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Inference of Universe Type Annotations

Introduction

The Universe type system was developed for aliasing control and is applied as a extension of the Java programming language. Aliasing control is a requirement for modular verification; if the behavior of a program is examined without its context. Universe Annotations were integrated in JML. For a better usage of the advantages of the Universe type system one should have the possibility to annotate automatically.

Goal

Within the scope of this master thesis the JML compiler is used to extract all the type relations of the syntax tree which are saved in a separate file as constraints. A Prolog program gets all possible solutions to annotate a program with the Universe type system considering these constraints. In doing so there could occure conflicts which require a downcast to a write reference. The Prolog program gets lots of solutions which have to be minimized by the appliance of several heuristics. The programmer can choose one solution which will be inserted in the program he wrote.

Tasks

- *Become acquainted* with the Universe type annotations and JML
- Usage of the JML compiler to extract *constraints* of the syntax tree
- Design of a *Prolog program* which gets all possible solutions of Universe annotations
- Determination of *heuristics*, which minimize the number of solutions
- *Implementation* of a program which inserts one possible solution in the original Java code
- Building a *modular architecture*: constraints generator, solver (with heuristics) and annotater

Simplifications

- Apply only to a sublanguage of Java
- Omit the insertion of the annotations

Potential Extensions

- No Simplifications
- Usage of downcasts for the solutions

Remarks

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