

2012 IEEE 20th International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems

(MASCOTS 2012)

**Washington, DC, USA
7 – 9 August 2012**



**IEEE Catalog Number: CFP12010-PRT
ISBN: 978-1-4673-2453-3**

2012 IEEE 20th International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems

MASCOTS 2012

Table of Contents

Message from the General Chair.....	xi
Message from the Program Chairs.....	xii
Committee Lists.....	xiii
Reviewers.....	xv
Keynote 1.....	xvi
Keynote 2.....	xvii

Session I-A: Cloud and Cluster Operations I

A Scalable Algorithm for Placement of Virtual Clusters in Large Data Centers	3
<i>Asser N. Tantawi</i>	
Two Sides of a Coin: Optimizing the Schedule of MapReduce Jobs to Minimize Their Makespan and Improve Cluster Performance	11
<i>Abhishek Verma, Ludmila Cherkasova, and Roy H. Campbell</i>	
Squeezing Out the Cloud via Profit-Maximizing Resource Allocation Policies	19
<i>Michele Mazzucco, Martti Vasar, and Marlon Dumas</i>	

Session I-B: Wireless Networks I

Multi-armed Bandit Congestion Control in Multi-hop Infrastructure Wireless Mesh Networks	31
<i>A.B.M. Alim Al Islam, S.M. Iftekharul Alam, Vijay Raghunathan, and Saurabh Bagchi</i>	
A Cross-Layer Analytical Model to Estimate the Capacity of a WiMAX Network	41
<i>A.B.M. Alim Al Islam and Vijay Raghunathan</i>	
Wireless Spectrum Occupancy Prediction Based on Partial Periodic Pattern Mining	51
<i>Pei Huang, Chin-Jung Liu, Li Xiao, and Jin Chen</i>	

Session II-A: Network Simulations

Comparing the ns-3 Propagation Models	61
<i>Mirko Stoffers and George Riley</i>	
Taming Wild Horses: The Need for Virtual Time-Based Scheduling of VMs in Network Simulations	68
<i>Srikanth B. Yeginath, Kalyan S. Perumalla, and Brian J. Henz</i>	
Towards Traffic Benchmarks for Empirical Networking Research: The Role of Connection Structure in Traffic Workload Modeling	78
<i>Jay Aikat, Shaddi Hasan, Kevin Jeffay, and F. Donelson Smith</i>	

Session II-B: Network Performance

Fair Scheduling on Parallel Bonded Channels with Intersecting Bonding Groups	89
<i>Gongbing Hong, James Martin, Scott Moser, and James Westall</i>	
Solving the TCP-Incast Problem with Application-Level Scheduling	99
<i>Maxim Podlesny and Carey Williamson</i>	
MMPP Characterization of Web Application Traffic	107
<i>Ali Rajabi and Johnny W. Wong</i>	

Session III-A: Simulation Techniques

Accelerating Multi-threaded Application Simulation through Barrier-Interval Time-Parallelism	117
<i>Paul D. Bryan, Jason A. Poovey, Jesse G. Beu, and Thomas M. Conte</i>	
Modeling Large Scale Circuits Using Massively Parallel Discrete-Event Simulation	127
<i>Elsa Gonsiorowski, Christopher Carothers, and Carl Tropper</i>	
Transparent and Efficient Shared-State Management for Optimistic Simulations on Multi-core Machines	134
<i>Alessandro Pellegrini, Roberto Vitali, Sebastiano Peluso, and Francesco Quaglia</i>	

Session III-B: Sensor Network Systems

Connectivity in Wireless Sensor Networks in the SINR Model	145
<i>Min Kyung An, Nhat X. Lam, Dung T. Huynh, and Trac N. Nguyen</i>	
A Practical Approach for Target Tracking in Sparsely Deployed Binary Sensor Network	153
<i>Deepak Jeswani, Ankit Kesharwani, Sneha Chaudhari, Vaishali P. Sadaphal, and R.K. Ghosh</i>	
Hop Distance Analysis in Partially Connected Wireless Sensor Networks	161
<i>Yun Wang, Brendan M. Kelly, and Aimin Zhou</i>	

Session IV-A: Data and I/O Systems

Understanding Scalability and Performance Requirements of I/O-Intensive Applications on Future Multicore Servers	171
<i>Shoaib Akram, Manolis Marazakis, and Angelos Bilas</i>	
SMART-IO: SysteM-AwaRe Two-Level Data Organization for Efficient Scientific Analytics	181
<i>Yuan Tian, Scott Klasky, Weikuan Yu, Hasan Abbasi, Bin Wang, Norbert Podhorszki, Ray Grout, and Matthew Wolf</i>	
Reliability of Data Storage Systems under Network Rebuild Bandwidth Constraints	189
<i>Vinodh Venkatesan, Ilias Iliadis, and Robert Haas</i>	

Session IV-B: File Storage Systems

Assuring Demanded Read Performance of Data Deduplication Storage with Backup Datasets	201
<i>Young Jin Nam, Dongchul Park, and David H.C. Du</i>	
Cooperative Storage-Level De-duplication for I/O Reduction in Virtualized Data Centers	209
<i>Min Li, Shravan Gaonkar, Ali R. Butt, Deepak Kenchammana, and Kaladhar Voruganti</i>	
Content Sharing Dynamics in the Global File Hosting Landscape	219
<i>Aniket Mahanti, Niklas Carlsson, and Carey Williamson</i>	

Session V-A: Execution Tools

Energy-Aware Execution of Fork-Join-Based Task Parallelism	231
<i>Thomas Rauber and Gudula Rünger</i>	
Power-Sleuth: A Tool for Investigating Your Program's Power Behavior	241
<i>Vasileios Spiliopoulos, Andreas Sembrant, and Stefanos Kaxiras</i>	
Performance Modeling of Design Patterns for Distributed Computation	251
<i>Ronald Strebelow, Mirco Tribastone, and Christian Prehofer</i>	

Session V-B: Memory System Design

Extrapolation Pitfalls When Evaluating Limited Endurance Memory	261
<i>Rishiraj A. Bheda, Jesse G. Beu, Brian P. Railng, and Thomas M. Conte</i>	
Making Write Less Blocking for Read Accesses in Phase Change Memory	269
<i>Jianhui Yue and Yifeng Zhu</i>	
Machine Learning-Based Self-Adjusting Concurrency in Software Transactional Memory Systems	278
<i>Diego Rughetti, Pierangelo Di Sanzo, Bruno Ciciani, and Francesco Quaglia</i>	

Session VI-A: Cloud and Cluster Operations II

Coordinated VM Resizing and Server Tuning: Throughput, Power Efficiency and Scalability	289
--	-----

Yanfei Guo and Xiaobo Zhou

Reducing Scalability Collapse via Requester-Based Locking on Multicore Systems	298
--	-----

Yan Cui, Yingxin Wang, Yu Chen, Yuanchun Shi, Wei Han, Xin Liao, and Fei Wang

Evaluation of Multi-core Scalability Bottlenecks in Enterprise Java Workloads	308
---	-----

Xavier Guerin, Wei Tan, Yanbin Liu, Seetharami Seelam, and Parijat Dube

Session VI-B: Disk Storage Systems I

H-SWD: Incorporating Hot Data Identification into Shingled Write Disks	321
--	-----

Chung-I Lin, Dongchul Park, Weiping He, and David H.C. Du

Extent Mapping Scheme for Flash Memory Devices	331
--	-----

Young-Kyo Suh, Bongki Moon, Alon Efrat, Jin-Soo Kim, and Sang-Won Lee

Emulating a Shingled Write Disk	339
---------------------------------------	-----

*Rekha Pitchumani, Andy Hospodor, Ahmed Amer, Yangwook Kang, Ethan L. Miller,
and Darrell D.E. Long*

Session VII-A: Wireless Networks II

Using Software-Defined Radio to Validate Wireless Models in Simulation	349
--	-----

Ketan Mandke and Scott M. Nettles

Barrier Counting in Mixed Wireless Sensor Networks	359
--	-----

Shambhavi Srinivasa, Carey Williamson, and Zongpeng Li

Session VII-B: Processor Caches

MERCURY: A Scalable and Similarity-Aware Scheme in Multi-level Cache Hierarchy	371
---	-----

Yu Hua, Xue Liu, and Dan Feng

Performance Modeling and Characterization of Large Last Level Caches	379
--	-----

Parijat Dube, Michael Tsao, Li Zhang, and Alan Bivens

Session VIII: Best Papers

Carbon-Aware Energy Capacity Planning for Datacenters	391
---	-----

Chuangang Ren, Di Wang, Bhuvan Urgaonkar, and Anand Sivasubramaniam

A Numerical Algorithm for the Decomposition of Cooperating Structured Markov Processes	401
---	-----

Andrea Marin, Samuel Rota Bulò, and Simonetta Balsamo

Evolutionary Trends in a Supercomputing Tertiary Storage Environment	411
--	-----

Joel C. Frank, Ethan L. Miller, Ian F. Adams, and Daniel C. Rosenthal

Session IX-A: Applications and Infrastructure

A Measurement Study of Network Coding in Peer-to-Peer Video-on-Demand Systems	423
<i>Saikat Sarkar and Mea Wang</i>	
Enhancing File Transfer Scheduling and Server Utilization in Data Distribution Infrastructures	431
<i>Daniel Higuero, Juan M. Tirado, Florin Isaila, and Jesús Carretero</i>	
Improving the Performance Efficiency of an IDS by Exploiting Temporal Locality in Network Traffic	439
<i>Govind Sreekar Shenoy, Jordi Tubella, and Antonio González</i>	

Session IX-B: Disk Storage Systems II

PCM-Based Durable Write Cache for Fast Disk I/O	451
<i>Zhuo Liu, Bin Wang, Patrick Carpenter, Dong Li, Jeffrey S. Vetter, and Weikuan Yu</i>	
Scheduling in Flash-Based Solid-State Drives - Performance Modeling and Optimization	459
<i>Werner Bux, Xiao-Yu Hu, Ilias Iliadis, and Robert Haas</i>	
On the Use of GPUs in Realizing Cost-Effective Distributed RAID	469
<i>Aleksandr Khasymski, M. Mustafa Rafique, Ali R. Butt, Sudharshan S. Vazhkudai, and Dimitrios S. Nikolopoulos</i>	

Poster Papers

Hybrot: Towards Improved Performance in Hybrid SLC-MLC Devices	481
<i>Muthukumar Murugan and David H.C. Du</i>	
Split Phase Multi-channel MAC Protocols - Formal Specification and Analysis	485
<i>Abdelaziz El Fatni and Guy Juanole</i>	
Analyzing Parallelization and Program Performance in Heterogeneous MPSoCs	489
<i>Chao Wang, Xi Li, Junneng Zhang, Gangyong Jia, Peng Chen, and Xuehai Zhou</i>	
OpenAirInterface Traffic Generator (OTG): A Realistic Traffic Generation Tool for Emerging Application Scenarios	492
<i>Aymen Hafsaoui, Navid Nikaein, and Lusheng Wang</i>	
Frequency Affinity: Analyzing and Maximizing Power Efficiency in Multi-core Systems	495
<i>Gangyong Jia, Xi Li, Chao Wang, Xuehai Zhou, and Zongwei Zhu</i>	
NetSim-Steer: A Runtime Steering Framework for Network Simulators	498
<i>Selim Ciraci and Bora Akyol</i>	
Energy-Efficient Cached DIMM Architecture	501
<i>Mu-Tien Chang, Joe Gross, and Bruce Jacob</i>	
Energy-Aware Replica Selection for Data-Intensive Services in Cloud	504
<i>Bo Li, Shuaiwen Song, Ivona Bezakova, and Kirk W. Cameron</i>	

Analysis of Prediction and Replacement Algorithms Applied to Real Workload for Storage Devices	507
<i>Ioram S. Sette, Bruno F.S. Cartaxo, Thun Pin T.F. Chiu, Abel Silva-Filho, Rodrigo E. Assad, José Dirceu Ramos, and Hamilton Coutinho</i>	
Performance and Power Consumption Measurement of Java Application Servers	510
<i>Hitoshi Oi and Sho Niboshi</i>	
Using QNA to Evaluate Parameter Tuning in Mission Critical SOA Networks	513
<i>M. Todd Gardner and Cory Beard</i>	
Energy-efficient Resource Management for QoS-guaranteed Computing Clusters	516
<i>Kaiqi Xiong</i>	
Author Index	519