Université d'Ottawa
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School of Electrical
Engineering
and Computer Science

Assignment 2

CSI2120 Programming Paradigms

Winter 2023

Due on March 24th 2023, 11:30PM

8% - 17 points

Instructions :

- This assignment will assess your knowledge and understanding of the Prolog programming language
- You must submit a zip file of your answers.
- This is an individual assignment. Strict measures to ensure academic integrity will be enforced.

Question 1. [1+2+2+3=8 points]

Write a Prolog program to implement a family tree. Your program should allow the user to define relationships between family members, such as parent-child and sibling relationships, and should be able to answer queries about these relationships.

Your program should include the following predicates:

- parent(Parent, Child) **(1 point)**: This predicate should be true if Parent is a parent of Child.
- sibling(Sibling1, Sibling2) **(2 points)**: This predicate should be true if Sibling1 is a sibling of Sibling2.
- grandparent(Grandparent, Grandchild) **(2 points)**: This predicate should be true if Grandparent is a grandparent of Grandchild.
- ancestor(Ancestor, Descendant) **(3 points)**: This predicate should be true if Ancestor is an ancestor of Descendant.

Your program should include the following facts about a sample family tree:

```
parent(john, mary).
parent(john, tom).
parent(mary, ann).
parent(mary, fred).
parent(tom, liz).

male(john).
male(tom).
male(fred).
```

female(mary).
female(ann).
female(liz).

You can assume that each person in the family tree has a unique name.

Question 2. (1+2+3 = 6 points)

Write a Prolog program that implements a simple knowledge base for a pet store. Your program should allow the user to define facts about pets, such as their name, species, and age, and should be able to answer queries about these facts.

Your program should include the following predicates:

pet(Name, Species, Age) **(1 point)** : This predicate should be true if a pet with the given Name, Species, and Age exists in the pet store.
species(Species, Count) **(2 points)** : This predicate should be true if there are Count pets of the given Species in the pet store.
age_range(MinAge, MaxAge, Count) **(3 points)** : This predicate should be true if there are Count pets in the pet store whose age is between MinAge and MaxAge.

Your program should include the following facts about pets in the pet store:

pet(fido, dog, 3).
pet(spot, dog, 5).
pet(mittens, cat, 2).
pet(tweety, bird, 1).

male(fido).
male(spot).

female(mittens).

Question 3. (3 points)

Given a list of integers, write a Prolog predicate sum_odd_numbers(List, Sum) that recursively sums all odd numbers in the list and returns the result in Sum.