Standard server protocols for letting Frama-C interact with IDEs

Keywords: Frama-C, Server, Communication protocols, Program analysis

Institution

The French Alternative Energies and Atomic Energy Commission (CEA) is a key player in research, development, and innovation. Drawing on the widely acknowledged expertise gained by its 16,000 staff spanned over 9 research centers with a budget of 4.1 billion Euros, CEA actively participates in more than 400 European collaborative projects with a large number of academic (notably as a member of Paris-Saclay University) and industrial partners. Within the CEA Technological Research Division, the CEA List institute addresses the challenges coming from smart digital systems.

Among other activities, CEA List's Software Safety and Security Laboratory (LSL) research teams design and implement automated analysis in order to make software systems more trustworthy, to exhaustively detect their vulnerabilities, to guarantee conformity to their specifications, and to accelerate their certification. In particular, the Frama-C platform is dedicated to perform a wide range of analyses over C programs (with an experimental C++ front-end).

Objectives

Frama-C offers a wide set of analysis tools, that can be combined with each others in very flexible ways in order to achieve results that would be out of reach for a single analysis technique. Moreover Frama-C is often used in the context of critical software development (in aeronautics, railways, nuclear industry, ...), where regulations impose very stringent code verification objectives, and integrated as part of a broader validation process.

It is thus important that Frama-C provides its users with powerful interfaces that let them retrieve the analysis results, or even to parametrize the framework to their exact needs. Moreover, since Frama-C needs to interoperate with other systems, such interfaces must follow standard communication protocols.

In this setting, the standards LSP (Language Server Protocols) and HTTP look like interesting targets. Both communication protocols are common and largely used. If HTTP powers the World Wide Web, LSP is becoming the most used standard to let development tools communicate to language, or analysis, specific services.

A plug-in implementing a LSP server has been developed during an internship in 2021. The aim of the present proposal is to build upon these foundations to provide more advanced interactions with Frama-C by extending the set of requests understood by the server. Notably, the Debug Adapter Protocol would be a powerful tool to interact with Frama-C's Eva plug-in based on abstract interpretation. Similarly, extensions to LSP proposed in the Specification Language Server Protocol would benefit the WP for deductive verification. Depending on the interests of the candidate, one of these tracks may be privileged.

Qualifications

- **Minimal**
- master 2 student in Computer Science
- knowledge of OCaml
- notions of communication protocols
- ability to work in a team
- **Preferred**
- familiarity with the Frama-C platform
- familiarity with LSP or/and HTTP protocols
- some knowledge in C

Characteristics

- **Duration:** 6 months from early 2022
- **Location:** CEA Nano-INNOV, Paris-Saclay Campus, France
- **Compensation:**
  - €700 to €1300 monthly stipend (determined by CEA compensation grids)
  - maximum €229 housing and travel expense monthly allowance (in case a relocation is needed)
  - CEA buses in Paris region and 75% refund of transit pass
  - subsidized lunches

Application

If you are interested in this internship, please send to the contact persons an application containing:

- your resume;
- a cover letter indicating how your curriculum and experience match the qualifications expected and how you would plan to contribute to the project;
- your bachelor and master 1 transcripts;
- the contact details of two persons (at least one academic) who can be contacted to provide references.

Applications are welcomed until the position is filled. Please note that the administrative processing may take up to 3 months.

Contact persons

For further information or details about the internship before applying, please contact:

- Virgile Prevosto (virgile.prevosto@cea.fr)
- Michele Alberti (michele.alberti@cea.fr)