SANDY MAGUIRE

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SUMMARY OF SKILLS

Programming Experience

↪ Haskell, Agda (expert) ↪ C++ (fluent) ↪ C#, JavaScript, Lua, PHP, Python, Scala (working proficiency)

WORK EXPERIENCE

Manifold Valley » Lead Compiler Engineer (Haskell)

April 2023 → ongoing

↪Rearchitected a failed 4-year compiler effort by migrating to a lesser-known core calculus; replaced the entire language foundation, unblocking system-wide progress

↪Asymptotically improved compiler performance from unscalable to linear; reduced compile times from hours to seconds and GHC build times by 93%

↪Built the core ML training infrastructure---used as the foundation for all models trained at the company

↪Guided the Python team through implementing the new runtime, including a fully-trampolined CPS transformation to eliminate stack overflows

↪Introduced modern engineering practices: testing, code review, Git discipline; migrated 4 fragmented repos into a monorepo to support cohesive development

↪Rewrote or replaced ~240k lines of code (~18% of the codebase), modernizing the compiler and runtime stack

Wire » Consultant (Haskell)

October 2021 → April 2023

↪Built a GHC plugin to track and reify federated service calls at the type-level.

↪Designed a property-testing framework for verifying the correctness of higher-order algebraic effects.

Self-Employed » Author of Software Textbooks

March 2018 → November 2023

↪Wrote three books on advanced programming techniques and high-quality software engineering.

Formation/Takt » Senior Software Engineer (Haskell)

September 2016 → January 2018

↪Increased new feature cadence by 30x after becoming lead of a four-person engineering team.

↪Directed a team of three to implement a high-throughput, low-latency brokered streaming library.

Google » Software Engineer III (C++)

September 2015 → September 2016

↪Led the architectural design of a user-defined permission model for the cloud.

↪Improved compile times by 96% and test coverage by 65% for a service-critical internal compiler.

Meta/Facebook » Software Engineer Intern (C++)

January → April 2014

↪Increased revenue by 0.5% after analyzing the advertising platform's spending behaviors.

↪Improved site-wide response time by 0.4% by parallelizing the backend graph ranker.

NOTABLE OPEN SOURCE

Cornelis

2022 → 2024

github.com/isovector/cornelis

↪Integrated Neovim tightly with the Agda compiler, allowing for interactive proof assistance.

ImplicitCAD

2020 → 2021

github.com/Haskell-Things/ImplicitCAD

↪Improved performance of single-core mesh rendering by ~2x.

↪Reduced code duplication by 50% by reorganizing types to be shared between 2D and 3D.

Wingman for Haskell 2020 → 2023

github.com/haskell/haskell-language-server

↪Developed an interactive tactic engine for Haskell, capable of robust, type-aware code synthesis.

↪Provided in-editor support for automatic pattern splitting.

Polysemy 2019 → 2023

github.com/polysemy-research/polysemy

↪Discovered a convenient encoding of an effect system based on higher-order free monads via simultaneous co-Yoneda and codensity transformations.

↪Implemented a GHC plugin to support ad-hoc functional dependencies when working with Polysemy; dramatically improving the developer experience.

PUBLICATIONS

Certainty by Construction November 2023

leanpub.com/certainty-by-construction

↪An exploration of topics from mathematics and computer science, entirely in literate Agda.

Algebra-Driven Design September 2020

leanpub.com/algebra-driven-design

↪A series of worked examples on designing and efficiently implementing combinator libraries.

↪*Algebra-Driven Design* is now the basis of a course taught at OST Zurich.

Thinking with Types October 2018

thinkingwithtypes.com

↪A how-to manual on using (and not misusing) Haskell's more advanced type-level features.

FORMAL EDUCATION

Bachelor of Software Engineering 2010 → 2015

University of Waterloo, Waterloo, ON

MISCELLANY

Interests

model checking, proof assistants, music, functional programming, compilers, robotics, electronics, math pedagogy