Bruce Collie

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EDUCATION

University of Edinburgh: CDT in Pervasive Parallelism
PhD (2018–22)
MScR (2017–18) — Distinction

University of Cambridge: Computer Science
MEng (2016–17) — Distinction
BA (2013–16) — 1st Class

EXPERIENCE

Monad Labs — **Senior Software Engineer**
Remote, 2024–

Upcoming

Runtime Verification — **K Framework Lead Developer**
Remote, 2023–204

Strategic leadership for a diverse team of engineers across multiple projects under the umbrella of the K Framework (a programming language and associated tooling for mechanised operational semantics and formal verification), including direct managerial responsibility for the core K compiler development team. Acted as a liaison for key client-facing commercial projects using the tools, and played a key role in ensuring a smooth transition when part of the company was spun out into a separate entity.

Continued direct technical contributions with a greater focus on high-level architectural design, collaborative work to upskill junior team members, and targeted escalation of complex issues.

Senior Compiler Engineer
Remote, 2021–2023

Contributed to the development of multiple key projects related to the K Framework, including a specialized LLVM-based compiler backend in C++, and an ISO C18 compliant compiler implementation. Drove internal adoption of C++ and general development best practices as the core K development team grew, as well as running onboarding training for new employees.

Responsible for several streams of technical outreach, including open-source community engagement, collaboration with university research groups and workshops at high profile academic conferences.

Huawei — **Research Developer, Compilers Team**
Edinburgh, 2019–2021

Developed cutting-edge features within a production-grade compiler as part of a larger programming languages research team. Established and maintained developer tools integral to the team's work, and provided specialist C++ expertise. Balanced part-time employment with PhD studies in order to gain experience working on real-world compiler technology.

GoCardless — **Core Payments Developer**
London, 2016

Worked on developing high-performance financial web services in Ruby, with responsibility for developing internal libraries and responding to customer bug reports. Led initial public-facing work on new open-source efforts.

EXPERTISE

C & C++ Primary programming language expertise; strong proficiency and working knowledge of modern best practice and language standards for both C and C++, including implementation-level experience of the ISO C18 standard.

Other Languages Professional or substantial academic experience using Python, Ruby, Scala, Java, Nix, and OCaml. Generalist engineer able to quickly adapt to new languages, tools and environments.

Compilers & Semantics Academic and industrial experience of compiler implementation and theory, including significant experience with LLVM.

Tools Familiar with common software engineering tools and workflows, including source control (Git, SVN), project management (GitHub, JIRA) and CI/CD pipelines.

Research Able to communicate effectively in person and through written media. High-quality, award-winning publication record across multiple top computer science conference venues.

PUBLICATIONS

Program Lifting using Gray-Box Behavior
PACT 2021, Conference Paper

Modeling Black-Box Components with Probabilistic Synthesis
GPCE 2020, Conference Paper (Best Paper Award)

M³: Semantic API Migrations
ASE 2020, Conference Paper

Retrofitting Symbolic Holes to LLVM IR
TyDe 2020, Presentation

Automatically Harnessing Sparse Acceleration
CC 2019, Conference Paper

Type-Directed Program Synthesis and Constraint Generation for Library Portability
PACT 2019, Conference Paper

Augmenting Type Signatures for Program Synthesis
TyDe 2019, Presentation

TALKS

Meeting Developers Where They Are: Lessons learned from formal verification in practice
SPLS Workshop, July 2024

From Zero to Proving: Building your first language with the K Framework
PLDI Tutorial Session, June 2023

Verification for Free: Using K to build a theorem prover for any language
University of Cambridge Logic & Semantics Seminar, October 2022

The K Framework: Practical semantic Tools from term rewriting
SPLS Workshop, July 2022