SESSION

02

Edge Analytics Online Training

CREATE YOUR FIRST FLOW

Work with modules and flows

Session 2

Agenda

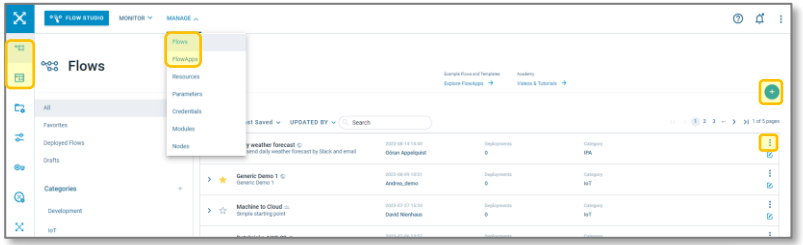
- UI introduction
  - Flows
  - The Flow Studio
  - Module settings
  - Testing and Deploying Flows
- Other functions
  - Message filtering
  - Managing Flows
- Modules covered:
  - Data Generator module
  - Aggregation module
  - Text Template module
  - MQTT Pub Client
- Exercise 1: Build your first flow – step by step

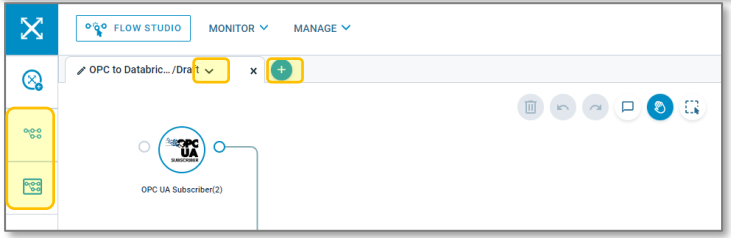
FLOWS

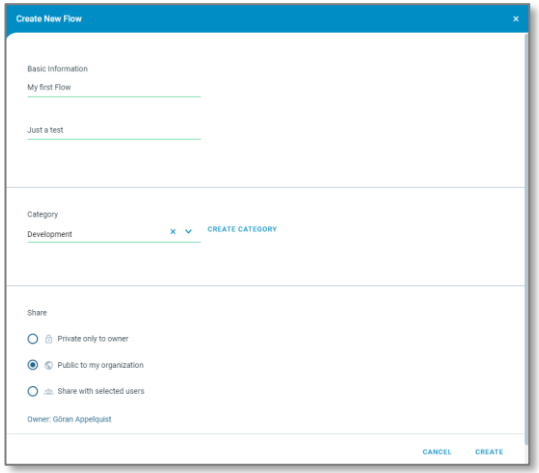
This is what You create with Crosser

Flows

- Created on the Flows page or from within the Flow Studio:
  - Using the “+” button (empty flow)
  - From a FlowApp
  - From an existing flow (menu on version/tab)
- Flows must have a unique name and a description (non-unique)
- From the Flows page:
  - Organize flows by adding them to a Category
  - Control who can access your flow through the sharing settings







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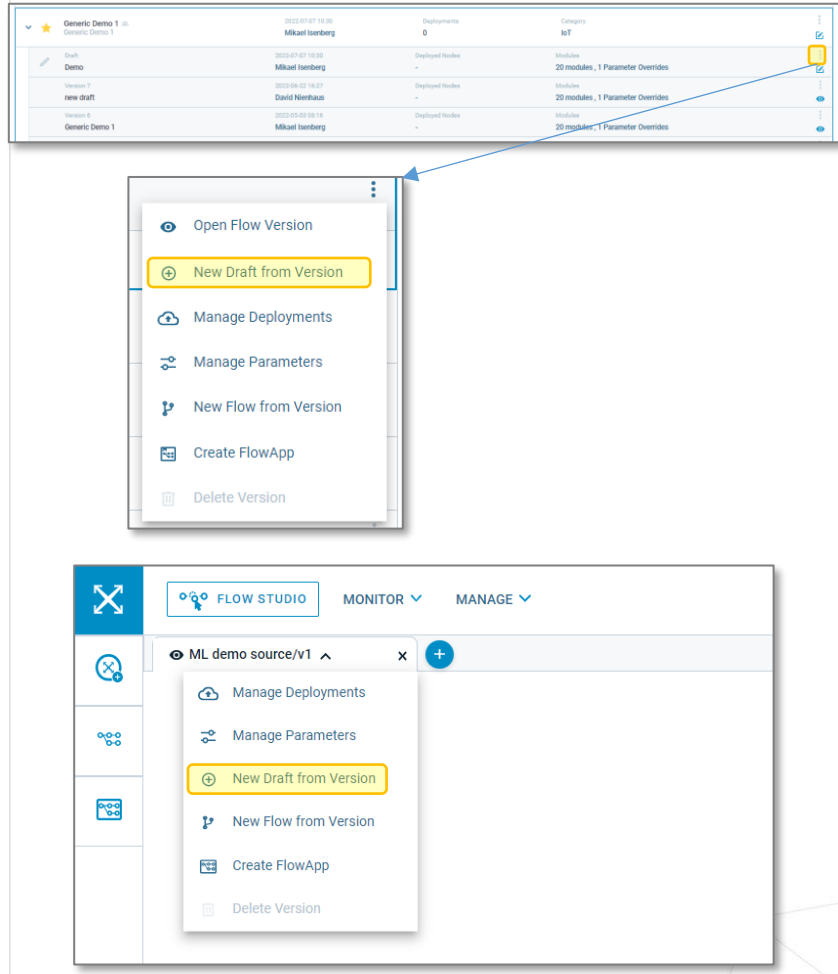
Flow Versions

- Each flow can have any number of versions
- Versions are deployed to Nodes, not Flows
- Only the latest non-deployed version can be modified
- A version becomes read-only the first time it is deployed on a node
- Create new versions using the “New Draft from Version” action (only available on read-only flows)
- You can also create a new draft from a version inside the Flow Studio (tab menu)

Note: You will not be able to create new versions of your flows until you can deploy them on your own node in session 5



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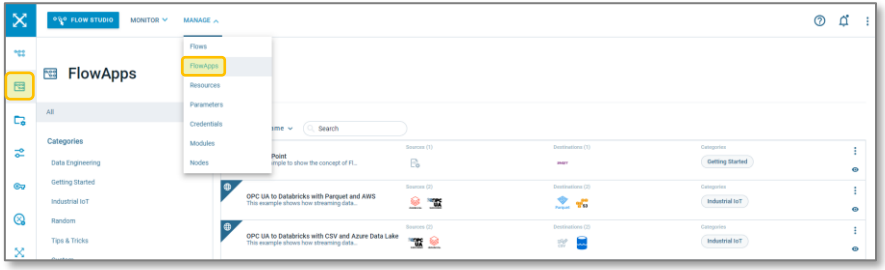
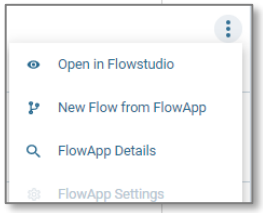
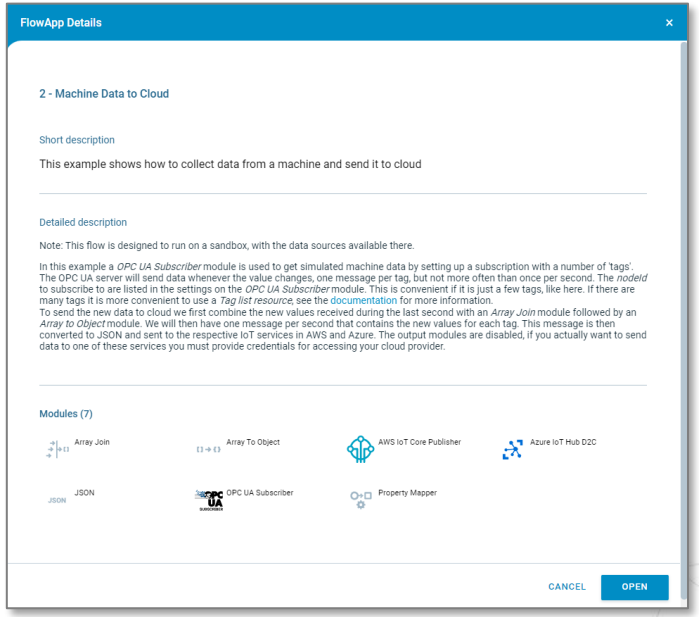
FlowApps

- Pre-built templates to use as starting points for new flows
  - Created by Crosser
  - Created by your organisation
- Browse to find a FlowApp that is close to what you need
  - Read description
  - Open the flow in Flow Studio
- Create a flow from a FlowApp by:
  - Using the “New Flow from FlowApp” action in the menu
- FlowApps can also be opened from inside the Flow Studio







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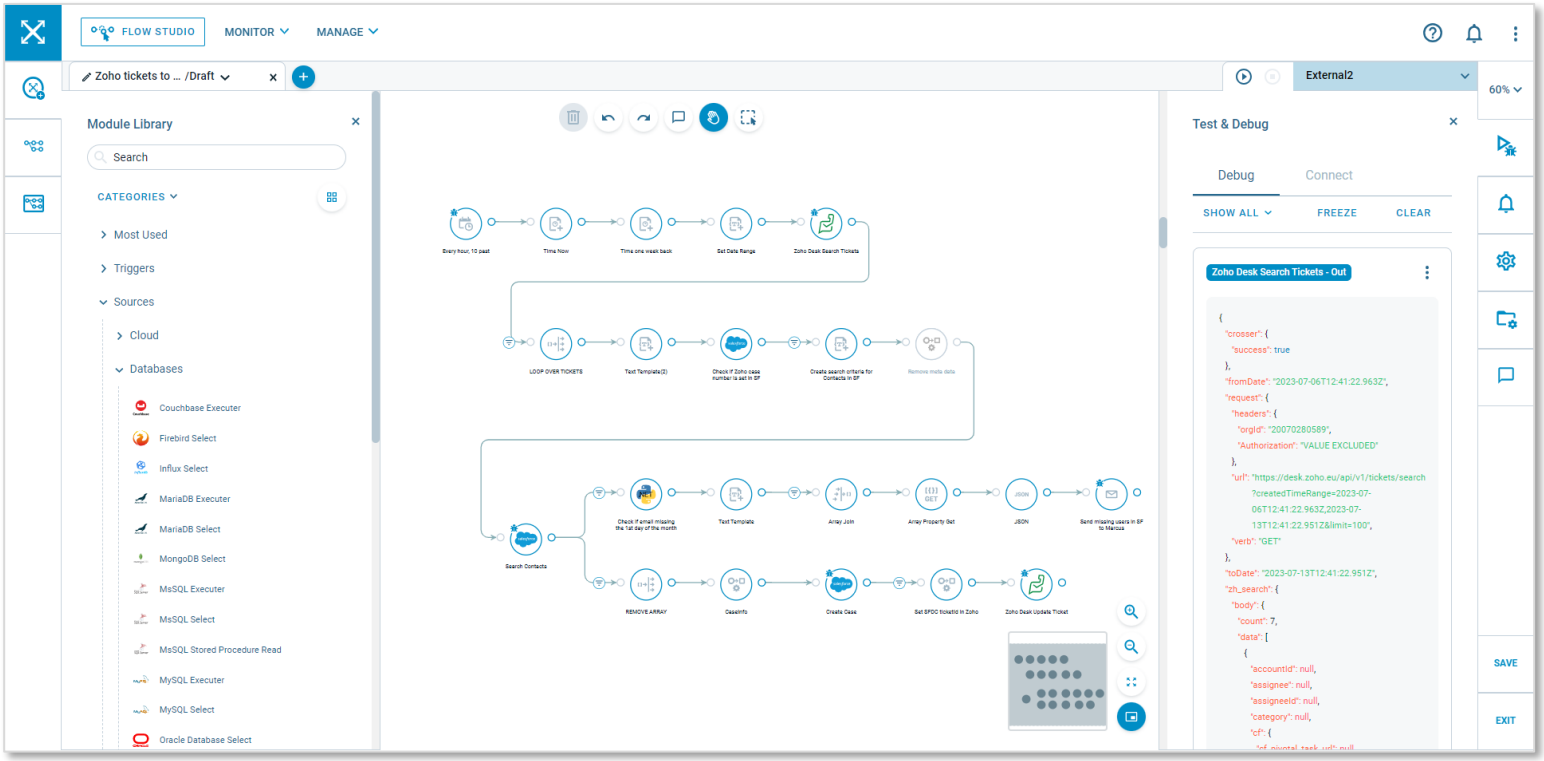
THE FLOW STUDIO

This is where you design and test your flows

The Flow Studio

Design and Test Your Flows



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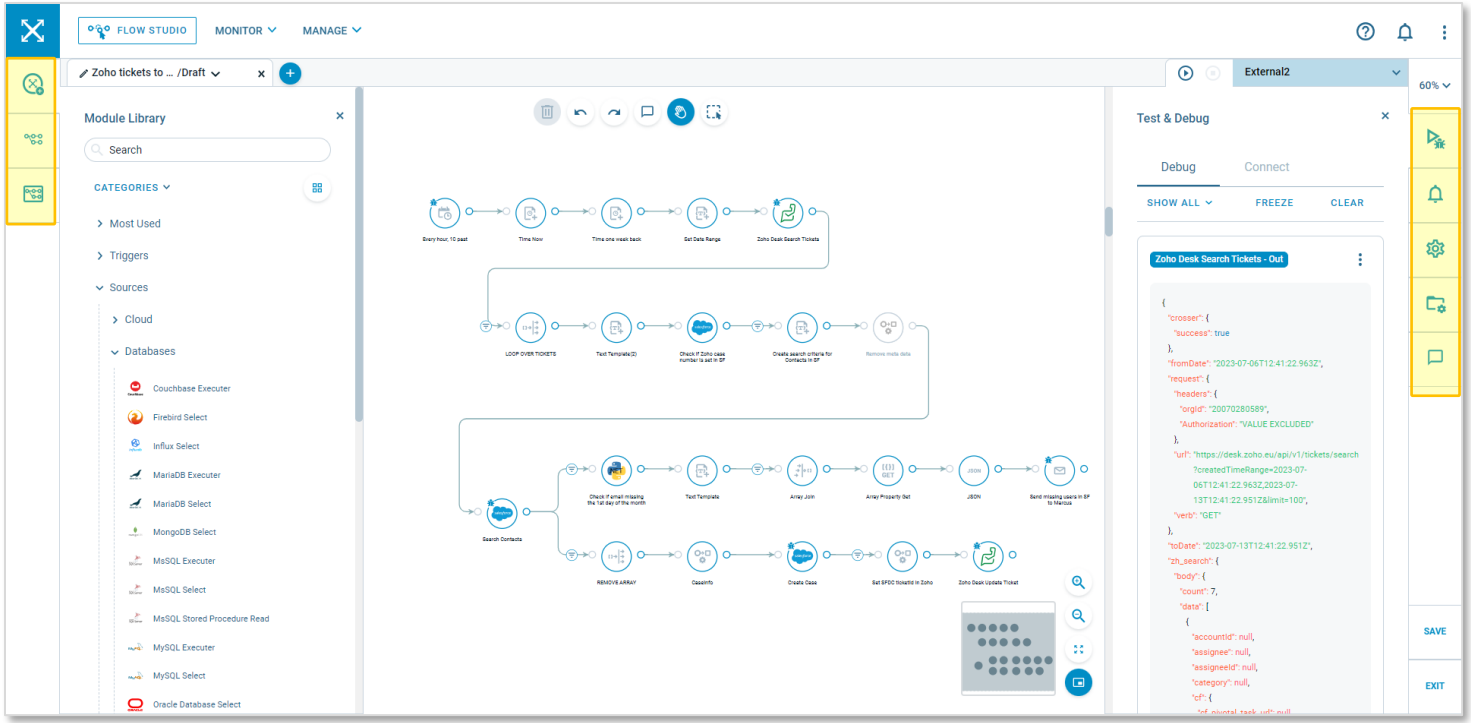
The Flow Studio

Side Panels

Module libray

Flows

FlowApps



Test & Debug

Notifications

Flow version settings

Resources

Annotations

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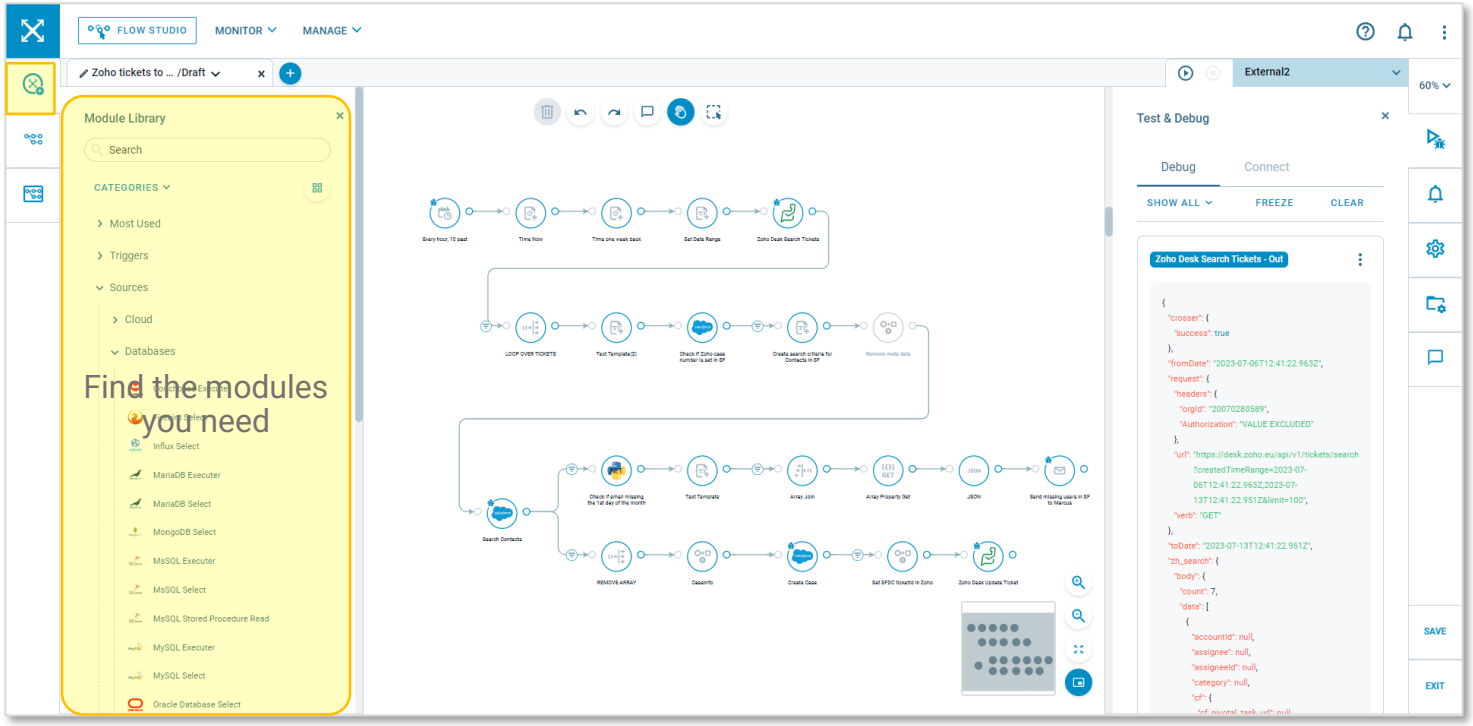
The Flow Studio

Module Library



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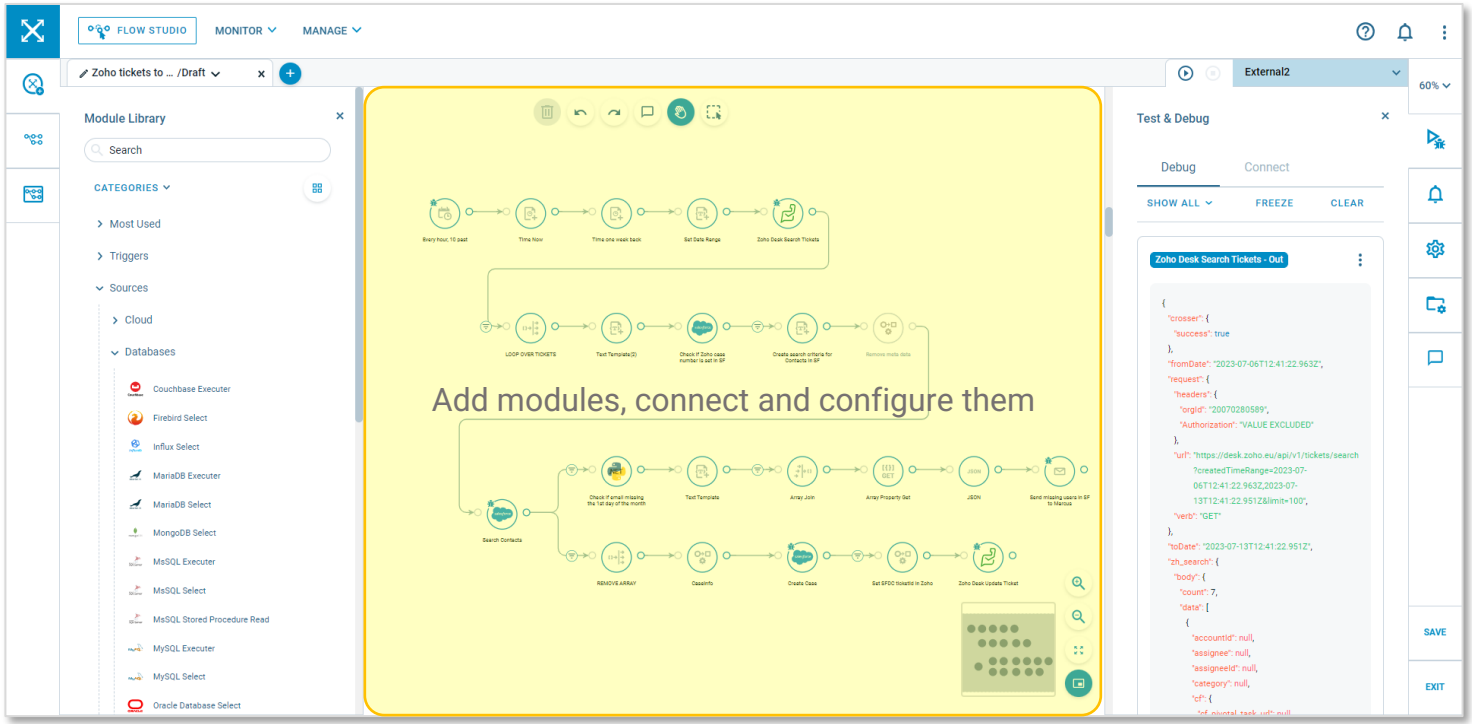
The Flow Studio

Drawing Canvas



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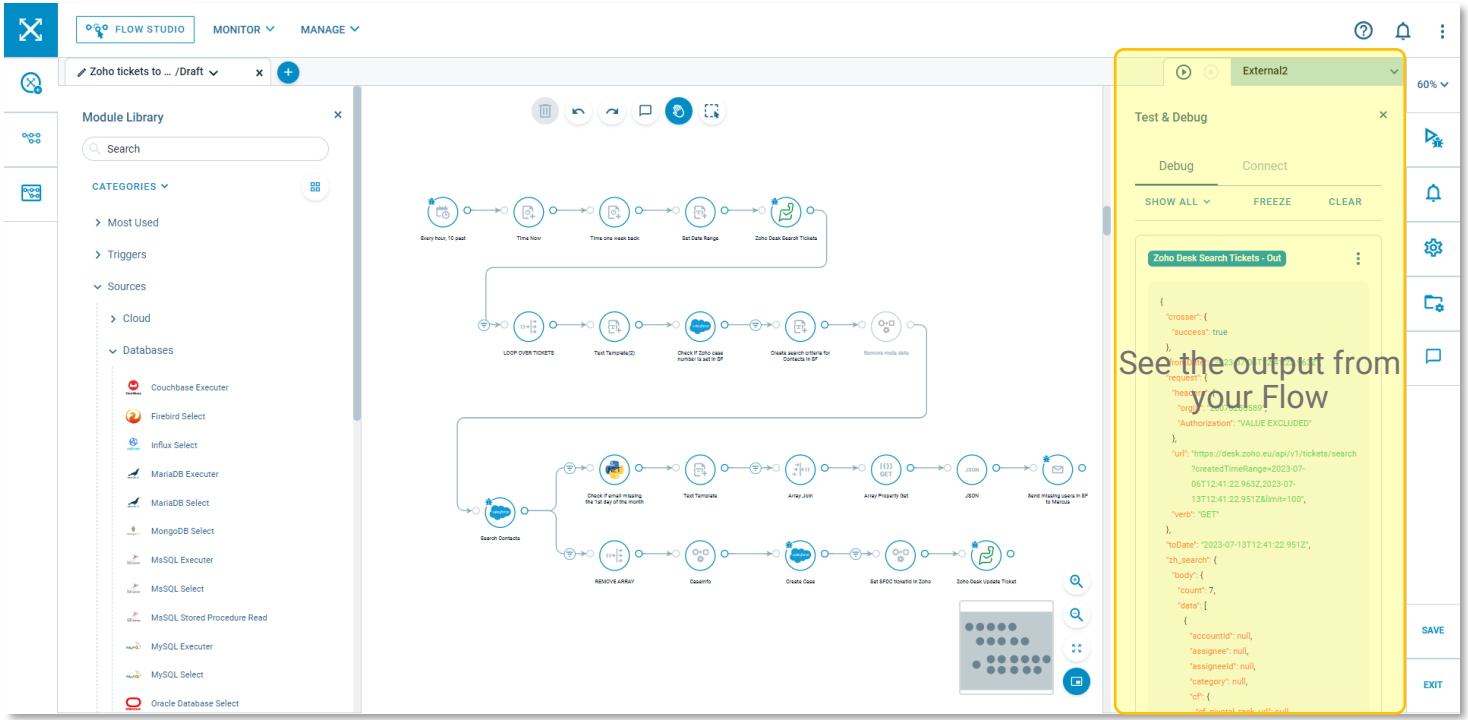
The Flow Studio

Test & Debug



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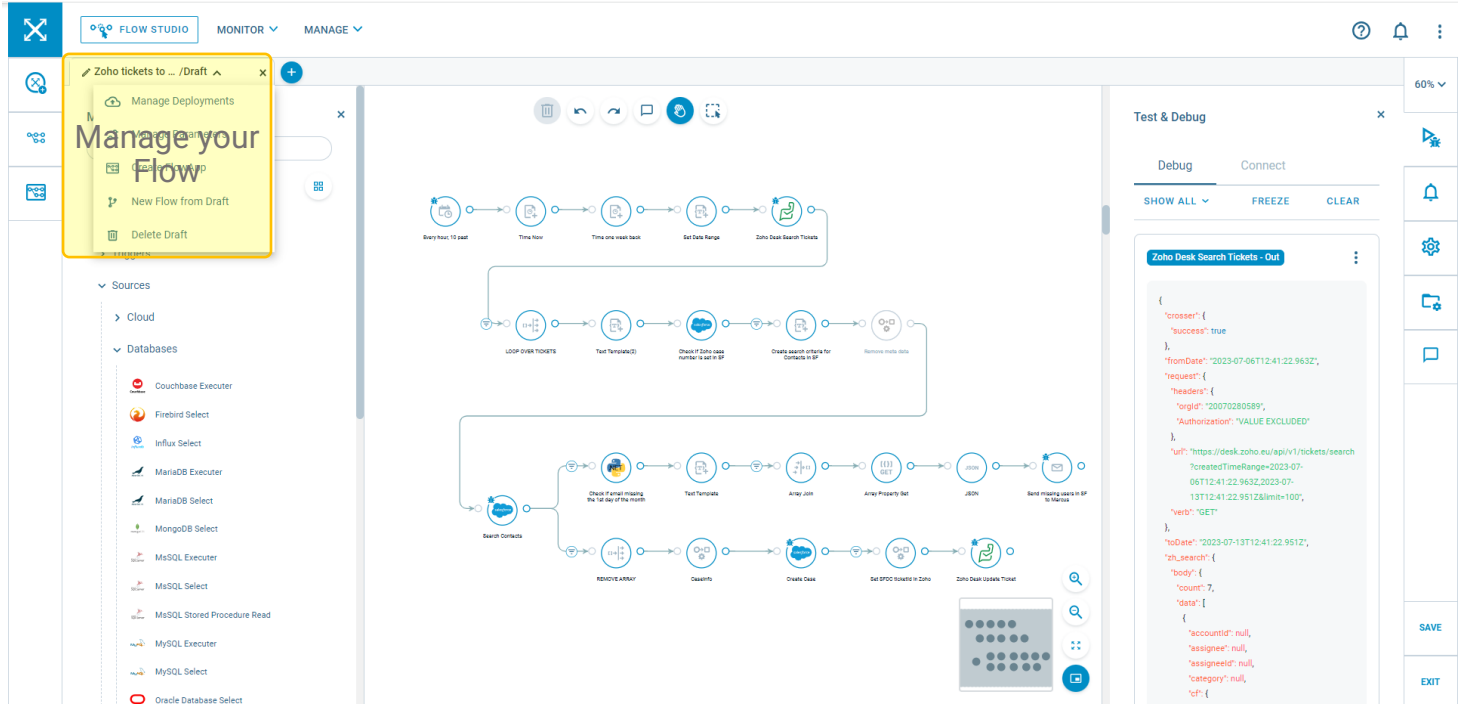
The Flow Studio

Manage Your Flows



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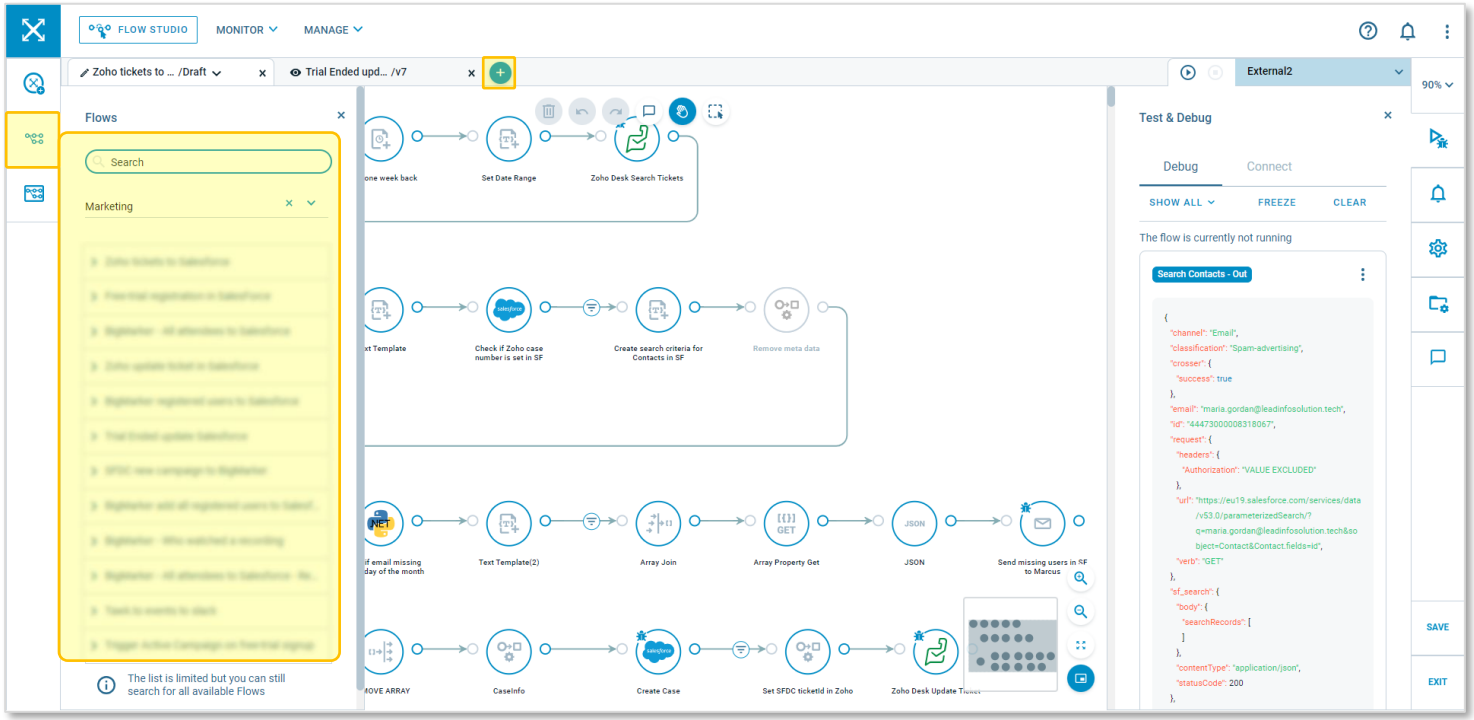
The Flow Studio

Create New Flows or Open Existing



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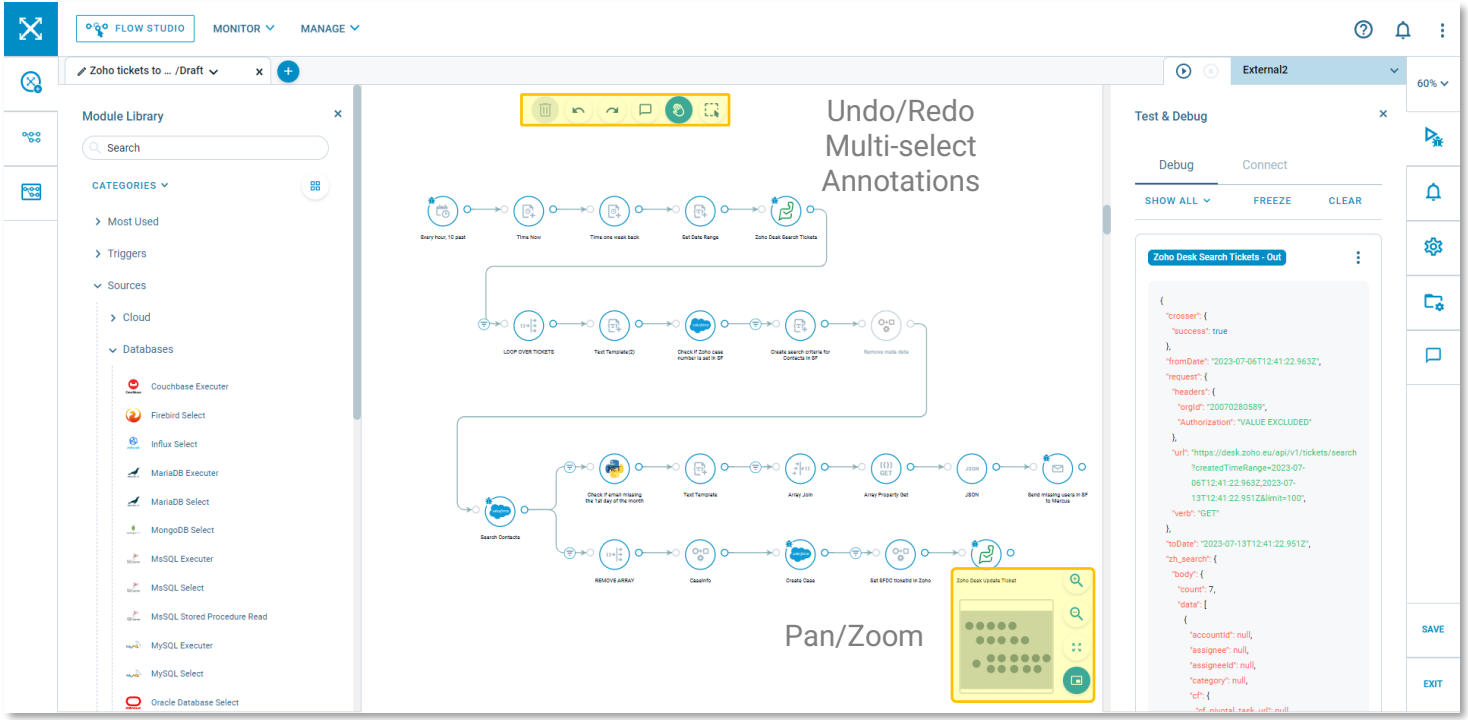
The Flow Studio

Visual Appearance



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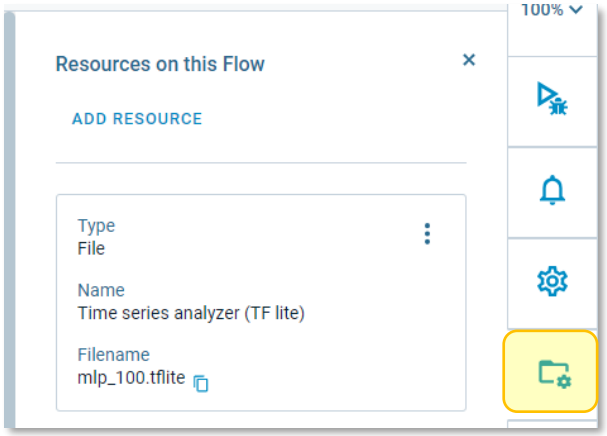
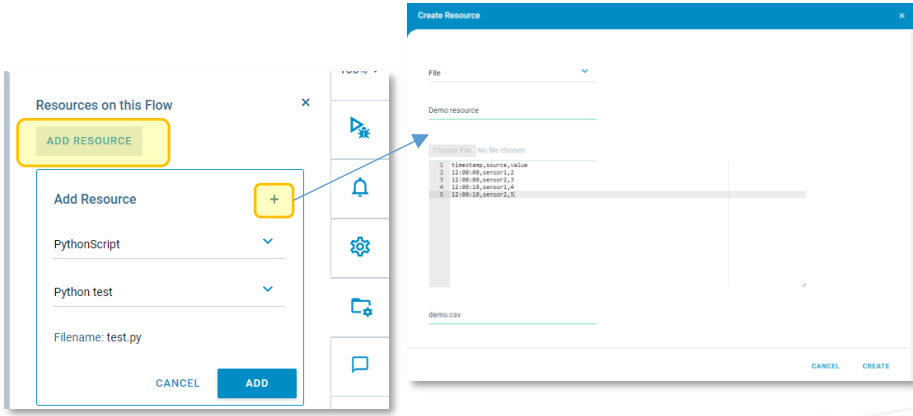
Resources

- Add resources from the library that your flow needs:
  - Files
  - ML models
- Create new resources by uploading files or enter data in the editor
- Resources added to a flow will be downloaded by nodes when the flow is deployed

- *Note: PLC resources are added from the respective module settings*





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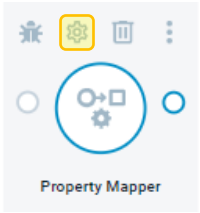
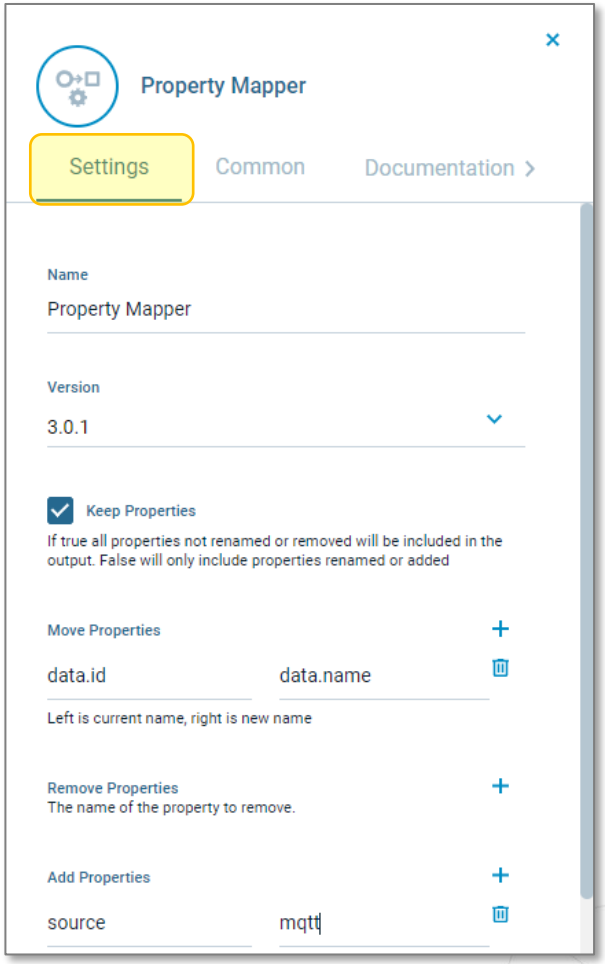
USING MODULES IN THE FLOW STUDIO

Modules
Settings tab

- The *Settings* tab shows module specific settings
  - Any setting called something with *Property* references messages. Which data to use from the incoming message (typically called *Source* or *Value* properties) and where to add the result on the output message (*Target* property)
  - I/O modules have settings to specify how to access external systems
  - Analytics modules have settings to control the processing of the selected data
- Modules have versions:
  - When dragging a module from the library the latest version is used
  - Multiple instances of the same module in a flow must have the same version
  - Different flows can use different versions of a module
  - The module and versions available depends on the Node version you are targeting (advanced feature)





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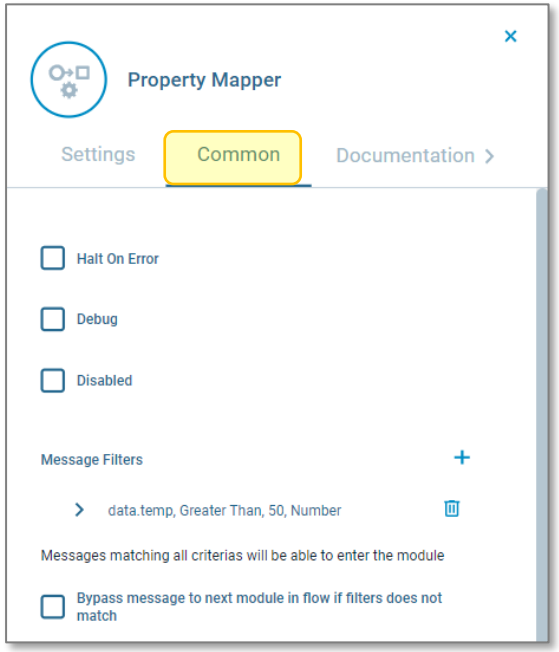
Modules
Common tab

- The same on all modules

- Flow behavior settings
  - Halt On Error
    - If enabled the flow will stop on module errors
    - If disabled, the behavior is controlled by the flow setting
  - Debug
    - Enable debug output from this module when testing (same as debug action on the module icon)
  - Disabled
    - “Turn off” a module, e.g. to prevent data to be sent externally during testing
- Message filters
  - Without filters all messages will be processed
  - With filters only selected messages will be processed
  - Messages not matching the filter can either be ignored or bypassed to the next module (“Bypass…” setting)

Note: Queue/Retry settings will not be covered in the Fundamentals course



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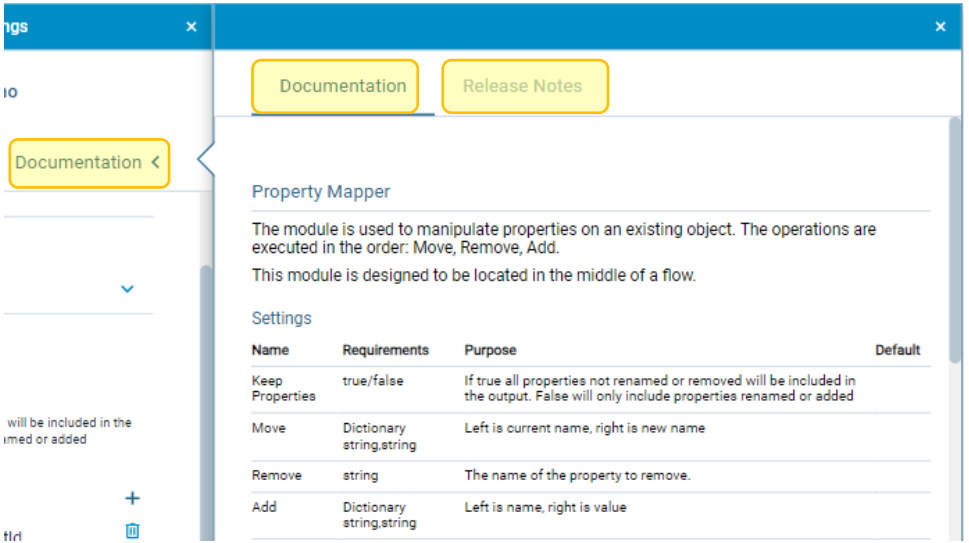
Modules

Documentation tab

- Module documentation
  - General description
  - Settings
  - Message requirements
  - Examples
- Release Notes
  - Describes changes in module versions



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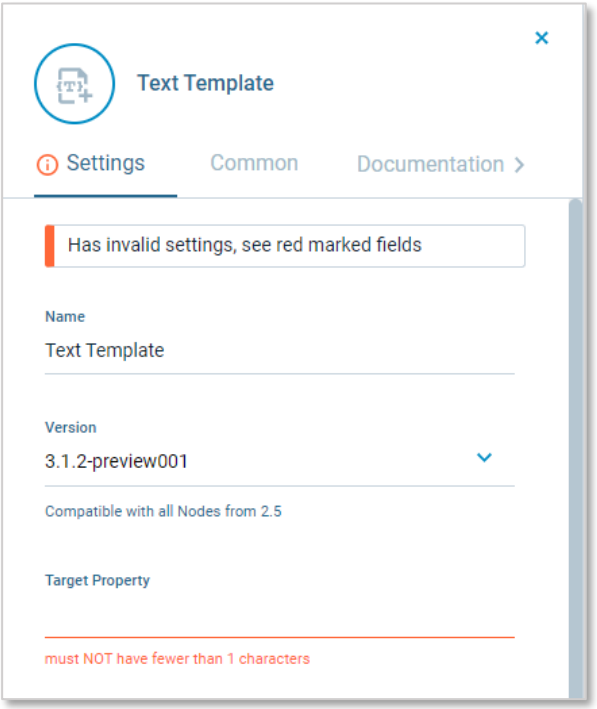
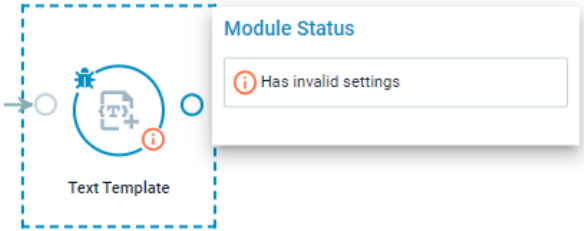
Modules

Settings validations

- Settings entered in modules are validated
- Invalid or incomplete settings:
  - Are indicated on the module in the canvas
  - In the Settings panel for the module





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TESTING YOUR FLOW

In the Flow Studio

Deploy to a Node

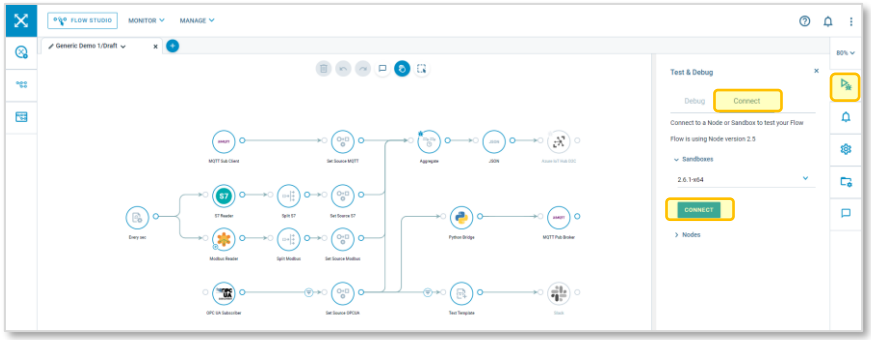
Test Flow

Connect to a Node

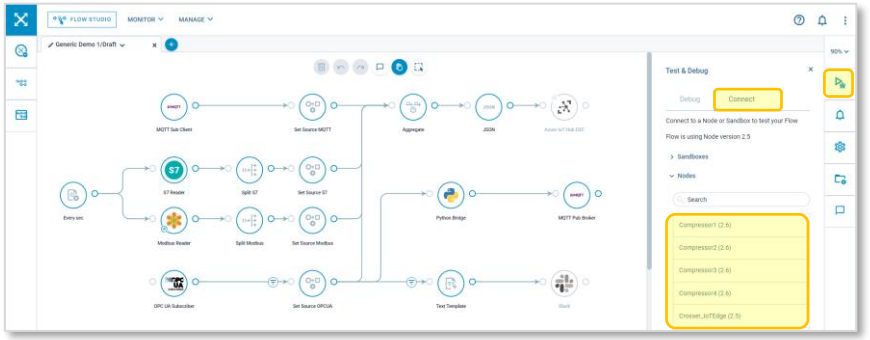
- Connect to a node to use for testing
  - Sandbox: Node hosted by Crosser. Can be used with flows that don't need access to local data sources. Only available in the Flow Studio
  - Local nodes: Nodes running on your infrastructure

Note: Exercises can be tested on a Sandbox, if not explicitly referring to your local node

Sandbox



Local Nodes



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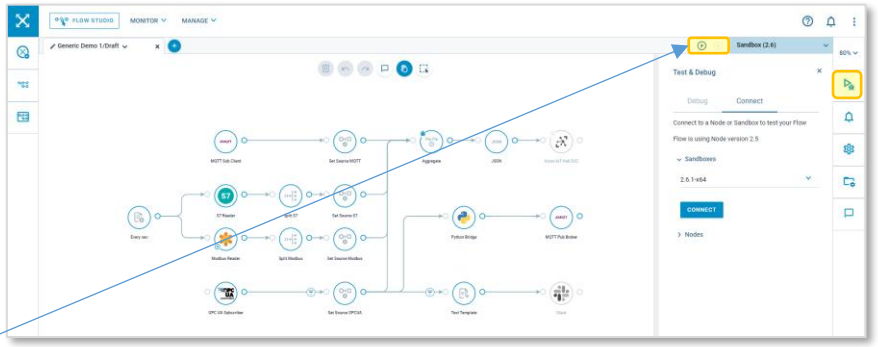
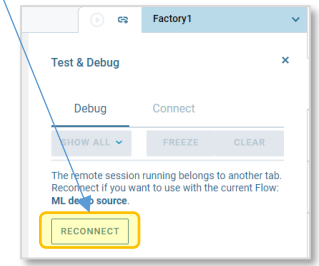
Test Flow

Run Your Flow and Check Results

- Start (and Stop) the flow
  - The flow must be saved before a remote session can be started. This can be done automatically, if you chose to enable that in the Save dialog
- Enable debugging on modules to see output in the Debug window (hover and use the debug action)
- A remote session is connected to a specific Flow version. You need to *Reconnect* to test another Flow version.
- The Flow is removed from the Node when you leave the Flow Studio





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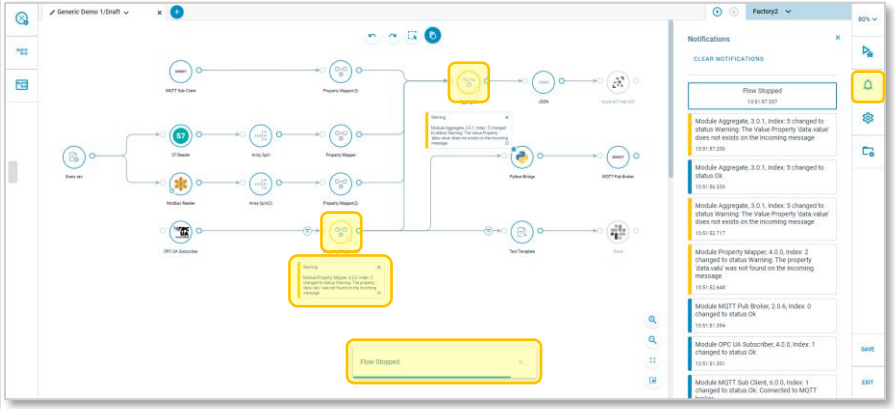
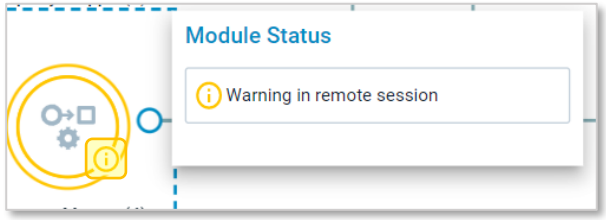
Test Flows

Notifications

- Notifications from the Flow will show up as *toasters* (bottom of screen):
  - Blue: Information and status
  - Yellow: Warnings
  - Red: Errors (flow will stop)
- Errors and Warnings from modules will be added on the module causing the event, as a colored ring, with the message below (large messages can be opened in a separate window)
- Notifications are also added to the Notifications tab and to the notification list on modules
- When the flow is deployed notifications will be sent to the Event log in the Control Center





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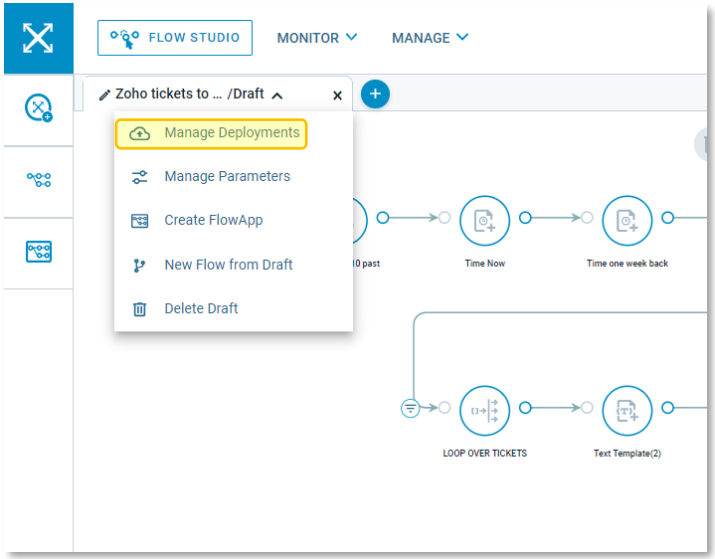
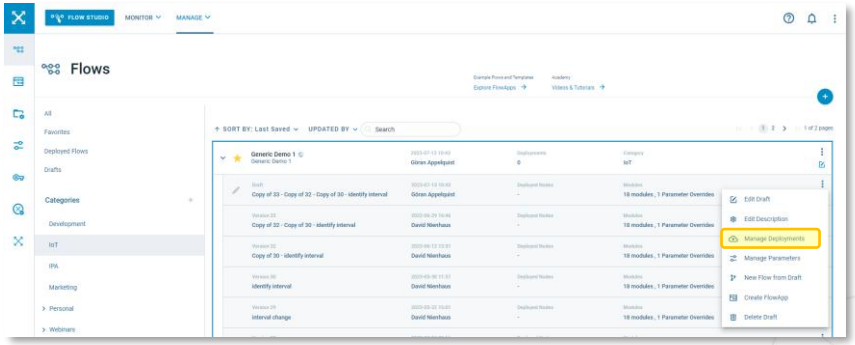
Deploy Flows
Install permanently

Open the Deployment tool

- In the Flow Studio:
  - Select the Manage Deployments action in the tab menu
- On the Flows page:
  - Expand a flow to see the versions
  - Select the Manage Deployments action in the menu, or click in the Deployments column





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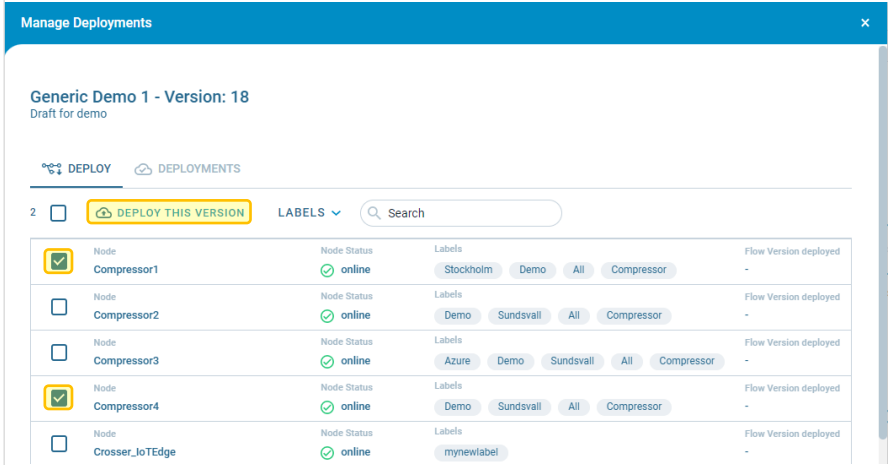
Deploy Flows

Select Node(s)

In the Deployment tool

- In the list of available Nodes, selects the ones where you want to install the Flow
- If the Node is currently offline, it will install the Flow the next time it comes online
- Click on Deploy This Version



Note 1: After a Flow has been deployed to Nodes, processing will run locally on those Nodes without any dependencies on the Crosser Control Center service

Note 2: Deploying a Flow will make it read-only. To update, create a new version

Note 3: You will not be able to deploy a flow until session 5, where you will install your own node

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MODULES USED IN EXERCISES

Data Generator

Aggregate

Text Template

SMTP Send

MODULE
Data generator

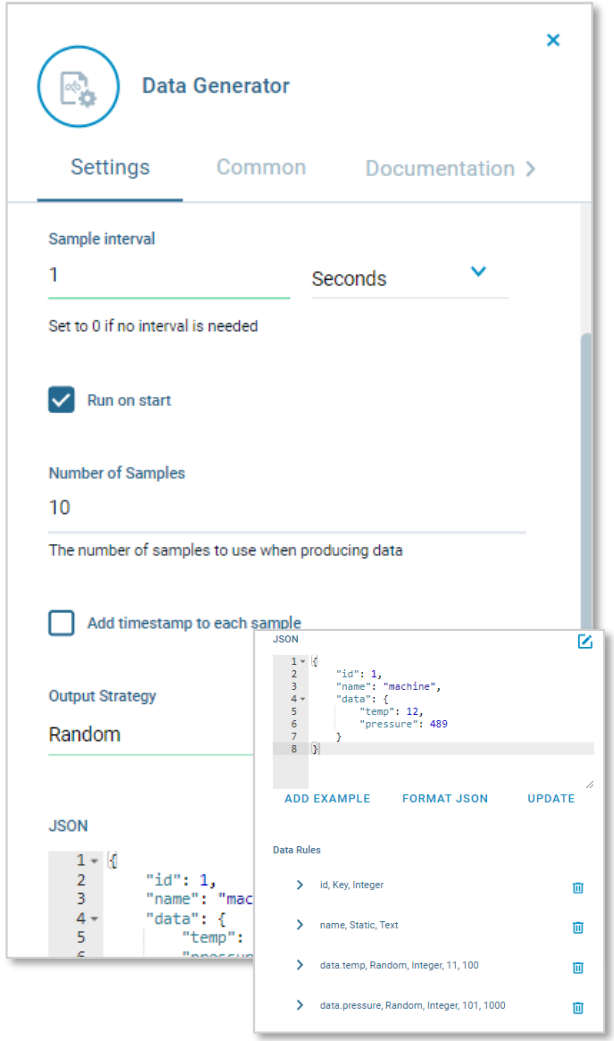
- Create test data (from JSON template)
- Useful for testing a flow without using external data sources
- Multiple “Samples” can be generated, e.g. to simulate multiple sensors or sources

- Enter a JSON template with the message structure you want to generate → Click “Update”
- In the “Data Rules” section, specify how you want to generate data for each property in the template

  Integers/GUIDs can be:
  - Static → Value from template
  - Key → Value unique per sample
  - Random

  Text can be:
  - Static → Value from template
  - Identifier → The template value plus a key added per sample

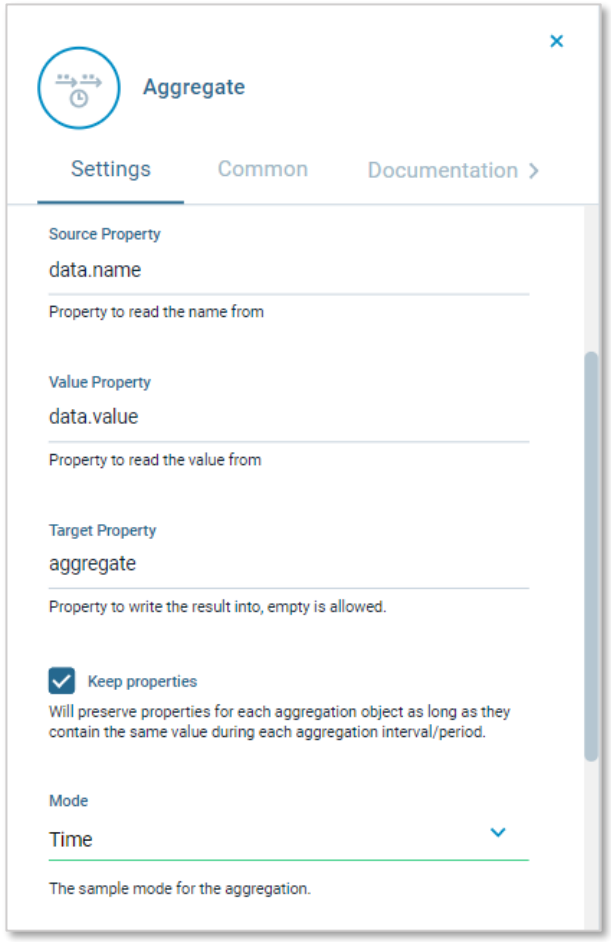
  Double/Booleans can be Static or Random
- Change “Output Strategy” to generate an ordered sequence of IDs, or an array of samples



Module
Aggregate

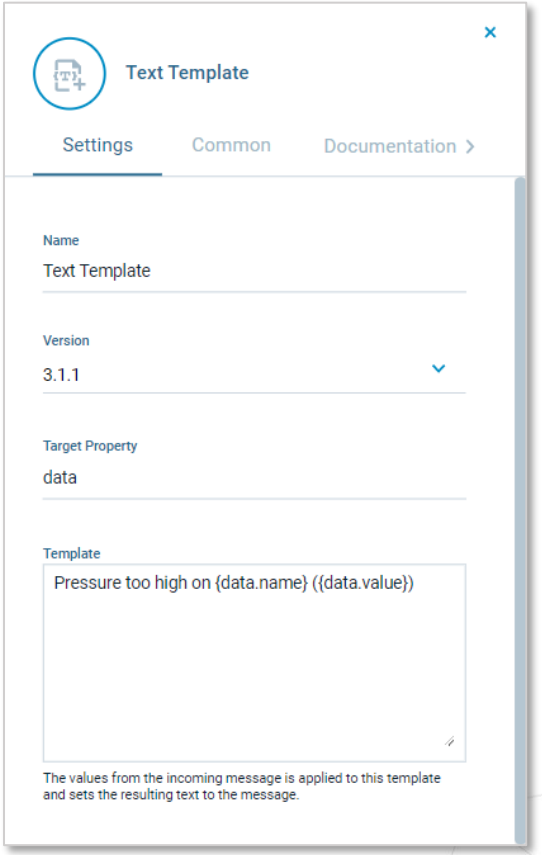
- The Aggregate module is used to aggregate values:
  - Over a time window
  - Over a certain number of messages
  - An output is generated when the end of the aggregation window is reached
- Calculates Average, Min and Max values
- Can group messages by source, i.e. aggregate data from multiple sources

Note: Use this module with streaming data. If you want to operate on data in an array, use the Array Statistics module.



Module
Text Template

- Create text strings based on a template where data from the flow message can be inserted
- Anything inside {} is replaced with the value from the corresponding property on the incoming message
- Use it to:
  - Add/append text to messages
  - Convert numeric values to strings



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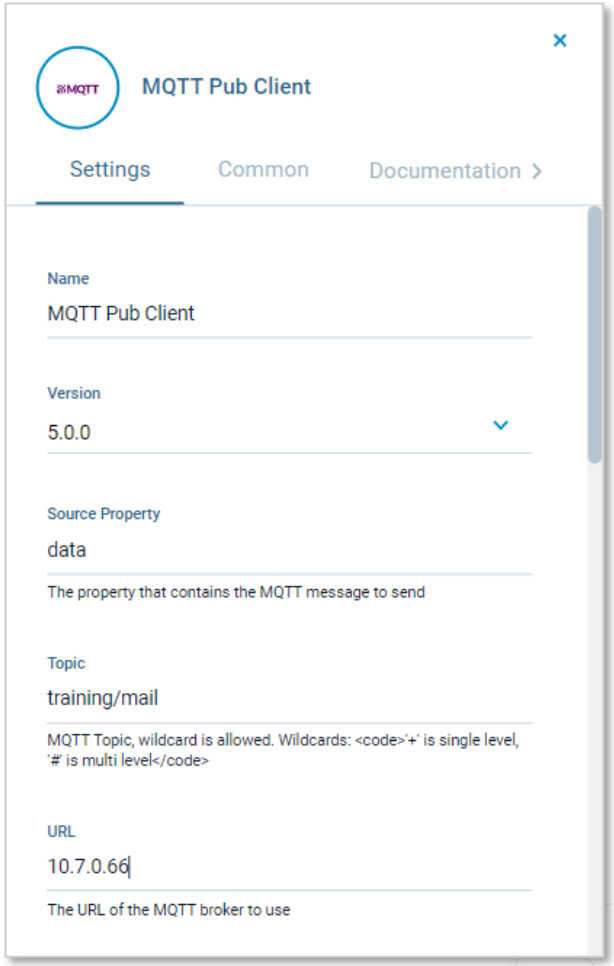
Module
MQTT Pub Client

- Publish message data to an external MQTT broker
- Default settings will convert message to JSON
  - Allows complete message structures to be transferred
  - XML and Raw formats also available
- Required settings:
  - Source Property: Which part of the message to send
  - Topic: Which topic to use when sending the data
  - URL: The IP address or hostname of the external broker



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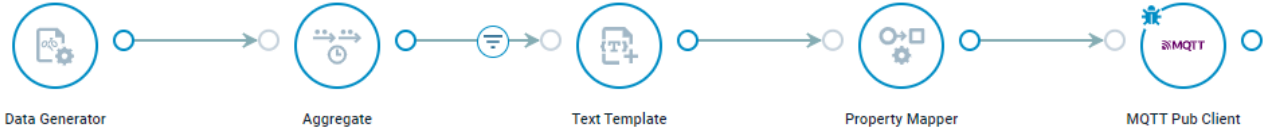
EXERCISES

Exercise 1

Overview



- You will build a flow step by step, starting with an internal data source
- You will see how we can process this data (aggregate)
- Use message filters
- Finally, you should get an email from your flow

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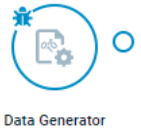
Exercise 1A

Your very first flow!




```
{
    "name": "machine",
    "data": {
        "temp": 12,
        "pressure": 489
    }
}
```

1. Login to Crosser Cloud (https://cloud.crosser.io)
2. On the Flows page, create a new flow called Exercise 1
3. Add a Data Generator module with default settings
   - Click on 'ADD EXAMPLE' to add the default template
4. Start an interactive debug session on the sandbox node
   - Click on 'Connect Node' and go to the 'Sandboxes' tab and click on 'Connect'
5. Start the flow, turn on debugging on the module and watch the output in the debug window
6. Change settings on the 'Data Generator':
   - Change *Number of Samples* to 3
   - In the 'Data Rules' section at the bottom, set the behaviour on the *name* property to Identifier
7. Run the flow again and check the output

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Exercise 1B
Aggregation

1. Add an Aggregate module
   - Value Property: data.temp
   - Target Property: aggregate
   - Interval: 10 seconds
2. Run the flow and check the output from the ‘Aggregate’ module

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Exercise 1C

Grouping

1. In the ‘Aggregate’ module, add name as the *Source Property*
2. Run the flow and check the output from the ‘Aggregate’ module
3. What is the difference?

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Exercise 1D

Creating a text message

1. Add a Text Template module after the ‘Aggregate’ module:
   - Target Property: data.content
   - Template: The max value is {aggregate.max}
2. Run the flow on your node and check the output

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Exercise 1E

Message filters

1. In the ‘Text Template’ module open the *Common* tab and specify a filter that selects messages where the *name* property is machine-1
2. Run the flow on your edge node and notify the difference

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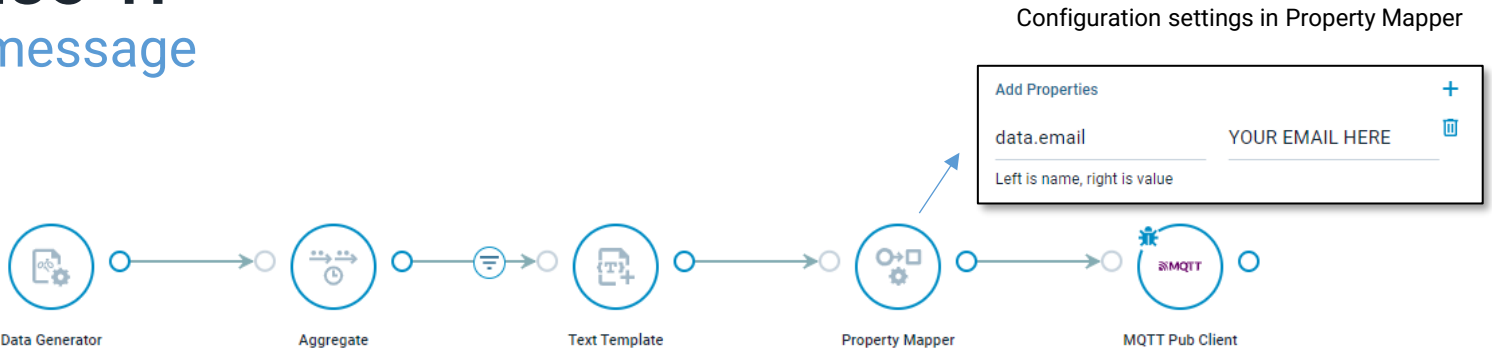
Exercise 1F

Send a message



1. Add a Property Mapper module and add the settings shown above
   - The Property Mapper will be covered in the next session
2. Add a MQTT Pub Client module:
   - Topic: training/mail
   - MQTT Brokers: 10.0.48.117:1883
3. Run the flow and you should receive an email!
   - You cannot send more than one email per minute

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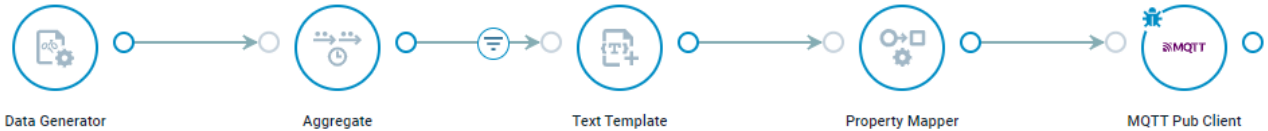
Exercise 1
Wrap-up



Things to test/consider:

- Try changing some settings in the Data Generator and notify the changes in the output
- Why did the number of output messages change when you added the 'Source Property' in the Aggregate module?
- Try some other filters in the Text Template module, like only letting through values in a range
- Try creating some other messages in the Text Template module, e.g. specifying the range of values (using min/max from the Aggregate module)

SESSION – 02 END

How to build a new flow

How to work with modules

Testing flows in the FlowStudio