

张杰

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张杰博士现任北京大学计算机系助理教授，研究员，博士生导师。他长期从事存储系统和专用处理器的研究和设计，致力于从计算机体系结构层面出发，解决大数据和人工智能时代对于高性能存储系统的需求，突破冯诺依曼体系结构下数据迁移的瓶颈以及内存墙的限制。负责和参与的项目得到了美国能源部、美国自然科学基金、韩国自然科学基金、三星电子、海力士、德州仪器和西部数据的累计超过 3000 万人民币的资助。他在国际会议及期刊上发表了 36 篇论文，其中以第一作者发表论文 22 篇，包括计算机体系结构与系统顶级会议 ISCA (CCF-A, 两篇)、OSDI (CCF-A)、HPCA (CCF-A, 三篇)、MICRO (CCF-A)、FAST (CCF-A)、DAC (CCF-A)、Eurosys (CCF-B)、PACT (CCF-B) 以及权威期刊 TPDS (CCF-A)、TACO (CCF-B)。

EDUCATION

KAIST , Daejeon, Korea Postdoctoral Researcher Yonsei University , Incheon, Korea PhD in Engineering University of Texas at Dallas , Richardson, Texas PhD in Computer Engineering (transfer to Korea) University of Texas at Dallas , Richardson, Texas Master of Science in Electrical Engineering Nanjing University of Posts and Telecommunications , Nanjing, China BS in Communication Engineering (computer communication)	Advisor: Dr. Myoungsoo Jung March 2020 – May 2021 Advisor: Dr. Myoungsoo Jung August 2015 – Feb 2020 Advisor: Dr. Myoungsoo Jung August 2014 – August 2015 Advisor: Dr. Myoungsoo Jung August 2012 – May 2014 September 2008 – July 2012
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PUBLICATIONS

2021

ISCA CCF-A	Revamping Storage Class Memory with Hardware Automated Memory-Over-Storage Solution (to appear) <i>Jie Zhang, Miryeong Kwon, Donghyun Gouk, Sungjoon Koh, Nam Sung Kim, Mahmut Kandemir, Myoungsoo Jung,</i> <i>The IEEE/ACM International Symposium on Computer Architecture</i>
NVMW	Architecting Throughput Processors with New Flash (to appear) <i>Jie Zhang, Myoungsoo Jung,</i> <i>The 12th Annual Non-volatile Memories Workshop</i>
NVMW	DRAM-less Accelerator for Energy Efficient Data Processing (to appear) <i>Jie Zhang, Gyuyoung Park, David Donofrio, John Shalf, Myoungsoo Jung</i> <i>The 12th Annual Non-volatile Memories Workshop</i>
NVMW	Manycore-Based Scalable SSD Architecture Towards One and More Million IOPS (to appear) <i>Jie Zhang, Miryeong Kwon, Michael Swift, Myoungsoo Jung,</i> <i>The 12th Annual Non-volatile Memories Workshop</i>

2020

ISCA CCF-A	ZnG: Architecting GPU Multi-Processors with New Flash for Scalable Data Analysis <i>Jie Zhang, Myoungsoo Jung,</i>
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	<i>The IEEE/ACM International Symposium on Computer Architecture</i>
FAST	Scalable Parallel Flash Firmware for Many-core Architectures
CCF-A	<i>Jie Zhang, Miryeong Kwon, Michael Swift, Myoungsoo Jung,</i> <i>The 18th USENIX Conference on File and Storage Technologies</i>
HPCA	DRAM-less: Hardware Acceleration of Data Processing with New Memory
CCF-A	<i>Jie Zhang, Gyuyoung Park, David Donofrio, John Shalf, Myoungsoo Jung</i> <i>26th IEEE International Symposium on High-Performance Computer Architecture</i>
ISPASS	Data Direct I/O Characterization for Future I/O System Exploration
CCF-C	<i>Mohammad Alian, Yifan Yuan, Jie Zhang, Ren Wang, Myoungsoo Jung, Nam Sung Kim</i> <i>The IEEE International Symposium on Performance Analysis of Systems and Software</i>
CAL	FastDrain: Removing Page Victimization Overheads in NVMe Storage Stack
SCI-3 	<i>Jie Zhang, Miryeong Kwon, Sanghyun Han, Nam Sung Kim, Mahmut Kandemir and</i> <i>Myoungsoo Jung</i> <i>IEEE Computer Architecture Letters (CAL)</i>
2019	
HPCA	FUSE: Fusing STT-MRAM into GPUs to Alleviate Off-Chip Memory Access Overheads
CCF-A	<i>Jie Zhang, Myoungsoo Jung, Mahmut Kandemir,</i> <i>25th IEEE International Symposium on High-Performance Computer Architecture</i>
IISWC	Faster than Flash: An In-Depth Study of System Challenges for Emerging Ultra-Low Latency SSDs
	<i>Sungjoon Koh, Junkyeok Jang, Changrim Lee, Miryeong Kwon, Jie Zhang, Myoungsoo Jung,</i> <i>The 2019 IEEE International Symposium on Workload Characterization</i>
DAC	FlashGPU: Placing New Flash Next to GPU Cores
CCF-A	<i>Jie Zhang, Miryeong Kwon, Hyojong Kim, Hyesoon Kim, Myoungsoo Jung,</i> <i>The 56th Design Automation Conference (DAC)</i>
TPDS	Exploring Fault-Tolerant Erasure Codes for Scalable All-Flash Array Clusters
CCF-A	<i>Sungjoon Koh, Jie Zhang, Miryeong Kwon, Jungyeon Yoon, David Donofrio, Nam Sung Kim,</i> <i>Myoungsoo Jung,</i> <i>IEEE Transactions on Parallel and Distributed Systems (TPDS)</i>
NVMW	Addressing Fast-Detrapping for Reliable 3D NAND Flash Design
	<i>Mustafa Shihab, Jie Zhang, Myoungsoo Jung, Mahmut Kandemir,</i> <i>10th Annual Non-Volatile Memories Workshop -- Nominated as Memorable Paper Award</i>
KCC	Maximizing GPU Cache Utilization with Adjustable Cache Line Management
	<i>Jie Zhang, Myoungsoo Jung,</i> <i>Korean Computer Congress (KCC), 2019 -- Nominated as Excellent Paper Award</i>

2018

- OSDI**
CCF-A **FlashShare: Punching Through Server Storage Stack from Kernel to Firmware for Ultra-Low Latency SSDs**
Jie Zhang, Miryeong Kwon, Donghyun Gouk, Changlim Lee, Mohammad Alian, Myoungjun Chun, Mahmut Kandemir, Nam Sung Kim, Jihong Kim, Myoungsoo Jung,
13th USENIX Symposium on Operating Systems Design and Implementation
- MICRO**
CCF-A **Amber: Enabling Precise Full-System Simulation with Detailed Modeling of All SSD Resources**
Donghyun Gouk, Miryeong Kwon, Jie Zhang, Sungjoon Koh, Wonil Choi, Nam Sung Kim, Mahmut Kandemir, Myoungsoo Jung,
The 51st Annual IEEE/ACM International Symposium on Microarchitecture
- TACO**
CCF-B **ReveNAND: A Fast-Drift Aware Resilient 3D NAND Flash Design**
Mustafa Shihab, Jie Zhang, Myoungsoo Jung, Mahmut Kandemir,
ACM Transactions on Architecture and Code Optimization (TACO), 2018
- Eurosys**
CCF-B **FlashAbacus: A Self-governing Flash-based Accelerator for Low-power Systems**
Jie Zhang, Myoungsoo Jung,
The European Conference on Computer Systems (EuroSys), 2018
- IPDPS**
CCF-B **CIAO: Cache Interference-Aware Throughput-Oriented Architecture and Scheduling for GPUs**
Jie Zhang, Shuwen Gao, Nam Sung Kim, Myoungsoo Jung,
32nd IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2018

2017

- CAL**
SCI-3 **SimpleSSD: Modeling Solid State Drive for Holistic System Simulation**
Myoungsoo Jung, Jie Zhang, Ahmed Abulila, Miryeong Kwon, Narges Shahidi, John Shalf, Nam Sung Kim and Mahmut Kandemir,
IEEE Computer Architecture Letters (CAL), 2017
- IISWC** **Understanding System Characteristics of Online Erasure Coding on Scalable, Distributed and Large-Scale SSD Array Systems**
Sungjoon Koh, Jie Zhang, Miryeong Kwon, Jungyeon Yoon, David Donofrio, Nam Sung Kim, Myoungsoo Jung,
IEEE International Symposium on Workload Characterization (IISWC), 2017
- IISWC** **TraceTracker: Hardware/Software Co-Evaluation for Large-Scale I/O Workload Reconstruction**
Miryeong Kwon, Jie Zhang, Gyuyoung Park, Wonil Choi, David Donofrio, John Shalf,

Mahmut Kandemir, Myoungsoo Jung,

IEEE International Symposium on Workload Characterization (IISWC), 2017

NPC

An In-depth Performance Analysis of Many-Integrated Core for Communication Efficient

CCF-C

Heterogeneous Computing

[Jie Zhang](#), Myoungsoo Jung,

IFIP International Conference on Network and Parallel Computing (NPC), 2017

NPC/IJPP

Enabling Realistic Logical Device Interface and Driver for NVM Express Enabled Full

CCF-C

System Simulations

Donghyun Gouk, [Jie Zhang](#), Myoungsoo Jung,

IFIP International Conference on Network and Parallel Computing (NPC) and Invited for

International Journal of Parallel Programming (IJPP), 2017

2016

HPCA

DUANG: Fast and Lightweight Page Migration in Asymmetric Memory Systems

CCF-A

Hao Wang, [Jie Zhang](#), Gieseok Park, Sharmila Shridhar, Myoungsoo Jung, Nam Sung Kim,

IEEE Symposium on High Performance Computer Architecture (HPCA), 2016

ASBD

A Study for Block-level I/O Trace Reconstruction on All-Flash Arrays

Miryeong Kwon, [Jie Zhang](#), Gyuyoung Park, Myoungsoo Jung,

Workshop on Architectures and Systems for Big Data (ASBD@ISCA), 2016

NVMSA

An In-Depth Study of Next Generation Interface for Emerging Non-Volatile Memories

Wonil Choi, [Jie Zhang](#), Shuwen Gao, Jaesoo Lee, Myoungsoo Jung, Mahmut Kandemir,

IEEE Non-Volatile Memory Systems and Applications Symposium (NVMSA), 2016

INFLOW

ROSS: A Design of Read-Oriented STT-MRAM Storage for Energy-Efficient Non-Uniform Cache Architecture

[Jie Zhang](#), Miryeong Kwon, Chanyoung Park, Myoungsoo Jung, Songkuk Kim,

USENIX Workshop on Interactions of NVM/Flash with Operating Systems and Workloads

INFLOW

Couture: Tailoring STT-MRAM for Persistent Main Memory

Mustafa Shihab, [Jie Zhang](#), Shuwen Gao, Josep Sloan, Myoungsoo Jung,

USENIX Workshop on Interactions of NVM/Flash with Operating Systems and Workloads

2015

ASBD

CoDEN: A Hardware/Software CoDesign Emulation Platform for SSD-Accelerated Near Data Processing

[Jie Zhang](#), Damian Szmulewicz, Erick Macias, Myoungsoo Jung,

The 5th Workshop on Architecture and System for Big Data (ASBD), 2015

PACT

NVMMU: Direct Solid State Disk Access for GPU-Accelerated Data Processing

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- CCF-B** **Jie Zhang**, David Donofrio, John Shalf, Myoungsoo Jung,
The 24th International Conference on Parallel Architecture and Compilation Techniques
- ICCD** **OpenNVM: An Open-Sourced FPGA-based NVM Controller for Low Level Memory**
- CCF-B** **Characterization**
Jie Zhang, Gieseok Park, David Donofrio, Mustafa Shihab, John Shalf and Myoungsoo Jung,
The 33rd International Conference on Computer Design (ICCD), 2015
- PACT-SRC** **Integrating 3D Resistive Memory Cache into GPGPU for Energy-Efficient Data Processing**
Jie Zhang, David Donofrio, John Shalf and Myoungsoo Jung,
*International Conference on parallel Architecture and Compilation Techniques (PACT) –
ACM SRC 2nd Runner Award, 2015*
- FAST-WiP** **Shared Non-Volatile Memory Cache for Energy-Efficient High Throughput GPU Computing**
Jie Zhang and Myoungsoo Jung,
USENIX Conference on File and Storage Technologies Working in Progress (FAST WiP), 2015

2014

- HotStorage** **Power, Energy, and Thermal Considerations in SSD-Based I/O Acceleration**
Jie Zhang, Myoungsoo Jung,
6th USENIX Workshop on Hot Topics in Storage and File Systems (HotStorage 14), 2014

PATENTS

- “Memory controlling device and computing device including the same”, Myoungsoo Jung, Donghyun Gouk, Miryeong Kwon, Sungjoon Koh, Jie Zhang, America (US20190171566A1)
- “Flash-based accelerator and computing device including the same”, Myoungsoo Jung, Jie Zhang, America (US10824341B2, US20180321859, US20170285968)
- “基于闪存的加速器和包含其的计算设备”, Myoungsoo Jung, Jie Zhang, China (CN107291424)
- “基于闪存的加速器及包括该加速器的计算设备”, Myoungsoo Jung, Jie Zhang, China (CN109460369)
- “Resistance switching memory-based accelerator”, Myoungsoo Jung, Gyuyoung PARK, Jie Zhang, America (US20180321880A1)
- “PARALLEL PROCESSING UNIT, COMPUTING DEVICE INCLUDING THE SAME, AND THREAD SCHEDULING METHOD”, Jie Zhang, Myoungsoo Jung, America (WO2018021620)
- “MEMORY CONTROL APPARATUS AND COMPUTING DEVICE INCLUDING SAME”, JUNG MYOUNGSOO, GOUK DONGHYUN, KWON MIRYEONG, KOH SUNGJOON, 정명수, JIE ZHANG, 국동현, 권미령, 고성준 장치에, Korea (KR1020180126267)
- “COMPUTING DEVICE, METHOD OF PROCESSING INPUT/OUTPUT REQUEST, AND RECORDING MEDIUM”, Jie Zhang, Myoungsoo Jung, Donghyun Gouk, Miryeong Kwon, Sungjoon Koh, America (pending)
- “FLASH-BASED COPROCESSOR”, Jie Zhang, Myoungsoo Jung, America (pending)
- “FLASH STORAGE DEVICE AND METHOD OF SCHEDULING PAGE VICTIMIZATION”, Jie Zhang, Myoungsoo Jung, America (pending)

EXPERIENCE

Research Assistant, Computer Architecture and Memory System Lab

Sep 2013 - Present

- Cache and memory system optimization in GPGPU and multi-core system.
- Non-volatile memory (including Spin-transfer torque magnetic random-access memory and Phase Change Random Access Memory) characterization and optimization.
- Performance, power and thermal optimizations of Solid State Disk (SSD).

External Activities

Journal Paper Review/Subreview

- IEEE Transactions on Computer
- ACM Transactions on Storage
- ACM Transactions on Architecture and Code Optimization
- ACM Transactions on Computer Systems
- IEEE Transactions on Parallel and Distributed Systems
- IEEE Computer Architecture Letters
- IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems

Conference Paper Review/Subreview

- MICRO'18 '16
- HPCA'18 '16
- ASPLOS'19 '18 '17
- DATE'19
- IPDPS'18 '16
- ICCD'19 '18 '17 '15
- DAC'20 '19
- NVMSA'17 '16
- HotStorage'20

Invited Talks and Presentations

- Invited talk, "ZnG: Architecting GPU Multi-Processors with New Flash for Scalable Data Analysis", Intel Computational Storage Lab, 2020
- Presentation, "ZnG: Architecting GPU Multi-Processors with New Flash for Scalable Data Analysis", ISCA, online, 2020
- Presentation, "DRAM-less: Hardware Acceleration of Data Processing with New Memory", HPCA, San Diego, CA, 2020
- Presentation, "Scalable Parallel Flash Firmware for Many-core Architectures", FAST, Santa Clara, CA, 2020
- Presentation, "FUSE: Fusing STT-MRAM into GPUs to Alleviate Off-Chip Memory Access Overheads", HPCA, Washington DC, 2019
- Presentation, "FlashGPU: Placing New Flash Next to GPU Cores", DAC, Las Vegas, NV, 2019
- Presentation, "Maximizing GPU Cache Utilization with Adjustable Cache Line Management", Jeju, South Korea, 2019
- Presentation, "FlashShare: Punching Through Server Storage Stack from Kernel to Firmware for Ultra-Low Latency SSDs", OSDI, Carlsbad, CA, 2018
- Presentation, "FlashAbacus: A Self-governing Flash-based Accelerator for Low-power Systems", Eurosys, Porto, Portugal, 2018
- Presentation, "CIAO: Cache Interference-Aware Throughput-Oriented Architecture and Scheduling for GPUs", IPDPS, Vancouver, Canada, 2018

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- Presentation, "An In-depth Performance Analysis of Many-Integrated Core for Communication Efficient Heterogeneous Computing", NPC, Anhui, China, 2017
- Presentation, "ROSS: A Design of Read-Oriented STT-MRAM Storage for Energy-Efficient Non-Uniform Cache Architecture", Inflow, Savannah, GA, 2016
- Presentation, "Couture: Tailoring STT-MRAM for Persistent Main Memory", Inflow, Savannah, GA, 2016
- Presentation, "CoDEN: A Hardware/Software CoDesign Emulation Platform for SSD-Accelerated Near Data Processing", ASBD, Portland, OR, 2015
- Presentation, "NVMMU: Direct Solid State Disk Access for GPU-Accelerated Data Processing", PACT, San Francisco, CA, 2015
- Presentation, "Integrating 3D Resistive Memory Cache into GPGPU for Energy-Efficient Data Processing", PACT SRC, San Francisco, CA, 2015
- Presentation, "OpenNVM: An Open-Sourced FPGA-based NVM Controller for Low Level Memory Characterization", ICCD, New York city, NY, 2015
- Presentation, "Shared Non-Volatile Memory Cache for Energy-Efficient High Throughput GPU Computing", FAST WiP, Santa Clara, CA, 2015
- Presentation, "Power, Energy, and Thermal Considerations in SSD-Based I/O Acceleration", HotStorage, Philadelphia, PA, 2014

Teaching Experience

- IIT 3002 Operating Systems (Fall'15, Fall'16)
- IIT 6036 Computer Organization and Design (Fall'15, Fall'16)
- IIT 7024 Advanced System Architecture (Spring'16)

Honors

- 2015 ACM Student Research Competition 2nd Runner Award
- 2018 OSDI travel grant
- 2019 Korea Computer Congress (KCC) -- Best Presentation Paper Award
- 2019 Annual Non-Volatile Memories Workshop (NVMW) -- Nominated as Memorable Paper Award
- 2020 HPCA travel grant
- 2020-2021 Korean BK21+ Scholarship