Jongyul Kim

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Research Interests

- **System software**
  - Distributed file system
  - Operating system
  - Smart devices (SmartNIC, SmartSSD)
  - Virtualization

Skills

- **Programming:**
  - C, Java, Python, Shell
  - File system, RDMA, Persistent memory, Virtualization, ARM-based SmartNIC
- **Languages:**
  - English, Korean (Korean citizen)

Education

Korea Advanced Institute of Science and Technology (KAIST) — Daejeon, South Korea
Ph.D. Integrated master's/doctoral program in School of Computing — Mar 2013 – Feb 2022
- Computer Architecture and Systems Laboratory
- Advisor: Seungryoul Maeng, Youngjin Kwon

Korea Advanced Institute of Science and Technology (KAIST) — Daejeon, South Korea
B.S. Double-majored in Computer Science and Management Science — Feb 2007 – Feb 2012

Experience

Korea Advanced Institute of Science and Technology (KAIST) — Daejeon, South Korea
Postdoctoral researcher at Computer Architecture and Systems Laboratory — Mar 2022 – Current

Software developer/Startup co-founder — Seoul, South Korea
Android application developer — Jun 2011 - Feb 2013

TestMidas Co., Ltd — Daejeon, South Korea
Internship — Jun 2009 - Aug 2009
- Seminar on *Writing Solid Code* by Stephen A. Maguire
- *Wine* source code analysis

Conference and workshop papers

Kim, **Jongyul**, Insu Jang, Waleed Reda, Jaeseong Im, Marco Canini, Dejan Kostić, Youngjin Kwon, Simon Peter, and Emmett Witchel. "LineFS: Efficient SmartNIC Offload of a Distributed File System with Pipeline Parallelism". *13th Annual Non-Volatile Memories Workshop 2022*. (NVMW 2022).

Kim, **Jongyul**, Insu Jang, Waleed Reda, Jaeseong Im, Marco Canini, Dejan Kostić, Youngjin Kwon, Simon Peter, and Emmett Witchel. "LineFS: Efficient SmartNIC Offload of a Distributed File System with Pipeline Parallelism". *Proceedings of the ACM SIGOPS 28th Symposium on Operating Systems Principles*. **Best paper awards.** (SOSP 2021).

Anderson, Thomas E., Marco Canini, **Jongyul Kim**, Dejan Kostić, Youngjin Kwon, Simon Peter, Waleed Reda, Henry N. Schuh, and Emmett Witchel. "Assise: Performance and Availability via Client-local NVM in a Distributed File System". *12th Annual Non-Volatile Memories Workshop 2021*. **Co-student author**. (NVMW 2021).

Anderson, Thomas E., Marco Canini, **Jongyul Kim**, Dejan Kostić, Youngjin Kwon, Simon Peter, Waleed Reda, Henry N. Schuh, and Emmett Witchel. "Assise: Performance and Availability via Client-local NVM in a Distributed File System". *14th USENIX Symposium on Operating Systems Design and Implementation*. **Co-student author**. (OSDI 2020).

Im, Jaeseong, **Jongyul Kim**, Jonguk Kim, Seongwook Jin, and Seungryoul Maeng. "On-demand virtualization for live migration in bare metal cloud". *Proceedings of the 2017 Symposium on Cloud Computing*. (SoCC 2017).

Im, Jaeseong, **Jongyul Kim**, and Seungryoul Maeng. "Whole System Checkpoint-recovery Mechanism in Bare-metal In-memory System". *Korea Computer Congress 2017*. (KCC 2017).

Journals

Im, Jaeseong, **Jongyul Kim**, Youngjin Kwon, and Seungryoul Maeng. "On-demand Virtualization for Post-copy OS Migration in Bare-metal Cloud". *IEEE Transactions on Cloud Computing* (2022). **Impact factor: 5.938** by WOS.

Service

- EuroSys 2023 Shadow PC 2023
- ACM Transactions on Storage review 2022

Teaching

- **Teaching Assistant** at KAIST
  - Digital System and Lab (CS211) Spring 2014 (Head), Spring 2015 (Head)
    Lab sessions : VHDL (Hardware description language) programming.
  - Embedded Computer Systems (CS310) Fall 2013 (Head), Fall 2014, Fall 2015
    Lab sessions: VHDL and Arduino programming.
  - Embedded Computing (SEP561) Spring 2014 (Head), Spring 2015, Spring 2019
    Lab sessions : VHDL programming.
- **Mentoring** at KAIST
  - Jaehwan Lee Aug 2021 - Dec 2021
    Multi-thread support in the persistent-memory-based file system.
  - Guseul Heo Aug 2021 - Dec 2021
    Replacing the extent tree with hash-based file mapping in the persistent-memory-based file system.
  - Donggeun Kim Jan 2022 - Aug 2022
    Replacing the extent tree with hash-based file mapping in the persistent-memory-based file system.

Projects

High-performance Exabyte Storage Systems - Samsung Computational Storage Research
Samsung Electronics Device Solutions (Samsung DS Division) Oct 2022 – Current

Lustre Distributed File System Performance Optimization leveraging SmartNIC
In collaboration with *Samsung Advanced Institute of Technology (SAIT)* May 2022 – Dec 2022

Efficient and Scalable Distributed File System Leveraging Emerging HW Technology
National Research Foundation of Korea (NRF) Mar 2020 – Feb 2023

New Cloud System Design combining Virtualized Cloud and Bare-metal Cloud
National Research Foundation of Korea (NRF) Jun 2016 – May 2019

UX-oriented Mobile SW Platform
Institute of Information & Communications Technology Planning & Evaluation (IITP) Apr 2013 – Aug 2016

Awards

- 2022 Spring KAIST breakthroughs (Biannual Engineering Research Webzine) Apr 2022
- KAIST Best dissertation award Feb 2022
- SOSP 2021 Best paper awards Oct 2021
- 2014 Fall Best teaching assistant awards March 2015
- 2013 Fall Best teaching assistant awards March 2014

Articles

- "Toward future cloud computing: Accelerating cloud file systems using programmable network cards." *KAIST Breakthroughs (Biannual Engineering Research Webzine Spring 2022)* Spring 2022
- "An efficient distributed file system leveraging local persistent memory." *Communications of the Korean Institute of Information Scientists and Engineer (Communications of KIISE July 2021)* Jul 2021

Invited talks

- "Persistent-memory-based Distributed File System and SmartNIC Offloading", EIRIC (*Electronic & Information Research Information Center*) Seminar. Jun 2022
- "LineFS: Efficient SmartNIC Offload of a Distributed File System with Pipeline Parallelism", Top conference session in *Korea Software Congress 2021* (KSC 2021). Dec 2021
- "LineFS: Efficient SmartNIC Offload of a Distributed File System with Pipeline Parallelism", *The 28th ACM Symposium on Operating Systems Principles* (SOSP 2021). Oct 2021

Patents

- KO, P2022-0173904, "COMPUTABLE NETWORK INTERFACE CARD AND ELECTRONIC APPARATUS INCLUDING THE SAME", Dec 2022
- KO, 10-2022-0165086, "METHOD FOR MANAGING MEMORY AND COMPUTER DEVICE FOR THE SAME", Nov 2022