COS128: Honors General Computer Science	Spring 1996

Problem Set # 7

Handed out:April 9, 1996 *Due: April 17, 1996*

In this assignment you will write a program that stores student records and allows the user to do fast searches on these records. The program should use a binary search tree to store the records.

You should use the following structure declarations.

```
struct student {char name[30]; int score;};
struct tree {struct student stud; struct tree *left; struct tree *right;};
```

Student records are stored initially in a file `somefile`. Each line in this file contains the student's name (represented by 30-characters) and his/her score (a positive integer). Assume that students have no last name. The name and the score are separated by a "tab" character, (`\t`).

Your program should use C's file input/output primitives (see the attached cheatsheet) to read/write this file, and to build a search tree containing these records. After that the program interacts with the user as follows.

```
<program>: Enter S to do a search, I to do an insert, and Q to quit.
<user>: I Bart 10
<program>Entered student Bart with score 10. Next command
<user> S Bart
<program> Found a student Bart, Score 10. Next Command.
<user> Q
<program> Good Bye.
```

Note that:

1. "Insert" should never insert two records with the same name.
2. When the user types Q, the program should write the updated records to `somefile` prior to exiting the program.

Finally, we remind you that C has some built-in functions (defined in `<string.h>`) that allow you to compare two strings and determine which is first in alphabetical order. (See attached cheatsheet.)

The Assignment:

(*Part 1:*) Write the program as described above. The file `somefile` is in the directory `/u/cs126/progs`. If something is not clear in the instructions above, ask your preceptor. If you make any assumptions in designing your program, state them clearly on your hardcopy submission. Finally, go through your program and find out if there are any unusual circumstances (e.g., `somefile` has incorrect format, user gives an unexpected input) under which your program doesn't work. List such circumstances in your hardcopy submission. (In other words, don't waste too much time making sure your program works correctly under all circumstances.)

(*Part 2*) Add a "delete" function to the program. This will involve writing a "delete" function for binary search trees.

Extra Credit: There are many possibilities for improvement in this program. Students have both first names and last names. You could modify the program so that it keeps track of both, and allows searches using either name. Or you could try to allow searches using partially-spelled names (e.g., "Bar" should still pull up Bart's record, along with Barbara's).

Submission:

Put your program in a file called `search.c`. To electronically submit it, type

`/u/cs128/bin/submit 7 search.c`

The deadline for electronic submission is **10pm on Wednesday, April 17**, and for hardcopy submission is the lecture on **Thursday, April 18**.