

# **New Foundations for Separation Logic** Hiep, H.A.

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## Stellingen

### behorende bij het proefschrift

## New Foundations for Separation Logic

- 1. An alias analysis separates 'separation logic' from 'Reynolds' logic'. (Chapter 1)
- 2. There is no sound and complete finitary proof system for standard separation logic, nor for full separation logic, nor for the fragment of separation logic light. (Chapter 2)
- 3. A sound and complete finitary proof system exists for the firstorder definable heap interpretation of separation logic, and also for extended separation logic comprising structures satisfying a semantic comprehension condition. (Chapter 3)
- 4. Reynolds' logic is also sound and relatively complete in a general semantics with infinite heaps, and via dynamic separation logic one obtains alternative axiomatizations of Reynolds' logic that satisfy gracefulness. (Chapter 4)
- 5. Second-order arithmetic is sufficient for computer science.
- 6. Separation logic lies between first-order and second-order logic, but it is an open problem whether full separation logic and second-order logic are equally expressive.
- 7. Diagonalization and self-reference are essential in undecidability.
- 8. Not only programs could contain bugs, but also specifications.
- 9. Some propositions are trivial since they follow from the definitions.
- 10. As a scientist, one enjoys being right—but also becoming wrong.

Hans-Dieter Anton Hiep Leiden, 23 mei 2024