

HAOSEN WEN

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Department of Computer Science, Univeristy of Rochester

Rochester, NY 14627

EDUCATION

University of Rochester, Rochester, NY

Sep. 2016–Present

Doctoral Student in Computer Science

Advisor: Professor Michael L. Scott

Beijing Foreign Studies University (BFSU), Beijing, China

Sep. 2012–Jun. 2016

B.E in Computer Science

Overall GPA: 3.65/4.00

INTERNSHIP

Facebook

Menlo Park, CA

Software Engineer Intern

Jun. 2020–Sep. 2020

- Built a persistent software block cache for RocksDB with PMDK that runs on byte-addressable non-volatile memory

Uber Technologies

San Francisco, CA

Software Engineer Intern

May. 2019–Aug. 2019

- Worked on a debugger for android applications using RxJava, a library for reactive programming.
- Learned reactive programming and IntelliJ extension development from scratch, and built a prototype as an IntelliJ plug-in within 11 weeks.

Institute for Network Sciences and Cyberspace

Tsinghua U., China

Research Assistant Intern

Aug. 2015–Jun. 2016

- Studied traffic engineering in datacenter networks, especially in scenarios based on SDN (Software Defined Network) simulation and emulation.

RESEARCH PROJECTS

Building Fast Recoverable Data Structures with Montage

U. of Rochester, NY

Supervised by Professor Michael L. Scott

Jan. 2019–Present

- Designed and implemented Montage, a general system that helps building buffered durable data structures on non-volatile byte-addressable memories.
- As co-lead author, published and presented at DISC'20 as brief announcement, and on arXiv as full paper.

Nonblocking Persistent Memory Allocator

U. of Rochester, NY

Supervised by Professor Michael L. Scott

Sep. 2019–Jun. 2020

- Helped designing and implementing Ralloc, the first nonblocking persistent memory allocator for non-volatile byte-addressable memories.
- Published at PPOPP'20 as poster, and ISMM'20 as full paper.

Object-based Non-blocking Persistent MCAS

Supervised by Professor Michael L. Scott

U. of Rochester, NY

May. 2018–May. 2019

- Implemented a persistent MCAS system that allows the programmer to atomically modify a set of shared objects if another previously read set of shared objects is still up-to-date.

Efficient Nonblocking Persistent Software Transactional Memory

Supervised by Professor Michael L. Scott

U. of Rochester, NY

May. 2018–Apr. 2019

- Presented QSTM (Queue-based Software Transactional Memory), a novel system that provides non-blocking thread-safe transactions on non-volatile byte-addressable memories.
- Helped with refining designs and debugging.
- Published as a technical report.

Debugging Persistent Concurrent Programs

Supervised by Dr. Sreepathi Pai, Associate Professor

U. of Rochester, NY

Sep. 2018–Dec. 2018

- Surveyed debugging tools for concurrent programs using execution synthesis, a combination of static/dynamic analysis and program synthesis.
- Proposed extensions to those debugging tools for programs running on systems with persistent memories and volatile caches.

Software Transactional Memory on Dalí

Supervised by Professor Michael L. Scott

U. of Rochester, NY

Aug. 2017–May. 2018

- Aimed at building an object-based Transactional Memory (TM) system on Dalí, a periodically persistent hash map.
- Helped re-implement Dalí and verify its correctness.
- Experimented with different implementations of whole-cache flushes in Dalí.

Interval-Based Memory Reclamation

Supervised by Professor Michael L. Scott

U. of Rochester, NY

Jan. 2017–Feb. 2018

- Led the design of a group of new memory management schemes for non-blocking concurrent data structures, which, with low overhead, bound the number of unreclaimable blocks held by stalling threads.
- Evaluated these schemes against state-of-art approaches and verified both low overhead and bounded space.
- As the lead author, presented the results at PPOPP'18.

Inter-Thread/Inter-Process Communication Performance Bottlenecks

Supervised by Professor Michael L. Scott

U. of Rochester, NY

Sep. 2016–Dec. 2016

- The goal was to find the bottlenecks of inter-process communication throughput across remote direct memory access (RDMA) links.
- Did a series of experiments to test the influence of factors (context switching, cache footprint, TLB hit rate, etc.) that may be bottlenecks by adding one factor each time to the experiment.
- Learned to use performance counters, including the PAPI library, to get hardware statistics to explain the outcomes of experiments.

Multipath Routing Strategy Based on Cooperation and Games

Supervised by Professor Jiahai Yang

Tsinghua U., China

Aug. 2015–Sep. 2016

- Used OpenvSwitch, an open-source virtual switch; Floodlight, an Openflow controller; and Mininet, an SDN simulation platform to design experiments to compare several existing traffic engineering algorithms.
- Did all the experiments in a paper independently, including building network topologies, writing Python scripts to program the controller (Floodlight), recording data, and analyzing it with statistical methods.

Internet Multipath Routing Between Domains

Supervised by Professor Jiahai Yang

Tsinghua U., China

Aug. 2015–Sep. 2016

- Modified code of OpenvSwitch in order to add a cache queue to buffer the packets forwarded in a new traffic engineering algorithm—Flowlet-binned Algorithm Based on Timeslot (FLAT).
- Expanded Openflow protocol experimentally; defined and realized a new action option in flow tables to realize the buffering function mentioned above.

A Universal Platform for Routing Strategies Powered by DPI on SDN

Supervised by Dr. Fu Chen, Associate Professor.

BFSU, China

Dec. 2015–Jun. 2016

- Implemented nDPI, a deep package inspection (DPI) library, into an SDN controller, enabling routing strategies based on flow patterns and application-level protocols rather than merely the information in package headers.
- Tested simple application-level routing strategies on the system.

Analysis of the Global Influence of Chinese Culture Based on Big Data

Supervised by Dr. Fu Chen, Associate Professor.

BFSU, China

Feb. 2015–Dec. 2015

- Studied detailed features of the Openflow protocol and the design and implementation of some popular SDN emulation tools such as Mininet and OpenvSwitch.
- Helped edit a chapter of a book in progress about SDN.
- Helped with a feasibility study for a database of Confucian scholars and institutions.

Network Services Modeling of Next Generation Networks

Supervised by Dr. Fu Chen, Associate Professor.

BFSU, China

Mar. 2013–Aug. 2013

- Used Nutch to search and grab web data from the Internet, and used Solr to index it for further usage by a searching engine.

PUBLICATIONS

- “Brief Announcement: Building Fast Recoverable Persistent Data Structures with Montage” by Haosen Wen, Wentao Cai, Mingzhe Du, Benjamin Valpey, and Michael L. Scott. *34th International Symposium on Distributed Computing (DISC)*, Virtual, Oct. 2020.
- “Understanding and optimizing persistent memory allocation” by Wentao Cai, Haosen Wen, H. Alan Beadle, Chris Kjellqvist, Mohammad Hedayati, and Michael L. Scott. *The 2020 ACM SIGPLAN International Symposium on Memory Management (ISMM)*, London, UK, Jun. 2020.
- “Towards Efficient Nonblocking Persistent Software Transactional Memory” by H. Alan Beadle, Wentao Cai, Haosen Wen, and Michael L. Scott. TR 1006, Computer Science Dept., Univ. of Rochester, Apr. 2019.
- “Interval-Based Memory Reclamation” by H. Wen, J. Izraelevitz, W. Cai, H. A. Beadle, and M. L. Scott. *23rd ACM Symposium on Principles and Practice of Parallel Programming (PPoPP)*, Vienna, Austria, Feb. 2018.
- “Multipath routing research based on traffic measurement under SDN in data center networks” by Y. Yang, J. Yang, H. Wen, and H. Wang. *Journal of Huazhong University of Science and Technology (Natural Science Edition)*, 44(11), Nov. 2016.

TEACHING ASSISTANCE

Database Systems (CSC2/461)

Led by Dr. Tamal T. Biswas

Led by Dr. Eustrat Zhupa

U. of Rochester, NY

Aug. 2017–Dec. 2017, Jan. 2018–Apr. 2018

Aug. 2018–Dec. 2018

- Covered database design theories, applications of SQL, NoSQL (MongoDB) and NoSQL in distributed environments (SPARK).

TECHNICAL SKILLS

- Proficient in C/C++, SQL, experienced in OCaml, Ruby, MATLAB, Java/JSP, C#, Python, JavaScript.
- Proficient in parallel programming, experienced in programming on persistent main memory.
- Experienced in database design and management.
- Experienced with exploring large code base.

AWARDS & HONORS

- Honorable Mention in Mathematical Contest of Modeling (MCM). *May 2016*
An international contest for high school students and college undergraduates, with thousands of participants.
- Huawei Scholarship of BFSU. *Dec. 2014*
- Outstanding Student Leader of the Youth League of China. *May 2013 & Nov. 2015*
An honor for top 5% student leaders in colleges in China.

EXTRACURRICULAR ACTIVITIES

- Member of University of Rochester Badminton Club. *Sep. 2017–Present*
- Member of Chinese Choral Society of Rochester. *Jan. 2017–Present*
- Silver medal of YONEX Eastern Collegiate Team Badminton Championships, Division 2, on behalf of University of Rochester. *Oct. 27–28, 2018*
- Leader and conductor of the Choir of BFSU. *Sep. 2014–Jul. 2015*
- Associate director of the Art Troupe of BFSU. *Sep. 2014–Jul. 2015*