CS 430 Programming Languages
Spring 2016
Module 16 Programming Assignment

Introduction

This assignment assesses your ability to use basic features of Prolog.

Requirements

For this assignment you must write several predicates describing family relationships. You must include tests using a database of facts and predicates about an extended family. The database of facts and predicates is in the file mod16Basis.pl. You should copy this file to your deliverable file (mod16PA.pl) and then edit the deliverable file for submission. (Note that these filenames begin with lowercase letters so that you can use the names as atoms when loading them into gprolog; if the names begin with uppercase letters then they would be variables, not atoms, and you would have to quote the filename.)

You must write the following predicates:

female(X)—Anyone who is not a male is a female (this makes unknown people female).

parent(X,Y)—A parent is either one of a person's biological parents. parent(X,Y) is read X has parent Y.

father(X,Y)—A father is a male biological parent. father(X,Y) is read X has father Y.

mother(X,Y)—A mother is a female biological parent. mother(X,Y) is read X has mother Y.

step_parent(X,Y)—A step parent is a non-biological parent of a spouse of a biological parent. step_parent(X,Y) is read X has step_parent Y.

step_father(X,Y)—A step father is a non-biological parent who is a male spouse of a biological parent. step_father(X,Y) is read X has step_father Y.

sibling(X,Y)—Siblings are distinct people who share a biological parent. sibling(X,Y) is symmetric. Hint: at the end of your rule, include X\==Y, which succeeds only if X and Y are not instantiated to the same atom.

sister(X,Y)—A sister is a female sibling. sister(X,Y) is read X has sister Y.

aunt(X,Y)—An aunt is a sister of a parent, or the female spouse of a sibling of a parent. aunt(X,Y) is read X has aunt Y.

grandparent(X,Y)—A grandparent is a biological parent of a biological parent. grandparent(X,Y) is read X has grandparent Y.

grandfather(X,Y)—A grandfather is a male grandparent. grandfather(X,Y) is read X has grandfather Y.

ancestor(X,Y)—The ancestor predicate is the transitive closure of the biological parent relation. In other words, a person's ancestors are their parents, their parents' parents, their parents' parents' parents, etc. ancestor(X,Y) is read X has ancestor Y.

relative(X,Y)—A (blood) relative of a person is anyone else that is either an ancestor of that person, has a common ancestor with that person, or is a descendant of that person; nobody is a relative of themselves. relative(X,Y) is read X has relative Y.

in_law(X,Y)—An in-law of a person is any relative of that person's spouse that is not also that person's relative. in_law(X,Y) is read X has in-law Y.

The final program must have all the test predicates uncommented, in particular the predicate test at the very end of the file. (This is because when I grade your program I will load it into gprolog, list it, and run the test predicate. If the tests are not there, I will be very annoyed.)

Hints

Write your predicates just above the tests for them and uncomment the tests as you write your predicates and test each one. Later predicates use earlier ones, so will be much easier to debug your code as you go along than waiting until the end. If a test fails, try each of its parts until you isolate the problem. If you are having trouble, you might find it helpful to draw the family tree.

Deliverables

The deliverable for this assignment is a Prolog source file called mod16PA.pl submitted on Canvas. Your name must appear in a comment at the top of the file. This file must be submitted by the due date on Canvas.