

Jonathan Mace - Teaching Statement

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Teaching is enjoyable and rewarding in many ways, and I am excited by the opportunity to work with students throughout my future career. My main areas of interest are computer systems, including distributed systems, operating systems, cloud systems, and computer networking. One of the most interesting parts of teaching computer systems comes in unraveling the layers and abstractions of complex systems; in doing so, it is immensely gratifying to see how systems combine simple components in elegant ways, carefully balance their design constraints and goals, and in turn hide complexity through simple, well reasoned interfaces and layers. My teaching philosophy is to focus on the challenges that systems are designed to address, the rationale behind different design decisions, alternative approaches (successful or otherwise), and commonalities among systems despite different goals or constraints. I aim to present systems in an accessible and inviting light, discouraging myths such as the “all-night super-hacker” that can make systems seem like intimidating and unwelcoming subject.

Classroom Teaching I have had the opportunity to both design and teach university courses at the undergraduate level. My main teaching experience is from helping to reboot Brown’s distributed systems class after several years’ hiatus. I was involved in both designing and running the course. To design the course, I worked with Prof. Tom Doeppner and Prof. Rodrigo Fonseca to structure course material, devise assignments, projects, and exams, and create reference implementations for course projects. This included translating interesting distributed systems research into meaningful assignments, such as introducing a project on Raft for implementing distributed consensus. As a TA for the course, I held weekly office hours, supervised group projects, gave guest lectures, led study sessions, and graded assignments and exams. Rebooting the course was a resounding success; with only two other TAs (compared to eight in subsequent years), the course still received overwhelmingly positive feedback. In anonymous end-of-semester evaluations, 45.2% of students rated the quality of my instruction as “Very Effective”, 45.2% “Effective”, 6.5% “Somewhat Effective”, 3.2% “Ineffective” and 0% “Very Ineffective”. I was furthermore awarded a “Great TA Award” by the computer science department, after being nominated by students of the class. The course has remained popular and I have returned to give guest lectures in subsequent years. In addition to distributed systems, I have also given guest lectures for Brown’s networking class, and I developed the reference implementations for the TCP and IP assignments. Elsewhere, I have lectured in seminars and reading groups, both at Brown and at other institutions including MIT, Microsoft Research, and Facebook. Before Brown, I taught an “Introduction to Java” class as part of IBM’s graduate program, and taught a weekly IT class at local primary schools as part of IBM’s local outreach.

Courses I Can Teach As faculty I would be qualified and excited to teach courses in distributed systems, cloud computing, and multiprocessor synchronization, at both the graduate and undergraduate level. My interests and qualifications would also extend to courses in operating systems, networking, and data structures, as well as introductory computer science courses. I am particularly interested in teaching special topics courses in cloud computing, and in distributed systems performance. Cloud computing is a relatively young field, and consequently a course in cloud computing can trace the entire evolution of these systems, from web search in the late 90s through to Google, Amazon and Facebook today. The prevalence of open-source systems, and publicly available cloud infrastructure, means students can also do meaningful class projects with real systems and real datasets.

Research Mentoring I have been fortunate to work with many undergraduate and graduate students during my time at Brown. I have supervised projects for six students: Kartik Singhal, now pursuing a Ph.D. at the University of Chicago; Joshua Liebow-Feeser, now at CloudFare; George Hongkai Sun, now at Google; Ryan Roelke, now at HP Vertica; Jonathan Leavitt, now at Google; and Evan Wallace, now CTO and co-founder of Figma. While my approach to advising varies from project to project and student to student, an overarching theme is that I strongly encourage communication, bi-directional questioning, and regular interaction. In my own research, discussing problems with colleagues has often led me to overcome roadblocks, either because I received unexpected questions, or because I realized I was unable to describe a concept that I was inadvertently glossing over. Similarly, several of my successful research projects began life as half-baked “what if?” discussions that came to fruition only thanks to an environment that encourages the free flow of ideas. Of course, knowing the right research questions to ask, and predicting questions that will be asked by others, are skills that only develop over time, and my research philosophy is to help students develop this mindset by asking questions of their research rather than dictating the direction.