Matt Luckcuck BSc (Hons), MSc, PhD(Ebor)

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Research

My research interests include formal modelling, model checking, safety-critical systems, and programming. My PhD relates to formalising Safety-Critical Java (SCJ) using the state-rich process algebra *Circus*, which combines elements of Z and CSP. I was supervised jointly by Professors Ana Cavalcanti and Andy Wellings at the University of York.

SCJ adopts a new programming paradigm for applications that must be certified. SCJ programs have a specific concurrent design and use region-based memory management (instead of garbage collection); specialised virtual machines are available to execute SCJ programs. It is organised into three compliance levels, of ascending complexity. My PhD focuses on the most complex compliance level, the programs of which are highly concurrent, potentially multi-processor, and make use of suspension and a variety of release patterns. My PhD provides the most complex compliance level of SCJ with its first semantics, enables further integration with other *Circus* semantics for SCJ, and provides automatic translation from SCJ to our model.

Publications

2016

- Matt Luckcuck, Andy Wellings, and Ana Cavalcanti '*Safety-Critical Java: Level 2 in Practice*' in Concurrency and Computation: Practice and Experience, 2016
- Matt Luckcuck, Ana Cavalcanti, and Andy Wellings '*A Formal Model of the Safety-Critical Java Level 2 Paradigm*' in Proceedings of the International Conference on Integrated Formal Methods, iFM 2016

2015

- Matt Luckcuck '*A Formal Model for the Safety-Critical Java Level 2 Paradigm*' in Proceedings of the Doctoral Symposium of Formal Methods 2015, DSFM 2015 [Honourable Mention]

2013

- Andy Wellings, Matt Luckcuck, and Ana Cavalcanti '*Safety-critical Java level 2: Motivations, Example Applications and Issues*' in Proceedings of the 11th International Workshop on Java Technologies for Real-time and Embedded Systems, JTRES 2013

Education

2012 — 2016 *University of York*

PhD in Computer Science
Safety-Critical Java Level 2: Applications, Modelling, and Verification

2011 — 2012 *University of York*

MSc with Merit in Computing
Modules:

Formal Specification	97	Software Measurement and Testing	70
Concurrent and Real-Time Programming	93	Final Project	66
Group Project	72	Software Engineering	66
Java Advanced Programming	70	Database-Driven Web Design	63
User Centered Design	70	Computer Systems Architecture	57

2007 — 2011 *University of Wolverhampton*

Bsc (Hons) First Class in Computer Science including Placement Year
Modules Include:

Java Programming	Oracle Databases
C/C++ Programming	HTML and CSS Websites
PHP Programming	

Work Experience

2015 *University of York*

Research Associate During my PhD I was employed, part-time, to produce a tool that automatically translated program code for Safety-Critical Java into a formal model written in the state-rich process algebra *Circus*. This role was closely related to my thesis, so I managed the work alongside my PhD.

2011 *University of Wolverhampton*

Support Desk Technician I provided front-line support to students using the university's computer systems. This involved polite and timely responses to requests regarding printing and WiFi access, for example. Emphasis was on following standard operating procedures and escalating more serious problems to the relevant teams within the university.

2010 *National Institute for Health Research*

Information Services Placement Student During the placement year of my BSc I worked in the Service Desk, Testing, and Infrastructure departments. Each department presented its own set of tasks and challenges. Most of my time was spent in the Service Desk where I supported several hundred clinicians using a health research data collection system. I also spent several days leading the Service Desk team due to staff illness.

Teaching

- 2017: Volunteering at a local Code Club, teaching 9-11 year olds basic programming skills using Scratch. The small group was of mixed ages and abilities. Each week we worked on a small game, each introducing increasingly complex techniques.
- 2016: Tutoring an A-Level Computing student, one-on-one. We focussed on covering key topics, and improved the student's exam grade by two grade boundaries. My contact time was 20 hours (1 hour per week).
- 2015—2016: assisting in the workshop sessions for two terms of a first year undergraduate module, introducing programming concepts, in the Computer Science degree at the University of York.
  - In the first term, the module focused on basic programming using Python. My contact time for the term was 20 hours.
  - In the second term, the module focused on objects and inheritance, and used both Python and Java. My contact time was 28 hours.
  - Each group contained around 65 students of very mixed ability.
- 2015: assisting in the workshop sessions for a LaTeX module for PhD students at the University of York. The group contained around 12 PhD students and my contact time was 5 hours. I also assisted in a workshop session on LaTeX for an MSc module, also with around 12 students.

Administration

- During 2014 I was the Programme Committee chair for the York Doctoral Symposium on Computer Science and Electronics (YDS2014), a student conference organised at the University of York. I was responsible for recruiting programme-committee members and ensuring that submissions were reviewed fairly. I also co-lead an interdepartmental team of PhD students in the planning and organisation of YDS2014.

- In 2014 I marked the two exams for a first-year undergraduate programming module. There were 108 scripts in one exam and 130 in the other. This involved working to the mark scheme and keeping to the marking deadline.
- In 2013 I marked the group projects for an MSc module. There were eight groups of six students. This involved reading each group's project report and grading it, along with supplementary material, against the module mark scheme. Again, there was a strict marking deadline.
- Throughout my PhD I have gained experience in academic writing, for both external publication and internal PhD progression.

Conference and Workshop Presentations

- 2016: International Conference on Integrated Formal Methods (iFM 2016)
- 2015: Doctoral Symposium at the International Symposium on Formal Methods (DSFM 2015)
- 2014: Certifiable Java for Embedded Systems (CJ4ES)
- 2013: Workshop on Java Technologies for Real-time and Embedded Systems (JTRES 2013)

Referees

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