Jungi Jeong

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Research Interests

My primary area of interest is computer architecture. Throughput my graduate studies, I have explored how computer architecture can support crash consistency and transactions in non-volatile memory. However, my interests are not limited to computer architecture, but span across operating systems and concurrency control. In particular, I am looking for interesting problems in computer-architecture related area and addressing these challenges with HW-SW codesigns.

Education

KAIST, Daejeon, South Korea ..... March 2015–February 2020

Ph.D. in School of Computing

Advisor: Professor Seungryoul Maeng

KAIST, Daejeon, South Korea ..... March 2013–February 2015

M.S. in Computer Science

Advisor: Professor Seungryoul Maeng

University of Tennessee at Knoxville, TN, United States ..... August 2011–May 2012

Exchange Student

Hanyang University, Seoul, South Korea ..... March 2006–February 2013

B.S. in Computer Science and Engineering

Publications

Conference Proceedings

[1] **Jungi Jeong**, Daewoo Lee, and Seungryoul Maeng. Application-assisted Writeback for Hadoop Clusters. In *Proceedings of the International Conference on Cluster Computing (**Cluster**)*, September 2016.

[2] Chang Hyun Park, Taekyung Heo, **Jungi Jeong**, and Jaehyuk Huh. Hybrid TLB Coalescing: Improving TLB Translation Coverage under Diverse Fragmented Memory Allocations. In *Proceedings of the International Symposium on Computer Architecture (**ISCA**)*, June 2017.

[3] **Jungi Jeong**, Chang Hyun Park, Jaehyuk Huh, and Seungryoul Maeng. Efficient Hardware-assisted Logging with Asynchronous and Direct Update for Persistent Memory. In *Proceedings of the International Symposium on Microarchitecture (**MICRO**)*, October 2018.

[4] Wonsang Kwak, **Jungi Jeong**, Ganguk Lee, Jin-soo Kim, and Seungryoul Maeng. GPU-delegated Direct I/O Framework Between GPU and NVMe-SSD. In *Korea Computer Congress (*KCC*)*, July 2019.

[5] **Jungi Jeong**, Jaewan Hong, Seungryoul Maeng, Changhee Jung, and Youngjin Kwon. Unbounded Hardware Transactional Memory for a Hybrid DRAM/NVM Memory System. In *Proceedings of the International Symposium on Microarchitecture (**MICRO**)*, October 2020.

[6] **Jungi Jeong** and Changhee Jung. PMEM-Spec: Persistent Memory Speculation. In *Proceedings of the International Conference on Architectural Support for Programming Languages and Operating Systems (**ASPLOS**)*, April 2021.

Journal Articles

[7] Moon Hwan Lee, Yeakyung Row, Oo Sung Son, Uichin Lee, JaeJeong Kim, **Jungi Jeong**, Seungryoul Maeng, and Tek-Jin Nam. Flower-pop: Facilitating casual group conversations with multiple mobile devices. *Wearable and Ubiquitous Technologies (**IMWET**)*, December 2017.

[8] **Jungi Jeong** and Youngjin Kwon. Supporting Atomic Durability in Persistent Transactions with Hardware Supports. *KIISE Journal, Invited article*, June 2019.

Research Projects

Designing the HW/SW codesign for strict persistency outperforming relaxed models

Proposed *PMEM-Spec*, the hardware/software combined solution that unburdens hardware.

PMEM-Spec opportunistically assumes all PM accesses are in the right-order and removes all complexities in the core and caches.

Ordering violation (e.g., misspeculation) is handled with software failure-atomicity solutions.

Participated as **the first author** leading the project.

Accepted and will be presented at ASPLOS 2021.

Designing unbounded hardware transactional memory for hybrid memory systems

Current hardware transactional memory (HTM) does not guarantee forward progress and aborts on *capacity overflows*, requiring a programmer-defined fall-back path.

The fall-back path often decreases concurrency by serializing transactions for forward progress.

Proposed `unbounded` hardware transactional memory for DRAM and NVM that eases the programming and accelerates transactions.

Participated as **the first author** leading the project.

Published and presented at MICRO 2020.

Proposing a HW logging mechanism that supports atomicity and durability of NVM writes

Explored design spaces of HW-logging that can provide atomicity and durability of NVM writes and identified key techniques to improve performance of HW-logging.

Proposed *ReDU*, redo-based hardware logging which replaces NVM log-read to DRAM write, simplifying HW redo-log implementation and outperforming previous studies in various write patterns.

Participated as **the first author** leading the project.

Published and presented at MICRO 2018.

Providing an adjustable TLB coverage for diverse memory mappings

Non-uniformity and heterogeneity (e.g., 3D-stacked, non-volatile memories) in future memory system require a TLB to perform well diverse memory mappings.

Proposed a HW-SW hybrid TLB coalescing, where the *anker* TLB that can provide an adjustable coverage using contiguity information encoded in the page table entry by the SW.

Participated as a **collaborator** to help evaluation.

Published in ISCA 2017.

Building a high-speed direct data transfer method between GPU and NVMe-SSD

Developed a library that transfers data between NVMe-SSD and GPU memory without copying to host memory (DRAM) using the NVMe protocol and Nvidia's RDMA APIs.

Proposed new programming model that GPU applications triggers data transfer and removes host intervention.

Participated as a **collaborator** to guide the direction of the project and help implementation.

Published in KCC 2019.

Patents

Domestic Patent, 10-1942663-0000, "METHOD AND SYSTEM TO IMPROVE TLB COVERAGE BY USING CHUNKS OF CONTIGUOUS MEMORY" ..... January 21, 2019.

Honors and Awards

National Full Scholarship for Graduate Study ..... March 2013 - February 2020

Outstanding Teaching Assistant Award at KAIST ..... Fall, 2013

Academic Scholarship at Hanyang University ..... Spring 2012, Fall 2012

Teaching Experience

Teaching Assistant at KAIST

Operating Systems for SK Hynix ..... Winter 2018

CS211 Digital Systems ..... Spring 2014, 2015, 2016, 2017 (**Head**), 2018

CS310 Embedded Computer Systems ..... Fall 2013, 2015 (**Head**), 2016, 2017, 2018 (**Head**)

SEP561 Embedded Computing ..... Spring 2014, 2015, 2019

Mentoring Experience

Wonsang Kwak (MS course, Mar 2017 - Feb 2019)

Hangyeoul Park (Undergraduate course, Individual Study, Spring 2015)

Jinnapat Indrapiromkul (Undergraduate course, Individual, Winter 2014)

Invited Talks

Unbounded Hardware Transactional Memory for a Hybrid DRAM/NVM Memory System

IEEE/ACM MICRO, Virtual ..... Oct 2020

Making Data Durable in Persistent Memory with Hardware-supported Logging

Ajou University, Korea ..... Oct 2019

Efficient Hardware-assisted Logging with Asynchronous and Direct Update for Persistent Memory

IEEE/ACM MICRO, Fukuoka, Japan ..... Oct 2018

Korea Software Congress, Pyungchang, South Korea ..... Dec 2018

Application-assisted Writeback for Hadoop Clusters

IEEE Cluster, Taipei, Taiwan ..... Sep 2016

References

Available upon request

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