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张杰博士现任北京大学计算机学院助理教授，特聘研究员，博士生导师，获得优秀青年科学基金海外项目、英特尔学术英才计划荣誉学者、ACM SIGCSE 新星奖、博雅青年学者。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 40 余篇论文，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，七篇）、 MICRO（CCF-A，两篇）、FAST（CCF-A）、DAC（CCF-A）、Eurosys（CCF-B）、PACT（CCF-B）以及权威期刊 TPDS（CCF-A）、TACO（CCF-B）。

工作经历

北京大学，北京，中国 — 助理教授，博导
计算机学院 — 2021 年 7 月–至今
KAIST, Daejeon, Korea — 博后
Electrical Engineering (Computing Division) — March 2020 年 3 月 –2021 年 5 月

教育经历

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

论文发表情况

2024

HPCA **StreamPIM: Streaming Matrix Computation in Racetrack Memory**

CCF-A *Yuda An, Yunxiao Tang, Shushu Yi, Li Peng, XIurui Pan, Guangyu Sun, Zhaochu Luo, Qiao Li,* ***Jie Zhang***

IEEE International Symposium on High-Performance Computer Architecture

HPCA **BeaconGNN: Large-Scale GNN Acceleration with Asynchronous In-Storage Computing**

CCF-A *Yuyue Wang, Xiurui Pan, Yuda An,* ***Jie Zhang****, Glenn Reinman*

IEEE International Symposium on High-Performance Computer Architecture

HPCA **LearnedFTL: A Learning-based Page-level FTL for Reducing Double Reads in Flash-based SSDs**

CCF-A *Shengzhe Wang, Zihang Lin, Suzhen Wu, Hong Jiang,* ***Jie Zhang****, Bo Mao*

IEEE International Symposium on High-Performance Computer Architecture

HPCA **Midas Touch: Invalid-Data Assisted Reliability and Performance Boost for 3D High-Density Flash**

CCF-A *QiaoLi, Hongyang Dang, Zheng Wan, Congming Gao, Min Ye,* ***Jie Zhang****, Tei-Wei Kuo, Chun*

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Jason Xue

IEEE International Symposium on High-Performance Computer Architecture

2023

NVMW **Optimizations of Linux Software RAID System for Next-Generation Storage**

Shushu Yi, Yanning Yang, Yunxiao Tang, Zixuan Zhou, Junzhe Li, Yue Chen, Myoungsoo Jung, ***Jie Zhang****,*

The 14th Annual Non-volatile Memories Workshop

SAC **BcBench: Exploring Throughput Processor Designs based on Blockchain Benchmarking**

Xiurui Pan, Yue Chen, Shushu Yi, ***Jie Zhang****,*

The 38th ACM/SIGAPP Symposium on Applied Computing

CAL **Intelligent SSD Firmware for Zero-Overhead Journaling**

SCI 3 *Hanyeoreum Bae, Donghyun Gouk, Seungjun Lee, Jiseon Kim, Sungjoon Koh,* ***Jie Zhang****, and Myoungsoo Jung,*

IEEE Computer Architecture Letters (CAL)

2022

HotStorage **ScalaRAID: Optimizing Linux Software RAID System for Next-Generation Storage**

Shushu Yi, Yanning Yang, Yunxiao Tang, Zixuan Zhou, Junzhe Li, Yue Chen, Myoungsoo Jung, ***Jie Zhang****,*

14th USENIX Workshop on Hot Topics in Storage and File Systems (HotStorage 22)

THPC **Survey on Storage-Accelerator Data Movement**

Zixuan Zhou, Shushu Yi, ***Jie Zhang****,*

CCF Transaction on High Performance Computing

NVMW **Integrating New Photonic-Based Heterogeneous Memory into Throughput Accelerators**

Jie Zhang*, Myoungsoo Jung,*

The 13th Annual Non-volatile Memories Workshop

NVMW **HAMS: Hardware Automated Memory-over-Storage for Large-scale Memory Expansion**

Jie Zhang*, Miryeong Kwon, Donghyun Gouk, Sungjoon Koh, Nam Sung Kim,*

Mahmut Taylan Kandemir, Myoungsoo Jung

The 13th Annual Non-volatile Memories Workshop

2021

MICRO **Ohm-GPU: Integrating New Optical Network and Heterogeneous Memory into GPU**

CCF-A **Multi-Processors**

Jie Zhang*, Myoungsoo Jung,*

The 54th Annual IEEE/ACM International Symposium on Microarchitecture

ISCA **Revamping Storage Class Memory with Hardware Automated Memory-Over-Storage**

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

2020

ISCA	**ZnG: Architecting GPU Multi-Processors with New Flash for Scalable Data Analysis**
CCF-A	***Jie Zhang**, Myoungsoo Jung,*
	The IEEE/ACM International Symposium on Computer Architecture
FAST	**Scalable Parallel Flash Firmware for Many-core Architectures**
CCF-A	***Jie Zhang**, Miryeong Kwon, Michael Swift, Myoungsoo Jung,*
	The 18th USENIX Conference on File and Storage Technologies
HPCA	**DRAM-less: Hardware Acceleration of Data Processing with New Memory**
CCF-A	***Jie Zhang**, Gyuyoung Park, David Donofrio, John Shalf, Myoungsoo Jung*
	26th IEEE International Symposium on High-Performance Computer Architecture
ISPASS	**Data Direct I/O Characterization for Future I/O System Exploration**
CCF-C	*Mohammad Alian, Yifan Yuan, **Jie Zhang**, Ren Wang, Myoungsoo Jung, Nam Sung Kim*
	The IEEE International Symposium on Performance Analysis of Systems and Software
CAL	**FastDrain: Removing Page Victimization Overheads in NVMe Storage Stack**
SCI-3 ☒	***Jie Zhang**, Miryeong Kwon, Sanghyun Han, Nam Sung Kim, Mahmut Kandemir and*
	Myoungsoo Jung
	IEEE Computer Architecture Letters (CAL)

2019

HPCA	**FUSE: Fusing STT-MRAM into GPUs to Alleviate Off-Chip Memory Access Overheads**
CCF-A	***Jie Zhang**, Myoungsoo Jung, Mahmut Kandemir,*
	25th IEEE International Symposium on High-Performance Computer Architecture
IISWC	**Faster than Flash: An In-Depth Study of System Challenges for Emerging Ultra-Low**

	Latency SSDs
	*Sungjoon Koh, Junkyeok Jang, Changrim Lee, Miryeong Kwon, **Jie Zhang**, Myoungsoo Jung,*
	The 2019 IEEE International Symposium on Workload Characterization
DAC	**FlashGPU: Placing New Flash Next to GPU Cores**
CCF-A	***Jie Zhang**, Miryeong Kwon, Hyojong Kim, Hyesoon Kim, Myoungsoo Jung,*
	The 56th Design Automation Conference (DAC)
TPDS	**Exploring Fault-Tolerant Erasure Codes for Scalable All-Flash Array Clusters**
CCF-A	*Sungjoon Koh, **Jie Zhang**, Miryeong Kwon, Jungyeon Yoon, David Donofrio, Nam Sung Kim, Myoungsoo Jung,*
	IEEE Transactions on Parallel and Distributed Systems (TPDS)
NVMW	**Addressing Fast-Detrapping for Reliable 3D NAND Flash Design**
	*Mustafa Shihab, **Jie Zhang**, Myoungsoo Jung, Mahmut Kandemir,*
	10th Annual Non-Volatile Memories Workshop -- Nominated as Memorable Paper Award
KCC	**Maximizing GPU Cache Utilization with Adjustable Cache Line Management**
	***Jie Zhang**, Myoungsoo Jung,*
	Korean Computer Congress (KCC), 2019 -- Nominated as Excellent Paper Award

2018

OSDI	**FlashShare: Punching Through Server Storage Stack from Kernel to Firmware for**
CCF-A	**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	**Amber: Enabling Precise Full-System Simulation with Detailed Modeling of All SSD**
CCF-A	**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	**ReveNAND: A Fast-Drift Aware Resilient 3D NAND Flash Design**
CCF-B	*Mustafa Shihab, **Jie Zhang**, Myoungsoo Jung, Mahmut Kandemir,*
	ACM Transactions on Architecture and Code Optimization (TACO), 2018
Eurosys	**FlashAbacus: A Self-governing Flash-based Accelerator for Low-power Systems**
CCF-B	***Jie Zhang**, Myoungsoo Jung,*
	The European Conference on Computer Systems (EuroSys), 2018
IPDPS	**CIAO: Cache Interference-Aware Throughput-Oriented Architecture and Scheduling for**

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CCF-B	**GPUs** ***Jie Zhang**, Shuwen Gao, Nam Sung Kim, Myoungsoo Jung,* *32nd IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2018*

2017

CAL	**SimpleSSD: Modeling Solid State Drive for Holistic System Simulation**
SCI-3 ☒	*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 ***CCF-C***	**An In-depth Performance Analysis of Many-Integrated Core for Communication Efficient Heterogeneous Computing** ***Jie Zhang**, Myoungsoo Jung,* *IFIP International Conference on Network and Parallel Computing (NPC), 2017*
NPC/IJPP ***CCF-C***	**Enabling Realistic Logical Device Interface and Driver for NVM Express Enabled Full 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 ***CCF-A***	**DUANG: Fast and Lightweight Page Migration in Asymmetric Memory Systems** *Hao Wang, **Jie Zhang**, Gieseo 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*

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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**
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**, Gieseo Park, David Donofrio, Mustafa Shihab, John Shalf and Myoungsoo Jung,*
The 33rd International Conference on Computer Design (ICCD), 2015

PACT-SRC **Integrating 3D Resisteive 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 Mmeory 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

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专利发表情况

- “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 장지에, 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)

研究经历

Research Assistant, Computer Architecture and Memory System Lab **2013 年 9 月 – 2021 年 5 月**

- 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).

学术活动情况

Journal Paper Review/Sub-review

- 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/Sub-review

- HPCA’24’18 ’16
- USENIX ATC’23
- ChinaSys’22
- SAC’22
- HotStorage’20
- DAC’20 ’19
- NVMSA’17 ’16
- ICCD’19 ’18 ’17 ’15

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- IPDPS'18 '16
- DATE'19
- ASPLOS'19 '18 '17
- MICRO'18 '16

演讲情况

- 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
- 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

教学经历

- Computer Architecture (Fall'22)

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- Introduction of Computer System (Fall'22)
- 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)

获奖情况

- 2023: 英特尔学术英才计划荣誉学者
- 2022: ACM SIGCSE 新星奖
- 2021: Our storage-class memory research is selected as KAIST breakthrough 50 years
- 2020-2021: Korean BK21+ Scholarship
- 2020: HPCA travel grant
- 2019: Annual Non-Volatile Memories Workshop (NVMW) -- Nominated as Memorable Paper Award
- 2019: Korea Computer Congress (KCC) -- Best Presentation Paper Award
- 2018: OSDI travel grant
- 2015: ACM Student Research Competition 2nd Runner Award