

“Meet-the-author” @ *LESS '23

Gabriele Russo Russo
University of Rome Tor Vergata, Italy

March 13th, 2023



TOR VERGATA
UNIVERSITY OF ROME

About me

Short bio

- ▶ 2021– PostDoc Researcher @ *University of Rome Tor Vergata*
- ▶ 2023– Research Collaborator @ *Roma Tre University*
- ▶ 2017–21 PhD in Computer Science
Thesis: “Model-based Auto-scaling of Distributed Data Stream Processing Applications”

Research interests

- ▶ Run-time adaptation of distributed systems
- ▶ QoS-aware scheduling and resource allocation

Research on FaaS Systems

- ▶ Interest in FaaS exploded over the last couple of years
- ▶ What about **FaaS out of Cloud data centers**?
 - ▶ Resource-constrained devices
 - ▶ Geographical distribution
 - ▶ State management
 - ▶ ...
- ▶ Can we provide **differentiated Quality-of-Service** to users?

Research on FaaS Systems

- ▶ Interest in FaaS exploded over the last couple of years
- ▶ What about **FaaS out of Cloud data centers**?
 - ▶ Resource-constrained devices
 - ▶ Geographical distribution
 - ▶ State management
 - ▶ ...
- ▶ Can we provide **differentiated Quality-of-Service** to users?

First step @ *LESS '22

Towards QoS-Aware Function Composition Scheduling in Apache OpenWhisk
G. Russo Russo, A. Milani, S. Iannucci, V. Cardellini @ *LESS '22

A new FaaS framework: why?

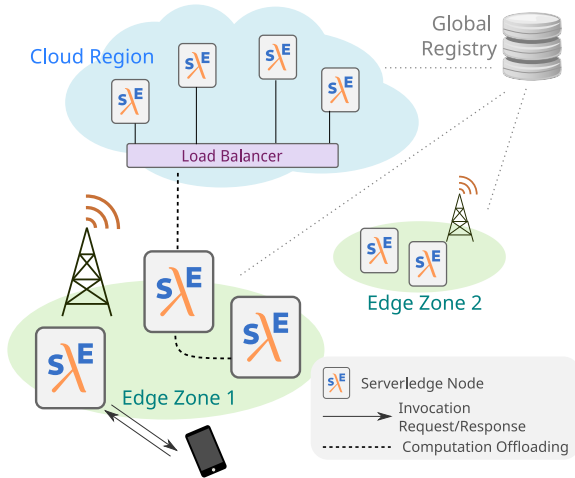
- ▶ Popular open-source frameworks do not suit well Edge environments
 - ▶ Centralized design (e.g., centralized gateway, scheduler, ...)
 - ▶ Resource-demanding deployments (databases, message queues, ...)
- ▶ ...and have little or no support for service differentiation

A new FaaS framework: why?

- ▶ Popular open-source frameworks do not suit well Edge environments
 - ▶ Centralized design (e.g., centralized gateway, scheduler, ...)
 - ▶ Resource-demanding deployments (databases, message queues, ...)
- ▶ ...and have little or no support for service differentiation
- ▶ Frameworks for the Edge have been proposed (e.g., [faasm](#), [Sledge](#), [tinyFaaS](#)), but none targets geo-distributed deployments
- ▶ Other solutions built as federations of existing frameworks

Serverledge

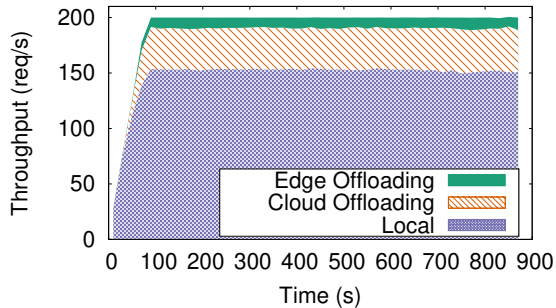
- ▶ FaaS framework designed for the Edge-Cloud Continuum
- ▶ Nodes organized into **Cloud regions** and **Edge zones**
- ▶ Vertical and horizontal offloading mechanisms
- ▶ Functions executed within Docker containers (**optimizations coming!**)



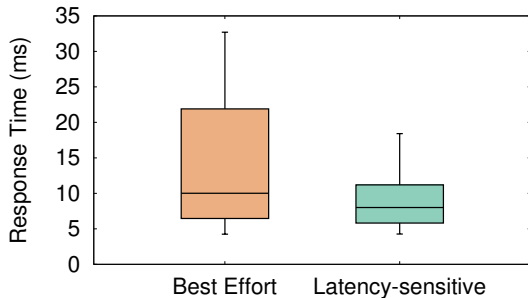
QoS-aware Offloading

Proof-of-concept policy with 2 classes of users

Served requests



Response time



- ▶ **Wednesday @ Session 4: Systems & Middleware:**
“Serverledge: Decentralized Function-as-a-Service for the Edge-Cloud Continuum”
- ▶ Source code: <https://github.com/grussorusso/serverledge>
- ▶ Various extensions already in progress, e.g.:
 - ▶ Live function migration
 - ▶ Energy-aware scheduling