Universität Stuttgart
Institut für Steuerungstechnik
der Werkzeugmaschinen und
Fertigungseinrichtungen

master thesis

to assign

Development of a Systematic Software Language Engineering Method

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Background

In model-driven software development models are considered as the central development model development model to bridge the gap between the domain-specific problem area and the technical, solution space, which is only comprehensible to software experts. Space, which can only be understood by software experts. For the description of a domain, domain-specific languages (DSLs) are used to describe a domain. Engineering DSLs is a complex endeavor due the different stakeholders and artifacts involved. Yet a systematic, general method for engineering DSLs is missing.

Challenge

Hitherto[1], we have conducted first efforts to develop such a method for DSLs developed within the Meta Attack Language (MAL) framework. MAL provides a framework to create domain-specific languages that express probabilistic attack graphs. The MAL provides a formalism that allows the semi-automated generation as well as the efficient computation of very large attack graphs. So far, different instantiations of MAL have been proposed like vehicleLang for the automotive domain or AWSlang for Amazon Webservices. The next step, which will be addressed by this thesis, is to generalize the outcomes of our previous work by considering a broader range of DSL not solely focusing on threat modeling.

Tasks

- Identify relevant terminology about DSL engineering approaches
- Conduct a systematic literature study using state-of-the-art natural language processing (NLP) techniques based on this terminology
- Analyze the different approaches found with
- Synthesize a general method for engineering DSLs

Requirements

- Ongoing studies in computer science, information systems, software engineering, or similar.
- Independent working
- Fluency in English
- Background in model-driven software engineering

Knowledge gain

- State-of-art in methods in software language engineering
- Systematic analysis of scientific literature
- Experience in applying natural language processing
- Independent scientific research and publishing
- The thesis will be conducted under collaborative supervision of Andreas Wortmann (University of Stuttgart) and Simon Hacks (Stockholm University) and will thus allow to gain experience in an international environment and may include a visit to the other group.

1 Hacks, S., Katsikeas, S., Rencelj Ling, E., Xiong, W., Pfeiffer, J., & Wortmann, A. (2022). Towards a Systematic Method for Developing Meta Attack Language Instances. In International Conference on Business Process Modeling, Development and Support, International Conference on Evaluation and Modeling Methods for Systems Analysis and Development (pp. 139-154). Springer, Cham