

Master Project

Practical Runtime Universe Type Inference

Marco Bär

Introduction The Universe type system provides means to structure the heap memory into so-called Universes. This structuring makes it easier to reason about object structures on the heap and program invariants, by assigning all references an additional Universe type. These additional types specify the access rights of the holder of such a reference.

In a recent Master Thesis [1], Frank Lyner developed a tool that annotates normal Java programs automatically with Universe types. This is done by observing the program execution using a tracing tool. However, the annotation of arrays and local variables were out of the scope of that project, making it hard to use for regular programs.

The goal of this master project is to extend the existing tool such that it can be practically used to annotate regular Java programs. There should be no limitations on the input program and the resulting annotations should be the most useful ones possible.

The main parts of this project are:

1. Extension of the existing tool by static methods and arrays. An approach to this problem was presented by Lyner[1] and needs to be implemented.
2. Annotation of method bodies: Development of a concept for method body annotation and its implementation.

The successful completion of these parts will let the tool produce compilable Universe type annotated source code.

The project will then be extended by determining test cases inferring optimal, e.g. most meaningful, annotations of the source code.

Literatur

- [1] Frank Lyner. Runtime universe type inference. Master's thesis, ETH Zurich, 2005.