



# Master Thesis

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Highly-Configurable Software Systems enable the development of a set of related variants by using variability implementation mechanisms such as plug-ins, frameworks, module systems, or annotations. A prominent example for annotations is the C preprocessor CPP, frequently used in the C programming language. While it allows for a flexible customization of the final software system (by excluding/including code fragments for compilation), the potential number of variants makes it impossible to analyze each variant separately. Instead, variability-aware analyses have been proposed to analyze whole system, including the CPP. In this thesis, the task is to implement a

## Lightweight, Variability-Aware Change Impact Analysis

Change Impact Analysis (CIA) has been proposed as a powerful mean to identify the impact of source code changes, i.e., which part of a software system may be influenced by changes. To this end, data- and control-flow dependencies are employed. For variable software systems, such a technique has to take variability (in terms of features) into account, to answer questions such as “Which feature(s) are impacted by a change to feature X”? So far, no solution exists for common variability mechanisms such as the C preprocessor. In this MSc. thesis, the task is to implement a lightweight CIA based on the tool srcml, which provides an abstract program representation by means of XML annotations. Based on this representation, the necessary information should be extracted and used for computing a set of impacted statements, given a particular change. The technique should be evaluated using mid- and large-scale open source systems..

### Main Tasks:

- Concept for CIA, including envisioned workflow and tools to be used
- Implementation of variability-aware CIA for the C preprocessor
- A critical evaluation of the implemented technique

### Requirements:

- good programming skills
- quick grasp of subject matter, strong work ethic, work on you on initiative (with guidance by the supervisor)
- background in programming or program analysis is a plus, but not required (can be obtained during MSc thesis)