AAA528: Computational Logic

Lecture 0 — Course Overview

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Basic Information

Instructor: Hakjoo Oh

- **Position:** Associate professor in CS, Korea University
- **Expertise:** Software Analysis, Programming Languages
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- **Office Hours:** by appointment

About This Course

- *Computational logic*
  - Logic for reasoning about program behavior
  - Why study logic?
    - ★ Logic is the mathematical basis of software
    - ★ Just as calculus is the basis of science and engineering
    - ★ Used for designing, implementing, and verifying software
- *Program verification*
  - Techniques for proving that programs meet their specifications

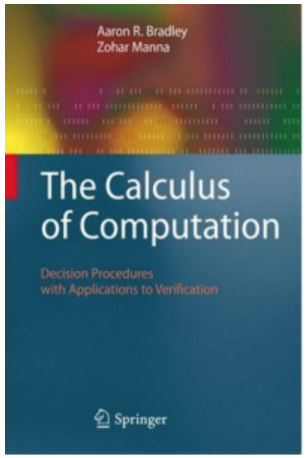
Topics

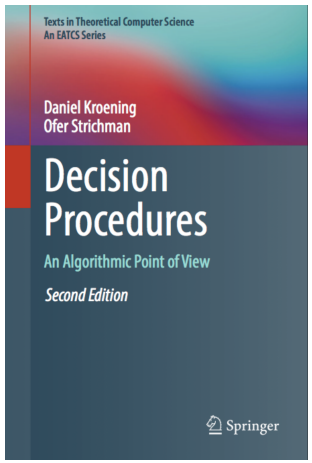
Computational logic and its application to program verification.

- Propositional logic
- First-order logic
- First-order theories
- Program verification

Course Materials

- Aaron R. Bradley and Zohar Manna. The Calculus of Computation. Springer
- Daniel Kroening and Ofer Strichman. Decision Procedures. Springer





- Materials from related courses:
  - Computer-Aided Reasoning for Software. Univ. of Washington
    `https://courses.cs.washington.edu/courses/cse507/17wi/`
  - Automated Logical Reasoning. Univ. of Texas at Austin
    `http://www.cs.utexas.edu/~isil/cs389L/`

Schedule (tentative)

Weeks	Topics
Week 1	Introduction & Propositional Logic (Chap. 1)
Week 2	Propositional Logic (Chap. 1)
Week 3	SAT Solvers & Conflict-driven clause learning
Week 4	First-order Logic (Chap. 2)
Week 5	First-order theories (Chap. 3)
Week 6	SMT Solvers & Theory propagation
Week 7	Program verification (Chap. 5, 6)
Week 8	Program verification (Chap. 5, 6)

Grading (tentative)

- Assignments – 60%
  - 3–4 programming assignments
- Quiz – 20%
  - First quiz: 3/8(Wed) 15:30 – 17:30 (online/blackboard submission)
- Attendance – 20%