

# A syntax-based proof of Deutsch-Schorr-Waite algorithm

semester project  
Ronny Zakhejm

Supervised by Bernd Schoeller  
Chair of Software Engineering  
ETH Zürich

## Abstract

Goal of this semester project is to proof the correctness of the Deutsch-Schorr-Waite graph marking algorithm with a syntax-based method, i.e. the proof will be done with a hoare style logic based on path properties.

*The Schorr-Waite algorithm is the first mountain that any formalism for pointer aliasing should climb*

--- Richard Bornat

## Project plan

Project start: 29<sup>th</sup> Mar '05

Project end: 1<sup>st</sup> July '05

## Schedule

- first month: getting into the topic by learning the path properties paper [1] and by reading some papers dealing with the correctness proof of the Deutsch-Schorr-Waite algorithm (references see later)
- second month: doing the work, i.e. proving the Deutsch-Schorr-Waite algorithm using path properties
- third month: writing the semester project report

## References

- [1] Bernd Schoeller. Path Properties: Reasoning about Pointer Structures on Object-Oriented Programs. 2004
- [2] Jean-Raymond Abrial. Event based sequential program development: Application to constructing a pointer program. In K.Araki, S. Gnesi, and D. Mandrioli, editors, FME 2003, LNCS 2805, pages 51–74, 2003.

- [3] Hubert and Marché: A case study of C source code verification: the Schorr-Waite algorithm
- [4] Farhad Mehta and Tobias Nipkow. Proving pointer programs in higher-order logic. In F. Baader, editor, Automated Deduction — CADE-19, volume 2741, pages 121–135, 2003.
- [5] John C. Reynolds. Separation logic: A logic for shared mutable data structures. In Proceedings of the 17th Annual IEEE Symposium on Logic in Computer Science, July 2002.
- [6] Joseph M. Morris. A general axiom of assignment. In M. Broy and G. Schmidt, editors, Theoretical Foundations of Programming Methodology, (Lecture Notes International Summer School, Markoberdorf), pages 25–34. Reidel, Dordrecht, Netherlands, 1982.
- [7] C.A.R. Hoare. An axiomatic basis for computer programming. Communications of the ACM, pages 576–583, October 1969.
- [8] H. Schorr and W. M. Waite. An efficient machine-independent procedure for garbage collection in various list structures. Commun. ACM, 10:501-506, 1967.