Pengfei Su

Ph.D. Candidate

Department of Computer Science

College of William & Mary

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Education

- **College of William & Mary** — Williamsburg, VA
  Ph.D in Computer Science — *Aug 2016 - Aug 2020*
  Advisor: Xu Liu

- **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

- **Program Analysis**

- **High Performance/Parallel Computing**

- **Software Engineering**

Publications

- [**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

- ACM SIGSOFT Travel Grant, ESEC/FSE'19 — 2019

- Distinguished Paper Award, ICSE19 — 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

- 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

- **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

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

Research Highlights

- **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 debug registers to intercept the return from the sample 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., transactional 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: dead stores, redundant loads and redundant stores by combining hardware performance monitoring units 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.
  - Requires no modifications to hardware, OS, JVM, or monitored applications.