Teaching Statement

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All my teaching experiences have been exciting and challenging, and collectively they have shaped my teaching philosophy. What underpins this philosophy is a strong belief that teaching is a mutual learning process. Through this process, my teaching experiences have provided unique opportunities to establish real partnerships with my students. Working together with my students has taught me how to be patient, inclusive, and rigorous. As a professor, I will expand on these traits and my teaching experience to attract and nurture a new, vibrant generation of younger computer scientists and engineers.

Teaching Experiences. I started teaching right after graduating from high school. My first experience was teaching a “Mathematics and Geometry” course to about 70 students at a middle school. I asked the school to provide me with the names and photographs of my students. On the first day of the class, without asking them to introduce themselves, I started addressing students with their names, which I had already memorized. Even now, after many years, when I meet some of those students, we talk about how impressed they were by creative ideas I used in the classroom. My successful teaching performance led to a continuous collaboration with the school for more than three years. I also had the privilege to teach multiple courses on computer science topics to high school students. Working with middle and high school students taught me how to articulate my ideas in a clear and comprehensible manner. It also helped me build my confidence and improve my teaching proficiency.

In addition to my experiences with middle and high school students, I have served as a teaching assistant at Duke University and University of Tehran. As a PhD student at Duke University, I have served as a teaching assistant for undergraduate algorithm design and computer architecture. For both courses, I taught weekly recitations, mentored undergraduate teaching assistants, and graded exams. Additionally, at University of Tehran, I was a teaching assistant for programming language design and database systems. I also served as the head teaching assistant for computer networks and performance evaluation of computer networks. As the head teaching assistant, I taught recitation classes and mentored other teaching assistants in grading and teaching duties.

Course Offerings. At the undergraduate level, I can to offer courses in computer systems, operating systems and computer architecture. At the graduate level, I can offer courses in computer architecture and cloud computing. Additionally, I am interested and most qualified to offer courses related to my research in the intersection of computer systems and economics. I am enthusiastic about offering a seminar course focusing on applications of economics and computation in shared computing systems. This seminar would cover a wide range of topics in computer systems and algorithmic game theory, bridging the gap between abstract algorithm design and purely practical systems design. In addition, I can offer a course on mathematical foundations of computer systems, focusing on optimization, game theory, control theory, and queuing theory. The goal of this course would be to equip graduate students with theoretical tools that they can use in their research.

Teaching Approach. A very popular quote attributed to Albert Einstein states “If you can’t explain it simply you don’t understand it well enough.” My main commitment in teaching is to understand the material enough to be able to explain it simply. Some concepts, algorithms, and methods are inherently complicated and complex. My goal is to articulate them with intuitions and insights into the reasoning behind these concepts, algorithms, and methods. This simple, necessary step usually entails studious preparation. I am also committed to students’ active learning through course projects that require teamwork and presentations. I, myself, have extend my course projects to award-winning papers. Therefore, I see great value in inspiring students to extend their course projects to research papers. Finally, I am committed to fostering an interactive lecture style. I believe lectures would not be effectively delivered if students are not engaged. An interactive lecture keeps students interested, and provides students with both confidence and freedom to grow as independent thinkers.

Mentoring Experiences. I had the privilege of collaborating with undergraduate students at Duke University, including Paul Kim, Abhimanyu Yadav, Matthew Faw, and Elijah Cole. Paul was interested in my first ASPLOS paper, “REF: Resource elasticity fairness with sharing incentives for multiprocessors.” REF proposes an allocation mechanism that uses Cobb-Douglas utility function to determine users’ fair share of hardware resources. REF allocates resources in a single multiprocessor server. During the summer of 2014, Paul and I collaborated on extending REF to allocate resources in multiple servers. Paul took on a graduate-like role and came up with interesting solutions based on multi-dimensional bin packing heuristics. Our work helped Paul discover and pursue his interests in microeconomics and business school. He later joined The University of Chicago Booth School of Business to work with Prof. Eric Budish.

Abhimanyu, Matthew and Elijah were interested in my second ASPLOS paper, “The computational sprinting game.” This paper examines the architecture, strategies, and dynamics of computational sprinting at datacenter scale. Abhimanyu formally analyzed one of our baselines and Matthew studied new sprinting mechanisms. Elijah analyzed efficiency and total cost of ownership for different sprinting mechanisms. These collaborations enabled an extended version of the computational springing game paper in the ACM Transactions on Computer Systems.
Mentoring and advising students, in my opinion, could be more challenging than teaching a class. The challenges of my mentoring experiences have taught me lessons that will help me in the future as a professor:

- **Diagnose the problem as early as possible.** No one wants to spend months on a project to later find a serious problem in the process and be forced to start over. Sometimes, very simple but important initial steps are overlooked, such as formally defining the problem, identifying the scope of the project, or having a clear motivation for the project. To avoid these, presenting the project to a trusted group of experts in its early stages tends to have positive results. More importantly, I believe successful mentors develop critical thinking skills in both themselves and their mentees. Being transparent and critical from the beginning is the main strategy to diagnose and resolve problems as early as possible.

- **Communication solves a lot of problems.** A main pillar of any successful teamwork is effective communication. To engage effectively in mentor-mentee relationship, I believe a mentor should be an active listener. Asking questions and making sure that everyone is on the same page goes a long way. Many misunderstandings would never exist if teammates learn how to listen attentively, rephrase and repeat the questions before answering them, and respond effectively.

- **Keep everyone excited.** Motivating mentees along the way is very important to start, execute, and successfully finish projects. Some students, especially undergraduate students, get excited easily and fast. But they lose their interest and excitement easily and quickly too. For some students, seeing early results is enough to remain motivated. For others, it may be encouraging if the mentor engages in the details of the project. The mentee should determine whether the mentor adopts a hands-on or hands-off style. I prefer to adopt a hands-on style at the beginning and calibrate my involvement as the project progresses.