Daehyeok Kim

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Education

Carnegie Mellon University, Pittsburgh, PA — *In progress since August 2016*
Ph.D. in Computer Science
M.S. in Computer Science — *May 2019*
Advisors: Srinivasan Seshan and Vyas Sekar

Pohang University of Science and Technology, Pohang, South Korea
M.S. in IT Convergence Engineering — *February 2012*
B.S. in Computer Science and Engineering — *February 2010*

Research Interests

Computer networks, Distributed systems, Data centers, Cloud computing, Systems security

Publications

[1] Matthew Mukerjee, Christopher Canel, Weiyang Wang, **Daehyeok Kim**, Srinivasan Seshan, and Alex C. Snoeren. *Adapting TCP for Reconfigurable Datacenter Networks.* In Proceedings of 17th USENIX Symposium on Networked Systems Design and Implementation **(NSDI)**, February 2020.

[2] **Daehyeok Kim**, Tianlong Yu, Hongqiang Harry Liu, Yibo Zhu, Jitu Padhye, Shachar Raindel, Chuanxiong Guo, Vyas Sekar, and Srinivasan Seshan. *FreeFlow: Software-based Virtual RDMA Networking for Containerized Clouds.* In Proceedings of 16th USENIX Symposium on Networked Systems Design and Implementation **(NSDI)**, February 2019.

[3] **Daehyeok Kim**, Yibo Zhu, Changhoon Kim, Jeongkeun Lee, and Srinivasan Seshan. *Generic External Memory for Switch Data Planes.* In Proceedings of the 17th ACM Workshop on Hot Topics in Networks **(HotNets)**, November 2018.

[4] **Daehyeok Kim**, Amirsaman Memaripour, Anirudh Badam, Yibo Zhu, Hongqiang Harry Liu, Jitu Padhye, Shachar Raindel, Steven Swanson, Vyas Sekar, and Srinivasan Seshan. *HyperLoop: Group-Based NIC-Offloading to Accelerate Replicated Transactions in Multi-Tenant Storage Systems.* In Proceedings of ACM SIGCOMM Conference **(SIGCOMM)**, August 2018.

[5] Kilho Lee, **Daehyeok Kim**, and Insik Shin. *REboost: Improving Throughput in Wireless Networks using Redundancy Elimination.* IEEE Communications Letters, 21(1), January 2017.

[6] Jaebaek Seo, **Daehyeok Kim**, Donghyun Cho, Taesoo Kim, and Insik Shin. *FlexDroid: Enforcing In-App Privilege Separation in Android.* In Proceedings of 23rd Network and Distributed System Security Symposium **(NDSS)**, February 2016.

[7] Sooel Son, **Daehyeok Kim**, and Vitaly Shmatikov. *What Mobile Ads Know About Mobile Users.* In Proceedings of 23rd Network and Distributed System Security Symposium **(NDSS)**, February 2016.

[8] Hyosu Kim, SangJeong Lee, Wookhyun Han, **Daehyeok Kim**, and Insik Shin. *SounDroid: Supporting Real-Time Sound Application on Commodity Mobile Devices.* In Proceedings of 36th IEEE Real-Time Systems Symposium **(RTSS)**, December 2015.

[9] Sangki Yun, **Daehyeok Kim**, Xiaofan Lu, and Lili Qiu. *Optimized Layered Integrated Video Encoding.* In Proceedings of 34th IEEE International Conference on Computer Communications **(INFOCOM)**, April 2015.

[10] Daehee Jang, Hojoon Lee, Minsu Kim, **Daehyeok Kim**, Daegyeong Kim, and Brent B. Kang. *ATRA: Address Translation Redirection Attack against Hardware-based External Monitors.* In Proceedings of 21st ACM Conference on Computer and Communications Security **(CCS)**, November 2014.

[11] Sangki Yun, **Daehyeok Kim**, and Lili Qiu. *Fine-grained Spectrum Adaptation in WiFi Networks.* In Proceedings of 20th ACM International Conference on Mobile Computing and Networking **(MobiCom)**, September 2013.

[12] **Daehyeok Kim** and Young-Joo Suh. *Multi-rate Combination of Opportunistic Routing and Network Coding*. In Proceedings of 9th IEEE Wireless Communications and Networking Conference **(WCNC)**, April 2012.

[13] **Daehyeok Kim**, Wan-Seon Lim, and Young-Joo Suh. *Multicast Extension to Proxy Mobile IPv6 for Mobile Multicast Services*. Journal of Computing Science and Engineering, 5(4), December 2011.

Fellowships and Awards

Microsoft Research PhD Fellowship	*2019 – 2021*
Finalist for the Facebook PhD Fellowship	*2019*
Bronze Award, the 24th Samsung HumanTech Paper Award	*2018*
Qualcomm Innovation Awards, Qualcomm Korea	*2016*
College of Natural Sciences Dean's Excellence Award, UT Austin	*2012*
The Award of Excellence, Microsoft Research Asia	*2010, 2012*
Excellent Undergraduate Research Award, POSTECH	*2009*
Academic Excellence Award, POSTECH	*2007, 2008*
Undergraduate Research Program (research grant), POSTECH	*2009 – 2010*
National Scholarship for Science and Engineering, KOSAF	*2006 – 2010*

Talks

Generic External Memory for Switch Data Planes
- at P4 Workshop, Palo Alto, CA. *May 2019*
- at Dagstuhl Seminar on Programmable Network Data Planes, Wadern, Germany. *April 2019*
- at ACM HotNets, Redmond, WA. *November 2018*
- at Barefoot Networks Seminar Talk, Santa Clara, CA. *November 2018*

Programmable Data Planes and Its Applications
- at Semiconductor Research Corporation (SRC) E-Workshop. *January 2020*

HyperLoop: Group-Based NIC-Offloading to Accelerate Replicated Transactions in Multi-Tenant Storage Systems
- at Annual Non-Volatile Memories Workshop, San Diego, CA. *March 2019*
- at Microsoft Research, Redmond, WA. *October 2018*
- at ACM SIGCOMM, Budapest, Hungary. *August 2018*

FreeFlow: Software-based Virtual RDMA Networking for Containerized Clouds
- at USENIX NSDI, Boston, MA. *February 2019*
- at Intel Labs Seminar Talk, Webinar. *March 2018*

Multi-rate Combination of Opportunistic Routing and Network Coding
- at IEEE WCNC, Paris, France. *March 2012*

Work Experience

Researcher, Microsoft Research *June 2019 - Present*
Mobility and Networking Research group

Graduate Research Assistant, Computer Science Department, CMU *August 2016 - Present*
- Work on building high-performance datacenter networks and applications with programmable and reconfigurable networks [1, 2, 3, 4].

Research Intern, Microsoft Research *May - August 2018*
Mobility and Networking Research group
- Worked an external memory architecture for programmable switch data planes [3].

Research Intern, Microsoft Research *May - August 2017*
Mobility and Networking Research group

- Worked on new network primitives for accelerating replicated storage transactions with RDMA NIC offloading with the support of non-volatile memory [4].
- Worked on a software-based RDMA virtualization framework for containerized clouds [2].

Research Scientist, KAIST *(Fulfillment of military service obligation)* *June 2013 - June 2016*
Cyber Security Research Center (Jun. 2013 - Feb. 2015)
Mobile Software Platform Research Center (Mar. 2015 - Jun. 2016)

- Worked on in-app privilege separation for Android OS [6].
- Worked on investigating privacy leakages from mobile advertising libraries [7].
- Worked on discovering a new attack which can bypass hardware-based kernel integrity monitors [10].
- Worked on developing a protection mechanism for web-based device fingerprinting.

Graduate Research Assistant, Department of Computer Sciences, UT Austin *August 2012 - May 2013*

- Worked on wireless video multicast in MIMO environments [9].
- Worked on efficient wireless spectrum utilization in WiFi networks [11].

Research Intern, Microsoft Research *May - August 2012*
Mobility and Networking Research group

- Worked on evaluating benefits of SPDY protocol in mobile applications.

Research Intern, Microsoft Research Asia *September 2011 - February 2012*
Wireless and Networking group

- Worked on a distributed MIMO system to improve wireless capacity.

Research Intern, Microsoft Research Asia *January 2010 - March 2010*
Wireless and Networking group

- Worked on a collaborative relaying system to improve wireless capacity in multi-hop wireless networks.

Research Assistant, POSTECH *March 2010 - February 2012*

- Worked on network coding and opportunistic routing and their combination in multi-rate wireless network [12].

Research Grants

Facebook Networking Systems Research Award: *Making In-network Compute Systems Tolerant of Switch Failures*, Contributed to writing and idea. *2019 – 2020*

Teaching Experience

15-441/641: Computer networks, *Teaching Assistant*, CMU *Spring 2019*

Taught about 30 students in weekly recitation sessions. Made homework assignment and exam problems. Held weekly office hours.

15-440/640: Distributed systems, *Teaching Assistant*, CMU *Fall 2017*

Gave lectures on virtualization. Held weekly tutoring sessions for a group of students for better undertanding of course materials. Held recitation sessions for course projects. Held weekly office hours.

CS 302: Computer fluency, *Teaching Assistant*, UT Austin *Spring 2013*

Taught about 100 students for better understanding of basics of computer science and Python programming. Held weekly office hours.

CS 312: Introduction to programming, *Teaching Assistant*, UT Austin *Fall 2012*

Taught about 100 students in weekly recitation sessions. Helped students for better understanding of the course materials and to get familiar with programming in Java. Held weekly office hours.