Data Stream

A Data Stream is a visual representation of a flow of data. It is created through the Data Stream Designer and consists of Stream Objects that ingest, transform, analyze, and act on data.

Overview

Data Streams are the backbone of real-time data processing in XMPro. They allow you to:

- Ingest data from various sources
- Transform and enrich data
- Analyze data for patterns and anomalies
- Take actions based on the data

Data Streams are designed to be:

- Visual and intuitive
- Real-time
- Scalable
- Flexible

Components of a Data Stream

A Data Stream consists of the following components:

Stream Objects

Stream Objects are the building blocks of a Data Stream. They are instances of Agents that perform specific functions in the data flow. Stream Objects are connected together to form a pipeline of data processing.

Connections

Connections define how data flows between Stream Objects. They are represented as arrows in the Data Stream Designer.

Data

Data flows through the Stream Objects and is transformed, analyzed, and acted upon as it moves through the Data Stream.

Types of Data Streams

There are two types of Data Streams:

Streaming

Streaming Data Streams run continuously, processing data as it arrives. They are used for real-time monitoring and alerting.

Recurrent

Recurrent Data Streams run on a schedule, processing data in batches. They are used for periodic reporting and analysis.

Related Concepts

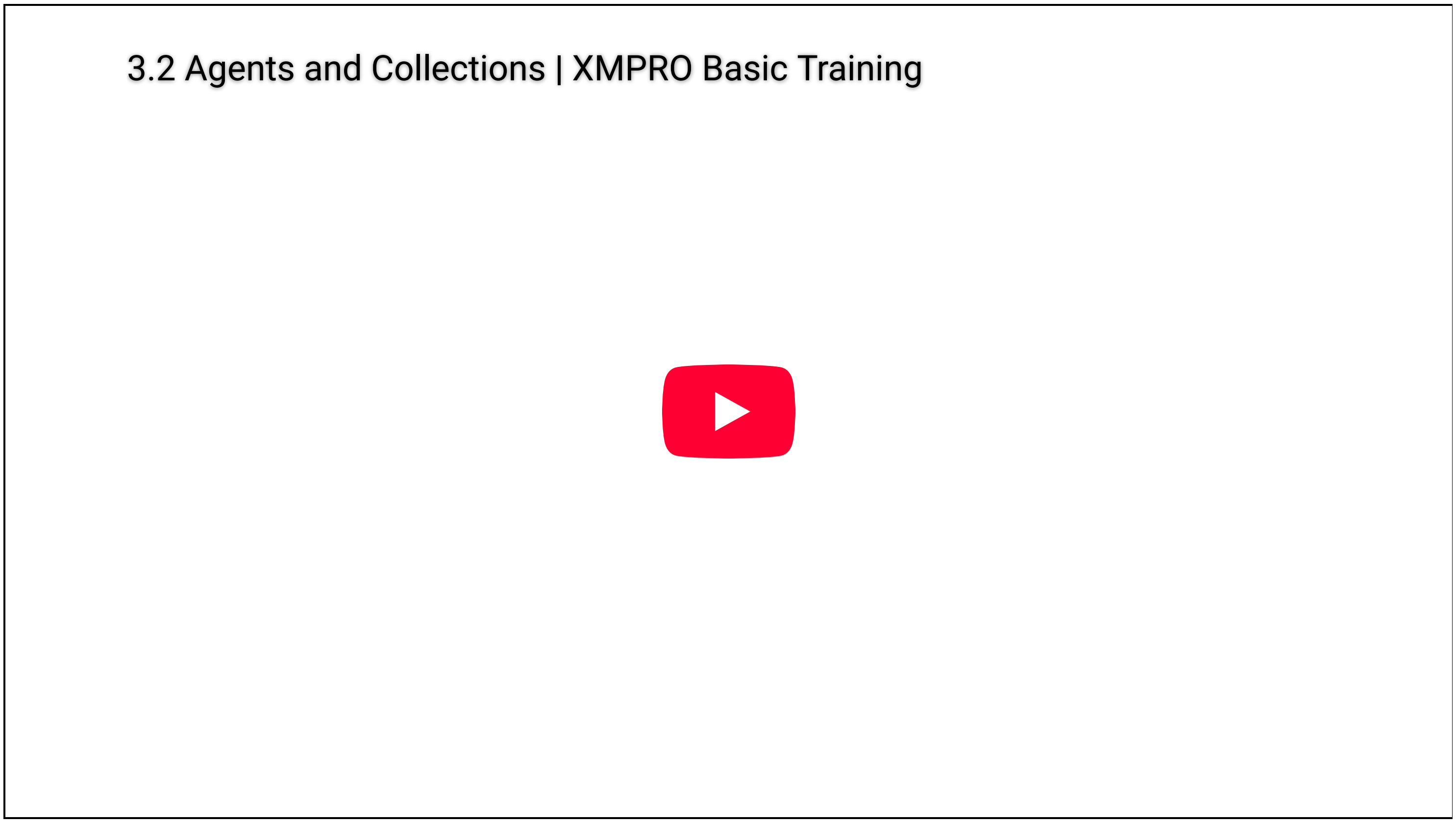
- Stream Object Configuration
- Verifying Stream Integrity
- Running Data Streams
- Timeline

Agent

An *Agent* is a reusable object which forms the building block of a Data Stream. When a number of Agents are connected together, a Data Stream is formed.

Each Agent is designed to perform a specific function in the stream. For example, they can be used to retrieve data from a database in real-time, display data, filter, sort the data, or save the data somewhere else, depending on the function of that individual Agent.

Agents are needed to connect to specific systems. Since Agents are individual components, new Agents can also be added and integrated into the Data Stream to complete a specific functionality.



> Video Presentation Discussing Agents and Collections

Each Agent consists of code, settings, and other properties that are packaged into a file that can be uploaded to Data Stream Designer.

XMPro has a library of Agents available to use. To acquire any of these Agents, please contact your XMPro sales representative or write to us at support@xmpro.com. Alternatively, since Agents can be written by anyone that has some knowledge of programming and has access to the required technologies, you can write your own Agent by following these instructions.

Categories

In Data Steam Designer, Agents are divided into different categories, depending on the overall function they perform. There are six different categories available: *Action Agents*, *Context Providers*, *Listeners, Transformations, AI & Machine Learning, Recommendations,* and *Functions*. To be able to distinguish them properly, they have been tagged with a certain color as well as an abbreviation. These categories are separate from the [App and Data Stream Categories](#).

Action Agents

An Action Agent is an Agent that consumes events in a stream and then performs internal or external (third-party) actions, e.g. sending notifications or performing data warehouse updates. Action Agents output a response after each event has been processed. For example, the Azure SQL Action Agent writes data to an Azure SQL database.

Context Providers

Context providers are Agents that provide context to a stream by consuming reference or static data and making it available. For example, the *SQL Server Context Provider* provides static data to the Data Stream by reading the data in a database table and sending it to the next Agent.

Listeners

Listeners are Agents that listen for data or events from sensors and third-party systems. For example, the *MQTT Listener* listens for data from sensors as it is posted to MQTT.

Transformations

Transformation Agents alter the shape or form of data. For example, the *Join Transformation* joins data it receives from two separate data sources.

AI & Machine Learning

AI & Machine Learning Agents allow you to run advanced AI to transform the data. For example, *Azure ML, IBM Watson, and Jupyter Notebook*.

Recommendations

Recommendation Agents are related to Recommendations and let you complete actions such as running recommendations, updating recommendations, and more.

Functions

Functions perform specific mathematical or statistical operations on data. For example, the *FFT Function* performs forward FFT calculations on the data it receives.

Settings

An Agent consists of code and user settings. The code defines the actions an Agent performs in any Data Stream. The settings are the input for the code that executes, provided by the user when adding the Agent to a Data Stream, such as authentication credentials.

For example, consider the SQL Server Writer Agent. The function this Agent performs in a Data Stream is to take the data it receives and write it to a table in a database. The settings a user must define for the Agent so it can do that are as follows:

- Name of the SQL Server instance
- SQL Server username
- Whether SQL Server authentication should be used or not
- SQL Server password
- Database to which the data should be written
- Whether a new table should be created or not
- Table to which data should be written - if the user wishes to use an existing table
- Name of the table that should be created if the user wants to write the data to a new table
- If database triggers should be fired when a record is inserted

Endpoints

Endpoints provide entry and exit points to the Agent.

The input endpoint allows the Agent to receive data from another Agent, whereas the output endpoint enables the Agent to pass data to another Agent. They are represented on the Data Stream canvas as green rectangles.

The error endpoint allows an Agent to send any error data further along a part of the stream, designed to handle data records or events that do not meet certain requirements. It is represented on the Data Stream canvas as a red rectangle.

> ⓘ **NOTE**
>
> Image placeholder: Fig 1. Data Stream Canvas and Agent's User Settings

> ⓘ **NOTE**
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> Image placeholder: Fig 2. Agent properties

Finding Agents

The search bar can be used to find any specific Agents that you may be looking for. There is a dropdown option where you can specify to search through everything in Data Stream Designer, or only for Agents.

> ⓘ **NOTE**
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> Image placeholder: Fig 3. Searching for an Agent

Versions

Agents can keep track of their different versions. Versions of an Agent can be copied, and changes made to it can be created as a new version without affecting previous versions. See the Version article for more details on versions.

Publish and Unpublish Data Streams

On the Agents page, there will be a number next to the version if the agent has been used in a Data Stream. Click the number to view a list of all Data Streams that are using that Agent version. Here you can directly unpublish or publish a Data Stream.

As an Admin, this is useful if you need to unpublish a Data Stream and you don't have access to it. See the How to Admin Unpublish Override article for more details.

> ⓘ **NOTE**
>
> Image placeholder: Fig 4. Data Stream Toolbox Interface

Actions on the Agent

Action	**Description**
Add	Adds a new Agent.
Select	Selects multiple Agents.
Delete	Deletes the Agent.
Save	Saves any changes made to the Agent up to this point.
Discard	Discards any changes made to the Agent up to this point.
Delete Versions	Deletes selected versions of the Agent.

Further Reading

- Agent FAQs
- How to Create and Manage Agents
- How to Run an Integrity Check
- How to Upgrade a Stream Object Version
- How to Use Error Endpoints
- Virtual vs Non-Virtual Agents