Teaching Statement

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My breadth in operating systems, distributed systems, storage, compilers, and architecture make me well suited to teach a variety of courses. I am excited to teach courses in operating systems, distributed systems, and architecture.

I find teaching very rewarding. I hope my work as a teacher will influence students to build systems that are reliable and easily managed, and to factor management costs into their thinking on system design. Inspired by my own research process, I want to teach students to look at the latest research and hardware. I want them to consider how hardware changes impact cost and performance, and when to revisit past design trade-offs. I have a passion for computer history and maintaining historical systems, and enjoy bringing examples from older systems into my teaching.

Courses

I have been a teaching assistant for classes at MIT and Stanford. Most recently, I co-taught CS140, the introductory operating systems course, with Prof. David Mazières and Adam Belay. This class had 142 students. I updated parts of the course that I was lecturing and helped develop the exams. My favorite lectures were on storage and file systems, which I updated with real world experiences and new ideas from some of my favorite storage systems.

In the class, I wanted students to keep in mind the disconnect between the theory and practice of storage system design. For example, we often assume that sector writes on disks are atomic and that failed writes leave the original data in-place. In rare circumstances, however, power failures can cause corruption and vibration/shock can cause a write failure that damages the original data or even permanently destroys sectors. For SSDs, critical metadata sometimes does not get flushed during power failure, corrupting or destroying the disk [1].

To help students understand how to deal with this, we talked about ZFS. This file system protects metadata against data corruption by storing replicas spread across the disk. Transactions in ZFS guarantee a crash consistent view of the file system, even if the disk lies about buffers flushing correctly. These ideas could be helpful for designing databases and applications that depend on storage behavior.

I was also the head teaching assistant for Stanford's distributed systems course, CS244B. I carried out general TA tasks including office hours with students and helping to manage the other two TAs. I developed one of the course labs and the testing infrastructure for both lab assignments.

At MIT, I was a teaching assistant for 6.004, the undergraduate computer architecture course. I led two recitation sessions, each with approximately 15 students, where we worked through problems in logic design and basic assembly programming.

Graduate Seminars

I would enjoy teaching graduate seminars on storage and the history of computing.

Storage continues to be an active area, with no end of research and startups trying to address people's needs. Understanding storage has implications for many application areas from databases and distributed systems, to IoT. I would enjoying exploring this area with students and sharing my experience from my time in industry.

I would also enjoy teaching a seminar on the history of computer systems. Students can learn a lot from the hardware and software design trade-offs made in old systems while gaining context for systems papers they read in other classes. Online resources that have emerged in recent years like emulators for older architectures and the availability of source code for historical systems can help this material come to life.

My passion for collecting and running historical computer systems, e.g., PDP, VAX, Alpha, PA-RISC and SPARC, and research experience ranging from architecture work to applications, make me uniquely qualified to teach this seminar.

Mentoring

I have had the opportunity to mentor students at both VMware and Stanford. In total, I mentored and worked with six undergrad, masters, and PhD students.

My mentoring philosophy, especially given my broad systems interests, is to try to match students with problems they enjoy working on. I have found that when students are personally motivated to solve a particular problem this leads to more interesting solutions.

At VMware, I mentored four different students over five summers. One masters and one undergraduate student helped with prototyping and measuring several optimizations I devised for Storage Migration. Another intern,

Ricardo Koller (now at IBM Research), was a PhD student at FIU when he worked with me on designing Centaur, a distributed IO load balancing system, that we published together. He worked with me over two summers and during the year when he became a full time engineer on this project. My last intern was a PhD student from Stanford that helped design a caching layer to help long distance migration.

At Stanford, I mentored two undergraduate students who both worked on the Ori file system. In both cases I gave the students a small project to work on to teach them the code base (at the time it was around 20 KLOC). One student in particular, Frank Huang (now at Google, Inc.), brought a lot of his own ideas on how to use Ori and helped find problems with its usability. His desire to use the system brought out new ideas based on his needs and a passion for working on the project.

References

[1] M. Zheng, J. Tucek, F. Qin, and M. Lillibridge, "Understanding the robustness of ssds under power fault," in *Proceedings of the 11th usenix conference on file and storage technologies*, ser. FAST'13, San Jose, CA: USENIX Association, 2013, pp. 271–284. [Online]. Available: http://dl.acm.org/citation.cfm?id=2591272.2591300.