

Autonomic Applications Workshop

17 December, 2003

Hyderabad, India

Current Trends: Smaller/Cheaper/Faster/Powerful/Connected

- Explosive growth in computation, communication, information and integration technologies
 - *computing is ubiquitous, pervasive – communication is/will be*
- Pervasive “anytime-anywhere” access environments
 - *ubiquitous access to information via PCs, PDAs, Cells, smart appliances, etc. (billions of devices, millions of users)*
 - *peers capable of producing/consuming/processing information at different levels and granularities*
 - *embedded devices in clothes, phones, cars, mile-markers, traffic lights, lamp posts, refrigerators, medical instruments ...*
- “On demand” computational/storage resources, services

The bad news ...

- Unprecedented
 - *scales, complexity, heterogeneity, dynamism and unpredictability, lack of guarantees*
 - *Millions of businesses, Trillions of devices, Millions of developers and users, Coordination and communication between them*
- The increasing system complexity is reaching a level beyond human ability to design, manage and secure
 - *programming environments and infrastructure are becoming unmanageable, brittle and insecure*

Autonomic Computing?

- Nature has evolved to cope with scale, complexity, heterogeneity, dynamism and unpredictability, lack of guarantees
 - *self configuring, self adapting, self optimizing, self healing, self protecting, highly decentralized, heterogeneous architectures that work !!!*
 - *e.g. the autonomic nervous system*
 - *tells you heart how fast to beat, checks your blood's sugar and oxygen levels, and controls your pupils so the right amount of light reaches your eyes as you read these words, monitors your temperature and adjusts your blood flow and skin functions to keep it at 98.6°F*
 - *coordinates - an increase in heart rate without a corresponding adjustment to breathing and blood pressure would be disastrous*
 - *is autonomic - you can make a mad dash for the train without having to calculate how much faster to breathe and pump your heart, or if you'll need that little dose of adrenaline to make it through the doors before they close*
 - *can these strategies inspire solutions?*
 - *of course, there is a cost*
 - *lack of controllability, precision, guarantees, comprehensibility, ...*
 - *A.I. ? – duplication of human thought is not the ultimate goal*

Autonomic Applications Workshop (AAW)

- Objective: Establish a forum to investigate the research issues and enabling technologies toward the convergence of biological, technological and information systems (called Autonomic Computing). Autonomic computing research will enable the design of the next generation of applications that are capable of managing, controlling and optimizing themselves. This workshop will focus on the research issues and challenges facing the development of autonomic applications that are self-defining, self-configuring, self-healing, self-optimizing, self-anticipating, contextually aware of their environments, and open.
- Thank you
 - *All of you*
 - *Sponsor: IBM India*
 - *Keynote Speaker – Professor Viktor K. Prasanna*
 - *Authors*
 - *Program committee*
 - *HiPC Workshop Chair – C.P. Ravikumar*
 - *HiPC 2003 Organizers*
 - *All of you*

AAW 2003 – Schedule

2:00-2:15 PM	Welcome/Opening Remarks – M. Parashar
2:15-3:30 PM	Energy efficiency of adaptive computing systems - Prof. Viktor Prasanna, University of Southern California, USA (Abstract)
3:30-4:00 PM	BREAK
4:00-6:00 PM	Autonomic Applications: Technical Session
4:00-4:30 PM	A Model to Integrate Live Bio-Sensor Nodes for Autonomic Pervasive Environments <i>A. Banerjee, D. Saha, IIM Calcutta, India</i>
4:30-5:00 PM	vGrid: A Framework for Development and Execution of Autonomic Grid Applications <i>B. Khargharia, S. Hariri, B. Kim, M. Zhang, P. Vadlamani, University of Arizona, AZ, USA</i> <i>M. Parashar, Rutgers University, NJ, USA</i>
5:00-5:30 PM	GridARM: An Autonomic Runtime Management Framework for SAMR Applications in Grid Environments <i>S. Chandra, X. Li, M. Parashar, Rutgers University, NJ, USA</i> <i>S. Hariri, University of Arizona, AZ, USA</i>
5:30-6:00 PM	Fault-Tolerant Mobile Agents Computing on Open Networks <i>R. B. Patel, K. Garg, IIT Roorkee, India</i>
6:00 PM	Closing Remarks

Related Conferences

- International Conference on Autonomic Computing (ICAC 2004)
 - *May 17-18, 2004, New York, NY, USA*
 - www.autonomic-conference.org
 - *In conjunction with the 13th International World Wide Web Conference*
- Challenges of Large Applications in Distributed Environments (CLADE 2004)
 - *June 7th, 2004, Honolulu, HI, USA*
 - <http://www.caip.rutgers.edu/clade2004/>
 - *In conjunction with the 13th International Symposium on High Performance Distributed Computing (HPDC 13)*

AAW 2003 – Keynote Address

Energy efficiency of adaptive computing systems

Professor Viktor K. Prasanna

University of Southern California

<http://ceng.usc.edu/~prasanna>

Recently energy dissipation has become an important performance metric. We outline an algorithm level design methodology for optimizing the energy performance of configurable computing fabrics and introduce "malleable algorithms" as an approach to develop energy efficient soft IP (Intellectual Property) cores for Field Programmable Gate Arrays (FPGAs). We consider several kernels in adaptive signal processing in Software Defined Radio (SDR) and demonstrate energy and time efficient algorithms and implementations for these on configurable logic. We demonstrate improved performance using algorithmic optimizations. The performance of FPGAs is also compared against state of the art embedded processors, general purpose processors, and DSPs.