

# Kelton OBrien

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## Education

**University Of Minnesota, Twin Cities** *GPA:3.95/4.00 TGPA:3.92/4.00* Fall 2019-Spring 2024

- Seeking a Computer Science B.S, a Linguistics B.S, a Philosophy B.A, and a Mathematics B.A.
- Attended the U of M full time throughout my senior year of high school through the PSEO program.
- Notable Coursework: Programming Languages, Dependent Type Theory, Algorithms and Data Structures, Formal Languages and Automata Theory, Honors Topology, and Functional Algorithm Design with Haskell

**Minneapolis College** *GPA:4.00/4.00 TGPA:4.00/4.00* Fall 2018-Spring 2019

- Attended MC full time as a non-degree seeking student during my junior year of high school through the PSEO program.

## Experience

### Minnesota Extensible Language Tools (MELT) research group

Minneapolis, Minneapolis

November 2020-Present *Undergraduate Researcher*

- I worked working on adding counterexamples for ambiguous or non-LALR grammars to the copper parser generator.
- I currently work on the silver attribute grammar programming language. I am currently adding support for polymorphic concrete syntax.

### Microsoft Research

Redmond, Washington

May 2023-August 2023 *Research Intern*

- I worked on TLA<sup>+</sup>, a temporal logic based specification and verification language, adding support for the verification of statistical properties.
- For this, I created a modal logic formalism for a probabilistic, bounded linear temporal logic (PBLTL), improved the statistical verification algorithms from prior work, and wrote a transpiler in from a probabilistic linear temporal logic to TLA<sup>+</sup>. I am working with MSR currently on a publication based on this work.

### CMU Program Analysis, Software Testing, and Applications (PASTA) research group

Pittsburgh, Pennsylvania

May 2022-August 2022 *Undergraduate Researcher*

- I worked on optimizing Mu2, a JVM Mutation-Testing based fuzzer.
- Mu2 is a fuzzer based on JQF+Zest that uses mutation score as well as code coverage to generate better sample inputs for test suites. The paper associated with the project received a distinguished paper award at ISSTA 2023.

### University of Minnesota Twin Cities Computer Science and Engineering Department

Minneapolis, Minnesota

January 2021-December 2022 *Teaching Assistant*

- I last TA'd for CSCI 2041, a class that teaches functional programming in OCaml, and formal reasoning about functional programs.
- I Previously TA'd for CSCI 2021, a class that teaches low level machine architecture, including programming in C and x86\_64 assembly.

### University of Minnesota Twin Cities School of Mathematics

Minneapolis, Minnesota

January 2021-April 2022 *Student Developer*

- I helped develop doenet, distributed open-source education software
- My work focused on the programming language parts of the project – I developed the text editor, parsing of the project's bespoke mark up language, doenetML, as well as working on the semantics.

### Moonshake Ventures

Minneapolis, Minnesota

May 2016-September 2018 *Systems Administrator*

- I managed a medium sized network of Linux and Windows machines, including maintaining and managing the company web and print servers, and the company website.

## Publications

Vasudev Vikram, Isabella Laybourn, Ao Li, Nicole Nair, **Kelton OBrien**, Raffaello Sanna, and Rohan Padhye. 2023. Guiding Greybox Fuzzing with Mutation Testing. <https://doi.org/10.1145/3597926.3598107> **Distinguished paper award!**

## Skills

Programming Languages: Ocaml, Haskell, Rust, TLA<sup>+</sup>, Agda, Python, C, Java, Javascript, Coq

Tools/Frameworks: Linux, Flask, Git, Nix, React, Recoil, MTL,  $\LaTeX$ , GDB, NGINX.

Human Languages: English (Native), German (A2-B1), Swedish (A1-A2)

## Personal Projects

### Hasus

I created Hasus, which is a turing complete, statically typed functional programming language with parametric polymorphism and typeclasses. It is very similar to Haskell, but with strict evaluation.

## Extracurriculars

### ACM UMN (Vice-President)

2020-2022, 2023-Present

After hitting the term limit for being club president set out by the ACM UMN constitution, I ran for Vice-President to keep an important leadership position in the club. I host a paper reading group, classes to teach new students about unix, seminars on programming language implementation,  $\LaTeX$  tutorials, and other various educational events. I also help with the organization & management of the club, running events (including MinneHack, the largest hackathon in minnesota), and helping train and advise the new group of officers who will be running the club when I graduate. I am the main organizer for the ACM UMN CTF (capture the flag), where I write most of the challenges.

### ACM UMN (President)

2022-2023

While serving for president for 2 terms, I did all of the things listed as what I do as vice president, but more of it and with greater responsibilities. I was also the organizer of MinneHack 2023, where I secured all corporate sponsorships, developed the prompt, organized the schedule, organized the budget, etc. I was also the sole organizer for most of our events during this time.

### ACM UMN (Treasurer)

2019-2020

### Programming Languages Seminar

2019-Present

I am a member of the Programming Languages Seminar, a reading group consisting mostly of graduate students researching programming languages. We've covered several courses worth of material with the books and papers we've discussed.

## Awards & Achievements

### Deans List, University of Minnesota

2019, 2020, 2021, 2022, 2023

### Deans List, Minneapolis College

2018, 2019

### 1st Place, U of M Software Design Competition

2019

### Amateur Radio General-Class License

2020