2022 Post Tenure Review narrative (Wu-chang Feng)

Research

I've focused on security education and cloud security over the last 5 years. Since the last PTR, I've had one NSF SaTC award.

- Wu-chang Feng (PI), “SaTC: EDU: Curricula and CTF Exercises for Teaching Smart Fuzzing and Symbolic Execution”, NSF 1821841, $279,448 (09/2018–09/2021).

The grant has produced source-code releases and publications around Thunder CTF (https://thunder-ctf.cloud), a framework for generating scenarios for practicing aspects of cloud security. Since the grant's end in 2021, I've submitted two NSF SaTC EDU proposals and two NSF SaTC regular proposals, one of which is still pending.

I currently advise 2 Ph.D. students (Allison Naaktgeboren and Wen Wu). Allison recently passed her RPE focused on the impact of seed selection on smart fuzzing performance and is searching for a Ph.D. thesis topic while Wen is preparing for her RPE focused on cloud security. With Wen, I've worked with her in the development, source code release, demonstration (via an OWASP workshop), and publication of her Least Privileges CTF that was funded as part of the NSF award above. I also advise an MS student (Michael Howard) who is attempting to build a "car charger" service that is analogous to AirBnb for his MS thesis.

Within the department, I've collaborated with Zhe Li and Fei Xie on published work that applies concolic execution to generate honeyfarms that can trick nmap scripts. I'm also collaborating with Ameeta Agrawal, who is jointly advising Wen and who is the co-PI for the NSF SaTC proposal in submission. The work involves attempting to apply Natural Language Processing techniques towards the problem of disentangling adversarial behavior from normal application behavior in the audit logs of compromised cloud projects. I'm also collaborating with Ameeta on her CoCo (compassionate computing) lab projects. Scoping out potential projects dealing with security for the elderly, cryptocurrencies, and privacy for victims of domestic violence (one of Allison's potential thesis topics) are being formulated and we will be looking to pursue funding via some of the social challenge programs run out of NSF and via foundations.

Looking forward, I plan to mentor whomever we hire in security this year and will look to support any of the department's security-related efforts, but plan to move over more towards topics aligned with Ameeta's CoCo lab in the future.

Teaching

Several years ago I had an animated technical conversation with an out-of-state student in the PCEP program. He could not believe that he was spending his time and going into debt learning what was being taught in some of the classes he was forced to take in our program. The conversation shifted my perspective on what I should be doing professionally for our students. Since then, I've worked to abandon content and topics that were academically interesting to me, but practically useless for most of our students to learn. Instead, I've made a concerted effort to learn topics in computing that can more directly provide value to students when they look for jobs. As a result, over the last 5 years, I've spent time learning topics in cloud computing using AWS and GCP, in cloud security, in web application security, and in information security. I've then used the experience gained to create and redesign several of our courses so that they can more effectively prepare students for jobs they are attempting to get when they graduate. These courses have been designed to cultivate both confidence and competence for students on the actual systems they are being asked to work with in practice. The list below encompasses the main courses I've developed along with the instructor ratings for their last 5 offerings. Comments from students who have taken these courses can be found here: https://thefengs.com/wuchang/cv/teaching.html

- CS 430P/530: Internet, Web, and Cloud Systems (5.0, 4.9, 4.9, 4.9, 5.0)
- CS 495/595: Web and Cloud Security (4.7, 4.8, 4.8, 4.7, 4.7, 4.7)
- CS 492/592: Malware Reverse Engineering (4.9, 4.9, 4.7, 4.6, 4.5)
- CS 491/591: Introduction to Computer Security (new)

A recent message from a female graduate student is indicative of the feedback I've gotten from former students taking these courses:

> *"I'm a Computer Science graduate from Portland State University currently working at Intel as a Cloud Software Development Engineer. I completed CS 530 and I just want to thank you. The topics taught were exactly what they expected from me in the Intel interview and these are the technologies used right now in industry. I was confident in my interview and now in my job because of the CS 530 labs and homework. I'm glad that I had the opportunity to take this amazing class under your assistance. Thank you!"*

I've attempted to spread this content as widely as possible to enable others in our department as well as faculty at other institutions to teach them through invited talks at Google Cloud Platform's Faculty Experts program and AWS's Cloud Ambassador program. The course material and the lab exercises are publicly available on Google Drive and all of the labs are publicly available at their respective sites:

- CS 430/530 https://codelabs.cs.pdx.edu/cs430
- CS 495/595 https://codelabs.cs.pdx.edu/cs495
- CS 492/592 https://codelabs.cs.pdx.edu/cs492
- CS 491/591 https://codelabs.cs.pdx.edu/cs491

The GCP team features our courses within their education site:
https://edu.google.com/why-google/case-studies/portland-state-cybersecurity-cloud

Service

My service activities are mostly focused on supporting students directly or supporting faculty who provide the most value to our students. Towards this end, I view my most valuable service contribution over the last 5 years to be the hiring and mentoring of our non-tenure track faculty with a focus on those whose technical and instructional approaches can provide the most benefit to our student population. Specific faculty I interact with include Caterina Paun with her full-stack web development courses, Jesse Chaney with the CS 201 content, and Michael Wilson with his CS 199/161/305 courses. Other service has included mentoring void* Vikings (the department's security club), being the department's curriculum coordinator (2019-), the faculty search committee chair (2019), the undergraduate committee chair (2022), and the department's representative on the college curriculum committee (2019-). Within the university, I've served on the University Studies Council, the Academic Computing and Infrastructure Committee, and the university's Undergraduate Curriculum Committee. I also served on the Faculty Senate, leading an unsuccessful attempt to make the RESR requirement more inclusive of the ethnicities that are prevalent in our college and department.

I've also been involved as the department and university have looked to bring more cybersecurity content to our students. Specifically, I'm the main point of contact for contributing most of the technical content that allows the university to keep its NSA CAE-R certification and have helped with an internal re-imagining proposal to make our cybersecurity courses (specifically CS 491/591) more practical and accessible to students. I'm currently re-working all of the security courses so that they can be taken right after the CS minor so that a viable BS degree in cybersecurity can be obtained for students who are filtered out from our current CS program. Towards this end, I've begun working with Kevin McGrath on some of the security courses that are part of the cybersecurity certificate.

Externally, I've focused most of my service in the educational communities that have sprung up around cloud platforms (AWS Academy, and Google Cloud Platform Faculty Experts) as well as local communities focused on cybersecurity (BSidesPDX and OWASP Portland). I'm currently on the review board for BSidesPDX which PSU hosted in October and try to help out when local news organizations need a talking head from Portland State to discuss cybersecurity incidents. Finally, I was the Local Arrangements Chair for MobiSys 2022 and served as a Saturday Academy mentor for the Apprenticeships in Science and Engineering program.