Thomas Shull

2014 Burlison Dr. Urbana, IL 61801, **email:** shull1@illinois.edu, **mobile:** 217-801-4613, thomasshull.net

Research Interests

Hardware-software co-designs to improve the performance of managed languages. Development of new persistent programming frameworks. Virtual Machine modifications to utilize emerging byte-addressable persistent memory technologies. Profiling-based compiler optimizations. Techniques to reduce the overhead of automatic memory management.

Education

University of Illinois at Urbana-Champaign August 2012 - Present
Ph.D. Candidate in Computer Science
Advisor: Prof. Josep Torrellas
Thesis: *Programming Non-Volatile Memory Effectively*
Committee: Prof. Josep Torrellas, Prof. Jian Huang, Prof. David Padua, Prof. James Larus, and Prof. Steven Swanson

Washington University of St. Louis June 2008 - May 2012
B.Sc. in Computer Science and B.Sc. in Computer Engineering
Summa Cum Laude

Professional Experience

Arm Ltd. July 2019 – Present

Open Source Software
Worked on AArch64 port of Substrate VM (SVM). SVM is a framework and runtime environment for the ahead-of-time compilation of Java applications. Made multiple bug fixes and performance improvements.

Non-Volatile Memory Research
Proposed ISA extensions to improve crash-consistent application performance by enabling more aggressive instruction reordering; implemented extensions within gem5 simulator. Also improved and fixed the AArch64 port of the Persistent Memory Development Kit.

Selected Publications

AutoPersist: An Easy-To-Use Java NVM Framework Based on Reachability (PLDI 2019), *Thomas Shull, Jian Huang, and Josep Torrellas*

Reusable Inline Caching for JavaScript Performance (PLDI 2019), *Jiho Choi, Thomas Shull, and Josep Torrellas*

QuickCheck: Using Speculation to Reduce the Overhead of Checks in NVM Frameworks (VEE 2019), *Thomas Shull, Jian Huang, and Josep Torrellas*

NoMap: Speeding-Up JavaScript Using Hardware Transactional Memory (HPCA 2019), *Thomas Shull, Jiho Choi, María J. Garzarán, and Josep Torrellas*

Biased Reference Counting: Minimizing Atomic Operations in Garbage Collection (PACT 2018), *Jiho Choi, Thomas Shull, and Josep Torrellas*

Defining a High-level Programming Model for Emerging NVRAM Technologies (ManLang 2018), *Thomas Shull, Jian Huang, and Josep Torrellas*

ShortCut: Architectural Support for Fast Object Access in Scripting Languages (ISCA 2017), *Jiho Choi, Thomas Shull, and Josep Torrellas*

Improving JavaScript Performance by Deconstructing the Type System (PLDI 2014), *Wonsun Ahn, Jiho Choi, Thomas Shull, María J. Garzarán, and Josep Torrellas*

Selected Research Projects

Developing a New Java Programming Model for Emerging Non-Volatile Memories
- Developed a new programming model which relies on the JVM to search the transitive closures of objects and identify all objects which require persistence.
- Implemented model within the Maxine JVM and developed compiler/runtime optimizations to maximize model's performance.

Improving JavaScript Performance
- Contributed to hardware and software proposals to improve the performance of managed languages.
- Developed a new optimization approach which leverages emerging hardware transactional memory technologies.

Technical Skills

Programming Skills: C/C++, Java, Python.
Managed Language Implementations: JavaScript–V8, JavaScriptCore; Swift; Java–HotSpot, Maxine, Substrate VM
Compiler Implementations: Graal, LLVM

References

Josep Torrellas, torrella@illinois.edu University of Illinois at Urbana-Champaign
Additional references available upon request