PAIR PROGRAMMING-IN-A-BOX
The Power of Collaborative Learning

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Pair Programming — Student Handout

PAIR PROGRAMMING BASICS

When working on labs and some programming assignments, you will use the "Pair Programming" approach. In pair programming, two programmers share one computer. One student is the "driver," who controls the keyboard and mouse. The other is the "navigator," who observes, asks questions, suggests solutions, and thinks about slightly longer-term strategies. The two programmers switch roles about every 20 minutes. Working in pairs should make you much better at programming than would working alone. The resulting work of pair programming nearly always outshines that of the solitary programmer, with pairs producing better code in less time.

"[Pair programming] makes learning programming faster and more fun. I have had previous experience working both alone and with partners. I definitely agree that working with partners is more profitable." – CS student

To "learn the do's and don'ts" of pair programming and to see pairs in action, view this entertaining video about pair programming from North Carolina State University: *An Introduction to Pair Programming for Students*.

You can work with a different partner or the same partner for each lab. For these pairings, we expect students to choose their partners, but if you prefer not to choose your own partner, or cannot find a partner, let your teaching assistant know; she or he will find a partner for you.

If you do not finish your lab during the allotted time, then you will need to arrange times to meet outside of lab to finish (or accept the grade given at the end of lab).

CHOOSING YOUR FIRST PARTNER

Your partner must be in your same lab section. If there is an odd amount of people in a lab, then form a group of three. You should try to pick a partner whose experience and skill level with programming is similar to your own. This may not always be possible, and it is sometimes hard to compare skill levels. However, students tell us (and other data support) that pairs are most productive when the partners start at about the same level.

Students bring different strengths to the process, regardless of how much experience they have had with programming. Both experienced and inexperienced students will need to draw on their reasoning and problem solving skills. A more experienced partner may sometimes feel frustrated or slowed down by a less experienced partner, but the experienced partner still benefits from the teamwork in many ways. The less experienced partner's requests for clarification often uncover flaws in an approach or solution; the exercise of providing a clear explanation solidifies and deepens the explainer's own understanding and the teamwork and communication skills they gain have great value in both the academic realm and the job market.

"My partner had never coded anything before so I was able to teach him a little bit about how it worked. The teaching bit helped me a lot with understanding the labs and passing the exams." – CS student

The less experienced partner may feel that questions hold the other partner back or that there is no benefit to participating actively, but pair programming studies show that paired work is consistently better than work the stronger partner does alone. It is each partner's job to understand the whole task; that means asking questions when necessary and answering them when possible.

It may be instructive to read a selection of students' partner evaluation comments from similar courses that have used pair programming; they give a picture of what good partnerships are like (and a few disasters, too). Read *Pair Programming Evaluations* from the University of California, Irvine Bren School of Information and Computer Sciences.

DEALING WITH DIFFERENCES

If you believe your partner is not participating appropriately in pair programming (*e.g.*, she or he often does not come to lab, does not keep in touch, or does not come to lab prepared to work) please first address your concerns to your partner, and try to agree on what should be done to make the pair programming experience work well for both of you. If that approach is not successful, explain the issues to your teaching assistant or the instructor, who will work with you and your partner to improve the situation.

HOW PAIR PROGRAMMING AFFECTS YOUR GRADE

All graded items in this course are completed individually, so how your partner scores on these items will not affect your score on them. That noted, lab attendance and completion of lab assignments is critical to your assignment and test performance, so you are expected to work collaboratively with a partner using the pair programming methods outlined during labs. Failure to participate fully and cooperatively will count against you; you could receive a one- or two-point deduction in your lab score for the week.

You will be asked to individually submit a brief partner evaluation at the end of each lab. This is required and due with the lab. You earn one point for a cursory evaluation, one point for providing an evaluation that is thorough or insightful, and no points if you turn an evaluation in late or not at all.