

PERFORMANCE EVALUATION REVIEW

Special Issue

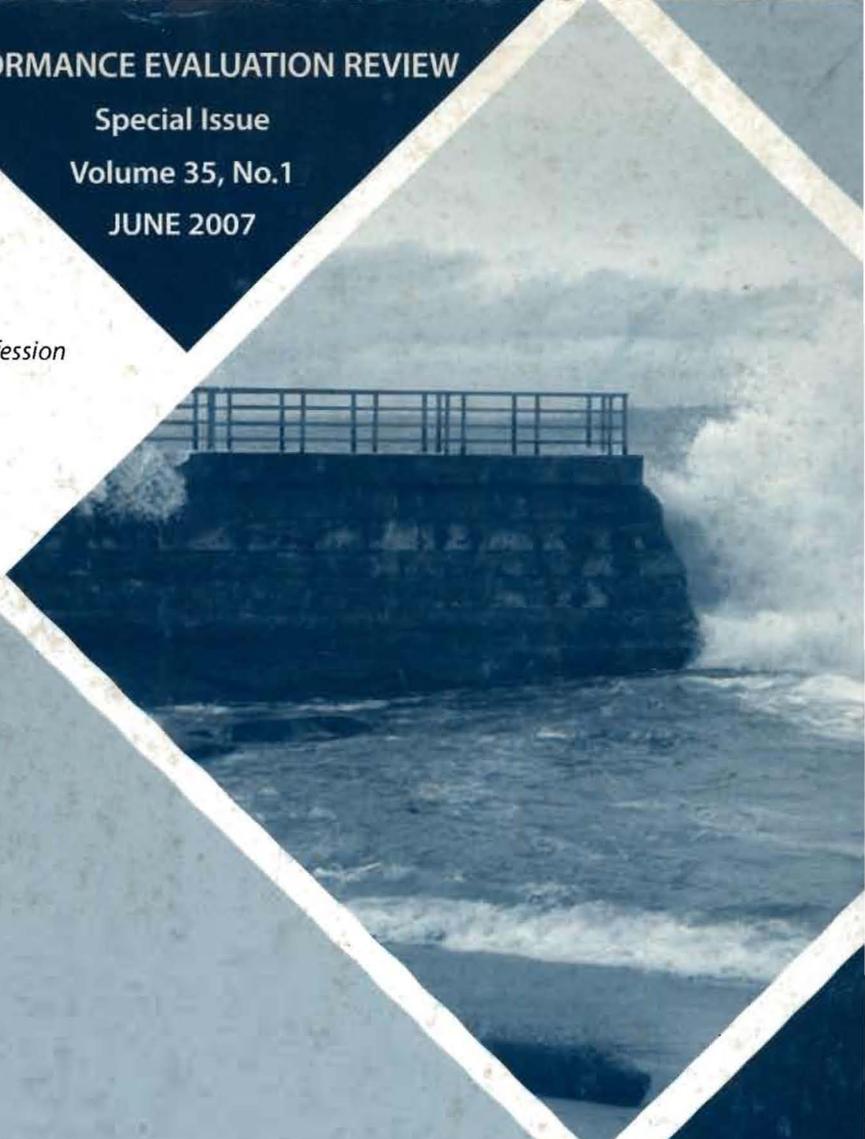
Volume 35, No.1

JUNE 2007



Association for
Computing Machinery

Advancing Computing as a Science & Profession



SIGMETRICS'07

Proceedings of the 2007 International Conference on
Measurement & Modeling of Computer Systems

June 12-16, 2007 • San Diego, California, USA

Sponsored by:

ACM SIGMETRICS

and supported by:

**HP Research, IBM Research, Google,
Microsoft Research & VMWare**

Table of Contents

SIGMETRICS'07 Organization	ix
Sponsor & Supporters	xii

Thursday, June 14th

Session 1: Storage • 9:15–11:15 am

Session Chair: J. Douceur (*Microsoft Research*)

- **Modeling and Improving Data Cache Reliability** 1
I. Kadayif (*Canakkale Onsekiz Mart University*),
M. Kandemir (*The Pennsylvania State University*)
- **ρ Clock: An Arrival Curve Based Approach
for QoS Guarantees in Shared Storage Systems** 13
A. Gulati (*Rice University*), A. Merchant (*Hewlett Packard Laboratories*),
P. J. Varman (*Rice University*)
- **QoS Policies and Architecture for Cache/Memory in CMP Platforms** 25
R. Iyer, L. Zhao (*Intel Corporation*), F. Guo (*North Carolina State University*),
R. Illikkal, S. Makineni, D. Newell (*Intel Corporation*),
Y. Solihin (*North Carolina State University*),
L. Hsu, S. Reinhardt (*University of Michigan at Ann Arbor*)
- **Best Paper Award: Modeling the Relative Fitness of Storage** 37
M. P. Mesnier, M. Wachs, R. R. Sambasivan, A. X. Zheng, G. R. Ganger (*Carnegie Mellon University*)

Session 2: Network Measurement • 1:30–3:30 pm

Session Chair: S. Banerjee (*University of Wisconsin-Madison*)

- **Facilitating Focused Internet Measurements** 49
Z. Wen, S. Triukose, M. Rabinovich (*Case Western Reserve University*)
- **Diagnosing Network Disruptions with Network-Wide Analysis** 61
Y. Huang, N. Feamster (*Georgia Institute of Technology*), A. Lakhina (*Guavus, Inc.*),
J. Xu (*Georgia Institute of Technology*)
- **Understanding Network Delay Changes Caused by Routing Events** 73
H. Pucha (*Purdue University*), Y. Zhang, Z. M. Mao, Y. C. Hu (*University of Michigan at Ann Arbor*)

Session 3: Networking 1 • 4:00–6:00 pm

Session Chair: Y. C. Tay (*National University of Singapore*)

- **Two-Phase Routing, Scheduling and Power Control
for Wireless Mesh Networks with Variable Traffic** 85
A. Kashyap (*University of Maryland*), S. Sengupta, R. Bhatia, M. Kodialam (*Bell Laboratories*)
- **A Machine Learning Approach to TCP Throughput Prediction** 97
M. Mirza, J. Sommers, P. Barford, X. Zhu (*University of Wisconsin at Madison*)
- **Sensitivity of PCA for Traffic Anomaly Detection** 109
H. Ringberg (*Princeton University*), A. Soule (*Thomson Research*),
J. Rexford (*Princeton University*), C. Diot (*Thomson Research*)
- **Backbone Construction in Selfish Wireless Networks** 121
S. Lee (*AT&T Laboratories - Research*), D. Levin (*University of Maryland*),
V. Gopalakrishnan (*AT&T Laboratories - Research*),
B. Bhattacharjee (*University of Maryland*)

Friday, June 15th

Session 4: Theory • 8:45–10:15 am

Session Chair: M. Squillante (*IBM Watson Research Laboratories*)

- **Scalability of Fork/Join Queueing Networks with Blocking** 133
C. H. Xia, Z. Liu (*IBM T.J. Watson Research Center*), D. Towsley (*University of Massachusetts*),
M. Lelarge (*INRIA & Ecole Normale Supérieure*)
- **Optimizing System Configurations Quickly by Guessing at the Performance** 145
T. Osogami, S. Kato (*IBM Tokyo Research Laboratory*)
- **Sizing Sketches: A Rank-Based Analysis for Similarity Search** 157
Z. Wang, W. Dong, W. Josephson, Q. Lv, M. Charikar, K. Li (*Princeton University*)

Session 5: Systems/Architecture • 8:45–10:15 am

Session Chair: A. Merchant (*Hewlett Packard Laboratories*)

- **Managing Energy-Performance Tradeoffs for Multithreaded Applications on Multiprocessor Architectures** 169
S. Park, W. Jiang, Y. Zhou, S. Adve (*University of Illinois at Urbana-Champaign*)
- **An Algorithm for Approximate Counting Using Limited Memory Resources** 181
A. Cvetkovski (*Boston University*)
- **Synthetic Designs: A New Form of True Experimental Design for Use in Information Systems Development** 191
E. S. Lee (*Saint Mary's University*), T. Whalen (*Communications Research Centre*)

Session 6: Scheduling • 10:30–11:30 am

Session Chair: A. Wierman (*Eindhoven University of Technology*)

- **PBS: A Unified Priority-Based Scheduler** 203
H. Feng, V. Misra, D. Rubenstein (*Columbia University*)
- **Adaptive and Scalable Comparison Scheduling** 215
P. R. Jelenkovic, X. Kang, J. Tan (*Columbia University*)

Session 7: Time Varying Workloads • 1:30–2:30 pm

Session Chair: M. Harchol-Balter (*Carnegie Mellon University*)

- **Optimal Capacity Planning in Stochastic Loss Networks with Time-Varying Workloads** 227
S. Bhadra (*University of Texas*), Y. Lu, M. S. Squillante (*IBM T.J. Watson Research Center*)
- **Flow-level Stability of Data Networks with Non-convex and Time-varying Rate Regions** 239
J. Liu (*Princeton University*), A. Proutière (*KTH*), Y. Yi, M. Chiang, H. V. Poor (*Princeton University*)

Future Research Directions Session • 2:30–3:45 pm

Session Chair: E. Smirni (*College of William and Mary*)

- **Panel: Future Directions in Performance Evaluation Research** 251
F. Damera (*National Science Foundation*), A. Greenberg (*Microsoft Research*),
A. Hoisie (*Los Alamos National Laboratory*), D. Towsley (*University of Massachusetts*)

Saturday, June 16th

Session 8: Systems • 8:30–10:30 am

Session Chair: J. Xu (*Georgia Tech*)

- **Wire Speed Packet Classification Without TCAMs: A Few More Registers (And a Bit of Logic) Are Enough** 253
Q. Dong, S. Banerjee (*University of Wisconsin*), J. Wang (*AT&T Laboratories - Research*),
D. Agrawal (*University of Wisconsin*)

- **Data Layouts for Object-Oriented Programs**265
M. Hirzel (*IBM T.J. Watson Research Center*)
- **Building High Accuracy Bloom Filters using Partitioned Hashing**277
F. HaoM. Kodialam, T. V. Lakshman (*Bell Laboratories*)
- **An Analysis of Latent Sector Errors in Disk Drives**289
L. N. Bairavasundaram, G. R. Goodson, S. Pasupathy, J. Schindler (*University of Wisconsin at Madison*)

Session 9: Networking 2 • 11:00am–1:00 pm

Session Chair: TBD

- **Clustering and Sharing Incentives in BitTorrent Systems**301
A. Legout (*INRIA Sophia Antipolis*), N. Liogkas, E. Kohler, L. Zhang (*University of California at Los Angeles*)
- **Distributed Link Scheduling with Constant Overhead**313
S. Sanghavi (*Massachusetts Institute of Technology*), L. Bui, R. Srikant (*CSL, UIUC*)
- **Theoretical Bounds on Control-Plane Self-Monitoring in Routing Protocols**325
R. K. Rajendran, V. Misra, D. Rubenstein (*Columbia University*)
- **Oblivious Routing for Fat-Tree Based System Area Networks with Uncertain Traffic Demands**337
X. Yuan, W. Nienaber, Z. Duan (*Florida State University*), R. Melhem (*University of Pittsburgh*)

Friday, June 15th

Poster Session • 4:00–5:30 pm

- **Evaluating SIP Server Performance**349
E. M. Nahum, J. Tracey, C. P. Wright (*IBM T.J. Watson Research Center*)
- **Pipeline Spectroscopy**351
T. R. Puzak, A. Hartstein, V. Srinivasan, P. G. Emma (*IBM T.J. Watson Research Center*),
A. Nadas (*New York University School of Medicine*)
- **Bottom-k Sketches: Better and More Efficient Estimation of Aggregates**353
E. Cohen (*AT&T Laboratories - Research*), H. Kaplan (*Tel Aviv University*)
- **GRE Encapsulated Multicast Probing: A Scalable Technique for Measuring One-Way Loss**355
Y. Gu (*University of Massachusetts*), L. Breslau, N. Duffield, S. Sen (*AT&T Laboratories - Research*)
- **When Is Service Really Denied? A User-Centric DoS Metric**357
J. Mirkovic (*University of Delaware*), A. Hussain, B. Wilson (*SPARTA, Inc.*),
S. Fahmy, W.-M. Yao (*Purdue University*), P. Reiher (*University of California at Los Angeles*),
S. Schwab, R. Thomas (*SPARTA, Inc.*)
- **Does Internet Media Traffic Really Follow Zipf-like Distribution?**359
L. Guo, E. Tan (*The Ohio State University*), S. Chen (*George Mason University*),
Z. Xiao (*IBM Research*), X. Zhang (*The Ohio State University*)
- **Comparative Characterization of SPEC CPU2000 and CPU2006 on Itanium® Architecture**361
A. Kejariwal (*University of California at Irvine*),
G. F. Holflehner, D. Desai, D. M. Lavery (*Intel Corporation*),
A. Nicolau, A. V. Veidenbaum (*University of California at Irvine*)
- **Power Reduction Through Measurement and Modeling of Users and CPUs: Summary**363
B. Lin, A. Mallik, P. A. Dinda, G. Memik, R. P. Dick (*Northwestern University*)
- **Generating Representative ISP Topologies From First-Principles**365
C. Wang, J. Byers (*Boston University*)
- **Bounding Damage From Link Destruction, with Application to the Internet**367
G. D. Bissias, B. N. Levine, A. Rosenberg (*University of Massachusetts at Amherst*)

• Semi-Supervised Network Traffic Classification	369
J. Erman (<i>University of Calgary</i>), A. Mahanti (<i>Indian Institute of Technology (Delhi)</i>), M. Arlitt (<i>Enterprise Systems & Software Laboratories & University of Calgary</i>), I. Cohen (<i>Enterprise Systems & Software Laboratories</i>), C. Williamson (<i>University of Calgary</i>)	
• Efficient Management of Idleness in Systems	371
N. Mi (<i>College of William and Mary</i>), A. Riska (<i>Seagate Research</i>), Q. Zhang (<i>Microsoft</i>), E. Smimi (<i>College of William and Mary</i>), E. Riedel (<i>Seagate Research</i>)	
• Asynchronous Iterative Solution for State-Based Performance Metrics	373
D. V. de Jager J. T. Bradley (<i>Imperial College London</i>)	
• Analyzing Commercial Processor Performance Numbers for Predicting Performance of Applications of Interest	375
K. Hostel L. Eeckhout (<i>Ghent University</i>), H. Blockeel (<i>K. U. Leuven</i>)	
• BRADO: Scalable Streaming through Reconfigurable Trees	377
J. He (<i>Princeton University</i>), A. Chaintreau (<i>Thomson Paris Research Laboratory</i>)	
• QBETS: Queue Bounds Estimation from Time Series	379
D. Nurmi (<i>University of California at Santa Barbara</i>), J. Brevik (<i>California State University</i>), R. Wolski (<i>University of California at Santa Barbara</i>)	
• Pong: Diagnosing Spatio-Temporal Internet Congestion Properties	381
L. Deng I. A. Kuzmanovic (<i>Northwestern University</i>)	
• Mean Delay Optimization for the M/G/1 Queue with Pareto Type Service Times	383
S. Aalto (<i>TKK Helsinki University of Technology</i>), U. Ayesta (<i>LAAS-CNRS</i>)	
Author Index	385