

# Mark Christopher Jeffrey

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CONTACT INFORMATION	MIT CSAIL 32 Vassar Street 32-G888 Cambridge, MA	mcj@csail.mit.edu  <a href="https://people.csail.mit.edu/mcj">https://people.csail.mit.edu/mcj</a>
RESEARCH INTERESTS	Parallel computing, computer architecture, computer systems, parallel programming models, speculative execution, irregular algorithms, distributed systems, optimization	
EDUCATION	<b>Massachusetts Institute of Technology</b> , Cambridge, MA <i>Doctor of Philosophy</i> , Computer Science <b>2013 – 2019</b> Thesis: <i>A new hardware and software architecture for ubiquitous parallel programming.</i> Advisor: Professor Daniel Sanchez GPA 4.8/5.0 in Computer Architecture, Database Systems, Distributed Algorithms, Machine Learning  <b>University of Toronto</b> , Toronto, Canada <i>Master of Applied Science</i> , Computer Engineering <b>2011</b> Thesis: <i>Understanding and improving Bloom filter configuration for lazy address-set disambiguation.</i> Advisor: Professor J. Gregory Steffan GPA 3.86/4.0 in Parallel and GPU Programming, On-Chip Networks, Algorithms, Info. Theory  <i>Bachelor of Applied Science</i> in Engineering Science with Honors <b>2009</b> Thesis: <i>Multiview face tracking for maintaining privacy in video surveillance.</i> Advisor: Professor K. N. Plataniotis GPA 3.76/4.0 in Distributed Systems, Optimizing Compilers, Operating Systems, DSP, and others	
HONORS AND AWARDS	\$300 Best Graduate Poster, Industry-Academia Partnership MIT Cloud Workshop <b>2018</b> \$181,000 Facebook PhD Fellow <b>2017</b> Honorable mention in IEEE Micro “Top Picks from the Computer Architecture Conferences” <b>2017</b> Paper selected for IEEE Micro “Top Picks from the Computer Architecture Conferences” <b>2016</b> \$500 Facebook PhD Fellowship finalist <b>2016</b> \$69,166 MIT Irwin Mark Jacobs and Joan Klein Jacobs Presidential Fellowship <b>2013</b> \$63,000 NSERC (NSF-equivalent) Post-Graduate Scholarship (PGS-D3) <b>2013</b> Best Presentation, Connections Graduate Symposium, University of Toronto <b>2011</b> \$17,500 NSERC Alexander Graham Bell Canada Graduate Scholarship (CGS-M) <b>2010</b> Best Paper, International Symposium on Applied Reconfigurable Computing <b>2010</b> \$4,000 Canada Millennium Scholarship Excellence Award <b>2006</b> \$1,300 #2 Canadian Army University Course Award, University of Toronto <b>2006</b> \$3,000 University of Toronto Scholar <b>2004</b>	
JOURNAL PUBLICATIONS	Unlocking ordered parallelism with the Swarm architecture <b>IEEE Micro</b> <b>2016</b> <b>M.C. Jeffrey</b> , S. Subramanian, C. Yan, J. Emer, D. Sanchez  Application-specific signatures for transactional memory in soft processors <b>ACM TRETS</b> <b>2011</b> M. Labrecque, <b>M.C. Jeffrey</b> , and J.G. Steffan	

CONFERENCE  
PUBLICATIONS

- Harmonizing speculative and non-speculative execution  
in architectures for ordered parallelism  
**M.C. Jeffrey**, V.A. Ying, S. Subramanian, H.R. Lee, J. Emer, D. Sanchez  
MICRO **2018**
- SAM: Optimizing multithreaded cores for speculative parallelism  
M. Abeydeera, S. Subramanian, **M.C. Jeffrey**, J. Emer, D. Sanchez  
PACT **2017**
- Fractal: An execution model for fine-grain nested speculative parallelism  
S. Subramanian, **M.C. Jeffrey**, M. Abeydeera, H.R. Lee, V.A. Ying, J. Emer, D. Sanchez  
ISCA **2017**
- Data-centric execution of speculative parallel programs  
**M.C. Jeffrey**, S. Subramanian, M. Abeydeera, J. Emer, D. Sanchez  
MICRO **2016**
- A scalable architecture for ordered parallelism  
**M.C. Jeffrey**, S. Subramanian, C. Yan, J. Emer, D. Sanchez  
MICRO **2015**
- Understanding Bloom filter intersection for lazy address-set disambiguation  
**M.C. Jeffrey** and J.G. Steffan.  
SPAA **2011**
- Application-specific signatures for transactional memory in soft processors  
M. Labrecque, **M.C. Jeffrey**, and J.G. Steffan  
ARC **2010**

PATENTS

- Systems and methods for managing files in a cloud-based computing environment  
**M.C. Jeffrey** and W. Wang  
US 20140259005 A1
- Human motion classification at cycle basis of repetitive joint movement  
G. Fu and **M.C. Jeffrey**  
US 20100305480 A1

INDUSTRY  
EXPERIENCE

**Google**, Mountain View, California

*Software Engineering Intern*

**June 2015 – August 2015**

Platforms Performance Team. Prototyped distributed communication-avoiding Google Brain training algorithms to optimize data-center network traffic. Achieved linear scaling and 5× throughput over the existing baseline, by using a map-reduce structure among neighboring nodes with high-bandwidth links. Built prototypes with the Python API of `tensorflow.org` and Borg configurations (predecessor to `kubernetes.io`).

**AeroFS**, Palo Alto, California

*Software Engineer*

**September 2011 – May 2013**

AeroFS is a private cloud file-sharing application. Design, proof, and Java implementation of patent-pending distributed algorithms for peer-to-peer file sharing. Major contributor to the automated, Python-based distributed system test infrastructure on Linux, Mac, and Windows virtual machines, to detect and prevent regressions in feature releases. Wrote dozens of distributed test scenarios with barrier-synchronization and simulated network partitions. Individually developed a Java REST service to collect sync metrics using dropwizard, JDBI and MySQL. Ported the user management service to Google's protobuf network protocol. Interviewer and recruiting experience.

**EPSON**, Toronto, Canada

*Software Development Intern*

**May 2007 – August 2008**

Developed an optical character recognition prototype in C++ with a team of four, achieving recognition accuracy rates desired by management. Character recognition accuracy was improved by tracking errors in a substitution matrix, finding their sources, and redesigning suspect modules. Patented a separate project using gyroscope sensor streams to classify human motion.

TEACHING  
EXPERIENCE

**Massachusetts Institute of Technology**, Cambridge, Massachusetts

*Undergraduate Research Mentor*

**Fall 2017, Spring 2018**

*Teaching Assistant*, 6.823 Computer System Architecture

**Spring 2017**

**Insight Data Science Fellows Program**, Palo Alto, California

*Mentor*

**September 2012, March 2013**

**University of Toronto**, Toronto, Canada

*Teaching Assistant*, ECE353 Systems Software

**Spring 2010, Spring 2011**

*Teaching Assistant*, ECE454 Computer Systems Programming

**Fall 2010**

*Teaching Assistant*, ESC103 Engineering Mathematics and Computation

**Fall 2009**

*Teaching Assistant*, MAT190 Vector and Matrix Algebra

**Fall 2008**

PRESENTATIONS

Harmonizing speculative and non-speculative execution in architectures for ordered parallelism. *IEEE/ACM International Symposium on Microarchitecture*. Fukuoka, Japan. October 2018.

Making parallelism pervasive with the Swarm architecture. *MIT 6.886 Graph Analytics Guest Lecture*. Cambridge, MA. May 2018.

Making parallelism pervasive with the Swarm architecture. *Center for Future Architectures Research e-Workshop*. WebEx workshop. July 2017.

Making parallelism pervasive with the Swarm architecture. *BARC: Boston Area Architecture Workshop*. Cambridge, MA. January 2017.

Data-centric execution of speculative parallel programs. *IEEE/ACM International Symposium on Microarchitecture*. Taipei, Taiwan. October 2016.

A scalable architecture for ordered parallelism. *IEEE/ACM International Symposium on Microarchitecture*. Waikiki, HI. December 2015.

Improving Bloom filter configuration for lazy transactional memory. *CASCON: International Conference hosted by the Centre for Advanced Studies Research*. IBM Canada Software Laboratory, Toronto, Canada. November 2011.

Understanding Bloom filter intersection for lazy address-set disambiguation. *ACM Symposium on Parallelism in Algorithms and Architectures*. San Jose, CA. June 2011.

Understanding Bloom filter intersection for lazy address-set disambiguation. *U of T Connections ECE Graduate Symposium*. Toronto, Canada. May 2011.

GPU-accelerated software transactional memory. *U of T Connections ECE Graduate Symposium*. Toronto, Canada. May 2010.

SERVICE

**Submissions** co-chair for MICRO 2017

**Program Committee** member for Tiny Transactions on Computer Science (TinyToCS) Volume IV

**Reviewer** for PPOPP 2016

SKILLS

Languages C, C++, Python, Java, bash, SQL, Matlab.

OS Linux, Mac OS X, some Windows and .NET.

Libraries C++11 STL, boost, pthreads, googletest, matplotlib, Guava, dropwizard, jdbi, CUDA.

Tools git, Vagrant, Intel pin, Jenkins, valgrind, jvisualvm, Intel SSE/AVX.