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Contents

1 Research Interests

Operating Systems, Storage Systems, Parallel and Distributed Systems, System Security

2 Employment History

08/2017–	**Assistant Professor**, The Department of Electrical and Computer Engineering, Virginia Tech . . . Blacksburg, VA, USA
11/2016–07/2017	**Research Scientist**, School of Computer Science, Georgia Tech . . . Atlanta, GA, USA
11/2014–10/2016	**Postdoctoral Fellow**, School of Computer Science, Georgia Tech . . . Atlanta, GA, USA
08/2014-11/2014	**Postdoctoral Fellow**, Computer Science, Sungkyunkwan University . . . Suwon, Korea
12/2005–07/2014	**Principal S/W Engineer**, Samsung Electronics . . . Suwon, Korea
01/1998–11/2005	**Staff R&D Engineer**, IBM . . . Seoul, Korea

3 Education

Ph.D.
Mobile Systems Engineering 03/2010 – 02/2014
Advisor: Dr. Young Ik Eom
Dissertation: DANBI: A Programming Model and Runtime for Dynamic and Scalable Stream Parallelism
Sungkyunkwan University, Korea

M.S.
Computer Science 03/1996 – 02/1998
Advisor: Dr. Myung Won Kim
Thesis: Compact Fuzzy Rule Generation Algorithm for Data Mining
Soongsil University, Korea

B.S.
Computer Science 03/1992 – 02/1996
Soongsil University, Korea

4 Honors and Awards

1. **Memorable Paper Award Finalist.**
   NVMW 2021
2. **Distinguished Reviewer.**
   ACM Transactions on Storage (TOS) 2019, 2020, 2021
3. **Best paper award.**
   VEE 2019
4. **100 Future Technologies and Leaders.**
   The National Academy of Engineering of Korea (NAEK) 2017
5. **Best student paper award.**
   EuroSys 2017
6. **Top 10 finalist.**
   CSAW Applied Research Competition 2016
7. **Outstanding Post-Doctoral Research Award.**
   College of Computing, Georgia Institute of Technology 2016
8. **First place best paper, Chester W Sall Memorial Awards.**
   IEEE Consumer Electronics Society 2016
9. **Post-doctoral research fellowship.**
   National Research Foundation of Korea (NRF) 2015
10. **Best papers award.**
    APSYS 2015
11. **Second place, ACM Student Research Competition (SRC).**
    PACT 2013

5 Research, Scholarship, and Creative Activities

5.1 Publication

5.1.1 Conference Publications

1. **Durinn: Adversarial Memory and Thread Interleaving for Detecting Durable Linearizability Bugs.**
   Xinwei Fu, Dongyoon Lee, and Changwoo Min.
   In Proceedings of *16th USENIX Symposium on Operating Systems Design and Implementation* (*OSDI 2022*).

2. **Odinfs: Scaling PM performance with Opportunistic Delegation.**
Diyu Zhou, Yuchen Qian, Vishal Gupta, Zhifei Yang, Changwoo Min, and Sanidhya Kashyap.
In Proceedings of *16th USENIX Symposium on Operating Systems Design and Implementation* (*OSDI 2022*).
3. **Tightly Seal Your Sensitive Pointers with PACTight.**
Mohannad Ismail, Andrew Quach, Christopher Jelesnianski, Yeongjin Jang, and Changwoo Min.
In Proceedings of *the 31st USENIX Security Symposium* (*Security 2022*).
4. **Fireworks: A Fast, Efficient, and Safe Serverless Framework using VM-level post-JIT Snapshot.**
Wonseok Shin, Wook-Hee Kim, and Changwoo Min.
In Proceedings of *ACM European Conference on Computer Systems* (*EuroSys 2022*).
5. **Witcher: Systematic Crash Consistency Testing for Non-Volatile Memory Key-Value Stores.**
Xinwei Fu, Wook-Hee Kim, Ajay Paddayuru Shreepathi, Mohannad Ismail, Sunny Wadkar, Dongyoon Lee, and Changwoo Min.
In Proceedings of *ACM Symposium on Operating Systems Principles* (*SOSP 2021*).
6. **PACTree: A High Performance Persistent Range Index Using PAC Guidelines.**
Wook-Hee Kim, R. Madhava Krishnan, Xinwei Fu, Sanidhya Kashyap, and Changwoo Min.
In Proceedings of *ACM Symposium on Operating Systems Principles* (*SOSP 2021*).
7. **Birds of a Feather Flock Together : Scaling RDMA RPCs with FLOCK.**
Sumit Kumar Monga, Sanidhya Kashyap, and Changwoo Min.
In Proceedings of *ACM Symposium on Operating Systems Principles* (*SOSP 2021*).
8. **VIP: Safeguard Value Invariant Property for Thwarting Critical Memory Corruption Attacks.**
Mohannad Ismail+, Jinwoo Yom+, Christopher Jelesnianski, Yeongjin Jang, and Changwoo Min.
In Proceedings of *Conference on Computer and Communications Security* (*CCS 2021*).
9. **ReplayCache: Enabling Volatile Caches for Energy Harvesting Systems.**
Jianping Zeng, Jongouk Choi, Xinwei Fu, Ajay Paddayuru Shreepathi, Dongyoon Lee, Changwoo Min, and Changhee Jung.
In Proceedings of *Annual IEEE/ACM International Symposium on Microarchitecture* (*MICRO-54*).
10. **TIPS: Making Volatile Index Structures Persistent with DRAM-NVMM Tiering.**
R. Madhava Krishnan, Wook-Hee Kim, Xinwei Fu, Sumit Kumar Monga, Hee Won Lee, Minsung Jang, Ajit Mathew, and Changwoo Min.
In Proceedings of *USENIX Annual Technical Conference* (*ATC 2021*).
11. **LODIC: Logical Distributed Counting for Scalable File Access.**
Jeoungahn Park, Taeho Hwang, Jongmoo Choi, Changwoo Min, and Youjip Won.
In Proceedings of *USENIX Annual Technical Conference* (*ATC 2021*).
12. **CrossFS: A Cross-layered Direct-Access File System.**
Yujie Ren, Changwoo Min, and Sudarsun Kannan.
In Proceedings of *the 12th annual non-volatile memories workshop* (*NVMW 2021*).
13. **POSEIDON : Safe, Fast and Scalable Persistent Memory Allocator.**
Wook-Hee Kim, Anthony Demeri, R. Madhava Krishnan, Jaeho Kim, Mohannad Ismail, and Changwoo Min.
In Proceedings of *the 12th Annual Non-Volatile Memories Workshop* (*NVMW 2021*).
14. **Making Volatile Index Structures Persistent using TIPS.**
R. Madhava Krishnan, Wook-Hee Kim, Hee Won Lee, Minsung Jang, Sumit Kumar Monga, Ajit Mathew, and Changwoo Min.
In Proceedings of *the 12th annual non-volatile memories workshop* (*NVMW 2021*).
15. **ExpRace: Exploiting Kernel Races through Raising Interrupts.**
Yoochan Lee, Changwoo Min, and Byoungyoung Lee.
In Proceedings of *the 30th USENIX Security Symposium* (*Security 2021*).
16. **POSEIDON: Safe, Fast and Scalable Persistent Memory Allocator.**
Anthony Demeri, Wook-Hee Kim, R. Madhava Krishnan, Jaeho Kim, Mohannad Ismail, and Changwoo Min.
In Proceedings of *the 21st ACM/IFIP International Middleware Conference* (*Middleware 2020*).

17. **An OpenMP Runtime for Transparent Work Sharing Across Cache-Incoherent Heterogeneous Nodes.**
Robert Lyerly, Changwoo Min, Christopher J. Rossbach, and Binoy Ravindran.
In Proceedings of *the 21st ACM/IFIP International Middleware Conference* (*Middleware 2020*).

18. **CrossFS: A Cross-layered Direct-Access File System.**
Yujie Ren, Changwoo Min, and Sudarsun Kannan.
In Proceedings of *the 14th USENIX Symposium on Operating Systems Design and Implementation* (*OSDI 2020*).

19. **Exploiting Kernel Races through Taming Thread Interleaving.**
Yoochan Lee, Byoungyoung Lee, and Changwoo Min.
BlackHat USA (*2020*).

20. **MARDU: Efficient and Scalable Code Re-randomization.**
Christopher Jelesnianski, Jinwoo Yom, Changwoo Min, and Yeongjin Jang.
In Proceedings of *the 13th ACM International Systems and Storage Conference* (*SYSTOR 2020*).

21. **DEX: Scaling Applications Beyond Machine Boundaries.**
Sang-Hoon Kim, Ho-Ren Chuang, Robert Lyerly, Pierre Olivier, Changwoo Min and Binoy Ravindran.
In Proceedings of *the 40th IEEE International Conference on Distributed Computing Systems* (*ICDCS 2020*).

22. **HydraList: A Scalable In-Memory Index Using Asynchronous Updates and Partial Replication.**
Ajit Mathew and Changwoo Min.
In Proceedings of *the 46th International Conference on Very Large Data Bases* (*VLDB 2020*).

23. **Durable Transactional Memory Can Scale with TimeStone.**
R.Madhava Krishnan, Jaeho Kim, Ajit Mathew, Xinwei Fu, Anthony Demeri, Changwoo Min, and Sudarsun Kannan.
In Proceedings of *the 11th Annual Non-Volatile Memories Workshop* (*NVMW 2020*).

24. **Durable Transactional Memory Can Scale with TimeStone.**
R.Madhava Krishnan, Jaeho Kim, Ajit Mathew, Anthony Demeri, Xinwei Fu, Changwoo Min, and Sudarsun Kannan.
In Proceedings of *ACM International Conference on Architectural Support for Programming Languages and Operating Systems* (*ASPLOS 2020*).

25. **Scalable and Practical Locking with Shuffling.**
Sanidhya Kashyap, Irina Calciu, Xiaohe Cheng, Changwoo Min, and Taesoo Kim.
In Proceedings of *ACM Symposium on Operating Systems Principles* (*SOSP 2019*).

26. **Alleviating Garbage Collection Interference Through Spatial Separation in All Flash Arrays.**
Jaeho Kim, Kwanghyun Lim, Youngdon Jung, Sungjin Lee, Changwoo Min, and Sam H. Noh.
In Proceedings of *USENIX Annual Technical Conference* (*ATC 2019*).

27. **A Binary-Compatible Unikernel.**
Pierre Olivier, Daniel Chiba, Stefan Lankes, Changwoo Min, and Binoy Ravindran.
In Proceedings of *ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments* (*VEE 2019*).

28. **MV-RLU: Scaling Read-Log-Update with Multi-Versioning.**
Jaeho Kim+, Ajit Mathew+, Sanidhya Kashyap, Madhava Krishnan Ramanathan, and Changwoo Min.
In Proceedings of *ACM International Conference on Architectural Support for Programming Languages and Operating Systems* (*ASPLOS 2019*).

29. **When Address Remapping Techniques Meet Consistency Guarantee Mechanisms.**
Dong Hyun Kang, Gihwan Oh, Dongki Kim, In Hwan Doh, Changwoo Min, Sang-Won Lee, and Young Ik Eom.
In Proceedings of *Workshop on Hot Topics in Storage and File Systems* (*HotStorage 2018*).

30. **Scaling Guest OS Critical Sections With eCS.**
Sanidhya Kashyap, Changwoo Min, and Taesoo Kim.
In Proceedings of *USENIX Annual Technical Conference* (*ATC 2018*).

31. **A Scalable Ordering Primitive for Multicore Machines.**
Sanidhya Kashyap, Changwoo Min, Kangnyeon Kim, and Taesoo Kim.
In Proceedings of *ACM European Conference on Computer Systems* (*EuroSys 2018*).

32. **SOLROS: A Data-Centric Operating System Architecture for Heterogeneous Computing.**
Changwoo Min, Woonhak Kang, Mohan Kumar, Sanidhya Kashyap, Steffen Maass, and Taesoo Kim.
In Proceedings of *ACM European Conference on Computer Systems* (*EuroSys 2018*).

33. **FLSCHED: A Lockless and Lightweight Approach to OS Scheduler for Xeon Phi.**
Heeseung Jo and Woonhak Kang and Changwoo Min and Taesoo Kim.
In Proceedings of *Asia-Pacific Workshop on Systems* (*APSys 2017*).

34. **Designing New Operating Primitives to Improve Fuzzing Performance.**
Wen Xu, Sanidhya Kashyap, Changwoo Min, and Taesoo Kim.
In Proceedings of *ACM Conference on Computer and Communications Security* (*CCS 2017*).

35. **Scalable NUMA-aware Blocking Synchronization Primitives.**
Sanidhya Kashyap, Changwoo Min, and Taesoo Kim.
In Proceedings of *USENIX Annual Technical Conference* (*ATC 2017*).

36. **Mosaic: Processing a Trillion-Edge Graph on a Single Machine.**
Steffen Maass, Changwoo Min, Sanidhya Kashyap, Woonhak Kang, Mohan Kumar, and Taesoo Kim.
In Proceedings of *ACM European Conference on Computer Systems* (*EuroSys 2017*).

37. **APISan: Sanitizing API Usages through Semantic Cross-checking.**
Insu Yun, Changwoo Min, Xujie Si, Yeongjin Jang, Taesoo Kim, and Mayur Naik.
In Proceedings of *USENIX Security Symposium* (*Security 2016*).

38. **Instant OS Updates via Userspace Checkpoint-and-Restart.**
Sanidhya Kashyap, Changwoo Min, Byoungyoung Lee, Taesoo Kim, and Pavel Emelyanov.
In Proceedings of *USENIX Annual Technical Conference* (*ATC 2016*).

39. **Understanding Manycore Scalability of File Systems.**
Changwoo Min, Sanidhya Kashyap, Steffen Maass, Woonhak Kang, and Taesoo Kim.
In Proceedings of *USENIX Annual Technical Conference* (*ATC 2016*).

40. **Cross-checking Semantic Correctness: The Case of Finding File System Bugs.**
Changwoo Min, Sanidhya Kashyap, Byoungyoung Lee, Chengyu Song, and Taesoo Kim.
In Proceedings of *ACM Symposium on Operating Systems Principles* (*SOSP 2015*).

41. **Scalability in the Clouds! A Myth or Reality?**
Sanidhya Kashyap, Changwoo Min, and Taesoo Kim.
In Proceedings of *Asia-Pacific Workshop on Systems* (*APSys 2015*).

42. **Lightweight Application-Level Crash Consistency on Transactional Flash Storage.**
Changwoo Min, Woon-Hak Kang, Taesoo Kim, Sang-Won Lee, and Young Ik Eom.
In Proceedings of *Annual Technical Conference* (*ATC 2015*).

43. **Effective SSD Caching for High-performance Home Cloud Server.**
Dongwoo Lee, Changwoo Min, and Young Ik Eom.
In Proceedings of *International Conference on Consumer Electronics* (*ICCE 2015*).

44. **Reducing Excessive Journaling Overhead in Mobile Devices with Small-Sized NVRAM.**
Junghoon Kim, Changwoo Min, and Young Ik Eom.
In Proceedings of *International Conference on Consumer Electronics* (*ICCE 2014*).

45. **Dynamic-prelink: An Enhanced Prelinking Mechanism without Modifying Shared Libraries.**
Hyungjo Yoon, Changwoo Min, and Young Ik Eom.
In Proceedings of *The 2014 International Conference on Embedded Systems and Applications* (*ESA 2014*).

46. **Understanding Implications of Trim, Discard, and Background Command for eMMC Storage Device.**
Byungjo Kim, Dong Hyun Kang, Changwoo Min, and Young Ik Eom.
In Proceedings of *IEEE Global Conference on Consumer Electronics* (*GCCE 2014*).

47. **Page Allocation Scheme for Anti-Fragmentation on Smart Devices.**
Jaewon Kim, and Changwoo Min, Jeehong Kim, Dong Hyun Kang, Inhyeok Kim, and Young Ik Eom.
In Proceedings of *IEEE Global Conference on Consumer Electronics* (*GCCE 2014*).

48. **An Efficient Buffer Replacement Algorithm for NAND Flash Storage Devices.**
Dong Hyun Kang, Changwoo Min, and Young Ik Eom.
In Proceedings of *IEEE 21st International Symposium on Modelling, Analysis & Simulation of Computer and Telecommunication Systems* (*MASCOTS 2014*).

49. **X-FTL: transactional FTL for SQLite databases.**
Woon-Hak Kang, Sang-Won Lee, Bongki Moon, Gi-Hwan Oh, and Changwoo Min.
In Proceedings of *ACM SIGMOD International Conference on Management of Data* (*SIGMOD 2013*).

50. **User-aware Power Management for Mobile Devices.**
Geunsik Lim, Changwoo Min, Dong Hyun Kang, and Young Ik Eom.
In Proceedings of *IEEE Global Conference on Consumer Electronics* (*GCCE 2013*).

51. **Ballooning Memory Trap Dynamic Memory Management in Virtualized Smart TV Environments.**
Taehun Kim, Junghoon Kim, Keonwoo Kim, Changwoo Min, and Young Ik Eom.
In Proceedings of *on Computer Applications and Information Processing Technology* (*CAIPT 2013*).

52. **Experimental Evaluations for the Relationship between Program Performance and Lifetime of NAND Flash Memory.**
Son Yoo Kim, Changwoo Min, and Young Ik Eom.
In Proceedings of *on Computer Applications and Information Processing Technology* (*CAIPT 2013*).

53. **Content-Based Chunk Placement Scheme for Decentralized Deduplication on Distributed File Systems.**
Keonwoo Kim, Jeehong Kim, Changwoo Min, and Young Ik Eom.
In Proceedings of *international conference on Computational Science and Its Applications - Volume Part III* (*ICCSA 2013*).

54. **Enhancing application performance by memory partitioning in Android platforms.**
Geunsik Lim, Changwoo Min, and Young Ik Eom.
In Proceedings of *International Conference on Consumer Electronics* (*ICCE 2013*).

55. **DANBI: Dynamic Scheduling of Irregular Stream Programs for Many-Core Systems.**
Changwoo Min, and Young Ik Eom.
In Proceedings of *International Conference on Parallel Architectures and Compilation Techniques* (*PACT 2013*).

56. **Optimized Lightweight Thread Framework for Mobile Devices.**
Geunsik Lim, Changwoo Min, and Young Ik Eom.
In Proceedings of *International Conference of the IET Brunei Darussalam* (*IETBIC 2012*).

57. **Load-Balancing for Improving User Responsiveness on Multicore Embedded Systems.**
Geunsik Lim, Changwoo Min, and Young Ik Eom.
In Proceedings of *Ottawa Linux Symposium* (*OLS 2012*).

58. **EIMOS: enhancing interactivity in mobile operating systems.**
Sunwook Bae, Hokwon Song, Changwoo Min, Jeehong Kim, and Young Ik Eom.
In Proceedings of *international conference on Computational Science and Its Applications - Volume Part III* (*ICCSA 2012*).

59. **Usage pattern-based prefetching: quick application launch on mobile devices.**
Hokwon Song, Changwoo Min, Jeehong Kim and Young Ik Eom.
In Proceedings of *international conference on Computational Science and Its Applications - Volume Part III* (*ICCSA 2012*).

60. **SFS: random write considered harmful in solid state drives.**
Changwoo Min, Kangnyeon Kim, Hyunjin Cho, Sang-Won Lee, and Young Ik Eom.
In Proceedings of *USENIX conference on File and Storage Technologies* (*FAST 2012*).

61. **Resource Redundancy Elimination by Bridging the Semantic Gap in Virtualized Systems.**
Inhyeok Kim, Changwoo Min, and Young Ik Eom.
In Proceedings of *International Conference on Ubiquitous Information TEchnologies & Applications* (*CUTE 2011*).

62. **Kernel-level dynamic binary instrumentation method using binary translation.**
Dongwoo Lee, Inhyuk Kim, Changwoo Min, and Young Ik Eom.
In Proceedings of *International Conference on Internet* (*ICONI 2010*).

63. **MAS: Malware Analysis System Based on Hardware-Assisted Virtualization Technology.**
Taehyoung Kim, Inhyuk Kim, Changwoo Min, and Young Ik Eom.
In Proceedings of *Security Technology, Disaster Recovery and Business Continuity* (*SecTech 2010*).

64. **Efficient fuzzy rule generation based on fuzzy decision tree for data mining.**
Myung Won Kim, Joong Geun Lee, and Changwoo Min.
In Proceedings of *International Fuzzy Systems Conference* (*FUZZ-IEEE 1999*).

5.1.2 Journal Publications

1. **Securely Sharing Randomized Code that Flies.**
Christopher Jelesnianski, Jinwoo Yom, Changwoo Min, and Yeongjin Jang.
ACM Digital Threats: Research and Practice.
March 2022.
2. **An OpenMP Runtime for Transparent Work Sharing Across Cache-Incoherent Heterogeneous Nodes.**
Robert Lyerly, Carloc Bilbao, Changwoo Min, Christopher J. Rossbach, and Binoy Ravindran.
ACM Transactions on Computer Systems.
December 2021.
3. **A Syscall-Level Binary-Compatible Unikernel.**
Pierre Olivier, Hugo Lefeuvre, Daniel Chiba, Stefan Lankes, Changwoo Min, and Binoy Ravindran.
IEEE Transactions on Computer.
October 2021.
4. **Making Application-level Crash Consistency Practical on Flash Storage.**
Dong Hyun Kang, Changwoo Min, Sang-Won Lee, and Young Ik Eom.
IEEE Transactions on Parallel and Distributed Systems, Volume 31-5.
May 2020.
5. **Opportunistic Spinlocks: Achieving Virtual Machine Scalability in the Clouds.**
Sanidhya Kashyap, Changwoo Min, and Taesoo Kim.
ACM SIGOPS Operating Systems Review (OSR), Volume 50-1.
January 2016.
LWN: qspinlock in Linux
6. **vCanal: Paravirtual Socket Library towards Fast Networking in Virtualized Environment.**
Dongwoo Lee, Changwoo Min, and Young Ik Eom.
IEICE Transactions on Information and Systems, Volume E99-D.
Febrary 2016.
7. **Dynamic Scheduling of Irregular Stream Programs toward Many-Core Scalability.**
Changwoo Min and Young Ik Eom.
IEEE Transactions on Parallel and Distributed Systems, Volume 26-6.
2015.
8. **Integrating Lock-free and Combining Techniques for a Practical and Scalable FIFO Queue.**
Changwoo Min and Young Ik Eom.
IEEE Transactions on Parallel and Distributed Systems, Volume 26-7.
2015.
9. **Static Dalvik Bytecode Optimization for Android Applications.**
Jeehong Kim, Inhyeok Kim, Changwoo Min, Hyung Kook Jun, Soo Hyung Lee, Won Tae Kim, and Young Ik Eom.
ETRI Journal, Volume 37-2.
October 2015.
10. **Effective flash-based SSD caching for high performance home cloud server.**
Dongwoo Lee, Changwoo Min, and Young Ik Eom.
IEEE Transactions on Consumer Electronics, Volume 61-2.
2015.
11. **Block Utilization-aware Buffer Replacement Scheme for Mobile NAND Flash Storage.**
Dong Hyun Kang, Changwoo Min, and Young Ik Eom.
IEICE Transactions on Information and Systems, Volume E97-D.
September 2014.

12. **Symbiotic Dynamic Memory Balancing for Virtual Machines in Smart TV Systems.**
Junghoon Kim, Taehun Kim, Changwoo Min, Hyung Kook Jun, Soo Hyung Lee, Won Tae Kim, and Young Ik Eom.
ETRI Journal, Volume 36-5.
October 2014.
13. **Design and Implementation of a Log-Structured File System for Flash-Based Solid State Drives.**
Min, Changwoo and Lee, Sang-Won and Eom, Young Ik.
IEEE Transactions on Computer, Volume 63-9.
September 2014.
14. **Reducing Excessive Journaling Overhead with Small-Sized NVRAM for Mobile Devices.**
Junghoon Kim, Changwoo Min, and Young Ik Eom.
IEEE Transactions on Consumer Electronics, Volume 60-2.
2014.
15. **Supporting Transactional Atomicity in Flash Storage Devices.**
Woon-Hak Kang, Sang-Won Lee, and Bongki Moon, and Gi-Hwan Oh, and Changwoo Min.
IEEE Data Eng. Bull., Volume 37-2.
2014.
16. **Zero-Sum Defender: Fast and Space-Efficient Defense against Return-Oriented Programming Attacks.**
Jeehong Kim, Inhyeok Kim, Changwoo Min, and Young Ik Eom.
IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences, Volume E97.A.
2014.
17. **Virtual memory partitioning for enhancing application performance in mobile platforms.**
Geunsik Lim, Changwoo Min, and Young Ik Eom.
IEEE Transactions on Consumer Electronics, Volume 59-4.
2013.
18. **VMMB: Virtual Machine Memory Balancing for Unmodified Operating Systems.**
Changwoo Min, Inhyeok Kim, Taehyoung Kim, Young Ik Eom.
Journal of Grid Computing, Volume 10-1.
March 2012.
19. **Scalable Cache-Optimized Concurrent FIFO Queue for Multicore Architectures.**
Changwoo Min and Hyung Kook Jun and Won Tae Kim and Young Ik Eom.
IEICE Transactions on Information and Systems, Volume E95.D-12.
2012.
20. **Hardware assisted dynamic memory balancing in virtual machines.**
Changwoo Min, Inhyeok Kim, Taehyoung Kim, Young Ik Eom.
IEICE Electronics Express, Volume 8-10.
May 2011.
21. **Weight Perturbation for Efficient Learning of Neural Networks.**
Samkeun Kim, Changwoo Min, and Myungwon Kim.
Journal of Electrical Engineering and Information Science, Volume 3-5.
1998.

5.1.3 Posters

1. **Scheduling HPC Workloads on Heterogeneous-ISA Architectures.**
Mohamed L Karaoui, Anthony Carno, Rob Lyerly, Sang-Hoon Kim, Pierre Olivier, Changwoo Min, and Binoy Ravindran.
Proceedings of the 24th Symposium on Principles and Practice of Parallel Programming (*PPoPP 2019*).
2. **TS-CLOCK: Temporal and Spatial Locality Aware Buffer Replacement Algorithm for NAND Flash Storages.**
Dong Hyun Kang, Changwoo Min, and Young Ik Eom.
Proceedings of the ACM SIGMETRICS/International Conference on Measurement and Modeling of Computer Systems (*SIGMETRICS 2014*).

3. **Flash-Friendly Buffer Replacement Algorithm for Improving Performance and Lifetime of NAND Flash Storages.**
Dong Hyun Kang, Changwoo Min, and Young Ik Eom.
Proceedings of the 12th USENIX conference on File and Storage Technologies (*FAST 2014*).
4. **Can Lock-free and Combining Techniques Co-exist? A Novel Approach on Concurrent Queue.**
Changwoo Min, and Young Ik Eom.
Proceedings of the 22st International Conference on Parallel Architectures and Compilation Techniques (*PACT 2013*).
5. **NUMA-aware Scheduler: Taking Both Data Locality and Caching Effectiveness into Account on NUMA Platforms.**
Junghoon Kim, Changwoo Min, and Young Ik Eom.
Proceedings of 10th USENIX Symposium on Operating Systems Design and Implementation (*OSDI 2012*).
6. **Towards Bare-metal Network Performance via Para-virtualized Socket Library and Exitless I/O.**
Dongwoo Lee, Changwoo Min, Junghan Kim, and Young Ik Eom.
Proceedings of 10th USENIX Symposium on Operating Systems Design and Implementation (*OSDI 2012*).
7. **Accelerating Virtual Machine Storage I/O for Multicore Systems.**
Dongwoo Lee, Junghan Kim, Junghoon Kim, Changwoo Min, and Young Ik Eom.
Proceedings of the 10th USENIX conference on File and Storage Technologies (*FAST 2012*).
8. **DANBI: Dynamic and Scalable Stream Parallelism for Many-core Systems.**
Changwoo Min, and Young Ik Eom.
Proceedings of 10th USENIX Symposium on Operating Systems Design and Implementation (*OSDI '12*).
9. **Guest Transparent Dynamic Memory Balancing in Virtual Machines.**
Changwoo Min, Inhyuk Kim, Taehyoung Kim, and Young Ik Eom.
9th USENIX Symposium on Operating Systems Design and Implementation (*OSDI 2010*).

5.2 Open Source Softwares

VIP	*VIP: Safeguard Value Invariant Property for Thwarting Critical Memory Corruption Attacks (code)*	11/2021
Witcher	*Witcher: Systematic Crash Consistency Testing for Non-Volatile Memory Key-Value Stores (code)*	09/2021
PACTree	*PACTree: A High Performance Persistent Range Index Using PAC Guidelines (code)*	09/2021
TIPS	*Framework to Make a Volatile Index Persistent (code)*	07/2021
TimeStone	*Scalable Durable Transactional Memory (code)*	06/2021
CrossFS	*Cross-layered Direct-Access File System (code)*	11/2020
HydraList	*Scalable In-Memory Sorted Index (code)*	11/2020
Shuffle Lock	*Scalable and Practical Locking with Shuffling (code)*	09/2019
HermiTux	*HermiTux: A Binary Compatable Unikernel (code)*	05/2019
MV-RLU	*MV-RLU: Scaling Read-Log-Update with Multi-Versioning (code)*	05/2019
Solros	*SOLROS: A Data-Centric Operating System Architecture for Heterogeneous Computing (code)*	11/2018
CST Lock	*Scalable NUMA-aware blocking synchronization primitives (code)*	07/2017
Mosaic	*Graph processing engine on a single machine for a trillion-edge graph (code)*	04/2017
APISan	*A tool to find API misuse bugs through semantic cross-checking (code)*	08/2016
FxMark	*Benchmark to measure filesystem multicore scalability (code)*	06/2016

Juxta	*A tool to find filesystem-specific semantic bugs (code)*	12/2015
VBench	*Multicore scalability application benchmark (code)*	07/2015
DANBI	*Dataflow Parallel Runtime for Manycore Systems (code)*	08/2013

5.3 Patent

1. **Method and apparatus for managing memory in virtual machine environment.**
   Changwoo Min, Inhyeok Kim, Taehyoung Kim, Young Ik Eom.
   US9229651B2 2016
2. **Method and apparatus for encrypting and processing data in flash translation layer.**
   Changwoo Min, and Jin-Ha Jun.
   US8261098B2 2012
3. **Analyzing user viewership of advertisements appearing in a screen display in a user terminal.**
   SangChul Kang and Changwoo Min.
   US8205167B2 2012
4. **Memory and method for data compression and management.**
   Soon-Yong Jeong and Changwoo Min.
   US8037255B2 2011
5. **Apparatus for developing a transfer dictionary used in transfer-based machine translation system.**
   Seong Mook Kim, Changwoo Min, SangChul Kang and Jeong In Cha.
   US7487082B2 2009

5.4 Invited Talks and Presentations

POSTECH	*Designing High-Performance, Scalable, and Bug-Free Non-Volatile Memory Based Storage Systems*	Virtual, 11/2021
NVRAMOS	*Designing High-Performance and Bug-Free Key-Value Stores for Non-Volatile Memory*	Busan, Korea, 10/2021
KAIST	*Designing and Optimizing Storage Systems in the Era of Extreme Heterogeneity*	Virtual, 09/2021
Samsung Electronics	*Designing and Optimizing Storage Systems in the Era of Extreme Heterogeneity*	Virtual, 09/2021
KIISE Computer System Society	*Scaling Persistent Memory Program for Manycore Systems*	Virtual, 02/2021
Eta Kappa Nu ECE Honor Society	*Computer System and System Software Challenges and (a Little Bit of) Solutions for 2020s*	Blacksburg, Virginia, 12/2020
NVRAMOS	*ShflLocks: Scalable and Practical Locking for Manycore Systems*	Jeju, Korea, 10/2019
Samsung Electronics	*Designing Operating Systems for 2020s*	Seoul, Korea, 07/2018
UNIST	*Designing Operating Systems for 2020s*	Ulsan, Korea, 07/2018
Sungkyunkwan University	*Designing Operating Systems for 2020s*	Suwon, Korea, 07/2018
KAIST	*Designing Operating Systems for 2020s*	Daejeon, Korea, 07/2018

EuroSys	*SOLROS: A Data-Centric Operating System Architecture for Heterogeneous Computing (video)*	Porto, Portugal, 04/2018
MICS, Virginia Tech	*System Software for Many and Specialized Core Era*	Blacksburg, VA, 12/2017
UNC Charlotte	*Finding Software Bugs through Semantic Cross-checking*	Charlotte, NC, 05/2017
Virginia Tech	*Improving Filesystems for Reliability and Scalability*	Blacksburg, Virginia, 02/2017
Stony Brook University	*Improving Filesystems for Reliability and Scalability*	New York, 03/2017
KAIST	*Improving Filesystems for Reliability and Scalability*	Daejeon, Korea, 11/2016
POSTECH	*Improving Filesystems for Reliability and Scalability*	Pohang, Korea, 09/2016
Seoul National University	*Improving Filesystems for Reliability and Scalability*	Seoul, Korea, 06/2016
Sungkyunkwan University	*Improving Filesystems for Reliability and Scalability*	Suwon, Korea, 06/2016
UNIST	*APISan: Finding API Misuse Bugs through Semantic Cross-checking*	Ulsan, Korea, 09/2016
USENIX ATC	*Understanding Manycore Scalability of File Systems (video)*	Denver, CO, 06/2016
SOSP	*Cross-checking Semantic Correctness: The Case of Finding File System Bugs (video)*	Monterey, CA, 10/2015
USENIX ATC	*Lightweight Application-Level Crash Consistency on Transactional Flash Storage (video)*	Santa Clara, CA, 07/2015
ETRI	*Tiny Little Things for Manycore Scalability: Scalable Locking and Lockless Data Structures*	Daejeon, Korea, 08/2014
PACT	*DANBI: Dynamic Scheduling of Irregular Stream Programs for Many-Core Systems*	Edinburgh, UK, 09/2013
PACT	*Can Lock-free and Combining Techniques Co-exist? A Novel Approach on Concurrent Queue*	Edinburgh, UK, 09/2013
ETRI	*Virtualization Technology: Overview, Memory Management and I/O Virtualization*	Daejeon, Korea, 09/2012
USENIX FAST	*SFS: Random Write Considered Harmful in Solid State Drives (video)*	San Jose, CA, 02/2012

6 Teaching

6.1 Courses Taught

Semester Year	Course Number	Course Title	Enrollment
Spring 2022	ECE 3574	Applied Software Design (link)	90
Fall 2021	ECE-4414/5414G(CS-4224/5264G)	(Advanced) Linux Kernel Programming	63
Spring 2021	ECE 3574	Applied Software Design	63
Fall 2020	ECE-4414/5414G(CS-4224/5264G)	(Advanced) Linux Kernel Programming	43
Spring 2020	ECE 3574	Applied Software Design	69
Fall 2019	ECE 4984/5984	(Advanced) Linux Kernel Programming	34
Spring 2019	ECE 3574	Applied Software Design	53
Fall 2018	ECE 4984/5984	(Advanced) Linux Kernel Programming	19
Spring 2018	ECE 3574	Applied Software Design	54
Fall 2017	ECE 4984/5984	(Advanced) Linux Kernel Programming	26

6.2 Individual Student Guidance

6.2.1 Ph.D. Students

1. **Sanidhya Kashyap**
   Fall 2014-Summer 2020
   Status: Graduated (co-advised with Dr. Taesoo Kim)
   Landing: Assistant Professor at EPFL
   Ph.D. Dissertation Awards (Colleage of Computing, Georgia Tech, 2021)
   Outstanding Research Assistant Award (Colleage of Computing, Georgia Tech, 2020)
   The Best Student Paper Award at EuroSys'17
   Best Paper at APSys'15
2. **Xinwei Fu**
   Summer 2019-Spring 2022
   Status: Graduated
   Landing: Amazon
3. **Christopher Jelesnianski**
   Summer 2018-present
   Status: Post-Qualifier
4. **Madhava Krishnan Ramanathan**
   Summer 2018-present
   Status: Post-Qualifier
   Travel Grant: NVMW'20, ASPLOS'20, ASPLOS'19
5. **Sumit Monga**
   Fall 2019-present
   Status: Pre-Qualifier
   Student Grant: OSDI'21
6. **Mohannad Ismail**
   Fall 2019-present
   Status: Post-Qualifier

6.2.2 M.S. Students

1. **Ajit Mathew**
   Fall 2017-Fall 2019
   Status: Graduated (Thesis Track)
   Landing: Amazon
   Torgersen Graduate Student Research Excellence Award
   Travel Grant: ASPLOS'19
2. **Jinwoo Yom**
   Spring 2018-Spring 2020
   Status: Graduated (Thesis Track)
   Landing: Qualcomm

3. **Anthony Demeri**
   Spring 2019-Spring 2020
   Status: Graduated (Thesis Track)
   Landing: A stealth mode company
4. **Wonseok Shin**
   Fall 2019-Spring 2021
   Status: Graduated (Thesis Track)
   Landing: SK Telecom
5. **FNU Sachin**
   Spring 2021-Spring 2021
   Status: Graduated (Non-thesis Track)
   Landing: Apple
6. **Naga Sanjana Bikonda**
   Fall 2019-Spring 2022
   Status: Graduated (Thesis Track)
   Landing: Samsung Semiconductor
   OSDI'20 Diversity Grant
7. **Shashwat Jain**
   Fall 2021-present
   Status: Non-thesis Track

6.2.3 Mentorship of Postdoctoral Fellows or Visiting Scholars

1. **Jaeho Kim**
   October 2017-October 2019
   Status: Postdoc
   Landing: Associate Professor at Gyeongsang National University
2. **Wookhee Kim**
   December 2019-January 2022
   Status: Postdoc
   Landing: Assistant Professor at Konkuk University
   Postdoctoral Fellowship by NRF (National Research Foundation of Korea)
3. **Junghan Kim**
   September 2019-February 2020
   Status: Visiting PhD student from Sungkyunkwan University
4. **Daegyu Han**
   Summer 2018
   Status: Visiting undergraduate student from Sungkyunkwan University
5. **Dongui Kim**
   Summer 2018
   Status: Visiting undergraduate student from Sungkyunkwan University
6. **Hyeonki Gwak**
   Summer 2018
   Status: Visiting undergraduate student from Sungkyunkwan University

6.2.4 Service on Thesis or Dissertation Committees

1. Naga Sanjana Bikonda, *"Retina: Cross-Layered Key-Value store using Computational Storage"*, Febrary 2022
2. Xinwei Fu, *"Detecting Persistence Bugs from Non-volatile Memory Programs by Inferring Likely-correctness Conditions"*, Febrary 2022

3. Garvit Goel, *"Real-Time Computed Tomography-based Medical Diagnosis Using Deep Learning"*, January 2022
4. Moein Borghei, *"Partial Discharges: Experimental Investigation, Model Development, and Data Analytics"*, January 2022
5. Burhanuddin Bharmal, *"Real-Time GPU Scheduling with Preemption Support for Autonomous Mobile Robots"*, December 2021
6. Mohannad Ismail, *"PACTIGHT: Tightly Seal Sensitive Pointers with Pointer Authentication"*, December 2021
7. Sumit Kumar Monga, *"Scaling RDMA RPCs with FLOCK"*, November 2021
8. Chandler Jearls, *"Open-Source Parameterized Low-Latency Aggressive Hardware Compressor and Decompressor for Memory Compression"*, May 2021
9. Angel Tehillah Isiadinso, *"Attribute Based Student Mappings to Facilitate University Operations"*, May 2021
10. FNU Sachin, *"Input Data Pipeline Analysis of TensorFlow Models"*, May 2021
11. Wonseok Shin, *"FIREWORKS: A Fast, Efficient and Safe Serverless Framework"*, May 2021
12. Sanidhya Kashyap, *"Scaling Synchronization Primitives"*, June 2020
13. Saumya Sardana, *"Vision-based Color Detection with the DJI Tello Drone"*, May 2020
14. Akhil Ahmed Rafeeq, *"A Development Platform to Evaluate UAV Runtime Verification Through Hardware-in-the-loop Simulation"*, May 2020
15. Lakshman Theyyar Maalolan, *"Trusted Unmanned Aerial System Operations"*, May 2020
16. Anthony Demeri, *"POSEIDON: Safe and Salable Persistent Memory Allocator"*, May 2020
17. Jinwoo Yom, *"HyperSpace: Data-Value Integrity for Securing Software"*, April 2020
18. Ajit Mathew, *"Multicore Scalability through Asynchronous Work"*, December 2019
19. Ahmed Helal, *"Automated Runtime Analysis and Adaptation for Scalable Heterogeneous Computing"*, December 2019
20. Ajit Mathew, *"Multicore Scalability through Asynchronous Work"*, December 2019
21. Yihan Pang, *"Leveraging Processor-diversity for Improved Performance in Heterogeneous-ISA Systems"*, September 2019
22. Akshat Malik, *"Monitoring and Preventing Data Exfiltration in Android-hosted Unmanned Aircraft System Applications"*, July 2019
23. Mihir Sagar Kulkarni, *"Determination of Optimal Technique for Ocean Wave Simulation and Prediction"*, July 2019
24. Ashish Malpani, *"Tweets Clustering and Visualization"*, May 2019
25. A K M Fazia Mehrab, *"Cross-ISA Execution Migration of Unikernels: Build Toolchain, Memory Alignment, and VM State Transfer Techniques"*, November 2018
26. Mohit Garg, *"Generalized Consensus for Practical Fault Tolerance"*, Aug 2018
27. Qingrui Liu, *"Compiler-Directed Error Resilience for Reliable Computing"*, June 2018
28. Daniel Chiba, *"Accelerating the Adoption of Unikernels through Optimised Hypervisor Boot Times and Enhanced Binary Compatibility with Linux Applications"*, May 2018

7 Service

7.1 Conference Committee Activities

1. Program Committee, *ACM International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS).* 2023
2. Program Committee, *USENIX Annual Technical Conference (ATC).* 2022-2018
3. Program Committee, *USENIX Conference on File and Storage Technologies (FAST).* 2022, 2020
4. Program Committee, *USENIX Workshop on Hot Topics in Storage and File Systems (HotStorage).* 2022-2021
5. Program Committee, *USENIX Symposium on Operating Systems Design and Implementation (OSDI).* 2021
6. Program Committee, *ACM SIGOPS Asia-Pacific Workshop on Systems (APSys).* 2020

7. Program Committee, *IEEE International Conference on Distributed Computing Systems (ICDCS).* 2020, 2018
8. Program Committee, *ACM International Systems and Storage Conference (SYSTOR).* 2016

7.2 Journal Reviewing Activities

1. Journal Reviewer, *ACM Transactions on Storage (TOS).* 2022-2017, 2014-2013
2. Journal Reviewer, *ACM Transactions on Computer Systems (TOCS).* 2019
3. Journal Reviewer, *ACM Transactions on Architecture and Code Optimization (TACO).* 2021-2020
4. Journal Reviewer, *IEEE Transactions on Computers (TC).* 2021-2020, 2017
5. Journal Reviewer, *The Journal of Systmes and Software (JSS).* 2020
6. Journal Reviewer, *Journal of Parallel and Distributed Computing (JPDC).* 2019
7. Journal Reviewer, *Concurrency and Computation: Practice and Experience.* 2016
8. Journal Reviewer, *IEEE Transactions on Parallel and Distributed Systems (TPDS).* 2014

7.3 Funding Agency Panel Activities

1. Proposal Panelist, *National Science Foundation (NSF).* 2021, 2019
2. External Proposal Reviewer, *Natural Sciences and Engineering Research Council (NSERC).* 2018

7.4 Memberships and Activities in Professional Societies

- Member, Association for Computing Machinery (ACM)
- Member, The Advanced Computing Systems Association (USENIX)
- Member, Institute of Electrical and Electronics Engineers (IEEE)