

Preface

This volume contains papers written in honour of A.W. Roscoe, better known as Bill Roscoe, on the occasion of his 60th birthday. Bill was born in Dundee and went on to read Mathematics at University College, Oxford (Univ) in 1975, achieving the top first. Bill's main tutors at Oxford were Michael Collins and Gordon Screaton, both of whom have had huge influences on his life and career. Remarkably, Bill has never left Univ, and is currently a Senior Research Fellow at the college, having previously been a College Lecturer and a Tutorial Fellow.

After completing his undergraduate degree, Bill completed a DPhil at Oxford under the supervision of Professor Sir Tony Hoare. Bill's thesis was on the mathematical foundations of Communicating Sequential Processes (CSP), a topic to which he has become synonymous and that has come to dominate his research career. His early work on CSP in the 1980s, together with Steve Brookes and others, focused on formally defining the mathematical foundations of CSP, and resulted in the development of the form of CSP used today. More widely, Bill has made huge contributions to the understanding of concurrency, as demonstrated by the fact that his first textbook on the subject, *The Theory and Practice of Concurrency*, has over 2,000 citations. He is undoubtedly one of the leading figures worldwide in the area of process algebras. Bill's research interests are not only confined to Computer Science; he also published a number of papers on topology, leading to an Erdős number of 2.

Bill has been the driving force behind the development of FDR, the CSP refinement checker, since its inception in the early 1990s. This also involved the setting up of the first company that he was involved in, Formal Systems (Europe) Limited. Bill is not only the most ardent user of FDR but has also made considerable contributions to the ideas behind FDR; most notably in determining how to efficiently perform refinement checking, and to FDR's compression functions. He has also built various tools to translate other languages into CSP for analysis using FDR, including one for analysing simple imperative programs, and another for analysing Statecharts.

Bill's passion for theory is matched with an equal desire to see his research make an impact in practice by solving industrial challenges. One of Bill's (many) remarkable qualities is his ability to deal with the details of analysing a horrendously combinatorially complex system in his head, even while performing at a board. He became known by some of his industrial partners as the "Professor of Difficult Sums", as he is the go-to person for fiendish challenges! Bill has enjoyed numerous fruitful collaborations with industry partners and government agencies throughout his career; for example, with Draper, Inmos, U.S. Office of Naval Research, and QinetiQ (and its previous versions). One of his early collaborations with Inmos on the verification of the floating-point unit on the T800 transputer, led to a Queen's Award in 1990. These collaborations have proven to be a stimulating influence on Bill's research over the

years, as is demonstrated to this day by his exciting research projects, which combine theory and practice in order to tackle the escalating costs of software development.

Bill is known for his love of solving puzzles using CSP and FDR. One of Bill's first papers was on this topic, and involved solving the so-called trains problem, where trains have to be moved to the correct sheds over a predetermined configuration of tracks. He later wrote a practical to accompany the undergraduate course in Concurrency at Oxford that required students to solve this problem, which is still in use today. He is particularly proud of the fact that FDR managed to find a shorter solution than previously known to a variant of the puzzle. Bill's passion for solving puzzles using CSP and FDR extends over many well-known examples and has become so well-established that they are now used as standard benchmarks for FDR. Indeed, he evaluates all of his new hardware on the basis of how quickly it can master his standard peg solitaire script!

In the mid-1990s Bill became involved in using CSP to analyse the security properties of systems. He first worked on analysing security protocols using CSP and FDR, along with Gavin Lowe amongst others. This work led to FDR becoming widely used as a protocol analysis tool, and also led to many advances in FDR particularly enhancing its scalability. He also worked on information flow, and developed one of the few definitions of non-interference that deals adequately with refinement. Lately, Bill has worked on human-interactive security protocols that allow secure networks to be established using non-fakable information that can be exchanged between humans. This technology has industrial applications such as mobile payments, medical data exchange, and telephony.

Bill's research record is matched by an astonishing track record of leadership and administration within the University of Oxford. Bill took over as Head of the Computer Laboratory at Oxford in 2003, and over a ten-year period led the department to nearly triple in size. His ambitions for the department were perhaps best illustrated in 2011, when he oversaw the change in name of the department, from the Computer Laboratory to the Department of Computer Science. This change in name clearly signalled to the world that the department was now intent on being a world-leading department of computer science — a status that has subsequently been confirmed by many third-party rankings. (Just before we went to press, the *Times Higher Education* published its first ever ranking of worldwide computer science departments, placing Oxford third in the world overall, and first in the UK.) In terms of scale and breadth of research interests, the present Department of Computer Science bears very little resemblance to the Computer Laboratory that Bill joined nearly 40 years ago; but in terms of quality, as these rankings clearly testify, the Department remains world class.

Bill has also been involved in the administration of Univ since he was appointed a tutorial fellow in 1983. Notably, he was appointed as a tutorial fellow in Computer Science two years prior to the degree launching! Bill therefore taught Mathematics for the first two years of his fellowship, which was a major contributor to the cohesion between Computer Science and Mathematics at Univ, something that continues to this day.

No account of Bill would be complete without the mention of his wife Coby, whom he met during his student days at Univ. Their story began in college over a computer and an accounting system in need of some software. The rest is history, filled with amazing stories of their travels around the world together.

November 2016

Thomas Gibson-Robinson
Philippa Hopcroft
Ranko Lazić

Concurrency, Security, and Puzzles

Essays Dedicated to Andrew William Roscoe on the
Occasion of His 60th Birthday

Gibson-Robinson, Th.; Hopcroft, P.; Lazić, R. (Eds.)

2017, XVIII, 319 p. 58 illus., Softcover

ISBN: 978-3-319-51045-3