AMORPH.pro
SMARTUNIFIER

Send file (XML) and database data via MQTT

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Amorph Systems GmbH

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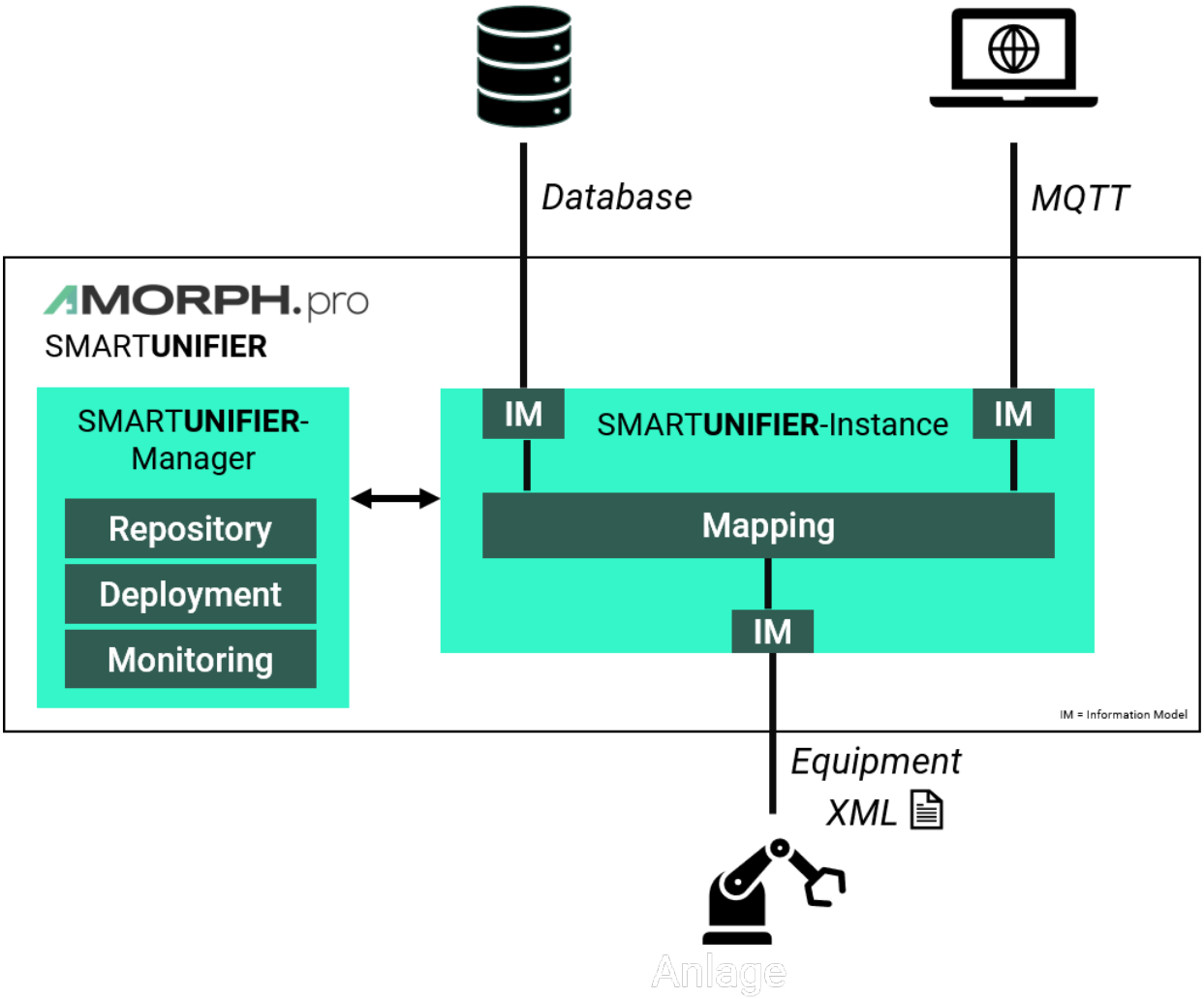
CONTENTS

CHAPTER

ONE

OVERVIEW

This Scenario describes step by step how XML data can be sent via MQTT enriched with additional data from a database. This scenario shows also how type conversion and date formatting can be implemented via the SMART**UNIFIER** Mapping.



CHAPTER

TWO

PREREQUISITES

1. Equipment Data - (XML file)

```
<?xml version="1.0" encoding="utf-8"?>
<ProductionResult>
   <OrderNumber>PO_000001</OrderNumber>
   <ProductNumber>F2PZJ55QW11</ProductNumber>
       <Date>2021-03-31T07:20:41.214Z</Date>
   <Quality>IO</Quality>
   <Quantity>5</Quantity>
</ProductionResult>
```

2. SQL Server (Database)

Create Table

```
create table DEMO_INTEGRATION_UC3_SCHEMA.CUSTOMER (MAIN_KEY bigint IDENTITY(1,1) PRIMARY KEY, CUSTOMER_NAME nvarchar(max), ORDER_NUMBER nvarchar(max))
```

Insert Data

```
INSERT INTO DEMO_INTEGRATION_UC3_SCHEMA.CUSTOMER (CUSTOMER_NAME, ORDER_NUMBER) VALUES ('DemoCompany1', 'PO_000001'); INSERT INTO DEMO_INTEGRATION_UC3_SCHEMA.CUSTOMER (CUSTOMER_NAME, ORDER_NUMBER) VALUES ('DemoCompany1', 'PO_000002'); INSERT INTO DEMO_INTEGRATION_UC3_SCHEMA.CUSTOMER (CUSTOMER_NAME, ORDER_NUMBER) VALUES ('DemoCompany2', 'PO_000003'); INSERT INTO DEMO_INTEGRATION_UC3_SCHEMA.CUSTOMER (CUSTOMER_NAME, ORDER_NUMBER) VALUES ('DemoCompany3', 'PO_000004');
```

3. MQTT Client (For testing)

Download the MQTT Explorer.

CHAPTER

THREE

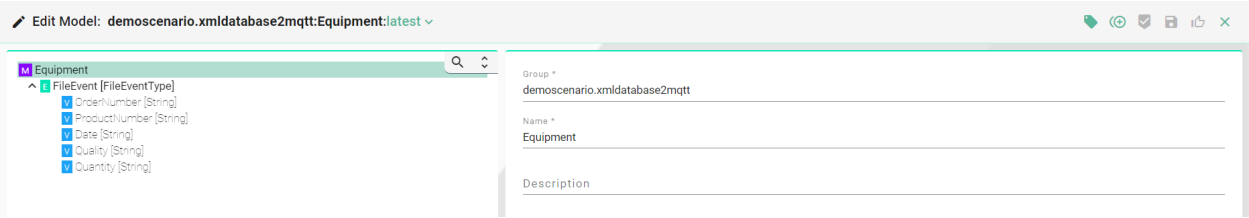
INFORMATION MODEL

3.1 Information Model - Equipment

Create an Information Model that represents the structure of the XML-file.

Structure of the *XML* - Information Model:

- Event that represents the **trigger** for the Mapping. If a new file is recognized by SMART**UNIFIER** the Rule in the Mapping will be executed.
- Variables (of data type String) under the Event represent the key-value pairs from the XML-file

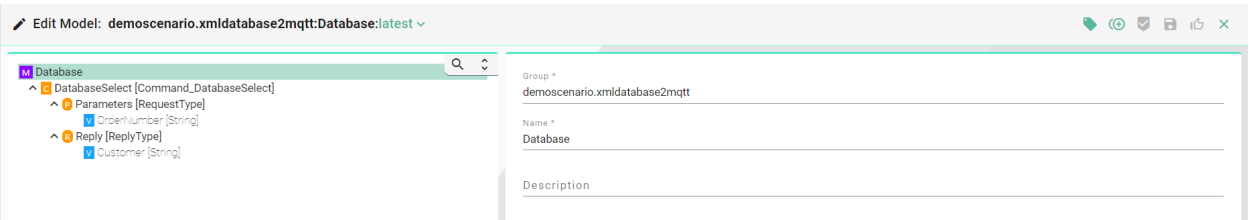


3.2 Information Model - Database

Create an Information Model, which will be used for the **Select** query.

Structure of the *Database* - Information Model:

- Command which is executed once the trigger is activated.
- Parameter variable **OrderNumber** (of data type String) that is used in the SELECT query later on.
- Reply variable **Customer** (of data type String) that holds the result of the query.

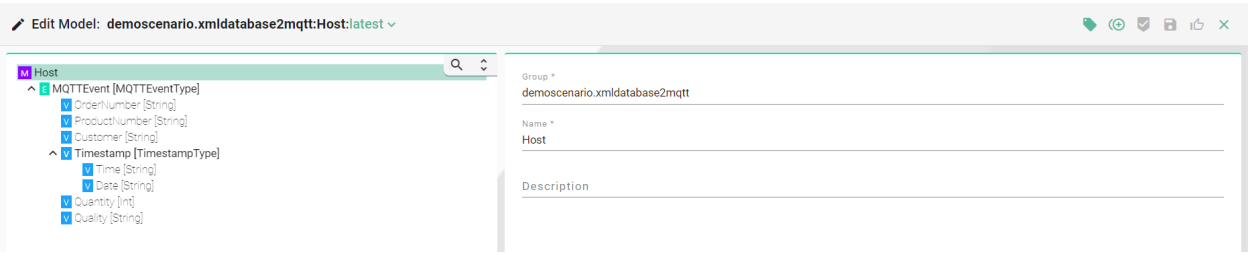


3.3 Information Model - Host (MQTT)

Create an Information Model that represents the structure of the Host (in this case MQTT).

Structure of the *MQTT* - Information Model:

- Event which is used to trigger the transfer of the data.
- Variables:
  - OrderNumber, ProductNumber, Customer, Quality - of type `String`.
  - Quantity of type `Int`
  - Timestamp (custom data type)
    - date, time - of type `String`



CHAPTER

FOUR

COMMUNICATION CHANNEL

4.1 Communication Channel - Equipment

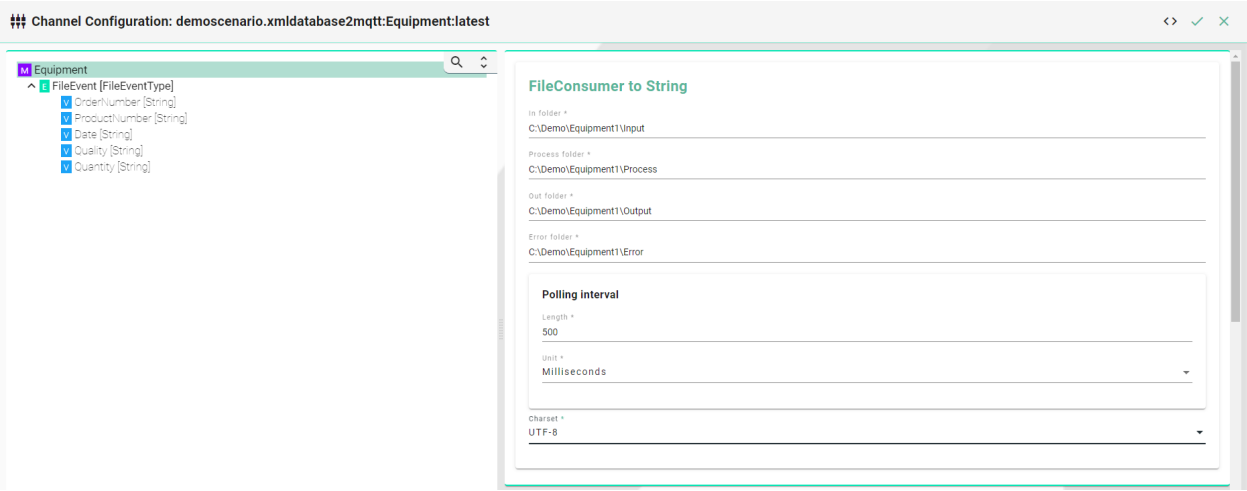
In this scenario the XML-file is processed by the SMART**UNIFIER** with the build-in File Reader.

1. Create File Reader Channel:

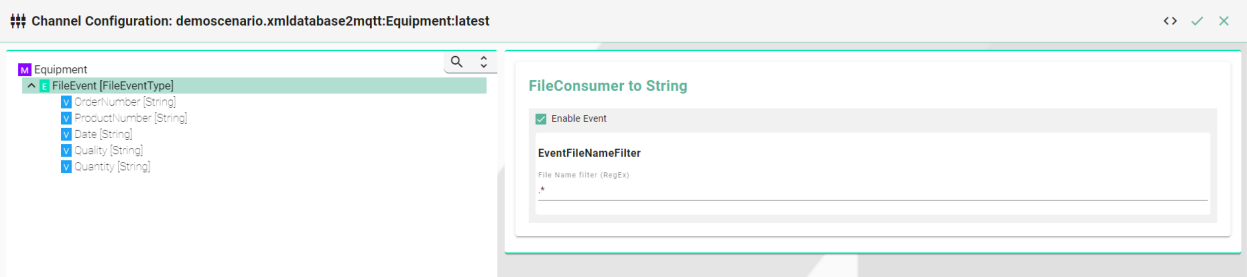
- Select the **Equipment** Information Model created previously.
- Select **File Reader (XML)** as Channel Type.

2. Configuration:

- Specify paths to following folder:
  - InFolder
  - ProcessFolder
  - OutFolder
  - ErrorFolder



- Select the Event to configure the *FileNameFilter*



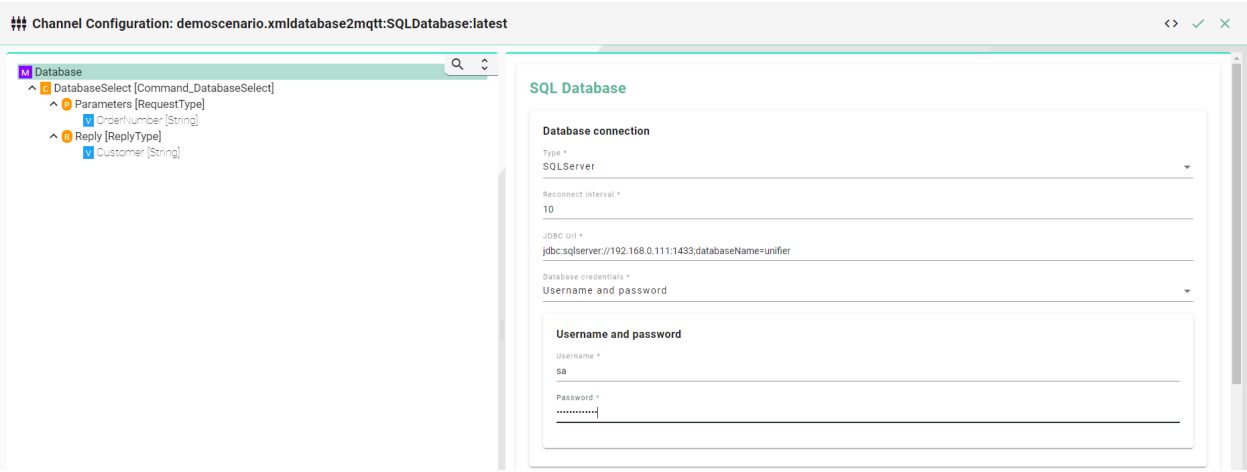
4.2 Communication Channel - SQL Database

1. Create a SQL Database Channel:

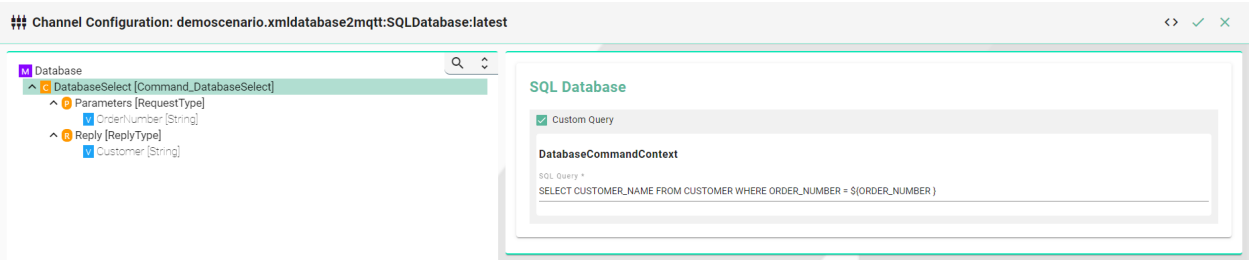
- Select the **Database** Information Model created previously.
- Select **SqlDatabase** as Channel Type.

2. Configuration:

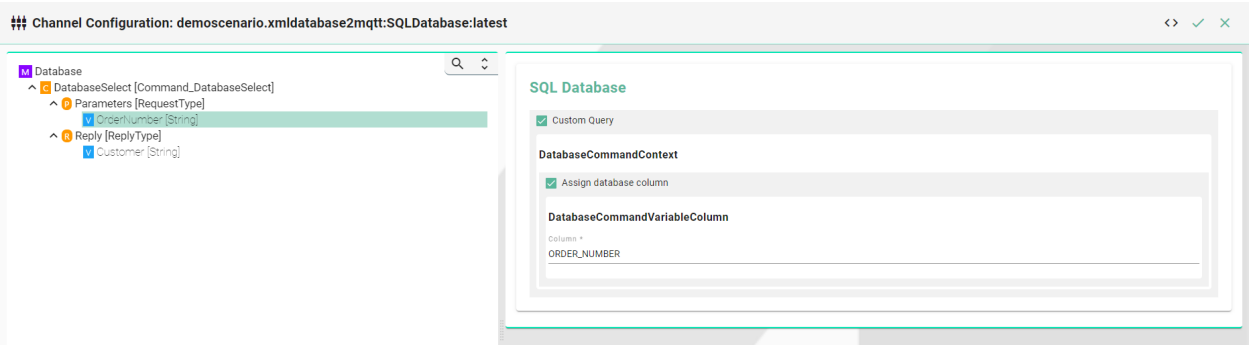
- Database Connection:
  - Select the database type **SQLServer**.
  - Set the **JDBC Url**, according to the selected database type - `jdbc:sqlserver://192.168.0.111:1433;databaseName=unifier`
  - Enter the **username** and the **password** or select it from the Credential Manager.



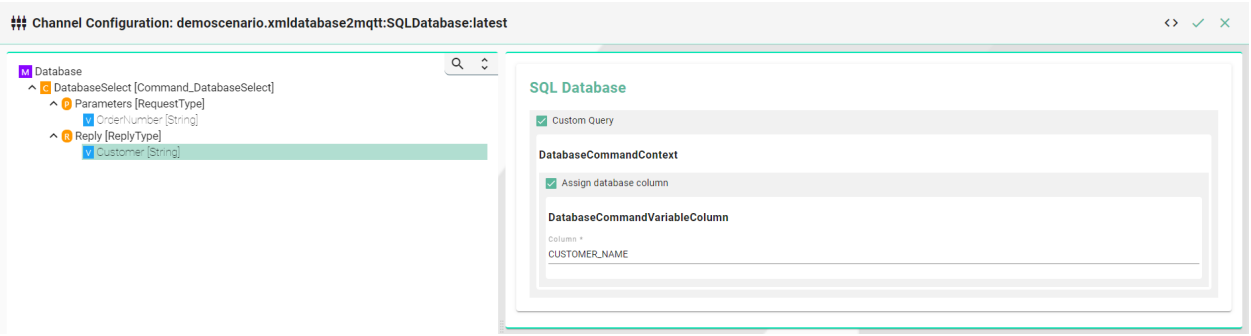
- Enter the SELECT query - `select CUSTOMER_NAME from DEMO_INTEGRATION_UC3_SCHEMA.CUSTOMER where ORDER_NUMBER = ${ORDER_NUMBER}`



- Enter the database column for the parameter **OrderNumber**.



- Enter the database column for the result variable **Customer**.



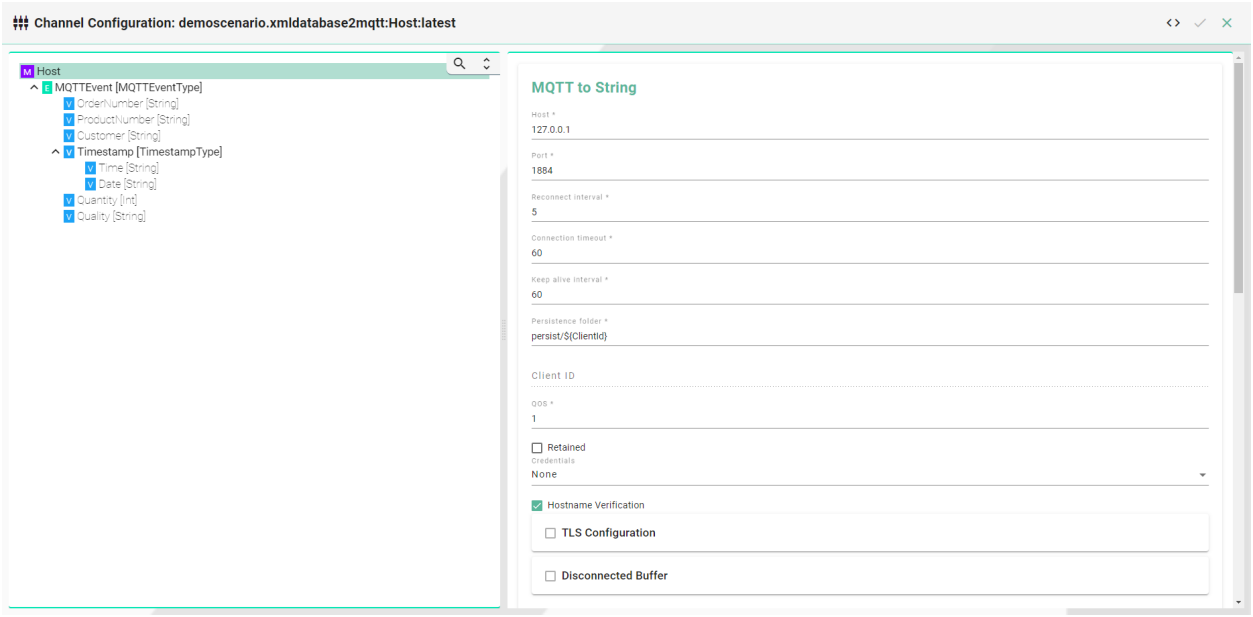
4.3 Communication Channel - MQTT

1. Create the MQTT Channel:

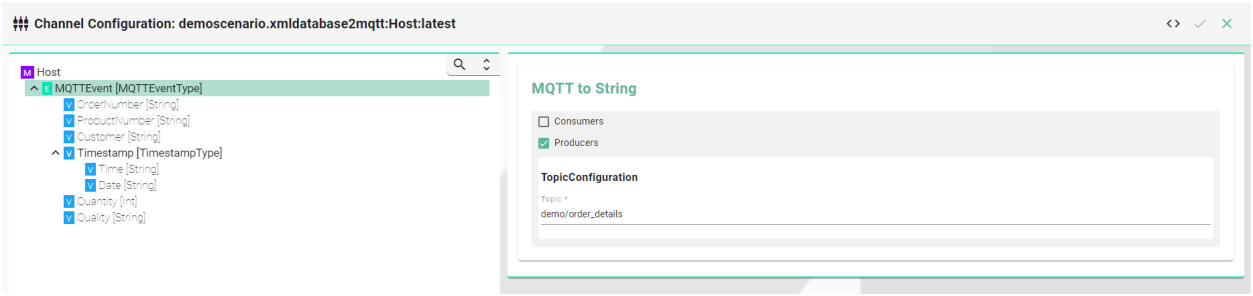
- Select the **Host** Information Model created previously.
- Select **MQTT (Json)** as Channel Type.

2. Configuration:

- Enter the **IP** of the MQTT Client.
- Enter the **Port** of the MQTT Client.



- Select the Event to enable the checkbox **Producers** and enter a **topic** name.



CHAPTER

FIVE

MAPPINGS

Create a Mapping with the Information Models created previously (Equipment, Database, and Host).

Create a Rule that executes a the SELECT query and sends the result with the other equipment data out via MQTT.

- Enter a **Rule Name**
- Select the **Edit Code** button.

Note: This scenario does not support the drag-and-drop functionality of the SMART**UNIFIER** Mapping due to type conversion and date formatting.

- Use the following code snippet and paste it into the Rule code editor:

```
equipment.FileEvent mapTo { event =>
  database.DatabaseSelect.execute(command => {
    Try {
      command.OrderNumber := event.orderNumber
      CommunicationLogger.log(event, command)
      }
  }, reply => {
    host.MQTTEvent.send(event1 => {

      Try {
        event1.Timestamp.time := java.time.format.DateTimeFormatter.ofPattern("HH:mm:ss").
↪format(java.time.OffsetDateTime.parse(event.date.value.toString))
        event1.Timestamp.date := java.time.format.DateTimeFormatter.ofPattern("dd.MM.yyyy").
↪format(java.time.OffsetDateTime.parse(event.date.value.toString))

        event1.OrderNumber := event.orderNumber
        event1.ProductNumber := event.productNumber
        event1.Customer := reply.Customer
        event1.Quantity := event.quantity.toInt
        event1.Quality := event.quality

        CommunicationLogger.log(reply, event1)
      }
```

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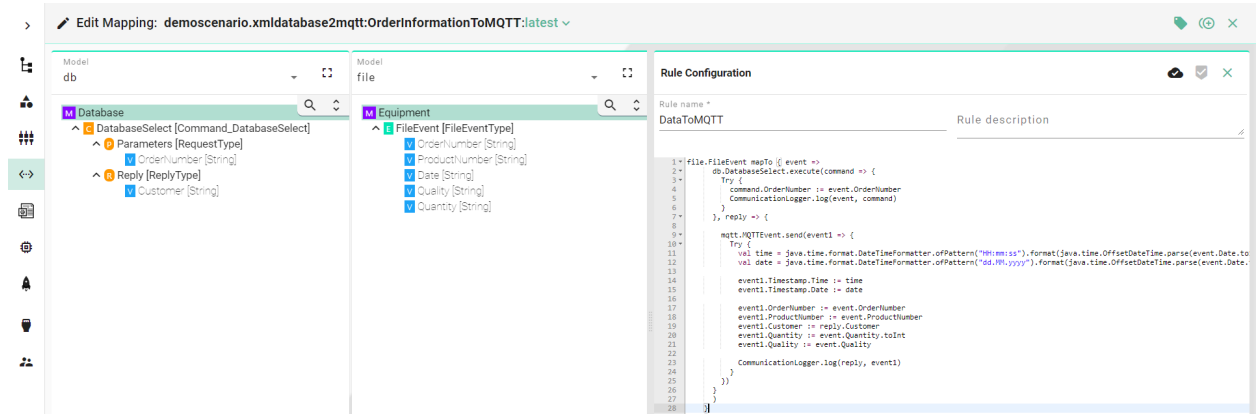
```
      }
      )
  }
  )
}
```



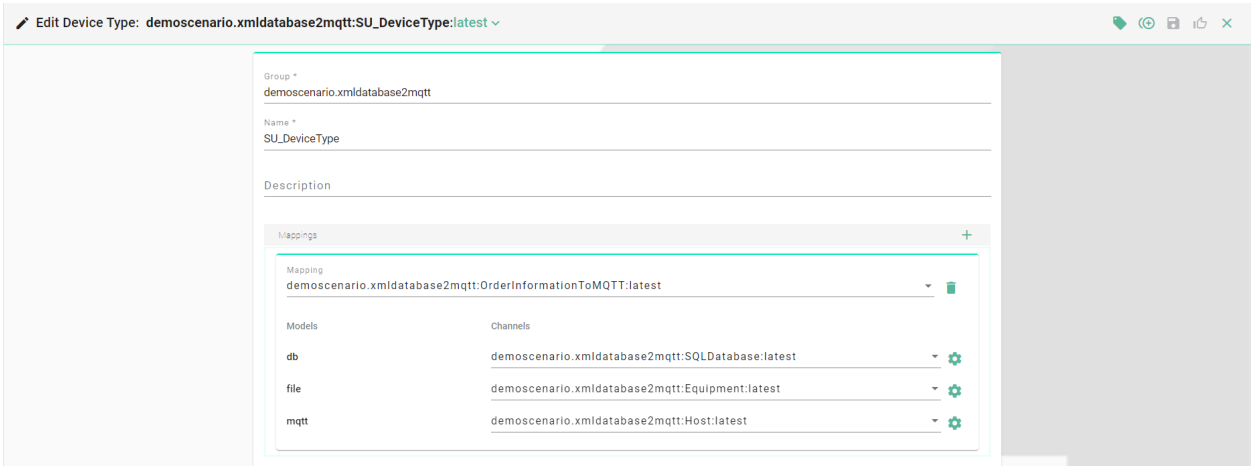
CHAPTER

SIX

DEVICE TYPE

Create a Device Type.

- Select the Mapping **EquipmentToHost** created previously
- Assign the Channels (Equipment, Database and Host (MQTT)) to their belonging Information Models.



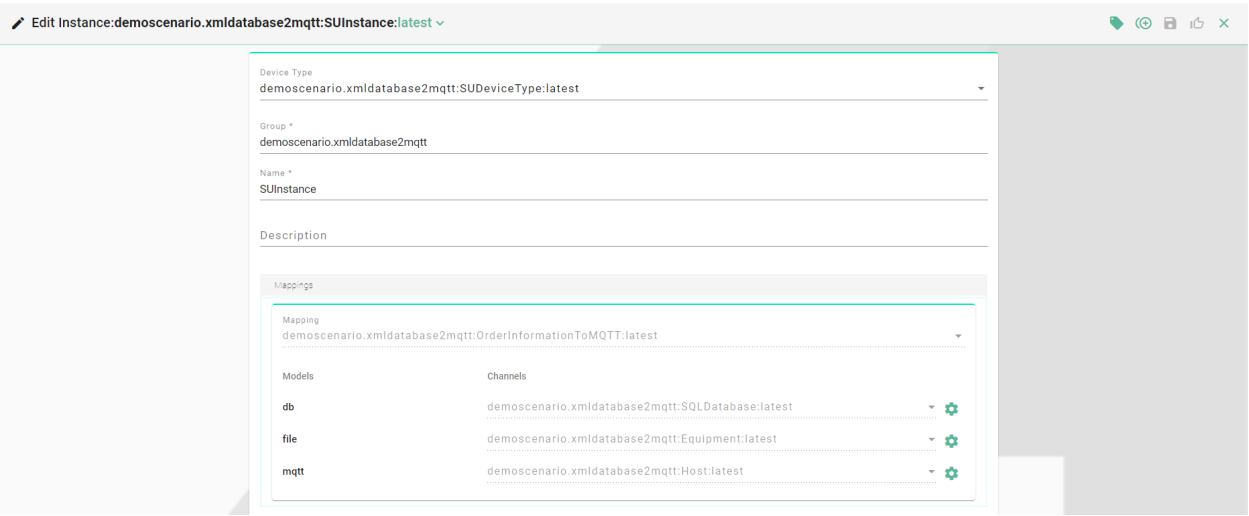
CHAPTER

SEVEN

INSTANCE

Create an Instance.

- Select the *Device Type* created previously.



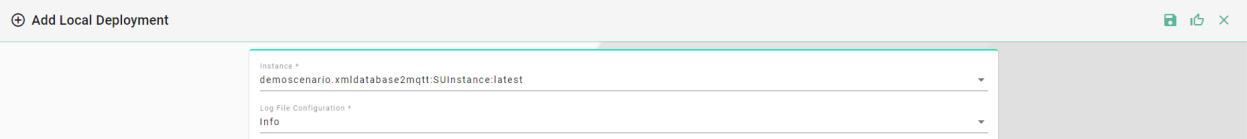
CHAPTER

EIGHT

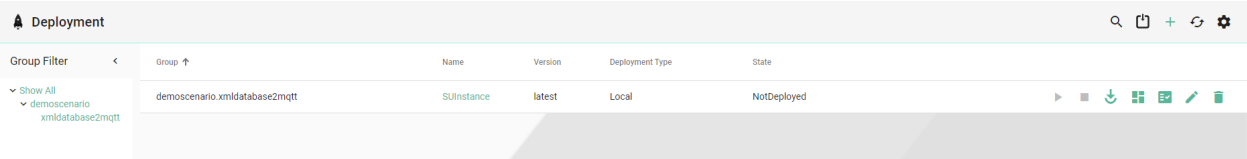
DEPLOYMENT

Create a new **Local** Deployment.

- Select the *Instance* created previously.
- Select the Log File Configuration *Info* (This defines the log detail).



Deploy and Start the Instance.



Execution

In order to send the data from the equipment with the customer information via MQTT, move the XML-file into the specified **InFolder**.