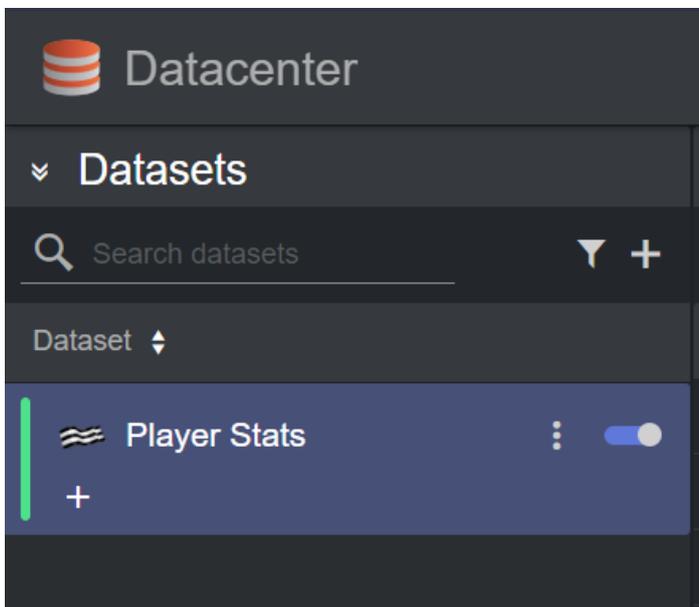
## 5.3 Creating Datasets

The Datasets panel list, shows all the existing datasets and allows you to create new ones. Existing datasets can be filtered or searched using the respective elements at the top of the list. The following section explains how to interact with datasets in Datacenter, including:

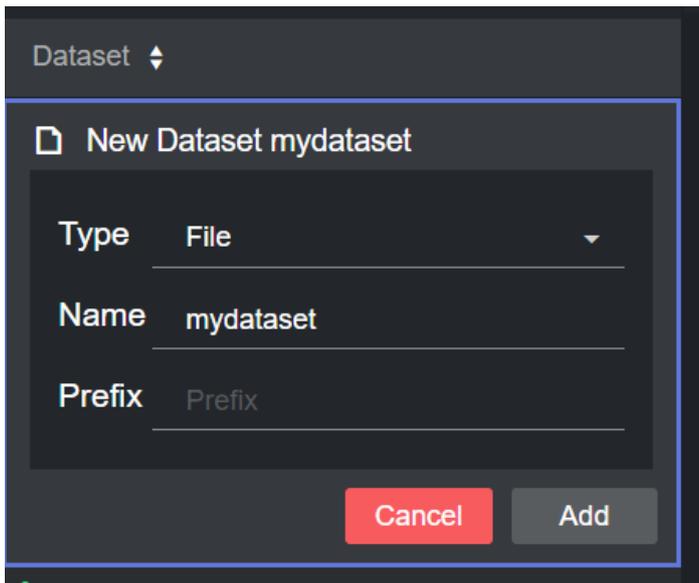
- [Creating a Dataset](#)
- [Tagging a Dataset](#)
- [Duplicate an Existing Dataset](#)
- [Disabling or Deleting a Dataset](#)
- [Monitoring a Dataset State](#)

### 5.3.1 Creating a Dataset

To create a new dataset, use the Dataset pane and press the  button to start.



A new panel is shown where you can fill the necessary information.



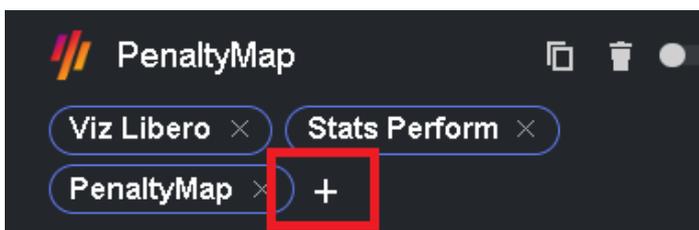
- **Type:** Choose the Provider type for this dataset.
- **Name:** Type a (unique) name for this dataset.
- **Prefix:** This field can be used if keys from different datasets are equal and you need to make them unique. This option is particularly useful when two datasets contain the same key (for example player stats for different players) and should be used simultaneously for the same output. Without using a prefix for one (or both) of the datasets, the values in the scene associated to the duplicate keys would be randomly taken from one of the datasets.

Click the **Add** button to create the dataset, or **Cancel** to abort.

Please refer to the [Providers](#) page for specific providers information on how to create a dataset.

### 5.3.2 Tagging a Dataset

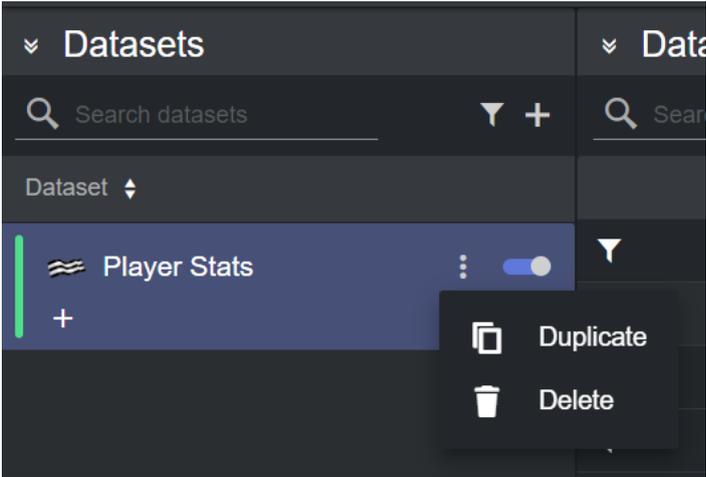
In order to access individual datasets via the [simple page](#), tags can be given to a dataset. To do so, use the "+" icon on the dataset:



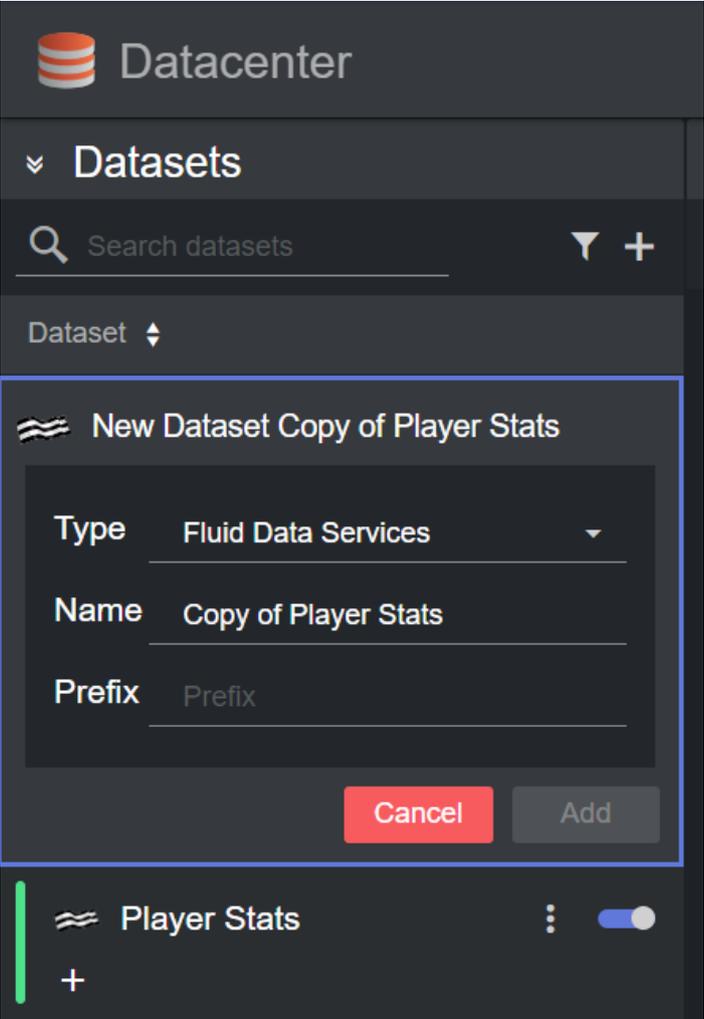
### 5.3.3 Duplicate an Existing Dataset

Instead of creating each dataset from scratch, you can duplicate existing datasets, and subsequently change some of their properties (for example, change a prefix or add a new endpoint to pull data from). To do so, locate the dataset to clone, expand the hamburger menu

next to the name and click on the Duplicate icon .



A new dataset is created with the default name *Copy of <original dataset name>*.

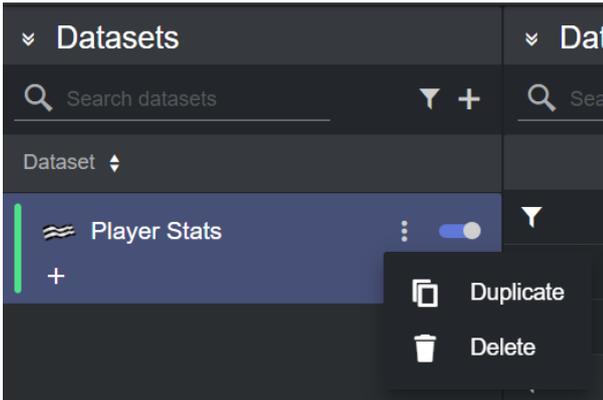


**Info:** When cloning a dataset, all the properties of the original datasets including data sources and specific settings, are assigned to the new datasets.

### 5.3.4 Disabling or Deleting a Dataset

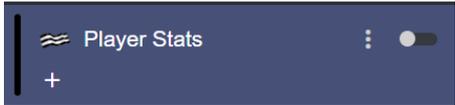
A dataset can be permanently deleted or temporary disabled. These are the steps for each:

- To delete a dataset, expand the hamburger menu next to its name and click on the Delete icon . The dataset is removed, and all its data is removed immediately from the outputs.



 **Note:** This operation is destructive, as the dataset cannot be recovered after deleting it.

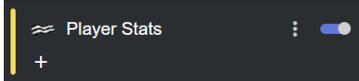
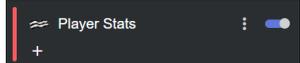
- To disable a dataset, click on the toggle next to its name:
  - A blue toggle means that the dataset is currently active.
  - A grey toggle means that the dataset is currently inactive.

| Status | Active  | Inactive   |
|--------|---|--|
|        |  |  |

### 5.3.5 Monitoring a Dataset State

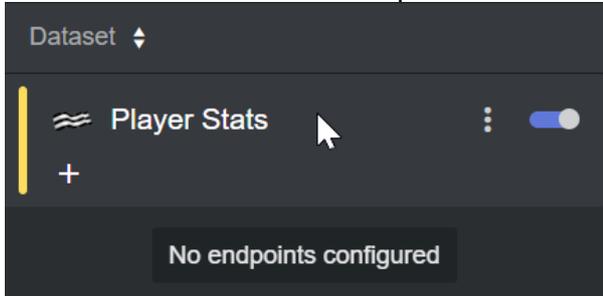
A dataset can be in three distinct states:

- **OK:** The dataset is correctly configured and has data entries.
- **Warning:** The dataset is not correctly configured and has (potentially) no data entries.
- **Error:** The dataset source or the dataset itself has blocking errors which prevents the dataset from working correctly.

| Status | OK  | WARNING  | ERROR   |
|--------|---|--|---|
|        |  |  |  |

When one or more datasets are in warning or error state, the app bar shows a red or yellow icon in the top-right corner.

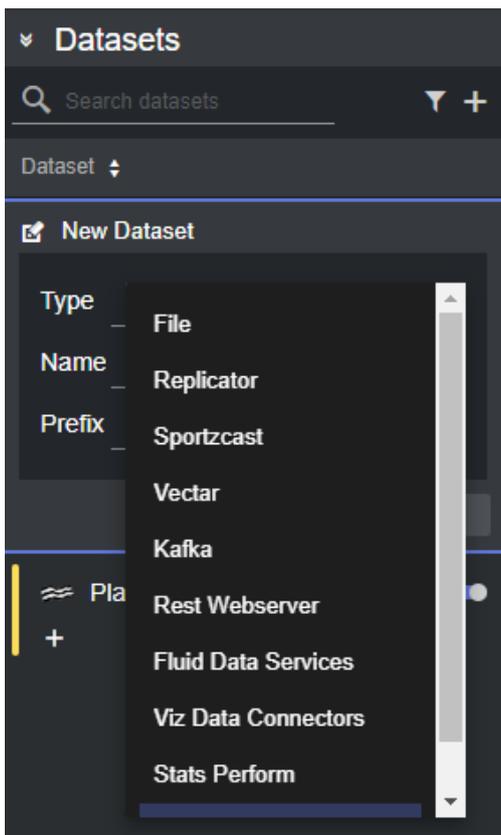
To obtain more information on a dataset in either Warning or Error state, hover the mouse on the dataset name to reveal a tooltip with further information and potential fixes.



Once all datasets are in the OK state, the app bar shows a green icon .

## 5.4 Configuring Datasets

The Datacenter allows communication with a variety of Providers, supporting a variety of technologies used to retrieve data.



The following Providers can be used to acquire live data from:

- **Manual:** You can specify the key/value pairs manually.
- **File:** Reads and monitors data from the configured files.

- **Replicator**: Replicates data from a specific dataset from a Datacenter instance that runs on a different machine.
- **Sportzcast**: Provides live data from electronic scoreboards in stadiums, as offered by [Sportzcast by Genius Sports](#).
- **Vectar**: Accesses the DataLink data source configured in Viz Vectar.
- **Kafka** : Provides data from a configured [Apache Kafka](#) broker.
- **Rest Webserver** : Fetches data from a generic REST-based webserver.
- **Fluid Data Services**: Provides live and telemetry as offered by the [Fluid Data Services](#) data provider.
- **Stats Perform** : Provides live and telemetry as offered by the [Stats Perform](#) data provider.
- **Viz Data Connectors** : Provides data from a configured Flowics Vizrt existing account. This mode requires a valid Flowics Middleware to be correctly configured and running.

Depending on the Provider chosen, the configuration of each Dataset differs. The rest of this section illustrates how to configure datasets for each of the supported providers:

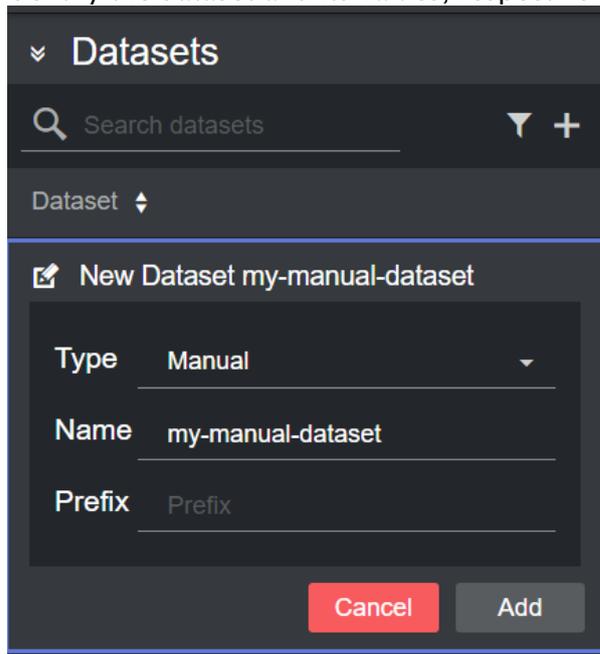
- [Supported Providers](#)
- [Filtering and Manipulating the Dataset Entries](#)
- [Enabling or Disabling Dataset Entries](#)

### 5.4.1 Supported Providers

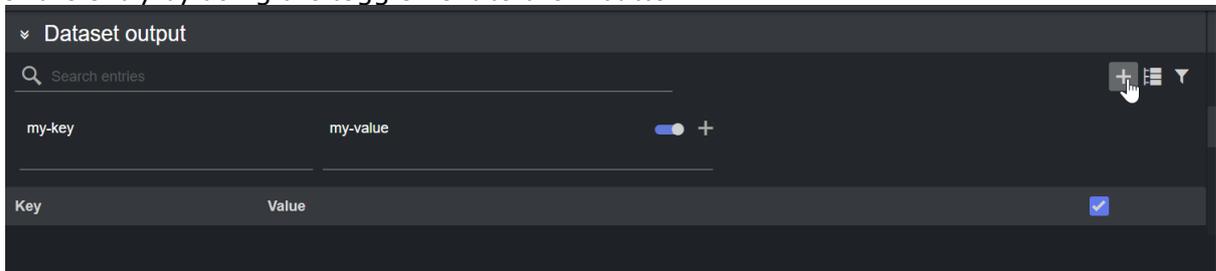
#### Manual

These are the steps to configure a **Manual** dataset:

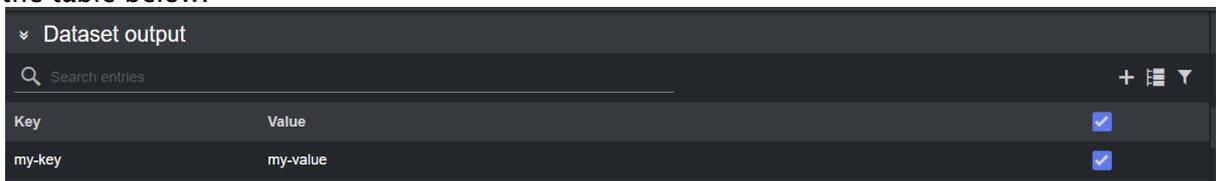
1. Create a new dataset of type **Manual**, specifying a name and (optionally) a prefix to use to identify the dataset and its values, respectively:



2. Click **Add**. You can now manually add new key-value data entries that work together with other datasets.
3. In the **Dataset Output** panel, click on the + button.
4. Fill the **Key/Value** pair in the panel that just opened. You can toggle the start activation state of the entry by using the toggle next to the + button.



5. Press the plus icon  to add the value to the entries. You should see the entry listed in the table below.

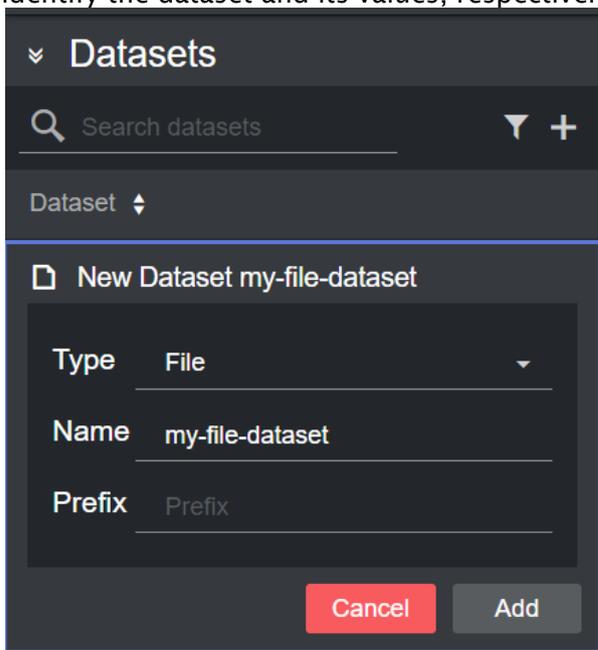


Please refer to the [Filtering and Manipulating the Dataset Entries](#) page to learn how to enable, disable and edit the entries added.

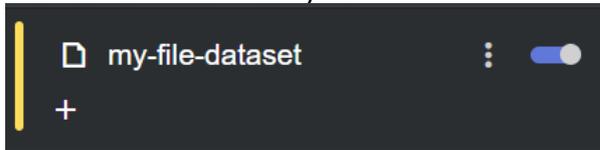
## File

This section provides the steps to configure a **File** dataset.

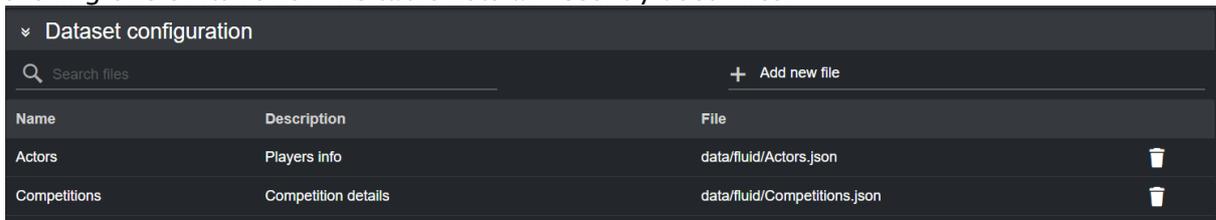
1. Create a new dataset of type **File**, specifying a name and (optionally) a prefix to use to identify the dataset and its values, respectively:



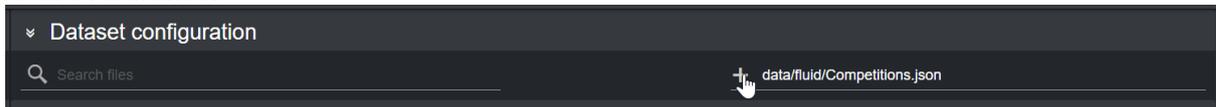
2. Click **Add**. The dataset is added to the list, and it has an initial WARNING status as it contains no source file yet.



3. You can now select a source file from the table in the **Dataset configuration** panel, by double clicking one of its rows. The table lists all recently used files.



Alternatively, you can type a file location in the input box at the top of the table and press the plus sign. The file is added to the dataset source, and included in the Files table for future reference.



The input box supports autocomplete, listing the files in the folder alias that were setup while configuring the File provider in the [Admin](#) page.

Datcenter supports the following file types:

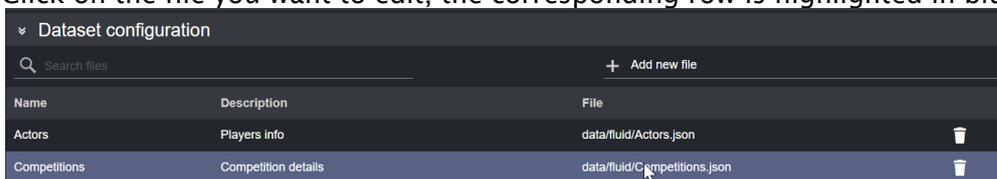
- **Text** (key-value pairs, using the '=' or ':' char as separators).
- **Ini-file**
- **JSON**

### Editing Recently Added Files

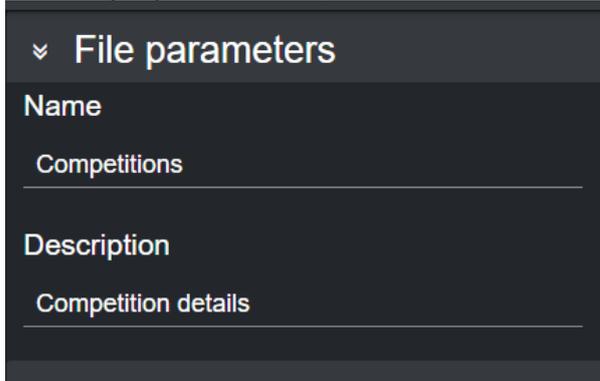
The table in the **Dataset configuration** panel lists all the recently added files. When adding a file, its values are set to default.

Follow these steps to edit those properties:

1. Click on the file you want to edit, the corresponding row is highlighted in blue:



2. Edit the properties listed, such as **Name** and **Description**.

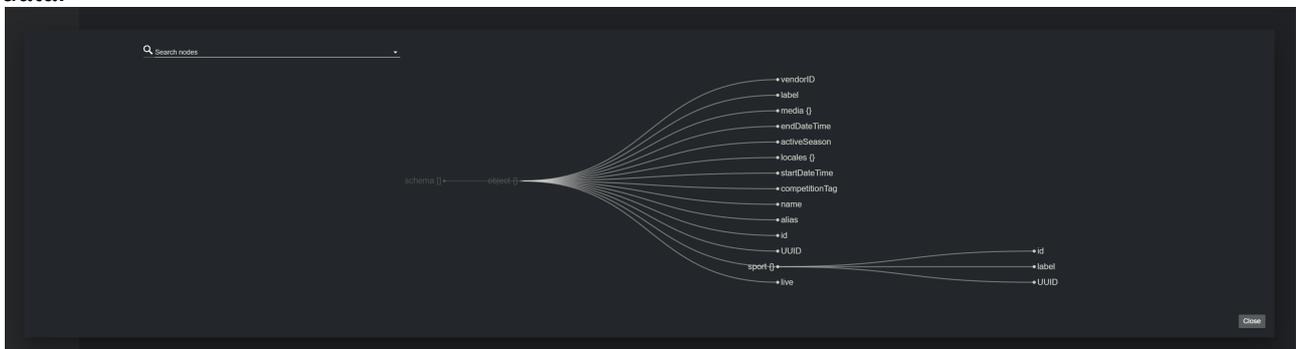


### Filtering a Dataset

Values read from a file into a dataset, can be filtered via the Filtering tool. To do so, select the dataset card, click on the hamburger menu and then press the **Filter** button.



A dialog visualizing the file's payload schema opens, through which a user can filter the source data.



Please refer to the [Filtering and Manipulating the Dataset Entries](#) page to learn how to enable, disable and edit the entries added.

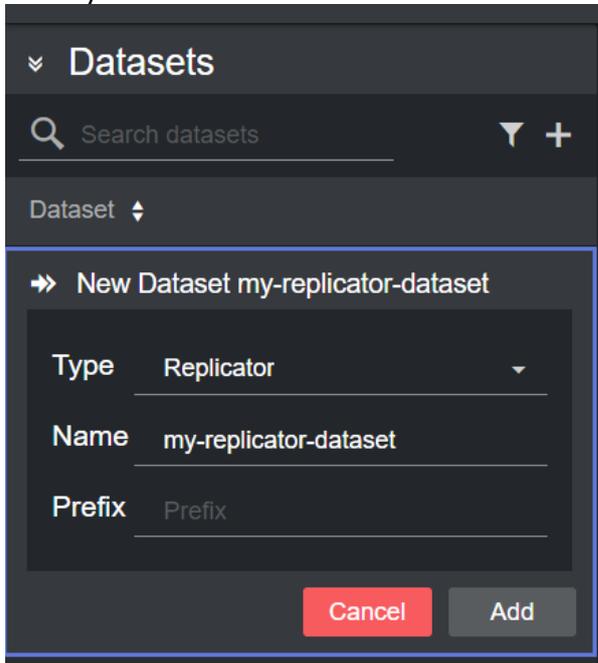
### Replicator

Datcenter supports datasets of type **Replicator**, and such data can be used to use one Datcenter as input for another.

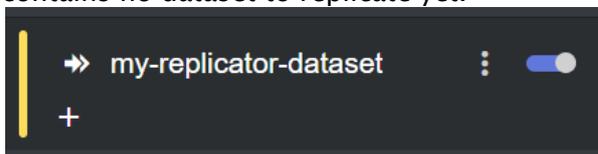
This is particularly useful when a Datcenter machine has to be removed from public internet, but still needs to fetch data from an online Provider. In this scenario, a Datcenter machine can be connected to the internet and the provider, and the protected machine, not on the internet but reachable from the first machine, setup with one or more Replicator datasets pointing to the online machine.

Follow these steps to configure a Replicator dataset:

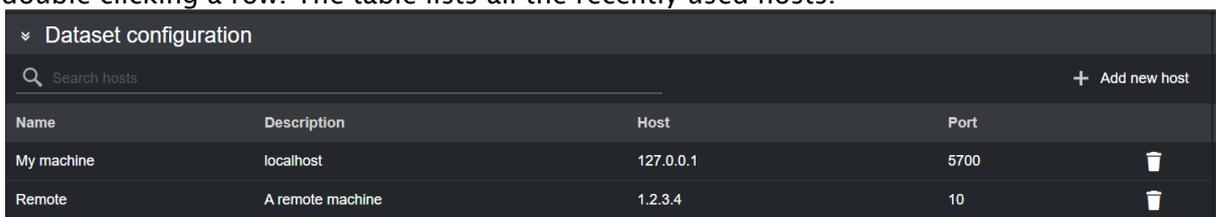
1. Create a new dataset of type **Replicator**, specifying a name and (optionally) a prefix to use to identify the dataset and its values:



2. Click **Add**. The dataset is added to the list, and it has an initial WARNING status as it contains no dataset to replicate yet.



3. You can now select a host to replicate from the table in the **Dataset configuration** panel by double clicking a row. The table lists all the recently used hosts.



Alternatively, you can add a new host by clicking on **Add new host** on the right-side of the panel, and then clicking on the empty host that is added at the bottom of the table.



Doing so reveals the new host details, where its properties can be entered.

Host parameters

Name  
newhost

Description  
localhost

Host  
127.0.0.1

Port  
690

Processing parameters  
None

Dataset parameters

Flatten delimiter /

Datset Dataset

use Https

You can now double click on the configured host in the host table to select it a source to replicate.

Dataset configuration

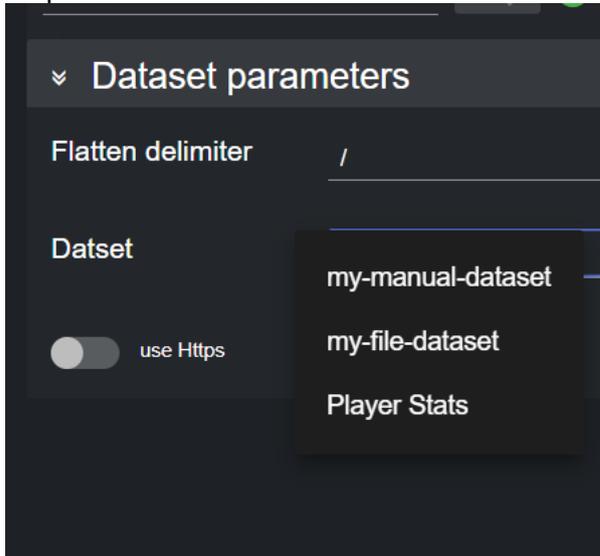
Search hosts + Add new host

| Name       | Description      | Host      | Port |  |
|------------|------------------|-----------|------|--|
| My machine | localhost        | 127.0.0.1 | 5700 |  |
| Remote     | A remote machine | 1.2.3.4   | 10   |  |
| newhost    | localhost        | 127.0.0.1 | 690  |  |

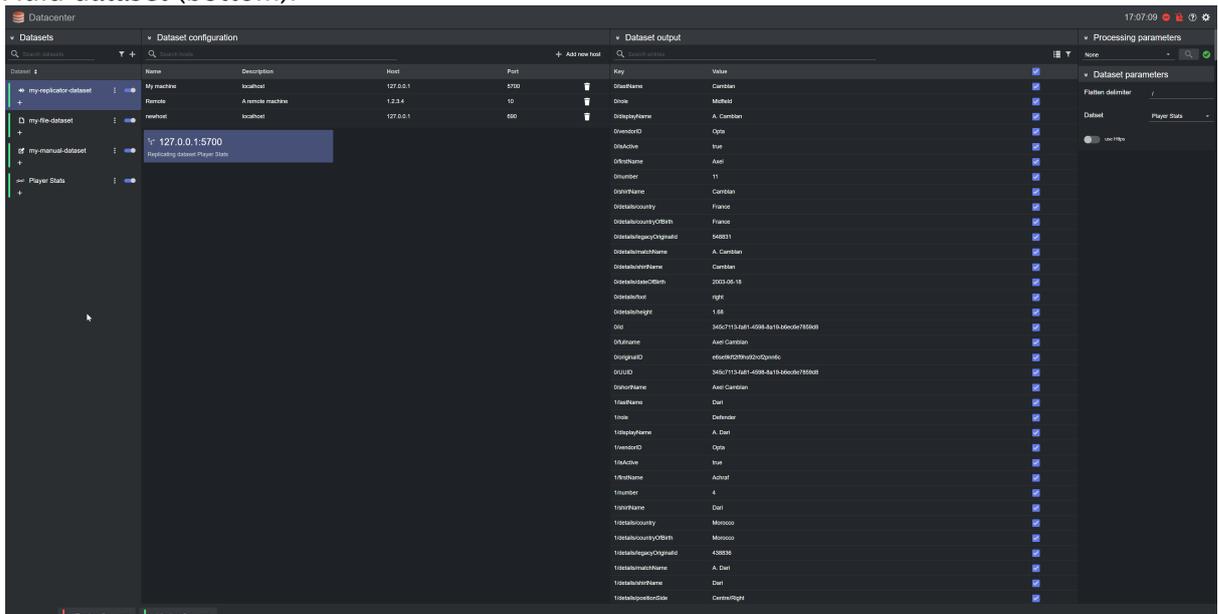
127.0.0.1:5700  
Please select a dataset.

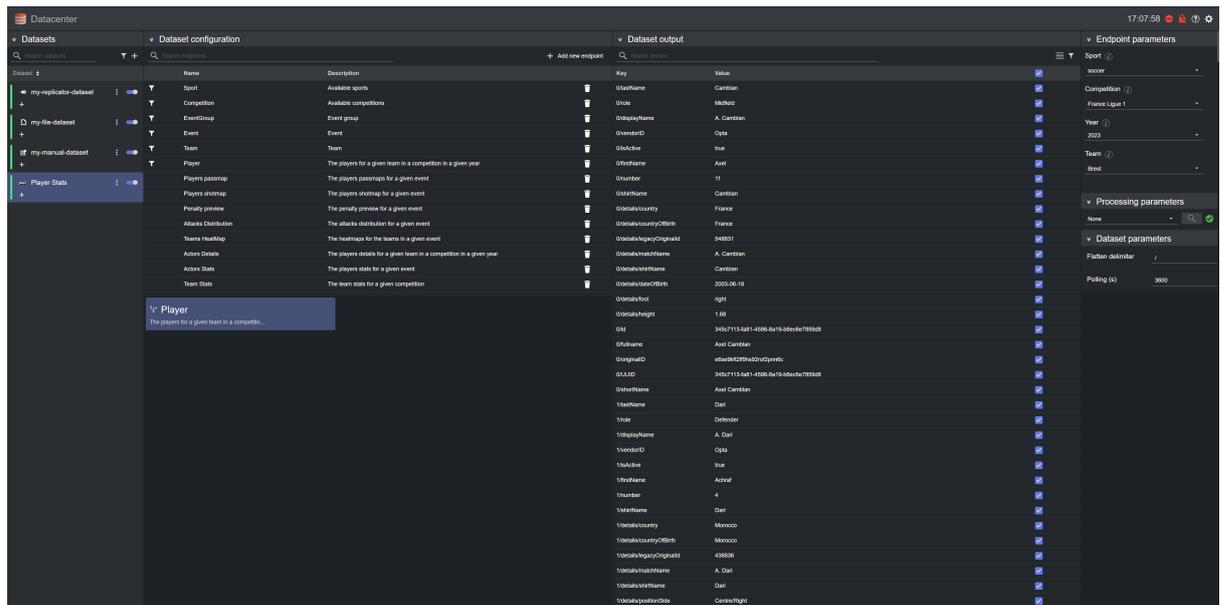
4. The **Https** toggle can be used to specify a host that runs an Https Datacenter service.

- If the specified host runs a Datacenter, the datasets created on that machine are listed in the dropdown **Dataset** menu available in the **Dataset parameters** section.



- After selecting a dataset, its entries are added to the **Dataset Entries** table. For example, the images below show a Replicator dataset (top) replicating entries from a Fluid dataset (bottom):





7.

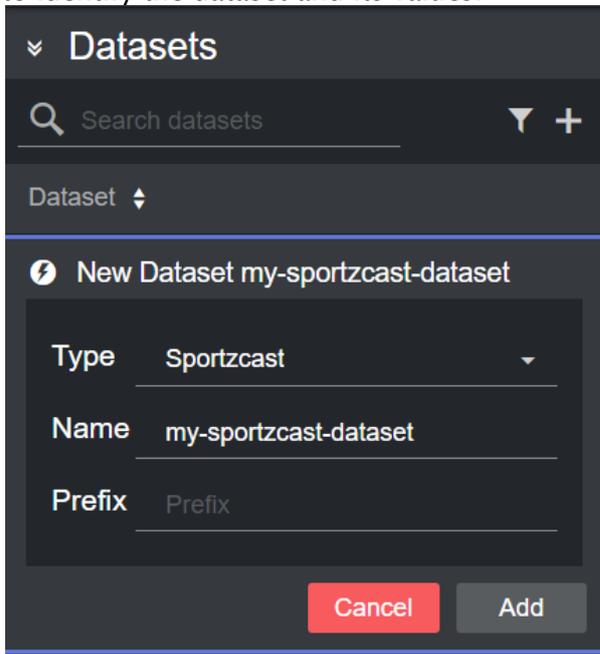
**Info:** When replicating a Dataset, each edit on the original dataset source (for example, disabling an entry or modifying a value) is immediately reflected in the Replicator dataset. Changes done on the Replicator dataset; however, do not reflect on the original source dataset.

Please refer to the [Filtering and Manipulating the Dataset Entries](#) page to learn how to enable, disable and edit the entries added.

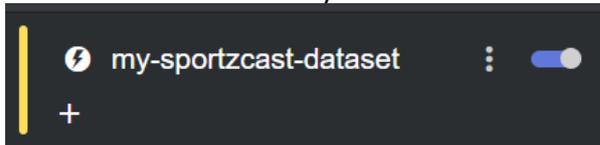
## Sportzcast

This section provides the steps to configure a **Sportzcast** dataset.

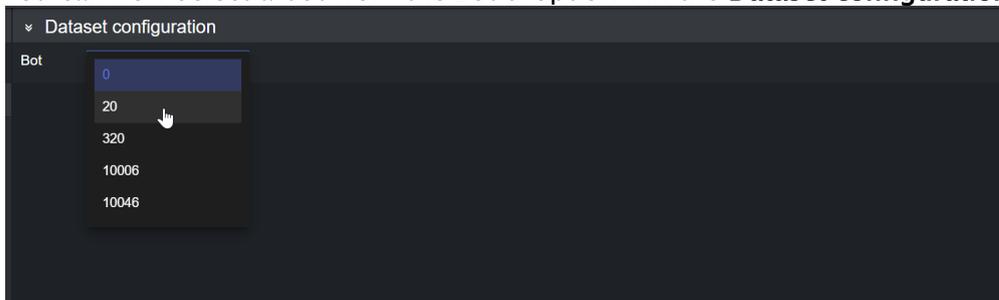
1. Create a new dataset of type **Sportzcast** , specifying a name and (optionally) a prefix to use to identify the dataset and its values:



2. Click **Add** . The dataset is added to the list, and it has an initial WARNING status as it contains no source bots yet.

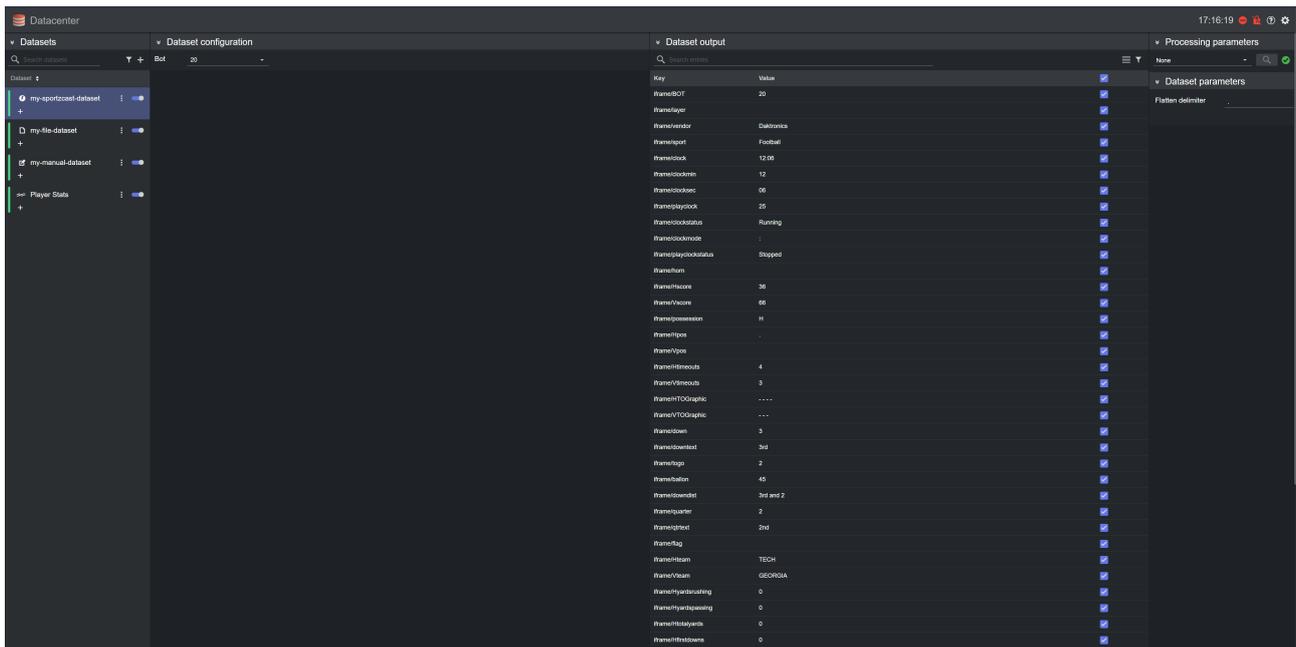


3. You can now select a bot from the Bot dropdown in the **Dataset configuration** panel:



**Note:** In the Sportzcast API, you are required to select the bot number that corresponds to a specific venue. These bots vary depending on the Sportscast bot server used while configuring the Provider in the [Admin](#) page.

After adding a source bot, its content are added to the **Dataset Entries** table.



**Note:** Data from the Sportzcast data provider is event based, meaning that the data is pushed to Datacenter and the output is updated instantly when data changes.

Please refer to the [Filtering and Manipulating the Dataset Entries](#) page to learn how to enable, disable and edit the entries added.

### Vectar

This section provides the steps to configure a [Viz Vectar](#) dataset, using [Datalink](#).

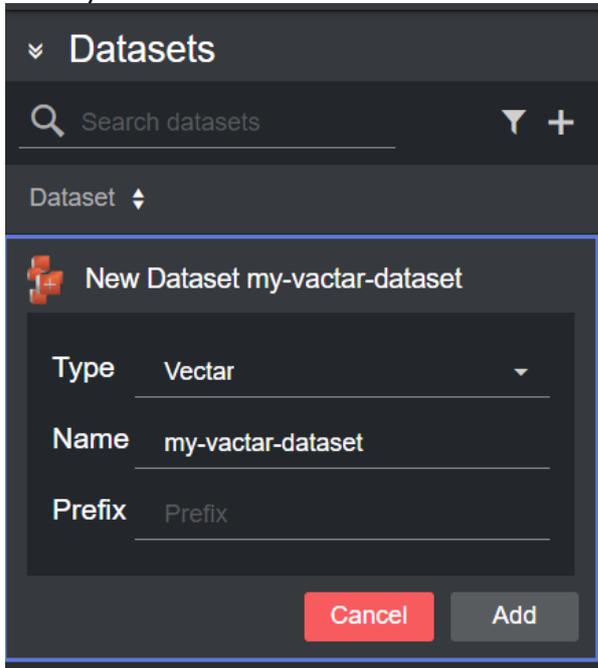
Datalink in Viz Vectar allows live data input from a wide range of data sources, such as:

- Daktronics devices
- DSI devices
- Nevco devices
- OES devices
- Ranbow devices
- Translux devices
- Whiteway devices
- Access to all external databases (anything supported by ODBC).
- All sorts of internal clocks.
- External CSV files, Excel Files, Text files and XML files.
- Web based score controllers.
- Web page real-time updates.

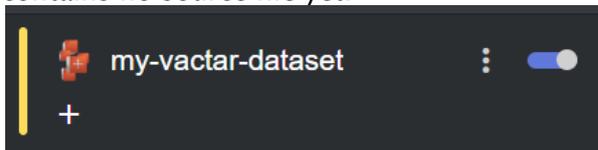
As such data is available in a Viz Vectar system (or Newtek's Tricaster), it can be used in Datacenter datasets.

Configuring a **Vectar** dataset requires the following steps:

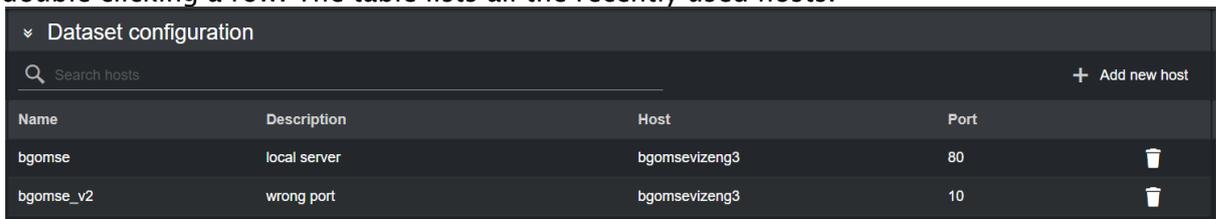
1. Create a new dataset of type **Vector**, specifying a name and (optionally) a prefix to use to identify the dataset and its values:



2. Click **Add**. The dataset is added to the list, and it has an initial **WARNING** status as it contains no source file yet.



3. You can now select a host to replicate from the table in the **Dataset configuration** panel by double clicking a row. The table lists all the recently used hosts.



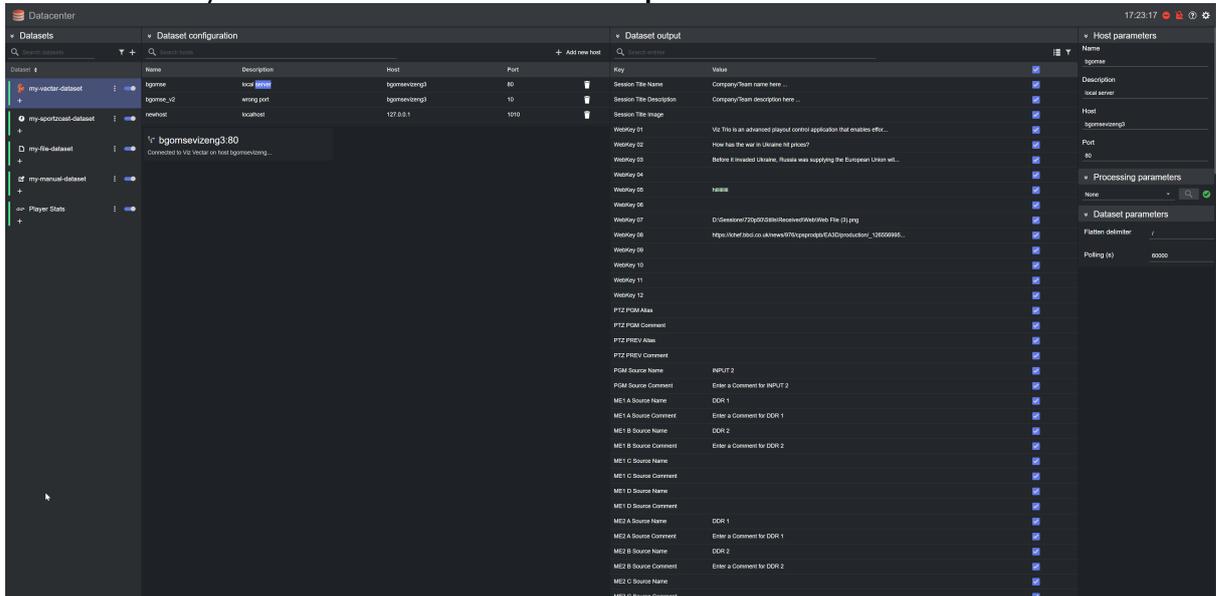
Alternatively, you can add a new host by clicking on **Add new host** on the right-side of the panel, and then clicking on the empty host that is added at the bottom of the table.



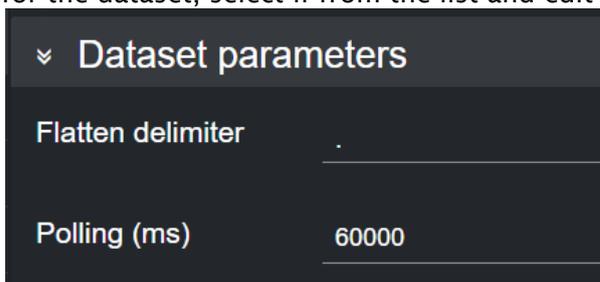
Doing so reveals the new host details on the right column, where its properties can be entered.



- After adding a host machine and establishing a successful connection to it, the data from the Viz Vectar system is added to the **Dataset output** table.



- To change the polling rate (how often the Viz Vectar host machine is polled for data, in ms) for the dataset, select it from the list and edit the **Polling** field in the **Dataset parameters**.



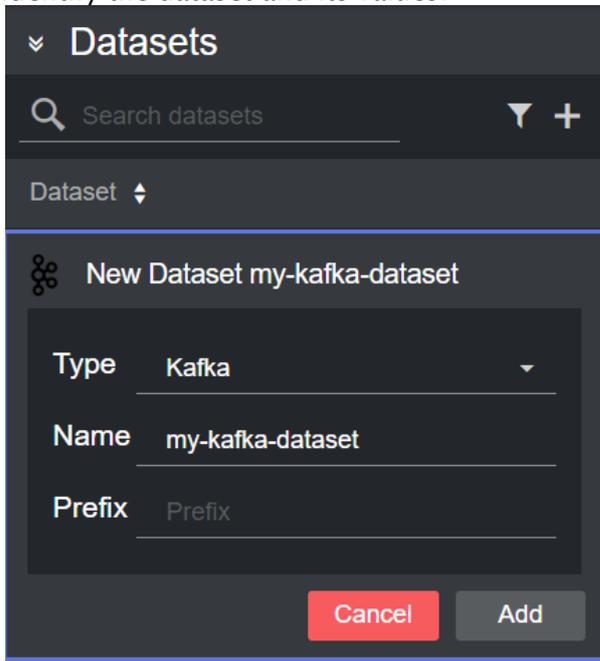
**Note:** Data from a Vectar data provider may be event based. Therefore, if your dataset contains updating data (for example, values of the same key that change over time), the data that is pushed to Datacenter updates the graphics instantly.

Please refer to the [Filtering and Manipulating the Dataset Entries](#) page to learn how to enable, disable and edit the entries added.

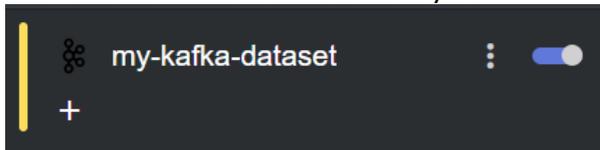
## Kafka

This section provides the steps to configure a **Kafka** dataset, which can be used to connect your outputs to data incoming from one of more [Apache Kafka](#) Brokers.

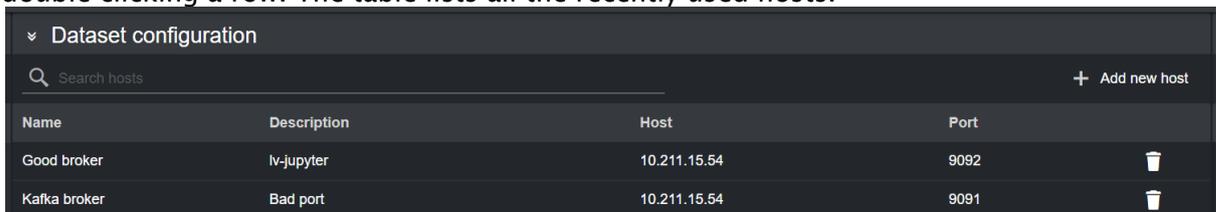
1. Create a new dataset of **Type** Kafka, specifying a name and (optionally) a prefix to use to identify the dataset and its values:



2. Click **Add**. The dataset is added to the list, and it has an initial WARNING status as it contains no Kafka broker source yet.



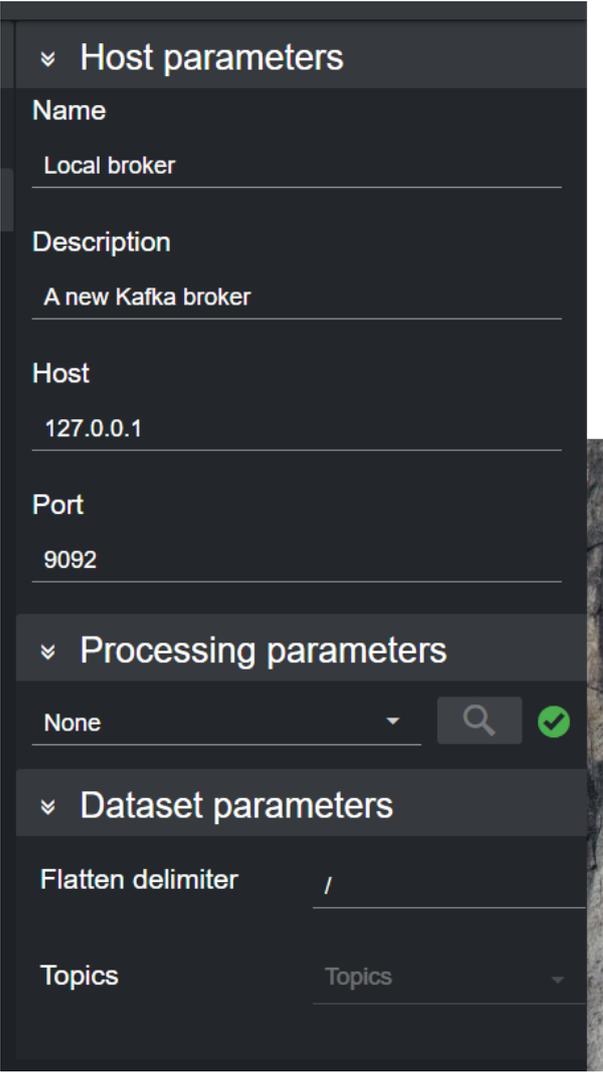
3. You can now select a host to replicate from the table in the **Dataset configuration** panel by double clicking a row. The table lists all the recently used hosts.



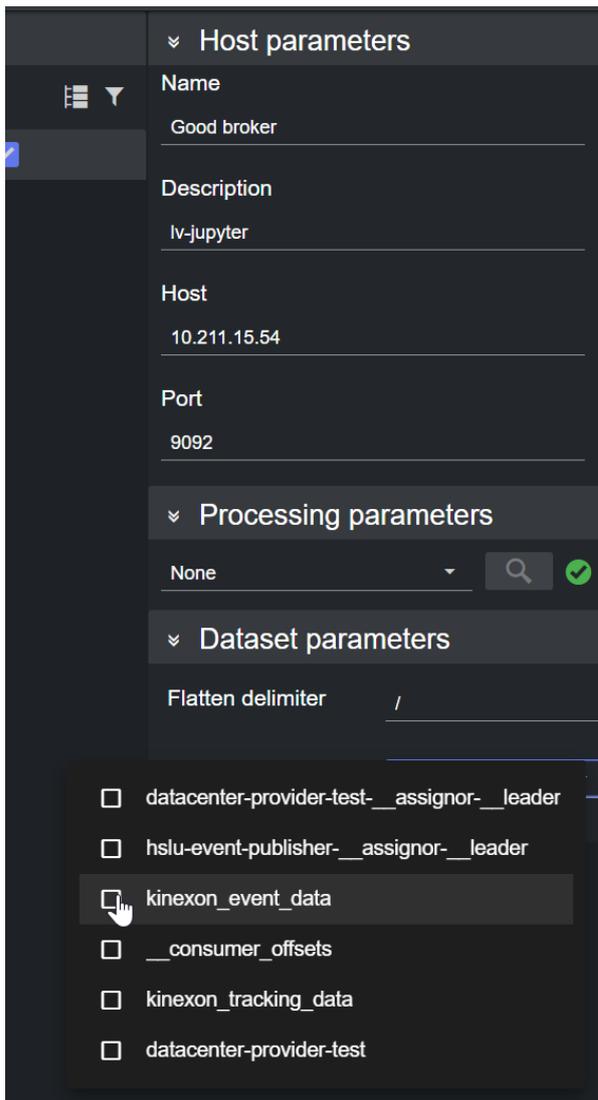
Alternatively, you can add a new host by clicking on **Add new host** on the right-side of the panel, and then clicking on the empty host that is added at the bottom of the table.



Doing so reveals the new host details, where its properties can be entered.



If the specified host runs a Kafka Broker, the topics advertised by the broker are listed in the dropdown **Topics** menu available in the **Dataset parameters** section.



Select one or more topics from this list. The data published on these topics are added to the Dataset Entries table.

**Info:** Datacenter expects from the Kafka topics, messages of type JSON. All other formats are discarded and the dataset is set to a Warning state.

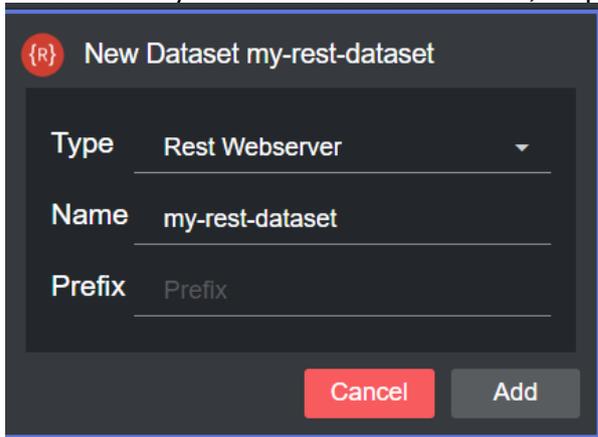
**Note:** Data from a Kafka data provider is typically event based. Therefore, if your broker publishes updating data (values of the same key that change over time), the data that is pushed to Datacenter updates the graphics instantly.

Please refer to the [Filtering and Manipulating the Dataset Entries](#) page to learn how to enable, disable and edit the entries added.

## Rest Webservice

This section provides the steps to configure a **Rest Webservice** dataset, to poll data from a generic REST provider.

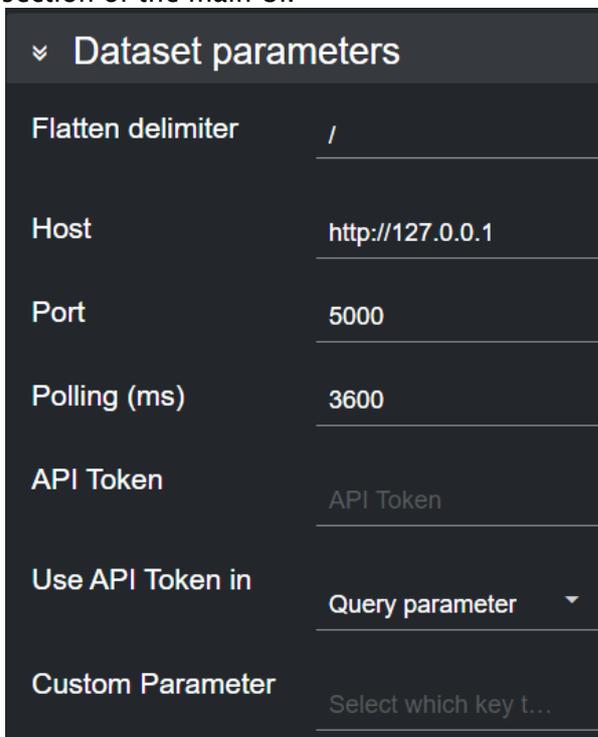
1. Create a new dataset of type **Rest Webservice**, specifying a name and (optionally) a prefix to use to identify the dataset and its values, respectively:



2. Click **Add**. The dataset is added to the list, and it has an initial WARNING status as it contains no configured endpoints yet.



3. Click on the dataset card and configure the webservice options in the **Dataset parameters** section of the main UI.

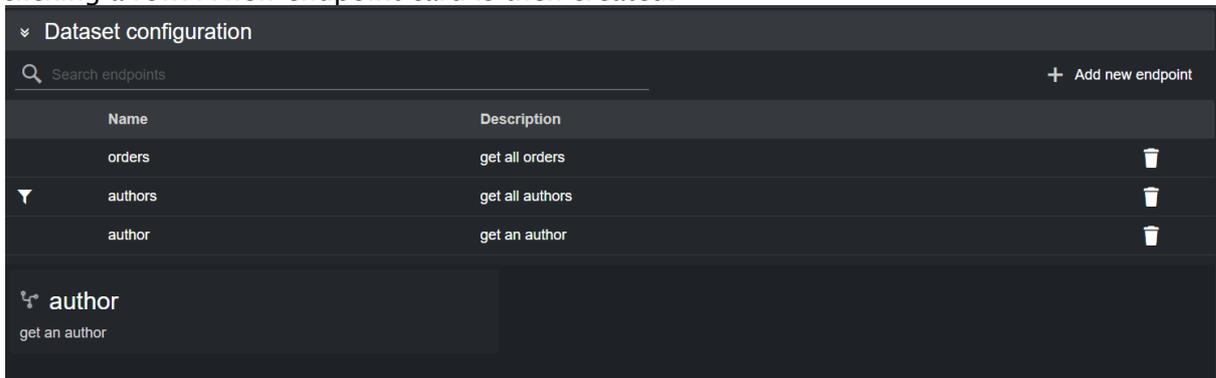


**Info:** If the host to connect to, does not require a port to be specified, please leave the **Port** field as zero.

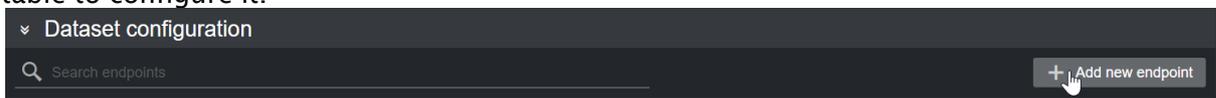
If needed, use the **API Token** and **Use API Token in** fields to specify how an API token should be passed in the request.

- **X-API-Key** embeds the API token in the X-API-Key key of the request header.
- **Custom header key** embeds the API token in the request header key specified in the **Custom Key** field.
- **Query Parameter** embeds the API token in the query parameter specified in the **Custom Key** field.

4. Select one or more endpoints from the table in the **Dataset configuration** panel by double clicking a row. A new endpoint card is then created.



Alternatively, you can enter a new endpoint by clicking **Add new endpoint** on the right-side of the panel, and then clicking on the empty endpoint that is added at the bottom of the table to configure it.



Doing so reveals the new endpoint details, where its properties can be entered.

A dark-themed form titled "Endpoint template parameters" with a dropdown arrow. It contains four input fields: "Name" with the value "Id\_3", "Description" with the value "Description", "Endpoint" (empty), and "Dependency filter" (empty). Below this is a section titled "Endpoint fixed options" with a dropdown arrow, containing a "Name" input field (empty).

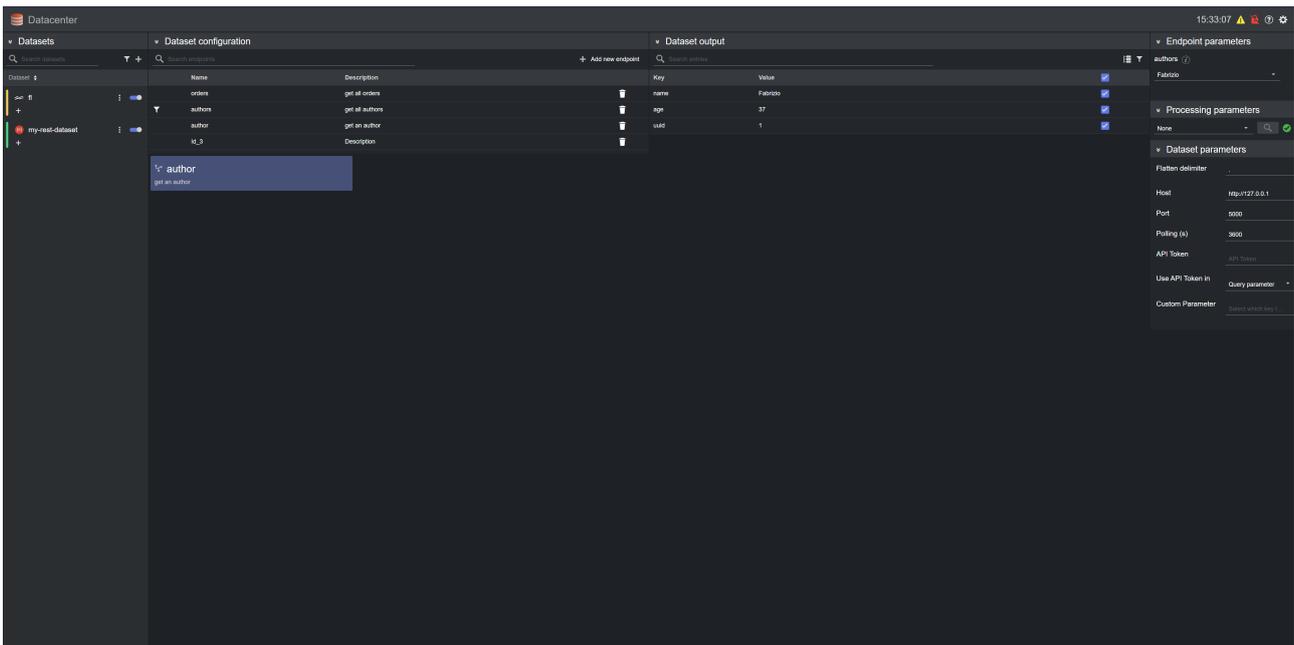
**i Endpoint Options:** When adding a new endpoint, parameters (for example, parts of the endpoint whose value should be fetched from other endpoints) should be encapsulated in curly braces: {part\_name}. The value inside curly braces is resolved either using other endpoints present in the **Dataset configuration** table, or the ones specified in the **Endpoint fixed options** section of the main view. Using as example the images above, the following endpoint `/authors/{authors}`, would use the {authors} option from the respective endpoint in the table.

Once an endpoint is added to a dataset, you can select the endpoint card, where its properties can be entered. You can now edit the endpoint configuration.

The screenshot shows a configuration interface with three main sections:

- Endpoint parameters:** A dropdown menu for 'authors' is set to 'Fabrizio'.
- Processing parameters:** A dropdown menu is set to 'None', with a search icon and a green checkmark icon.
- Dataset parameters:** A list of parameters with their values:
  - Flatten delimiter: /
  - Host: http://127.0.0.1
  - Port: 5000
  - Polling (ms): 3600
  - API Token: API Token
  - Use API Token in: Query parameter
  - Custom Parameter: Select which key t...

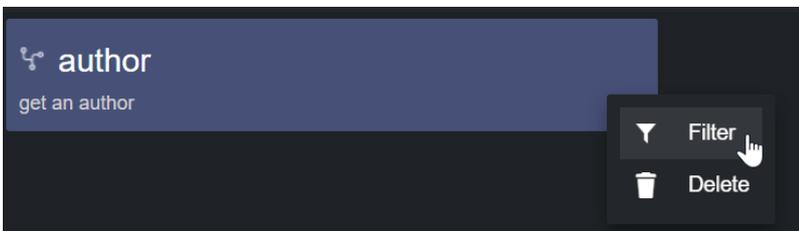
When done, the data is added to the **Dataset output** table.



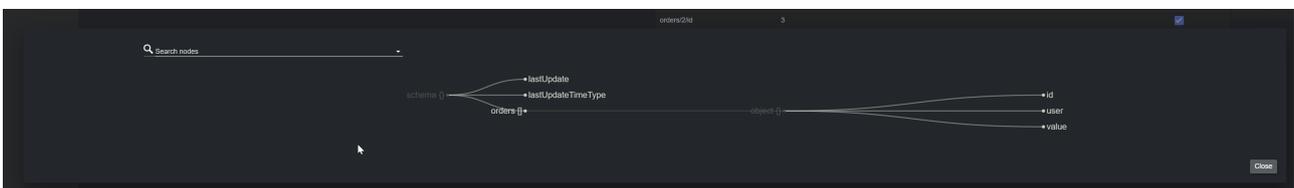
To change the polling rate (how often the remote REST host is polled for data, in ms) for the dataset, select it from the list and edit the **Polling** field in the Dataset parameters on the right-side column.

### Filter a Dataset

Values read from a file into a dataset can be filtered with the Filtering tool. To do so, select the dataset card, click on the hamburger menu and then press the **Filter** button.



A dialog visualizing the file's payload schema opens, through which a user can filter the source data.



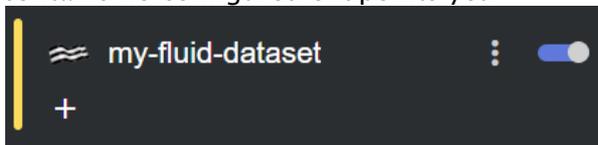
Please refer to the [Filtering and Manipulating the Dataset Entries](#) page to learn how to enable, disable and edit the entries added.

### Fluid Data Services

This section provides the steps to configure a **Fluid Data Services** dataset.

1. Create a new dataset of type **Fluid Data Services**, specifying a name and (optionally) a prefix to use to identify the dataset and its values, respectively:

2. Click **Add**. The dataset is added to the list, and it has an initial WARNING status as it contains no configured endpoints yet.

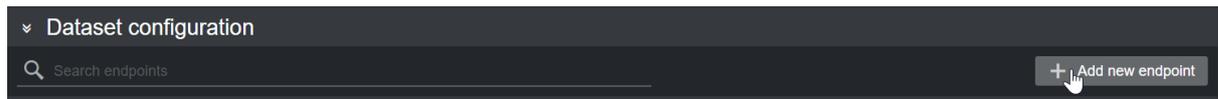


3. Select one or more endpoints from the table in the **Dataset configuration** panel by double clicking a row. A new endpoint card is then created.

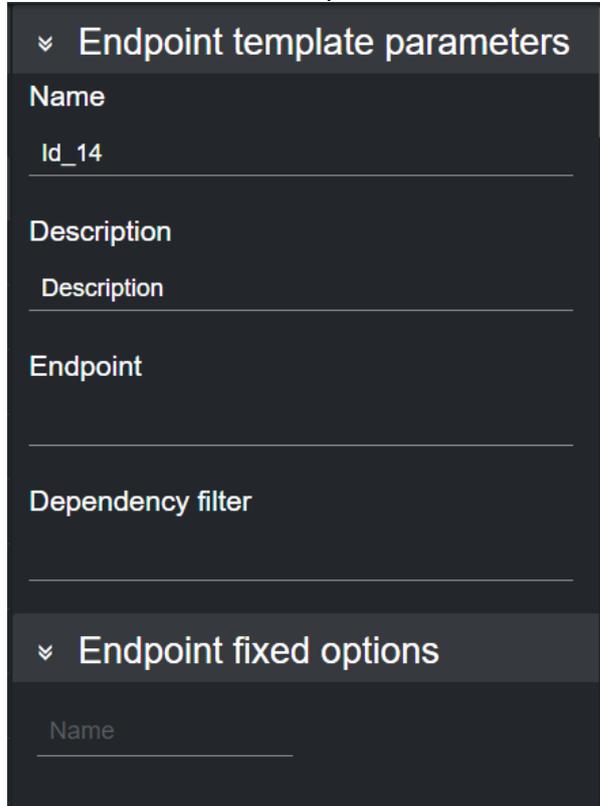
| Name                 | Description   |
|----------------------|---|
| Sport                | Available sports  |
| Competition          | Available competitions  |
| EventGroup           | Event group   |
| Event                | Event   |
| Team                 | Team  |
| Player               | The players for a given team in a competition in a given year         |
| Players passmap      | The players passmaps for a given event                                |
| Players shotmap      | The players shotmap for a given event                                 |
| Penalty preview      | The penalty preview for a given event                                 |
| Attacks Distribution | The attacks distribution for a given event                            |
| Teams HeatMap        | The heatmaps for the teams in a given event                           |
| Actors Details       | The players details for a given team in a competition in a given year |
| Actors Stats         | The players stats for a given event                                   |
| Team Stats           | The team stats for a given competition                                |

**Player**  
The players for a given team in a competitio...

Alternatively, you can enter a new endpoint by clicking **Add new endpoint** on the right-side of the panel, and then clicking on the empty endpoint that is added at the bottom of the table to configure it.



This reveals the new endpoint details, where its properties can be entered.

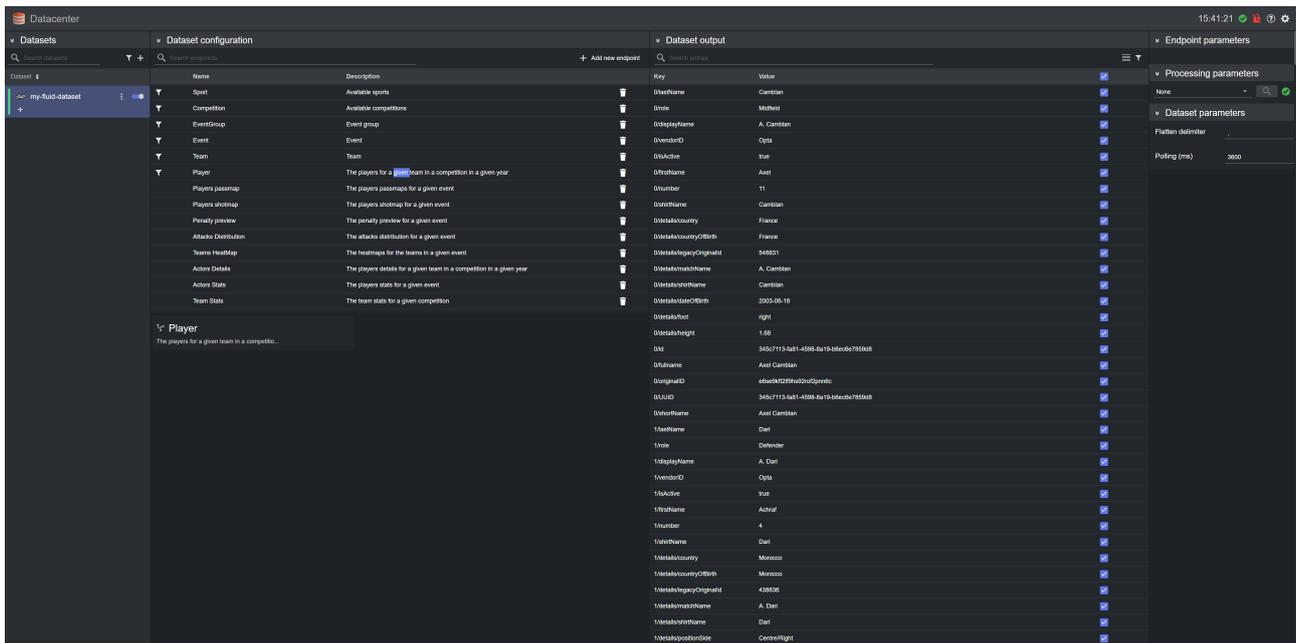


**Endpoint Options:** When adding a new endpoint, parameters (for example, parts of the endpoint whose value should be fetched from other endpoints) should be encapsulated in curly braces: {part\_name}. The value inside curly braces is then resolved either using other endpoints present in the **Dataset configuration** table, or the ones specified in the **Endpoint fixed options** section of the main view. Using as example the images above, the following endpoint */Competitions/{Competition}/{%year%}/teams/{Team}/actors*, would use the {Competition} and {Team} options from the respective endpoint in the table. The {%year%} option, on the other hand, is a special token used to list years as date.

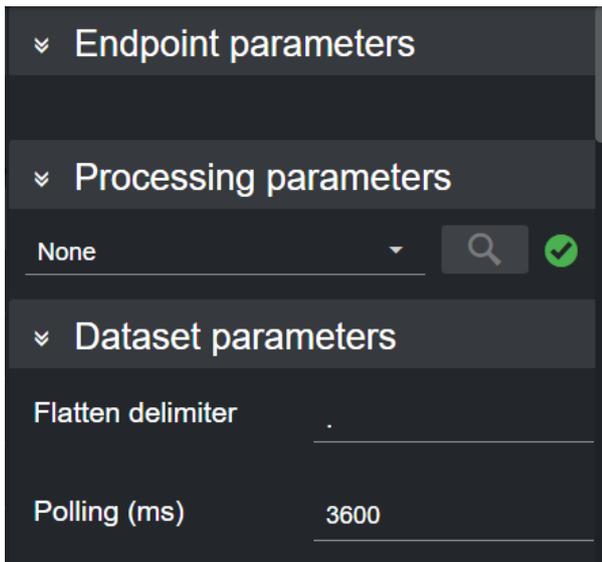
Once an endpoint is added to a dataset, you can select the endpoint card, where its properties can be entered. You can now edit the endpoint configuration (Competition, Season, Match and Event Type in the picture below).



When done, the data is added to the **Dataset output** table.

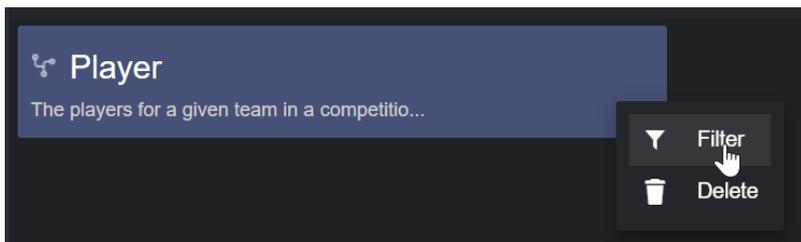


To change the polling rate (how often the Fluid remote host is polled for data, in ms) for the dataset, select it from the list and edit the **Polling** field in the Dataset parameters on the right-most column.

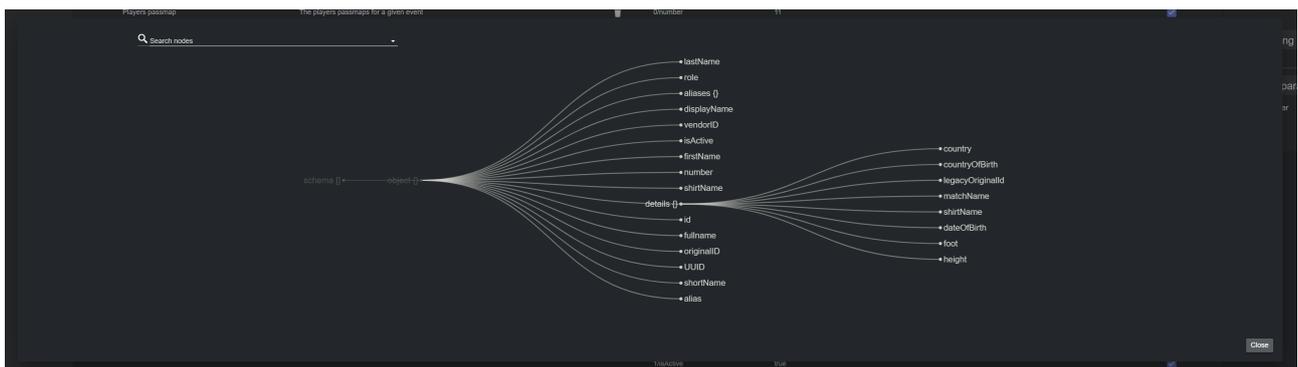


### Filter a Dataset

Values read from a file into a dataset can be filtered with the Filtering tool. To do so, select the dataset card, click on the hamburger menu and then press the **Filter** button.



A dialog visualizing the file's payload schema opens, through which a user can filter the source data.



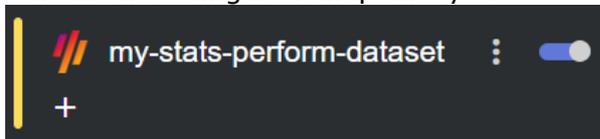
Please refer to the [Filtering and Manipulating the Dataset Entries](#) page to learn how to enable, disable and edit the entries added.

### Stats Perform

These are the steps to configure a **Stats Perform** dataset.

1. Create a new dataset of type **Stats Perform**, specifying a name and (optionally) a prefix to use to identify the dataset and its values, respectively:

2. Click **Add**. The dataset is added to the list, and it has an initial WARNING status as it contains no configured endpoints yet.



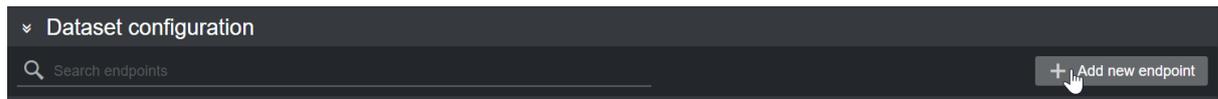
3. Select one or more endpoints from the table in the **Dataset configuration** panel by double clicking a row. A new endpoint card is then created.

|   |                       |  |    |
|---|-----------------------|--|----|
| ▼ | Competition           | The league (Competition)                           | 🗑️ |
| ▼ | Season                | The season of a specific competition               | 🗑️ |
| ▼ | Match                 | The matches (Fixtures) of a specific season        | 🗑️ |
| ▼ | Team                  | Teams of a specific match                          | 🗑️ |
| ▼ | Player                | The players of a specific team of a specific match | 🗑️ |
|   | MatchEvents           | All match events of both teams                     | 🗑️ |
|   | MatchEventsTeam       | All match events of a specific team                | 🗑️ |
|   | MatchEventsTeamPlayer | All match events of a specific player              | 🗑️ |
|   | MatchStats            | All statistics of a match                          | 🗑️ |
|   | MatchPenaltiesPreview | All historical penalties relevant for a match      | 🗑️ |
|   | Id_10                 | Description  | 🗑️ |

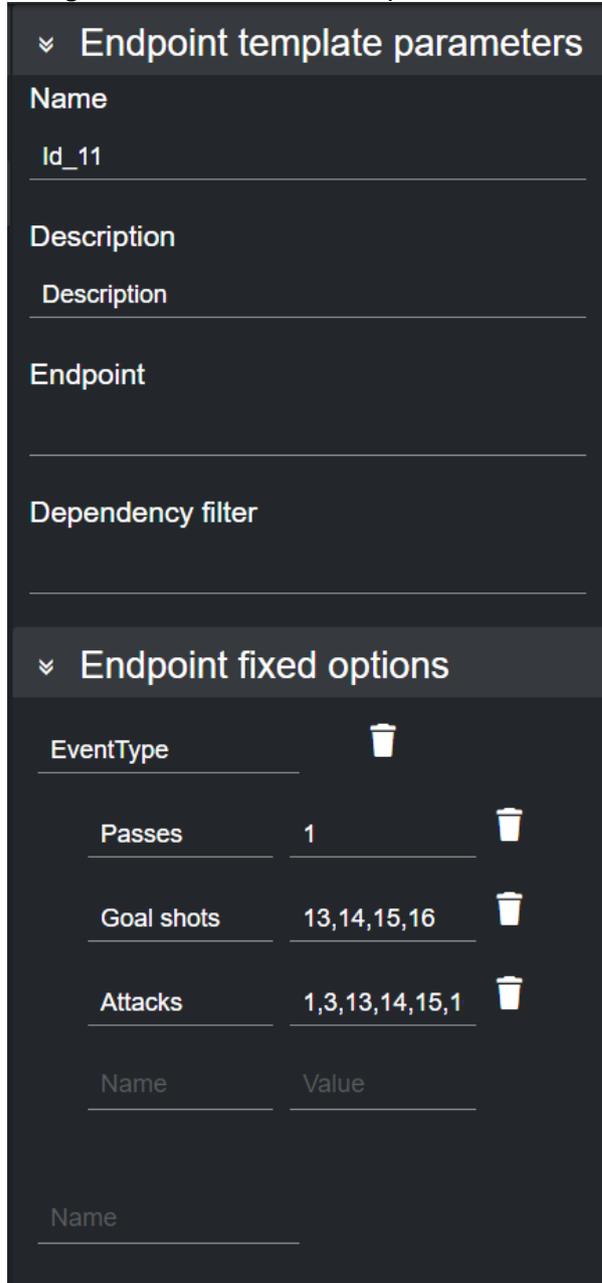
  

**MatchEvents**  
All match events of both teams

Alternatively, you can enter a new endpoint by clicking **Add new endpoint** on the right-side of the panel, and then clicking on the empty endpoint that is added at the bottom of the table to configure it.



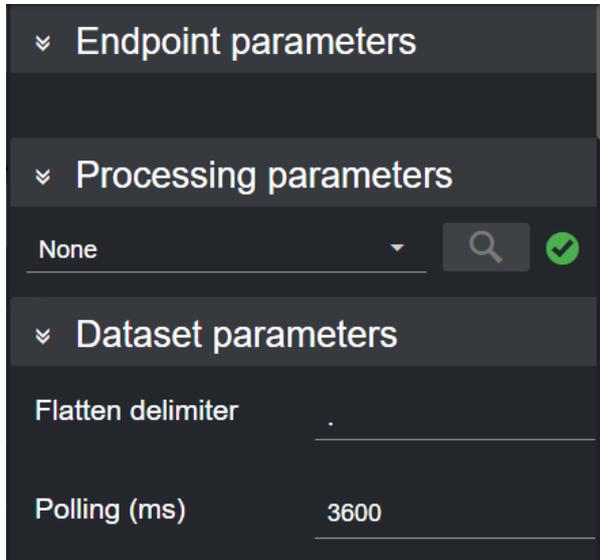
Doing so reveals the new endpoint details, where its properties can be entered.



**Endpoint Options:** When adding a new endpoint, parameters (for example, parts of the endpoint whose value should be fetched from other endpoints) should be encapsulated in curly braces: {part\_name}. The value inside curly braces is resolved either by using other endpoints present in the **Dataset configuration** table, or the ones specified in the **Endpoint fixed options** section of the right-most column in the main view.

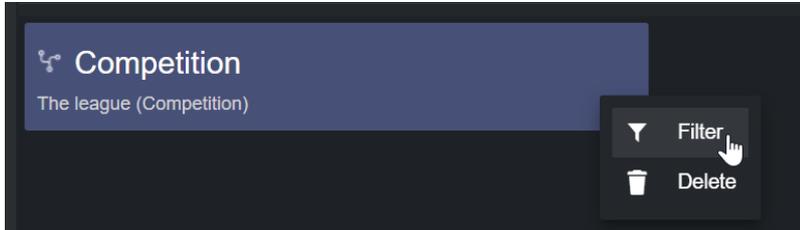


- To change the polling rate (how often the Fluid remote host is polled for data, in ms) for the dataset, select it from the list and edit the **Polling** field in the Dataset parameters on the right-most column.

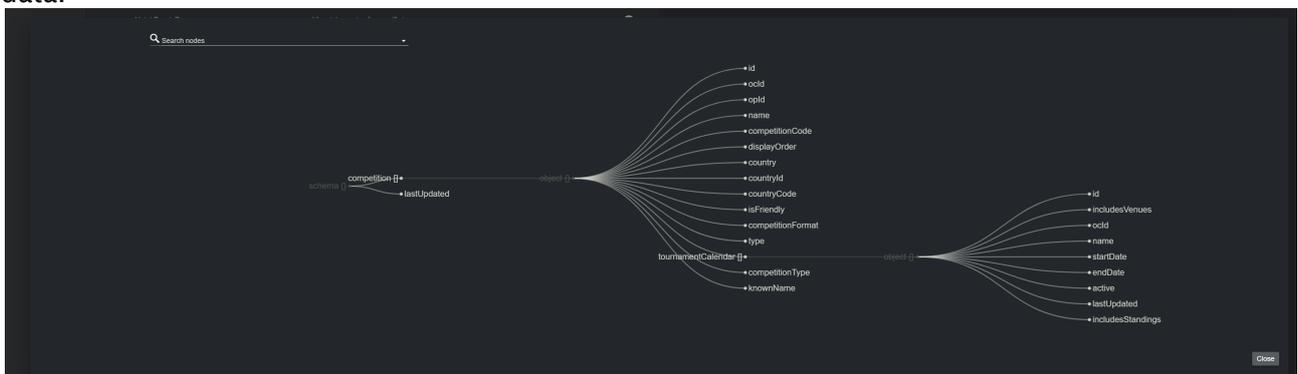


### Filtering a Dataset

Values read from a file into a dataset can be filtered via the Filtering tool. To do so, select the dataset card, click on the hamburger menu and then press the **Filter** button.



A dialog visualizing the file's payload schema opens, through which a user can filter the source data.



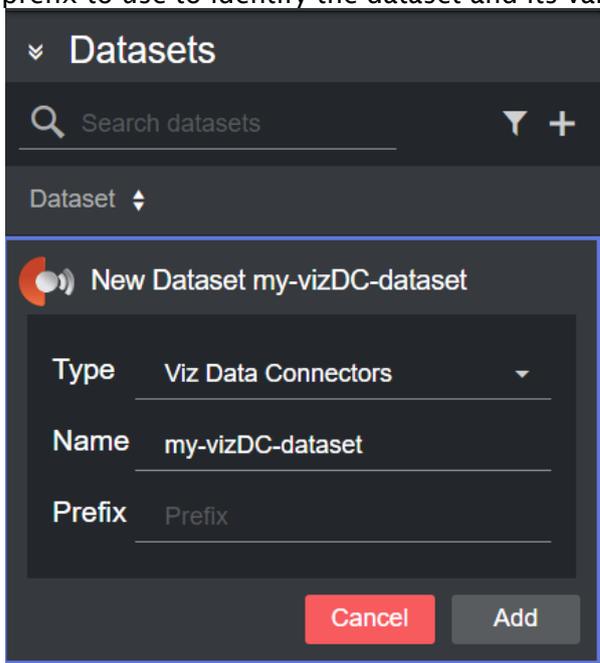
Please refer to the [Filtering and Manipulating the Dataset Entries](#) page to learn how to enable, disable and edit the entries added.

## Viz Data Connectors

This section provides the steps to configure a **Viz Data Connectors** dataset using **Flowics Middleware**.

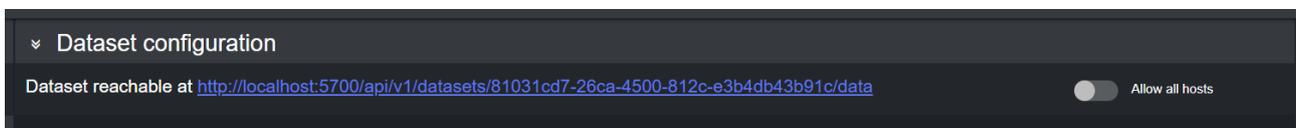
**ⓘ Flowics Account:** For a Viz Data Connectors dataset to work correctly, an existing account with Flowics by Vizrt must be obtained (separately) by the customer. Additionally, the connectors to forward to Datacenter via the Flowics Middleware, as well as its setup, must be performed beforehand by Flowics web-ui. Please refer to the [Flowics by Vizrt documentation](#) for further information.

1. Create a new dataset of **Type** Viz Data Connectors, specifying a name and (optionally) a prefix to use to identify the dataset and its values:



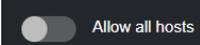
2. Click **Add**.

The following link is displayed in the **Dataset configuration** panel:



This link can be used in the Flowics web-ui, to configure the Middleware to forward data to Datacenter.

The basic setup assumes that both Datacenter and the Flowics Middleware run on the same machine. When this is the case, no further steps are required to setup a Flowics dataset, and any data configured to be forwarded by the Middleware, should also appear in the Dataset Entries panel. However, for setups where Datacenter runs on a different machine than the Flowics Middleware, the following additional steps have to be performed:

- Enable the **Allow all hosts** toggle in the dataset 

- Substitute the *localhost/127.0.0.1* part of the address shown in the **Dataset configuration** panel with the machine public IP.

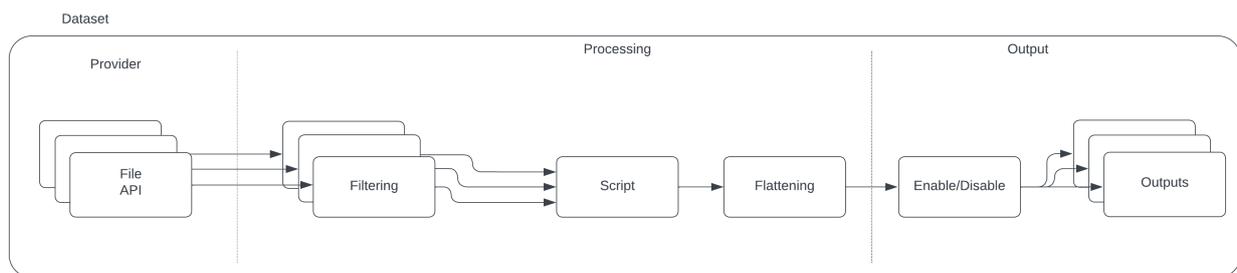
**i** **Machine IP:** On Windows, a machine IP can be found by running the *ipconfig* command from a command line terminal (CMD), or the *Get-NetIPAddress* cmdlet in Powershell.

Please refer to the [Filtering and Manipulating the Dataset Entries](#) page to learn how to enable, disable and edit the entries added.

## 5.4.2 Filtering and Manipulating the Dataset Entries

The data contained in each dataset can be filtered or modified with tools provided by Datacenter. This way, a user can control in real-time, which values are sent to the output(s) and in which format.

Data manipulation can be done by [filtering](#), [scripting](#) and [flattening](#). Each step acts on the dataflow, whether it is globally (filtering) or locally (scripting and flattening), and is applied in a specific order, as shown in the diagram below:



This section describes how to filter and manipulate dataset entries in Datacenter, including:

- [Filtering a Dataset](#)
- [Manipulating Dataset Entries via Scripting](#)
- [Flattening a Dataset](#)

### Filtering a Dataset

#### Introduction

Filtering can be used to process the incoming data before it is sent to the outputs, allowing flexible data manipulation. Unlike other data manipulation operations ([scripting](#) and [flattening](#)), filtering acts on the data schema rather than the payload. That is, filtering acts on an object representation rather than on its instance.

**i** **Info:** When filtering a dataset, the incoming data must be a valid JSON object. When this is not the case, filtering cannot be applied to a dataset.

For example, given the incoming data below:

```

Incoming object

[
  {
    "id": "457e14f6-6244-4fb5-882a-eafc874ac384",
    "label": "Soccer",
    "UUID": "457e14f6-6244-4fb5-882a-eafc874ac384"
  },
  {
    "id": "1f66f5cf-978e-4fc1-9c39-7f2bde73778c",
    "label": "Basketball",
    "UUID": "1f66f5cf-978e-4fc1-9c39-7f2bde73778c"
  },
  {
    "id": "fb238641-7e4b-4578-b34f-bdd172be03bf",
    "label": "Tennis",
    "UUID": "fb238641-7e4b-4578-b34f-bdd172be03bf"
  }
]
    
```

Filtering it to remove "id" and "UUID" results in the data held in the datacenter to be:

```

Incoming object

[
  {
    "label": "Soccer"
  },
  {
    "label": "Basketball"
  },
  {
    "label": "Tennis"
  }
]
    
```

On subsequent data, should the array contain more entries and assuming the same filtering is applied, then the Datacenter only reads the property "label" for all entries.

Currently, the following providers support filtering:

| Provider   | Filtering Supported |
|------------|---------------------|
| Manual     | ✓                   |
| File       | ✗                   |
| Replicator | ✗                   |

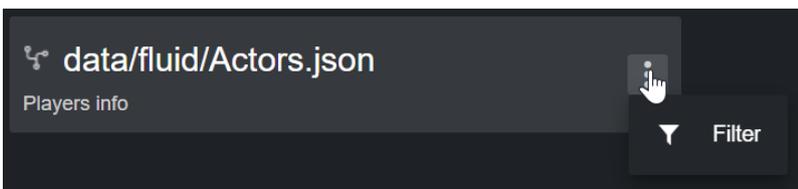
| Provider            | Filtering Supported |
|---------------------|---------------------|
| Sportzcast          | ✗                   |
| Vectar              | ✗                   |
| Kafka               | ✗                   |
| Rest Webserver      | ✓                   |
| Fluid Data Services | ✓                   |
| Stats Perform       | ✓                   |
| Viz Data Connectors | ✗                   |

These are the following topics:

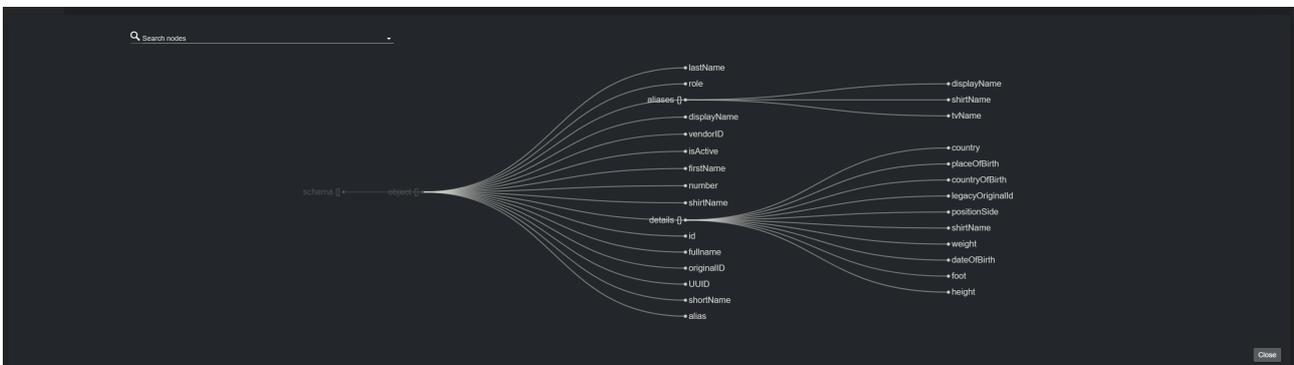
- [Introduction](#)
- [Accessing the Filter Page](#)
- [Interacting with the Tree: Filtering Nodes](#)
- [Searching Nodes and Inspecting Sample Values](#)

### Accessing the Filter Page

To access the filtering page, select a dataset of one of the supported providers, hover on an instance of a template and in the hamburger menu that appears, select **Filter**:



This opens a dialog, where the "schema" (an abstract representation that describes your existing data format) is shown as an interactive tree.



## Interacting with the Tree: Filtering Nodes

The tree shown in the filtering dialog can be panned and zoomed: use your mouse's left-button to pan, and the mouse scroll wheel to zoom.

A node in the tree can be in one of the following three states:

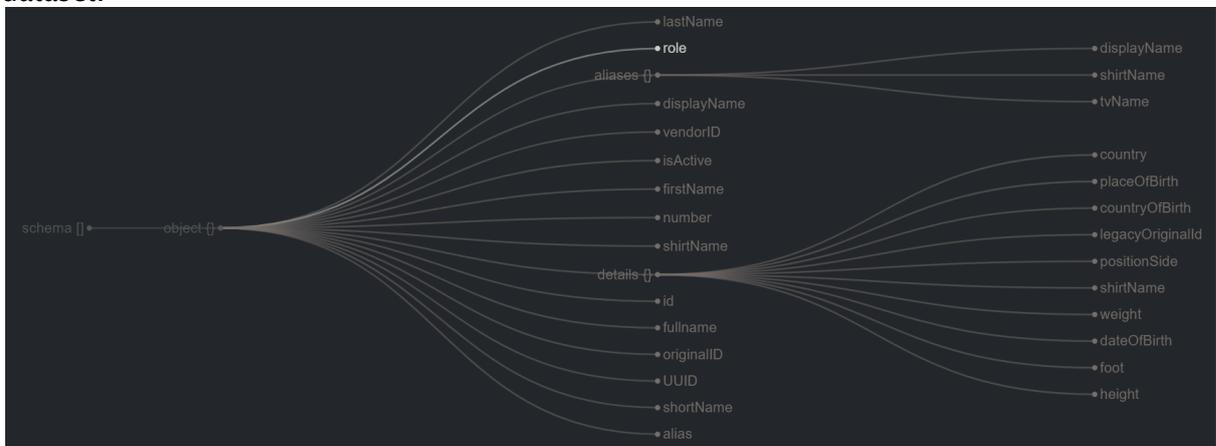
| State | Active (filtered in)  | Inactive (filtered out)  | Disabled  |
|-------|---|--|---|
|       |  |  |  |

- **Active:** The node is added to the dataset data. If a node represents an object, its children are also added if no further filtering is applied, or the individual filtering on the children is considered.
- **Inactive:** The node is not added to the dataset data. If a node represents an object, all its children is excluded from the dataset.
- **Disabled:** No interaction is possible with the node.

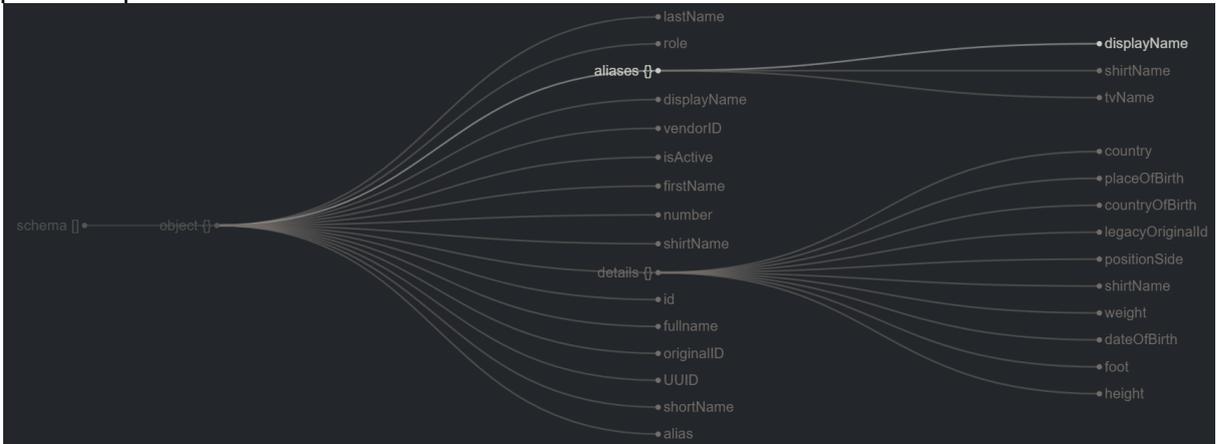
When adding a new data source, by default, the incoming data is set to active. That is, all fields in the incoming object are added to the dataset data. To start filtering nodes in the tree, click on the nodes you wish to add to the dataset.

When clicking on a node, there are three possible scenarios:

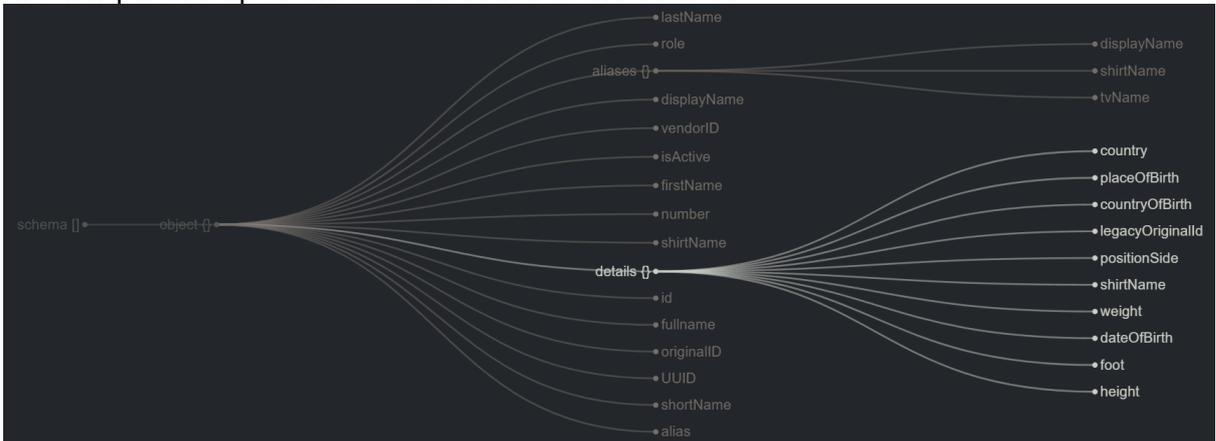
1. A **leaf node that is directly connected to the root** is clicked: a single node is added to the dataset.



2. A leaf node that is a children of an object is clicked: the leaf node, its parents, and all other parents up to the root are added to the dataset.

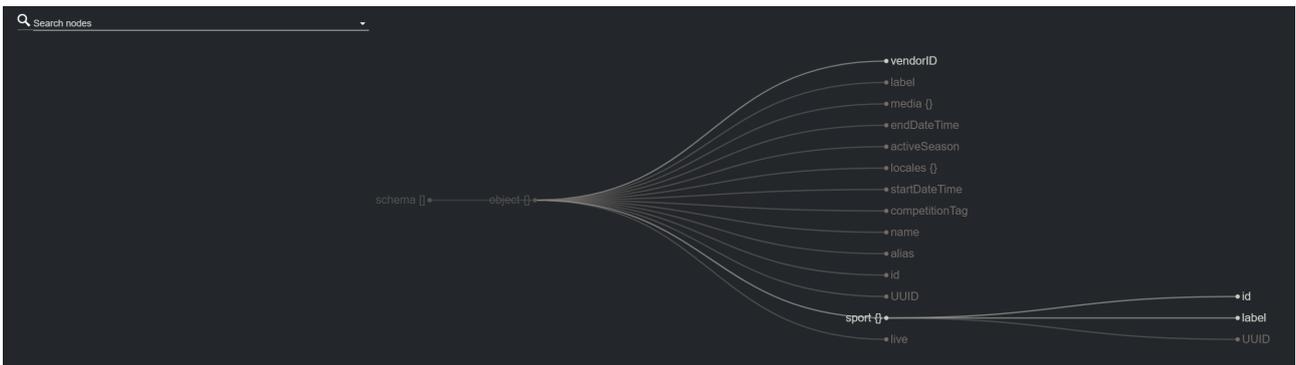


3. A node representing an object is clicked: the object node, its children, and its parents and all other parents up to the root are added to the dataset.



Once you start filtering a dataset, you can click on a node to toggle its state. That is, clicking on a node for the first time sets its state to active. Clicking on it again sets its state to inactive.

To further illustrate how filtering works, consider the following filtered tree:

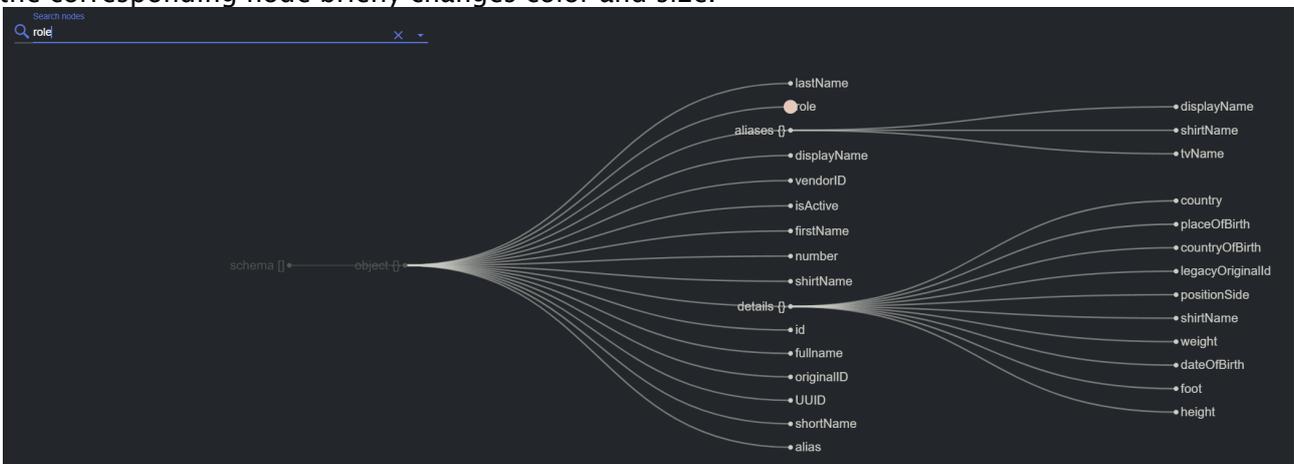


This selection results in the dataset to hold the following (flattened) values.

| Dataset output |                                      |                                     |
|----------------|--------------------------------------|-------------------------------------|
| Search entries |                                      |                                     |
| Key            | Value                                | <input checked="" type="checkbox"/> |
| 0/sport/label  | soccer                               | <input checked="" type="checkbox"/> |
| 0/sport/id     | 457e14f6-6244-4fb5-882a-eafc874ac384 | <input checked="" type="checkbox"/> |
| 0/vendorID     | Opta                                 | <input checked="" type="checkbox"/> |

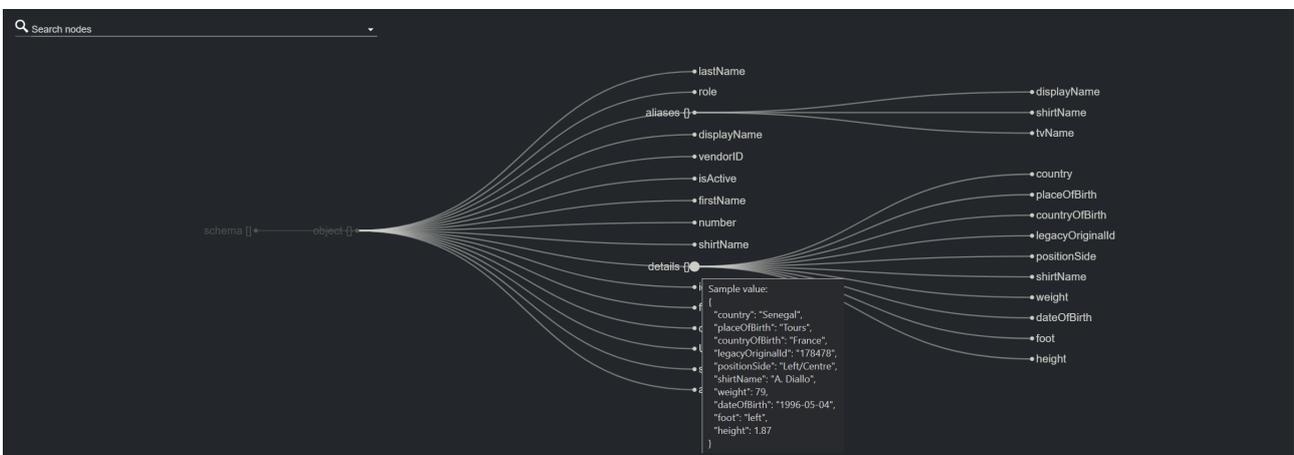
### Searching Nodes and Inspecting Sample Values

Nodes in the tree can be searched using the **Search nodes** field in the top-left of the dialog. Start typing a node name in the text field to see all possible matches. By selecting one of the results, the corresponding node briefly changes color and size.



**Note:** Searching a node triggers highlighted animations on the tree and has no effect on the final dataset. That is, selecting a node name from the search text field does not add the node to the dataset output.

To get an idea of the incoming data, sample payload can be inspected for each node in the tree. To reveal the sample content of a node, hover on its name.



## Manipulating Dataset Entries via Scripting

### Introduction

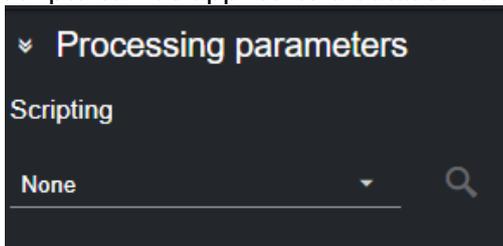
Scripting can be used to process the incoming data before it is sent to the output, allowing flexible data manipulation. For example, data can be normalized to an expected format / units, and new entries can be computed from incoming data.

These are the following topics:

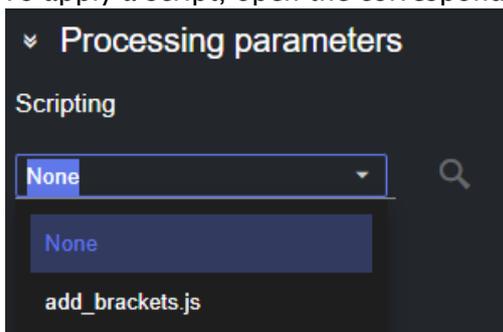
- [Introduction](#)
- [Applying a Script](#)
- [Development](#)
- [Process](#)
- [Arguments](#)
- [Imports](#)
- [Debugging](#)

### Applying a Script

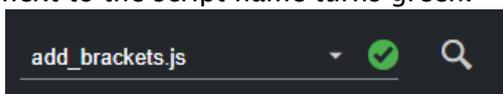
Scripts can be applied to a dataset via the **Processing parameters** panel:



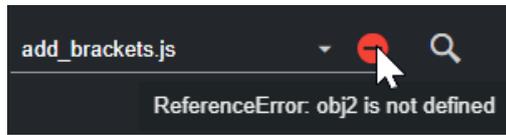
- To apply a script, open the corresponding dropdown menu and select the script to apply.



- Scripts are applied immediately on the dataset output. When applied successfully, the icon next to the script name turns green.



- Conversely, scripts that are not applied successfully show a red icon next their name. You can hover over the icon to reveal the error message.



- By clicking the magnifier glass icon  you can inspect the content of the loaded script.

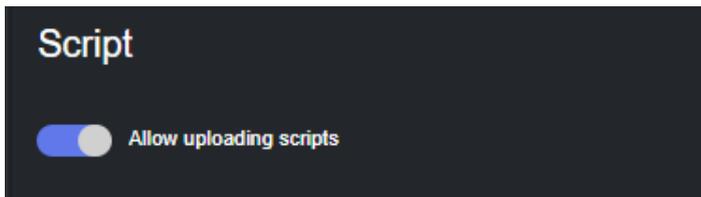
```
export function process(input) {
  var obj = JSON.parse(input.data);
  for(var key in obj)
  {
    ...
  }
  return {new_data: obj}
}
```

Close

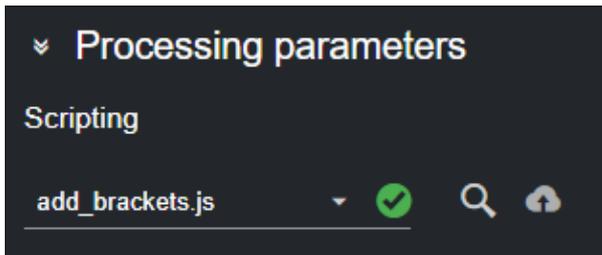
### Adding A New Script

Datacenter, constantly monitors all the scripts located in *C:\ProgramData\vizrt\Datacenter\scripts*, and therefore, the new scripts added to that folder are immediately visible in the Datacenter script list.

Another option to add a new script is to enable the **Allow uploading scripts** toggle in the General/Communication section of the Admin page.



Doing so, enables an upload button next to the scripts list in the main page, which can be used to load new scripts.



#### ⚠ Script Uploading

**Warning:** Datacenter does not vet uploaded scripts, therefore, allowing the upload of arbitrary scripts to Datacenter can pose a security threat. We **strongly recommend** to enable scripts uploading, only when strictly necessary and for the time required.

## Development

Scripts are Javascript programs located in `C:\ProgramData\vizrt\Datacenter\scripts`, and they must be named as `*.js` (sub-directories are supported).

Scripts are constantly monitored by Datacenter, and are reloaded every time there is a change.

To start developing a script, simply open a Visual Studio Code (or any other text editor) in `C:\ProgramData\vizrt\Datacenter\scripts`, create a script and see your changes applied as soon as the file is saved.

⚠ **Warning:** Because of the file watcher, when saving a script with VS Code, the file might suddenly become empty. Therefore, simply Undo (**CTRL + Z**) the last action and save the file again.

## Process

All scripts must export a function named `process`, which is then called whenever data is received from a provider.

When multiple inputs are configured (for example multiple endpoints for a REST provider), the input variable holds the incoming data in multiple members named `data`, `data_1`, `data_2`.

## Example

Here is an example of a script with the following inputs:

**Input**

```

raw_endpoint_data_1 = { // in the script, this is readable from input.data
  "key11": 1,
  "key12": 2
}

raw_endpoint_data_2 = { // in the script, this is readable from input.data_1
  "key21": 3,
  "key22": 4
}

```

**Script**

```

1  export function process(input) {
2    var obj1 = JSON.parse(input.data);
3    var obj2 = JSON.parse(input.data_1);
4    return {
5      a: obj1.key11,
6      b: obj2.key21,
7      c: obj1.key12 + obj2.key22
8    }
9  }

```

The output data is then three keys (a, 1), (b, 3) and (c, 6).

## Arguments

To allow more flexible scripts, arguments can be added to the code and is shown in the UI.

It is possible to add numbers, strings, enums and date arguments that are then passed to the script during execution.

A function named *getProcessArguments* must be exported from the script and must return the arguments created with helper functions (see example). This function takes an optional parameter of the current provider input, allowing to create arguments dependent on the currently received values.

### Argument Declaration Helper Functions

The following helpers can be used to declare scripts arguments:

```

function argumentEnum(name, defaultIndex, values, description="") { /*... */ }
function argumentString(name, defaultValue, description="") { /*... */ }
function argumentInt(name, defaultValue, min = Number.MIN_VALUE, max =
Number.MAX_VALUE, description="") { /*... */ }
function argumentFloat(name, defaultValue, min = Number.MIN_VALUE, max =
Number.MAX_VALUE, description="") { /*... */ }
function argumentDate(name, defaultValue, description="") { /*... */ }

```

The enum values can be of type *string*, or an object of type *{label: string, data: string}*. On the second case, the label is displayed to the user and the script receives the data.

## Example

### Example with hard-coded arguments

```

export function getProcessArguments() {
  return [
    argumentEnum("enumArg", 0, ["option1", "option2"], "An enum argument"),
    argumentEnum("enumWithValuesArg", 1, [ {"label": "option3", "data": "value3"}
, {"label": "option4", "data": "value4"}], "Another enum argument"),
    argumentString("stringArg", "default value", "A string argument"),
    argumentInt("intArg", 2, 0, 5, "An int argument"),
    argumentFloat("floatArg", 3.1, 1.2, 5.6, "A float argument"),
    argumentDate("dateArg", "2023-07-01", "A date argument"),
  ];
}

export function process(input, args) {
  var result = {}
  result["receivedInput"] = input.data;
  result["receivedEnumArg"] = args.enumArg;
  result["receivedEnumWithValuesArg"] = args.enumWithValuesArg;
  result["receivedStringArg"] = args.stringArg;
  result["receivedIntArg"] = args.intArg;
  result["receivedFloatArg"] = args.floatArg;
  result["receivedDateArg"] = args.dateArg;

  return result;
}

```

### Example with arguments generated from input

```

/** Function called by the Viz Datacenter scripting stage. The script's input
arguments are defined with this function.
 * @param {object} input The input object
 * @returns {object[]} An Array of arguments

```

```

*/
export function getProcessArguments (input) {
  const events = getEvents(input)
  const options = getEventOptions(events)

  return [argumentEnum('Event', 0, options, 'The event to select')]
}

/** Retrieves the list of events from the input object
 * @param {object} input The input object
 * @returns {object[]} A list of all the events
 */
function getEvents (input) {
  let events = []
  if (input.data) {
    const obj = parseInputObject(input)
    for (const event of obj.liveData.event) {
      events.push(event)
    }
  }
  return events
}

```

Assuming some kind of input and if the user does not modify the default arguments, the dataset would contain the following values:

|                           |                              |
|---------------------------|------------------------------|
| receivedInput             | { "inputData": "something" } |
| receivedEnumArg           | option1                      |
| receivedEnumWithValuesArg | value4                       |
| receivedStringArg         | <b>default</b> value         |
| receivedIntArg            | 2                            |
| receivedFloatArg          | 3.1                          |
| receivedDateArg           | 2023-07-01                   |

## Imports

In order to allow code reuse, it is possible for a script to import another file. Those imported files must be named *\*.import.js*, so they are not shown as scripts in the Datacenter UI.

The imports are relative to the scripts root directory *C:\ProgramData\vizrt\Datacenter\scripts*, not the current script directory.

## Example

### utils/helpers.import.js

```

export function doNothing(input) {
  return input;
}

```

```
}

```

### provider/script.js

```
import { doNothing } from "utils/helpers.import.js"

export function process(input) {
  return doNothing(input);
}
```

## Debugging

To debug a script add the following launch configuration to VS Code:

### Launch configuration

```
{
  "launch": {
    "configurations": [
      {
        "name": "ClearScript",
        "type": "node",
        "request": "attach",
        "address": "localhost",
        "port": 9757
      }
    ],
    "compounds": []
  }
}
```

Then add the following line to the script to debug:

```
//SCRIPT_DEBUG_PORT=9757
```

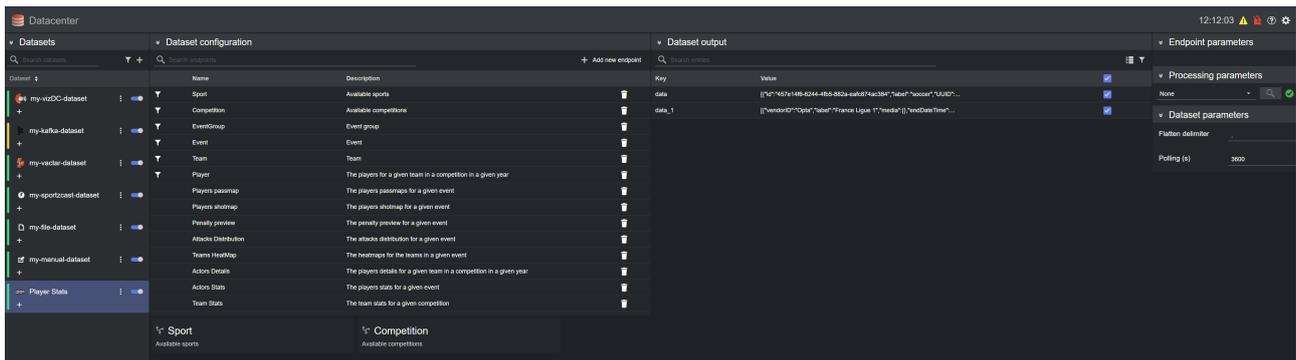
In VS code, execute **Run and debug** with the ClearScript configuration. The debugger attaches to the running script and breakpoints can be set in the **Loaded scripts** section.

**Info:** Because of some internal limitations, the debug port is not immediately freed after modifying a script. Therefore, it is necessary to adapt the debug port in the script and launch configuration when modifying and saving the debugged script.

## Flattening a Dataset

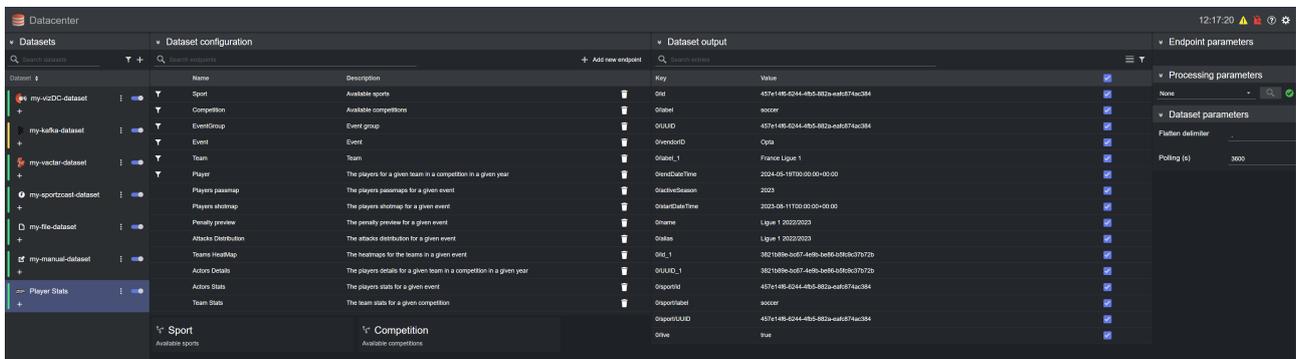
By default, datasets connected to providers providing data in valid JSON format (for example, Fluid Data Services) hold the incoming payload using the key-value pair `[data_N][Data_as_JSON_object]`, where N is the index of the dataset source where the data originates from (for example, in Fluid Data Services, the index of the endpoint configured for the dataset).

In the following scenario, a Fluid Data Services dataset is configured to accept data from two endpoints (Sport and Competition), and subsequently the data is organized in two key-value pairs (data and data\_1), one per endpoint:



However, in certain scenarios, all values in the JSON objects need to be associated with a specific key. For these cases, one can automatically flatten the incoming data for a given dataset, by

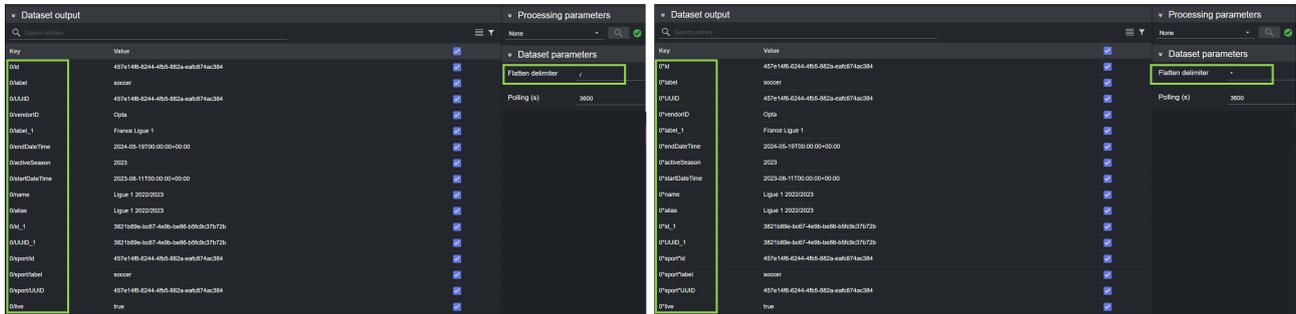
clicking on the flatten icon  in the top-right corner of the **Dataset output** panel. Doing so results in a flattened version of all the values of the incoming payload, where each atomic value in the JSON object(s) is associated to its own key:



**Note:** When flattening several objects there is a chance of running into key duplication. Datacenter automatically detects such keys and appends a number to them, to make them unique again (for example, 0/label and 0/label\_1 in the image above).

**Note:** When flattening a payload that contains arrays, the index of the array element is prepended to the the element key, such that unique keys are created (for example, 0/id in the image above).

The default separator used to flatten the incoming data is specified in the [General configuration](#) in the Admin page. However, the delimiter can be changed per dataset, by using the **Flatten delimiter** field in the **Dataset parameters** section of the main view.



To unflatten the data back to the original [data\_N][Data\_as\_JSON\_object] format, click on the unflatten icon  in the top-right corner of the **Dataset output** panel.

**Note:** The flattening operation is only successful if the data to flatten is in JSON format. If you apply a script prior flattening, make sure the resulting script output is still a valid JSON objects for the flattening to have effect.

**Info:** For performance reasons, the number of flattened data elements that can be displayed is limited to 1024. This is also true for the search mechanism. All flattened keys are forwarded to the outputs, however.

### 5.4.3 Enabling or Disabling Dataset Entries

Once added, dataset entries are immediately enabled on all connected outputs. This results in all entries in the **Dataset output** to have a checked checkbox.

Dataset output

Search entries

| Key              | Value                                | <input checked="" type="checkbox"/> |
|------------------|--------------------------------------|-------------------------------------|
| 0/live           | false                                | <input checked="" type="checkbox"/> |
| 0/sport/UUID     | 457e14f6-6244-4fb5-882a-eafc874ac384 | <input checked="" type="checkbox"/> |
| 0/sport/label    | soccer                               | <input checked="" type="checkbox"/> |
| 0/sport/id       | 457e14f6-6244-4fb5-882a-eafc874ac384 | <input checked="" type="checkbox"/> |
| 0/UUID           | 3821b89e-bc67-4e9b-be86-b5fc9c37b72b | <input checked="" type="checkbox"/> |
| 0/id             | 3821b89e-bc67-4e9b-be86-b5fc9c37b72b | <input checked="" type="checkbox"/> |
| 0/alias          | Ligue 1 2020/2021                    | <input checked="" type="checkbox"/> |
| 0/name           | Ligue 1 2020/2021                    | <input checked="" type="checkbox"/> |
| 0/competitionTag | 3821b89e-bc67-4e9b-be86-b5fc9c37b72b | <input checked="" type="checkbox"/> |
| 0/startDateTime  | 2022-08-05T00:00:00+00:00            | <input checked="" type="checkbox"/> |
| 0/activeSeason   | 2022                                 | <input checked="" type="checkbox"/> |
| 0/endTime        | 2023-06-04T00:00:00+00:00            | <input checked="" type="checkbox"/> |
| 0/label          | France Ligue 1                       | <input checked="" type="checkbox"/> |
| 0/vendorID       | Opta                                 | <input checked="" type="checkbox"/> |

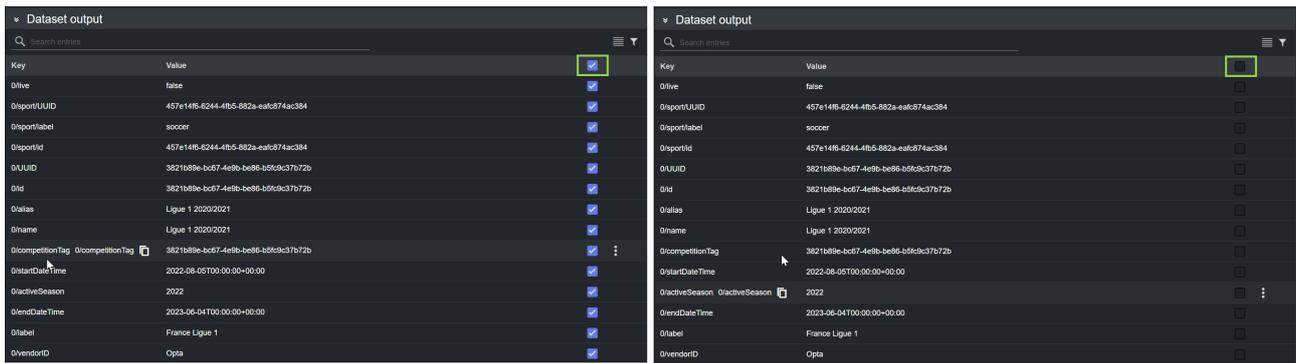
However, individual entries state can easily be toggled from the Datcenter UI. To disable a single entry, uncheck the checkbox in the relevant entry row in the **Dataset output** table.

Dataset output

Search entries

| Key              | Value                                | <input type="checkbox"/>            |
|------------------|--------------------------------------|-------------------------------------|
| 0/live           | false                                | <input type="checkbox"/>            |
| 0/sport/UUID     | 457e14f6-6244-4fb5-882a-eafc874ac384 | <input type="checkbox"/>            |
| 0/sport/label    | soccer                               | <input checked="" type="checkbox"/> |
| 0/sport/id       | 457e14f6-6244-4fb5-882a-eafc874ac384 | <input checked="" type="checkbox"/> |
| 0/UUID           | 3821b89e-bc67-4e9b-be86-b5fc9c37b72b | <input checked="" type="checkbox"/> |
| 0/id             | 3821b89e-bc67-4e9b-be86-b5fc9c37b72b | <input checked="" type="checkbox"/> |
| 0/alias          | Ligue 1 2020/2021                    | <input checked="" type="checkbox"/> |
| 0/name           | Ligue 1 2020/2021                    | <input checked="" type="checkbox"/> |
| 0/competitionTag | 3821b89e-bc67-4e9b-be86-b5fc9c37b72b | <input checked="" type="checkbox"/> |
| 0/startDateTime  | 2022-08-05T00:00:00+00:00            | <input checked="" type="checkbox"/> |
| 0/activeSeason   | 2022                                 | <input checked="" type="checkbox"/> |
| 0/endTime        | 2023-06-04T00:00:00+00:00            | <input checked="" type="checkbox"/> |
| 0/label          | France Ligue 1                       | <input checked="" type="checkbox"/> |
| 0/vendorID       | Opta                                 | <input checked="" type="checkbox"/> |

Likewise, all dataset entries can be disabled at once by clicking the checkbox in the header of the Dataset output table.



## 5.5 Outputs

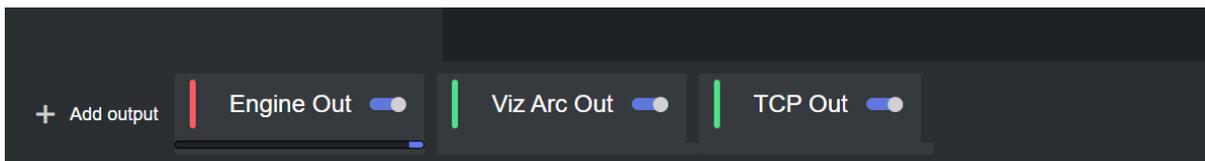
This section describes how to configure the following outputs in Datcenter:

- [Viz Engine Output](#)
- [Viz Arc Output](#)
- [Generic TCP Output](#)

Please refer to the [Configuring Outputs](#) section for steps on how to correctly setup each supported receiving end to accept incoming data from Datcenter.

### 5.5.1 Overview

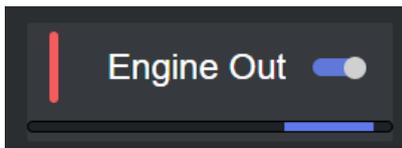
Datcenter provides data to one or more outputs, so graphics can be linked to it seamlessly. To do so, first create and configure the desired output(s), which is then listed at the bottom of the main UI, in the **Outputs** panel.



Each output can be either in Connected state (green) or not connected (red):

| State | Connection | Not Connected |
|-------|------------|---------------|
|       |            |               |

When not connected, an output periodically attempts to reconnect, in which case a progress bar is shown at the bottom of the connecting output.



## 5.5.2 Add and Edit an Output

To configure or edit an output, click on its name in the output list and edit the fields that are listed in the dialog that appears.

### **i** Applying changes to an output

**Info:** When editing an output, click on **Confirm** to apply changes, or they are lost when closing the dialog.

Waiting to connect

Name  
Engine Out

Type  
Viz Engine

Host  
localhost

Port  
6100

Control channels

UDP  
N/A

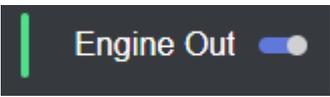
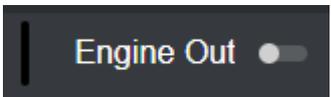
Scene ID  
N/A

Delete Confirm

After adding and configuring an Output, a connection is attempted.

## 5.5.3 Disable an Output

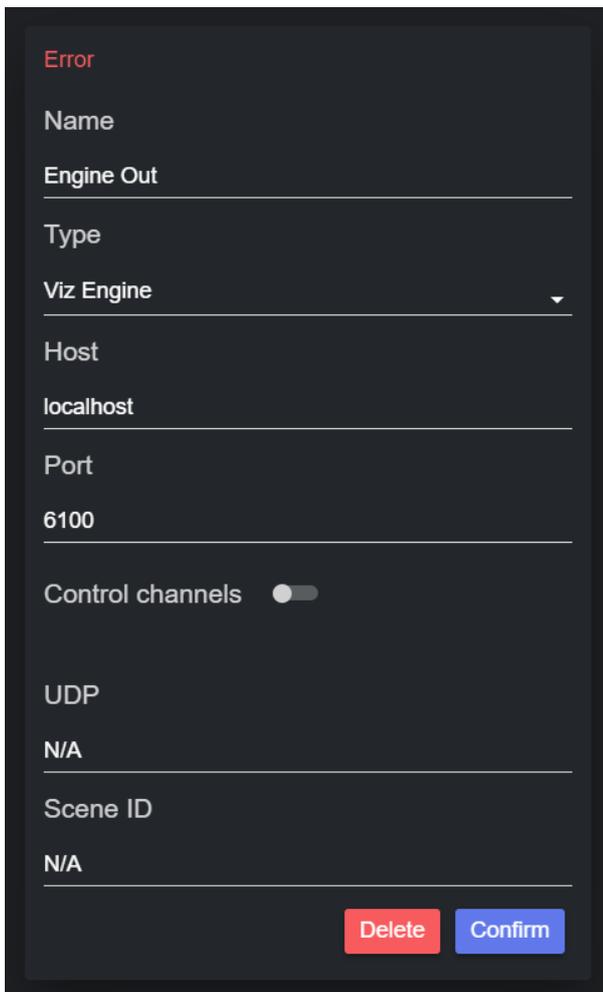
An output can be temporary disabled by using the toggle next to its name in the Output list. When disabled, the output does not receive incoming data from Datacenter.

| State | Enabled   | Disabled   |
|-------|---|--|
|       |  |  |

### 5.5.4 Viz Engine Output

To create an output of type Viz Engine, add a new output and click on the new entry.

On the dialog that appears, select **Viz Engine** in the **Type** field, and fill all other fields as required:



- **Name:** Name of the output that is displayed in the output list.
- **Host:** Host address where Viz Engine runs.
- **Port:** The port to connect to.
- **Control channels:** Toggle between communication done via Global Shared memory map (default, typically used with Control Objects) or Scene-local Shared memory map (typically used with Control Channels).

The UDP and Scene ID fields are read only and are auto-populated on first connect.

**i** **Scene ID:** Make sure the scene is loaded in Viz Artist before connecting to the Viz Engine, as the Output automatically fetches the Scene ID of the main scene. Should there be an error reported in the **Scene ID** field, or should you change the scene in Viz Artist after having connected to it, please temporarily disable and re-enable the output to force a new scene ID fetch.

To learn more about configuring a Viz Engine to accept incoming data from Datacenter, please refer to the [Configuring Output](#) section of this manual.

To learn more about preparing your Viz Engine scene to accept incoming data, please refer to [Prepare Scenes for Data Input in Viz Artist](#).

## Prepare Scenes for Data Input in Viz Artist

When working with a Viz Engine output, the scenes that receive live data from Datacenter, must be correctly prepared, depending on the communication option selected.

## Global Shared Memory Map Communication via Control Objects

Control objects communication is the default option when creating a new [Viz Engine output](#).

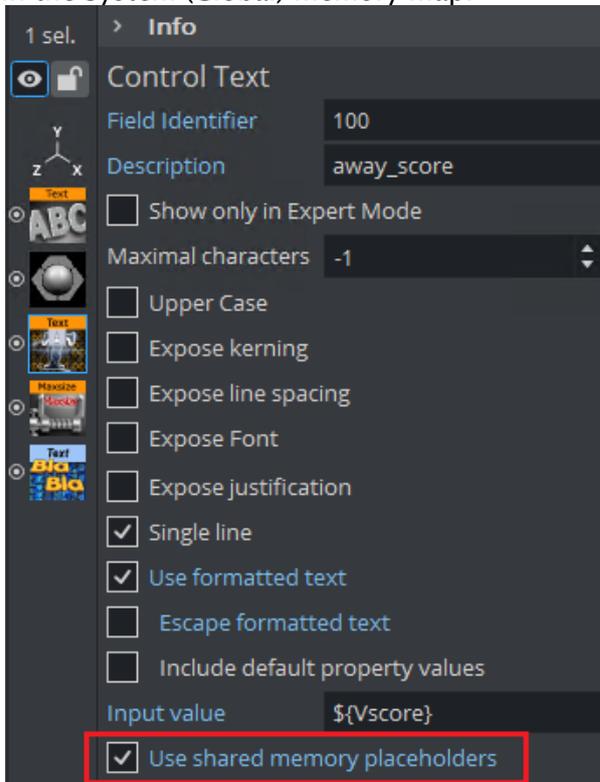
For the communication to work, the Viz Engine scene must enable **Use shared memory placeholders** for the control plugins that are updated with data. The following control plugins support Global Shared memory placeholder out of the box:

- ControlText
- ControlParameter
- ControllImage

To enable live data input from Datacenter:

1. Open the scene in **Viz Artist**.
2. Locate the control plugin for the field that should receive live input.

3. Check **Use shared memory placeholders**. Note that this enables listening for shared memory in the System (Global) memory map.



4. Set the **Input value** field to the *key* of the Datcenter dataset entry that should update this object, using the `${KEY_NAME}` syntax (in the example above the value would be updated with a dataset entry with key *Vscore*).
5. Save the scene.



## Scene-local Shared Memory Map Communication via Control Channels

Control channels communication must be enabled on each **Viz Engine output** that uses it . To do so, click on the output you want to send data to and enable the **Control channels** toggle.

Connected

Name

Engine Out

Type

Viz Engine

Host

localhost

Port

6100

Control channels

UDP

12000

Scene ID

#1289

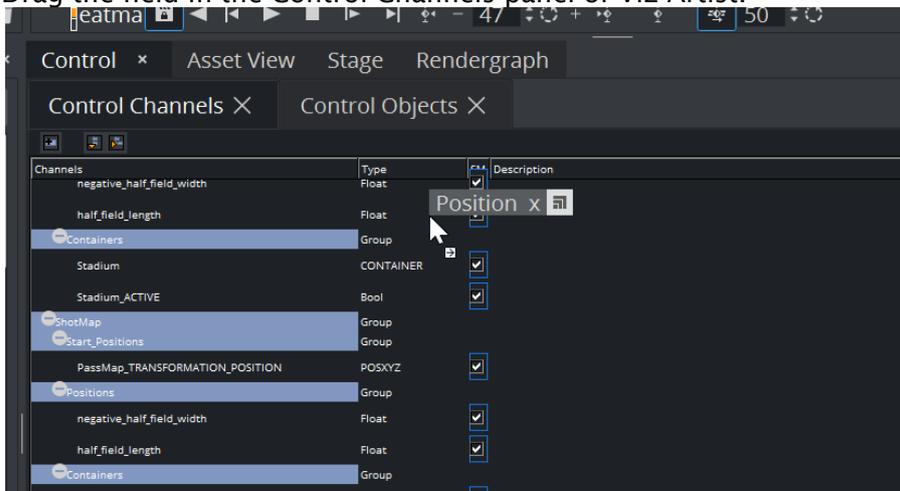
Delete Confirm

**i Scene ID Fetching:** Make sure that the scene is loaded in Viz Artist before connecting to Viz Engine, as the Output automatically fetches the Scene ID of the main scene. Should there be an error reported in the **Scene ID** field, or should you change the scene in Viz Artist after having connected to it, please temporarily disable and re-enable the output to force a new scene ID fetch.

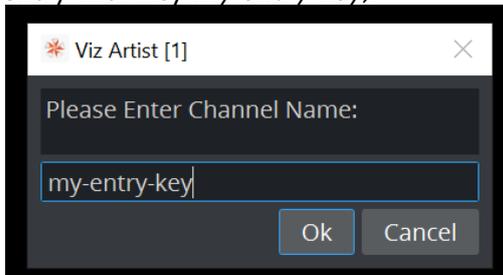
Then, to enable live data input from Datacenter:

1. Open the scene in **Viz Artist**.
2. Locate the container that should receive live input, and the container field that should be updated with data from the Datacenter.

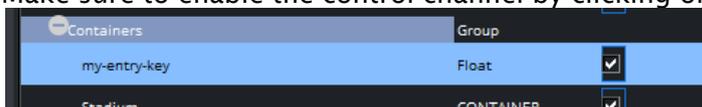
3. Drag the field in the Control Channels panel of Viz Artist.



4. In the dialog that appears, set the Control Channel name to the *key* of the dataset entry that should update this object (in the example below the value would be updated with a dataset entry with key *my-entry-key*).

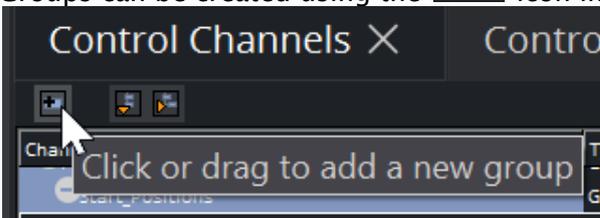


5. Make sure to enable the control channel by clicking on the SM column

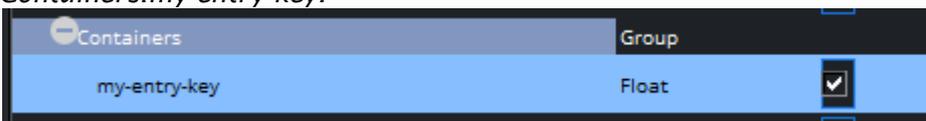


**Control Channel Groups:** Control channels in Viz Engine can be organized in Groups.

Groups can be created using the  icon in the Control channels panels.



To access a control channel inside a group one must use the '.' delimiter. For example, the *my-entry-key* channel in the example below can be accessed using the following SHM key: *Containers.my-entry-key*.

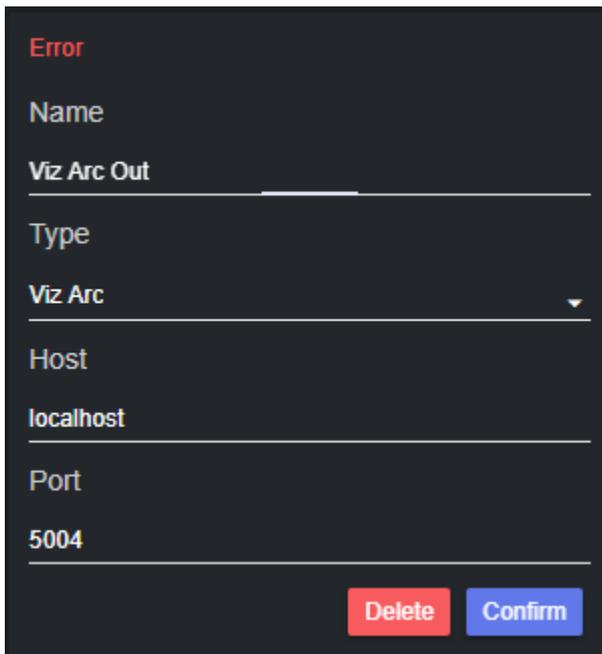


This property is particularly useful when flattening data in a Datacenter dataset. By setting the flattening delimiter to '.', one can organize the control channels to reflect the flattened data structure.

### 5.5.5 Viz Arc Output

To create an output of type Viz Arc, add a new output and click on the new entry.

On the dialog that appears, select **Viz Arc** in the **Type** field, and fill all other fields as required:



**Error**

Name  
Viz Arc Out

Type  
Viz Arc

Host  
localhost

Port  
5004

Delete Confirm

- **Name:** Name of the output that is displayed in the output list.
- **Host:** Host address where Viz Arc runs.
- **Port:** The port to connect to.

To learn more about configuring Viz Arc to accept incoming data from Datacenter, please refer to the [Configuring Output](#) section of this manual.

### 5.5.6 Generic TCP Output

To create an output of type Generic TCP, add a new output and click on the new entry.

On the dialog that appears, select **Generic TCP** in the **Type** field, and fill all other fields as required:

Waiting to connect

Name

My output

---

Type

Generic TCP

---

Host

localhost

---

Port

6150

---

Delete Confirm

- **Name:** Name of the output and that is displayed in the output list.
- **Host:** Host address.
- **Port:** The port to connect to.

A generic TCP output sends the data entries with the following format:

```
{
  "type": "data",
  "payload": {
    "key": "entry_key",
    "value": "entry_value"
  }
}
```

A ping packet is also sent regularly to test the connection. This packet can be ignored by the receiver:

```
{
  "type": "ping",
  "payload": null
}
```

A TCP output is used to send data to Viz Libero. To learn more about configuring Viz Libero to accept incoming data from Datacenter, please refer to the [Configuring Output](#) section of this manual.

## 6 Alternative Views

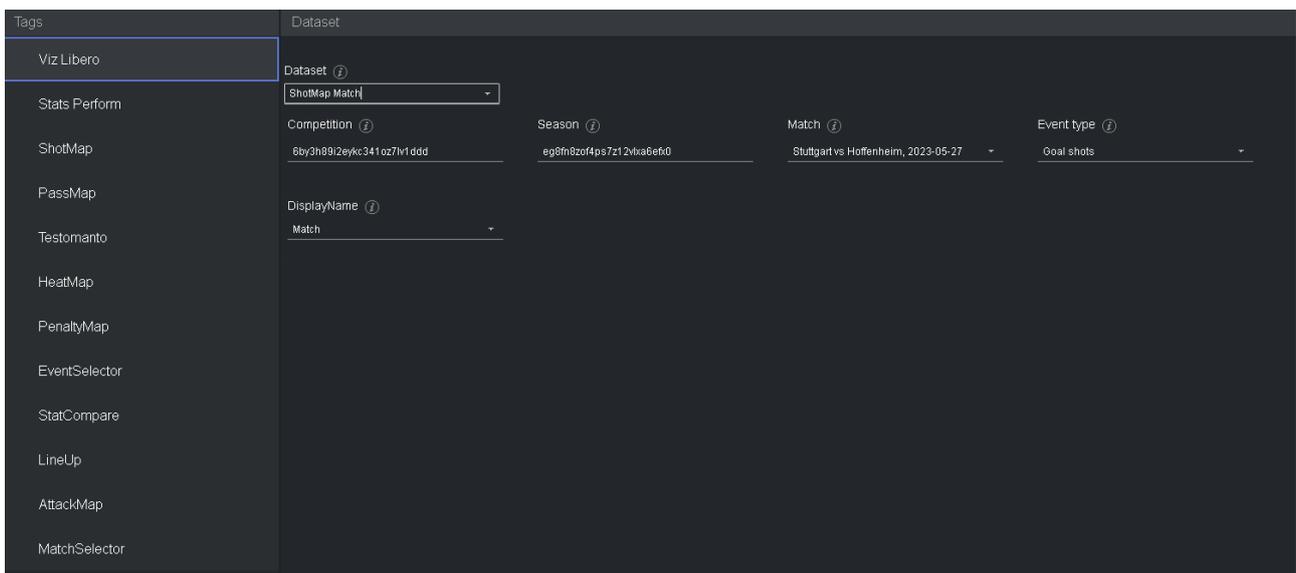
Datacenter can be run in "simplified" mode, where some of its panels are hidden to create a focus view, or information relevant for a certain integration (for example, integration with Viz Libero) is shown.

This section goes through the simplified views supported by Datacenter, each accessible via a unique URL:

- [Simple Page](#)
- [Configurable Page](#)

### 6.1 Simple Page

The simple page is accessible via `<datacenter_url>/simple` (for example, <http://127.0.0.1:5700/simple>), and provides a minimalistic UI that allows the selection of endpoints through the pre-configured tags (see [Creating Datasets](#)).



Tags can be selected directly through the UI or passed as an argument in the URL (for example, <http://127.0.0.1:5700/simple?tags=Viz%20Libero,ShotMap>).

If the tags are passed in the URL, the **Tags** column is not shown and only datasets relevant for the given tags are available for selection. If, given the tag filtering, only one dataset is available, it is automatically selected.

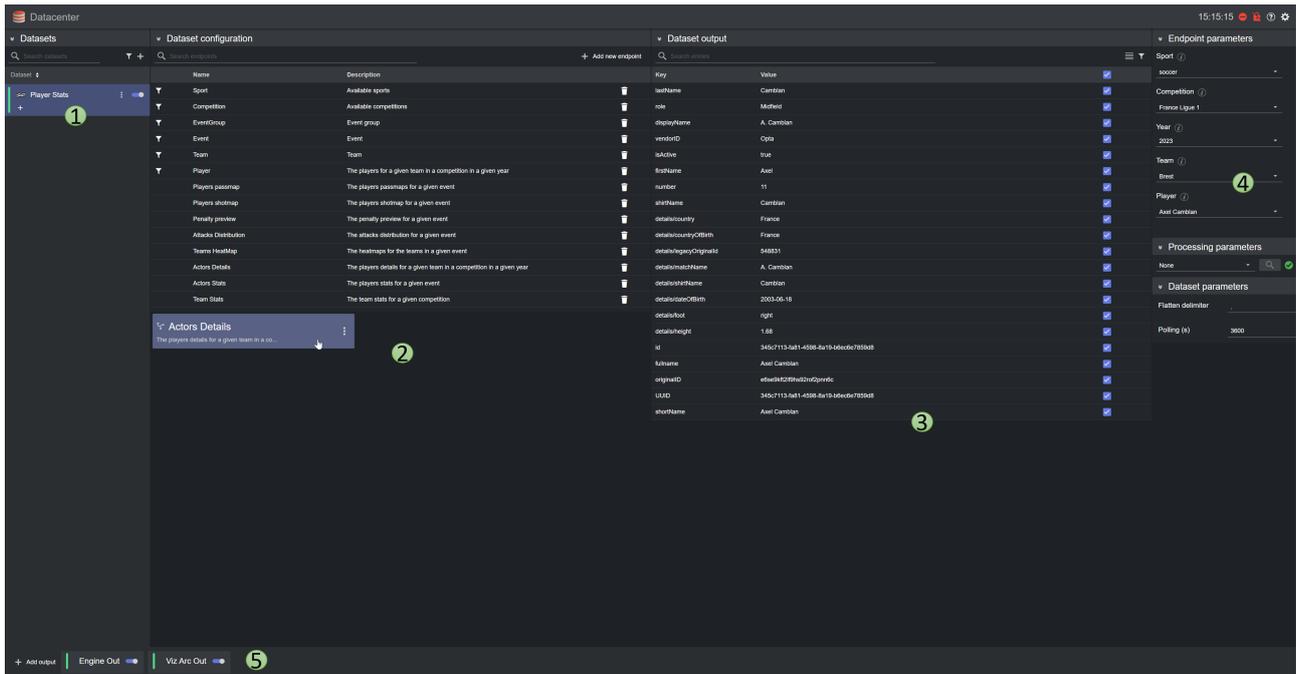
### 6.2 Configurable Page

The configurable page is accessible via `<datacenter_url>/?components=<ComponentsCommaSeparatedList>` (for example, <http://127.0.0.1:5700/?components=DatasetPanel>), and gives the option to create configurable views that can, for instance, improve focus or remove unnecessary panels from the main UI for a given workflow.

The available configurable components are:

1. DatasetPanel
2. DatasetEditPanel
3. DataEntriesPanel
4. PropertiesPanel
5. OutputsPanel

They must be specified as a comma separated list argument to the *?components* query element, representing respectively:



For example, the <http://127.0.0.1:5700/?components=DatasetPanel,DataEntriesPanel> creates a simplified view where only the configured datasets and their data entries are shown:

The screenshot shows the 'Datacenter' application interface. On the left, there is a sidebar with 'Datasets' and 'Player Stats'. The main area displays a 'Dataset output' table with a search bar and a list of key-value pairs. Each row in the table has a blue checkmark icon on the right side.

| Key                   | Value                               |
|-----------------------|-------------------------------------|
| fullName              | Carlton                             |
| nick                  | Wolfer                              |
| displayname           | A. Carlton                          |
| genderID              | 000                                 |
| roleId                | 100                                 |
| fullName              | Carlton                             |
| number                | 11                                  |
| shortName             | Carlton                             |
| statsAccuracy         | France                              |
| statsAccuracyClaim    | France                              |
| statsAccuracyOriginal | 14831                               |
| statsAccuracyName     | A. Carlton                          |
| statsAccuracyRole     | Carlton                             |
| statsAccuracyTeam     | 2023-06-18                          |
| statsAccuracyType     | 101                                 |
| statsAge              | 1.00                                |
| statsAgeID            | 34527115-6d1-4390-8a70-5b60de705098 |
| statsAgeName          | Axel Carlton                        |
| statsAgeOriginalID    | 6100e4020a620a02020e6c              |
| statsAgeUSD           | 34527115-6d1-4390-8a70-5b60de705098 |
| statsAgeShortName     | Axel Carlton                        |

---

## 7 Third-Party Licenses

If required by any of these licenses, Vizrt Inc. will provide source code and/or binaries used in the respective product.

If you have any queries regarding third party components, please contact Vizrt at [orange@vizrt.com](mailto:orange@vizrt.com).

This section contains information about the following third party software licenses:

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- [Confluent Kafka for .NET](#)
- [Coverlet](#)
- [d3js](#)
- [JUnitTestLogger](#)
- [Moq4](#)
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### 7.1 ASP.NET Core

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## 7.2 Confluent Kafka For .NET

Version 2.0, January 2004  
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File: alocal.m4 (only for ICU4C)

Section: pkg.m4 - Macros to locate and utilise pkg-config.

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```
=== src/compat.h src/compat-inl.h ===
```

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| @esbuild-plugins/node-globals-polyfill@0.1.1 | ISC        | <a href="https://github.com/remorses/esbuild-plugins">https://github.com/remorses/esbuild-plugins</a>               |
| @esbuild-plugins/node-modules-polyfill@0.1.4 | ISC        | <a href="https://github.com/remorses/esbuild-plugins">https://github.com/remorses/esbuild-plugins</a>               |
| @fontsource/open-sans@4.5.13                 | MIT        | <a href="https://github.com/fontsource/fontsource">https://github.com/fontsource/fontsource</a>                     |
| @jridgewell/sourcemap-codec@1.4.14           | MIT        | <a href="https://github.com/jridgewell/sourcemap-codec">https://github.com/jridgewell/sourcemap-codec</a>           |
| @logue/vue2-helpers@2.1.1                    | Apache-2.0 | <a href="https://github.com/logue/vue2-helpers">https://github.com/logue/vue2-helpers</a>                           |
| @rollup/plugin-inject@5.0.3                  | MIT        | <a href="https://github.com/rollup/plugins">https://github.com/rollup/plugins</a>                                   |
| @rollup/pluginutils@5.0.2                    | MIT        | <a href="https://github.com/rollup/plugins">https://github.com/rollup/plugins</a>                                   |
| @types/estree@1.0.0                          | MIT        | <a href="https://github.com/DefinitelyTyped/DefinitelyTyped">https://github.com/DefinitelyTyped/DefinitelyTyped</a> |
| @vizrt/vizrticonfont@4.1.8                   | ISC        | <a href="https://gitlab.vizrt.com/ux/icons">https://gitlab.vizrt.com/ux/icons</a>                                   |
| @vue/compiler-sfc@2.7.14                     | MIT        |   |
| @vue/devtools-api@6.4.5                      | MIT        | <a href="https://github.com/vuejs/vue-devtools">https://github.com/vuejs/vue-devtools</a>                           |
| commander@7.2.0                              | MIT        | <a href="https://github.com/tj/commander.js">https://github.com/tj/commander.js</a>                                 |
| csstype@3.1.1                                | MIT        | <a href="https://github.com/frenic/csstype">https://github.com/frenic/csstype</a>                                   |
| d3-array@3.2.1                               | ISC        | <a href="https://github.com/d3/d3-array">https://github.com/d3/d3-array</a>   |
| d3-axis@3.0.0                                | ISC        | <a href="https://github.com/d3/d3-axis">https://github.com/d3/d3-axis</a>   |

|                          |              |   |
|--------------------------|--------------|---|
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| d3-chord@3.0.1           | ISC          | <a href="https://github.com/d3/d3-chord">https://github.com/d3/d3-chord</a>                     |
| d3-color@3.1.0           | ISC          | <a href="https://github.com/d3/d3-color">https://github.com/d3/d3-color</a>                     |
| d3-contour@4.0.2         | ISC          | <a href="https://github.com/d3/d3-contour">https://github.com/d3/d3-contour</a>                 |
| d3-delaunay@6.0.2        | ISC          | <a href="https://github.com/d3/d3-delaunay">https://github.com/d3/d3-delaunay</a>               |
| d3-dispatch@3.0.1        | ISC          | <a href="https://github.com/d3/d3-dispatch">https://github.com/d3/d3-dispatch</a>               |
| d3-drag@3.0.0            | ISC          | <a href="https://github.com/d3/d3-drag">https://github.com/d3/d3-drag</a>                       |
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| d3-ease@3.0.1            | BSD-3-Clause | <a href="https://github.com/d3/d3-ease">https://github.com/d3/d3-ease</a>                       |
| d3-fetch@3.0.1           | ISC          | <a href="https://github.com/d3/d3-fetch">https://github.com/d3/d3-fetch</a>                     |
| d3-force@3.0.0           | ISC          | <a href="https://github.com/d3/d3-force">https://github.com/d3/d3-force</a>                     |
| d3-format@3.1.0          | ISC          | <a href="https://github.com/d3/d3-format">https://github.com/d3/d3-format</a>                   |
| d3-geo@3.1.0             | ISC          | <a href="https://github.com/d3/d3-geo">https://github.com/d3/d3-geo</a>                         |
| d3-hierarchy@3.1.2       | ISC          | <a href="https://github.com/d3/d3-hierarchy">https://github.com/d3/d3-hierarchy</a>             |
| d3-interpolate@3.0.1     | ISC          | <a href="https://github.com/d3/d3-interpolate">https://github.com/d3/d3-interpolate</a>         |
| d3-path@3.1.0            | ISC          | <a href="https://github.com/d3/d3-path">https://github.com/d3/d3-path</a>                       |
| d3-polygon@3.0.1         | ISC          | <a href="https://github.com/d3/d3-polygon">https://github.com/d3/d3-polygon</a>                 |
| d3-quadtree@3.0.1        | ISC          | <a href="https://github.com/d3/d3-quadtree">https://github.com/d3/d3-quadtree</a>               |
| d3-random@3.0.1          | ISC          | <a href="https://github.com/d3/d3-random">https://github.com/d3/d3-random</a>                   |
| d3-scale-chromatic@3.0.0 | ISC          | <a href="https://github.com/d3/d3-scale-chromatic">https://github.com/d3/d3-scale-chromatic</a> |
| d3-scale@4.0.2           | ISC          | <a href="https://github.com/d3/d3-scale">https://github.com/d3/d3-scale</a>                     |

|                            |     |   |
|----------------------------|-----|---|
| d3-selection@3.0.0         | ISC | <a href="https://github.com/d3/d3-selection">https://github.com/d3/d3-selection</a>                                     |
| d3-shape@3.2.0             | ISC | <a href="https://github.com/d3/d3-shape">https://github.com/d3/d3-shape</a>   |
| d3-time-format@4.1.0       | ISC | <a href="https://github.com/d3/d3-time-format">https://github.com/d3/d3-time-format</a>                                 |
| d3-time@3.1.0              | ISC | <a href="https://github.com/d3/d3-time">https://github.com/d3/d3-time</a>   |
| d3-timer@3.0.1             | ISC | <a href="https://github.com/d3/d3-timer">https://github.com/d3/d3-timer</a>   |
| d3-transition@3.0.1        | ISC | <a href="https://github.com/d3/d3-transition">https://github.com/d3/d3-transition</a>                                   |
| d3-zoom@3.0.0              | ISC | <a href="https://github.com/d3/d3-zoom">https://github.com/d3/d3-zoom</a>   |
| d3@7.8.1                   | ISC | <a href="https://github.com/d3/d3">https://github.com/d3/d3</a>   |
| delaunator@5.0.0           | ISC | <a href="https://github.com/mapbox/delaunator">https://github.com/mapbox/delaunator</a>                                 |
| esbuild-windows-64@0.14.54 | MIT | <a href="https://github.com/evanw/esbuild">https://github.com/evanw/esbuild</a>   |
| esbuild@0.14.54            | MIT | <a href="https://github.com/evanw/esbuild">https://github.com/evanw/esbuild</a>   |
| escape-string-regexp@4.0.0 | MIT | <a href="https://github.com/sindresorhus/escape-string-regexp">https://github.com/sindresorhus/escape-string-regexp</a> |
| estree-walker@0.6.1        | MIT | <a href="https://github.com/Rich-Harris/estree-walker">https://github.com/Rich-Harris/estree-walker</a>                 |
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| http-status-codes@2.2.0    | MIT | <a href="https://github.com/prettymuchbryce/http-status-codes">https://github.com/prettymuchbryce/http-status-codes</a> |
| iconv-lite@0.6.3           | MIT | <a href="https://github.com/ashtuchkin/iconv-lite">https://github.com/ashtuchkin/iconv-lite</a>                         |
| internmap@2.0.3            | ISC | <a href="https://github.com/mbostock/internmap">https://github.com/mbostock/internmap</a>                               |
| magic-string@0.25.9        | MIT | <a href="https://github.com/rich-harris/magic-string">https://github.com/rich-harris/magic-string</a>                   |

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| magic-string@0.27.0                | MIT          | <a href="https://github.com/rich-harris/magic-string">https://github.com/rich-harris/magic-string</a>                               |
| nanoid@3.3.4                       | MIT          | <a href="https://github.com/ai/nanoid">https://github.com/ai/nanoid</a>   |
| picocolors@1.0.0                   | ISC          | <a href="https://github.com/alexeyraspopov/picocolors">https://github.com/alexeyraspopov/picocolors</a>                             |
| picomatch@2.3.1                    | MIT          | <a href="https://github.com/micromatch/picomatch">https://github.com/micromatch/picomatch</a>                                       |
| pinia@2.0.28                       | MIT          | <a href="https://github.com/vuejs/pinia">https://github.com/vuejs/pinia</a>   |
| postcss@8.4.20                     | MIT          | <a href="https://github.com/postcss/postcss">https://github.com/postcss/postcss</a>   |
| robust-predicates@3.0.1            | Unlicense    | <a href="https://github.com/mourner/robust-predicates">https://github.com/mourner/robust-predicates</a>                             |
| rollup-plugin-inject@3.0.2         | MIT          | <a href="https://github.com/rollup/rollup-plugin-inject">https://github.com/rollup/rollup-plugin-inject</a>                         |
| rollup-plugin-node-polyfills@0.2.1 | MIT          | <a href="https://github.com/ionic-team/rollup-plugin-node-polyfills">https://github.com/ionic-team/rollup-plugin-node-polyfills</a> |
| rollup-plugin-polyfill-node@0.11.0 | MIT          | <a href="https://github.com/FredKSchott/rollup-plugin-polyfill-node">https://github.com/FredKSchott/rollup-plugin-polyfill-node</a> |
| rollup-pluginutils@2.8.2           | MIT          | <a href="https://github.com/rollup/rollup-pluginutils">https://github.com/rollup/rollup-pluginutils</a>                             |
| rollup@2.77.3                      | MIT          | <a href="https://github.com/rollup/rollup">https://github.com/rollup/rollup</a>   |
| rw@1.3.3                           | BSD-3-Clause | <a href="https://github.com/mbostock/rw">https://github.com/mbostock/rw</a>   |
| safer-buffer@2.1.2                 | MIT          | <a href="https://github.com/ChALkeR/safer-buffer">https://github.com/ChALkeR/safer-buffer</a>                                       |
| source-map-js@1.0.2                | BSD-3-Clause | <a href="https://github.com/7rulnik/source-map-js">https://github.com/7rulnik/source-map-js</a>                                     |
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| sourcemap-codec@1.4.8              | MIT          | <a href="https://github.com/Rich-Harris/sourcemap-codec">https://github.com/Rich-Harris/sourcemap-codec</a>                         |

|                  |     |   |
|------------------|-----|---|
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| vue-demi@0.13.11 | MIT | <a href="https://github.com/antfu/vue-demi">https://github.com/antfu/vue-demi</a>       |
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