November 15, 2021

(This is a publicly posted generic cover letter that describes my background and teaching experience. It is not tailored to a specific university. Please see my application materials submitted to your university for the tailored version I wrote to you.)

Dear Search Committee,

I am writing to apply for a teaching position at your university, starting in the 2022-2023 academic year. I received my Ph.D. from the Paul G. Allen School of Computer Science & Engineering at the University of Washington and have taught in the Allen school variously as a 50%-time and 100%-time temporary lecturer since March 2020. This academic year, I am teaching full-time in the fall and spring, and half-time in the winter. I believe my classroom teaching experience at the University of Washington, my background in the programming languages and systems research communities, and my teaching philosophy and future teaching goals make me a good fit for your university and I would be excited to work with new colleagues in this position.

I have been the instructor of record for 7 course offerings at the University of Washington. First, as a graduate student in winter 2017, I taught CSE 341 (undergraduate programming languages). Then, as a temporary lecturer, I have taught two more offerings of 341, as well as CSE 331 (software design and implementation), CSE 374 (non-majors intro to systems), CSE 490P (advanced undergrad programming languages and verification), and CSEP 505 (graduate programming languages). In addition, I TAed 9 courses as both an undergraduate (at Williams College) and graduate student from 2010 to 2019, and I am actively involved in mentoring and outreach work at the high school, undergraduate, and graduate levels since 2014. Throughout this time, I have worked with over 500 students at the undergraduate, BS/MS master's, professional master's, and Ph.D. levels, across different backgrounds, including non-majors and majors, and across both electives and required courses. Later this academic year, I am also scheduled to teach CSE 452 (distributed systems) and a CSE 490 special topics course on web browser internals from a systems perspective. This broad experience gives me the flexibility to teach a wide array of subjects, generally in the programming, languages, and systems areas, which I believe would make me a useful resource at your university.

My research focuses on building more reliable software by applying formal reasoning techniques to real systems. In my thesis work, I, along with my collaborators, built verified implementations of widely used distributed protocols, including the widely used Raft consensus protocol. Here, by "verified", I mean that we constructed a machine-checked proof of the global correctness of our implementation of the system. Such a proof was challenging to develop because of the scale and complexity of the system, and because we insisted on reasoning about real executable code, not just abstract models. My primary research expertise is in the tools and techniques required to build such proofs. I have also worked on a wide variety of other topics in programming languages, verification, and systems, including floating point, inductive invariant inference, dynamic program analysis, concurrency, and 3d printing. After graduate school, I worked full-time as CTO of Certora, a company that is building exactly these kinds of verification tools for blockchain smart contracts, where correctness is of paramount concern due to potentially catastrophic financial losses in the presence of bugs.

Throughout my career, my work has been driven by wonderful collaborative relationships. As I discuss in more detail in my teaching statement, I believe that my position in the research community enables a "stewardship of ideas" that directly supports my teaching by allowing me to remain up to date with the field, increasing the depth of understanding I am able to impart to my students, and providing opportunities to mentor students (especially undergraduates) in their own research projects. While I plan to continue participating in research and working with my collaborators, I want to be absolutely clear that I am seeking a full-time position where teaching will be my primary responsibility, and I have no plans to apply for industry, tenure-track, or research-first positions during this year's job cycle or in the foreseeable future.

My teaching philosophy is student-centered, collaborative, and stewardship-driven. This philosophy has been guided by my experience in the Allen school in the computing education seminar (CSE 590E), teaching in the classroom, and through teaching and research collaborations with colleagues. I have had the pleasure of participating in the computing education seminar (CSE 590E) since autumn 2020. It has been an absolutely transformative experience for me, giving me the vocabulary and techniques to cast my intuitions about teaching into crisp analyses and interventions. In particular, last fall, 590E spent the quarter discussing mastery-based grading, which inspired me to experiment with alternative grading techniques in CSE 374 and CSEP 505 later that year. While not perfect, I was very pleased with the early outcomes of these pilots, and I look forward to continuing to experiment with course design in the future, informed by education research.

Another highlight of my time in the Allen school has been the opportunity to collaborate with colleagues on the design of CSE 341 and to co-teach an offering of CSE(P) 505. In CSE 341, Dan Grossman, Zach Tatlock, and I have converged on a unified set of materials that we all contribute to each quarter and continue to improve. The original course design is entirely due to Dan. I have made several relatively minor contributions, including developing a new homework that uses JSON to teach pattern matching. I also converted the course from SML to OCaml and replaced Ruby with the Racket object system. Zach has also improved the OCaml workflow significantly by introducing the dune build system to the course. But what is most exciting to me about this situation is not the "who-did-what" of it, but the fact that we are building on a shared foundation of materials that is easy to reuse and easy to improve. It is a great feeling to fix a typo on the slides or a bug in the homework code and *know* that next quarter will be able to take advantage of the fix seamlessly.

I also had the opportunity to co-teach one section each of CSE 505 (for Ph.D. students) and CSEP 505 (for professional master's students) with Zach last spring. Officially, Zach was the instructor of record for CSE 505, and I was the instructor of record for CSEP 505. Zach and I both attended all lectures for both courses, and tag-teamed the lectures, alternating every 20 minutes or so. We completely redesigned the course from the ground up, producing new lecture materials and new homework assignments. This was one of the most enjoyable and productive professional experiences of my career. It helps that Zach and I work well together, but I also think co-teaching allowed us to create something greater than the sum of our parts. We piloted an additive points-based grading scheme that gave students the flexibility to choose what grade they wanted in the course and decide what assignments they needed to complete to achieve that grade. We also encouraged community building and student collaboration by providing a shared editable document where the entire class could construct a document explaining the (challenging!) concepts of the course on their terms. Over the quarter, students together produced over 100 pages of notes. I also developed an interactive web editor for one of the theoretical languages we study in the course, System F. By turning the theoretical into something interactive that they could practice with, students gained insight into what the language was like to program in, which helped them understand the theory more deeply. Together, the grading system, community notes, and interactive material design are examples of centering the student experience in the classroom, which I elaborate on further in my teaching statement.

My experience co-teaching 505 and collaborating on 341 make me very optimistic about the future of undergraduate and graduate CS education as we continue to scale both in terms of number of students and quality of education. It would be my great pleasure to continue to work towards these goals at your university.

Please find my CV, teaching statement, diversity statement, and references enclosed. I would be happy to answer any questions you may have or provide additional information. I look forward to hearing from you.

Sincerely,

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