User Manual

MoDD Framework (1.0)

I. Introduction

MoDD is model-driven data collection framework for drone-based systems. It is based on a customized publish/subscribe architecture. MoDD's objectives are twofold: (1) to provide scientists with a straightforward development process and (2) to generate optimized configurations tailored to scientists' requirements.

II. Modeling process

a. Software pre-requisites

To configure MoDD, first set up **Obeo Designer**, a modeling tool that operates within the Eclipse environment. The installation of Obeo Designer is as follows:

- Download version **11.1.2** of Obeo Designer Community from the following link: "https://www.obeodesigner.com/en/download-previous-versions".
- Unzip the file in the **ObeoDesigner-Community** directory.
- Run Obeo Designer using the **obeodesigner.exe** file.

b. Project creation

To configure your MoDD instances, first create a new project.

- Run Obeo Designer.
- Go to the **File** menu, select **New** > **Project**. Follow the prompts to initialize a new project.
- Right-click on the project directory in the left side **Project Explorer** panel.
- Select **New > File**. Enter a name for your file with the extension "**.collector**".

c. Framework configuration

You can now configure the MoDD instance based on your specific requirements. Ensure that it follows the MoDD language syntax rules. The names defined by the user must be unique. An example is provided in the following picture.

```
DataCollector
{
    Drone usv
    {
        Sensors
        {
            Sensor accelerometer measures
            {
                accel_x(METER_PER_SECOND_SQUARED);
                accel_y(METER_PER_SECOND_SQUARED);
                accel_z(METER_PER_SECOND_SQUARED);
            }
        }
    }
    PubBroker broker("192.168.1.128":7171, "/path/to/logs");
    SubBroker proxy("192.168.1.163":7272, "/path/to/conf");
    Publishers
    {
        Publisher pub_1("192.168.1.128":7373, 0.04, "usv.accelerometer.accel_x", "usv.accelerometer.accel_y", "usv.accelerometer.accel_z");
    }
    Subscriptions
    {
        Subscriber sub_1("192.168.1.173":7474, "usv.accelerometer.accel_x", 1.0, MIN);
        Subscriber sub_2("192.168.1.173":7474, "usv.accelerometer.accel_z", 3.0, AVERAGE);
    }
}
```

The **DataCollector** constitutes the main block of the description. It includes the observation platform (**Drone** and **Sensors**), the broker entities responsible for managing the sensor data transmission (**PubBroker** and **SubBroker**), the data producers (**Publishers**) and the data consumers (**Subscriptions**).

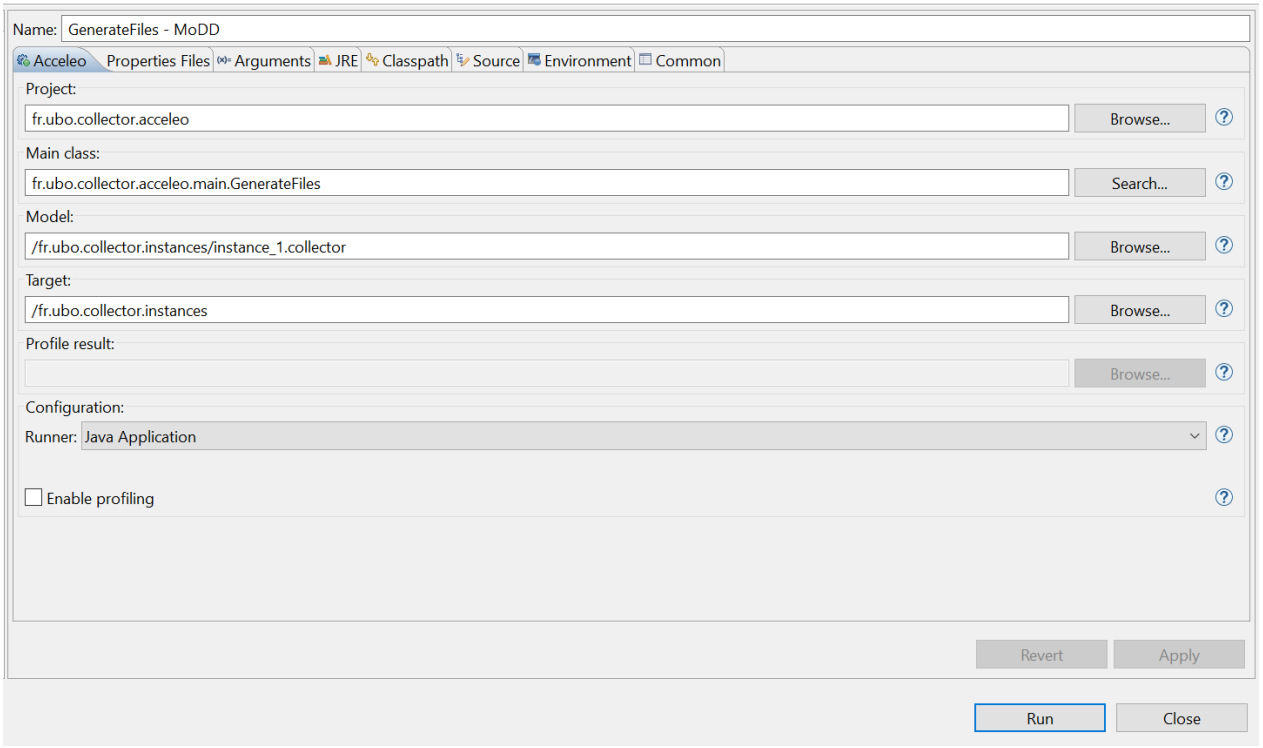
The example provided defines a **Drone** named **usv** equipped with sensors that measure **acceleration** accross three axes (**x, y, z**) in $\mathbf{m.s^{-2}}$. Two types of brokers manage data transmission. The **PubBroker** (**192.168.1.128:7171**) handles the publication of sensor data with logs stored at a specified path, while the **SubBroker** (**192.168.1.163:7272**) manages subscriptions, with configurations stored as specified.

The data collection system includes a **Publisher**, designated as **pub_1**, which publishes the accelerometer data, and two **Subscribers** (**sub_1** and **sub_2**) with different requirements: **sub_1** receives the minimum values from the x-axis data every second, while **sub_2** receives the average of the z-axis data every three seconds.

d. Code generation

To generate configuration files and source code from a MoDD instance, proceed as follows :

- Double-click on the MoDD instance and select **Run As > Run Configurations.**
- A configuration window will open. Here, set the **Model** to specify the path of the instance you are working on, and the **Target** to define where the generated files will be saved.
- Ensure all configurations are correctly entered and click **Apply** to save these settings. Then, click **Run** to begin generating the files.


Name: GenerateFiles - MoDD
Acceleo
Properties Files
Arguments
JRE
Classpath
Source
Environment
Common
Project:
fr.ubo.collector.acceleo
Browse...
Main class:
fr.ubo.collector.acceleo.main.GenerateFiles
Search...
Model:
/fr.ubo.collector.instances/instance_1.collector
Browse...
Target:
/fr.ubo.collector.instances
Browse...
Profile result:
Browse...
Configuration:
Runner: Java Application
Enable profiling
Revert
Apply
Run
Close