

# Pengfei Su

Ph.D. Candidate

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## Education

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- **College of William & Mary** Williamsburg, VA  
*Ph.D in Computer Science*  
Advisor: Xu Liu  
*Aug 2016 - Jul 2020*
- **Institute of Computing Technology, Chinese Academy of Sciences** Beijing, China  
*M.S. in Computer Science*  
*Aug 2013 - Jun 2016*
- **Yunnan University** Yunnan, China  
*B.S. in Computer Science*  
*Aug 2009 - Jun 2013*

## Research Interests

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- Program Analysis
- High Performance/Parallel Computing
- Software Engineering

## Publications

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- [SC'19] "Pinpointing Performance Inefficiencies via Lightweight Variance Profiling", **Pengfei Su**, Shuyin Jiao, Milind Chabbi, Xu Liu, The International Conference for High Performance Computing, Networking, Storage and Analysis, Nov 17-22, 2019, Denver, CO, USA.
- [ESEC/FSE'19] "Pinpointing Performance Inefficiencies in Java", **Pengfei Su**, Qingsen Wang, Milind Chabbi, Xu Liu, The 27th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering, Aug 26 - 30, 2019, Tallinn, Estonia.
- [ICSE'19] "Redundant Loads: A Software Inefficiency Indicator", **Pengfei Su**, Shasha Wen, Hailong Yang, Milind Chabbi, Xu Liu, The 41st IEEE/ACM International Conference on Software Engineering, May 25 - Jun 1, 2019, Montreal, Canada. **ACM SIGSOFT Distinguished Paper Award**
- [PPoPP'19] "Lightweight Hardware Transactional Memory Profiling", Qingsen Wang, **Pengfei Su**, Milind Chabbi, Xu Liu, The 24th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming, Feb 16-20, 2019, Washington, D.C.. **Best Paper Award**
- [Under Review] "An Object-centric Profiler for Java", Bolun Li, **Pengfei Su**, Milind Chabbi, Xu Liu.

## Honors and Awards

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- ACM SIGSOFT Travel Grant, ESEC/FSE'19 2019
- Distinguished Paper Award, ICSE'19 2019
- Best Paper Award, PPoPP'19 2019
- ACM SIGPLAN Travel Grant, PPoPP'19 2019
- NSF Travel Grant, PPoPP'19 2019
- Outstanding Student Award (Top 5%), Chinese Academy of Sciences 2014&2015
- Outstanding Student Award (Top 3%), Yunnan University 2010&2011&2012

## Professional Services

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- Artifact Evaluation Committee CGO'18&19&20, PPOPP'18&19
- Conference Sub-reviewer HPCA'20, CGO'20, ICPP'17&19, BIGCOM'19
- Conference Volunteer ASPLOS'18

## Teaching Experiences

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- **College of William & Mary** Williamsburg, VA  
*Teaching Assistant for Principles of Programming Languages (CSCI312)* Spring 2018, Fall 2017
- **College of William & Mary** Williamsburg, VA  
*Teaching Assistant for Algorithms (CSCI303)* Spring 2017, Fall 2016

## Internship

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- **Uber** Palo Alto, CA  
*Software Engineering Intern* May 2019 - Aug 2019

## Research Highlights

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- **LoadSpy — a fine-grained performance tool for pinpointing redundant memory loads**
  - Shows that redundant memory loads are a common indicator of various forms of software inefficiencies.
  - Proposes new strategies for analyzing profiling data by attributing redundancies to runtime contexts, objects, and scopes.
  - Pinpoints large quantities of temporal and spatial redundant memory loads in well-known real-world applications that are the subjects of optimization for years.
  - Available at <https://github.com/CCTLib/cctlib>.
- **FVSampler — a lightweight performance tool for pinpointing function-level execution variance**
  - Quantifies execution variance across different invocations of the same function.
  - Uses performance monitoring units (PMU) to sample function call and uses debug registers to intercept the return from the same function invocation to monitor whole function instances.
  - Overcomes a critical missing piece in existing sampling-based tools — synchronize samples with function boundaries to monitor whole function instances.
  - Available at <https://github.com/WitchTools/FVSampler>.
- **TXSampler — a lightweight performance tool for hardware transactional memory (HTM) profiling**
  - Quantifies the time spent in different components (e.g., transaction path, fallback path) of an HTM-based critical section.
  - Exploits call stack unwinding to construct the calling contexts outside transactions and exploits last branch records (LBR) to deduce the calling contexts inside transactions.
  - Available at <https://github.com/ScalableMachinesResearch/TXSampler>.
- **JXPerf — a lightweight performance tool for pinpointing redundant memory operations in Java**
  - Pinpoints three kinds of redundant memory operations (i.e., dead stores, silent stores, silent loads) by combining PMU and debug registers.
  - Works at the machine code level with no bytecode instrumentation.
  - Requires no modifications to hardware, OS, JVM, or monitored applications.
  - Available at <https://github.com/ScalableMachinesResearch/JXPerf>.

- **DJXPerf** — a lightweight object-centric performance tool for pinpointing locality issues in Java
  - Develops a novel object-centric profiling technique.
  - Combines PMU and lightweight bytecode instrumentation to reduce runtime and memory overheads.
  - Addresses the distinct challenges caused by just-in-time compilation and garbage collection.