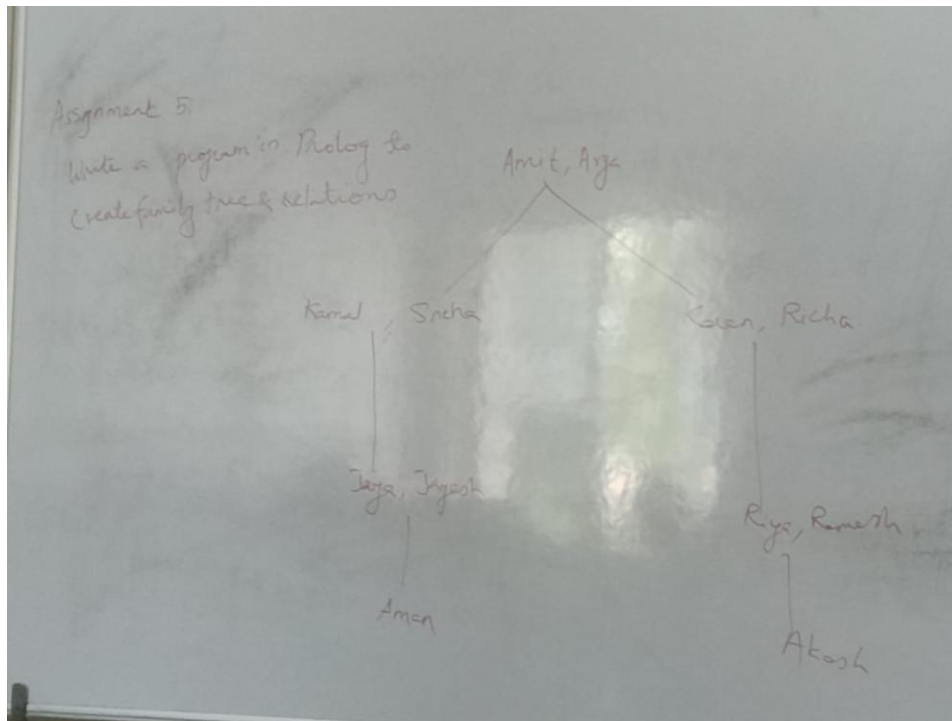


ARTIFICIAL INTELLIGENCE

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Assignment 5:
Implementation predicate logic using PROLOG.
Write a code in Prolog to create Family tree and show the relations.



Description:-

To represent a family tree using facts and rules in Prolog, and define logical relationships like:

Parent

Grandparent

Sibling

Grandchild

Cousin

Great-grandchild

Husband/Wife

Then, perform queries to extract meaningful relationships such as:

Who is the grandson of a person?

Are two people cousins?

Who are the ancestors or descendants of a person?

Problem Statement:

Given a set of individuals with relationships such as:

Marriages (e.g., Amit and Arya are married)

Parent-child relations (e.g., Kamal is the son of Amit)

Multi-level generations (up to great-grandchildren)

We need to:

Represent all relationships using Prolog facts

Define rules for inferring complex relations like grandson, granddaughter, cousin, great_grandson, etc.

- Code:
- RULES:



assign_5_family_tree.pl [modified]

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assign_5_family_tree.pl [modified]

```
female(arya).
female(sneha).
female(jaya).
female(riya).
female(richa).

married(amt, arya).
married(arya, amt).

married(kamal, sneha).
married(sneha, kamal).

married(jaya, jayesh).
married(jayesh, jaya).

married(karan, richa).
married(richa, karan).

married(riya, ramesh).
married(amesh, riya).

parent(amt, kamal).
parent(arya, kamal).

parent(amt, karan).
parent(arya, karan).

parent(kamal, jaya).
parent(sneha, jaya).

parent(jaya, aman).
parent(jayesh, aman).


parent(karan, riya).
parent(richa, riya).

parent(riya, akash).
parent(amesh, akash).
```

```
grandson(X, Y) :- parent(Y, Z), parent(Z, X), male(X).
granddaughter(X, Y) :- parent(Y, Z), parent(Z, X), female(X).
grandfather(X, Y) :- parent(X, Z), parent(Z, Y), male(X).
^grandmother(X, Y) :- parent(X, Z), parent(Z, Y), female(X).

great_grandson(X, Y) :- parent(Y, A), parent(A, B), parent(B, X), male(X).
great_granddaughter(X, Y) :- parent(Y, A), parent(A, B), parent(B, X), female(X).
cousin(X, Y) :- parent(PX, X), parent(PY, Y), cousin(PX, PY), X \= Y.
cousin(X, Y) :- parent(P1, X), parent(P2, Y), sibling(P1, P2), X \= Y.
sibling(X, Y) :- parent(Z, X), parent(Z, Y), X \= Y.
```

Screenshots/Output

 SWI-Prolog (AMD64, Multi-threaded, version 9.2.9)

File Edit Settings Run Debug Help

Welcome to SWI-Prolog (threaded, 64 bits, version 9.2.9)
SWI-Prolog comes with ABSOLUTELY NO WARRANTY. This is free software.
Please run `?- license.` for legal details.

For online help and background, visit <https://www.swi-prolog.org>
For built-in help, use `?- help(Topic).` or `?- apropos(Word).`

```
?- parent(amt,X), male(X).  
X = kamal ;  
X = karan.
```

```
?- parent(amt,X), female(X).  
false.
```

```
?- grandfather(X,amt).  
X = kamal ,
```

```
?- grandmother(X,akash).  
X = richa ,
```

```
?- grandson(X,kamal).  
X = amt.
```

```
?- granddaughter(X,amt).  
X = jaya ;  
X = riya.
```

```
?- great_grandson(X,amt).  
X = amt ;  
X = akash.
```

```
?- great_granddaughter(X,amt).  
false.
```

File Edit Settings Run Debug Help

```

creep
    Exception: (13) cousin(jaya, riya) ? Unknown
    Exception: (13) cousin(jaya, riya) ? creep
    Exception: (12) cousin(aman, akash) ? creep
?- cousin(aman, akash).
true .

?- cousin(A,B).
A = aman,
B = akash ;
A = aman,
B = akash ;
A = akash,
B = aman ;
A = akash,
B = aman ;
A = jaya,
B = riya ;
A = jaya,
B = riya ;
A = riya,
B = jaya ;
A = riya,
B = jaya ;
false.

?- married(jaya,X).
X = jayesh.

?- grandfather(A,B).
A = amit,
B = jaya .

?- grandmother(A,B).
A = arya,
B = jaya ;
A = arya,
B = riya ;
A = sneha,
B = aman ;
A = richa,
B = akash ;
false.

?- grandson(A,B).
A = aman,
B = kamal ;
A = aman,
B = sneha ;
A = akash,
B = karan ;
A = akash,
B = richa ;
false.

?- granddaughter(A,B).

```

```
?- granddaughter(A,B).  
A = jaya,  
B = amit ;  
A = jaya,  
B = arya ;  
A = riya,  
B = amit ;  
A = riya,  
B = arya ;  
false.
```

```
?- parent(A,B).  
A = amit,  
B = kamal .
```

```
?-  
|  
| .
```

ERROR: Stream user_input:149:6 Syntax error: Unexpected end of clause

```
?- parent(A,B).  
A = amit,  
B = kamal ;  
A = arya,  
B = kamal ;  
A = amit,  
B = karan ;  
A = arya,  
B = karan ;  
A = kamal,  
B = jaya ;  
A = sneha,  
B = jaya ;  
A = jaya,  
B = aman ;  
A = jayesh,  
B = aman ;  
A = karan,  
B = riya ;  
A = richa,  
B = riya ;  
A = riya,  
B = akash ;  
A = ramesh,  
B = akash .
```