

# **2014 IEEE International Symposium on Parallel and Distributed Processing with Applications**

**(ISPA 2014)**

**Milan, Italy  
26-28 August 2014**



**IEEE Catalog Number: CFP1446F-POD  
ISBN: 978-1-4799-4292-3**

# 2014 IEEE International Symposium on Parallel and Distributed Processing with Applications

## ISPA 2014

### Table of Contents

|                                   |     |
|-----------------------------------|-----|
| Message from General Chairs ..... | ix  |
| Message from Program Chairs ..... | x   |
| Organizing Committee .....        | xi  |
| Technical Program Committee ..... | xii |
| Keynotes .....                    | xv  |

---

### Resource Allocation

|   |    |
|---|----|
| FM-Index on GPU: A Cooperative Scheme to Reduce Memory Footprint .....                                  | 1  |
| <i>Alejandro Chacón, Santiago Marco-Sola, Antonio Espinosa, Paolo Ribeca,<br/>and Juan Carlos Moure</i> |    |
| Analyzing the Energy Efficiency of the Memory Subsystem in Multicore<br>Processors .....                | 10 |
| <i>Sandra Catalán, Jorge González-Domínguez, Rafael Mayo,<br/>and Enrique S. Quintana-Ortí</i>          |    |
| Virtualizing Storage as Memory for High Performance Storage Access .....                                | 18 |
| <i>Shuichi Oikawa</i>   |    |
| A Proactive Customer-Aware Resource Allocation Approach for Data Centers .....                          | 26 |
| <i>Filippo Seracini, Xiang Zhang, Tajana Rosing, and Ingolf Krüger</i>                                  |    |

### Parallel Workloads

|   |    |
|---|----|
| Parallel Subgraph Counting for Multicore Architectures .....  | 34 |
| <i>David Oliveira Aparício, Pedro Manuel Pinto Ribeiro,<br/>and Fernando Manuel Augusto da Silva</i>  |    |
| Automatic Tuning of a Parallel Pattern Library for Heterogeneous Systems<br>with Intel Xeon Phi ..... | 42 |
| <i>Jiri Dokulil and Siegfried Benkner</i>   |    |

|  |    |
|--|----|
| petaPar: A Scalable Petascale Framework for Meshfree/Particle Simulation ..... | 50 |
| <i>Leisheng Li, Yingrui Wang, Zhitao Ma, and Rong Tian</i>                     |    |

## **Applications**

|   |    |
|---|----|
| A Shape-Shifting Distributed Meta-algorithm for Modular Robots .....                                  | 58 |
| <i>Hakim Mabed and Julien Bourgeois</i>   |    |
| A High Performance Compression Method for Climate Data .....  | 68 |
| <i>Songbin Liu, Xiaomeng Huang, Yufang Ni, Haohuan Fu, and Guangwen Yang</i>                          |    |
| A Utility-Maximizing Tasks Assignment Method for Rendering Cluster System .....                       | 78 |
| <i>Jianhang Huang, Weiguo Wu, and Qian Li</i>   |    |
| An Open-Source, Efficient, and Parameterizable Hardware Implementation<br>of the AES Algorithm .....  | 85 |
| <i>Alessandro Antonio Nacci, Vincenzo Rana, Donatella Sciuto,<br/>and Marco Domenico Santambrogio</i> |    |

## **Cloud, Social Networks, and Service Oriented Architectures**

|   |     |
|---|-----|
| Efficient Routing Algorithms Combining History and Social Predictors in Mobile<br>Social Networks ..... | 93  |
| <i>Xiao Chen, Chengyin Liu, and Cong Liu</i>  |     |
| Estimating Effective Slowdown of Tasks in Energy-Aware Clouds .....                                     | 101 |
| <i>Altino M. Sampaio and Jorge G. Barbosa</i>   |     |
| The Impact of Service Semantics on the Consistent Recovery in SOA .....                                 | 109 |
| <i>Mateusz Holenko, Anna Kobusinska, Dariusz Wawrzyniak, and Piotr Zierhoffer</i>                       |     |
| A High-Throughput and Low-Latency Parallelization of Window-Based Stream<br>Joins on Multicores .....   | 117 |
| <i>Daniele Buono, Tiziano De Matteis, and Gabriele Mencagli</i>   |     |

## **Runtime Management and Resource Optimization in Heterogeneous Computing Systems**

|   |     |
|---|-----|
| OpenCL Application Auto-tuning and Run-Time Resource Management<br>for Multi-core Platforms .....   | 127 |
| <i>Davide Gadioli, Simone Libutti, Giuseppe Massari, Edoardo Paone,<br/>Michele Scandale, Patrick Bellasi, Gianluca Palermo, Vittorio Zaccaria,<br/>Giovanni Agosta, William Fornaciari, and Cristina Silvano</i> |     |
| FPGA-Based Design Using the FASTER Toolchain: The Case of STM Spear<br>Development Board .....  | 134 |
| <i>F. Spada, A. Scolari, G.C. Durelli, R. Cattaneo, M.D. Santambrogio, D. Sciuto,<br/>D.N. Pnevmatikatos, G.N. Gaydadjiev, O. Pell, A. Brokalakis, W. Luk,<br/>D. Stroobandt, and D. Pau</i>                      |     |

|  |     |
|--|-----|
| Runtime Resource Management in Heterogeneous System Architectures: The SAVE Approach .....   | 142 |
| <i>Gianluca C. Durelli, Marcello Pogliani, Antonio Miele, Christian Plessl, Heinrich Riebler, Marco D. Santambrogio, Gavin Vaz, and Cristiana Bolchini</i> |     |
| Cross Resource Optimisation of Database Functionality across Heterogeneous Processors .....  | 150 |
| <i>Eoghan O'Neill, John McGlone, J.G.F Coutinho, Andrew Doole, Carmelo Ragusa, O. Pell, and P. Sanders</i>   |     |

## **Present and Future Directions in the Reconfigurable Computing Domain**

|   |     |
|---|-----|
| Trace-Based Reconfigurable Acceleration with Data Cache and External Memory Support .....   | 158 |
| <i>Nuno Miguel Cardanha Paulino, João Canas Ferreira, and João Manuel Paiva Cardoso</i>     |     |
| Future Trends on Adaptive Processing Systems .....  | 166 |
| <i>Benedikt Janßen, Jones Y. Mori, Osvaldo Navarro, Diana Göhringer, and Michael Hübner</i> |     |
| Elastic Management of Reconfigurable Accelerators .....                                     | 174 |
| <i>Paul Grigoras, Max Tottenham, Xinyu Niu, Jose G.F. Coutinho, and Wayne Luk</i>           |     |

## **Fault Tolerance and Simulation in the Multicore Era**

|   |     |
|---|-----|
| EURETILE Design Flow: Dynamic and Fault Tolerant Mapping of Multiple Applications Onto Many-Tile Systems .....  | 182 |
| <i>Lars Schor, Iuliana Bacivarov, Luis Gabriel Murillo, Pier Stanislaw Paolucci, Frédéric Rousseau, Ashraf El Antably, Robert Buecs, Nicolas Fournel, Rainer Leupers, Devendra Rai, Lothar Thiele, Laura Tosoratto, Piero Vicini, and Jan Weinstock</i> |     |
| A Hierarchical Architecture Description for Flexible Multicore System Simulation .....  | 190 |
| <i>Thomas Bruckschloegl, Oliver Oey, Michael Rückauer, Timo Stripf, and Jürgen Becker</i>   |     |
| The DeSyRe Runtime Support for Fault-Tolerant Embedded MPSoCs .....   | 197 |
| <i>Dionisios Pnevmatikatos, Dionisios Pnevmatikatos, Stavros Tzilis, and Ioannis Sourdis</i>  |     |

## Poster Session

|  |            |
|--|------------|
| Hardware Managers with File System Support for Faster Dynamic Partial Reconfiguration .....                                | 205        |
| <i>Fernando A. Escobar, Jimmy Tarrillo, Xin Chang, and Carlos Valderrama</i>   |            |
| Misleading Generalized Itemset Mining in the Cloud .....   | 211        |
| <i>Elena Baralis, Luca Cagliero, Tania Cerquitelli, Silvia Chiusano, Paolo Garza, Luigi Grimaudo, and Fabio Pulvirenti</i> |            |
| BwMan: Bandwidth Manager for Elastic Services in the Cloud .....   | 217        |
| <i>Ying Liu, Vamis Xhagjika, Vladimir Vlassov, and Ahmad Al-Shishtawy</i>  |            |
| Dynamic Frequency Scaling for Energy Consumption Reduction in Synchronous Distributed Applications .....                   | 225        |
| <i>Jean-Claude Charr, Raphaël Couturier, Ahmed Fanfakh, and Arnaud Giersch</i>   |            |
| Efficient Multicast Algorithms for Mesh and Torus Networks .....   | 231        |
| <i>Hovhannes A. Harutyunyan and Ankit Malani</i>   |            |
| Kernel-User Space Separation in DRAM Memory .....  | 237        |
| <i>Xi Li, Beilei Sun, Zongwei Zhu, Chao Wang, and Xuehai Zhou</i>  |            |
| A Survey on Recent Hardware and Software-Level Cache Management Techniques .....   | 242        |
| <i>Alberto Scolari, Filippo Sironi, Donatella Sciuto, and Marco Domenico Santambrogio</i>                                  |            |
| GPGPU Implementation of Nearest Neighbor Search with Product Quantization .....  | 248        |
| <i>Akiyoshi Wakatani and Akio Murakami</i>   |            |
| <b>Author Index</b> .....  | <b>254</b> |