Develop the CPS data communication software components

Work objective

Learning how to program the data transfer between a data acquisition software component and an in-the-cloud Web Service.

Organisational topics

The data to be sent to the Web Service will be provided by the measurement and processing application.
The process parameters and the processed values will be organised in data sets.

Each data set will contain:
- an ID of the team;
- an ID of the data set;
- the process parameters configured for certain conditions;
- the measured and processed values in the respective conditions.

For example, if an experimental setup was developed for measuring the cooling time, the parameters describing the conditions could be:
- the starting temperature;
- the air speed;

and the measured value could be the time needed for cooling the air by one degree Celsius.
Different data sets could be obtained by starting the measurement from different initial temperatures and using different air speeds.

Another example could be that of an experimental setup measuring the frequency of the vibrations of a machine-tool.
The parameters describing the conditions could be the rotational speed and the working force, while the value obtained by measurement and processing could be the main frequency of the system's vibrations.

Communication steps

The following steps will have to be included in the measurement and processing application for sending the data to the Web Service:
- building the string containing the data set;
- sending the string to the Web Service and reading the answer;
- interpreting the answer and taking a decision.

Building the string containing the data set

The string will have to start with the section

http://141.85.192.24:8002/CPIS_WS/Get_Data?Data=

which contains the Web Service IP (141.85.192.24), the Web Service port (8002), the Web Service name (CPIS_WS) and the name of the data coolecting application (Get_Data).

After the intial section, the team ID, the data set ID, the process parameters and the measured values will have to be structured in a string with the following format:

**<team_ID>##<data_set_ID>##<param_1>;<param_2>; …
<param_m>##<value_1>;<value_2>; …<value_n>**

For the above example, presuming team_ID = 3 and data_set_ID = 15, where the process parameters are the starting temperature (24 C) and the air speed (0.5 m/s) and the measured value is the cooling time (12 s), the string to be sent to the Web Service will be

http://141.85.192.24:8002/CPIS_WS/Get_Data?Data=3##15##24;0.5##12

Sending the string to the Web Service and reading the answer

The **Get.vi** LabVIEW function will have to be used for sending the string and reading the answer.
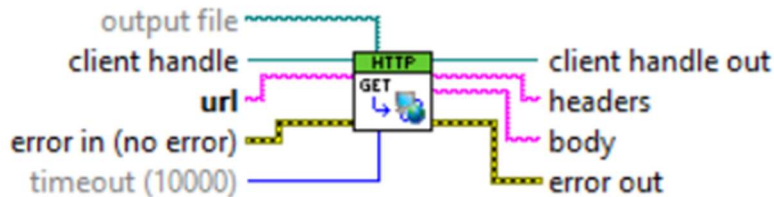
For seding, it is enough to connect the previously built string to the **url** input of the **Get.vi** function.
The **timeout** value can be increased if the server is not responding fast enough.

If there is no communication error, the Web Service answer can be read from the **body** output of the **Get.vi** function.

If the sent data was correctly formatted, the answer will be in the format

OK##<team_ID>##<data_set_ID>

If the communication was performed but the data set was not correctly formatted, the answer will be

ERROR