

# Statement of Teaching Interests

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A rapidly evolving field such as computer science is driven by the stream of capable and enthusiastic graduates. This requires those in academia to teach students the fundamentals, motivate them to keep at hard problems, and inspire them to innovate. I have learnt a lot by observing my professors at the UofR work with students, and hope to serve society by cultivating the next generation of computer science researchers.

### 1 Experience

I have served as a teaching assistant for two undergraduate programming courses (CS172 and CS173) and for the graduate parallel and distributed systems course (CS458) on two occasions.

CS172 and CS173 are pre-major courses, which introduce students to two fundamental topics in computer science, programming and formalisms (e.g., predicate logic). They see enrollment from students with diverse backgrounds with varying levels of expertise in computer science and mathematics. I helped design the examinations, graded the assignments, and in conjunction with another graduate TA, developed a web-based discussion board, which enabled timely feedback. Interestingly, CS172 and CS173 were held in back-to-back semesters and had many common students. I was able to build a good relationship with the students and prepare them for more advanced courses.

CS458 is a course devoted to the system design and programming of large-scale computing systems varying from shared-memory multiprocessors to distributed PC clusters. I set up the required infrastructure for the programming assignments, and provided regular feedback to help the students. I was able to use my experience with multi-threaded applications to teach students about the typical symptoms of common synchronization bugs and help them analyze performance issues. An important feature of the course is that it required students to lead class discussions on advanced research topics. Reviewing these topics and helping students prepare for class presentations taught me how to engage students and get them to understand the key concepts.

### 2 Teaching Plans

#### 2.1 Goals

My primary goal in teaching is to help students understand the intuition and principles behind the design of computing systems. I will focus on providing insights into the approach and constraints that led to specific design choices in contemporary and past systems. This experience should enable students to tackle any new problem with a clear understanding of the design tradeoffs and to work systematically toward a solution.

To keep the class enjoyable for students, I plan to deliver my lectures in an interactive style. I will intersperse the lectures with questions to solicit answers and foster discussion. There are many benefits to such an approach: it keeps all the students engaged, provides them the opportunity to digest and think about the lecture material immediately in the classroom, and enables me to understand the student's concerns and adapt the lectures accordingly.

I believe that professors need to make it possible for students to learn things by developing systems. Toward this end, I plan to devise course projects that would develop proof-of-concept systems and teach them to adopt a methodical scientific approach to quantitative evaluation of systems. To motivate students and get them to innovate, I will try to incorporate and tie in such projects with my research agenda.

#### 2.2 Course Offerings

My dissertation research focused on developing architectural mechanisms to aid software development, specifically targeting multiprocessor architectures. I see my teaching to be strongly influenced by my research experience. Hence, at the undergraduate level, I have particular interest in offering courses in computer organization, parallel programming, and systems software. At the graduate level, I am keen to offer advanced courses in computer architecture, multiprocessor hardware, and memory systems. As part of these classes, I also plan to participate in the community movement that is seeking to encourage the usage of open source Field Programmable Gate Arrays (FPGAs) hardware. Incorporating FPGAs in class

projects would motivate students by empowering them to synthesize the proposed designs on a real hardware board. Providing feedback about our class experience and sharing the framework we develop with colleagues at other universities would help advance the overall field.

Finally, I am looking forward to developing a new course that provides an integrated view of emerging smartphone platforms. The first part of this class will familiarize students with the hardware architecture and the programming environment. It will seek to understand the fundamental performance and resource management issues on these new devices. The second part will focus on group projects that will try to innovate with applications that help us exploit new hardware features on these platforms, like accelerometers and sensors. The course will use open source software frameworks and commodity hardware to enable students to realize their work on real-life systems.