2018-00470 - Explaining faults in dynamic networks -
Post-Doctorant Inria Grenoble Research center

Contract type : Public service fixed-term contract  
Level of qualifications required : PhD or equivalent  
Fonction : Post-Doctoral Research Visit

About the research centre or Inria department

Grenoble Rhône-Alpes Research Center groups together a few less than 800 people in 35 research teams and 9 research support departments.

Staff is localized on 5 campuses in Grenoble and Lyon, in close collaboration with labs, research and higher education institutions in Grenoble and Lyon, but also with the economic players in these areas.

Present in the fields of software, high-performance computing, Internet of things, image and data, but also simulation in oceanography and biology, it participates at the best level of international scientific achievements and collaborations in both Europe and the rest of the world.

Context

The postdoc will be hosted by the SPADES team at INRIA Grenoble and collaborate with Gregor Goessler (INRIA Grenoble, SPADES team), Armen Aghasaryan (Nokia Bell Labs, Nozay), and Eric Fabre (INRIA Rennes, SUMO team).

The SPADES project-team aims at mastering the complexity and dependability of networked embedded computing systems.

Assignment

Explaining faults in dynamic networks

Networks such as IoT and virtualized telecommunication networks adapt to changes in the physical environment, component faults, or user requests, by dynamically reconfiguring their topology. In the case of failures, traditional root cause analysis and model-based diagnosis techniques fail short of the complexity of such networks: (1) they rely on a known, static model of the network; and (2) they are generally unable to distinguish alarms and component faults that crucially contributed to the failure from less pertinent ones, resulting in an overwhelming quantity of information presented to the operator. The goal of this project is to develop techniques for causal analysis of failures in programmable networks.

Objectives:

1) Propose a realistic failure scenario in an IoT or virtualized network, and model it in an appropriate formalism.

2) Study existing approaches to counterexample explanation and causal compression, and propose their extension to concurrent, possibly probabilistic models.

3) Investigate the application to dynamic networks by extending the approach with model discovery, learning, and/or construction from code.

4) Implement the proposed approach and apply it to the case study.

5) If time permits, study how to reuse or adapt existing techniques for distributed diagnosis for a decentralized construction of the explanation.

Informations supplémentaires:

https://team.inria.fr/spades

Main activities

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Skills
Candidates must have a PhD in computer science. Expertise in formal methods and basic knowledge in programmable networks are required.

Some knowledge on machine learning techniques will be appreciated.

Justification: The project requires competences in several domains (formal methods, programmable networks, machine learning) that the candidate has to acquire in order to tackle all aspects of the subject. In particular, the required work should combine a theoretical development and its implementation and application.

Benefits package
- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Flexible working hours
- Sports facilities

Remuneration
Gross salary: 2650 Euros per month