Kunal Agrawal

Work Address
32 Vassar Street
Cambridge, MA 02139
kunal@csail.mit.edu

Home Address
24 Magazine Street #3
Cambridge, MA 02139
(650) 704 3274

Education

Massachusetts Institute of Technology
Ph.D. Candidate, Computer Science and Engineering — 2003—July 2009 [Expected]
Cumulative GPA: 5.0/5.0 Thesis Topic: Scheduling and Synchronization for Multicore Processors

National University of Singapore, Singapore-MIT Alliance
S.M., Computer Science — July 2001—June 2002
Cumulative GPA: 5.0/5.0

Ramrao Adik Institute of Technology, Mumbai University
Bachelors of Enginering, Electronics Engineering — July 1997—June 2001
Graduated with Distinction

Interests

Parallel Computing, Algorithms, Scheduling, Trasactional Memory, Synchronization Mechanisms, Dynamic Multithreading, Stream Programming, Cache-Efficient Algorithms, Memory Models.

Experience

MIT CSAIL, Supercomputing Technologies Group
Cambridge, MA — August 2003—present
Research Assistant. Worked on scheduling, synchronization and locality issues for parallel processors. In the domain of scheduling, my contributions include provably efficient algorithms for adaptive scheduling for dynamic multithreaded languages like Cilk and complexity results of scheduling workflow applications. In addition, I implemented an adaptive scheduler in the Cilk runtime system. In the domain of synchronization, I have primarly worked on transactional memory semantics and design. In the domain of locality, I am working on provably good cache-efficient schedulers for streaming applications.
Adviser: Prof. Charles E. Leiserson.

VMWare Inc.
Palo Alto, CA — June 2006—August 2006
Software Intern. Developed and evaluated algorithms for load balancing and resource allocation for virtual machines on a cluster of computers.
Mentor: Minwen Ji

Singapore-MIT Alliance, National University of Singapore
Singapore — June 2002—June 2003
Research Assistant. Implemented a page-level distributed shared memory system using MPI and C.
Advisor: Prof. Wong Weng Fai

MIT LCS, Compilers Group
Cambridge, MA — Feb 2003—April 2003
Visiting Scholar. Implemented bit packing optimizations in the Streamit Compiler using Java.
Advisor: Saman Amarasinghe

Kent Ridge Digital Labs
Singapore — January 2002—June 2002
Research Intern. Worked on two bioinformatics projects called "Splice-Site Recognition using Support Vector Machines" and "Use of Self Organizing Neural Networks as Filters of Clean Start Codon."
Advisor: Dr. Vladimir Bajic

Bhabha Atomic Research Center
Mumbai, India July 2000—June 2001

Research Intern. Worked on design and implementation of microcontroller interface to measure reactor fluid levels. The project involved hardware design using VHDL programming.
Advisor: Dr Patil.

Teaching

MIT EECS Department
Cambridge, MA Spring 2005, Fall 2005, Sring 2007

Teaching Assistant. Assisted for the introductory algorithms course.

MIT EECS Department, Women's Technology Program
Cambridge, MA Summer 2004

Mathematics Instructor. Independently designed and taught a condensed course on Discrete Mathematics in a summer program for talented high school girls.

Singapore-MIT Alliance, National University of Singapore
Singapore Fall 2002

Teaching Assistant. Assisted for the compilers course.

Conference Publications

1. **Safe Open-Nested Transactions Using Ownership**
   Kunal Agrawal, Angelina Lee and Jim Sukha. In the *Proceedings of the ACM/SIGPLAN Symposium on the Principles and Practices of Parallel Programming (PPOPP)* 2009.

2. **Mapping Linear Workflows with Computation/Communication Overlap**
   Kunal Agrawal, Anne Benoit and Yves Robert. In the *Proceedings of International Conefercence on Parallel and Distributed Systems (ICPADS)* 2008.

3. **Nested Parallelism in Transactional Memory.**
   Kunal Agrawal, Jeremy Fineman, and Jim Sukha. In the *Proceedings of the ACM/SIGPLAN Symposium on the Principles and Practices of Parallel Programming (PPOPP)* 2008.

4. **Worst Page-Replacement Strategy.**
   Kunal Agrawal, Michael Bender and Jeremy Fineman. In the *Proceedings of the Forth Intrenational Conference on Fun with Algorithms (FUN)* 2007.

5. **Work Stealing with Parallelism Feedback.**
   Kunal Agrawal, Yuxiong He, and Charles E. Leiserson. In the *Proceedings of the ACM/SIGPLAN Symposium on the Principles and Practices of Parallel Programming (PPOPP)* 2007.

6. **Memory Models for Open-Nested Transactions.**
   Kunal Agrawal, Charles E. Leiserson, and Jim Sukha. In the *Proceedings of the ACM/SIGPLAN Workshop on Memory Systems Performance and Correctness (MSPC)* 2006.

7. **An Emprical Evaluation of Work Stealing with Parallelism Feedback.**
   Kunal Agrawal, Yuxiong He, and Charles E. Leiserson. In the *Proceedings of the International Conference on Distributed Computing Systems (ICDCS)* 2006.

8. **Adaptive Scheduling with Parallelism Feedback.**
   Kunal Agrawal, Yuxiong He, Wen Jing Hsu, and Charles E. Leiserson. In the *Proceedings of ACM/SIGPLAN Symposium on the Principles and Practices of Parallel Programming (PPOPP)* 2006.

9. **Mapping Pipelined Filtering Services with Communication Cost.**
   Kunal Agrawal, Anne Benoit, Fanny Defosse, and Yves Robert. *Submitted for Publication.* 2009.

Journal Publications

1. **Adaptive Work Stealing with Parallelism Feedback**
   Kunal Agrawal, Yuxiong He, Wen Jung Hsu, and Charles Leiserson. *ACM Transactions on Computer Systems (TOCS)* 2008.

2. **The Worst Page Replacement Strategy**
   Kunal Agrawal, Michael Bender and Jeremy Fineman. *Theory of Computer Systems* 2008.

Conference Talks

1. **Safe Open-Nested Transactions Through Ownership.**
   ACM/SIGPLAN Symposium on the Principles and Practices of Parallel Programming (PPOPP) 2009.

2. **Nested Parallelism in Transactional Memory.**
   ACM/SIGPLAN Symposium on the Principles and Practices of Parallel Programming (PPOPP) 2008.

3. **Worst Page-Replacement Strategy.**
   Intrenational Conference on Fun with Algorithms (FUN) 2007.

4. **Work Stealing with Parallelism Feedback.**
   ACM/SIGPLAN Symposium on the Principles and Practices of Parallel Programming (PPOPP) 2007.

5. **An Emprical Evaluation of Work Stealing with Parallelism Feedback.**
   International Conference on Distributed Computing Systems (ICDCS) 2006.

6. **Adaptive Scheduling with Parallelism Feedback**
   ACM/SIGPLAN Symposium on the Principles and Practices of Parallel Programming (PPOPP) 2006.

Invited Talks

Adaptive Scheduling with Parallelism Feedback.

University of Paris 6	2008.
Microsoft	2007.
Stanford University	2006.

Feedback Driven Adaptive Scheduling

NSF-NGS workshop held in conjunction with IPDPS	2007

Patent

Computing the Processor Desires of Jobs in an Adaptively Parallel Scheduling Environment

Co-authored with Charles E. Leiserson, Yuxiong He, and Wen Jing Hsu (Under Review)	2007

Grant

Feedback Driven Adaptive Scheduling

NSF grant proposal co-authored with Charles E. Leiserson (Funded for $484,000 over 3 years)	2006

Professional Service

Program Committee Chair and Organizer.

The Fourth CSAIL Student Workshop	2008

Program Committee Member and Volunteer.

CSAIL Student Workshop	2005, 2006, 2007

Reviewer.

Symposium on Paralellism in Algorithms and Architectures	2009
Symposium on Paralellism in Algorithms and Architectures	2007
European Conference on Parallelism	2005
International Conference on High Performance Computing	2005
Journal of Discrete Algorithms	
Parallel Computing	

Honors

Merit award for outstanding performance in SMA5503: Design of Algorithms	2002
Merit award for outstanding performance in SMA5506: Computer Systems Engineering.	2002
2^{nd} among 120 students in the class in Bachelors of Electronics Engineering.	2001
Finalist, Indian National Mathematics Olympiad	1996

References

1. Charles E. Leiserson
   Voice: (617) 253-5833
   Fax: (617) 253-0415
   `cel@mit.edu`

2. Michael Bender
   Voice: (631) 632-7835
   Fax: (631) 632-8334
   `bender@cs.sunysb.edu`

3. Yves Robert
   Voice: (+33) 4 72 72 85 86
   Fax: (+33) 4 72 72 88 06
   `Yves.Robert@ens-lyon.fr`

4. Srini Devadas
   Voice: (617) 253-0454
   Fax: (617) 253-6652
   `devadas@mit.edu`