

Seungjae Baek

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Research Interests

My research interests include anything that can make computer systems perform faster, cooler, and more reliably. Before joining Dankook University, as a post-doc research associate at the University of Pittsburgh, I developed the DRAM management schemes for reliability and performance enhancement. Prior to that, as a start-up member and as a chief research engineer, I contributed to the definition and development of instant booting techniques to minimize power consumption and user waiting time at Peromnii Inc. For my Ph. D. and MS thesis, I focused on system software issues that arise when Flash memory and novel memory technologies such as PCM, FeRAM and MRAM are deployed for achieving higher performance. I am interested in file system, storage device, and operating system itself. I have much experience in modifying and creating new components of the Linux kernel related with the topics listed above.

Higher Education

- **Ph.D.** Dept. of Computer Engineering, Dankook University, 2007~2010
Thesis: "A Study of Next Generation Memory Hierarchy for Low Power Consumption and High Performance Computing"
Advisor: Jongmoo Choi
- **M.S.** Dept. of Information and Computer Science, Dankook University, 2005~2007
Thesis: "A Study on Performance Optimization of a Flash Memory-Based File System"
Advisor: Jongmoo Choi
- **B.S.** Dept. of EE Computer Engineering, Dankook University, 1998~2005

Appointments

● Director	Jul. 2018 ~ Present	Maritime ICT R&D Center @KIOST
● Supervisor	Mar. 2017 ~ Jun. 2018	ICT R&D Unit @KIOST
● Senior Research Scientist	Jul. 2016 ~ Present	KIOST
● Director of Research	Mar. 2016 ~ Jun. 2016	TheIN Co. Ltd.
● Assistant Professor	Jan. 2014 ~ Feb. 2016	Dankook University
● Post-doc. Research Associate	Jul. 2011 ~ Sep. 2013	University of Pittsburgh
● Chief Research Engineer	Jan. 2010 ~ Jun. 2011	Peromnii inc.
● Lecturer	Mar. 2009 ~ Feb. 2010	Dankook University
● Lecturer	Jan. 2005 ~ Jun. 2011	Bit Academy
● Teaching Assistant	Oct. 2004 ~ Dec. 2007	SYSDEC

Publications (More significant publications are highlighted)

International Journals

- Taewoon Kim, Wooyeol Choi, Seungjae Baek, Myeong-Ho Lee, "Optimal Cooperative Retransmission and Rate Control on Wireless Networks", International Journal of Pharma and Bio Sciences (IJPBS), Special Issue on Engineering and Bio Science, pp. 110-120, Mar. 2017
- **Seungjae Baek, Sangyeun Cho, Jongmoo Choi, "Don't make cache too complex: A simple probability-based cache management scheme for SSDs", PLoS ONE 12(3):e0174375, Mar. 30, 2017**
- **Yujae Song, Wooyeol Choi, Seungjae Baek, "Network Switching Strategy for Energy Conservation in Heterogeneous Networks", PLoS ONE 12(2):e0172318, Feb. 27, 2017**
- **Seungjae Baek, Sangyeun Cho, Rami Melhem, "Refresh Now and Then", IEEE Transactions on Computers (TC), Vol. 63, No. 12, pp. 3114~3126, 5 Dec. 2014**
- **Seungjae Baek, Jongmoo Choi, Donghee Lee, S. H. Noh, "Energy Efficient and High Performance Software Architecture for Storage Class Memory", ACM Transactions on Embedded Computing Systems (TECS), Vol. 12, No. 3, Article 81, 22 pages, Mar. 2013**
- Seungjae Baek, Heekwon Park, Jongmoo Choi, "On Improving the Reliability and Performance of the YAFFS Flash File System", The Institute of Electronics, Information and Communication Engineers (IEICE), Transactions on Information and System, Vol. E94-D, No. 12, pp. 2528~2532, Dec. 2011
- Heekwon Park, Seungjae Baek, Jongmoo Choi, "Performance and Energy Efficiency Tradeoffs of Storage Class Memory", The Institute of Electronics, Information and Communication Engineers (IEICE), Transactions on Information and System, Vol. E93-D, No. 11, pp. 3112~3115, Nov. 2010

- Yoojin Chung, Seungjae Baek, Jongmoo Choi, "INFLAWARE: INtegrated FLAsh Memory SoftWARE Architecture with FAT Compatibility and Reconfigurability", Journal of Information, Vol. 13, No. 2, Mar, 2010
- **Seungjae Baek, J. Choi, D. Lee, S. H. Noh, "Design and Implementation of a Uniformity-improving Page Allocation Scheme for Flash-based Storage Systems", Invited as one of two best papers of EMSOFT 2007, Journal of Design Automation for Embedded Systems, Vol. 13, No. 1-2, pp. 5~25, June, 2009**
- Seungjae Baek, J. Choi, D. Lee, S. H. Noh, "Model and Validation of Block Cleaning Cost for Flash Memory", Embedded Computer Systems: Architectures, Modeling, and Simulation, LNCS 4599, pp. 46~54, 2007
- Seungjae Baek, J. Choi, D. Lee, S. H. Noh, "Performance Characteristics of Flash Memory: Model and Implications", Embedded Software and Systems, LNCS 4523, pp. 162~173, 2007

International Conferences and Workshops

- Haechun Kim, Seungmin Lim, Junkee Yoon, Seungjae Baek, Jongmoo Choi, Seongje Cho, "Analysis of Micro-architecture Resources Interference on Multicore NUMA Systems", ACM Symposium on Applied Computing (SAC), 4~8 April, 2016, Pisa, Italy
- Donghwa Suh, Sewoog Kim, Seungjae Baek, Jongmoo Choi, "Charge Manipulation based Flash Memory Simulator for Reliability Analysis", USENIX Conference on File and Storage (FAST), poster, 22~25 Feb, 2016, Santa Clara, CA
- **Dongwoo Kang, Seungjae Baek, Jongmoo Choi, Donghee Lee, Sam H. Noh, Onur Mutlu, "Amnesic Cache Management for Non-Volatile Memory", IEEE International Conference on Massive Storage Systems and Technology (MSST), 30 May ~ 5 Jun, 2015, Santa Clara, CA**
- Kimmo Choi, Seungjae Baek, Jongmoo Choi, Sooyoung Kang, Jaehyuk Cha, Youjip Won, Sungroh Yoon, "Correlated Update: Detection and Application in SSDs", USENIX Conference on File and Storage (FAST), Poster, 16~19, Feb, 2015, Santa Clara, CA
- **Seungjae Baek, Daeyeon Son, Dongwoo Kang, Jongmoo Choi, Sangyeun Cho, "Design Space Exploration of an NVM-based Memory Hierarchy", The 32nd IEEE International Conference on Computer Design (ICCD), Invited, 19~22, Oct, 2014, Seoul, Korea**
- Myounghoon Oh, Dongwoo Kang, Seungjae Baek, Jongmoo Choi, "D3: Discarding Dispensable Data for Efficient Live Migration of Virtual Machines", ACM Research in Adaptive and Convergent Systems (RACS), 5~8, Oct, 2014, Baltimore, MD
- Dongwoo Kang, Seungjae Baek, Jongmoo Choi, Donghee Lee, Sam H. Noh, "Characterizing Large Scale Workload and Its Implications", USENIX Conference on File and Storage (FAST), Poster, 17~20 Feb, 2014, Santa Clara, CA

- Sewoog Kim, Seungjae Baek, Jongmoo Choi, Donghee Lee, Sam H. Noh, "MapReduce on a Virtual Cluster: From an I/O Virtualization Perspective", USENIX Conference on File and Storage (FAST), Poster, 17~20 Feb, 2014, Santa Clara, CA
- **Heekwon Park, Seungjae Baek, Jongmoo Choi, Donghee Lee, Sam H. Noh, "Regularities Considered Harmful: Forcing Randomness to Memory Access to Reduce Buffer Conflicts for Multi-Bank, Multi-Core Systems", The 18th International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 16~20 Mar, 2013, Houston, Texas**
- Heekwon Park, Seungjae Baek, Jongmoo Choi, Donghee Lee, Sam H. Noh, "Exploiting Storage Class Memory to Reduce Energy Consumption in Mobile Multimedia Devices", International Conference on Consumer Electronics (ICCE), 11~13 Jan, 2010, Las Vegas
- Yumi Kim, Seungjae Baek, Jongmoo Choi, Donghee Lee, Sam H. Noh, "An Integrated Reconfigurable Flash Memory Software Architecture with FAT Compatibility", The 4th International Conference on Convergence Technology and Information Convergence (CTIC), 12~14 Oct, 2009, Nashville, Tennessee
- **Seungjae Baek, Kyoungmoon Sun, Jongmoo Choi, Eunsam Kim, Donghee Lee, Sam H. Noh, "Taking Advantage of Storage Class Memory Technology Through System Software Support", Workshop on the Interaction between Operating Systems and Computer Architecture (WIOSCA), 20 June, Austin, Texas, Held in conjunction with the 2009 ISCA**
- Seungjae Baek, Kyoungmoon Sun, Jongmoo Choi, Eunsam Kim, Donghee Lee, Sam H. Noh, "Implementation Study of an SCRAM manager for Storage Class Random Access Memory", The 3rd International Workshop on Software Support for Portable Storage (IWSSPS), 23 October, 2008, Atlanta, USA
- **Kyoungmoon Sun, Seungjae Baek, Jongmoo Choi, Donghee Lee, Sam H. Noh, Sang Lyul Min, "LTFTL: Lightweight Time-shift Flash Translation Layer for Flash Memory based Embedded Storage", An Annual ACM Conference on Embedded Systems Software sponsored by ACM SigBED (EMSOFT), 19~24, Oct, 2008, Atlanta**
- **Seungjae Baek, Seongjun Ahn, Jongmoo Choi, Donghee Lee, Sam H. Noh, "Uniformity Improving Page Allocation for Flash Memory File Systems", An Annual ACM Conference on Embedded Systems Software sponsored by ACM SigBED (EMSOFT), 1~3, Oct, 2007, Salzburg, Austria**
- Seungjae Baek, Choulseung Hyun, Jongmoo Choi, Donghee Lee, Sam H. Noh, "Design and Analysis of a Space Conscious Nonvolatile-RAM File System", IEEE Tencon06, 14~17 Nov, 2006, Hongkong

- Choulseung Hyun, Seungjae Baek, Seoungjun Ahn, Jongmoo Choi, Donghee Lee, "Experimental Evaluation of an Extent-based File System for Nonvolatile-RAM", The 2nd International Workshop on Software Support for Portable Storage (IWSSPS), October 26, 2006, Seoul, Korea
- Jongmoo Choi, Seungjae Baek, Sung Y. Shin, "Design and Implementation of a Kernel Resource Protector for Robustness of Linux Module Programming", The 21st Annual ACM Symposium on Applied Computing (SAC), April 23-27, 2006, Dijon France

Domestic Journals

- Ikjoon Son, Yumi Kim, Seungjae Baek, Jongmoo Choi, "Improving the Reliability and Performance of the YAFFS Flash File System", KIISE CST, Vol. 16, No. 9, pp. 898~903, Aug. 2010
- Yumi Kim, Yongsuk Choi, Seungjae Baek, Jongmoo Choi, "Reconfigurable Integrated Flash Memory Software Architecture with FAT Compatibility", KIISE CPLS, Vol. 16, No. 1, pp. 17~22, Jan. 2010
- Seungjae Baek, Jongmoo Choi, "A Unified Software Architecture for Storage Class Random Access Memory", KIISE CST, Vol. 36, No. 3, pp. 171~180, Jun. 2009
- Byungjin Kim, Seungjae Baek, Keneun Kim, Jongmoo Choi, "Design and Implementation of Kernel Resource Management Scheme", KIISE CST, Vol. 36, No. 3, pp. 181~190, Jun. 2009
- Seungjae Baek, Jongmoo Choi, "An Implementation Study of an Operating System for SCRAM", KIISE Vol. 27, No. 5, pp. 29~37, May 2009
- Seungjae Baek, Jongmoo Choi, "Design and Implementation of MODA Allocation Scheme based on Analysis of Block Cleaning Cost", KIISE CST, Vol. 34, No. 11, pp. 599~609, Dec. 2007
- Seungjae Baek, Jongmoo Choi, "Purity based Page Allocation Scheme for Flash Memory File System", KIPS Vol. 13-A, No. 5, Oct. 2006
- Chulseung Hyun, Seungjae Baek, Jongmoo Choi, Donghee Lee, Sam H. Noh, "Design and Implementation of a File System that Considers the Space Efficiency of NVRAM", KIISE CST, Vol. 33, No. 9, pp. 615~625, Sep. 2006

Book

- Seungjae Baek, Jongmoo Choi, "Linux Kernel Internal", ATIO inc., Jan. 2015
- Seungjae Baek, Jongmoo Choi, "Linux Kernel Internal", KyoHak inc., Sep. 2008

Patent

- Seungjae Baek, Yujae Song, Soomee Kim, Sunghoon Lim, Cheolsu Pak, "Seawater Battery Comprising Seawater Battery Cells", 10-2018-0082534, 2018. 07. 16

- Seungjae Baek, Jungmin Seo, "Marine Organism Antifouling Device for Seawater Battery", 10-2018-0080736, 2018. 07. 11
- Osoon Kwon, Changjoo Shin, Insung Jang, Seungjae Baek, Yujae Song, Sunggyu Won, Jungmin Seo, Hyoun Kang, "Modular Underwater ROV Common Platform", 10-2018-0025810, 2018. 03. 05
- Seungjae Baek, Yujae Song, Yong Joo Park, "Device for Preventing Attachment of Marine Life using Sea Water Cells", 10-2017-0140454, 2017. 10.26
- Jongmoo Choi, Sungmin Koo, Seungjae Baek, Jinyoung Yang, "Method and System for Access Event Logging in Mobile Storage", 10-1751876, 2017. 06. 22 (10-2016-0025131, 2015. 03.02)
- Seungjae Baek, Jongmoo Choi, Dongwoo Kang, "Apparatus and Method for Periodically Updating Memory Based Storage Device", 10-1609980, 2016. 03. 31 (10-2015-0034453, 2015. 03. 12)
- Changwoo Baek, Seungjae Baek, "Apparatus and Method for Processing Program using Many-core", 10-1504877, 2015. 03. 16 (10-2014-0144484, 2014. 10. 23)
- Jongmoo Choi, Dongwoo Kang, Seungjae Baek, "Method for Managing Cache based on Non-volatile Memory and Apparatus for Performing the Method", Pending, 10-2015-0063907, 2015. 05. 07

Honors and Awards

- Post-doctoral Research Fellowship, NRF (National Research Foundation of Korea), Sep. 2012 ~ Aug. 2013
- Graduate Research Fellowship, Seoul Broadcasting System, Mar. 2008 ~ Feb. 2010
- Best paper award (one of two) for the work "Uniformity Improving Page Allocation for Flash Memory File Systems", EMSOFT 2007

Professional Activities

- Program committee chair
 - The 23rd Korean Conference on Semiconductors (KCS2016), Kangwon, Korea, Feb. 22 ~ 24, 2016
 - The 22nd Korean Conference on Semiconductors (KCS2015), Incheon, Korea, Feb. 10 ~ 12, 2015
- Organizing committee
 - Operating System Support for Next Generation Large Scale NVRAM (NVRAMOS), Jeju, Korea, Oct. 24~25, 2013

- Program committee
 - Operating System Support for Next Generation Large Scale NVRAM (NVRAMOS), Jeju, Korea, Oct. 30 ~ Nov. 1, 2014
 - The 2nd International Workshop on Parallelism in Mobile Platforms (PRISM-2), co-located with ISCA-41, Minneapolis, MN, Jun. 14, 2014
 - The 19th IEEE International Conference on Parallel and Distributed System (ICPADS), Seoul, Korea, Dec. 15~18, 2013
 - The 1st Annual International Workshop on Parallelism on Mobile Platforms (PRISM), co-located with HPCA-2013, Shenzhen, China, Feb. 24, 2013
- Reviewer
 - Journals: IEEE Transactions on Computers (TC), ACM Transactions on Embedded Computing Systems (TECS), Journal of Information Science and Engineering (JISE)
 - Conferences: IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS) 2012, IEEE International Symposium on Workload Characterization (IISWC) 2012