Karlsruhe Institute of Technology

Institute for Program Structures
and Data Organization (IPD)

Gradual Verification and maybe something about implicit dynamic frames

Master's Thesis of

Johannes Bader

at the Department of Informatics
Institute for Program Structures and Data Organization (IPD)

Reviewer: Prof. Dr.-Ing. Gregor Snelting, Karlsruhe Institute of Technology - Karlsruhe, Germany

Advisors: Assoc. Prof. Jonathan Aldrich, Carnegie Mellon University - Pittsburgh, USA
Assoc. Prof. Éric Tanter, University of Chile - Santiago, Chile

Duration: 2016-05-10 – 2016-09-28

I declare that I have developed and written the enclosed thesis completely by myself, and have not used sources or means without declaration in the text, and have followed the rules of the KIT for upholding good scientific practice.

Karlsruhe, 2016-09-??

.....

(**Johannes Bader**)

Abstract

Formal verification using Hoare logic is a powerful tool to prove properties of imperative computer programs.
However, in practice programmers often face situations ... rigid... not flexible... - incomplete information about parts of the program - laziness, forced to annotate everything - unable to express due to limited syntax - unable to prove something facing undecidability
To counteract these limitations we introduce the notion of gradual formulas with an unknown part "?".
The main contribution of this work is presenting a gradual verification logic that covers the full range between completely unannotated programs and fully annotated programs. We prove the soundness of this logic and ... Siek et al. (2015).

Acknowledgments

I wish to thank my advisors Jonathan Aldrich and Éric Tanter for offering me this topic and for their patient assistance throughout the past few months. In any situation and every way, their remarks and thoughts guided me in the right direction.

Also I am very grateful to all my family and friends who encouraged and supported me throughout my life.

Contents

1 Introduction

1.1 Motivation

1.2 Goal

1.3 Related Work

2 Language and syntax

2.1 Syntax

3 Conclusion

3.1 Evaluation

3.1.1 Limitations

3.2 Future Work

4 Appendix

Bibliography