2018-00650 - PhD position on Rule Format for Formal Semantics

Level of qualifications required: Graduate degree or equivalent
Fonction: PhD Position

About the research centre or Inria department
Inria, the French National Institute for computer science and applied mathematics, promotes “scientific excellence for technology transfer and society”. Graduates from the world’s top universities, Inria’s 2,700 employees rise to the challenges of digital sciences. With its open, agile model, Inria is able to explore original approaches with its partners in industry and academia and provide an efficient response to the multidisciplinary and application challenges of the digital transformation. Inria is the source of many innovations that add value and create jobs.

Context
The CISC “Certification of IoT Secure Compilation” project, which is funded by ANR, the French National Research Agency, aims to investigate multitier languages and compilers to build secure IoT applications with privacy guarantees. The goal of the project is to define language, semantics, attacker models, and policies for the IoT and investigate the automatic implementation of privacy and security policies. The consortium includes 10 researchers and professors from all over France. This job description concerns one of the open positions within this project.

Assignment
Our previous work on the systematic derivation of correct abstract semantics from concrete ones (https://hal.inria.fr/hal-01111588) has shown that describing the semantics of a programming language in a rigid format simplifies the development of formal tools. In parallel, we have been working on the formal semantics of real languages, in particular JavaScript (http://jscert.org/), and we are currently developing a tool to help the standardization process (https://github.com/jscert/jsexplain).

One goal of the CISC project is to develop a formal semantics for Hop.js (http://hop.inria.fr/home/index.html) and use it to certify analyses of Hop.js program. To achieve this goal, we need to design an approach that scales to large and complex programming languages.

Main activities
The main activities during the PhD will be:
- the definition of a rule format to formalize the semantics of languages in the Coq proof assistant;
- the development of tools to extract certified interpretations of semantics (interpreter, abstract semantics, flow-sensitive analyzers);
- the applications to real programming languages, in particular Hop.js.

Skills
Technical skills and level required: knowledge of formal methods, proof assistants, and programming language semantics

Languages: English

Benefits package
- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave

General Information
- Theme/Domain: Proofs and Verification
  Software engineering (BAP E)
- Town/city: Rennes
- Inria Center: CRI Rennes - Bretagne Atlantique
- Starting date: 2018-10-01
- Duration of contract: 3 years
- Deadline to apply: 2018-05-04

Contacts
- Inria Team: CELTIQUE
- Recruiter: Schmitt Alan / alan.schmitt@inria.fr

The keys to success
We seek candidates with a solid background in the formal semantics of programming languages. Experience with the Coq proof assistant is not required but is a plus.

Conditions for application
Please submit online: your resume, cover letter and letters of recommendation.

For further information, please contact Alan Schmitt: alan.schmitt@inria.fr

Defence Security:
This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy:
As part of its diversity policy, all Inria positions are accessible to people with disabilities.

Warning: you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not
Remuneration
Monthly gross salary amounting to 1982 euros for the first and second years and 2085 euros for the third year.