

Refactoring

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type	60ECTS
study program	Informatics: Programming and System Architecture
planned date of completion	May 2023

Short description

The task is to implement and research refactoring for the ABS programming language [3].

Background and motivation

Refactoring is the process of changing a software system in such a way that it preserves the external behavior of the code, but also improves its internal structure. [2]

The thesis will be based around implementing refactoring support and researching refactorings for the ABS programming language. We want to offer users of ABS more refactorings and a satisfactory method to apply them. To do this we will build upon an existing Xtext_[1] grammar and work with the LSP protocol_[5]. A proposal to extend the LSP protocol might be made if it aligns with the thesis. The temporary thesis statement and research questions will be:

- How should refactoring be implemented for ABS?
- Which refactorings can we safely implement for ABS?
- Is the resulting approach generalizable to other programming languages?

Methodology

The thesis will consist of both theoretical and practical work. The theoretical work will consist of reading relevant research, formalizing refactorings, and argue their correctness. The practical work will consist of implementing software which will provide these refactorings. That will be a process of specifying requirements for the software, implementing the software and then evaluating it.

Progress plan

Autumn 2021

- Deliver the project plan and read relevant curriculum and papers

Spring 2022

- Read relevant papers
- Connect previously developed refactorings from Erlend Kristiansen's master thesis_[4] with ABS, using LSP
- Narrow down the scope of the thesis based on the result of this implementation
- Formulate a thesis for and write essay

Autumn 2022

- Analyze LSP and determine if the protocol is sufficient for refactoring
- Propose alternatives/extensions to the LSP protocol
- Implement refactorings for ABS

Spring 2023

- Evaluate refactorings and/or alternative LSP proposal
- Finish master thesis

References

- [1] Eclipse. *Xtext*. <https://www.eclipse.org/Xtext/>. 2021.
- [2] M. Fowler. *Refactoring: Improving the Design of Existing Code*. Boston, MA, USA: Addison-Wesley, 1999.
- [3] E. B. Johnsen et al. “ABS: A Core Language for Abstract Behavioral Specification”. In: *Formal Methods for Components and Objects - 9th International Symposium, FMCO 2010, Graz, Austria, November 29 - December 1, 2010. Revised Papers*. Ed. by B. K. Aichernig, F. S. de Boer, and M. M. Bonsangue. Vol. 6957. Lecture Notes in Computer Science. Springer, 2010, pp. 142–164.
- [4] E. Kristiansen and V. Stolz. “Search-based composed refactorings”. In: *27th Norsk Informatikkonferanse, NIK 2014, Høgskolen i Østfold, Fredrikstad, Norway, November 17-19, 2014*. Bibsys Open Journal Systems, Norway, 2014.
- [5] Microsoft. *Language Server Protocol*. <https://microsoft.github.io/language-server-protocol/>. 2020.