Teaching Statement

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Sharing knowledge is a primary motivation for me to pursue an academic career. During my PhD at ETH Zurich, I thoroughly enjoyed the mentoring and teaching opportunities I had. I have mentored fifteen master students doing their semester or master theses, three of which have resulted in top-tier publications. I have also worked as a teaching assistant for one undergrad and one graduate course at ETH for a total of seven semesters. These experiences have excited me and motivated me to continuously improve my teaching and mentoring practices by incorporating students’ feedback. As a young faculty member, I look forward to the responsibility and privilege of providing students the necessary resources to discover their inclination and succeed in pursuing their goals.

Mentoring

Advisors have an immense responsibility to help their students flourish while respecting their personalities and ambitions. I had the honor and opportunity to mentor several students and be mentored by excellent academics and industry professionals. Guided from this experience, I believe a good advisor needs to master three skills: (i) find good problems for the right students; (ii) plan ahead; (iii) continually adapt to the student’s and project’s needs.

A good advisor finds good problems. For me, this is the most critical phase of a research project. A good problem should be impactful, challenging, and easy to grasp. Even as a PhD student advising masters students, I spent a lot of time collecting research ideas and discussing them with my peers. This gives me more flexibility when I am asked to suggest a project to a student. I usually suggest projects to students mostly based on their interests and less based on their strengths. While the students’ skill-set plays an important role in the project’s success, I have observed that once students discover their interest and inclination, they tend to pick up knowledge and cover their weaknesses very fast. For instance, I had the idea of applying profile-guided optimizations (a well-known technique in general-purpose compilers) to programs in the P4 programming language. I chose to propose this as a project to Patrick Wintermeyer, a master student who was very critical of the P4 compiler’s limitations during the Advanced Networking class. While Patrick had no background in compilers and his project lasted only 14 weeks, he had enough drive to quickly pick up all the required knowledge. His work led to a HotNets paper.¹

A good advisor plans ahead. Thoroughly preparing a project before discussing it with a student is of paramount importance. Preparing entails crystallizing its motivation, problem statement, first steps, and core milestones. For instance, I advised Vamsi Addanki, a master student at Sorbonne University, Paris. In this case, I prepared a clear problem statement containing three key inefficiencies of the state-of-the-art buffer management algorithm and a straw-man approach to solve them. Starting from there, Vamsi could use his strong mathematical background to pursue his master thesis on this topic and contribute to the project which later led to a NSDI submission.2

A good advisor adapts according to the student and the project. Even in my limited mentoring experience, I found that students have different needs: some students prefer working independently, while others prefer more close guidance; some need frequent affirmation, others like to be challenged. I am continuously trying to adapt my style based on the student’s needs incorporating their feedback. Further, some projects might be harder than one would have initially anticipated. I try to continually reflect on the situations and acknowledge my misjudgments. For example, I advised Cedric Maire, who was pursuing his master thesis on a project on the anonymity of Ethereum. While I had extensively worked on Bitcoin, I ignored some Ethereum-specific details that complicated Cedric’s task. I dealt with this situation by adjusting the project and providing more technical support such that he could successfully finish his project on time.

Teaching

Teachers have an extreme effect on their students’ approach to science and their professional future. My teaching philosophy was formed by observing my teachers and peers and by my experience as a Teaching Assistant at ETH Zurich in Advanced Topics in Communication Networks and Discrete Event Systems courses for several semesters. I believe a good teacher needs to: (i) keep all students engaged; (ii) help students find their interest; and (iii) motivate students to think critically and collaborate.

A good teacher keeps all students engaged. To do that, I intend to make lecture material relatable to students’ everyday life. For instance, when describing BGP, I would explain that every time they connect to a web page, their traffic follows a path via multiple routers, which is calculated by BGP. Moreover, making lectures more interactive helps keep students engaged and allow them to better understand the material. To do so, I would ask intuitive questions, effectively guiding

2 Maria Apostolaki, Vamsi Addanki, Manya Ghobadi, and Laurent Vanbever. Plasticine: A Flexible Buffer Management Scheme for DataCenter Switches. Submitted to NSDI’21
students to discover knowledge on their own. For instance, when talking about secure routing, I would ask how we could make sure that a network does not lie in her BGP announcement. Finally, I believe that it is the teacher’s responsibility to keep the class inclusive. I have observed that some students are very reluctant to interact. In such cases, I often ask students to simply vote for or against an answer, and I encourage them to either answer or make a question in each session.

**A good teacher helps students find their interests.** Courses cannot always delve into much depth, but they should provide enough knowledge, tools, and ideas to allow students to discover their interests. I intend to incorporate interesting research questions in all courses, even introductory ones. Doing so will trigger further discussions, curiosity, and even independent research projects for interested students.

**A good teacher promotes collaboration and critical thinking.** I believe that collaboration promotes effective learning, especially when combined with tasks that encourage creativity. Thus, I intend to include group projects in the classes that I teach, which are challenging and require critical thinking. For example, for the Advanced Topics in Communication Networks course, I designed two 7-week projects in which two student groups partially re-implemented part of a research paper. I chose two relatively old papers that used conventional networking practices. In effect, students were urged to leverage modern networking practices (i.e., programmable data planes) which were taught during the course and made their task easier. These projects helped them realize in practice the benefits of recent networking advancements.

**Teaching Plan.** Given my interdisciplinary research experience on security, networks, and Blockchain systems, I would be most skilled and passionate to teach computer networks, network security, and special topics such as Blockchain technology at both graduate and undergraduate levels. I am also happy to teach introductory courses in computer science, systems, data structures, and algorithms. Finally, I would be very interested in doing an interdisciplinary seminar in which students from different fields will explain the open problems in their field and share their common practices and toolsets.