Research vision. My vision is to enhance cloud security against adversaries through practical and rigorous approaches. This vision focuses on two main areas: *software compartmentalization*, which involves dividing programs into isolated components, and *confidential computing*, particularly in terms of hardening it against side-channel attacks. I have proposed solutions that have been widely recognized by the research community. My work on compartmentalization with hardware mechanisms 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 practically addressing side-channel attacks in the cloud was featured at the *IEEE S&P 2025*, a premier conference in computer security.

Leveraging the cross-disciplinary research culture at UBC, I aspire to expand this vision toward new methodologies and emerging problems. Under the guidance of my postdoctoral supervisor, *Aastha Mehta*, I will initiate collaborations with systems researchers at UBC's *Systopia Lab*, developing operating system-supported solutions to 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 plan to build collaborations with the Electrical and Computer Engineering Department, especially with *Mohammad Shahrad*, whose expertise in cloud computing will enrich my research. 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 have been one of the challenges for the Faculty of Medicine, and interdisciplinary research collaboration could be initiated to create streamlined and secure medical research workflows.

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. Basing research in a geographically isolated location, I am motivated to be proactive: I independently sought out and participated in international projects with researchers from Systopia Lab and CISPA, Germany. At the same time, I contributed to the broader field through service on artifact evaluation and poster committees at major 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. Through open-source, I also created tools for others, such as my bibliography manager, bibli-ls. 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, where a collaborative, respectful, and inclusive research culture is being built.

Teaching. The most effective learning is achieved through *interactivity*. 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. The platform not only connects me with the next generation of researchers but also enhances my own understanding of complex concepts in cybersecurity. At UBC, I plan to bring my CTF-organizing experiences to UBC's MapleBacon CTF team and to courses such as CPSC 538M: Systems Security, where I have already served as a guest lecturer.

Students learn best when they can connect abstract concepts to intuitive understanding, and *visualization* is a powerful tool for this. 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 to make learning more engaging and intuitive. Toward this goal, I will collaborate with visualization researchers at UBC, such as *Ivan Beschastnikh*, who has worked on visualizing distributed systems, and *Tamara Munzner*, an expert in visualization techniques. Outside of teaching, I also intend to assist students in creating visualizations for their research projects, as good visualization significantly increases the understandability and impact of the research.

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.