

Alex Reinking

Research and Development

Education

- December 2022 **University of California Berkeley**, *Ph.D.*, Berkeley.
Computer Science. THESIS: “The Design and Implementation of User-Schedulable Languages”.
ADVISOR: Jonathan Ragan-Kelley
- December 2019 **University of California Berkeley**, *Master of Science*, Berkeley.
Computer Science. THESIS: “Formal Semantics for the Halide Language”.
- May 2016 **Yale University**, *Bachelor of Science*, New Haven.
Computer Science (*with Distinction*); Mathematics

Publications and Awards

- 2022 **Alex Reinking**, Gilbert Louis Bernstein, and Jonathan Ragan-Kelley. “Formal Semantics for the Halide Language.” *arXiv preprint arXiv:2210.15740* (2022).
Yuka Ikarashi, Gilbert Louis Bernstein, **Alex Reinking**, Hasan Genc, and Jonathan Ragan-Kelley. “Exocompilation for Productive Programming of Hardware Accelerators.” In *Programming Languages Design and Implementation, 2022*.
- 2021 **Alex Reinking**, Ningning Xie, Leonardo de Moura, and Daan Leijen. “Perceus: Garbage Free Reference Counting with Reuse.” In *Programming Languages Design and Implementation, 2021*. **Distinguished Paper**
University of California, Berkeley Outstanding GSI Award
- 2020 **Alex Reinking**, Gilbert Bernstein and Jonathan Ragan-Kelley. “Formal Semantics for the Halide Language.” In *EECS Department University of California, Berkeley Technical Report No. UCB/EECS-2020-40*. Master’s thesis.
- 2016 Department of Computer Science Prize. Yale University.
Achievement Rewards for College Scientists (ARCS) Fellowship Recipient
- 2015 **Alex Reinking** and Ruzica Piskac. “A Type-Directed Approach to Program Repair.” In *Computer Aided Verification*, pp. 511-517. Springer International Publishing, 2015.
Alex Reinking. “A Type-Directed Approach to Program Repair.” 2nd Place. PLDI Student Research Competition. Adviser: Ruzica Piskac.

Work Experience

Research

- January 2023–Present **Postdoctoral Researcher**, MIT, Cambridge, MA.
Designing a new scheduling language for Exo, using a novel design for rewrite-stable code pointers. This will form the basis of a new technique for implementing BLAS-like libraries. PI: Jonathan Ragan-Kelley
- Summer 2022 **Research Intern**, GOOGLE, Cambridge, MA.
Designed a novel algebraic effects system for the experimental programming language Dex. Work is open-source and ongoing. PI: Dougal Maclaurin and Adam Paszke
- Summer 2020 **Research Intern**, MICROSOFT RESEARCH, Virtual.
Designed *Perceus*, a state-of-the-art reference-counting scheme for the Koka programming language. Implemented in Haskell and merged with open-source system. Assisted with the specification of semantics and correctness for the system. PI: Daan Leijen

- Summer 2018 **Research Intern**, FACEBOOK, Menlo Park.
Designed extensions to the *Halide* programming language to allow pipeline-level, bounded feedback loops. Identified several compiler-level challenges, including necessary IR extensions, a need for a new bounds inference framework, closed forms for diagonalizable bounds equations, and storage optimizations. PI: Zachary DeVito
- Summer 2017 **Research Intern**, MICROSOFT RESEARCH, Redmond.
Designed and implemented a new compiler for the *P* programming language. *P* is designed for modeling communication protocols between parts of a system. It was previously used to implement the USB 3.0 hub driver in Windows 8 and beyond. PI: Shaz Qadeer
- Fall 2014 – **Research Assistant**, YALE UNIVERSITY, New Haven.
Spring 2016 Designed *Winston*, an algorithm to interactively synthesize correct expressions of a given data type, allowing IDEs to present completions of full expressions, instead single symbols. Extended this work to repair ill-typed expressions. Implemented results as a Java compiler plugin that attempts to correct type errors. Published at CAV 2015. PI: Ruzica Piskac
- Summer 2014 **Research Intern**, YALE INSTITUTE FOR NETWORK SCIENCE, New Haven.
Designed and implemented algorithms for solving Laplacian linear systems efficiently. Java implementation produced the highest-quality output among its competition. PI: Daniel Spielman
- Summer 2013 **Research Intern**, YALE HASKELL GROUP, New Haven.
Developed interactive musical instrument widgets for the Euterpea project. Researched efficient pure-functional signal representations to facilitate the creation of low-latency virtual instruments. Wrote a test suite to identify and correct bugs and a design flaw. PI: Paul Hudak

Software Engineering

- Summer 2016 **Software Development Engineer Intern**, MICROSOFT, Redmond, WA.
Worked with the Intune Core Services team to develop a workflow engine to automate support operations procedures. Framework manages execution, suspension, cancellation, and error recovery for long-running tasks.
- Summer 2015 **Software Development Engineer Intern**, MICROSOFT, Redmond, WA.
Worked on the Intune Core Services team to develop software to improve live-site bug response by providing more detailed diagnostics than were previously available. Also worked to parallelize automated tests on the Azure Batch cloud service to lower project build times.
- Summer 2011 **Programmer**, DESARROLLO INTEGRAL DE LA FAMILIA, Puebla, Mexico.
Volunteered for a charitable organization that provides food to Mexico's most impoverished schools. Developed web interface for collection, reporting, and statistical analysis of nutrition data gathered from the students.

Open-Source and Professional Activities

- December 2019 – **Halide**, <https://github.com/halide/Halide>.
Present Maintain build system and manage the release cycle for Halide, a programming language for high-performance tensor processing. Halide is used on billions of devices and by high-profile companies, including Google, Adobe, Qualcomm, and more.
- Spring 2015 **Yale CS Petition**, <https://alexreinking.com/petition>.
Developed and managed the website to collect signatures for a petition to increase the number of CS ladder faculty at Yale University. Managed campaign strategy, and worked closely with fellow undergraduates and graduate students to publicize the petition. Secured over 1,100 signatures. Twenty million dollars were allocated to seven new faculty spots and additional teaching space within weeks, marking the first expansion of the Yale CS department in 20 years.

Programming Languages

Python, C, C++, C#, Halide, Haskell, Java

Natural Languages

Fluent in English.

Working proficiency in Spanish.

Hobbies

Play 7-string electric guitar.

Cook modernist dishes.