

Rebecca L. Collins

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RESEARCH INTERESTS

- Programming methodologies for multi-core and parallel systems
- Performance enhancements of latency-insensitive systems

EDUCATION

Columbia University

- Ph.D. student, Computer Science 9/05 – present
GPA 4.0/4.0

University of Tennessee - Knoxville

- M.S., Computer Science 12/04
GPA 4.0/4.0, Thesis: *A Framework for Downloading Wide-Area Files*
- B.S., Computer Science, Minor Mathematics 5/03
GPA 3.95/4.0, Summa Cum Laude

HONORS

- NDSEG Fellowship, 2005 Recipient, 3 year Graduate Fellowship [2005-2008]
- Computer Science Service Award, Columbia University, 2006, 2007
- Citation for Outstanding Academic Achievement, University of Tennessee, 2003
- Honors Scholar, University of Tennessee, 1999-2003
- Kimberly-Clark Scholarship, 2002 (first scholarship given by UT's CS Dept.)
- National Merit Scholarship, Presidential Scholarship, University of Tennessee, 2000-2003

RESEARCH EXPERIENCE

Research Assistant, System-Level Design Group, Columbia University 9/05 – present

- Evaluating trade-offs between data mapping and concurrency for recursive parallel programs
- Developing load balancing techniques for stream programming with the Gedae programming tool
- Examined how topology influences throughput performance in latency-insensitive systems
- Formally verified two implementations of the latency-insensitive design library

Intern, IBM T.J.Watson Research Center, IBM Corporation Summer 2007

- Conducted study of the trade-offs of high-level programming tools on streaming multi-core systems
- Evaluated the Cell BE processor vs. the NVIDIA GeForce 8800 GPU for general purpose programs
- Implemented parallel benchmarks Bitonic Sort, Binomial Options Pricing, and Smith-Waterman alignment with the RapidMind programming tool

Research Assistant, Network Computing Lab, Columbia University 9/05 – 8/06

- Augmented a Linux sound device driver to enable audio capture in the THINC thin-client system
- Evaluated VoIP performance of the thin client on a PDA

Research Assistant, Logistical Computing and Internetworking Lab, University of Tennessee 1/04 – 7/05;

- Participated in a study of small optimal parity-check erasure codes 8/02 – 5/03
- Empirically analyzed algorithms for downloading distributed wide-area files
- Built a content-addressable server that uses MD5 hashes as an extension to the Internet Backplane Protocol

Research Assistant, Computational Theory and Algorithms Group, University of Tennessee 6/03 – 12/03

- Developed code for kernelization methods for Vertex Cover

- Dynamic load balancing for the fixed-parameter tractable formulation of Vertex Cover

Intern, System Administration Group for Environmental Molecular Sciences Lab,
Pacific Northwest National Laboratory

Summer 2002

TEACHING EXPERIENCE

- Teaching Assistant for Computer Architecture, Columbia University, Fall 2008
- Teaching Assistant for Distributed Embedded Systems, Columbia University, Spring 2007
- Teaching Assistant for Graduate Theory Foundations Course, Univ. of Tenn., Fall 2003

COMMUNITY SERVICE

- Organized Women in Computer Science Mentoring Program, Fall 2008
- Coffee Hour Czar, 1/06 – 5/07

PUBLICATIONS

Refereed Journal Papers

- R. L. Collins and L. P. Carloni, "Topology-Based Performance Analysis and Optimization of Latency-Insensitive Systems", *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems* (to appear).

Refereed Conference Papers

- R. L. Collins and L. P. Carloni, "Topology-Based Optimization of Maximal Sustainable Throughput in a Latency-Insensitive System", *Design Automation Conference (DAC)*, June 2007.
- C. Li, R.L.Collins, S. Sonalkar, L.P.Carloni, "Design, Implementation, and Validation of a New Class of Interface Circuits for Latency-Insensitive Design", *International Conference on Formal Methods and Models for Codesign (MEMOCODE)*, May 2007.
- J. S. Plank, A. L. Buchsbaum, R. L. Collins and M. G. Thomason, "Small Parity-Check Erasure Codes - Exploration and Observations," *The International Conference on Dependable Systems and Networks (DSN)*, June 2005.
- R. L. Collins and J. S. Plank, "Assessing the Performance of Erasure Codes in the Wide-Area," *The International Conference on Dependable Systems and Networks (DSN)*, June 2005.
- R. L. Collins and J. S. Plank, "Downloading Replicated, Wide-Area Files – a Framework and Empirical Evaluation," *The 3rd IEEE International Symposium on Network Computing and Applications (NCA)*, August 2004.
- N. E. Baldwin, R. L. Collins, M. A. Langston, M. R. Leuze, C. T. Symons and B. H. Voy, "High Performance Computational Tools for Motif Discovery," *IEEE International Workshop on High Performance Computational Biology (HiCOMB)*, April 2004.
- R. L. Collins and J. S. Plank, "Content-Addressable IBP – Rationale, Design and Performance," *IEEE International Conference on Information Technology: Coding and Computing (ITCC)*, April 2004.
- F. N. Abu-Khzam, R. L. Collins, M. R. Fellows, M. A. Langston, W. H. Suters and C.T. Symons, "Kernelization Algorithms for the Vertex Cover Problem: Theory and Experiments," *ACM-SIAM Workshop on Algorithm Engineering and Experiments (ALENEX)*, January, 2004.

Technical Reports

- R. L. Collins, "IBPCA:IBP with MD5," Technical Report CS-03-511, University of Tennessee Department of Computer Science, November, 2003.