2018-00596 - Postdoctoral Researcher in computer science and engineering in security for the TeamPlay European project

Contract type: Public service fixed-term contract
Level of qualifications required: PhD or equivalent
Other valued qualifications: PhD or Eng.D. in computer science or software engineering
Fonction: Post-Doctoral Research Visit

About the research centre or Inria department
TAMIS (Threat Analysis and Mitigation for Information Security) project-team

Systems security requires both formal and engineering techniques to assess or even secure systems. Modern systems are networked, use virtual machines to improve security and handle multiple applications concurrently on the same hardware, which is often enhanced to with hardware security modules. The resulting complexity is typically far beyond what formal verification techniques can manage. On the other hand, merely applying engineering techniques to build secure systems has consistently resulted in deployments riddled with significant vulnerabilities.

TAMIS' central goal is thus to demonstrably narrow the gap between the vulnerabilities found using formal verification and the issues found using systems engineering. Type theory is a representative example where formal verification and software engineering are combined, as in type theory formal methods are used to formally prove the absence of certain classes of bugs. However, it is not the case that the entire system is shown to be formally correct with respect to a more comprehensive specification, which requires software engineering effort to handle classes of bugs not captured by the type system.

TAMIS thus aim at creating tool chains that combine statistical model checking, abstract interpretation, supervised execution and manual annotations to efficiently check interesting security properties of realistic systems that were previously not efficiently checkable.

TAMIS have established a strong connection with industry and with international teams recognized in this area, with numerous research contracts both with EU and industry.

Context
TeamPlay EU H2020 project (https://teamplay-h2020.eu/)

The work occurs in the context of the TeamPlay (Time, Energy and security Analysis for Multi/Many-core heterogeneous PLAtforms) research project that is funded from early 2018 till end 2020 by the European Union.

This project federates 6 academic and 5 industrial partners from 7 European countries and aims to develop new, formally-motivated, techniques that will allow execution time, energy usage, security, and other important non-functional properties of parallel software to be treated effectively, and as first-class citizens. We will build this into a toolbox for developing highly parallel software for low-energy systems, as required by the internet of things, cyber-physical systems etc. The TeamPlay approach will allow programs to reflect directly on their own time, energy consumption, security, etc., as well as enabling the developer to reason about both the functional and the non-functional properties of their software at the source code level.

Our success will ensure significant progress on a pressing problem of major industrial importance: how to effectively manage energy consumption for parallel systems while maintaining the right balance with other important software metrics, including time, security etc.

The project brings together leading industrial and academic experts in parallelism, energy modeling/ transparence, worst-case execution time analysis, non-functional property analysis, compilation, security, and task coordination. Results will be evaluated using industrial use cases taken from the computer vision, satellites, flying drones, medical and cyber security domains.

Within TeamPlay, Inria and TAMIS lead and coordinate the whole project, while being also in charge of the research aspects more specifically related to security.

Assignment
Under supervision of the scientists in charge and of the European TeamPlay project, in the TAMIS
team of Inria in Rennes, the postdoctoral researcher shall mainly contribute to the project technical lead and coordination, and to the research work pertaining to the nonfunctional property of security. She/he shall interact with the local senior and junior scientists and engineers working on TeamPlay at Inria, as well as with the other international partners in the project.

Main activities
Main: research and project management for security in TeamPlay, in the TAMIS team:
- Participate to the research on expressing, evaluating and guaranteeing the security and energy non-functional properties in programs
- Participate to the technical lead and coordination of the project by Inria
- Participate to the supervision of junior researchers and engineers at Inria
- Participate to the integration to the project toolchain of the models and tools developed at Inria
- Participate to the publication of Inria results in TeamPlay

Additional: participate to project demonstrations locally and abroad

Skills
Profile sought (expected competences and qualifications)

- PhD or Eng.D. in computer science or software engineering
- Software engineering and/or cybersecurity.
- Formal methods, modeling
- Taste for research
- Dynamism, willingness to take initiative
- Team spirit
- Ability to meet deadlines and have them met
- Good writing skills
- Good level in written and spoken English

Benefits package
Work conditions:
- Salary based on experience, full benefits
- Subsidized cafeteria in the premises, subsidized meals outside
- Social committee subsidizing various activities
- Public transportation (subsidized 50%) 400m from the premises
- Large free parking lots around the premises

Work location:
Research Center Inria Rennes - Bretagne Atlantique
Campus universitaire de Beaulieu. Rennes. France