

Research vision and achievements. My vision is to enhance cloud security against adversaries through practical and rigorous approaches. To realize this vision, my immediate research focus has been (i) software compartmentalization, which involves dividing programs into isolated components, and (ii) trusted execution environments (TEEs), particularly in terms of hardening them against side-channel attacks. Toward (i), during my Ph.D., I developed an approach for software compartmentalization with new instructions introduced in modern CPUs, which earned the Distinguished Paper Award at the ACM CCS 2023 and the Korean government's BK21 Research Scholarship in 2024. For (ii), I developed practical methods for addressing side-channel attacks using operating system primitives and hardware acceleration, which were featured at the IEEE S&P 2025 and ACSAC 2025, highly regarded security conferences.

At UBC, I aim to continue working toward realizing the vision of enhancing cloud security. Building upon my experience, I will tackle new challenges arising from the tension between security and usability in modern TEEs, under the guidance of Aastha Mehta. UBC is an ideal place for this research due to its diverse expertise and tradition of interdisciplinary collaboration. Within the department of Computer Science, I see strong connections with Aastha Mehta's [expertise in mitigating side-channel leaks](#), as well as with Margo Seltzer's and Thomas Pasquier's [pioneering research on whole-system data provenance](#). Across the departments, I am interested in exploring collaborations with Mohammad Shahradd in the Electrical and Computer Engineering Department, whose expertise in cloud computing will help me scale my research in a distributed context. Further, my work also benefits other fields that handle private information in the cloud. For instance, [security compliance and cybersecurity](#) have been ongoing challenges for the Faculty of Medicine. To address them, I plan to initiate interdisciplinary research collaborations to develop secure cloud computing solutions for medical applications.

Leadership and community engagement. A good researcher is an outreaching one; as Richard Hamming observed in [his lecture](#), the scientists who leave doors open often make the most impactful contributions. Coming from a geographically isolated research environment, I independently initiated international collaborations, which led to ongoing projects with researchers at UBC's Systopia Lab and CISPA in Germany. At the same time, I contributed to the broader field through service on artifact evaluation and poster committees at major security conferences, earning me the Noteworthy Reviewer Recognition at USENIX Security 2025. I also engaged in open-source work through contributions to the Unikraft unikernel, participating in its security discussions and implementing new features, including [security feature support](#) and [hardware support](#). These outreach efforts expanded my horizons and built long-lasting connections that extended beyond research. I am eager to continue my outreach trajectory at UBC; its [collaborative, respectful, and inclusive research culture](#) deeply resonates with me.

Teaching philosophy. I believe that the most effective learning is achieved through interactive platforms. As a teaching assistant for Computer Security and System Programming at SKKU, I developed and maintained ctf.skku.edu, a platform where students can participate in Capture-the-Flag (CTF) events modeled after real-world cybersecurity competitions. This game-like approach to teaching security not only sparked the curiosity of many students but also encouraged several of them to join my advisor's lab. I want to bring my experiences to UBC's teaching mission, particularly to help organize CTF events for UBC's own CTF team, [MapleBacon](#), and to bring CTF into cybersecurity courses such as [CPSC 538M: Systems Security](#) – where I have already served as a guest lecturer – to improve students' learning.

Another powerful tool in teaching is visualization, which helps students connect abstract concepts to intuitive understanding. At UBC, I plan to expand my visualization skill set, building on my experiences developing [video games](#) and [visualizing security algorithms](#). I aim to visualize abstract security concepts, such as compartmentalization and side channels, making the learning process more intuitive. To achieve this, I will collaborate with visualization researchers at UBC, including Ivan Beschastnikh, who has expertise in visualizing distributed systems, and Tamara Munzner, a leading expert in visualization. I will also help students create visualizations for their research projects to increase their impact and reach.