

## Lab # 3

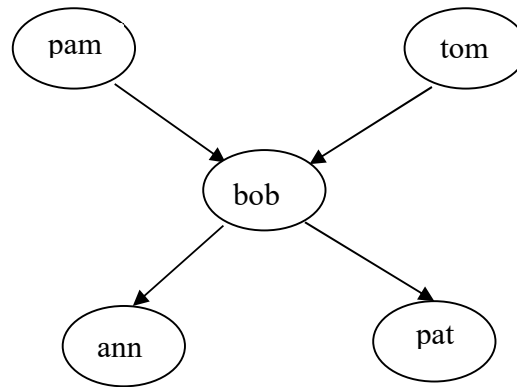
### Object:

Family relationship in Prolog.

### Theory:

#### Facts.

```
parent(pam,bob).  
parent(tom,bob).  
parent(bob,ann).  
parent(bob,pat).
```



The parent relation has been defined by stating the n-tuples of objects based on given info in family tree. The user can easily query the Prolog system about relations defined in the program. The arguments of relations can be **concrete objects or constants** such as pat and ann or general objects such as X and Y. Objects of first kind are called **atoms** and second kind are called **variables** and questions to the system consists of one or more goals.

#### Additional Facts.

```
male(pat).  
male(tom).  
male(bob).  
female(pam).  
female(ann).
```

#### Relationship.

```
Mother      mother(X, Y) :- parent(X,Y), female(X).  
Father      father(X, Y) :- parent(X,Y), male(X).  
Sister      sister(X,Y) :- parent(Z,X), parent(Z,Y),female(X),X\==Y.  
Brother     brother(X,Y) :- parent(Z,X), parent(Z,Y),male(X),X\==Y.  
Has child   haschild(X) :- parent(X,_).
```

In the above relationships `_` is called the **anonymous variable**.

#### More Relationships

```
grandparent(X,Y) :- parent(X,Z),parent(Z,Y).  
grandmother(X,Z) :- mother(X,Y),parent(Y,Z).  
grandfather(X,Z) :- fatger(X,Y),parent(Y,Z).  
wife(X,Y) :- parent(X,Z), parent(Y,Z),female(X),male(Y).  
uncle(X,Z) :- brother(X,Y), parent(Y,Z).
```

**Exercise:**

1. Write a prolog program to create a family tree by creating facts and rules based on the information given below:

Parveen is the parent of Babar.  
Talib is the parent of Babar.  
Talib is the parent of Lubna.  
Parveen is the parent of Lubna.  
Talib is male.  
Babar is male.  
Parveen is female.  
Lubna is female.

**SOLUTION:**

male(talib).  
male(babar).  
female(parveen).  
female(lubna).  
parent(parveen,babar).  
parent(talib,babar).  
parent(talib,lubna).  
parent(parveen,lubna).

2. Write a prolog program to create an administration tree by creating facts and rules-based on your imagination [Hint: Consider the administrative positions of different people around you].

1. Administrative Assistant
2. Office Assistant
3. Data Entry Clerk
4. Office Administrator
5. Receptionist

3. Write all the facts and rules which were discussed in lab.

**FACTS**

parent(pam,bob).  
parent(tom,bob).  
parent(bob,ann).  
parent(bob,pat).

**ADDITIONAL FACTS**

male(pat).  
male(tom).  
male(bob).  
female(pam).  
female(ann).

## %RULES

```
mother(X,Y):- parent(X,Y), female(X).
father(X,Y):- parent(X,Y), male(X).
sister(X,Y):- parent(Z,X), parent(Z,Y), female(X), X\==Y.
brother(X,Y):- parent(Z,X), parent(Z,Y), male(X), X\==Y.
haschild(X): parent(X,_).

daughter(X, Y):- female(X), parent(Y,X).
son(X,Y):- male(X),parent(Y,X).
siblings(X,Y):- parent(Z,X),parent(Z,Y),X\==Y.

uncle(X,Z):- brother(X,Y),parent(Y,Z).
aunt(X,Z):- sister(X,Y),parent(Y,Z).
cousin(X,Y):- parent(Z, X), uncle(Z, Y), Y\=X.

wife(X,Y) :- parent(X,Z),parent(Y,Z), female(X),male(Y).
husband(X,Y):- parent(X,Z), parent(Y,Z), male(X), female(Y).

stepfather(X,Y) :- mother(Z,Y),husband(X,Z),father(K,Y),K\==X.
stepmother(X,Y) :- father(Z,Y),wife(X,Z),mother(K,Y),K\==X.

grandparent(X,Y) :- parent(X,Z), parent(Z,Y).
grandfather(X,Y) :- father(X,Z),parent(Z,Y).
grandmother(X,Y) :- mother(X,Z),parent(Z,Y).
```

Outputs :

```
| ?- wife(X,Y).
      X = pam
      Y = tom ? ;

      X = pat
      Y = peter ? ;

(15 ms) no
| ?- uncle(X,Y).
      X = peter
      Y = jim ? ;

no
```