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 Vietnamese.

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.

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.
- *Publication:* "File Systems Deserve Verification Too!"
  Gabriele Keller, Toby Murray, Sidney Amani, Liam O'Connor
  Zilin Chen, Leonid Ryzhyk, Gerwin Klein, Gernot Heiser
  Workshop on Programming Languages and Operating Systems
  November 2013

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.