

Project I – Simulation & implementation of CoAP Protocol

2023-2024

An application developer aims to create a system that notifies the end-users of this application when a vehicle of type "Bus" enters a specific geographical area known as "Zone A" (it can be any city that you chose) as shown on the Figure 1 below which provides an overview of the system elements. The developer intends to implement a suitable communication architecture, specifically to ensure the interactions detailed in Table 1 using the CoAP (Constrained Application Protocol) protocol.

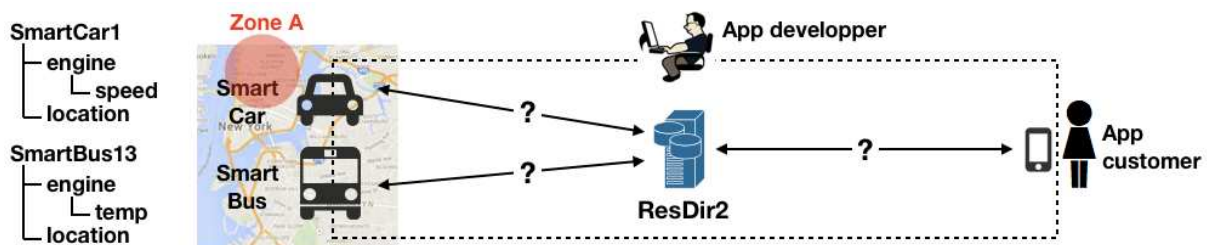


Figure 1 – System components designed by the Application developer

Table 1 – Interactions required to the creation of the application

Interaction step	Description
1	Connected vehicles register with a catalog of services (<i>Resource Directory</i>), which has the name ResDir2, when they enter the Zone A. the maximum age of the resource representation in ResDir2 is 10min.
2	The Application developed must subscribe to ResDir2 in order to receive notifications of any new vehicles entering Zone A.
3	If the vehicle in question is a "Bus", the application customer starts directly a subscription with the "Bus" in in order to receive notifications of the bus location (Figure 1 provides an overview of the overview of resources that can be subscribed to vehicles). Otherwise, the App does nothing.

1 CoAP - What to do

1.1 The server side

1. Implement a first CoAP server, using the python code in the moodle, for the resources related to the SmartCar1.
2. Implement another CoAP server for the resources related to the SmartBus13.

All the values of all resources must be stored in MongoDB database.

1.2 The end-user side

1. Create a function which simulate the location of the SmartCar1 & the SmartBus13 (doesn't need to be in the zone 13)

In this task, you must use Node-RED in order to create two user interfaces :

1. The first interface is used to show the location of the SmartCar1 & the SmartBus13 (doesn't need to be in the Zone A),
2. The second one is for the App customer's notification when the SmartCar1 & the SmartBus13 enter to the Zone A

- For the subscription part in Node-RED, you can use the protocol MQTT.
- Your solution must be explained with a file including all explications of your flows.
- after finishing the project, you compress the Node-RED flow file and the file in which you explain the solution, and you send them in ZIP format.
- Deadline : December, 11th

2 Bonus

Eclipse Ponte (**Ponte**) is a project that provides a framework for developing Internet of Things (IoT) applications. It focuses on enabling communication between IoT devices and applications over the MQTT protocol. It also supports bridging between different protocols, for example, it can bridge MQTT to HTTP, enabling devices that communicate over MQTT to interact with applications that use HTTP.

- Use Eclipse Ponte to bridge between CoAP protocol (the task above) and another protocol MQTT for example.

