UNIVERSITY OF BRESCIA

PhD Program
in
TECHNOLOGY FOR HEALTH

Study, development and implementation of a container-based system for applications supporting light mobility

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Background

Smart mobility is emerging, addressing heterogeneous scenarios with high impact on technology infrastructures, solutions, and people. Safety and availability are mandatory, forcing the design of new reliable services for localization, health monitoring of the user, maintenance of vehicle, and protection of the environment.

Objectives

This paper proposes a container-based microservice approach to the edge computing in IoT smart mobility scenarios. Since smart mobility backends must manage a large heterogeneity of applications, the proposed approach is promising with respect to the classical solutions (based on "monolithic hardware+software" devices), from the point of view of flexibility, upgradability, security, scalability, and reliability.

Methodologies

The proposed approach is divided into two steps:

1) the description of the containerisation architecture applied to the field of light mobility in a smart city environment, where object, service and people are connected. This phase can initially be carried out in a test environment, laptop for laboratory test and industrial-grade hardware for field test. Metrics such as latency, number of lost packets, number of faults occurring, consumption, and percentage of important event (e.g., person falls) detected will be defined in order to evaluate the developed architecture;

2) the optimization of the hardware platform to run containerized microservices in the light mobility vehicles.

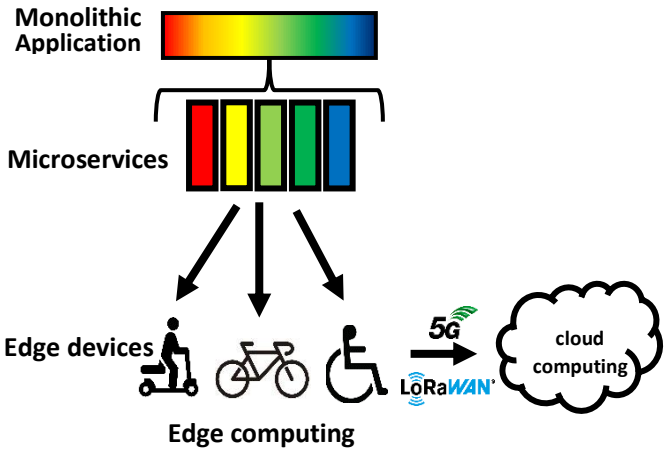

FIGURE 1. SHORT OVERVIEW OF THE RESEARCH PROJECT

Expected Results and Impact

The project includes different university and person that work on different topic. Using containerized architecture can bring a fastest and simple developing. One of the main aspects is inclusivity, these mobility services must be accessible to everyone guaranteeing safety of the users. A demo use case, based on industry-grade hardware and Docker, has been realized and multiple implementations of the same services have been executed in parallel, showing strong independence between them. Moreover, average delays of less than 10 ms are obtained, confirming the usability in several smart mobility (and smart city) applications.