

ICT PHD

Research project for a PhD curriculum in ICT – Computer Engineering and Science

Tutor:

Riccardo Lancellotti

Proposed Title of the research:

Management techniques for edge computing platforms

Keywords – (5)

Distributed Systems, Fog Computing, Edge Computing, Load Balancing, Optimization Problems

Research objectives: – (max 10 rows)

The research aims at proposing innovative techniques for the management of an Edge computing platform (often referred to as Fog computing). To this purpose, we consider a distributed scenario where a set of sources produce data that is to be processed by an intermediate layer of edge computing nodes before being forwarded to one or more Cloud computing data centers.

The research aims at tackling the problems of managing such infrastructure considering multiple aspects ranging from computing load to network characteristics and up to power efficiency.

Proposed research activity – (max 10 rows)

The research activity concerns two main aspects of the infrastructure management, characterized by different time granularity.

At a coarse-grained time scale we consider an optimization problem where sensors are connected to one or more edge computing nodes. To this aim, we consider mainly static or stationary (i.e. slowly changing scenarios). In the problem we need to combine the guarantees in terms of Quality of Service (taking into account processing time, impact of network delays) with other objectives such as the minimization of the overall power consumption.

At a fine-grained time scale we consider dynamic load balancing cooperative algorithms to distribute on-the-fly data across the platform. To this aim, we investigate algorithms to forward computing jobs to nearby edge nodes using a simulation-based approach to describe emerging global properties starting from simple local algorithms.

Supporting research projects (and Department)

This project will be carried out at the Department of Engineering “Enzo Ferrari” and will be supported by research funds provided by Prof. R. Lancellotti.

Possible connections with research groups, companies, universities.

The research may involve the ongoing collaborations with research groups at:

- Roma “Tor Vergata” (Prof. Chiaraviglio)
- Roma “Sapienza” (Prof. Beraldi)
- Unimore – DISMI (Prof. Iori)