

SICSA Report on the 28th UK Performance Engineering Workshop

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1 The Workshop

The 28th UK Performance Engineering Workshop (UKPEW) was held in the School of Informatics at the University of Edinburgh on the 2nd of July 2012. The workshop was first held in the (then) Department of Computer Science at the University of Edinburgh. Although UKPEW has been held in Edinburgh many times since then it is always good to have it come back again.

UKPEW is the leading UK forum for the presentation of all aspects of performance modelling and analysis of computer and telecommunication systems. It is the primary event at which the UK performance community can get together to present and discuss their work.

This year the workshop displayed the usual range of themes across modelling, modelling languages, analysis techniques, simulation, measurement, and case studies to illustrate these.

2 Meeting summary

The invited keynotes at the workshop came from Prof Katinka Wolter (Berlin) and Dr Nigel Thomas (Newcastle). Katinka Wolter's keynote was on stochastic models in the analysis of dependable systems and contained a detailed treatment of the important role of precise time synchronisation in dependable systems. Nigel Thomas' keynote stressed the valuable role that formal modelling languages (in his case, the Markovian process algebra PEPA) play in modelling studies, illustrating his talk with examples from areas as diverse as secure communication protocols and patient movement between treatment centres in hospitals.

One of the most exciting developments in performance modelling in recent years has been the move from individuals-based models to population-based models. This is underpinned by a change in the mathematical machinery used to perform the analysis, moving from discrete-state models to continuous-state models. Two of the talks in the workshop were on this theme, from Alireza Pourranjbar (Edinburgh) and Chris Guenther (Imperial College London). Alireza Pourranjbar focussed on circumstances where population-based analysis may miss some details of the dynamic behaviour of the system which you might wish to be aware of, and backed this up by comparing continuous analysis results against discrete analysis results obtained from an extensive simulation study. Chris Guenther reported on PCTMC (Population Continuous-Time Markov Chain) models of wireless sensor networks.

One hot topic in performance modelling now is energy consumption of computing equipment and two of the talks at the workshop took this as their theme. A paper by Matthew Forshaw and Nigel Thomas (Newcastle) looked at a novel approach to energy-efficient content distribution using the BitTorrent protocol. Considering protocols in these terms is a relatively new activity and adds another dimension to the difficulty of protocol design, over and above achieving authenticated, secure and efficient delivery of content. Anton Stefanek (Imperial) reported on an experiment in monitoring the energy consumption of a typically shared office in a computing department with several computers of various ages, air conditioning, a fridge and a radio. The ambient temperature and the CPU load

were also recorded, and compared against the energy consumption of the devices. The experiment was a warm-up exercise before a larger-scale study involving monitoring a student computer lab.

Performance modelling is not limited to modelling of hardware, and two papers from Warwick considered the optimisation of scientific codes which solve Physics problems on high-performance computers. Robert Bird presented a performance model of scientific software for a magnetohydrodynamics problem. The model was generated using the Structural Simulation Toolkit (SST) from Sandia National Laboratories, and validated on both a commodity cluster located at the University of Warwick and a large scale capability resource located at Lawrence Livermore National Laboratory. David Beckingsale discussed optimisation of patch distribution strategies for adaptive mesh refinement applications. Applications using adaptive mesh refinement (AMR) trade off communication for computational load balancing, to enable the focused computation of specific areas of interest.

The case studies presented illustrated the range of interests at UKPEW. Osama Younes (Newcastle) is working towards designing an analytical framework that can be used to study the effect of numerous factors on the performance of Mobile Ad hoc Networks (MANETs), where nodes move according to the random waypoint mobility model. Finally, Will Knottenbelt (Imperial) explored the relationship between official rankings of professional tennis players and rankings computed using a variant of the Google PageRank algorithm as proposed by Radicchi in 2011. For top-ranked players these two rankings are broadly in line; however, there is wide variation in the tail which would call into question the degree to which the official ranking mechanism reflects true player ability.

3 Attendees

UKPEW this year was a one-day workshop attended by 23 delegates. Of these, 8 of the delegates were from SICSA-affiliated institutions and 15 were either not SICSA-affiliated or were from industry. The SICSA institutions represented were the University of Edinburgh, Heriot-Watt University and the University of St. Andrews. Participants from non-SICSA-affiliated universities were from Imperial College London, University of Manchester, University of Newcastle, University of Southampton and University of Warwick. Although the workshop is UK-based, participants and paper authors are not restricted to have UK affiliations and this year saw contributions from presenters and authors from Berlin, Pisa and Trieste.

4 Acknowledgements

UKPEW with year was organised by Stephen Gilmore, University of Edinburgh (General Chair); Robert Holton, University of Bradford (Proceedings Chair); and Steven Wright, University of Warwick (Publicity Chair). The organising committee gratefully thanks Avril Heron and Fiona Lees of the School of Informatics for their administrative support in dealing with many aspects of the arrangements for the workshop and their associated logistics.

5 Web site

The workshop web site at <http://workshops.inf.ed.ac.uk/ukpew2012> has more details about the workshop and preprints of the papers submitted to the workshop. A post-proceedings book will be published by Springer-Verlag.