Internship Naomod 2021

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Title

Unifying Model Execution Facilities for Heterogeneous Metaprogramming Approaches

Description

Scope

A major challenge in software and systems engineering is the development of ever more complex systems, such as cyber-physical systems or new modern production systems. A key technique to cope with this increase of complexity is the engineering of domain-specific modeling languages (DSMLs) to provide abstractions adapted to each application domain and directly usable by domain experts. A main research challenge in software language engineering (SLE) is to reduce the costs of creating such new languages, and the costs of creating the tools required to use these languages (editors, executors, debuggers, etc.).

Today, this challenge faces two major obstacles: on the one hand the great diversity among DSMLs (syntaxes, semantics, paradigms, application domains, etc.), on the other hand the great diversity in how to create a DSMLs (metalanguages, semantic domains, etc.). In this context, an interesting idea is to favor the creation of *generic* tools compatible with a large number of DSMLs, thus making it possible to factorize the tooling efforts significantly. But such an idea requires a good understanding of not only what makes up a DSML, but also what makes up an approach to creating and using a DSML.

In this context, the scope of this internship is to study one specific category of tools: tools required to manage the *execution* of a model conforming to an executable DSML. In particular, we are interested in the following question: how can the same model execution framework can properly deal with a diversity of DSMLs and metaprogramming approaches?

Goals

This internship aims to improve the existing model execution framework of the GEMOC Studio, a research platform in language engineering and an official project of the Eclipse foundation, in order to deal with various metaprogramming approaches in a more generic fashion. More precisely, the goal is to provide a unique interface for executing models in the GEMOC Studio, while remaining independent of the metaprogramming approach used to define the DSML used for the execution.

The internship will first require to read and learn from a set of books and research papers about Model Driven Engineeing (MDE) and Software Language Engineering (SLE). In parallel, a training will take place on how to use and develop the GEMOC Studio.

Then, the work will consist in understanding the existing code of the GEMOC Studio Execution Framework, and to propose design and implementation changes to unify both the model execution

process and the facilities offered to other tools (debugger, tracer, etc.). **This internship will therefore include an important part of software design and development** using Eclipse technologies.

If relevant, we do not exclude summarizing the results if this internship into a small reasearch paper, which could be submitted to an international workshop.

Profile

The candidate should preferably be interested in science and research, be curious, enjoy reading and writing, and enjoy programming and experimenting.

The proposed work will be facilitated by a good level in Java development, and knowledge of model-driven engineering, metamodeling, language engineering, and some associated Eclipse technologies (EMF, Ecore, Xtext, GEMOC Studio).

This job is very suitable for someone who loves programming, loves to design software and software architectures!

The internship will take place in the premises of the LS2N Laboratory. The intern will be able to choose to work either on the Lombarderie campus (building 34), or on the IMT Atlantique campus, or both.

Contact

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