

Jakob Hain

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Education

Northeastern University - Khoury College of Computer Sciences

Sept 2017

Seeking: Bachelor of Science in Computer Science

exp. Jan 2020

GPA: 3.984 / 4. Member of the Honors College

Classes: CS4620 Building Extensible Systems, CS4400 Programming Languages

Technical Knowledge

Languages: Haskell, C++, TypeScript

APIs: Node.js, Lex & Yacc, UIKit & SpriteKit, Git, SSH, Linux OS, GitLab CI

Graphic Design: UI, logos, presentations. **Tools:** Pixelmator, Sketch, Keynote, Powerpoint

Area of Focus: Programming language design and analysis

Work Experience / Community Service

Ř Research Assistant - Northeastern PRL

Jan 2019 - exp. Dec 2019

- Ř is an R interpreter which JIT compiles closures and uses speculation to elide unused semantics. For instance, it removes R's first class environments and moves variables to the stack. When it realizes an instruction needs an environment, such as a generic call, it de-optimizes, preserving semantics almost identical to GNU-R
- Ř uses liveness analysis, SSA form, loop peeling, constant folding, and other analyses
- Co-author for a paper (R melts brains) describing development of Ř, accepted by DLS
- Mainly worked on type inference fixes, serialization, and STM to "safely" evaluate forces
- Collaboration between 6 people, developed on GitHub with CI on GitLab

Fundamentals I Teaching Assistant - Northeastern CCIS

Sept 2018 - Dec 2018

- Graded homework & exams, attended tutoring sessions, gave advice

Freelance Developer - RemoG, Remote

Jan 2018

- Built an iOS app to show sensor data (e.g. speed, temperature, pressure) for a car

Sempai - Cervizzi's Martial Arts Academy, Winthrop MA

Apr 2015, Oct 2016

- Taught young children Karate moves and techniques, held out punching bags

Personal Projects

TreeScript - DSL to transform syntax (Work in Progress)

Dec 2018

- Similar to "Parser Parser Combinators" (van Tonder, Le Goues), doi:10.1145/3314221.3314589
- Works via transformers which match and replace syntax, e.g. "foo(\x) -> bar(\x)"
- Also supports "functions", basic types, and can evaluate JavaScript syntax.
- Implemented in Haskell. Finalist at Northeastern's RISE 2019

Descript - Simple language which transforms its own code (2 versions)

Feb 2018

- To perform refactors like renaming symbols & adding fields to structures, simply run one Descript file on another file, and it will transform it in place (both versions)
- IDE (VS Code) extension which highlights errors and renames symbols (old version)
- New version interpreter in OCaml, old version interpreter in Haskell

Squarejitsu - Tile-based platforming game

Jan 2015

- Swipe to move & throw objects, dodge obstacles, destroy turrets
- Built-in level editor, custom physics engine, tile system, and resource-loading system
- Taught me the importance of using libraries to save writing unnecessary code
- For iOS, code in Objective-C & Swift, textures made with Pixelmator

Other: Running (10mi. in 1:05:49), Piano (Sweet Child O' Mine), Karate (1st degree black belt)