



ESR Project title: Elastic allocation of edge computing resources in EH-MEC networks [ESR1]

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Institution: University of Padova, Italy

Application deadline: May 31, 2021

ESR Project Description:

MEC computation flows can be conveniently modelled through Directed Acyclic Graphs (DAGs); most current solutions allocate DAG computation flows across servers in a static manner, i.e., without performing load balancing on-the-fly, and without guaranteeing strict delay constraints. The project deals with the elastic allocations of computation graphs in Energy Harvesting (EH)-MEC networks. Goals are: (1) To develop centralized/distributed online, elastic and energy aware allocation algorithms for distributed computing processes in Energy Harvesting (EH)-MEC environments with unreliable communication links; (2) To develop prediction algorithms for mobility, energy and workload arrival processes; (3) To develop predictive and adaptive allocation techniques combining (1) and (2); (4) To test the algorithms in a simulation setup and in a testbed.

Expected Results:

(1) The developed distributed solutions should: converge to the offline optimal solution, be resilient to losses over the wireless links, reach fast convergence to allow their use in an online context, (2) As confirmed by our current research, the use of predictive algorithms is expected to allow a major performance boost over myopic schemes.

Supervision and Mobility Program:

Once hired, the candidate:

- will work at the University of Padova, performing full-time research under the supervision of Prof Michele Rossi.
- will be enrolled in the PhD program at the University of Padova, under the supervision of Prof Michele Rossi.
- will additionally pursue two secondments at Purdue University and Nokia Bell-Labs, Stuttgart, for a respective duration of 5 and 5 months.

Required, Preferred and Desired Prerequisites/Skills:¹

- **Required:** At the time of recruitment, the applicant must not have lived in Italy for more than 12 months in the previous 36 months (3 years).
- **Required:** No more than 4 years spent in research/work activities after the achievement of the MS degree.

¹ **Required**, means mandatory to pass the eligibility check. **Preferred**, means highly welcome and recommended. **Desired**, means additional, not strictly needed, but still very much appreciated.



- **Required:** A Master's degree in Telecommunications Engineering, Computer Science, Data Science or equivalent.
- **Preferred:** Very good communication skills in oral and written English.
- **Preferred:** Open-mindedness, strong integration skills and team spirit.
- **Preferred:** MS-level training in mathematics, probability and optimization theory.
- **Preferred:** MS-level training in modern machine learning techniques.
- **Preferred:** Strong programming skills (e.g., C/C++, Python, TensorFlow, Keras, PyTorch, SciKit, NumPy).
- **Desired:** Previous exposure on programming for embedded systems.
- **Desired:** Previous experience with system integration and prototyping (e.g., for MS level projects).

Additional requirements for this position

Required: a declaration that the obtained MS degree is equivalent to a five-year MS degree in the EU and that it grants access to the Doctoral (PhD) Study Program in the Country where it has been issued. This declaration will be mandatory if the applicant is selected and must be available by the starting date of the contract. Prospective applicants are encouraged to make the necessary arrangements to obtain it.