Julian Shun

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Employment

July 2018 - Current	**Douglas T. Ross Career Development Professorship of Software Technology**, *Massachusetts Institute of Technology*, Cambridge, MA.
Sept 2017 - Current	**Assistant Professor in Electrical Engineering and Computer Science**, *Massachusetts Institute of Technology*, Cambridge, MA.
Aug 2015 - Aug 2017	**Miller Postdoctoral Research Fellow**, *University of California, Berkeley*, Berkeley, CA.

Education

Aug 2009 - May 2015	**Ph.D. in Computer Science**, *Carnegie Mellon University*, Pittsburgh, PA. Thesis: Shared-Memory Parallelism Can Be Simple, Fast, and Scalable Advisor: Guy Blelloch Received the ACM Doctoral Dissertation Award Received the CMU SCS Doctoral Dissertation Award
Aug 2004 - May 2008	**B.A. in Computer Science**, *University of California, Berkeley*, Berkeley, CA. GPA: 3.98/4.0 Ranked 1st in the 2008 graduating class of Computer Science with over 100 students

Awards

2018	Best Paper Award at the *ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2018*
2018	DOE Early Career Award
2018	Research Support Committee Award (MIT)
2015–2017	Miller Research Fellowship (UC Berkeley)
2015	ACM Doctoral Dissertation Award
2015	CMU SCS Doctoral Dissertation Award
2015	Capocelli Prize for the best student-authored paper at the *IEEE Data Compression Conference (DCC), 2015*
2013–2014	Facebook Graduate Fellowship
2008	UC Berkeley Highest Achievement Award in Computer Science for graduating 1st in the 2008 graduating class of over 100 students
2007	Inducted into Phi Beta Kappa as a junior
2006	Inducted into Upsilon Pi Epsilon, an international honor's society for the computing sciences

Journal Publications

[1] Kimon Fountoulakis, Farbod Roosta-Khorasani, Julian Shun, Xiang Cheng, and Michael Mahoney. Variational Perspective on Local Graph Clustering. *Mathematical Programming, Series B*, 2017.

[2] Julian Labeit, Julian Shun, and Guy Blelloch. Parallel lightweight wavelet tree, suffix array and FM-index construction. *Journal of Discrete Algorithms*, 2017. **Special issue of DCC 2016.**

[3] Julian Shun and Guy Blelloch. A Simple Parallel Cartesian Tree Algorithm and its Application to Parallel Suffix Tree Construction, *ACM Transactions on Parallel Computing (TOPC)*, Vol. 1 Issue 1, Article No. 8, 2014. (Earlier version appears in ALENEX 2011.)

[4] David Aldous and Julian Shun. Connected Spatial Networks over Random Points and a Route-Length Statistic, *Statistical Science*, Vol. 25, No. 3, pp. 275–288, 2010.

Conference Publications

[5] Yunming Zhang, Mengjiao Yang, Riyadh Baghdadi, Shoaib Kamil, Julian Shun, and Saman Amarasinghe. GraphIt - A High-Performance Graph DSL. To appear in *Object-Oriented Programming, Systems, Languages & Applications (OOPSLA)*, 2018.

[6] Laxman Dhulipala, Guy Blelloch, and Julian Shun. Theoretically Efficient Parallel Graph Algorithms Can Be Fast and Scalable. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 393–404, 2018. **Best Paper Award.**

[7] Guy Blelloch, Phillip Gibbons, Yan Gu, Charles McGuffey, and Julian Shun. The Parallel Persistent Memory Model. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 247–258, 2018.

[8] Guy Blelloch, Yan Gu, Julian Shun, and Yihan Sun. Parallel Write-Efficient Algorithms and Data Structures for Computational Geometry. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 235–246, 2018.

[9] Naama Ben-David, Guy Blelloch, Jeremy Fineman, Phillip Gibbons, Yan Gu, Charles McGuffey, and Julian Shun. Implicit Decomposition for Write-Efficient Connectivity Algorithms. *Proceedings of IEEE International Parallel and Distributed Symposium (IPDPS)*, pp. 711–722, 2018.

[10] Laxman Dhulipala, Guy Blelloch, and Julian Shun. Julienne: A Framework for Parallel Graph Algorithms using Work-efficient Bucketing. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 293–304, 2017.

[11] Julian Shun. Improved Parallel Construction of Wavelet Trees and Rank/Select Structures. *Proceedings of the IEEE Data Compression Conference (DCC)*, pp. 92–101, 2017.

[12] Julian Shun, Farbod Roosta-Khorasani, Kimon Fountoulakis, and Michael Mahoney. Parallel Local Graph Clustering. *Proceedings of the VLDB Endowment*, 9(12), pp. 1041–1052, 2016.

[13] Guy Blelloch, Jeremy Fineman, Phillip Gibbons, Yan Gu, and Julian Shun. Efficient Algorithms with Asymmetric Read and Write Costs. *Proceedings of the European Symposium on Algorithms (ESA)*, pp. 14:1–14:18, 2016.

[14] Guy Blelloch, Yan Gu, Julian Shun, and Yihan Sun. Parallelism in Randomized Incremental Algorithms. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 467–478, 2016.

[15] Naama Ben-David, Guy Blelloch, Jeremy Fineman, Phillip Gibbons, Yan Gu, Charles McGuffey, and Julian Shun. Parallel Algorithms for Asymmetric Read-Write Costs. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 145–156, 2016.

[16] Julian Labeit, Julian Shun, and Guy Blelloch. Parallel Lightweight Wavelet Tree, Suffix Array and FM-Index Construction. *Proceedings of the IEEE Data Compression Conference (DCC)*, pp. 33–42, 2016. (Journal version in *Journal of Discrete Algorithms*, 2017.

[17] Niklas Baumstark, Guy Blelloch, and Julian Shun. Efficient Implementation of a Synchronous Parallel Push-Relabel Algorithm. *Proceedings of the European Symposium on Algorithms (ESA)*, pp. 106–117, 2015.

[18] Julian Shun. An Evaluation of Parallel Eccentricity Estimation Algorithms on Undirected Real-World Graphs. *Proceedings of the ACM Conference on Knowledge Discovery and Data Mining (KDD)*, pp. 1095–1104, 2015.

[19] Guy Blelloch, Jeremy Fineman, Phillip Gibbons, Yan Gu, and Julian Shun. Sorting with Asymmetric Read and Write Costs. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 1–12, 2015.

[20] Yan Gu, Julian Shun, Yihan Sun and Guy Blelloch. A Top-Down Parallel Semisort. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 24–34, 2015.

[21] Julian Shun and Kanat Tangwongsan. Multicore Triangle Computations Without Tuning. *Proceedings of the IEEE International Conference on Data Engineering (ICDE)*, pp. 149–160, 2015.

[22] Julian Shun, Laxman Dhulipala, and Guy Blelloch. Smaller and Faster: Parallel Processing of Compressed Graphs with Ligra+. *Proceedings of the IEEE Data Compression Conference (DCC)*, pp. 403–412, 2015.

[23] Julian Shun. Parallel Wavelet Tree Construction. *Proceedings of the IEEE Data Compression Conference (DCC)*, pp. 63–72, 2015. **Awarded the Capocelli Prize for Best Student-Authored Paper.**

[24] Julian Shun, Yan Gu, Guy Blelloch, Jeremy Fineman, and Phillip Gibbons. Sequential Random Permutation, List Contraction and Tree Contraction are Highly Parallel. *Proceedings of the ACM-SIAM Symposium on Discrete Algorithms (SODA)*, pp. 431–448, 2015.

[25] Julian Shun. Fast Parallel Computation of Longest Common Prefixes. *Proceedings of the ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (SC)*, pp. 387–398, 2014.

[26] Julian Shun and Guy Blelloch. Phase-concurrent Hash Tables for Determinism. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 96–107, 2014.

[27] Julian Shun, Laxman Dhulipala, and Guy Blelloch. A Simple and Practical Linear-Work Parallel Algorithm for Connectivity. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 143–153, 2014.

[28] Aapo Kyrola, Julian Shun, and Guy Blelloch. Beyond Synchronous: New Techniques for External Memory Graph Algorithms. *Proceedings of the International Symposium on Experimental Algorithms (SEA)*, pp. 123–137, 2014.

[29] Julian Shun, Guy Blelloch, Jeremy Fineman, and Phillip Gibbons. Reducing Contention Through Priority Updates. *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 152–163, 2013.

[30] Julian Shun and Fuyao Zhao (joint first author). Practical Parallel Lempel-Ziv Factorization. *Proceedings of the IEEE Data Compression Conference (DCC)*, pp. 123–132, 2013.

[31] Julian Shun and Guy Blelloch. Ligra: A Lightweight Graph Processing Framework for Shared Memory. *Proceedings of the ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP)*, pp. 135–146, 2013.

[32] Guy Blelloch, Jeremy Fineman, and Julian Shun. Greedy Sequential Maximal Independent Set and Matching are Parallel on Average, *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 308–317, 2012.

[33] Julian Shun, Guy Blelloch, Jeremy Fineman, Phillip Gibbons, Aapo Kyrola, Harsha Vardhan Simhadri, and Kanat Tangwongsan. Brief Announcement: The Problem Based Benchmark Suite, *Proceedings of the ACM Symposium on Parallelism in Algorithms and Architectures (SPAA)*, pp. 68–70, 2012.

[34] Guy Blelloch, Jeremy Fineman, Phillip Gibbons, and Julian Shun. Internally Deterministic Parallel Algorithms Can Be Fast, *Proceedings of the ACM Symposium on Principles and Practice of Parallel Programming (PPoPP)*, pp. 181–192, 2012.

[35] Guy Blelloch and Julian Shun. A Simple Parallel Cartesian Tree Algorithm and its Application to Suffix Tree Construction, *Proceedings of the SIAM Meeting on Algorithm Engineering and Experiments (ALENEX)*, pp. 48–58, 2011.

Books

Julian Shun. Shared-Memory Parallelism Can Be Simple, Fast, and Scalable. *Association for Computing Machinery and Morgan & Claypool*, 2017.

Student Advising

Ph.D. Students.
Jessica Shi
Yiqiu Wang
Mengjiao Yang

M.Eng. Students.
Omar Obeya

Undergraduate Students.
Edward Fan

Alumni.
Omer Cerrahoglu (undergraduate)
Omar Obeya (undergraduate)
Bristy Sikder (undergraduate)
Mengjiao Yang (M.Eng.)

Ph.D. Thesis Committee Member.
Yan Gu (CMU)
Justin Kopinsky (MIT)

Professional Service

MIT Internal.
- EECS Ph.D. Admissions Committee (2017–2018)
- EECS Undergraduate Advisor (2018–Current)

Program Committee Member.
- European Symposium on Algorithms (ESA), 2019
- IEEE International Parallel and Distributed Processing Symposium (IPDPS), 2019
- ACM SIGMETRICS, 2019
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2018
- International Symposium on String Processing and Information Retrieval (SPIRE), 2018
- ACM SIGMETRICS, 2018
- ACM SIGMOD, 2018
- IEEE International Conference on High Performance Computing (HiPC), 2017
- High Performance Graph Data Mining and Machine Learning Workshop (HPGDML), 2017
- ACM Symposium on Parallelism in Algorithms and Architectures (SPAA), 2016
- ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI), 2016 (External Review Committee)
- High Performance Graph Processing Workshop (HPGP), 2016
- IEEE International Conference on Cloud and Big Data Computing (CBDCom), 2016
- IEEE International Conference on High Performance Computing (HiPC), 2016
- High Performance Graph Data Management and Processing Workshop (HPGDMP), 2016 (Program committee co-chair)
- Conference on Neural Information Processing Systems (NIPS), 2016 (Review committee)

Journal Reviewer.
TACO 2014, TALG 2014, JPDC 2014, TOPC 2014, TPDS 2015, TOPC 2015, TOPC 2016, JEA 2016, TOPC 2017, TALG 2018, TOCS 2018, TSC 2018, VLDBJ 2018

Conference Reviewer.
DCC 2013, Euro-Par 2013, ALENEX 2015, SPAA 2015, SODA 2016, ICDE 2016, ICPP 2016, OSDI 2016, PPoPP 2017, IPDPS 2017, DCC 2017, DISC 2017, PPoPP 2018, LATIN 2018, Euro-Par 2018, ESA 2018

Teaching Experience

Sept 2018 - Current	**Instructor**, *MIT*, Cambridge, MA. Instructor for Performance Engineering for Software Systems (6.172)
Feb 2018 - May 2018	**Instructor**, *MIT*, Cambridge, MA. Instructor for Graph Analytics (6.886)
Sept 2017 - Dec 2017	**Instructor**, *MIT*, Cambridge, MA. Instructor for Performance Engineering for Software Systems (6.172/6.871)
Feb 2017	**Guest Facilitator**, *MIT*, Cambridge, MA. Guest facilitator and lecturer for Advanced Performance Engineering for Multicore Applications (6.S898)
Nov 2016	**Guest Lecturer**, *MIT*, Cambridge, MA. Presented a guest lecture on optimizing graph algorithms in the Performance Engineering for Software Systems (6.172/6.871) course at MIT
March 2016	**Tutorial Presenter**, *PPoPP 2016*, Barcelona, Spain. Presented a 3-hour tutorial on Large-Scale Graph Processing in Shared Memory at the Symposium on Principles and Practice of Parallel Programming (PPoPP), 2016
Jan 2013 - Dec 2013	**Teaching Assistant**, *Carnegie Mellon University*, Pittsburgh, PA. Parallel and Sequential Data Structures and Algorithms (15-210; undergraduate-level course) • Led weekly recitations and office hours • Designed homework assignments, exam problems and recitation notes • Gave a guest lecture on sequential and parallel hash tables

Sept 2012	**Teaching Assistant**, *Carnegie Mellon University*, Pittsburgh, PA.
	CMU SCS: Graph Analytics Workshop
	• Designed written and programming exercises for the workshop
	• Led an exercise session at the workshop, helping participants complete the exercises
Jan 2012 -	**Teaching Assistant**, *Carnegie Mellon University*, Pittsburgh, PA.
May 2012	Introduction to Computer Systems (15-213; undergraduate-level course)
	• Led weekly recitations and office hours
	• Helped students with assignments during office hours and on the course discussion forum
	• Coordinated with the instructors to write, administer and grade exams
Jan 2007 -	**Teaching Assistant**, *University of California, Berkeley*, Berkeley, CA.
May 2007	Structure and Interpretation of Computer Programs (CS 61A; undergraduate-level course)
	• Led weekly lab and discussion sessions for an introductory programming course
	• Helped students with homework assignments during office hours and via e-mail
	• Coordinated with the instructor to write, administer and grade exams

Talks

Theoretically Efficient Parallel Graph Algorithms Can Be Fast and Scalable
• Dagstuhl Seminar on High-Performance Graph Algorithms, June 2018
• USC Seminar, May 2018
• Stanford Seminar, May 2018

Large-scale Graph Analytics
• MIT CSAIL Annual Meeting, June 2018
• MIT CSAIL Alliances Annual Meeting, June 2018

GraphIt - A High-Performance DSL for Graph Analytics
• Applications Driving Architectures SRC JUMP Center Meeting, October 2018
• DARPA Software Defined Hardware Program Meeting, June 2018
• Applications Driving Architectures SRC JUMP Center Meeting, May 2018

Shared-Memory Parallelism Can Be Simple, Fast, and Scalable
• MIT EECS Special Seminar, April 2017
• Yale CS Seminar, March 2017
• UC Davis CS/ECE Seminar, March 2017
• University of Chicago CS Seminar, March 2017
• University of Illinois Urbana-Champaign CS Seminar, February 2017
• University of Maryland College Park CS Seminar, February 2017
• Caltech Frontiers in CMS Symposium, January 2017
• Georgia Tech CSE Seminar, September 2016
• MIT Theory of Computation Seminar, November 2015
• SUNY Stony Brook CS Seminar, May 2015
• Carnegie Mellon University Ph.D. Thesis Defense, April 2015
• Northwestern University EECS Seminar, April 2015
• Indiana University Bloomington CS Seminar, March 2015

Improved Parallel Construction of Wavelet Trees and Rank/Select Structures
• Data Compression Conference (DCC), April 2017

Large-Scale Graph Processing in Shared Memory
• Guest lecture in the Advanced Performance Engineering for Multicore Applications (6.S898) course at MIT, February 2017
• Tutorial at the Symposium on Principles and Practice of Parallel Programming (PPoPP), March 2016

Parallel Local Graph Clustering
- MIT EECS Seminar, November 2016
- CMU Systems Design and Implementation (SDI) Seminar, September 2016
- International Conference on Very Large Data Bases (VLDB), September 2016
- UC Berkeley Database Seminar, June 2016
- International Computer Science Institute Lunch Seminar, June 2016
- UC Berkeley AMPLab Retreat, June 2016

Graph Optimization
- Guest lecture in the Performance Engineering of Software Systems course (6.172) at MIT, November 2016

Ligra: A Lightweight Graph Processing Framework for Shared Memory
- ACM San Francisco Bay Area Chapter, July 2016
- Workshop on Algorithms for Modern Massive Data Sets (MMDS), June 2016
- Stanford CS Seminar, June 2016
- Stanford Software Seminar, January 2016
- UC Berkeley AMPLab Seminar, December 2015
- Keynote talk at the High Performance Graph Mining (HPGM) Workshop, August 2015
- UC San Diego CSE Seminar, January 2015
- Georgia Tech CSE Seminar, October 2014
- UCLA CS Seminar, October 2014
- University of Washington CSE Seminar, October 2014
- CMU Systems Design and Implementation (SDI) Seminar, October 2014
- Intel Labs, Hillsboro, September 2014
- Intel Labs, Santa Clara, January 2014
- UC Berkeley ASPIRE Seminar, October 2013
- Facebook, October 2013
- Symposium on Principles and Practice of Parallel Programming (PPoPP), February 2013

Parallelism in Randomized Incremental Algorithms
- Symposium on Parallelism in Algorithms and Architectures (SPAA), July 2016

Models and Algorithms with Asymmetric Read and Write Costs
- UC Berkeley Benchmarking and Optimization (BeBOP) Seminar, October 2015

A Simple Parallel Cartesian Tree Algorithm and its Application to Parallel Suffix Tree Construction
- UC Berkeley Cloud Computing and Networking Seminar, September 2015
- Microsoft Research, Beijing, July 2011
- CMU Theory Lunch, February 2011
- Meeting on Algorithm Engineering and Experiments (ALENEX), January 2011

An Evaluation of Parallel Eccentricity Estimation Algorithms on Undirected Real-World Graphs
- Conference on Knowledge Discovery and Data Mining (KDD), August 2015
- UC Berkeley AMPLab Seminar, August 2015

Multicore Triangle Computations Without Tuning
- International Conference on Data Engineering (ICDE), April 2015

Smaller and Faster: Parallel Processing of Compressed Graphs with Ligra+
- Data Compression Conference (DCC), April 2015

Parallel Wavelet Tree Construction
• Data Compression Conference (DCC), April 2015

Sequential Random Permutation, List Contraction and Tree Contraction are Highly Parallel
• CMU Theory Lunch, January 2015
• Symposium on Discrete Algorithms (SODA), January 2015

Large-Scale Parallel Graph Algorithms
• University of Maryland (College Park) CS Seminar, December 2014

Fast Parallel Computation of Longest Common Prefixes
• International Conference for High Performance Computing, Networking, Storage and Analysis (SC), November 2014

Beyond Synchronous Computation: New Techniques for External Memory Graph Algorithms
• Symposium on Experimental Algorithms (SEA), June 2014

Phase-concurrent Hash Tables for Determinism
• Symposium on Parallelism in Algorithms and Architectures (SPAA), June 2014

Sequential and Parallel Hash Tables
• Guest lecture in the Parallel and Sequential Data Structures and Algorithms course (15-210) at CMU, November 2013

Greedy Sequential Maximal Independent Set and Matching are Parallel on Average
• UC Berkeley Theory Lunch, March 2016
• Nanjing University Seminar, January 2014
• MIT EECS Seminar, July 2013
• Symposium on Parallelism in Algorithms and Architectures (SPAA), June 2012
• CMU Theory Lunch, February 2012

Reducing Contention Through Priority Updates
• Symposium on Parallelism in Algorithms and Architectures (SPAA), July 2013

Practical Parallel Lempel-Ziv Factorization
• Data Compression Conference (DCC), March 2013

Brief Announcement: The Problem Based Benchmark Suite
• Symposium on Parallelism in Algorithms and Architectures (SPAA), June 2012

Internally Deterministic Parallel Algorithms Can Be Fast
• CMU SCS Student Seminar Series, March 2012
• Symposium on Principles and Practice of Parallel Programming (PPoPP), February 2012