Liam O'Connor-Davis

SUMMARY

I'm a computer scientist specialising in programming languages and type systems. My main interest is in dependent type theories and their use in software verification and mathematics. I have significant experience in functional programming, particularly in Haskell. I also enjoy programming in languages such as Scala and ML. I have skills in traditional formal verification and theorem proving, including work on the formally verified seL4 kernel. I also have some skill at concurrent and distributed programmming, and I'm aware of various approaches to concurrency abstraction (e.g process algebra) and concurrent data structures. I am able to structure proofs of properties on concurrent programs using standard methods. I have significant interest in mathematics, particularly proof theory, the foundations of mathematics, algebraic topology, category theory, and abstract algebra.

In the past I have developed a great deal of experience in web development, including experience at Google in the development of a new product (Google Wave). I follow closely development of new standards for the Web.

I have a moderate understanding of conversational Japanese and can read and write at a rudimentary level, and beginning study of Korean.

SPECIALTIES

Functional Programming; Formal Verification; Type Theory; Logic; Logic Programming; Programming Languages; Compilers; Web Development; Theorem Proving; Process Algebra; Concurrency.

COMPUTING SKILLS

Programming Languages: Haskell, Agda, Coq, Rust, Swift, Isabelle, Standard ML, Scheme, C, OCaml, C++, Java, Scala, Clojure, Ruby, Python, Erlang, Mercury.
Operating Systems: Mac OS X, Linux, BSD

EDUCATION

PhD (currently studying) Computer Science
University of New South Wales. In 2014 I was also affiliated with NICTA.
Thesis topic: "Language-aided Systems Verification"
Focusing on the use of linear types and other PL research to make verifying low-level software systems for functional correctness cheaper and easier.

- NICTA Impact Award Recipient, for high-impact trustworthy systems research.
- Several high-quality publications in top-tier conferences.

Bachelor of Science (Hons. 1st Cl.), Computer Science
University of New South Wales. Completed several courses with high distinction and earned four awards:

- Macquarie Undergraduate Performance Award (1st Year)
- CSE Undergraduate Performance Award (1st Year), 3rd Place
- CSE Undergraduate Performance Award (3st Year), 3rd Place
- CSE Undergraduate Performance Award (4th Year), 3rd Place

I had an honours thesis result that was second among all graduands, at 93.4.

Honours thesis: "Formalising GHC's Type System", a dependently typed formalisation of the type system of a Haskell compiler.
Special Project: "PhracJS - A Lazy, Purely Functional Language for Browsers", an investigation into the suitability of purely functional programming for the web browser via compilation to JavaScript. Involved the implementation of a small compiler.

Special Project: "Gentzen - A Beginner's Theorem Prover", a carefully designed theorem prover intended to aid in the teaching of introductory courses for formal semantics of programming languages.

EXPERIENCE

Research Engineer January 2013 - January 2014
Software Systems Research Group, NICTA

- Working on Haskell DSLs for file system specification for the Bilby verified file systems project.

Research Assistant March 2011 - December 2012
Software Systems Research Group, NICTA

- Contributions to the l4.verified operating system verification project.

Casual Teaching Academic January 2009 - Present
School of Computer Science and Engineering, UNSW

- Teaching tutorials and lectures in courses ranging from introductory C and Java programming to formal semantics of programming languages, high-assurance programming, concurrency and verification.

Software Engineer November 2009 - February 2010
Google

- Internship developing features for Google Wave.

Tech Lead January 2008 - March 2011
Mudo Media

- Developing a web and facebook application for travellers to share information with each other. Developed using Haskell web frameworks (Yesod) and a RESTful API.

Director May 2005 - May 2010
Innove Pty. Ltd.

- Chief Technical Officer, Director and Manager.