## Experiment No: 1
## Experiment Name: Formulate the following queries/ add the following facts.

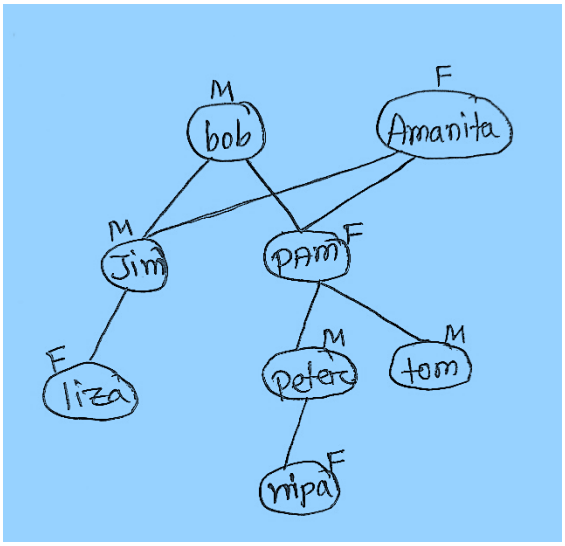
We have one set of male = {bob, tom, peter, jim} and another set of female= {liza, amanita, nipa, pam}. Write a prolog program to implement the following rules:

- ✓ "peter is the uncle of jim"
- ✓ "bob is the grandfather of liza"
- ✓ "jim is the brother of pam"

Also write the following rules: father, mother, grandfather, grandmother, predecessor, brother, sister, sibling, uncle….

**Solution:**

**1: First generate a tree:**




**2: Declare facts in knowledge base:**

```
male(bob).
male(tom).
male(peter).
male(jim).
female(liza).
female(amanita).
female(nipa).
female(pam).

parents(bob,jim).
parents(bob,pam).
parents(amanita,jim).
parents(amanita,pam).
parents(jim,liza).
parents(pam,peter).
parents(pam,tom).
parents(peter,nipa).
```

**3: Define rules:**

```
grandfather(X,Z):- parents(Y,Z),parents(X,Y),male(X).
%grandmother  ????
sibling(X,Y):- parents(Z,X),parents(Z,Y).
mother(X,Y):- parents(X,Y),female(X).
%father  ????
brother(X,Y):-parent(Z,X),parent(Z,Y),male(X),X\==Y.
sister(X,Y):-parent(Z,X),parent(Z,Y),female(X),X\==Y.
uncle(X,Y):-brother(X,Z),parent(Z,Y).%parent(X,Y):father(X,Y);mother(X,Y).
grandfather(X,Y):-father(X,Z),father(Z,Y).
grandmother(X,Y):-mother(X,Z),father(Z,Y).
wife(X,Y):-parent(X,Z),parent(Y,Z),male(Y),female(X).
uncle(X,Y):-brother(X,Z),parent(Z,Y).
```

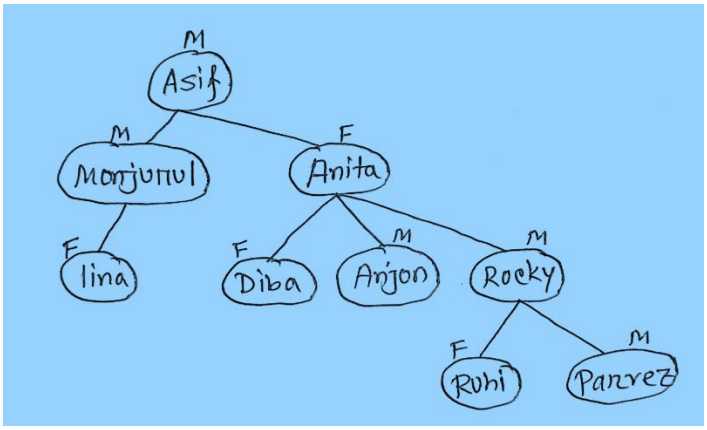
**H/W:** We have one set of male = {asif, monjurul, anjon, rocky, parvez} and another set of female = {lima,anita, lita, ruhi, diba}.
Write a prolog program to implement the following rules

- ✓ "asif is the grandfather of lina"
- ✓ "diba is the sister of anjon"
- ✓ "rocky is the predecessor of ruhi"

Also write the following rules: father, mother, grandfather, grandmother, predecessor, brother, sister, sibling, uncle….

**Solution:**

**1: First generate a tree:**




**2: Declare facts in knowledge base:**

male(asif).
male(monjurul).
male(anjon).
male(rocky).
male(parvez).

female(lina).
female(anita).
female(lita).
female(ruhi).
female(diba).

parents(rocky,ruhi).
parents(rocky,parvez).
parents(asif,monjurul).
parents(asif,anita).
parents(monjurul,lina).

**3: Define rules:**

grandfather(X,Z):- parents(Y,Z),parents(X,Y),male(X).
sibling(X,Y):- parents(Z,X),parents(Z,Y).
mother(X,Y):- parents(X,Y),female(X).
father(X,Y):-parent(X,Y),male(X).
brother(X,Y):-parent(Z,X),parent(Z,Y),male(X),X\==Y.
sister(X,Y):-parent(Z,X),parent(Z,Y),female(X),X\==Y.
uncle(X,Y):-brother(X,Z),parent(Z,Y).%parent(X,Y):father(X,Y);mother(X,Y).
grandfather(X,Y):-father(X,Z),father(Z,Y).
grandmother(X,Y):-mother(X,Z),father(Z,Y).
wife(X,Y):-parent(X,Z),parent(Y,Z),male(Y),female(X).
uncle(X,Y):-brother(X,Z),parent(Z,Y).

## Experiment No: 2
## Experiment Name: Basic Arithmetical Operations of Prolog.

**Objectives:**

Do the following operations :

Write a rule to show the -

I. summation of two numbers.
II. subtraction of two numbers.
III. multiplication of two numbers.
IV. division of two numbers.
V. maximum number from given three numbers.
VI. X is raised to Y power.
VII. remainder of two numbers.
VIII. bitwise AND operation between two numbers.
IX. bitwise OR operation between two numbers.
X. bitwise XOR operation between two numbers.
XI. bitwise left shift operation of the number.
XII. bitwise right shift operation of the number.
XIII. bitwise complement operation of the number.

**Solution:**

**L.W: Addition and finding average:**

```
go:-
write("Enter your first number: "), nl,
read(X), nl,
write("Enter your second number: "), nl,
read(Y), nl,
sum(X,Y).
sum(X,Y):- S is X+Y, nl,
write('sum is: '), nl,
write(S).
```

```
addition(Sum):-
write('1st number: '),
read(P),
write('2nd number: '),
read(Q),
Sum is P+Q.

subtraction(Sub):-
write('1st number: '),
read(P),
write('2nd number: '),
read(Q),
Sum is P-Q.

multiplication(Mul):-
write('1st number'),
read(P),
write('2nd number'),
read(Q),
Mul is P*Q.

division(Div):-
write('1st number'),
read(P),
write('2nd number'),
read(Q),
Div is P/Q.

power(Pow):-
write('1st number'),
read(P),
write('2nd number'),
read(Q),
Pow is P**Q.

remainder(Rem):-
write('1st number'),
read(P),
write('2nd number'),
read(Q),
Rem is P mod Q.

and(And):-
write('1st number'),
read(P),
write('2nd number'),
read(Q),
And is P/\Q.

or(Or):-
write('1st number'),
read(P),
write('2nd number'),
read(Q),
Or is P\/Q.

xor(Xor):-
write('1st number'),
read(P),
write('2nd number'),
read(Q),
Xor is P xor Q.

maximum(Max):-
write('1st number'),
read(X),
write('2nd number'),
read(Y),
write('3rd number'),
read(Z),
(X>Y,X>Z -> Max is X,
write(Max);
 Y>X,Y>Z -> Max is Y,
write(Max);
 Max is Z, write(Max)).


leftsft(Sft):-
write('1st number: '),
read(A),
Sft is A<< 2


rightsft(Sft):-
write('1st number: '),
read(A),
Sft is A>> 2.


root(X1,X2):-
write('Enter Co-efficient
of x*x,a: '),
read(A),
write('Enter Co-efficient
of x,b: '),
read(B),
write('Enter Co-efficient
of 1, c: '),
read(C),
D is (B*B - 4*A*C),
D>0,
X1 is ((-B +
sqrt(D))/(2*A*C)),
X2 is ((-B -
sqrt(D))/(2*A*C))
```

**Experiment No: 3**

**Experiment Name:** Make a result builder AI program with below names and using read and write facts.

| Student Name | CGPA |
|---|---|
| Rifat | 4.0 |
| Shaon | 3.9 |
| Inzamamul | 3.8 |
| Siam | 3.85 |
| Rajib | 3.92 |
| Elman | 3.82 |

**Solution:**

1: Construct a knowledge Base:

```
result(rifat, 4.0).
result(shaon,3.9).
result(inzamamul,3.8).
result(siam,3.85).
result(rajib,3.92).
result(elman,3.82).
```

2: Create rules:

```
get_result:-
        write('Enter your name: '), nl,
        read(X), nl,
        result(X,Y), nl,
        write(Y).
```

3: Open Query Section:

```
?- get_result.
Enter Your name: rajib
3.8
true
```

**Experiment 4:**

**Experiment Name:** Make a result builder AI program -

| Section A | |
|---|---|
| Student Name | CGPA |
| Rifat | 4.0 |
| Shaon | 3.9 |
| Inzamamul | 3.8 |

| Section B | |
|---|---|
| Student Name | CGPA |
| Siam | 3.85 |
| Rajib | 3.92 |
| Elman | 3.82 |

Use compare techniques (If/If Else) and compare two section results.

**Solution:**

**1: Construct a knowledge Base:**

```
% section A
result(rifat, 4.0).
result(shaon,3.9).
result(inzamamul,3.8).

%section B
result(siam,3.85).
result(rajib,3.92).
result(elman,3.82).
```

**2: Create compare rules:**

```
get_result:-
        write('Enter Section A student name: '), nl,
        read(X), nl,
        result(X,Y), nl,
        write('Section A student result is: '), nl,
        write(Y),nl,

        write('Enter Section B student name: '), nl,
        read(P),nl,
        result(P,Q),nl,
        write('Section B Student result is: '), nl,
        write(Q),nl,

        compare(Y,Q).

compare(Y,Q):-

        Y>Q, nl, write('Section A Students is Best.');
        Q>Y, nl, write('Section B Students is Best');
        Y=:=Q, nl, write('All the students are same');
```

H/W: Write a AI program which calculate CGPA of a student.

Experiment No: 5

Experiment Name: Check whether the number is prime or not?

Solution:

```
Check(X):-
        X=:=0,
        write('Prime').
Check(X):-
        X\==0,
        write('Prime').
prime_or_not(X,Y):- Z is X mod Y,
        Check(Z).
input_number(N):-
prime_or_not(N,2).
```