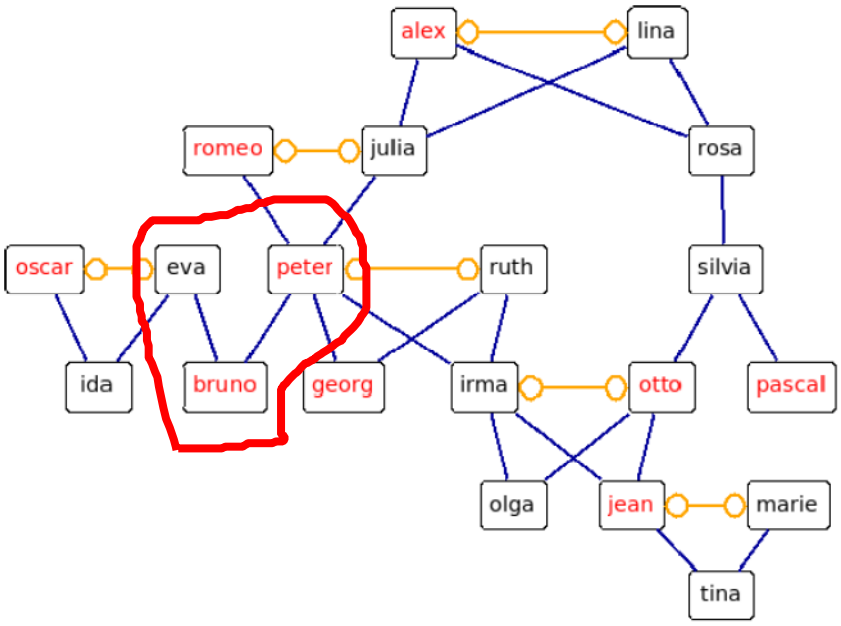
Course: CSE 402

Offline: 1(Introduction to Prolog)

Marks: 20

FAMILY TREE

A. Observe the following family tree:-



B. Write the following facts in *Swi-Prolog*:-

```
% parent(X,Y) means: X is a
% parent (father or mother) of Y
parent(alex,julia).
parent(alex,rosa).
parent(lina,julia).
parent(lina,rosa).
parent(romeo,peter).
parent(julia,peter).
parent(rosa,silvia).
parent(oscar,ida).
parent(eva,ida).
parent(eva,bruno).
parent(peter,bruno).
parent(peter,georg).
parent(peter,irma).
parent(ruth,georg).
parent(ruth,irma).
parent(silvia,otto).
parent(silvia,pascal).
parent(irma,olga).
parent(irma,jean).
parent(otto,olga).
parent(otto,jean).
parent(jean,tina).
parent(marie,tina).
```

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% male(X) means:
% X is a male person
male(alex).
male(romeo).
male(oscar).
male(peter).
male(bruno).
male(georg).
male(otto).
male(pascal).
male(jean).

% husband(X,Y) means:
% X is the husband of Y
husband(alex,lina).
husband(romeo,julia).
husband(oscar,eva).
husband(peter,ruth).
husband(otto,irma).
husband(jean,marie).
```

C. First define the predicate female(X) as follows:-

```
female(X) :- \+ male(X).
```

Now write the predicates for the following relationships:-

1) father (X,Y):- % X is the father of Y.
2) mother(X,Y):- % X is the mother of Y.
3) son(X,Y):- % X is the son of Y.
4) daughter(X,Y):- % X is the daughter of Y.
5) sibling(X,Y):- % X and Y are siblings i.e. both of their parents are common.
6) brother(X, Y):- % X is a brother of Y and both of their parents are common.
7) sister(X, Y):- % X is a sister of Y and both of their parents are common.
8) wife(X, Y):- % X is the wife of Y.
9) grandchild(X, Y):- % X is a grandchild of Y (2-hop descendant in the family tree) .
10) grandfather(X, Y):- % X is the grandfather of Y.
11) grandmother(X, Y):- % X is the grandmother of Y.
12) uncle(X, Y):- % X is an uncle of Y.
13) halfbrother(X, Y):- % X is male and has a common parent with Y.
14) halfsister(X, Y):- % X is female and has a common parent with Y.
15) stepbrother(X, Y):- % X is male and one of his parents at some point was/is
% married to one of the parents of Y .
16) stepsister(X, Y):- % X is female and one of her parents at some point was/is
% married to one of the parents of Y.
17) ancestor(X, Y):- % there is path from node X to node Y in the family tree.
18) descendant(X, Y):- %there is a path from node Y to node X in the family tree.

D. Test with different cases inferring from the given family tree.

sibling(bruno, georg)→false.
sibling(irma, georg)→true.
brother(georg, irma)→true.
brother(bruno, ida)→false.
halfsister(ida, bruno)→true.
halfbrother(bruno, georg)→true.
stepsister(ida, irma)→true.
stepbrother(georg,ida)→true.
wife(eva, peter)→false.
wife(eva, oscar)→true.
grantparent(julia, ida)→false.
grandfather(otto, tina)→true
ancestor(alex, tina)→true.
descendant(ida, lina)→false.

Marks:-

Predicates (**1**) to (**16**): 1 each.
Predicates (**17**) and (**18**): 2 each.

Total: **16x1+2x2=20.**

Reference: - *The Art of Prolog* by Sterling and Shapiro, Chapter-1.