

Simulating FaaS applications at the Edge

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Context of the internship: Serverless computing is an increasingly popular model for delivering cloud services [3]. Serverless isolates developers from the details of infrastructure management, allowing them to focus on the business logic of their applications. At the core of serverless is the Function-as-a-Service (FaaS) programming model. In this model, applications take the form of short-lived, event-triggered functions that incur costs only during function execution.

Applying the FaaS model to edge computing has recently received significant interest in research as well as industry [2]. Edge computing refers to taking advantage of computation-enabled devices located at the edge of network. By allocating resources only during function execution, FaaS promises reduced resource consumption, which is essential for the resource-constrained edge nodes. Software that can be deployed at the edge may include networking services, such as virtual network functions (VNF). The interest of applying FaaS to network function virtualization (NFV) has already been identified, and research results start to appear on how virtualized network infrastructures can leverage FaaS [4, 1].

A main challenge for researchers and practitioners seeking to apply the FaaS model to edge deployments is the shortage of simulation tools. Specifically, although there is a wide range of simulation tools targeting edge and fog scenarios [8], there are only a few tools focusing on the FaaS model [6, 7] and, in particular, on executing FaaS applications in edge environments [5].

Objectives: The aim of this internship is to explore tools for simulating FaaS applications deployed at the edge. The intern will first study the state-of-the-art in simulation frameworks for such environments. The intern will then select an existing framework and apply it to simulate the execution of an IoT application at the edge, potentially including serverless VNFs. The simulation will be validated using a real IoT application deployed on the Grid’5000 testbed. Finally, the intern will perform simulation experiments in order to evaluate the benefits of applying the serverless paradigm to a representative use case.

Skills: Good knowledge of distributed systems. Good programming skills (e.g., Java and

Python). Basic knowledge of simulation.

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