2013 IEEE Eighth International Conference on Networking, Architecture and Storage

(NAS 2013)

Xi’an, Shaanxi, China
17 – 19 July 2013
# 2013 IEEE Eighth International Conference on Networking, Architecture and Storage

## NAS 2013

### Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td></td>
<td>xi</td>
</tr>
<tr>
<td>Organizing Committee</td>
<td></td>
<td>xiii</td>
</tr>
<tr>
<td>Technical Program Committee Vice-Chairs</td>
<td></td>
<td>xiv</td>
</tr>
<tr>
<td>Technical Program Committee</td>
<td></td>
<td>xv</td>
</tr>
<tr>
<td>Steering Committee</td>
<td></td>
<td>xviii</td>
</tr>
</tbody>
</table>

### Session 1A: Wireless Network

- McDisc: A Reliable Neighbor Discovery Protocol in Low Duty Cycle and Multi-channel Wireless Networks ........................................................................... 1  
  **Maotian Zhang, Lei Zhang, Panlong Yang, and Yubo Yan**

  **Li Yue, Dongliang Xie, Jiatong Zhao, and Jie Zhang**

- An Energy Aware Protocol for Cyclic Monitoring Wireless Sensor Networks ......................................................................................... 13  
  **Ittipong Khemapech, Ishbel Duncan, and Alan Miller**

### Session 1B: Microarchitecture

- A HW/SW Co-design of Execution Migration for Shared-ISA Heterogeneous Chip Multiprocessors ............................................................................. 23  
  **Hongwei Liu, Bo Sang, Jing Huang, Ji Qiu, and Xiang Gao**

- Spontaneous Reload Cache: Mimicking a Larger Cache with Minimal Hardware Requirement ................................................................. 31  
  **Lunkai Zhang, Mingzhe Zhang, Lingjun Fan, Da Wang, and Paolo Ienne**

- BFEPM: Best Fit Energy Prediction Modeling Based on CPU Utilization .................................................................................................. 41  
  **Xiao Zhang, Jianjun Lu, and Xiao Qin**
Session 1C: Solid-State Storage

Improve Effective Capacity and Lifetime of Solid State Drives .......................................................... 50
   Ping Huang, Guangping Wan, Ke Zhou, Miaoqing Huang, Chunhua Li, and Hua Wang

A New Metadata Update Method for Fast Recovery of SSD Cache .................................................. 60
   Jing Yang and Qing Yang

Performance Analysis of NAND Flash Based Cache for Network Storage System ............................... 68
   Lin Han, Hao Huang, and Changsheng Xie

Session 2A: Network Service

A Mechanism of Maintaining the Survivability of Streaming Media Service in Overlay Networks ...................... 76
   Bo Bai, Jihong Zhao, and Hua Qu

A Specific Scheme for Rate-Controlled Smooth Scheduling Based on Timeslot-Iteration ......................... 81
   Ji Li, Zheng Wan, Zhonghua Li, and Naixue Xiong

Session 2B: Data Center

MCD: Overcoming the Data Download Bottleneck in Data Centers ..................................................... 88
   Jürgen Kaiser, Dirk Meister, Viktor Gottfried, and André Brinkmann

A Congestion Control Algorithm for Datacenters .................................................................................. 98
   Zhengwei Zhao, Zhixiong Jiang, Chunyang Lu, Yushan Cai, and Jingping Bi

Session 2C: Data & Storage System

PEAM: Predictive Energy-Aware Management for Storage Systems ...................................................... 105
   Xunfei Jiang, Ji Zhang, Mohammed I. Alghamdi, Xiao Qin, Minghua Jiang, and Jifu Zhang

DynaM: Dynamic Multiresolution Data Representation for Large-Scale Scientific Analysis ....................... 115
   Yuan Tian, Scott Klasky, Weikuan Yu, Bin Wang, Hasan Abbasi, Norbert Podhorszki, and Ray Grout
Session 3A: Virtualization
Comparisons of Memory Virtualization Solutions for Architectures with Software-Managed TLBs .......................................................... 125
  Yunfang Tai, Wanwei Cai, Qi Liu, Ge Zhang, and Wenzhi Wang
Charriot: A High Compatible Architecture to Improve Virtual Machine Reliability ........................................ 131
  Hao Zheng, Xiaoshe Dong, Endong Wang, Baoke Chen, Weifeng Gong,
  and Xingjun Zhang

Session 3B: Internet & Web
An Evolvable Locator/ID Separation Internet Architecture (ELISIA) .............................................................. 141
  Haitao Zhang, Xing Li, and Congxiao Bao
Mining User Interests in Web Logs of an Online News Service Based on Memory Model ........................................ 151
  Wei Wang, Dongyan Zhao, Haining Luo, and Xin Wang

Session 3C: Interconnect
High-Speed Multicast Scheduling for All-Optical Packet Switches ........................................................... 156
  Zhiyang Guo and Yuanyuan Yang
IX-Level Adversaries on Entry- and Exit-Transmission Paths in Tor Network ........................................ 166
  Peipeng Liu, Jinqiao Shi, Lihong Wang, Xiao Wang, and Qingfeng Tan

Session 4A: Network on Chip
REPAIR: A Reliable Partial-Redundancy-Based Router in NoC .............................................................. 173
  Lei Xie, Kuizhi Mei, and Yuhai Li
Robustness Analysis of Mesh-Based Network-on-Chip Architecture under Flooding-Based Denial of Service Attacks ........................................ 178
  Dabin Fang, Huikai Li, Jun Han, and Xiaoyang Zeng
SPC: An Approach to Guarantee Performance in Cost Oriented Mapping Algorithm for NoC Architectures ........................................ 187
  Qinghua Wu, Leibo Liu, Shouyi Yin, Yu Ren, and Shaojun Wei

Session 4B: Analytical Model
The Prediction Mathematical Model for HO Performance in LTE Networks ........................................ 191
  Xiaohui Zhao, Xinlong Luo, Tong Wu, and Dengkun Xiao
A Novel Method for Computing Encoding Delay and Bandwidth on Network Coding Node ........................................ 198
  Yuxing Wu, Xingjun Zhang, Song Cen, Li Wang, and Xiaoshe Dong
### Session 4C: Three Musketeers

- Scheduling Algorithms for Handling Updates in Shingled Magnetic Recording .................................................205  
  **Kalyana Sundaram Venkataraman, Tong Zhang, Wenzhe Zhao, Hongbin Sun, and Nanning Zheng**

  **Xia Zhang, Jinyu Zhan, Wei Jiang, and Yue Ma**

- An Optimized GP-GPU Warp Scheduling Algorithm for Sparse Matrix-Vector Multiplication  
  **Lifeng Liu, Meilin Liu, and Chong-Jun Wang**

### Short Paper Session 1A: Networks 1

- Multiple Channel Assignment and Recovery Algorithm for MR-MC Network .................................................232  
  **Ping Ren**

- Defence against Botnets: A Formal Definition and a General Framework .........................................................237  
  **Lei Cao and Xiaofeng Qiu**

- A New Interest-Sensitive and Network-Sensitive Method for User Recommendation ........................................242  
  **Yanmin Shang, Peng Zhang, and Yanan Cao**

- Research on English Learning Strategy Usage in Web-Based and Conventional Environments  
  **Zhi Wen**

### Short Paper Session 1B: Architecture

- Luminance and Chrominance Parallelization of H.264/AVC Decoding on a Multi-core Processor  
  **Xiaofu Meng, Xiang Gao, Qian Yu, Shuangshuang Zhang, Xiaochun Zhang, and Jing Huang**

- Parallel Algorithm for Approximate String Matching with K Differences .......................................................257  
  **Longjiang Guo, Shufang Du, Meirui Ren, Yu Liu, Jinbao Li, Jing (Selena) He, Ning Tian, and Keqin Li**

- Analysis of Sparse Matrix-Vector Multiplication Using Iterative Method in CUDA ...........................................262  
  **Rashid Hassani, Amirreza Fazely, Riaz-Ul-Ahsan Choudhury, and Peter Luksch**

- Design of a Quadruple Precision Floating-Point Fused Multiply-Add Unit Based on 4-Way SIMD Device  
  **He Jun, Wang Biao, and Zhu Ying**
Short Paper Session 1C: Storage
Optimize Multidimensional Arrays Queries with Heterogeneous Replica Method ......................................................................................................................................................272
Meiqi Zhu, Xiaomeng Huang, Songbin Liu, Haohuan Fu, Qiming Fang, and Guangwen Yang
An FPGA-Based Random Functional Verification Method for Cache ......................................................277
Li Tiejun, Zhang Jianmin, and Li Sikun
Evaluating Memory Compression and Deduplication ..................................................................................282
Yuhui Deng, Liangshan Song, and Xinyu Huang

Short Paper Session 2A: Networks 2
One Wide-Sense Circuit Tree per Traffic Class Based Inter-domain Multicast ........................................287
Chen Yue, Li Chaoling, Huang Kaixiang, and Zhang Xiaobo
A Pre-buffer Mechanism in Multi-channel P2P Live Streaming ................................................................292
Pan Wang, Hao Huang, and Changsheng Xie
Battery-Aware MAC Analytical Modeling for Extending Lifetime of Low Duty-Cycled Wireless Sensor Network ........................................................................................................................................297
Yulin Li, Shouyi Yin, Leibo Liu, Shaojun Wei, and Dong Wang
A Variant-Hop Algorithm in Forming Bluetooth Sensor Networks ............................................................302
Chih-Min Yu and Yih-Bin Yu

Short Paper Session 2B: Networks 3
An Effective Feature Selection Approach for Network Intrusion Detection ..............................................307
Fengli Zhang and Dan Wang
An Improved Ant Colony Clustering Method for Network Intrusion Detection ........................................312
Meng Lingxi and Sun Guang
An Optimization Algorithm for PAPR Reduction in OFDM System Based on Tabu Search ........................317
Ding Shuyan, Shu Ruo, Li Shibao, and Gu Zhaozhi

Short Paper Session 2C: "Four Musketeers"
A Novel Web Service Composition Recommendation Approach Based on Reliable QoS ..........................321
Wang Denghui, Huang Hao, and Xie Changsheng
Dynamic Workflow Planning on Programmable Infrastructure ....................................................................326
Wenchao Jiang, Zhiming Zhao, Adianto Wibisono, Paola Grosso, and Cees de Laat
A New Approach to Multi-objective Virtual Machine Placement in Virtualized Data Center .................................................................331
  Sinong Wang, Huaxi Gu, and Gang Wu

D-PALD: A Dynamic Power-Aware Load Dispatcher with Response Time Percentile Guarantee in Heterogeneous Clusters .................................................................336
  Xu Zhou, Qiang Cao, Changsheng Xie, and Xubin He

Author Index ..................................................................................................................................................................341