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 focuses has been software compartmentalization, which involves dividing programs into isolated components, and confidential computing, particularly in terms of hardening it against side-channel attacks. Toward this end, I develop software

My work on hardware-assisted compartmentalization earned the Distinguished Paper Award at the ACM CCS 2023 and the Korean government's BK21 Research Scholarship in 2024. More recently, my solution for addressing side-channel attacks in the cloud was featured at the IEEE S&P 2025, a highly regarded conference in the field.

I aspire to continue the work toward realizing this vision at UBC as a postdoctoral researcher.

You can say that you will continue to work towards realizing your vision and going forward you will build upon your experience to now tackle new challenges arising from

this vision toward new methodologies and emerging problems. Under the guidance of Aastha Mehta, I will initiate collaborations with researchers at UBC to pursue my research proposal – developing operating system-supported solutions for secure cloud confidential computing. In particular, I see strong connections with the work on system provenance by Margo Seltzer and Thomas Pasquier, and on application-aware memory management by Alexandra Fedorova. I also expect collaborations with the Electrical and Computer Engineering Department, particularly with Mohammad Shahrad, whose expertise in cloud computing will help scale my work in a distributed manner. My work to make cloud security more practical can benefit other fields that frequently handle private information in the cloud. For instance, security compliance and cybersecurity has been one of the challenges for the Faculty of Medicine. Toward this, I plan to initiate interdisciplinary research collaboration to build 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. During my doctoral studies, I independently initiated international collaborations beyond my immediate circle. This led to ongoing research projects with researchers at UBC 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, which earned me the Noteworthy Reviewer Recognition at USENIX Security 2025. I also engaged in open-source work, participating in security discussions and implementing new features for the Unikraft unikernel like CPU and hardware features support, and bug fixes. 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 being built deeply resonates with me.

Teaching. I believe that the most effective learning is achieved through interactive learning 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 ignited the curiosity of many students but also motivated several of them to join my lab. Maintaining the platform also strengthens my understanding of security concepts. I will to bring my experiences in designing interactive cybersecurity learning to UBC's teaching mission. I plan to achieve this with the help of UBC's own MapleBacon CTF team. I will also incorporate CTF events into cybersecurity courses such as CPSC 538M: Systems Security, where I have already served as a guest lecturer.

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 engaging. 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. In addition to teaching, I will also help students create visualizations for their research projects to widen their reach.

1 Appendix: Guide

Address the following:

- Describe your research experience and relevant work experiences
- Describe your personal qualities through other activities such as athletic/artistic achievements, leadership activities, community engagements, volunteerism, etc.
- Describe your career aspirations
- Include details concerning what teaching, if any, you will be doing and how it is related to your work

2 Appendix: Evaluation criteria

The search is for candidates whose work is beyond "excellent" and whose research is convincingly groundbreaking.
Excellence in scholarly work and independent research - 60%

- quality of contributions to research to date
- scholarships and awards held
- duration of graduate studies, taking into account the nature of the program and relevant personal circumstances
- determination and ability to complete projects within an appropriate period of time
- critical thinking, judgment, and initiative
- resilience and flexibility in adjusting research plans, particularly in response to COVID-19 impacts

Quality of proposed research project - 30%

- originality in developing a research agenda
- merit, potential significance, clarity, and feasibility of the proposed project
- relevance of applicant's work experience and academic training to the field of proposed research
- suitability and quality of research environment (proposed supervisor, facilities, support of academic unit) Personal qualities of the applicant - 10%

Personal qualities of the applicant - 10%

- character: integrity, collegiality, and respect for others
- communication skills
- Preference will be given to applicants who have not already held a postdoctoral award or fellowship.
- leadership abilities as demonstrated by employment, athletic/artistic achievements, community engagement, volunteering, etc.