

BRADFORD LARSEN, COMPUTER SCIENTIST

brad@bradfordlarsen.com

<https://bradfordlarsen.com>

SKILLS

Compiler & interpreter development, software security, static program analysis, abstract interpretation, information visualization, continuous delivery, software as a service, multi-platform software development, general-purpose GPU programming, troubleshooting, debugging, property-based testing, fuzz testing

C++, C, Python, Haskell, OCaml, Rust, bash, R

EXPERIENCE

Software Developer

January 2016 – Present

Ab Initio Software, Lexington MA

- Ported CPython 2.7 to z/OS
- Forward-ported 30 internal modifications to CPython 2.5 onto CPython 2.7
- Added a build profiling mechanism to GNU Make 4.2; ported GNU Make to z/OS
- Found and fixed a bug in SQLite 3.11 that prevented it from working on EBCDIC systems
- Improved developer productivity company-wide by implementing custom GDB extensions and custom pretty-printers for types in Ab Initio base code
- Integrated several static & dynamic analysis tools into the software development process
- Found and fixed over 100 memory corruption and undefined behavior errors in Ab Initio base code with the help of several C++ static analysis tools

Senior Software Engineer, Static Analysis

May 2012 – December 2015

Veracode, Inc, Burlington MA

- Increased speed of the static security scanner — Veracode's flagship product — by 4x via improved job scheduling algorithms and coaching others on use of sampling profilers
- Saved 160 hours per week by overhauling our legacy QA infrastructure, implementing automated test failure triage and analysis, and improving build times
- Saved 20 hours per week in manual buffer overflow vulnerability validation by implementing & deploying a symbolic execution postprocessor using the Z3 SMT solver
- Found and fixed 1000 errors in Veracode's security rules domain-specific language by creating a custom lint tool in C# & integrating this tool into the development process
- Submitted 2 invention disclosures to in areas of program analysis and machine learning-based runtime prediction of static analyses

Bradford Larsen, Computer Scientist — brad@bradfordlarsen.com

- Identified dozens of latent defects in Veracode's flagship product by collecting production metrics, then analyzing them using R, ggplot2, and SQL; delegated repair of these defects
- Fixed 50 memory corruption errors by refining core data types — *interfaces really matter!*
- Converted the build system for the static scanner from Visual Studio to CMake

Research Assistant **2010 – 2012**
Tufts University Computer Science, Medford MA

- Identified interpreter design decisions that have significant affect on runtime performance by developing and evaluating 924 interpreter implementations for Lua in OCaml
- Formalized part of a distributed revision control system in the Coq proof assistant
- Implemented a clear & efficient binary decision diagram library in ANSI C, along with Haskell bindings (<https://github.com/bradlarsen/bdd>)

Research Assistant **2007 – 2010**
UNH Computer Science, Durham NH

- Designed Barracuda, a statically typed, array-based language for numeric problems
- Implemented an optimizing compiler for Barracuda, targeting GPUs via NVIDIA's CUDA; generated code was better than than NVIDIA's BLAS library for certain operations
- Designed and implemented Switchback, a shortest path algorithm that runs up to 10 times faster than earlier algorithms and requires no explicit heuristic function
- Improved processing time by 100x in space weather data conversion tools by reducing I/O
- Made software builds repeatable by replacing a legacy build system with GNU Autotools

Software Contractor **2007**
Evergreen Solar, Marlboro MA

- Automated a solar panel simulation and validation workflow using Python, wxPython, and several existing simulation programs

Research Assistant **2007**
Friedrich-Alexander University, Erlangen, Germany

- Improved performance by a factor of 3 in a software model checker and a naive graph isomorphism checker by implementing object caching in a distributed shared-memory Java virtual machine

**Performance Algorithms Group Intern
Mercury Computers, Inc, Chelmsford MA**

2005 – 2006

- Fixed bugs, added tests, and added new functions to Mercury's Vector Signal Image Processing Library
- Maintained an Eclipse debugger plugin for remote programs running on a Cell processor

EDUCATION

2010 – 2012 Ph.D. Computer Science (incomplete), Tufts University 3.70/4.00 GPA
2010 M.S. Computer Science, University of New Hampshire 3.57/4.00 GPA
2009 B.A. Philosophy, University of New Hampshire 3.73/4.00 GPA
2008 B.S. Computer Science, University of New Hampshire 3.72/4.00 GPA

PUBLICATIONS

Jan Midtgaard, Norman Ramsey, and Bradford Larsen. Engineering definitional interpreters. PPDP 2013. ACM, September 2013.

Bradford Larsen. Simple optimizations for an applicative array language for graphics processors. DAMP '11. ACM, January 2011.

Bradford Larsen, Ethan Burns, Wheeler Ruml, and Robert Holte. Searching without a heuristic: efficient use of abstraction. AAI-10. AAAI Press, July 2010.

Ronald Veldema, Bradford Larsen, and Michael Philippsen. A DSM protocol aware of both thread migration and memory constraints. PDCS '08. ACTA Press, November 2008.

AWARDS

2010 – 2012 Dean's Fellowship, Tufts University, School of Engineering
2009 University of New Hampshire Barlow Prize, Honorable Mention
2008 – 2009 NASA New Hampshire Space Grant Consortium Graduate Fellowship
2007 UNH International Research Opportunities Program Fellow
2003 Eagle Scout, Boy Scouts of America