

Won Woo Ro, Ph.D.

School of Electrical and Electronic Engineering
Yonsei University, Seoul, Republic of Korea

Contact Information

- Tel: +82-2-2123-5769, e-mail: wro@yonsei.ac.kr, <http://escal.yonsei.ac.kr/>
 - Mailing address: 50 Yonsei-ro, Seodaemun-gu, Seoul 03722, Republic of Korea
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Research Interests

- Microprocessor architectures, GPU architectures, and machine learning accelerators
 - Parallel and multi-Threaded architectures and parallel processing
 - Memory hierarchy, transactional memory, data consistency, and synchronization
 - System software optimization, virtualization, and parallel processing
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Education

- *Ph.D. in Electrical Engineering* (2004), University of Southern California, Los Angeles, California (Dissertation: Decoupled Memory Access Architectures with Speculative Pre-Execution, Advisor: Jean-Luc Gaudiot)
 - *M.S. in Electrical Engineering* (1999), University of Southern California, Los Angeles, California
 - *B.S. in Electrical Engineering* (1996), Yonsei University, Seoul, Republic of Korea
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Work Experience

- *Professor* – School of Electrical and Electronic Engineering, Yonsei University, Seoul, Republic of Korea (2017 – present)
- *Associate Professor* – School of Electrical and Electronic Engineering, Yonsei University, Seoul, Republic of Korea (2012 – 2017)
- *Assistant Professor* – School of Electrical and Electronic Engineering, Yonsei University, Seoul, Republic of Korea (2007 – 2012)
- *Visiting Scholar* – Department of Electrical Engineering, University of Southern California (Murali Annaram), Los Angeles, California (2014 – 2015)
- *Assistant Professor* – Department of Electrical and Computer Engineering, California State University, Northridge, California (2004 – 2007)
- *Software Engineer* – ARM Inc., Irvine, California (2006 – 2007)
- *Assistant Specialist* – Department of Electrical Engineering and Computer Science, University of California, Irvine, CA, U.S.A. (2004)
- *Intern* – Apple Inc., Cupertino, California (2003 – 2004)
- *Teaching Assistant* – University of Southern California, Los Angeles, California (1999 – 2000)
- *System Engineer* – IBM Korea, Seoul, Republic of Korea (1996 – 1997)

Professional Activities

- Senior Member, IEEE Computer Society (2016.5 - present)
 - Associate Editor, IEEE Transactions on Emerging Topics in Computing (2021.1 – Present)
 - Associate Editor, IEEE Transactions on Computers (2014.1 – 2018.12)
 - Founding Member, IEEE Computer Society STC Parallel Model and System: Dataflow and Beyond (2016 – present)
 - ACM SIGARCH Korea Chapter, Chair (2017.4 – 2018.4)
 - ACM SIGARCH Korea Chapter, Vice Chair (2016 – 2017.3)
 - Advisory Board Member, National Assembly Library, Republic of Korea
 - Program Committee Chair, IEEE International Symposium on Embedded Multicore/Many-Core Systems-on-Chip (MCSoc-17)
 - Sponsorship Chair, IEEE International Symposium on High-Performance Computer Architecture 2021
 - Program Committee, IEEE International Symposium on High-Performance Computer Architecture 2021
 - Program Committee, Design Automation Conference, 2021
 - Program Committee, Design Automation Conference, 2020
 - External Review Committee, IEEE/ACM International Symposium on Microarchitecture 2019
 - External Review Committee, IEEE International Symposium on High-Performance Computer Architecture 2018
 - External Review Committee, IEEE/ACM International Symposium on Microarchitecture 2017
 - External Program Committee, IEEE/ACM International Symposium on Computer Architecture 2017
 - External Review Committee, IEEE/ACM International Symposium on Microarchitecture 2016
 - External Review Committee, IEEE International Symposium on High-Performance Computer Architecture 2016
 - Program Committee, IEEE International Parallel and Distributed Processing Symposium (IPDPS 2015)
 - Program Committee, IEEE International Conference on High Performance Computing (HiPC 2014)
 - Program Committee, The 19th IEEE International Conference on Parallel and Distributed Systems (ICPADS 2013)
 - Finance Chair, The 54th IEEE International Midwest Symposium on Circuits and Systems (2011)
 - Publicity Chair, The 4th IEEE International Conference on Ubi-media Computing (U-Media'2011)
 - Publicity Chair, The 2010 IET International Conference on Frontier Computing - Theory, Technologies and Applications (2010)
 - Board Member, KIPS
 - Board Member, Computer System Society, KIISE
 - Business Director (2019), Finance Director (2018), General Affair Director (2017), IEIE
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Awards / Honors

- IEIE Research Pioneer Award (Nov. 2020)
- IITP President Award (Nov. 2019)
- Outstanding Teaching Award, Yonsei University (Feb. 2019)
- Achievement Award, IEIE (2018)
- Korea Semiconductor Industry Association Chairman Award (Oct. 2018)
- Teaching Award, IC Design Education Center (IDEC), KAIST, Korea (July. 2018)
- Outstanding Professor Award in Research, Yonsei University (Feb. 2017)
- LG Academic-Industrial Cooperation Award (Mar. 2014)
- Outstanding Teaching Award, Yonsei University (Feb. 2014)
- Outstanding Teaching Award, Yonsei University (Feb. 2013)
- Outstanding Teaching Award, Yonsei University (Feb. 2012)
- Outstanding Teaching Award, Yonsei University (Feb. 2011)
- Outstanding Teaching Award, Yonsei University (Feb. 2010)
- Outstanding Teaching Award for Lectures in English, Yonsei University (Dec. 2009)
- Outstanding Professor Award in the Area of Engineering Education, Yonsei University (Feb. 2009)
- Achievement Award, IEIE (2010)
- Achievement Award, IEIE (2009)
- Certificate of Appreciation, CSUN IEEE Student Branch (2007)
- CSUN Faculty Research and Creative Activity Awards, California State University, Northridge (2006)
- The Probationary Faculty Support Program Awards, California State University, Northridge (2006)

Book Chapters

- [B2] Jaeyoung Yi, Yong J. Jang, Doohwan Oh, and Won Woo Ro, “Programmability and Scalability on Multi-Core Architectures,” chapter in *“Handbook of Research on Scalable Computing Technologies”*, edited by Kuan-Ching Li, Ching-Hsien Hsu, Laurence Tianruo Yang, Jack Dongarra, and Hans Zima, Information Science Reference, 2009
- [B1] Jean-Luc Gaudiot, Jung-Yup Kang, and Won Woo Ro, “Techniques to Improve Performance Beyond Pipelining: Superpipelining, Superscalar, and VLIW,” chapter in *“Computer Architecture,” a volume of “Advance in Computers,”* edited by Ali R. Hurson, Elsevier, 2005

Conference Publications (Selected)

- [C50] Hongju Kal, Seokmin Lee, Gun Ko, and Won Woo Ro, “SPACE: Locality-Aware Processing in Heterogeneous Memory for Personalized Recommendations,” in *the 48th ACM/IEEE International Symposium on Computer Architecture (ISCA 2021)*
- [C49] Hyeonjin Kim, Sungwoo Ahn, Yunho Oh, Bogil Kim, Won Woo Ro, William Song, “Duplo: Lifting Redundant Memory Accesses of Deep Neural Networks for GPU Tensor Cores,” in *the 53rd IEEE/ACM International Symposium on Microarchitecture (MICRO 2020)*
- [C48] Joohyeong Yoon, Won Seob Jeong, and Won Woo Ro, “Check-In: In-Storage Checkpointing for Key-Value Store System Leveraging Flash-Based SSDs,” in *the 47th ACM/IEEE International Symposium on Computer Architecture (ISCA 2020)*

- [C47] Ipoom Jeong, Seihoon Park, Changmin Lee, and Won Woo Ro, "CASINO Core Microarchitecture: Generating Out-of-Order Schedules Using Cascaded In-Order Scheduling Windows," in *the 26th IEEE International Symposium on High Performance Computer Architecture (HPCA 2020)*
- [C46] Yunho Oh, Gunjae Koo, Murali Annavaram, and Won Woo Ro, "Linebacker: Preserving Victim Cache Lines in Idle Register Files of GPUs," in *the 46th ACM/IEEE International Symposium on Computer Architecture (ISCA 2019)*
- [C45] Yunho Oh, Myung Kuk Yoon, William J. Song, and Won Woo Ro, "FineReg: Fine-Grained Register File Management for Augmenting GPU Throughput," in *The 51st IEEE/ACM International Symposium on Microarchitecture (MICRO 2018)*
- [C44] Keunsoo Kim and Won Woo Ro, "WIR: Warp Instruction Reuse to Minimize Repeated Computations in GPUs," in *the 24th IEEE Symposium on High Performance Computer Architecture (HPCA 2018)*
- [C43] Gunjae Koo, Yunho Oh, Won Woo Ro, and Murali Annavaram, "Access Pattern-Aware Cache Management for Improving Data Utilization in GPU," in *the 44th ACM/IEEE International Symposium on Computer Architecture (ISCA 2017)*
- [C42] Myung Kuk Yoon, Keunsoo Kim, Sangpil Lee, Won Woo Ro, and Murali Annavaram, "Virtual Thread: Maximizing Thread-Level Parallelism beyond GPU Scheduling Limit," in *the 43rd ACM/IEEE International Symposium on Computer Architecture (ISCA 2016)*
- [C41] Yunho Oh, Keunsoo Kim, Myung Kuk Yoon, Jong Hyun Park, Yongjun Park, Won Woo Ro, and Murali Annavaram, "APRES: Improving Cache Efficiency by Exploiting Load Characteristics on GPUs," in *the 43rd ACM/IEEE International Symposium on Computer Architecture (ISCA 2016)*
- [C40] Qiumin Xu, Hyeran Jeon, Keunsoo Kim, Won Woo Ro, and Murali Annavaram, "Efficient Intra-SM Slicing through Dynamic Resource Partitioning for GPU Multiprogramming," in *the 43rd ACM/IEEE International Symposium on Computer Architecture (ISCA 2016)*
- [C39] Keunsoo Kim, Sangpil Lee, Myung Kuk Yoon, Gunjae Koo, Won Woo Ro, and Murali Annavaram "Warped-Preexecution: A GPU Pre-execution Approach for Improving Latency Hiding," in *Proceedings of the 22nd IEEE Symposium on High Performance Computer Architecture (HPCA 2016)*
- [C38] Seung Hun Kim, Lei Xu, Ziyi Liu, Zhiqiang Lin, Won Woo Ro, and Weidong Shi, "Enhancing Software Dependability and Security with Hardware Supported Instruction Address Space Randomization," in *Proceedings of the 45th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2015)*
- [C37] Sangpil Lee, Keunsoo Kim, Gunjae Koo, Hyeran Jeon, Won Woo Ro, and Murali Annavaram, "Warped-Compression: Enabling Power Efficient GPUs through Register Compression," in *The 42nd International Symposium on Computer Architecture (ISCA 2015)*
- [C36] Myung Kuk Yoon, Yunho Oh, Sangpil Lee, Seung Hun Kim, Deokho Kim, and Won Woo Ro, "DRAW: Investigating Benefits of Adaptive Fetch Group Size on GPU," in *Proceedings of the 2015 IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS 2015)*
- [C35] Kyungah Kim, Minwoo Kim, Deokho Kim, and Won Woo Ro, "True Motion Compensation With Feature Detection for Frame Rate Up-Conversion," in *Proceedings of the 2015 IEEE International Conference on Image Processing (ICIP 2015)*
- [C34] Minsik Kim, Deokho Kim, Minyong Sung, and Won Woo Ro, "An Accelerated Separable Median Filter with Sorting Networks," in *Proceedings of the 2015 IEEE International Conference on Image Processing (ICIP 2015)*
- [C33] Myung Hyun Jo and Won Woo Ro, "Contention-Free Fair Queuing for High-Speed Storage with RAID-0 Architecture," in *Proceedings of the 17TH IEEE International Conference on High Performance Computing and Communications (HPCC 2015)*

- [C32] Zhimin Gao, Nicholas DeSalvo, Pham Dang Khoa, Seung Hun Kim, Lei Xu, Won Woo Ro, Rakesh M. Verma, and Weidong Shi, "Integrity Protection for Big Data Processing with Dynamic Redundancy Computation," in *Proceedings of the 2015 IEEE International Conference on Autonomic Computing (ICAC 2015)*
- [C31] Lei Xu, Pham Dang Khoa, Seung Hun Kim, Won Woo Ro, and Weidong Shi, "LUT based Secure Cloud Computing - an Implementation using FPGAs 2014 International Conference on ReConfigurable Computing and FPGAs," in *Proceedings of the International Conference on ReConfigurable Computing and FPGAs (ReConFig 2014)*
- [C30] Keunsoo Kim, Changmin Lee, Jung Ho Jung, and Won Woo Ro, "Workload Synthesis: Generating Benchmark Workloads from Statistical Execution Profile," in *Proceedings of the IEEE International Symposium on Workload Characterization (IISWC 2014)*
- [C29] Hyunkyung Park, Changmin Lee, Seung Hun Kim, Won Woo Ro and Jean-Luc Gaudiot, "Mark-Sharing: A Parallel Garbage Collection Algorithm for Low Synchronization Overhead," in *Proceedings of the 19th IEEE International Conference on Parallel and Distributed Systems (ICPADS 2013)*
- [C28] Sangpil Lee and Won Woo Ro, "Parallel GPU Architecture Simulation Framework Exploiting Work Allocation Unit Parallelism," in *Proceedings of The 2013 IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS 2013)*, Austin, TX, USA, Apr. 21 – 23, 2013
- [C27] Myung Kuk Yoon, Sangpil Lee, Deokho Kim, and Won Woo Ro, "Directory Centralized Ring-based Interconnection for Multi-Core Systems," in *Proceedings of The 12th International Conference on Electronics, Information and Communication (ICEIC 2013)*, Bali, Indonesia, Jan. 30 – Feb. 2, 2013
- [C26] Hyunkyung Park, Changmin Lee, and Won Woo Ro, "Parallel Garbage Collection with Transactional Memory," in *Proceedings of The 12th International Conference on Electronics, Information and Communication (ICEIC 2013)*, Bali, Indonesia, Jan. 30 – Feb. 2, 2013
- [C25] Dongmin Choi, Seung Hun Kim, and Won Woo Ro, "Conflict Avoidance Scheduling using Grouping List for Transactional Memory," in *Proceedings of The 17th International Workshop on High-Level Parallel Programming Models and Supportive Environments (HIPS-17)*, Shanghai, China, May 21, 2012
- [C24] Changmin Lee, Won Woo Ro, and Jean-Luc Gaudiot, "Cooperative Heterogeneous Computing for Parallel Processing on CPU/GPU Hybrids," in *Proceedings of The 16th Workshop on Interaction between Compilers and Computer Architectures (INTERACT-16)*, New Orleans, USA, Feb. 25 - 29, 2012
- [C23] Minwoo Kim, and Won Woo Ro, "Matrix Data Layout Optimization for Multi-Core Architectures," in *Proceedings of The 11th International Conference on Electronics, Information and Communication (ICEIC 2012)*, Jeongseon, Korea, Feb. 1 - 3, 2012
- [C22] Seung Hun Kim, Dongmin Choi, and Won Woo Ro, "The Effect of Concurrency Control in Transactional Memory Systems," in *Proceedings of The 11th International Conference on Electronics, Information and Communication (ICEIC 2012)*, Jeongseon, Korea, Feb. 1 - 3, 2012
- [C21] Dongmin Choi, Hyunkyung Park, Seung Hun Kim, and Won Woo Ro, "Adaptive Replacement Cache in Transactional Memory," in *Proceedings of The 11th International Conference on Electronics, Information and Communication (ICEIC 2012)*, Jeongseon, Korea, Feb. 1 - 3, 2012
- [C20] Minwoo Kim, Yong J. Jang, and Won Woo Ro, "Parallel Transpose of Matrix Multiplication Based on the Tiling Algorithm," in *Proceedings of The 54th IEEE International Midwest Symposium on Circuits and Systems (MWSCAS 2011)*, Seoul, Korea, Aug. 7 - 10, 2011
- [C19] Deokho Kim, Karam Park, and Won Woo Ro, "Performance Evaluation of Adaptive Progressive Network Coding," in *Proceedings of The 54th IEEE International Midwest Symposium on Circuits and Systems (MWSCAS 2011)*, Seoul, Korea, Aug. 7 - 10, 2011

- [C18] Doohwan Oh, Sangpil Lee, Deokho Kim, Changmin Lee, and Won Woo Ro, "Development of Virtual CUDA Systems of Parallel Processing on CPU and GPGPU," *Workshop on Micro Architectural Support for Virtualization, Data Center Computing, and Clouds In Conjunction with MICRO 2010 (MASVDC Workshop 2010)*, Atlanta, USA, Dec. 5, 2010
- [C17] Tien-Hsiung Weng, Sheng-Wei Huang, Won Woo Ro, and Kuan-Ching Li, "Implementing FFT using SPMD style of OpenMP," in *Proceedings of the 6th International Conference on Networked Computing and Advanced Information Management (NCM 2010)*, Seoul, Korea, Aug. 16 - 18, 2010
- [C16] Yun H. Oh and Won Woo Ro, "Multi-Threaded Filtered BackProjection Algorithm on Multi-Core Processors," in *Proceedings of The 10th International Conference on Electronics, Information, and Communication (ICEIC 2010)*, Cebu, Philippines, June 30 - July 2, 2010
- [C15] Dong H. Kim, Yun H. Oh, Yun H. Nam, M. Gu, and Won Woo Ro, "Accelerated Reconstruction Using Parallel Computing for Spiral Spectroscopic Imaging," in *Proceedings of 2010 International Society for Magnetic Resonance in Medicine Annual Meeting (2010 ISMRM Annual Meeting)*, Stockholm, Sweden, May 1 - 7, 2010
- [C14] Sunwoo Kim and Won Woo Ro, "FPGA Implementation of Highly Parallelized Decoder Logic for Network Coding," in *Proceedings of Eighteenth ACM/SIGDA International Symposium on Field-Programmable Gate Arrays (FPGA2010)*, Monterey, USA, Feb. 21 - 23, 2010
- [C13] Yong J. Jang and Won Woo Ro, "Evaluation of Cache Coherence Protocols on Multi-Core Systems with Linear Workloads," in *Proceedings of 2009 International Colloquium on Computing, Communication, Control, and Management (CCCM2009)*, Sanya, China, Aug. 8 - 9, 2009
- [C12] Jongwook Woo and Won Woo Ro, "Comparing Open Source Web Services: gSoap and AXIS," in *Proceedings of the 24th International Technical Conference on Circuits/Systems, Computers and Communications (ITC-CSCC 2009)*, Jeju Island, Korea, July 5 - 8, 2009
- [C11] Karam Park, Joon-Sang Park, and Won Woo Ro, "Efficient Parallelized Network Coding for P2P File Sharing Applications," in *Proceedings of the 4th International Conference on Grid and Pervasive Computing (GPC 2009)*, Geneva, Switzerland, May 4 - 8, 2009
- [C10] Jaeyoung Yi, Karam Park, Joonseok Park, and Won Woo Ro, "Fully Pipelined Hardware Implementation of 128-bit SEED Block Cipher Algorithm," in *Proceedings of the 5th International Workshop on Applied Reconfigurable Computing (ARC 2009)*, Karlsruhe, Germany, Mar. 16 - 18, 2009
- [C9] Joon-Sang Park, Won Woo Ro, Handuck Lee, and Neungsoo Park, "Parallel Algorithms for Steiner Tree Problem," in *Proceedings of the 3rd International Conference on Convergence and Hybrid Information Technology (ICHIT 2008)*, Busan, Korea, Nov. 11 - 13, 2008
- [C8] Won Woo Ro and Jean-Luc Gaudiot, "Design and Effectiveness of Small-Sized Decoupled Dispatch Queues," in *Proceedings of European Conference on Parallel Computing (EURO-PAR 2006) - LNCS*, Dresden, Germany, Aug. 29 - Sep. 1, 2006
- [C7] Won Woo Ro and Jean-Luc Gaudiot, "A Low-Complexity Issue Queue Design with Speculative Pre-Execution," in *Proceedings of the 12th International Conference on High Performance Computing (HiPC 2005) - LNCS*, Goa, India, Dec. 18 - 21, 2005
- [C6] Won Woo Ro and Jean-Luc Gaudiot, "SPEAR: A Hybrid Model for Speculative Pre-Execution," in *Proceedings of the 18th International Parallel and Distributed Processing Symposium (IPDPS 2004)*, Santa Fe, New Mexico, 2004
- [C5] Won Woo Ro, Jean-Luc Gaudiot, Stephen P. Crago, and Alvin M. Despain, "HiDISC: A Decoupled Architecture for Data-Intensive Applications," in *Proceedings of the 17th International Parallel and Distributed Processing Symposium (IPDPS 2003)*, Nice, France, Apr. 22 - 26, 2003
- [C4] Won Woo Ro and Jean-Luc Gaudiot, "Compiler Support for Dynamic Speculative Pre-Execution," in *Proceedings of the 7th Annual Workshop on Interaction between Compilers and Computer Architectures (INTERACT-7) in conjunction with HPCA-9*, Anaheim, California, Feb. 8, 2003

- [C3] Amol Bakshi, Jean-Luc Gaudiot, Wen-Yen Lin, Manil Makhija, Viktor K. Prasanna, Won Woo Ro, and Chulho Shin, "Memory Latency: to Tolerate or to Reduce?," in *Proceedings of the 12th Symposium on Computer Architecture and High Performance Computing (SBAC-PAD'00)*, Sao Pedro, Brazil, Oct. 24 - 27, 2000
- [C2] Stephen P. Crago, Alvin Despain, Jean-Luc Gaudiot, Manil Makhija, Won Woo Ro, and Apoorv Srivastava, "A High-Performance, Hierarchical Decoupled Architecture," in *Proceedings of the Memory access Decoupling for superscalar and multiple issue Architectures (MEDEA) Workshop in conjunction with PACT2000*, Philadelphia, Oct. 15, 2000
- [C1] Kai Hwang, Hai Jin, Roy Ho, and Won Woo Ro, "A Reliable Cluster Computing with a New Checkpointing RAID-x Architecture," in *Proceedings of the 9th Heterogeneous Computing Workshop (HCW)*, Cancun, Mexico, May 1, 2000
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Journal Publications

- [J54] Won Jeon, Jun Hyun Park, Yoonsoo Kim, Gunjae Koo, and Won Woo Ro, "Hi-End: Hierarchical, Endurance-Aware STT-MRAM-Based Register File for Energy-Efficient GPUs," *IEEE Access*, Vol. 8, pp. 127768-127780, Jul. 2020
- [J53] Won Seob Jeong, Changmin Lee, Keunsoo Kim, Myung Kuk Yoon, Won Jeon, Myoungsoo Jung, and Won Woo Ro, "REACT: Scalable and High-Performance Regular Expression Pattern Matching Accelerator for In-Storage Processing," *IEEE Transactions on Parallel and Distributed Systems*, Vol. 31, Issue 5, pp. 1137-1151, May 2020
- [J52] Ipoom Jeong, Changmin Lee, Keunsoo Kim, and Won Woo Ro, "OverCome: Coarse-Grained Instruction Commit with Handover Register Renaming," *IEEE Transactions on Computers*, Vol. 68, Issue 12, pp. 1802-1816, Dec. 2019
- [J51] Kyungah Kim and Won Woo Ro, "Contents-Aware Partitioning Algorithm for Parallel High Efficiency Video Coding," *Multimedia Tools and Applications*, Vol. 78, Issue 9, pp. 11427-11442, May 2019
- [J50] Kyungah Kim and Won Woo Ro, "Fast CU Depth Decision for HEVC using Neural Networks," *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 29, No. 5, pp. 1462-1473, May 2019
- [J49] Yunho Oh, Keunsoo Kim, Myung Kuk Yoon, Jong Hyun Park, Yongjun Park, Murali Annavaram, and Won Woo Ro, "Adaptive Cooperation of Prefetching and Warp Scheduling on GPUs," *IEEE Transactions on Computers*, Vol. 68, No. 4, pp. 609-616, Apr. 2019
- [J48] Lei Xu, Jong Hyuk Lee, Seung Hun Kim, Qingji Zheng, Shouhuai Xu, Taeweon Suh, Won Woo Ro, and Weidong Shi, "Architectural Protection of Application Privacy against Software and Physical Attacks in Untrusted Cloud Environment," *IEEE Transactions on Cloud Computing*, Vol. 6, No. 2, pp. 478-491, Apr-Jun. 2018
- [J47] Yunho Oh, Myung Kuk Yoon, Jong Hyun Park, Yongjun Park, and Won Woo Ro, "WASP: Selective Data Prefetching with Monitoring Runtime Warp Progress on GPUs," *IEEE Transactions on Computers*, Vol. 67, No. 9, pp. 1366-1373, Sep. 2018
- [J46] Changmin Lee and Won Woo Ro, "Simultaneous and Speculative Thread Migration for Improving Energy Efficiency of Heterogeneous Core Architectures," *IEEE Transactions on Computers*, Vol. 67, No. 4, pp. 498-512, Apr. 2018
- [J45] Minsik Kim, Minyong Sung, Minwoo Kim, and Won Woo Ro, "Exploiting Pseudo-Quadtree Structure for Accelerating HEVC Spatial Resolution Downscaling Transcoder," *IEEE Transactions on Multimedia*, Vol. 20, No. 9, pp. 2262-2275, Sep. 2018

- [J44] Myung Kuk Yoon, Yunho Oh, Sangpil Lee, Seung Hun Kim, Deokho Kim, and Won Woo Ro, "Dynamic Resizing on Active Warps Scheduler to Hide Operation Stalls on GPUs," *IEEE Transactions on Computers*, Vol. 28, No. 11, pp. 3142-3156, Nov. 2017
- [J43] Myunghyun Jo and Won Woo Ro, "Dynamic Load Balancing of Dispatch Scheduling for Solid State Disks," *IEEE Transactions on Computers*, Vol. 66, No. 6, pp. 1034-1047, Jun. 2017
- [J42] Sangpil Lee, Keunsoo Kim, Gunjae Koo, Hyeran Jeon, Murali Annavaram, and Won Woo Ro, "Improving Energy Efficiency of GPUs through Data Compression and Compressed Execution," *IEEE Transactions on Computers*, Vol. 66, No. 5, pp. 834-847, May 2017
- [J41] Keunsoo Kim, Benjamin Y. Cho, and Won Woo Ro, "Server Side, Play Buffer Based Quality Control for Adaptive Media Streaming," *Multimedia Tools and Applications*, Vol. 75, No.10, pp. 5397-5415, May 2016
- [J40] Minwoo Kim, Deokho Kim, Kyungah Kim, and Won Woo Ro, "Exploiting Thread-Level Parallelism on HEVC by Employing Reference Dependency Graph," *IEEE Transactions on Circuits and Systems for Video Technology*, Vol. 26, No. 4, pp. 736-749, Apr. 2016
- [J39] Sangpil Lee and Won Woo Ro, "Parallel GPU Architecture Simulation Framework Exploiting Architectural-Level Parallelism with Timing Error Prediction," *IEEE Transactions on Computers*, Vol. 65, No.4, pp. 1253-1265, Apr. 2016
- [J38] Seung Hun Kim, Dohoon Kim, Changmin Lee, Won Seob Jeong, Won Woo Ro, and Jean-Luc Gaudiot, "A Performance-Energy Model to Evaluate Single Thread Execution Acceleration," *IEEE Computer Architecture Letters*, Vol.14, No.2, pp. 99-102, Dec. 2015
- [J37] Deokho Kim, Minwoo Kim, Kyungah Kim, Minyong Sung, and Won Woo Ro, "Dynamic Load Balancing of Parallel SURF with Vertical Partitioning," *IEEE Transactions on Parallel and Distributed Systems*, Vol. 26, No. 12, pp. 3358-3370, Dec. 2015
- [J36] Keunsoo Kim, Benjamin Y. Cho, Won Woo Ro, and Jean-Luc Gaudiot, "Network Variation and Fault Tolerant Performance Acceleration in Mobile Devices with Simultaneous Remote Execution," *IEEE Transactions on Computers*, Vol. 64, No. 10, pp. 2862-2874, Oct. 2015
- [J35] Doohwan Oh, Ilkyu Kim, Keunsoo Kim, Sang-Min Lee, and Won Woo Ro, "Highly Secure Mobile Devices Assisted with Trusted Cloud Computing Environments," *ETRI Journal*, Vol. 37, No. 2, pp. 348-358, Apr. 2015
- [J34] Doohwan Oh, Deokho Kim, and Won Woo Ro, "A Malicious Pattern Detection Engine for Embedded Security Systems in Internet of Things," *Sensors*, Vol. 14, No. 12, pp. 24188-24211, Dec. 2014
- [J33] Seung Hun Kim, Sang Hyong Lee, Minje Jun, Byunghoon Lee, Won Woo Ro, Eui-Young Chung, and Jean-Luc Gaudiot, "C-Lock: Energy Efficient Synchronization for Embedded Multicore Systems," *IEEE Transactions on Computers*, Vol. 63, No. 8, pp. 1962-1974, Aug. 2014
- [J32] Won Seob Jeong, Seung Hun Kim, Sang-Min Lee, and Won Woo Ro, "Swarm Processor System: Hardware Process Scheduler based Energy Efficient Multi-Core System," *IEICE Electronics Express*, Vol. 11, No. 14, pp. 20140424, July 2014
- [J31] Seung Hun Kim, Dongmin Choi, Won Woo Ro, and Jean-Luc Gaudiot, "Complexity-Effective Contention Management with Dynamic Backoff for Transactional Memory Systems," *IEEE Transactions on Computers*, Vol. 63, No. 7, pp. 1696-1708, July 2014
- [J30] Minwoo Kim and Won Woo Ro, "Architectural Investigation of Matrix Data Layout on Multicore Processors," *Future Generation Computer Systems*, Vol. 37, pp. 64-75, July 2014
- [J29] Minje Jun, Won Woo Ro, and Eui-Young Chung, "Exploiting Implementation Diversity and Partial Connection of Routers in Application-Specific Network-on-Chip Topology Synthesis," *IEEE Transactions on Computers*, Vol. 63, No. 6, pp. 1434-1445, Jun. 2014
- [J28] Hai Jiang, Yi Chen, Zhi Qiao, Kuan-Ching Li, Won Woo Ro, and Jean-Luc Gaudiot, "Accelerating MapReduce Framework on Multi-GPU Systems," *Cluster Computing*, Vol. 17, No. 2, pp. 293-301, Jun. 2014

- [J27] Changmin Lee, Won Woo Ro, and Jean-Luc Gaudiot, "Boosting CUDA Applications with CPU-GPU Hybrid Computing," *International Journal of Parallel Programming*, Vol. 42, No. 2, pp. 384-404, Apr. 2014
- [J26] Deokho Kim, Changmin Lee, Sangpil Lee, and Won Woo Ro, "Parallelized Sub-Resource Loading for Web Rendering Engine," *Journal of Systems Architecture*, Vol. 59, No. 9, pp. 785-793, Oct. 2013
- [J25] Sunwoo Kim, Won Seob Jeong, Won Woo Ro, and Jean-Luc Gaudiot, "Design and Evaluation of Random Linear Network Coding Accelerators on FPGAs," *ACM Transactions on Embedded Computing Systems*, Vol.13, No. 1, pp. 1-24, Aug. 2013
- [J24] Yunho Oh, Doohwan Oh, and Won Woo Ro, "GPU-Friendly Parallel Genome Matching with Tiled Access and Reduced State Transition Table," *International Journal of Parallel Programming*, Vol. 41, No. 4, pp. 526-551, Aug. 2013.
- [J23] Ilkyu Kim, Doohwan Oh, Myung Kuk Yoon, Kyueun Yi, and Won Woo Ro, "A Distributed Signature Detection Method for Detecting Intrusions in Sensor Systems," *Sensors*, Vol. 13, No. 4, pp. 2998-4016, March, 2013
- [J22] Deokho Kim, Karam Park, and Won Woo Ro, "Exploiting SIMD Parallelism on Dynamically Partitioned Parallel Network Coding for P2P Systems," *Computers and Electrical Engineering*, Vol. 39, No. 1, pp. 55-56, Jan. 2013
- [J21] Minwoo Kim, Karam Park, and Won Woo Ro, "Benefits of Using Parallelized Non-Progressive Network Coding," *Journal of Network and Computer Applications*, Vol. 36, No. 1, pp. 293-305, Jan. 2013
- [J20] Kyueun Yi, Won Woo Ro, and Jean-Luc Gaudiot, "Importance of Coherence Protocols with Network Applications on Multi-Core Processors," *IEEE Transactions on Computers*, Vol. 62, No. 1, pp. 6-15, Jan. 2013
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Research Funding

- Many-Core NPU Architectures and Memory Interface for Data Center Server, Samsung Electronics, (2019-10-01 – 2022-09-30)
- GPU Data Space Optimization with Warp Instruction Reuse and STT-MRAM, National Research Foundation, Korea, (2018-03-01 – 2021-02-28)
- Development of Multi-GPU Based High Speed Ray-Tracing Engine, Samsung Electronics (2017-08-21 – 2018-08-20)
- Technology Development of Unified Memory System for Heterogeneous System Architecture, KEIT (2017-07-01 – 2021-12-31)
- Development of Reconfigurable Artificial Neural Network Accelerator and Instruction Set Architecture, KEIT (2017-07-01 – 2021-12-31)
- Architecture and IP Development for the Next Generation Mobile Intelligence, Samsung Electronics, (Sep. 2016 – Aug. 2017)
- Development of Simulation Framework for 5G High-Performance Wireless Communications on GPUs, Samsung Electronics, (Aug. 2015 – July 2017)
- Development of the High Efficiency GPU Structure for Artificial Intelligence, KEIT (Aug. 2016 – July 2018)
- A GPU Virtualization Technique Cooperating with OpenStack, ETRI (June 2016 – Dec. 2016)

- Development of Application Program Optimization Tools for High Performance Computing Systems, IITP (April 2016 – Dec 2018)
- A New Image Compression Method based on Quality Prediction Modeling, Samsung Electronics (July 2015 – June 2017)
- Development of Regular Expression Accelerator IP for SSD, Samsung Electronics, (July 2015 – June 2017)
- GPU Architectures for Unstructured and Irregular Parallel Programs, National Research Foundation, Korea (May 2015 – April 2018)
- Development of Low-Power Mobile Computing Platform, LG Electronics July 2014 – June 2017)
- Constructing a Data Plane Acceleration Verification Environment and Performance Analysis, ETRI (July 2015 – Dec. 2015)
- Development of Server Solutions Using an Analytic Model of Processors and DRAM Controllers, Samsung Electronics (Oct. 2014 – Sep. 2015)
- Development of a Real-Time Automatic Survey Tool for SNS Big Data, IITP/Microsoft (Oct. 2014 – June 2015)
- Developing SSD-based MapReduce Acceleration Technology for Efficient Analysis of Big Data, Samsung Electronics (July 2013 – June 2015)
- Research for Next Generation High Performance Multimedia Encoding Method, Samsung Electronics (Feb. 2013 – Feb. 2015)
- Development of Software-Based Packet Processing Architecture, ETRI (July 2014 – Jan. 2015)
- Development of DSP Accelerating Technique for Image Analysis, Samsung Electronics (Dec. 2013 – Oct. 2014)
- Development of System Benchmarks and Bottleneck Analysis Tools for Evaluating User Experience, Samsung Electronics (July 2013 – July 2014)
- Development of Power-awareness Android Binder Monitoring and Enhancement Techniques, LG Electronics (Mar. 2013 – Feb. 2014)
- Development of Optimized Resource Allocation Policy for Hypervisor on L4+ Unified Virtual Server, ETRI (May 2013 – Dec. 2013)
- Network Adaptive Video Streaming Solution for Mobile Environment (Ministry of Knowledge Economy, Korea, NHN Co. (Oct. 2012 – June 2013)
- Development of Low Power / High Performance Multimedia Contents Management Method Using Adaptive Distributed Transcoding Technology, Ministry of Knowledge Economy, Korea (June 2012 – May 2015)
- Development of Low Power Cache Coherence Protocol and Interconnection Network, LG Electronics Inc. (Jan. 2012 through Dec. 2013)
- Cache and Memory Architecture to Implement Transactional Memory, National Research Foundation, Korea (May 2010 – April 2015)
- Development of Web Application Server and Bottleneck Analysis, Samsung Electronics (April 2012 – Oct. 2012)
- Development of Device Driver and BFT program for Multicore Network Appliance Systems, KTNF Co. (Oct. 2011 – Oct. 2012)
- Load-Balancing of Video Transcoding with GPU-Accelerated Encoding and Computation Offloading, Ministry of Knowledge Economy, Korea/NHN Co. (Nov. 2011 – June 2012)
- An Instruction Set Simulator for the Next Generation GPGPU, National Research Foundation, Korea (May 2009 – April 2012)

- Improvement the performance of Smart Home Gateway Using Profiling Information, Samsung Electronics (June 2011 – Jan. 2012)
- Development of Mobile SDR Platform and Chip Based on Multi-Core System, Electronics and Telecommunications Research Institute, Korea (March 2011 – Nov. 2011)
- Development of High-Performance Network System Using Layer-7 Data Analysis, Korea Sanhak Foundation (June 2010 – May 2011)
- Design of Flow Generation Engine and Performance Analysis, Electronics and Telecommunications Research Institute, Korea (May 2010 – Jan. 2011)
- Development of Mobile SDR Platform and Chip Based on Multi-Core System, Electronics and Telecommunications Research Institute, Korea (March 2010 – Nov. 2010)
- Development of Accelerated Parallel Platform for Mobile Web Rendering, Samsung Electronics (Jan. 2010 – Dec. 2010)
- Implementation and Improving Performance of the SEED Algorithm Using GPGPU, Korea Sanhak Foundation (June 2009 – May 2010)
- Efficient Conflict Management on Hardware Transactional Memory, National Research Foundation, Korea (May 2009 – April 2010)
- Parallel Algorithms Development for Network Coding on Multi-Core Systems, National Research Foundation, Korea (May 2008 – April 2009)
- Low-Power/High-Performance 2D Vector Graphics Acceleration Architecture for Handsets, LG Electronics (Aug. 2008 – July 2009)
- FPGA Implementation of SEED Block Cipher Algorithm, NexG Co. (June 2008 – Sep. 2008)
- Embedded System with Controller Area Network (CAN) for the Intelligent Power Switch in Automobiles, Korea Sanhak Foundation (June 2008 – May 2009)