RIPHAH INTERNATIONAL UNIVERSITY, ISLAMABAD

Lab # 12

Bachelors of Computer Science – 6th Semester

Subject: AI

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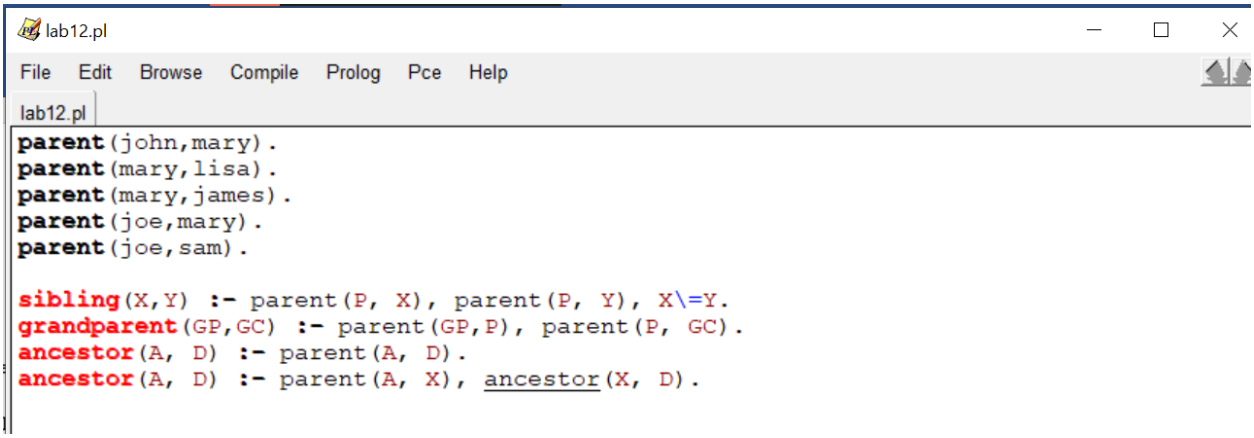
Task 1:



Output:

```
?- parent(john, mary).
true.

?- sibling(lisa, james).
true.

?- grandparent(john, lisa).
true.

?- ancestor( joe,james).
true
```

Task 2:

```
has_fur(dog).
has_fur(cat).
has_feathers(eagle).
has_feathers(parrot).
lay_eggs(eagle).
lay_eggs(parrot).
lay_eggs(snake).
lay_eggs(turtle).
has_scales(snake).
has_scales(turtle).
gives_milk(dog).
gives_milk(cat).
can_fly(eagle).
can_fly(parrot).

mammal(X) :- has_fur(X), gives_milk(X).
bird(X) :- has_feathers(X), lay_eggs(X), can_fly(X).
reptile(X) :- has_scales(X), lay_eggs(X).
```

Output:

```
?-
|    mammal(dog).
true.

?- bird(parrot).
true.

?- reptile(snake).
true.

?- mammal(eagle).
false.

?-
```

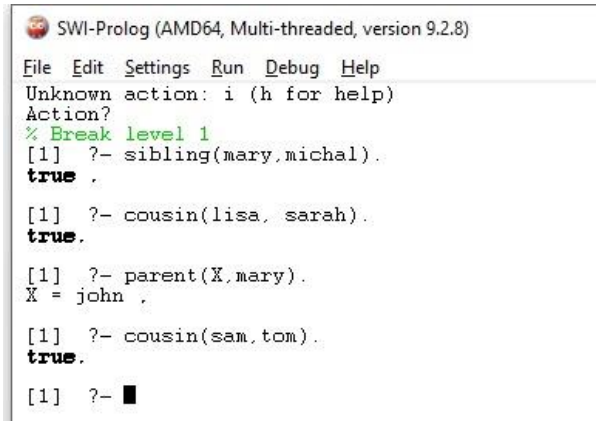
Task 3:

```
parent(john,mary).
parent(john,michael).
parent(mary,lisa).
parent(mary,tom).
parent(susan,mary).
parent(susan,james).
parent(james,sarah).
parent(james,sam).

sibling(x, Y) :- parent(P, X), parent(P, Y), X \= Y.

cousin(X, Y) :-
    parent(P1, X),
    parent(P2, Y),
    sibling(P1,P2).
```

Output:



Task 4:

```
fruit(apple,pome).
fruit(orange,citrus).
fruit(lemon,citrus).
fruit(strawberry,berry).
fruit(blueberry,berry).
fruit(grape,berry).
fruit(banana,tropical).
fruit(mango,tropical).

same_category(X, Y) :- fruit(X,Category), fruit(Y, Category), X \= Y.
```

Output:

```
?- same_category(orange, lemon).
true.

?- same_category(strawberry, X).
X = blueberry ;

?- fruit(X, citrus).
X = orange ;

?- same_category(X,Y).
X = orange,
Y = lemon
```

Task 5:

```
color(apple,red).
color(banana,yellow).
color(orange,orange).
color(lemon,yellow).
color(grape,purple).
color(strawberry,red).
color(blueberry,blue).

taste(apple,sweet).
taste(banana,sweet).
taste(orange,tangy).
taste(lemon,sour).
taste(grape,sweet).
taste(strawberry,sweet).
taste(blueberry,tart).

same_color(X, Y) :- color(X, Color), color(Y, Color), X \= Y.
same_taste(X, Y) :- taste(X, Taste), taste(Y, Taste), X \= Y.
same_color_and_taste(X, Y) :- same_color(X, Y), same_taste(X, Y).
```

Output:

```
?- same_color(apple,X).
X = strawberry.

?- same_taste(banana,Y).
Y = apple ;

?- same_color_and_taste(X, Y).
X = apple,
Y = strawberry ;

?- color(X, red), taste(X, sweet).
X = apple
```