VOLUME 29 ■ NUMBER 1 JANUARY 2004

SOFTWARE ENGINEERING NOTES

An Informal Newsletter Published by the Association for Computing Machinery
SPECIAL INTEREST GROUP ON SOFTWARE ENGINEERING

WOSP'04

Proceedings of the

Fourth International Workshop on Software and Performance

Redwood Shores, California, USA • January 14-16, 2004

Sponsored by the

Association for Computing Machinery

Special Interest Group on Measurement and Evaluation (SIGMETRICS)

and Special Interest Group on Software Engineering (SIGSOFT)

SIGSOFT
SPECIAL INTEREST GROUP ON SOFTWARE ENGINEERING

WOSP 04

Proceedings of the
Fourth International Workshop on Software and Performance
Redwood Shores, California
January 14-16, 2004

Sponsored by the
Association for Computing Machinery
SIGSOFT
and
SIGMETRICS
in cooperation with IFIP WG 6.3 and 7.3

Meeting hosted by
Oracle Corporation
Redwood Shores, California, USA

Contents

Software Performance Tools and Techniques

Estimating the CPU Utilization of a Rule-Based System 1
Alberto Avritzer, Johannes Ros and Elaine Weyuker (AT&T Labs)

Software performance modelling using PEPA nets 13
Stephen Gilmore, Jane Hillston (LFCS, Edinburgh),
Leila Kloul (LFCS, Edinburgh and PRISM, Versailles) and
Marina Ribaudo (DISI, Genova)

From UML Activity Diagrams To Stochastic Petri Nets: Application To Software Performance Engineering 25
Juan Pablo Lóopez-Grao, José Merseguer and Javier Campos (Universidad de Zaragoza)

Performance Analysis

Performance Lies My Professor Told Me: The Case for Teaching Software Performance Engineering to Undergraduates 37
Robert Dugan (Stonehill College)

Expressing Performance Requirements using Regular Expressions to specify Stochastic Probes over Process Algebra Models 49
Ashok Argent-Katwala, Jeremy T. Bradley and Nicholas J. Dingle (Imperial College, London)

Towards Automatic Compositional Performance Analysis of Component-based Systems 59
Vincenzo Grassi (Universita di Roma TorVergata) and
Raffaela Mirandola (Universita di Roma TorVergata)

Application of the Operational Profile in Software Performance Analysis 64
Zakarya Alzamil (Riyadh College of Technology)

Rapid Performance Prediction for Library Components 69
Sibylle Schupp, Marcin Zalewski and Kyle Ross (Chalmers University of Technology)

Analysing UML 2.0 activity diagrams in the software performance engineering process 74
Catherine Canevet, Stephen Gilmore, Jane Hillston (LFCS, Edinburgh),
Leila Kloul (LFCS, Edinburgh and PRISM, Versailles) and
Perdita Stevens (LFCS, Edinburgh)

An Autonomic Failure-Detection Algorithm for Distributed Object Systems 79
Kevin Mills (National Institue of Standards and Technology (NIST)),
Scott Rose, Steve Quirolgico (NIST),
Mackenzie Britton (Southern Methodist University) and
Ceryen Tan (Montgomery Blair High School)

Performance Measurement and Modeling I

Application Performance on the Direct Access File System 84
Alexandra Fedorova, Margo Seltzer, Kostas Magoutis and Salimah Addetia (Harvard University)

Early Performance Testing of Distributed Software Applications 94
Giovanni Denaro (Universita degli Studi di Milano-Bicocca),
Andrea Polini (ISTI-CNR) and
Wolfgang Emmerich (University College London)

MUDD: A Multi-Dimensional Data Generator 104
John M. Stephens (Gradient Systems) and
Meikel Poess (Oracle Corporation)

Early-stage performance modeling and its application for integrated embedded control software design 110
Shige Wang and Kang Shin (University of Michigan)

Experimenting different software architectures performance techniques: a case study 115
Simonetta Balsamo (Universita Ca Foscari di Venezia),
Antinisca Di Marco, Paola Inverardi (Universita dell'Aquila) and
Moreno Marzolla (Universita Ca Foscari di Venezia)

Incorporating SPE into MDA: Including Middleware Performance Details into System Models 120
Tom Verdickt, Bart Dhoedt, Frank Gielen and Piet Demeester (Ghent University - IMEC)

Exploring Architectural Scalability 125
Gunnar Brataas, Peter Hughes (IDI, NTNU, Trondheim, Norway)

Performance Engineering

Software Performance Engineering of a Web Services-Based Clinical Decision Support Infrastructure 130
Christina Catley, Dorina C Petriu (Carleton University) and
Monique Frize (Carleton University, University of Ottawa)

Profiling Java Applications Using Code Hotswapping and Dynamic Call Graph Revelation (position paper) 139
Mikhail Dmitriev (Sun Microsystems Laboratories)

Efficient Approximation of Response Time Densities and Quantiles in Stochastic Models 151
Susanna Au-Yeung, Nicholas Dingle and William Knottenbelt (Imperial College London)

Applying Fixed Priority Scheduling in Practice 156
Raimondas Lencevicius and Alexander Ran (Nokia Research Center)

Validated Observation and Reporting of Microscopic Performance using Pentium II Counter Facilities 161
Haleh Najafzadeh and Seth Chaiken (University at Albany, State University of New York)

Predicting the Performance of Middleware-based Applications At The Design Level 166
Yan Liu, Alan Fekete (University of Sydney) and
Ian Gorton (Pacific Northwest National Laboratory)

Topology Based Automation of Distributed Applications Management 171
Umesh Bellur (IIT Bombay)

Performance and Quality of Service

Computing the Performability of Layered Distributed Systems with a Management Architecture 174
Olivia Das and Murray Woodside (Carleton University)

A Framework for QoS-Aware Software Components 186
Daniel Menascé, Honglei Ruan and Hassan Gomaa (George Mason University)

Towards a UML profile for QoS: a contribution in the reliability domain 197
Vittorio Cortellessa and Antonio Pompei (Universita dell'Aquila)

Performance Measurement and Modeling II

Generating Realistic Workloads for Network Intrusion Detection Systems 207
Spyros Antonatos (ICS-FORTH),
Kostas Anagnostakis (University of Pennsylvania) and
Evangelos Markatos (ICS-FORTH)

Using Locality of Reference to Improve Performance of Peer-to-Peer Applications 216
Marcelo Barbosa, Melissa Costa, Jussara Almeida and Virglio Almeida (Federal University of Minas Gerais)

Collecting Whole-System Reference Traces of Multiprogrammed and Multithreaded Workloads 228
Scott Kaplan (Amherst College)

Software Performance Engineering of Component-based Systems 238
Antonia Bertolino (ISTI, CNR Pisa) and
Raffaela Mirandola (University of Roma TorVergata)

A framework to model and analyze the performability of mobile software systems 243
Paola Bracchi and Vittorio Cortellessa (University of L'Aquila)

Performance of Parallel Architectures for CORBA-Based Systems 249
Ming Huo and Shikharesh Majumdar (Carleton Univ.)

A Performance Analysis Approach Based on the UML Class Diagram 254
Ahmad Alsaadi (University of Dortmund)

Visualization of Java Workloads Using Ternary Diagrams 261
Jozo Dujmović and Carl Herder (San Francisco State University)

Software Engineering and Performance Engineering

Operating System Scenarios as Use Case Maps 266
Edward Billard (California State University, Hayward)

Performance of Publish/Subscribe Middleware in Mobile Wireless Networks 278
Umar Farooq, Eric Parsons and Shikharesh Majumdar (Carleton University)

Performance Modeling from Software Components 290
Xiuping Wu and Murray Woodside (Carleton University)

Author Index 302