

Taliver Heath

Curriculum Vitae

Department of Computer Science
Rutgers University
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Education

Ph.D. Computer Science, Rutgers University Dissertation : “Energy Conservation Using Component Level Modeling”	May 2005
Masters in Computer Science, Rutgers University	January 2004
B.S. in Computer Science and Physics Florida State University	May 1995

Employment

Teaching Assistant and Lecturer Introduction to Computer Applications (Head TA from Spring 2003 until May 2004)	Aug 1999 - Present
Instructor at Naval Nuclear Power School Taught Nuclear Physics and Reactor Principles Top Secret Clearance Level	July 1995 - August 1999
Interned at Argonne National Laboratories as Programmer	1992 - 1994
Research Assistant for FSU Physics Department Upper Isomers of Odd-A Atomic Nuclei	September 1992 - May 1993

Honors and Distinctions

- Taliver Heath, Eduardo Pinheiro, Jerry Hom, Ulrich Kremer, Ricardo Bianchini, “Application Transformations for Energy and Performance-Aware Device Management”, *The Proceedings of the The Eleventh International Conference on Parallel Architectures and Compilation Techniques*, 2002 and winner of the Best Student Paper Award.
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Publications

Journals and Related Publications

1. Taliver Heath, Bruno Diniz, Enrique V. Carrera, Wagner Meira Jr., and Ricardo Bianchini, “Energy Conservation in Heterogeneous Server Clusters”, To appear in *ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming(PPoPP)*, June 2005
2. T. Heath, E. Pinheiro, J. Hom, U. Kremer, and R. Bianchini. “Code Transformations for Energy-Efficient Device Management”, *IEEE Transactions on Computers*, 2004.
3. E. Pinheiro, R. Bianchini, E. V. Carrera, and T. Heath. “Dynamic Cluster Reconfiguration for Power and Performance”. *Kluwer Academic Publishers*, September 2003.
4. T. Heath, B. Diniz, E. V. Carrera, W. Meira Jr., and R. Bianchini “Self-Configuring Heterogeneous Server Clusters”. *Proceedings of the Workshop on Compilers and Operating Systems for Low Power (COLP)*, September 2003.
5. Taliver Heath, Eduardo Pinheiro, Jerry Hom, Ulrich Kremer, Ricardo Bianchini, “Application Transformations for Energy and Performance-Aware Device Management”, *The Proceedings of the The Eleventh International Conference on Parallel Architectures and Compilation Techniques(PACT)*, September 2002

6. T. Heath, R. P. Martin, T. D. Nguyen, "Improving Cluster Availability Using Workstation Validation", *The Proceedings of the International Conference on Measurement and Modeling of Computer Systems(SIGMETRICS)*, June 2002.
7. T. Heath, E. Pinheiro, and R. Bianchini. "Application-Supported Device Management for Energy and Performance". *Proceedings of the Workshop on Power-Aware Computer Systems (PACS)*, February 2002.
8. T. Heath, R. P. Martin, T. D. Nguyen. "The Shape of Failure", *The Proceedings of the First Workshop on Evaluating and Architecting System dependability(EASY)*, June 2001.
9. E. Pinheiro, R. Bianchini, E. V. Carrera, and T. Heath. "Load Balancing and Unbalancing for Power and Performance in Cluster-Based Systems". *Proceedings of the Workshop on Compilers and Operating Systems for Low Power(COLP)*, September 2001.
10. T. Heath, S. Kaur, R. Martin, and T. Nguyen, "Quantifying the Impact of Architectural Scaling on Communication" *Proceedings of the 7th IEEE International Symposium on High-Performance Computer Architecture(HPCA)*, January, 2001

Projects, Current and Past

- **Quantifying The Impact of Architecture Scaling on Communication** From April 2000 until January 2001, I worked on a project involving quantifying how persistent increases in processor speed compared to I/O speed reduce the performance gap between specialized, high-performance messaging layers and general-purpose protocols, such as TCP/IP and UDP/IP. The projections showed that the performance benefit afforded by specialized messaging for small messages would significantly erode.
- **Modeling Cluster Failures** From January 2000 until December 2001, I worked on modeling Internet services as a collection of interconnected components, each possessing well-defined interfaces and failure semantics. Our observations of 3 distinct clusters showed that the time between reboots was best modeled by a Weibull distribution with shape parameters of less than 1, implying that a workstation becomes more reliable the longer it has been operating. Leveraging this observed property, we designed an allocation strategy which showed that approximately 70% of the workstation failures can be masked from end clients with 30% extra capacity added to the cluster.
- **Mobile Hard Drive Energy Usage** From July 2001 until October 2002, a fellow student and I studied the energy usage of mobile disk devices. We determined the potential benefits of application-supported device management for optimizing energy and performance. We considered application transformations that increase device idle times and inform the operating system about the length of each upcoming period of idleness. We found that the transformations we proposed could reduce disk energy consumption from 55% to 89% with only a small degradation in performance.
- **Cluster-wide Modeling for Resource Usage** From July 2002 until the present, I have been designing and implementing energy-efficient servers for heterogeneous clusters. This required defining an efficiency metric, modeling the different types of nodes with respect to the metric, searching for request distributions that optimize the metric, and implementing a few adaptive server systems. The experimental results for a cluster comprised of traditional and blade nodes showed that our design can consume 43% less energy than an energy-oblivious server.