

# Joshua Clune

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## EDUCATION

### Pursuing PhD in Computer Science, Carnegie Mellon University

Advisor: Professor Jeremy Avigad

Sep 2021-Present

### B.S. in Computer Science, Carnegie Mellon University

Computer Science major, Philosophy additional major (GPA: 3.86/4)

Sep 2017-May 2021

## RESEARCH

### A Formalized Reduction of Keller's Conjecture

Advisor: Jeremy Avigad (CMU)

Sep 2021-Present

- Formalizing the connection between Keller graphs and Keller's original conjecture on cube tilings in Lean

### A Polymorphic Logical Framework

Advisor: Karl Crary (CMU)

Sep 2020-Jul 2021

- Worked on developing an extension to the LF logical framework that includes polymorphic types
- Main goals included proving identity expansion and cut elimination

### Program Equivalence for Assisted Grading of Functional Programs

Advisors: Umut Acar (CMU) and Ruben Martins (CMU)

May 2019-Nov 2020

- Developed a technique for checking for equivalence between purely functional programs
- Implemented the technique for use on thousands of Standard ML programming submissions from an introductory functional programming course
- Proved the soundness of the technique so that if the technique identifies two programs as equivalent, it is necessarily the case that the two programs exhibit identical behavior

## WORK EXPERIENCE

### Teaching Assistant

Carnegie Mellon University

Aug-Dec 2018 and 2019

Served as a teaching assistant for the class Mathematical Foundations for Computer Science

- Prepared lessons for and lead recitations twice a week
- Created and gave two extracurricular lectures for students interested in tangential material
- Participated in the creation and grading of homework and exam problems
- Held weekly office hours and met students individually to provide additional tutoring

### Software Engineering Intern

Bloomberg L.P.

Sep 2016-Aug 2017, Jun-Aug 2018

Personally lead and completed the following development projects for the Bloomberg Terminal:

- Created a Terminal function to help sales representatives monitor how effectively their customers engaged in various workflows, both at the aggregate level to discover widespread trends and the individual level for closer monitoring

- Created a Terminal function to display specific Terminal user information while simultaneously running internal checks to ascertain the consistency of the displayed data

#### General Coding Intern

Readorium

June 2016-Aug 2016

Worked with a team of interns to complete various development projects:

- Migrated Readorium's main product from Flash to HTML5
- Developed a system of recording user transactions that can be used both to identify bugs and to determine whether a user improperly bypassed certain security features. I personally served as the lead developer for this system

#### **PUBLICATIONS/AWARDS**

- Joshua Clune, Vijay Ramamurthy, Ruben Martins, and Umut A. Acar. 2020. Program Equivalence for Assisted Grading of Functional Programs. Proc. ACM Program. Lang. 4, OOPSLA, Article 171 (November 2020), 29 pages. <https://doi.org/10.1145/3428239>
- Received Honorable Mention for 2021 CRA Outstanding Undergraduate Researcher Award