

## Dr. James Colin Hales

### Professional Experience

*Commonwealth Bank of Australia, Analytics & Information* 2015-Present  
Lead software engineer of Conveyor squad. Designed and developed a lambda architecture data delivery pipeline enabling expert systems to make decisions at scale based on an integrated feed of batch and streaming analytics and information. Developed in Scala, using Hadoop MapReduce, Scalding, Spark, Kafka, Cassandra, Oracle, and a variety of open source libraries developed in-house.

*The University of Western Australia, School of Computer Science and Software Engineering* 2013-2014  
Laboratory demonstrator: CITS2232 Databases (2013), wrote assessed lab sheet “Introduction to Django”; CITS2200 Data Structures and Algorithms (2014), wrote supplementary lab sheet “Unit testing with JUnit”.

*The University of Western Australia, Information Services* 2009-2012  
IT support analyst, Student Internet Support Office. Configured Linux-based kiosk machines in the university bookshop for students to search for required textbooks. Wrote a Python script that interfaces with Google Apps for Education to retrieve emails for former students with deactivated accounts.

### Education

*Doctor of Philosophy, Computer Science* May 2016  
The University of Western Australia, Perth, Australia.

**Advisors:** Prof. Tim French, Dr. Rowan Davies.

**Thesis Title:** Logics for quantifying over information change.

**Abstract:** Epistemic modal logic models the knowledge that a set of agents hold about the state of the world. The knowledge of agents may change in response to informative updates, events that communicate additional information about the world to the agents whilst leaving the world itself unchanged. We are interested in developing general techniques for determining how a set of agents with some initial knowledge can arrive at a certain state of knowledge through the execution of informative updates, perhaps subject to additional constraints. This could have applications in the development of communication protocols, or in the verification of secure systems. We extend epistemic modal logics with refinement quantifiers, operators in the logic that have the effect of quantifying over informative updates, allowing us to pose questions about the existence of informative updates that result in particular states of knowledge of the agents. We also consider the addition of refinement quantifiers to other modal logics, where refinements correspond to different kinds of “updates”; in logics for games, refinements may correspond to a player discarding possible moves from consideration, or in logics for topology, refinements may correspond to subspace projections. We investigate computational methods in the resulting refinement quantified modal logics, including methods to synthesise informative updates according to desired properties in refinement quantified epistemic modal logic.

*Bachelor of Computer and Mathematical Sciences (First Class Honours)* December 2011  
The University of Western Australia, Perth, Australia.

**Advisors:** A/Prof. Tim French, Dr. Rowan Davies.

**Thesis Title:** Refinement Quantifiers for Logics of Belief and Knowledge.

**GPA:** 7.000

**WAM:** 89.250

*Bachelor of Computer and Mathematical Sciences* December 2010  
Majors in Computation and Pure Mathematics

The University of Western Australia, Perth, Australia.

**Majors:** Computation and Pure Mathematics.

**GPA:** 6.792

**WAM:** 87.167

### **Education (continued)**

<i>24th European Summer School in Logic, Language and Information</i> Uniwersytet Opolski, Opole, Poland.	August 2012
<i>PhD School on Modal Logics</i> , previous to the 7th Methods for Modalities workshop. Universidad de Málaga, Málaga, Spain.	November 2011
<i>Logic Summer School</i> Australian National University, Canberra, Australia.	December 2010
<i>iVEC/WASP OpenCL summer school</i> iVEC and the Western Australian Supercomputer Program, Perth, Australia.	January 2010

### **Visiting Scholar Positions**

<i>Laboratoire Lorrain de Recherche en Informatique et ses Applications (LORIA)</i> Computational Epistemic Logic in Lorraine research group (CELLO) Université de Lorraine, Nancy, France. Showed computability and complexity results for arbitrary positive announcement logic.	September-October 2014
<i>Institut de Recherche en Informatique et Systèmes Aléatoires (IRISA)</i> Logic and Applications research group (LogicA) Université de Rennes 1, Rennes, France. Showed expressivity results for refinement quantified transitive modal logic.	August 2014

### **Scholarships and Prizes**

<i>Convocation Postgraduate Research Travel Award</i> , The University of Western Australia	2014
<i>Prescott Postgraduate Scholarship</i> , The University of Western Australia	2012
<i>J.A. Wood Memorial Prize</i> , The University of Western Australia	2011
<i>Faculty of Engineering, Computing and Mathematics Medal</i> , The University of Western Australia	2011
<i>Thales Prize in Computer Science</i> , The University of Western Australia	2011
<i>Hackett Alumni Honours Scholarship</i> , The University of Western Australia	2011
<i>Logic Summer School scholarship</i> , Australian National University	2010
<i>South Pacific Region second placing team</i> , ACM Intercollegiate Programming Contest	2010
<i>Fogarty Foundation Excellence Award</i> , The University of Western Australia	2008

### Peer-Reviewed Publications

L. BOZZELLI, H. VAN DITMARSCH, T. FRENCH, J. HALES, AND S. PINCHINAT. Refinement modal logic. *Information and Computation* (2014). <http://dx.doi.org/10.1016/j.ic.2014.07.013>.

T. FRENCH, J. HALES, AND E. TAY. A composable language for action models. In *Advances in Modal Logic 10* (2014), College Publications, pp. 197–216. Proceedings of the 10th conference “Advances in Modal Logic”.

J. HALES. Arbitrary action model logic and action model synthesis. In *Proceedings of the 2013 28th Annual IEEE/ACM Symposium on Logic in Computer Science* (2013), IEEE, pp. 253–262.

J. HALES, T. FRENCH, AND R. DAVIES. Refinement quantified logics of knowledge and belief for multiple agents. In *Advances in Modal Logic 9* (2012), College Publications, pp. 317–338. Proceedings of the 9th conference “Advances in Modal Logic”.

J. HALES, T. FRENCH, AND R. DAVIES. Refinement quantified logics of knowledge. In *Electronic Notes in Theoretical Computer Science 278* (2011), pp. 85–98. Proc. of the 7th Workshop on Methods for Modalities.

### Administrative Experience

*ACM International Collegiate Programming Contest, South Pacific Region* 2012-2014  
Judge for ACM ICPC and ‘ANZAC’ practice competitions at UWA. Systems administrator for UWA practice competitions (2013-2014) and Western Division of South Pacific Regional competition (2014).

*The University of Western Australia, Computer Science Students Club* 2009-2013  
Webmaster (2009), Secretary (2010), Vice-President (2011-2013). Co-organised annual quiz night (2010).

### Technical Skills

Programming languages: Scala, Haskell, Python, Java, Bash.

Big data technologies: Hadoop MapReduce, Scalding, Spark, Kafka, Cassandra.

Operating systems: Linux (Fedora, Ubuntu, and CentOS), FreeBSD, Mac OS X, Windows.