MAHMUT TAYLAN KANDEMIR
Current Work Address
Room FG–42
Department of Electrical and Computer Engineering
Technological Institute, Northwestern University
2145 Sheridan Road
Evanston, Illinois 60208-3118
phone: +1 (847) 467-2299. fax : +1 (847) 467-4144
e-mail: mtk@ece.nwu.edu

Research Interests Parallelizing compilers, Compiler optimizations for memory hierarchy, Computer architecture, Programming languages, Parallel and distributed computing, Large-scale I/O intensive applications.

Teaching Interests Compilers, Parallel and distributed computing, Computer architecture, Programming languages, Operating systems.

Ph.D. Thesis Subject Developing and implementing compiler optimizations to improve memory performance of programs running on parallel and sequential machines. The proposed techniques include both loop and data transformations and can be applied to the cache–main memory interface as well as the main memory–disk subsystem interface.

Education SYRACUSE UNIVERSITY Syracuse, NY Ph.D. candidate in Electrical Engineering and Computer Science Department.

TECHNICAL UNIVERSITY OF ISTANBUL Istanbul, TURKEY M.Sc. in Control and Computer Engineering in 1992.

TECHNICAL UNIVERSITY OF ISTANBUL Istanbul, TURKEY B.Sc. in Control and Computer Engineering in 1988.

Work Experience NORTHWESTERN UNIVERSITY Evanston, IL May 1997–present Research assistant for Dr. Alok Choudhary, visiting predoctoral fellow at Northwestern University.

SYRACUSE UNIVERSITY Syracuse, NY June 1996–May 1997 Research assistant for Dr. Alok Choudhary.

SYRACUSE UNIVERSITY Syracuse, NY June 1995–June 1996 Teaching assistant for C++ and Scheme courses.

Professional Societies and Activities Student Member, IEEE Computer Society.

Member, Phi Kappa Phi

Program Committee Member, 6th International Conference on High-Performance Computing, Dec 1999, Calcutta, India.

Talks

'Improving Locality Using Loop and Data Transformations in an Integrated Framework', CPDC, Northwestern University, Evanston, IL, Feb 23, 1999.

'Compiler Algorithms for Optimizing Locality and Parallelism on Shared Memory and Distributed Memory Machines', CPDC, Northwestern University, Evanston, IL, Nov 24, 1997.

'Data Access Reorganizations in Compiling Out-of-Core Data Parallel Programs on Distributed Memory Machines', CPDC, Northwestern University, Evanston, IL, April 21, 1997.

Talks in MICRO'98, PACT'98, Europar'98, LCPC'98, PACT'97, IOPADS'97, ICPP'97, SIAM PP'97, CPC'96.

Publications Referred Journals

'A Matrix-Based Approach to Global Locality Optimization', by **M. Kandemir**, A. Choudhary, J. Ramanujam, and P. Banerjee. Journal of Parallel and Distributed Computing Special Issue on Compilation and Architectural Support for Parallel Applications, to appear.

'A Global Communication Optimization Technique Based on Data-Flow Analysis and Linear Algebra', by **M. Kandemir**, P. Banerjee, A. Choudhary, J. Ramanujam, and N. Shenoy. ACM TOPLAS, to appear.

'Improving Cache Locality by a Combination of Loop and Data Transformations', by **M. Kandemir**, J. Ramanujam, and A. Choudhary. IEEE Transactions on Computers, Vol. 48, No. 2, February 1999.

'A Linear Algebra Framework for Automatic Determination of Optimal Data Layouts', by **M. Kandemir**, A. Choudhary, N. Shenoy, P. Banerjee, and J. Ramanujam. IEEE Transactions on Parallel and Distributed Systems, Vol. 10, No. 2, February 1999.

'Compilation Techniques for Out-of-Core Parallel Computations', by **M. Kandemir**, A. Choudhary, J. Ramanujam, and R. Bordawekar. Parallel Computing, 24(3-4):597-628, June 1998.

'Locality Optimization Algorithms for Compilation of Out-of-Core Codes', by **M. Kandemir**, A. Choudhary, J. Ramanujam, and M. Kandaswamy. Journal of Information Science and Engineering, 14(1):107-138, March 1998.

'An Experimental Study to Analyze and Optimize Hartree-Fock Application's I/O with PASSION', by M. Kandaswamy, **M. Kandemir**, A. Choudhary, and D. Bernholdt. Int. J. High Perf. Computing Applications. Volume 12, Number 4, Winter 1998, pp 411-439.

'Changing Interaction of Compiler and Architecture', by S. Adve, D. C. Burger, R. Eigenmann, A. Rawsthorne, M.D. Smith, C. Gebotys, **M. Kandemir**, D. Lilja, A. Choudhary, J. Fang, and P. Yew. In IEEE Computer,

pages 51–58, Dec 1997.

Book Chapters

'An Iteration Space Transformation Algorithm Based on Explicit Data Layout Representation for Optimizing Locality', by **M. Kandemir**, J. Ramanujam, A. Choudhary, and P. Banerjee. Languages and Compilers for Parallel Computing, S. Chatterjee et al., Eds., Lecture Notes in Computer Science, Springer-Verlag, 199 9.

'Improving Locality in Out-of-core Computations Using Data Layout Transformation s', by **M. Kandemir**, J. Ramanujam, and A. Choudhary. In Languages, Compilers, and Run-Time Systems for Scalable Computers, D. O'Hallaron et al., Eds., Lecture Notes in Com puter Science, Volume 1511, pages 359-366, Springer-Verlag, 1998.

Referred Conferences and Workshops

'On reducing false sharing while improving locality on shared memory multiprocessors', by **M. Kandemir**, A. Choudhary, J. Ramanujam, and P. Banerjee. To appear in PACT'99, Newport Beach, CA, October 1999.

'System-level Meta-data for High Performance Data Management', by A. Choudhary and **M. Kandemir**. Third IEEE Meta-data Conference, April 6-7, 1999, Bethesda, Maryland.

'Data Management for Large-Scale Scientific Computations in High Performance Distributed Systems', by A. Choudhary, **M. Kandemir**, H. Nagesh, J. No, X. Shen, V. Taylor, S. More, and R. Thakur. To appear in Proc. 8th IEEE International Symposium on High Performance Distributed Computing (HPDC'99), August 3-6, 1999, Redondo Beach, California.

'An ILP Approach for Optimizing Cache Locality', by **M. Kandemir**, P. Banerjee, A. Choudhary, J. Ramanujam, and E. Ayguade. To appear in Proc. 1999 ACM International Conference on Supercomputing (ICS'99), Rhodes, Greece, June 1999.

'A Graph Based Framework to Detect Optimal Memory Layouts for Improving Data Locality', by **M. Kandemir**, A. Choudhary, J. Ramanujam, and P. Banerjee. In Proc. 1999 International Parallel Processing Symposium (IPPS'99), San Juan, Puerto Rico, April 1999.

'Improving Locality Using Loop and Data Transformations in an Integrated Framework', by **M. Kandemir**, A. Choudhary, J. Ramanujam, and P. Banerjee. In Proc. MICRO-31, Dallas, TX, December, 1998.

'A Matrix-Based Approach to the Global Locality Optimization Problem', by **M. Kandemir**, A. Choudhary, J. Ramanujam, and P. Banerjee. In Proc. International Conference on Parallel Architectures and Compilation Techniques (PACT'98), Paris, France, October 1998.

'Enhancing Spatial Locality Using Data Layout Optimizations', by **M. Kandemir**, A. Choudhary, J. Ramanujam, N. Shenoy, and P. Banerjee. In Proc. Euro-Par'98 (Workshop on Automatic Parallelization), Southampton, UK, September 1998.

'Minimizing Data and Synchronization Costs in One-Way Communication', by **M. Kandemir**, N. Shenoy, P. Banerjee, J. Ramanujam, and A. Choudhary In Proc. 1998 International Conference on Parallel Processing (ICPP'98), Minneapolis, MN, August 1998.

'Performance Implications of Architectural and Software Techniques on I/O-Intensive Applications', by M. Kandaswamy, **M. Kandemir**, A. Choudhary, and D. Bernholdt In Proc. 1998 International Conference on Parallel Processing (ICPP'98), Minneapolis, MN, August 1998.

'A Hyperplane Based Approach for Optimizing Spatial Locality in Loop Nests', by **M. Kandemir**, A. Choudhary, N. Shenoy, P. Banerjee, and J. Ramanujam. In Proc. 1998 ACM International Conference on Supercomputing (ICS'98), Melbourne, Australia, July 1998.

'A Generalized Framework for Global Communication Optimization', by **M. Kand emir**, P. Banerjee, A. Choudhary, J. Ramanujam, and N. Shenoy. In Proc. 1998 International Parallel Processing Symposium (IPPS'98), pages 69-73, Orlando, Florida, April 1998.

'Global I/O Optimizations for Out-of-Core Computations', by **M. Kandemir**, M. Kandaswamy, and A. Choudhary. In Proc. High-Performance Computing Conference (HiPC'97) Bangalore - India, December 1997.

'Compiler Algorithms for Optimizing Locality and Parallelism on Shared and Distr ibuted Memory Machines', by **M. Kandemir**, J. Ramanujam, and A. Choudhary. In Proc. 1997 International Conference on Parallel Architectures and Compilation Techniques (P ACT'97), pages 236-247, San Francisco, CA, November 1997.

'A Unified Compiler Algorithm for Optimizing Locality, Parallelism and Communica tion in Out-of-Core Computations', by **M. Kandemir**, A. Choudhary, J. Ramanujam, and M. Kandaswamy. In Proc. IOPADS '97: Workshop on I/O in Parallel and Distributed Sys tems, co-located with SC'97 in San Jose, CA, pages 79-92, November 1997.

'Optimization and Evaluation of Hartree-Fock Application's I/O with PASSION', by M. Kandaswamy, **M. Kandemir**, A. Choudhary, and D. Bernholdt. In Proc. SC'97 Conference - (formerly known as 'Supercomputing'), November 1997.

'Optimizing Out-of-Core Computations using Chain Vectors', by **M. Kandemir**, J. Ramanujam, and A. Choudhary. In Proc. Euro-Par'97,

Lecture Notes in Computer Sci ence, Volume 1300, pages 601-608, Springer-Verlag, Passau, Germany, August 1997.

'Improving the Performance of Out-of-Core Computations', by **M. Kandemir**, J. Ramanujam, and A. Choudhary. In Proc. 1997 International Conference on Parallel Processing (ICPP'97), pages 128-136, Bloomingdale, IL, August 1997.

'A Compiler Algorithm for Optimizing Locality in Loop Nests', by **M. Kandemi r**, J. Ramanujam, and A. Choudhary. In Proc. 11th ACM International Conference on Supercomputing (ICS'97), pages 269-278, Vienna, Austria, July 1997.

'Data Access Reorganizations in Compiling Out-of-core Data Parallel Programs on Distributed Memory Machines', by **M. Kandemir**, R. Bordawekar, and A. Choudhary. In Proc. Intl. Parallel Processing Symposium (IPPS'97), April 1997.

'I/O Optimizations for Compiling Out-of-Core Programs on Distributed-Memory Machines', by **M. Kandemir**, A. Choudhary, and R. Bordawekar. In Proc. PP'97 (Eight SIAM Conference on Parallel Processing for Scientific Computing), Minneapolis, MN, March 1997.

'Optimizing Out-of-Core Computations in Uniprocessors', by **M. Kandemir**, A. Choudhary, J. Ramanujam, and R. Bordawekar. In Proc. Workshop on Architecture–Compiler Interaction, 3rd HPCA, San Antonio, TX, February 1997.

Unreferred Workshops

'Optimizing spatial locality in loop nests using linear algebra', by **M. Kandemir**, A. Choudhary, J. Ramanujam, and P. Banerjee. In Proc. 7th International Workshop on Compilers for Parallel Computers (CPC'98), Linkoping, Sweden, June 1998.

'A Unified Tiling Approach for Out-of-Core Computations', by **M. Kandemir**, R. Bordawekar, A. Choudhary and J. Ramanujam. In Proc. 6th International Workshop o n Compilers for Parallel Computers (CPC'96), Aachen, Germany, December 1996.

References

Prof. Alok N. Choudhary
Northwestern University
Department of Electrical and Computer Engineering
Technological Institute
2145 Sheridan Road, Evanston, Illinois 60208-3118
phone: (847) 467-4129. fax : (847) 467-4144
e-mail: choudhar@ece.nwu.edu

Prof. Prith Banerjee
Director, Center for Parallel and Distributed Computing
Northwestern University
Department of Electrical and Computer Engineering
Technological Institute
2145 Sheridan Road, Evanston, IL-60208-3118
phone: (847) 491-3641 fax : (847) 491-4455
e-mail: banerjee@ece.nwu.edu

Prof. J. Ramanujam
Department of Electrical and Computer Engineering
Louisiana State University
Baton Rouge, LA 70803-5901
phone: (225) 388-5628. fax : (225) 388-5200
e-mail: jxr@ee.lsu.edu

Dr. Meena Kandaswamy
Mail Stop CO3-202
5200, N. E. Elam Young Parkway
Intel Corp.
Hillsboro, OR 97124-6497
e-mail: meena.a.kandaswamy@intel.com