# Homework 4: Prolog and Logic Programming

Put your Prolog code for the standard problems in `hw4.l`. (We will want to be able to see the `hw4.l` file in your directory.)

You should hand in a printout of your programs. (If you do extra-credit problems, please write the names of the file(s) where the source code for your solutions can be found on your print-out.)

Test your programs using the `prolog` command on Unix, which is the interpreter described in Appendix I.

The load command for Prolog works as follows. You load "myfile" by executing:

```
(infer? (load myfile))
```

Note, however, that in Prolog new facts and rules are simply *added* to the database at the end, they do *not* replace old rules; thus to fix a bug it may be best to quit and start all over.

1. (8 points) Use the Prolog program found in `/home/cs342/public/lib/prolog/history.pro` to answer the following questions by writing prolog queries. Turn in the queries and their output as your answer.
   (a) What language is an ancestor of C++?
   (b) What ancestor of C++ was produced in 1960?
   (c) What language is both an ancestor of Ada and C?
   (d) What descendent of Algol-60 is an ancestor of Pascal?
2. (6 points) Code the following facts and rules in Prolog (using lower case for CLU and LISP):
   - clu is good.
   - You can program in lisp
   - If you know how to program in language X, and X is a good language, then you program well.
   - If you know how to program in lisp, then you know how to program in clu.

   Now using the above facts and rules, answer the following query (by using Prolog, that is, write a query). Do you program well?
3. (16 points) Do problem 2 on page 404 of the text.
4. (15 points) Do problem 6 on page 404 of the text.
5. (20 points) Do problem 7, parts (a) and (b) on page 404 of the text. Code for this problem from section 8.4 of the book is found in `/home/cs342/public/lib/prolog/lib-blocksw.pro`. You are to edit this code to put in lines that are needed to solve parts (a) and (b). Each line that you enter should be commented on the far right with either `; (a)` or `; (b)` to indicate which part of the code the line is added for.
6. (extra credit only) Do problem 7, parts (c) and (d) on page 404 of the text.

7. (extra credit only) Do problem9 in section 8.8.2 of Kamin's book. You will find the source for the prolog interpreter in

   `/home/cs342/public/src/chap.8/prolog.p`

   Make a copy using the Unix `cp` command and then edit your copy. Turn in differences (using the Unix command `diff`) as before.