SE 2A04 Fall 2000

Lab Exercise 1

Instructor: William M. Farmer

Assigned: 12 September 2000
Lab report due: 26 September 2000

Step 1

Form a team of two members.

Step 2

Read and understand the following two specifications.

Specification 1. A *tree* is defined inductively by the following statements:

1. A number is a tree.
2. If s and t are trees, then the ordered pair $\langle s, t \rangle$ is a tree.

Let trees denote the set of trees. $\mathsf{pair} : \mathsf{trees} \times \mathsf{trees} \rightarrow \mathsf{trees}$ is the function such that, for all $s, t \in \mathsf{trees}$, $\mathsf{pair}(s, t) = \langle s, t \rangle$.

Specification 2. build_trees is a program that interacts with the user to build a list of trees. The list is initially empty. The program allows the user to add trees to the list by entering a number or applying pair to two trees already on the list. After a tree is added to the list, the list is printed for the user. The build_trees program should inform the user in a friendly way of any errors in input.

Step 3

One member of the team should implement (in C) and test the first specification, and the other member should implement (in C) and test the second specification. The two resulting programs should be compiled separately. After you are convinced that the programs are correct, combine them and test them together. The final product should be a system that can be demonstrated.

Each member of the team should record in his or her log book all major decisions and all errors discovered. If you consult with anyone, summarize the conversation in your log book. Your log book should clearly indicate your role on each program.

Step 4

During the lab session on 19 September 2000, exchange your implementation of pair with that of another team chosen by the instructor or TAs. Test the implementation of pair, and combine it with your build_trees program, and then test the combination.

Step 5

Write a lab report that includes the following:

1. A description and analysis of your work and the results obtained. In particular, analyze the difficulties you encountered and explain how they could have been avoided.
2. Listings of your source code. Be prepared to provide copies of your source code files if they are requested. Your full program must work correctly on the Sun workstations in the laboratory.
3. A description of how you tested your programs including what test data you used.
4. A copy of each team member's log book.

The final lab report is due at the beginning of the lab session on 26 September 2000.

Step 6

During the lab session on 26 September 2000, each team will be required to demonstrate their full program to one of the TAs.