

# MINCHEOL SUNG

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## EDUCATION

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### Virginia Tech, Blacksburg, United States

*August 2016 - Present*

Doctor of Philosophy in Computer Engineering  
Department of Electrical and Computer Engineering

### Virginia Tech, Blacksburg, United States

*August 2016 - December 2018*

Master of Science in Computer Engineering  
Department of Electrical and Computer Engineering

### Sungkyunkwan University, South Korea

*March 2009 - February 2016*

Bachelor of Science in Computer Engineering  
Department of Computer Engineering

## PUBLICATIONS

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### [VEE 2020] Intra-Unikernel Isolation with Intel Memory Protection Keys

Mincheol Sung, Pierre Olivier, Stefan Lankes, and Binoy Ravindran. In Proceedings of the 16th ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments. Lausanne, Switzerland.

### [VEE 2020] LibrettOS: A Dynamically Adaptable Multiserver-Library OS

Ruslan Nikolaev, Mincheol Sung, and Binoy Ravindran. In Proceedings of the 16th ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments. Lausanne, Switzerland.

### Study of Application Launching Time on Low-memory Condition in Mobile System

Mincheol Sung, Sejun Kwon, and Jinkyu Jeong. 2015. Korea Institution of Information Scientists and Engineers. **Best Student Paper awarded.**

## RESEARCH PROJECTS

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### Intra-unikernel isolation

Although the isolation between unikernels is generally recognized to be strong, there exists no isolation within a unikernel. This is due to the use of a single and unprotected address space, a basic principle of unikernels from which result various lightweightness and performance benefits. In this project, we propose a new design bringing memory isolation inside a unikernel instance while keeping a single address space. We leverage Intel's Memory Protection Key to do so without impacting the lightweightness and performance benefits of unikernels. We implement our isolation scheme within an existing unikernel and use it to provide isolation between trusted and untrusted components: we isolate (1) safe from unsafe Rust kernel code and (2) kernel from user code.

### LibrettOS

LibrettOS is an OS design that implements two paradigms to address issues of isolation, recovery ability, and performance. LibrettOS acts as a multiserver OS in its basic form and shares hardware resources through system servers. For selected applications requiring performance, LibrettOS also acts as a library OS where the applications are granted exclusive access to virtual hardware resources such as storage and networking. I implemented a network server as a prototype server of the multiserver OS mode.

### Virtue

A virtualization infrastructure in cloud environments (AWS) that provides security without sacrificing

usability and performance, in particular for legacy applications. Applications are isolated by running on separate virtual machines. We also implement disaggregation of critical data sharing and security services into unikernels.

## TECHNICAL STRENGTHS

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<b>General Programming</b>	C, x86 Assembly, Rust, Bash, Python, Java, C++
<b>Systems Programming</b>	Linux, NetBSD, Google Fuchsia, VMware ESXi, Xen, KVM, Rumprun unikernel, HermitCore unikernel

## WORK EXPERIENCES

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### VMware, Inc.

May 2020 - Aug 2020

Intern, Member of Technical Staff – VM monitor team

SEV-ES remote attestation: Implement an attestation feature for Virtual Machines using a new HW feature (AMD SEV-ES) that is available on the latest generation of CPUs. Develop SW that handles encryption keys, verifying Virtual Machine launch measurement, and injecting and reading out private information from the encrypted guest Operating System, where the data is protected against access by the hypervisor.