

# Walking Through My Thesis

## Necessary Liberal Preconditions: A Proof System

Anran Wang

Department of Informatics  
Technical University of Munich

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# Agenda

1 Thesis Structure

2 Contribution

3 Current TODOs

*Link to repository:*

<https://github.com/AnranW/wlp/blob/main/thesis/main-anran-ma.pdf>

# Overview: 3 Parts, 30 Pages, N Images

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Currently divided into three parts:

**Part I** Definitions, explanations, illustrations.

**Part II** Proposals, proofs, examples.

**Part III** Tables, figures, acronyms.

# Part I: Hoare Triples, Weakest Preconditions, Weakest Liberal Preconditions

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## Chapter 1: Background

- Convince that proof systems are important
- Show the structure of the thesis

## Chapter 2: Preliminaries

- Table of Notations
- Definitions of Hoare Triples, GCL, wp, wlp, sp
  - Explain the use of lfp and gfp
- Soundness: semantics of wp, wlp, sp
- Properties of wp and wlp that will be used in part II

# Part II: Necessary Liberal Preconditions

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## Chapter 3: A Proof System

- Literature review: the similar triples that have been studied
- Studying a special  $G$  such that  $wlp.C.F \implies G$ : establish wlp with angelic non-determinism using  $G$  and  $sp$ .
- Studying  $G$  in general: proving things negatively

## Chapter 4: Conclusion

- Conclusion
- Future work

# Part III: Appendix

## III APPENDIX

### A SYMBOLS AND ACRONYMS

### B GRAPHICAL ILLUSTRATION OF PREDICATE TRANSFORMERS

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- Symbols and Acronyms
- Graphical illustration of predicate transformers (all combinations)

# Contribution of My Thesis

- (Re-)Explanation of the use of least and greatest fixed points while defining predicate transformers, might be of pedagogic value.
- Establish wlp in angelic setting using  $wlp_d$  and  $sp$ , which might shed light on angelic and demonic views on non-determinism.
- A proof system that proves programs when negation is hard or impossible.

# Current TODOs

Tons of refining and correcting, plus:

(Code: 🤔-happy for now, 🌕-halfway there, 🌑-to be continued)

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*Thank you!*