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Yuan Tang

▬▬▬ Research Interests

Performance Science, an interdisciplinary research area at the intersection of parallel and concurrent computing, computational and data science, programming languages, systems and theory. I am particularly interested in pursuing scalable and portable performance for real-world algorithms on modern computing systems by exploiting the balance among time, or equivalently parallelism for parallel algorithms, space, caching, and communication.

▬▬▬ Education

July 2004   **Doctor of Engineering, Computer Science**, Institute of Software, *Chinese Academy of Science*

July 1999   **B.S. Computer Science**, Department of Computer Science, *Peking University*

▬▬▬ Research and Teaching Appointments

2006–present   Assistant/Associate Professor, School of Computer Science, *Fudan University*, Shanghai, China

2009–2012   Visiting Scientist, Computer Science and Artificial Intelligence Laboratory (CSAIL), *Massachusetts Institute of Technology* (**MIT**), Cambridge, MA, USA

2004–2006   Assistant Professor, School of Computer Science, *Peking University*, Beijing, China

▬▬▬ Conference Publications

[TK18]   Yuan Tang and Haibin Kan. "Non-orthogonal Homothetic Range Partial-Sum Query on Integer Grids - [Extended Abstract]". In: *Frontiers in Algorithmics - 12th International Workshop, FAW 2018, Guangzhou, China, May 8-10, 2018, Proceedings.* **FAW'18**. 2018, pp. 273–285.

[Cho+17a]   Rezaul A. Chowdhury, Pramod Ganapathi, Yuan Tang, and Jesmin Jahan Tithi. "Poster: Provably Efficient Scheduling of Cache-Oblivious Wavefront Algorithms". In: *Proceedings of the 22nd ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming.* **PPoPP'17**. Austin, TX, USA, 2017.

[Cho+17b]   Rezaul A. Chowdhury, Pramod Ganapathi, Yuan Tang, and Jesmin Jahan Tithi. "Provably Efficient Scheduling of Cache-Oblivious Wavefront Algorithms". In: *Proceedings of the 19-th ACM Symposium on Parallelism in Algorithms and Architectures.* **SPAA'17**. Washington D.C. USA, 2017.

[Yua17]   Yuan Tang. "Brief Announcement: STAR (Space-Time Adaptive and Reductive) Algorithms for Real-World Space-Time Optimality". In: *Proceedings of the 19-th ACM Symposium on Parallelism in Algorithms and Architectures*. **SPAA'17**. Washington D.C. USA, 2017.

[YY17]   Yuan Tang and Ronghui You. "Poster: STAR (Space-Time Adaptive and Reductive) Algorithms for Real-World Space-Time Optimality". In: *Proceedings of the 22nd ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*. **PPoPP'17**. Austin, TX, USA, 2017.

[Cho+16a]   Rezaul A. Chowdhury, Pramod Ganapathi, Jesmin Jahan Tithi, Charles Bachmeier, Bradley C. Kuszmaul, Charles E. Leiserson, Armando Solar-Lezama, and Yuan Tang. "AUTOGEN: Automatic discovery of cache-oblivious parallel recursive algorithms". In: *Proceedings of the 21st ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*. **PPoPP '16**. Barcelona, Spain, 2016.

[Cho+16b]   Rezaul A. Chowdhury, Pramod Ganapathi, Yuan Tang, and Jesmin Jahan Tithi. "Cache-Oblivious Wavefront algorithms for dynamic programming problems: efficient scheduling with optimal cache performance and high parallelism". In: *The International Conference for High Performance Computing, Networking, Storage, and Analysis*. **SC'16** Research Poster. 2016.

[DSY16]   David Dinh, Harsha Vardhan Simhadri, and Yuan Tang. "Extending the Nested Parallel Model to the Nested Dataflow Model with Provably Efficient Schedulers". In: *Proceedings of the 28th ACM Symposium on Parallelism in Algorithms and Architectures*. **SPAA'16**. Pacific Grove, California, USA, 2016.

[Yua+15]   Yuan Tang, Ronghui You, Haibin Kan, Jesmin Jahan Tithi, Pramod Ganapathi, and Rezaul A. Chowdhury. "Cache-Oblivious Wavefront: Improving Parallelism of Recursive Dynamic Programming Algorithms without Losing Cache-efficiency". In: *Proceedings of the 20th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*. **PPoPP '15**. San Francisco, CA, USA: ACM, 2015, pp. 205–214. ISBN: 978-1-4503-3205-7.

[Lui+14]   Luis Barba, Otfried Cheong, Jean-Lou De Carufel, Michael Gene Dobbins, Rudolf Fleischer, Akitoshi Kawamura, Matias Korman, Yoshio Okamoto, János Pach, Yuan Tang, Takeshi Tokuyama, Sander Verdonschot, and Tianhao Wang. "Weight Balancing on Boundaries and Skeletons". In: *Proceedings of the 30th Annual Symposium on Computational Geometry*. **SoCG '14**. Kyoto, Japan: ACM, 2014, 436:436–436:443. ISBN: 978-1-4503-2594-3.

[Mic+14]   Michael A. Bender, Rezaul Alam Chowdhury, Pramod Ganapathi, Samuel McCauley, and Yuan Tang. "The Range 1 Query (R1Q) Problem". In: *Proceedings 20th International Conference on Computing and Combinatorics*. **COCOON '14**. 2014, pp. 116–128.

[Yua+14]   Yuan Tang, Ronghui You, Haibin Kan, Jesmin Jahan Tithi, Pramod Ganapathi, and
             Rezaul A. Chowdhury. "Improving Parallelism of Recursive Stencil Computations
             without Sacrificing Cache Performance". In: *Proceedings of the 2nd Workshop on
             Optimizing Stencil Computations*. **WOSC '14**. Portland, Oregon, USA: ACM, 2014,
             pp. 1–7. ISBN: 978-1-4503-2308-6.

[PCT12]   Pramod Ganapathi, Rezaul Alam Chowdhury, and Yuan Tang. "The R1Q Problem".
             In: *22nd Annual Fall Workshop on Computational Geometry*. **FWCG '12**. 2012.

[Yua+11a]   Yuan Tang, Rezaul Alam Chowdhury, Bradley C. Kuszmaul, Chi-Keung Luk, and
             Charles E. Leiserson. "The Pochoir Stencil Compiler". In: *Proceedings of the 23rd
             Annual ACM Symposium on Parallelism in Algorithms and Architectures*. **SPAA
             '11**. San Jose, California, USA: ACM, 2011, pp. 117–128. ISBN: 978-1-4503-0743-7.

[Yua+11b]   Yuan Tang, Rezaul Chowdhury, Chi-keung Luk, and Charles E. Leiserson. "Coding
             Stencil Computations Using the Pochoir Stencil-Specification Language". In: *3rd
             USENIX Workshop on Hot Topics in Parallelism*. **HotPar '11**. USENIX, 2011.

[YZ08]   Yuan Tang and Yunquan Zhang. "Utilizing the Multi-threading Techniques to Improve
             the Two-Level Checkpoint/Rollback System for MPI Applications." In: *Proceedings
             of the 10th IEEE International Conference on High Performance Computing and
             Communications*. **HPCC '08**. IEEE, 2008, pp. 864–869. ISBN: 978-0-7695-3352-0.

[YCT07]   Yunquan Zhang, Ying Chen, and Yuan Tang. "Block Size Selection of Parallel LU and
             QR on PVP-based and RISC-based Supercomputers". In: *Proceedings of the Asian
             Technology Information Program's (ATIP's) 3rd Workshop on High Performance
             Computing in China: Solution Approaches to Impediments for High Performance
             Computing*. **HPC CHINA '07**. Reno, Nevada: ACM, 2007, pp. 115–125. ISBN:
             978-1-59593-903-6.

[YFD06]   Yuan Tang, G.E. Fagg, and J.J. Dongarra. "Proposal of MPI Operation Level
             Checkpoint/Rollback and One Implementation". In: *Proceedings of the 6th IEEE
             International Symposium on Cluster Computing and Grid*. Vol. 1. **CCGrid '06**. May
             2006, pp. 27–34.

[Yua+03]   Yuan Tang, Yunquan Zhang, Jiachang Sun, and Yucheng Li. "Hardware Impact on
             Communication Performance of Beowulf LINUX Cluster". In: *Proceedings of the 21st
             IASTED International Multi-Conference on Applied Informatics*. Innsbruck, Austria,
             Feb. 2003, pp. 495–500.

Textbooks

[Tia+07a]   Tianzhou Chen, Yuan Tang, Hongwei Feng, Qixun Zhang, Suke Li, Kang Chen,
             Wei Xue, and Qingsong Shi. *Multi-Core Programming (Book) (in Chinese)*. Tsinghua
             University Press, 2007. ISBN: 9-787302-158356.

[Tia+07b]   Tianzhou Chen, Yuan Tang, Hongwei Feng, Qixun Zhang, Suke Li, Kang Chen,
             Wei Xue, and Qingsong Shi. *Multi-Core Programming (DVD) (in Chinese)*. Tsinghua
             University Press, 2007. ISBN: 978-7-89486-587-6.

Journal Publications

[Ben+18]   Michael A. Bender, Rezaul Alam Chowdhury, Pramod Ganapathi, Samuel McCauley, and Yuan Tang. "The range 1 query (R1Q) problem". In: *Theor. Comput. Sci.* **(TCS)** 743 (2018), pp. 130–147.

[Cho+17c] Rezaul Chowdhury, Pramod Ganapathi, Stephen L. Tschudi, Jesmin Jahan Tithi, Charles Bachmeier, Charles E. Leiserson, Armando Solar-Lezama, Bradley C. Kuszmaul, and Yuan Tang. "Autogen: Automatic Discovery of Efficient Recursive Divide-8-Conquer Algorithms for Solving Dynamic Programming Problems". In: *ACM Transactions on Parallel Computing.* **(TOPC)** 4.1 (2017), 4:1–4:30.

[YS05]   Yuan Tang and Jiachang Sun. "Research of NASA Parallel Benchmark's communication pattern on Myrinet 2000 (in Chinese)". In: *Journal on Numerical Methods and Computer Applications* (2005). ISSN: 1000-3266.

[Yua+05]   Yuan Tang, Jiachang Sun, Yunquan Zhang, and Linbo Zhang. "New Consideration on the Evaluation Model of Cluster Area Network (in Chinese)". In: *Journal of Software* 16(6) (2005), pp. 1131–1139. ISSN: 1000-9825.

Research Projects and Grants

2018–2020 **High-Performance Computing Research on Modern Large-Scale Multi-Core and Many-Core Systems**. Shanghai Natural Science Funding (No. 18ZR1403100). *Principal Investigator.* RMB **200,000**

2016–2017 **The Nested Dataflow Parallel Programming Language with Provably Efficient Runtime Schedulers**. Open Funding of State Key Laboratory of Computer Architecture, ICT, CAS (No. CARCH201606). *Principal Investigator.* RMB **50,000**

2015 **Multicore Software Technology for Video-Conferencing Systems**. MIT-Foxconn joint research project, *overseas collaborator*, with Prof. Charles E. Leiserson at MIT.
My role is to lead the design and development of cache-oblivious parallel and cache-oblivious wavefront algorithms by supervising two software engineers from the Foxconn.

2013–2014 **The Bellmaniac Dynamic-Programming Compiler**. *overseas collaborator*, with Prof. Armando Solar-Lezama and Prof. Charles E. Leiserson at MIT and Prof. Rezaul A. Chowdhury at Stony Brook University.
My role is to jointly lead the design and development of new parallel programming model, provably efficient runtime scheduler, algorithms and benchmarks.

2012–2013 **Enhancing the Pochoir Stencil Compiler**. Intel Corp. *Principal Investigator.* RMB **628,463.76** ≈ USD **100,000**

2011-2013 **SHF: AF: Medium: Collaborative Research: The Pochoir Stencil Compiler**. NSF Grant CCF-1162196, *overseas collaborator* , with Prof. Charles E. Leiserson and Prof. Steven G. Johnson at MIT and Prof. Rezaul A. Chowdhury at Stony Brook University. Total NSF fund was USD **983,017**
My role is to jointly lead the software-development effort with Prof. Charles E. Leiserson.

2011–2012   **The Pochoir Stencil Compiler**. Intel Corp. *Principal Investigator*. RMB **276,163.96** ≈ USD **43,000**

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Reviewer:

2015   ACM Transactions on Architecture and Code Optimization (TACO)

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Apr 2017   **Institute of Software, Chinese Academy of Science**, Host: *Prof. Chao Yang.*
Title: *PACO (Processor-Aware Cache-Oblivious) Algorithms*

May 2016   **Tsinghua University**, Host: *Prof. Wengguang Chen*, ChinaSys.
Title: *Extending the Nested Parallel Model to the Nested Dataflow Model with Provably Efficient Schedulers*

Mar 2016   **Sun Yat-Sen University**, Host: *Prof. Jun Xu*, Seminar.
Title: *Applications of Foundational Parallel Algorithms*

May 2015   **Tsinghua Univeristy**, Host: *Prof. Guangwen Yang*, Seminar.
Title: *Cache-oblivious Wavefront: Improving Parallelism of Recursive Dynamic Programming Algorithms without Losing Cache-efficiency*

May 2015   **Tsinghua Univeristy**, Host: *Prof. Guangwen Yang*, Seminar.
Title: *The Pochoir Stencil Compiler*

Mar 2015   **Microsoft Research Redmond**, Host: *Principal Researcher Madan Musuvathi*, Seminar.
Title: *Cache-oblivious Wavefront: Improving Parallelism of Recursive Dynamic Programming Algorithms without Losing Cache-efficiency*

Feb 2015   **University of California, Berkeley**, Host: *Harsha Vardhan Simhadri*, Reference: *Prof. James Demmel*, CS Seminar series.
Title: *Cache-oblivious Wavefront: Improving Parallelism of Recursive Dynamic Programming Algorithms without Losing Cache-efficiency*

Feb 2015   **Lawrence Berkeley National Laboratory**, Host: *Harsha Vardhan Simhadri*, Weekly Meeting of DEGAS Project Group.
Title: *The Pochoir Stencil Compiler*

Feb 2015   **Stony Brook University**, Host: *Prof. Rezaul A. Chowdhury*, iACS Seminar.
http://www.iacs.stonybrook.edu/event/seminars/cache-oblivious-wavefront-improving-parallelism-of-recursive-dynamic-programming
Title: *Cache-oblivious Wavefront: Improving Parallelism of Recursive Dynamic Programming Algorithms without Losing Cache-efficiency*

Jul 2014   **Massachusetts Institute of Technology**, Host: *Prof. Charles E. Leiserson*, Seminar.
Title: *Cache-oblivious Wavefront: Improving Parallelism of Recursive Dynamic Programming Algorithms without Losing Cache-efficiency*

References

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