SPECIAL ISSUE EDITORIAL
PERFORMANCE ENGINEERING

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This special issue brings together extended versions of papers selected from the 21st UK Performance Engineering Workshop (UKPEW), held in Newcastle in July 2005. UKPEW is the leading UK forum for the presentation of all aspects of performance modelling and analysis of computer and telecommunication systems. The workshop attracts papers from the leading research groups in the UK and several from overseas. The papers in this issue were selected as amongst the best research presented at UKPEW 2005. They also represent a broad cross-section of performance engineering research combining sound theory and practical relevance.

The first paper is by Richard Clegg from the University of York. The paper concerns the Hurst parameter, which is used to characterise Long Range Dependence (LRD) in time-series data. LRD is closely related to self similarity, which has been observed in Internet traffic. Clegg examines some commonly used estimators for predicting the Hurst parameter, against some data with known properties. The results are both surprising and rather disconcerting. All the estimators examined perform with varying degrees of inaccuracy. Furthermore it is not possible to determine which, if any, of estimators accurately predicts the presence of LRD. Clegg recommends extreme caution and concludes that "a researcher relying on the results of any single estimator for the Hurst parameter is likely to be drawing false conclusions, no matter how sound the theoretical backing for the estimator in question".

The second paper in this issue, by Tari, Telek and Buchholz, concerns the use of a moment estimation technique to predict extreme probabilities, i.e. the probability of unlikely but significant events. Moment-based estimation has become an accepted approach in tackling large and complex models where direct solution is infeasible. In this paper the authors extend their previous work in the area to focus on the problem of calculating bounds on the distribution function. The algorithm presented is shown to be both fast and accurate.

The third paper concerns the use of service level agreements in Grid computing, and is by Padgett, Djamame and Dew. Service level agreements (SLAs) are used to set the performance demands of an application executing on a Grid. However, due to changes in workload and availability it is not always possible for the same level of performance to available for every instance of an application. Hence, the authors describe an SLA management system which predicts the remaining execution time for an application and may perform remedial action, including migration, in order to best meet the service demand. Experimental data is presented from the White Rose Grid, currently one of the largest and most successful Grids in the UK.

Simsek, Wolter and Coskun present an analysis of a proposed new wireless LAN protocol, 802.11e. This protocol is designed to give better support to real time traffic, such as voice over IP, by enforcing traffic requirements over wireless links. This paper focuses on the QBSS (Quality of service enhanced Basic Service Set) and presents

results from simulation which show some poor performance from the proposed standard.

Jarvis *et al*, present a paper on peer to peer live media streaming. The focus of the work concerns the efficiency of various overlays, which determine where each peer downloads from. The organisation of peers is clearly a crucial part of the performance and reliability of the system and the authors present some simulation results which underline this. A new algorithm is proposed, called *The Heap Algorithm*, which is shown to outperform the other algorithms considered in relation to service delay, service reliability and protocol overhead.

The final paper, by Lamprecht *et al*, concerns the problem of additional overhead introduced by security measures. The paper covers a number of measurement based experiments into the efficiency of various cryptographic algorithms. The results presented are not altogether intuitive and show a wide variation, not only between different algorithms, but also between different implementations of the same algorithm. The paper focuses on web services and in particular VeriSign's Trusted Services Integration Kit (TSIK). The conclusions drawn from the study include the observation that TSIK would be more efficient without compromising security if alternative algorithms were employed.

As guest editor for this special issue I would like to express my thanks to all involved in UKPEW 2005. In particular, I would like to thank the authors of the papers included in this special issue for their diligence and hard work. I would also like to thank the anonymous reviewers, without whom it would not be possible to run any workshop, conference or journal.

research interests lie within the field of performance engineering. His principal activity involves in Markov modelling using queueing theory and stochastic process algebra. The areas of application that interest him most at present are security (including e-voting) and the grid (principally scheduling and hosting problems). He is also working with models of massively parallel systems in computer science, sociology and behavioural biology, using stochastic process algebra.

BIOGRAPHY

Dr Thomas has been a lecturer in the School of Computing Science at the University of Newcastle since January 2004. Prior to this he was a lecturer at the University of Durham for five years. Most of his