IoT Project 2022

Two different options are available for the implementation of the IoT project:

- Solo project,
- Group project: each group must be composed of 2 students. No other options are available.

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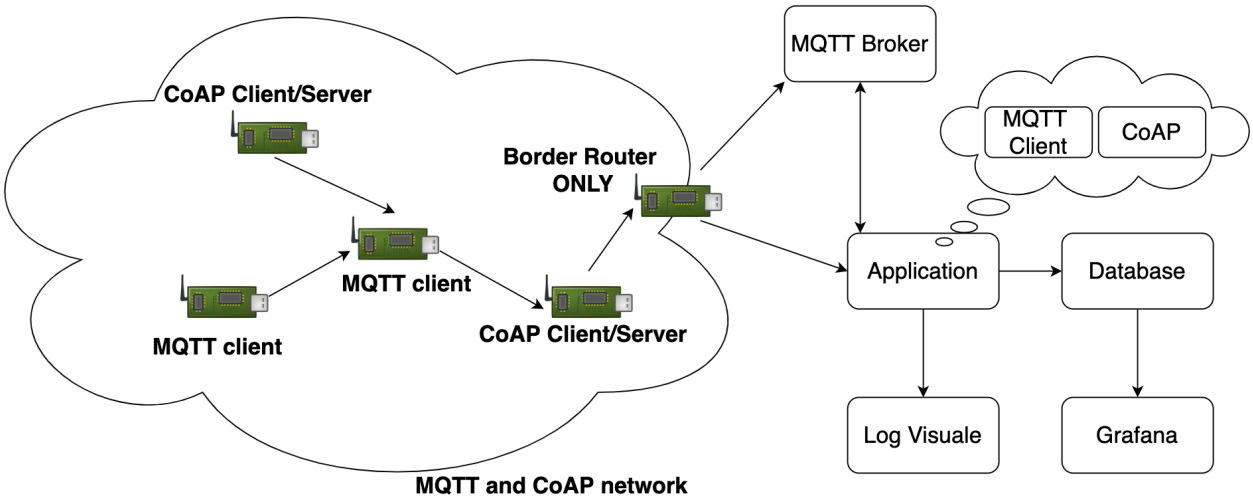
The project **must** be discussed in the same appeal in which the oral part of the exam will be given.
In the case of group project, the project can be discussed if at least one of the two members will give the oral part of the exam in the same appeal.

Project Objective

Development of an IoT telemetry and control system. The use-case of the project is open and must be defined by the student(s), examples are industrial control systems, logistics systems, smart office cooling and heating systems, etc.

System scheme and structure



The system must comprise the following components:

- *A network* of IoT devices, including sensors collecting data from the physical system/ environment and actuators. The network must be composed of IoT devices, both sensors and actuators. Half IoT devices must use MQTT and half CoAP. The network must be deployed using real sensors. In the network a border router must be deployed in order to provide external access[1]. The MQTT broker can be deployed on the Virtual Machine.

[1] For the sake of simplicity, during the deployment we suggest to simulate the network on Cooja with both MQTT and CoAP sensors.

- An *application* that collects data from sensors, store them in a MySQL database, and sends commands to the actuators. The application can run on your virtual machine. The connection with the MQTT broker can be performed following the procedure illustrated at the end of this document.
- A user interface:
  - [SOLO PROJECT] The application must show the collected data via a textual log as they are stored into the database.
  - [GROUP PROJECT] A web-based interface deployed using Grafana must be developed in order to show the data collected and stored on the database.
- A simple *control logic* executed on the application in order to apply some modifications to one or more actuators based on the data collected from the sensors, e.g. some closed-loop control logic.

Guidelines/Requirements

- The application can be implemented using JAVA or Python
- Data should be encoded in a proper format that might depend on the specific use-case. The selection of the encoding language should be motivated, and it is going to be part of the evaluation.
- Button and LED interactions with sensors must be used.

Project submission

Projects must be submitted via email to Francesca Righetti 4 days prior to the day of the exam. Students must deliver the **code** of the project (through a github repository or through a shared folder) and a **document describing the implementation and the use-case**. For the latter both a report or a detailed presentation are accepted.

Project discussion

The project discussion will take place the day of the exam, in person. The discussion, 10 minutes max, will consist on the demo of the execution of the application, showing all the implemented and required features (5-6 minutes), and on 4-5 minutes questions on the code.

Please note that if any clarification is required after the project delivery, you will be contacted for an online discussion in the days before the exam.

Project discussion - Exception

If requested, students with disabilities, international students or Erasmus students, can discuss the project online, in the days before the exam. In this case the project can be implemented using Cooja instead of real sensors. Cooja will also be exploited to perform the simulation during the online project discussion.