

Stanford CS444A / Berkeley CS294-4  
Recovery-Oriented Computing  
Fall 2001

Taught jointly at Berkeley and Stanford by Professors Dave Patterson and Armando Fox, with TA's George Candea (Stanford) and Aaron Brown (Berkeley), and help from Bill Tetzlaff of IBM and Kim Keeton of HP.

Course description: <http://roc.cs.berkeley.edu/294fall01/> or <http://www.stanford.edu/class/cs444a> (pointers to same site)

Overall, we think the joint Berkeley/Stanford course had many advantages:

- **Different perspectives:** not only from different faculty, but from different students in the courses. The different projects on the 2 campuses affects the students perspectives.
- **Variety of speakers:** some were willing to go to one campus but not the other, for geographic reasons. Also the potential of "capturing" speakers who are going to be on either campus anyway for other reasons.
- **High long term potential:** students and faculty from the two schools are aware of each other, and may work together on projects, act as members of dissertation committees, get letters of recommendation, and so on.
- **Shared workload for staff:** We had 1 professor and 1 "TA" per school (although only one of the TA's was paid). This was less work then doing it by oneself, as 2 could share the workload and still be teaching enough students at each school to justify offering the course.

Thus the overhead in coordination and commuting was higher, but well worth it for students and faculty.

What worked well:

- **Student projects:** we had an amazingly high fraction submitted (or to be shortly submitted) to conferences: 5 of 8 projects. Highest I've ever had in a course. Reasons why include:
  - **Twice the staff.** Since we had 1 prof and 1 TA per school, there was more help/advice available on the project, and project quality was higher than usual, despite the fact that many of the Stanford students involved were MS rather than PhD (the Stanford MSCS program is course-heavy, and research-project seminars are not the norm for most MSCS students).
  - **Project was the prominent part of course.** Rather than have the project be incidental, it was prominent. Students were advised up front that conference-quality work and a submission-quality writeup were expected. Thus students got feedback from visitors, needed to make short presentations on progress for the visitors and sometimes the staff, and so on.
- **Meeting once a week.** Since one group had to take a 1-hour bus trip to the other campus and back, one meeting per week saved overhead.
  - **Visitor feedback on projects.** It also meant that when we had a visitor, we could ask him or her to speak in the first part of the course and then give feedback on

- each student project in the rest of the course. This was excellent feedback, and gave an outside perspective that was interesting to everyone.
- **Meals.** Since it was such a long day, starting at 1:45 to catch the bus and getting back around 7:15PM, we included a meal. Next time might be better to allocate a whole hour for the meal so that there was time to eat and to have a group discussion. The meal expenses are well worth it as an inducement to stay later.
  - **Guest speakers.** Having people like Jim Gray and Brendan Murphy of Microsoft and Udi Manber of Yahoo give their views is wonderful for both the students and the instructors, not only for the lecture but for the identification of projects and feedback on their value. As mentioned above, having people of such caliber answer student questions and offer advice is tremendous for the students, even though they may not appreciate how hard it is to get these people's time.
  - **“How to have a bad career/write a bad paper/make a bad poster.”** Dave gave this talk a couple of weeks before the project writeups were due, and the writeups and posters were clearly influenced (positively) by it. (*Armando says: This talk is so useful that I will keep a pointer to the archived version and require students in my other project courses to view it on the Web.*)
  - **Reciprocal network access.** Despite having to overcome some administrative inertia, the efforts to establish wireless network access for visitors were well worth it. (It helped that in both departments, the department chairs or equivalent people leaned a bit on the administrative staff; especially at Berkeley, where it has to be done at the EECS level, not the CS level.) *Armando says: Especially when visiting the other campus by bus (and therefore being constrained by the bus schedule), it makes a big difference to know that one can use one's extra time to do useful work.*

### **Bus logistics**

- We ended up rotating campuses, 3 weeks at a time, to reduce the overhead. We just needed to settle on a schedule, and in the end, it was easier to attract students from both schools if the commuting was split about equally. It's going to be a while before telepresence makes commuting unnecessary.
- During the last few weeks, we skipped commuting and had local project-update meetings at each school. For one of the meetings, Dave delivered his “How to Have a Bad Career” at Berkeley, but it was Webcast to Stanford.
- We would need a much larger bus to make it possible to type on the bus, as smaller buses are just too bouncy. Bus company was reliable once the schedule was fixed and communicated clearly; initially we changed the schedule frequently as speaker dates were nailed down.

### **Areas for improvement:**

- **Coordination.** It was absolutely vital to have a staff discussion outside of that meeting to talk things over without time pressure. We had a phone call once a week for about 30 minutes. We never knew what the topics were the day before, but discussions were always vital. There were also some minor issues in setting up a

common course Web site, since some details (registration instructions, course control number, etc.) vary between the two schools.

- **Administrative rules.** The informal agreement for this course was: Stanford would pay for a 25% TA (since the course was relatively small), while Berkeley would pick up bus and other commuting-related expenses. Institutionalizing some policy guidelines regarding TA's, faculty teaching credit, etc. would make it easier to set these up in the future.
- **Webcasting.** Although we don't expect Webcasting to replace the value of in-person class meetings, it is sometimes useful to have it (e.g. for Dave's "bad career" lecture, or remote speakers such as Lisa Spainhower who delivered her lecture remotely from IBM in New York). At Berkeley this required special help from Larry Rowe and the Berkeley Multimedia center; at Stanford it would probably require advance arrangements with Stanford Online. There should be a process in place at the start of class so that Webcasting can be setup quickly when needed.
- **When classes start.** Berkeley started classes 3 weeks earlier than Stanford, and expecting students to show up before official start of classes is just not going to work. We ended up doing a long catchup session at Stanford to cover a lot of the background we had given the Berkeley students in the first couple of weeks. Since Berkeley is going to start a week later starting next Fall, this may be easier in the future, as the gap should only be 3 weeks. Perhaps 1<sup>st</sup> class has no content, just a coordination meeting, next 2 get students up to speed, 4<sup>th</sup> class is joint, and there is a makeup session at another time for students in the latter course.
  - **A spring start.** Since Stanford would start 2 weeks before Berkeley in Winter, the roles would be reversed. Presumably Stanford would be a 2-quarter course and Berkeley a semester course. Perhaps just stop the Stanford course in the second quarter during finals week at Berkeley? Or make the Berkeley course end during Finals at Stanford. One issue is whether Spring Break is the same week.
- **Cross campus project groups.** Only 1 out of 8 project groups included students from both schools, and this was in part because one of the two students in that group was a commuter anyway and it was no more difficult for him to go to Berkeley than to Stanford. If we want to encourage this more, we need to allocate meeting time as part of the trip. Perhaps longer meal helps? Specific break in the middle for project meetings? Scheduling certain class meetings exclusively for project meetings? (Maybe during visitor feedback, other groups can meet in another room?) Also covering phone charges.
- **Efficiency of knowledge exchange.** (*George*)
  - Lecturers to students: Would students learn more if the class was structured and systematic? Some guest lectures overlapped in content; the technical/scientific level of guest lectures varied; some material did not receive full coverage. Unique themes for each class meeting may help, with the themes being part of an overall class plan ("big picture"); we should inform guest speakers of that day's theme. Instructors/TAs may choose to deliver a higher percentage of the lectures, to maintain the structure. Developing class/lecture notes over time could be very valuable.
  - Students to class: Can we devise a better way to stimulate students to share their insights re. ROC with the rest of the class and the staff?

- **Project delivery/evaluation.** (*George*) It would be interesting and instructive to have students anonymously review at the end of the quarter each other's project papers (like for a workshop), using reviewer forms a la conference program committees. Students can then revise their papers based on the feedback and submit them as final class reports. (*Aaron says: this is a great idea; the first research course I took did something similar and it was very valuable in learning how to write research papers and how the review/feedback process works. We actually did a mock-PC meeting with the people in the class, but this might be overkill for a more advanced seminar like the ROC class.*)