

Fareast International University



Final lab report

Submitted By:

Name: Golam Morshed Bhuiyan

ID: 18120013

Course: Artificial Intelligence

Course Code: CSE-3115

Submitted To:

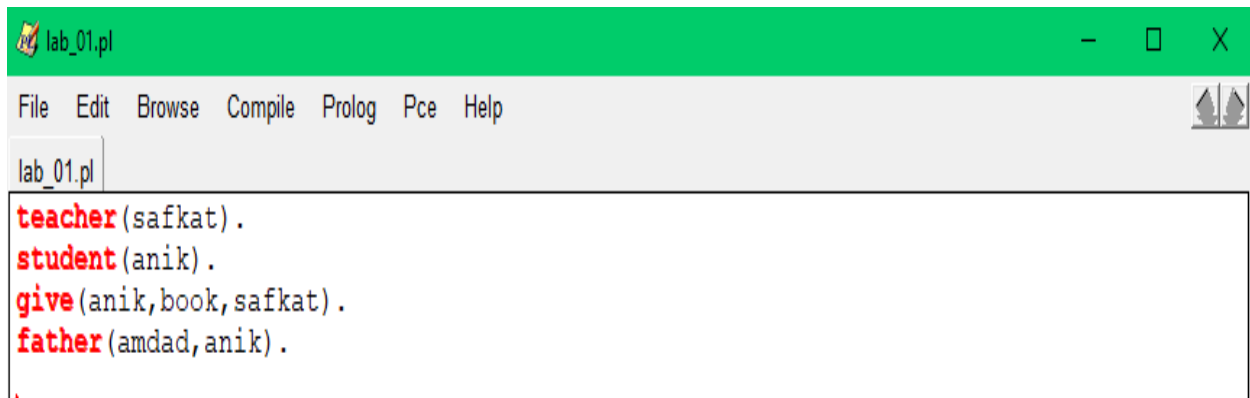
Name: Ahmed Shafkat

Designation: Lecturer

Introductions

Basically I will discuss logical programming here and show the output of different programs with prolog logical programming language. Prolog is a knowledge based (fact & rules) programming language. In a word it's a declarative programming language.

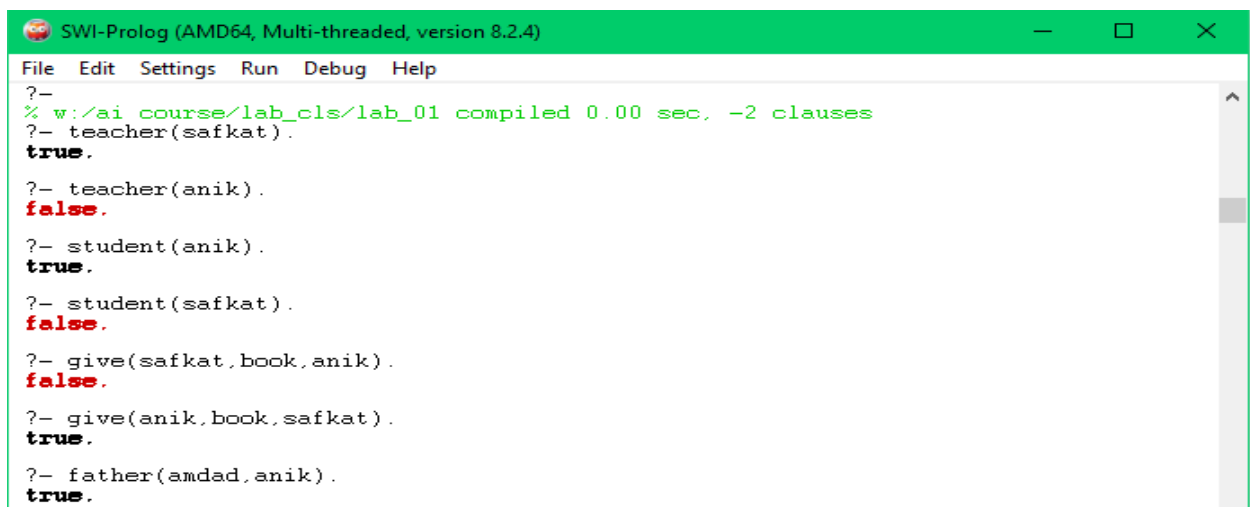
Problem 01: How to declare fact with output in prolog?



```
lab_01.pl
File Edit Browse Compile Prolog Pce Help
lab_01.pl
teacher(safkat).
student(anik).
give(anik,book,safkat).
father(amdad,anik).
```

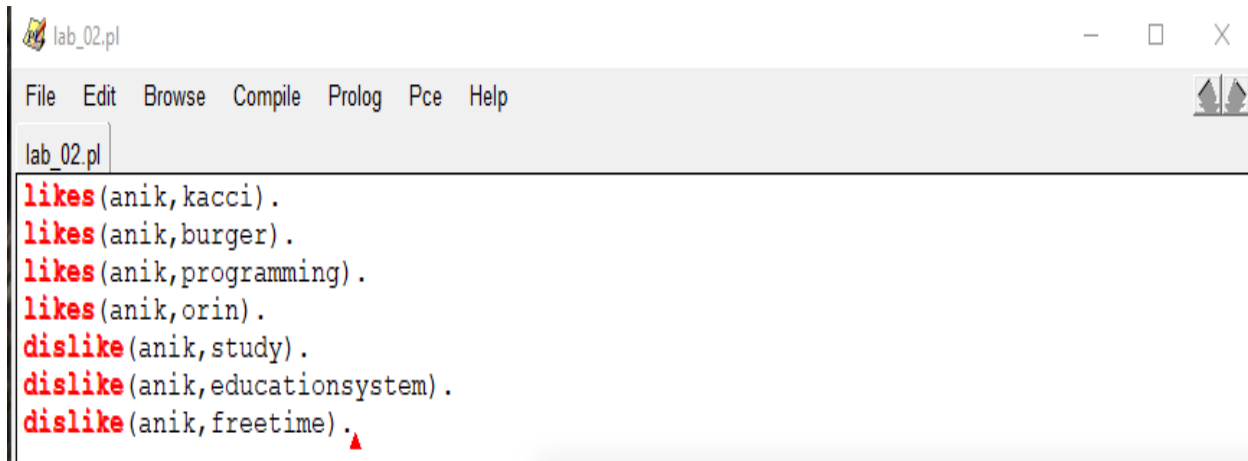
Explanation of the code: Here are some fact's declared like, teacher(safkat). student(anik). give(anik,book,safkat). father(amdad,anik). If we think the essence of these, then the sentence's will be like this-

Safkat is a teacher, Anik is a student, Anik gave the book to Orin, Amdad is a anik's father.



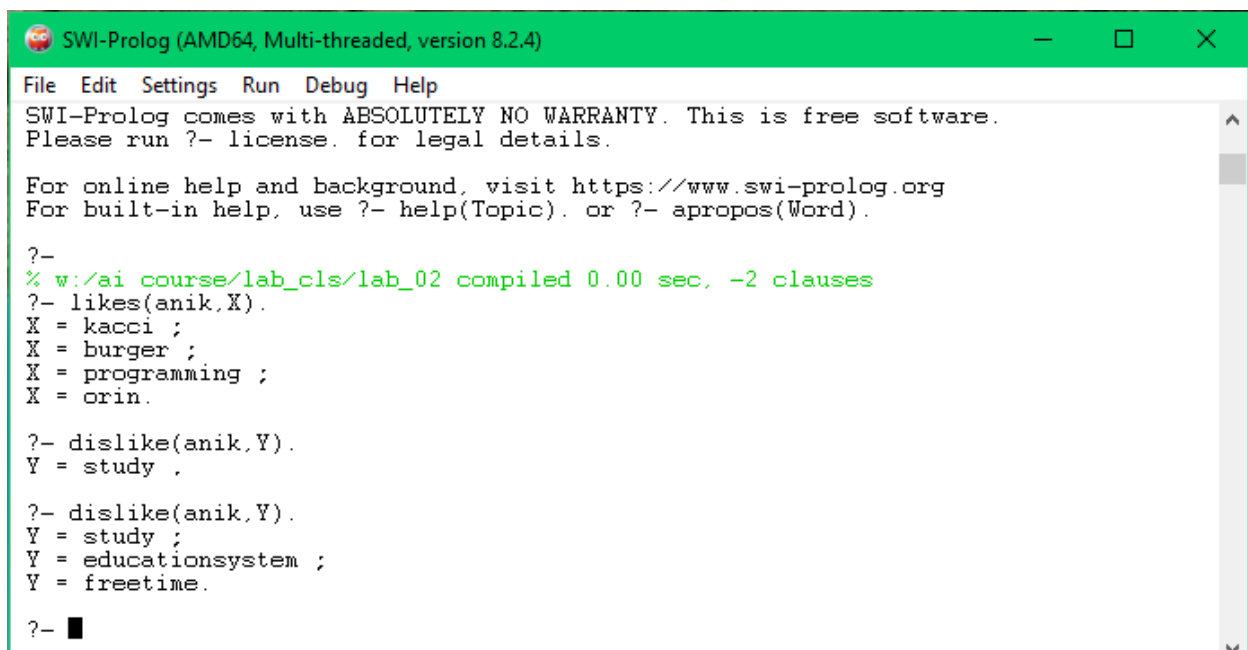
```
SWI-Prolog (AMD64, Multi-threaded, version 8.2.4)
File Edit Settings Run Debug Help
?-
% w:/ai course/lab_cls/lab_01 compiled 0.00 sec, -2 clauses
?- teacher(safkat).
true.
?- teacher(anik).
false.
?- student(anik).
true.
?- student(safkat).
false.
?- give(safkat,book,anik).
false.
?- give(anik,book,safkat).
true.
?- father(amdad,anik).
true.
```

Problem 02: How to declare variable in prolog?



```
lab_02.pl
File Edit Browse Compile Prolog Pce Help
lab_02.pl
likes(anik,kacci).
likes(anik,burger).
likes(anik,programming).
likes(anik,orin).
dislike(anik,study).
dislike(anik,educationsystem).
dislike(anik,freetime).
```

Explanation of the code: Here are some facts. I will display the output of these facts through variable. We need uppercase letter for variable like X,Y,Z or Cse, Eee, EEE,CSE etc otherwise will not be considered a variable. Number or others symbol not allow for declare a variable.



```
SWI-Prolog (AMD64, Multi-threaded, version 8.2.4)
File Edit Settings Run Debug Help
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).

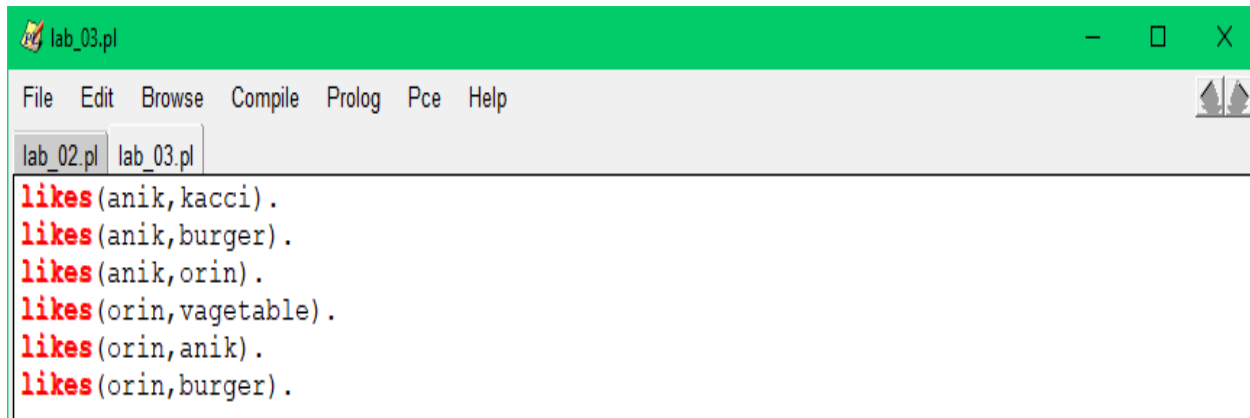
?-
% w:/ai course/lab_cls/lab_02 compiled 0.00 sec, -2 clauses
?- likes(anik,X).
X = kacci ;
X = burger ;
X = programming ;
X = orin.

?- dislike(anik,Y).
Y = study ;

?- dislike(anik,Y).
Y = study ;
Y = educationsystem ;
Y = freetime.

?-
```

Problem 03: How to use and & or operator in prolog?



```
lab_03.pl
File Edit Browse Compile Prolog Pce Help
lab_02.pl lab_03.pl
likes(anik,kacci).
likes(anik,burger).
likes(anik,orin).
likes(orin,vaetable).
likes(orin,anik).
likes(orin,burger).
```

Explanation of the code: First I took the input some facts. Then I will show through the output how to use AND & OR operator in prolog. First I will check those facts whether they are true or false by using AND & OR operator. Then use AND & OR operator with variable.



```
SWI-Prolog (AMD64, Multi-threaded, version 8.2.4)
File Edit Settings Run Debug Help
?- likes(anik,burger),likes(orin,burger).
true .

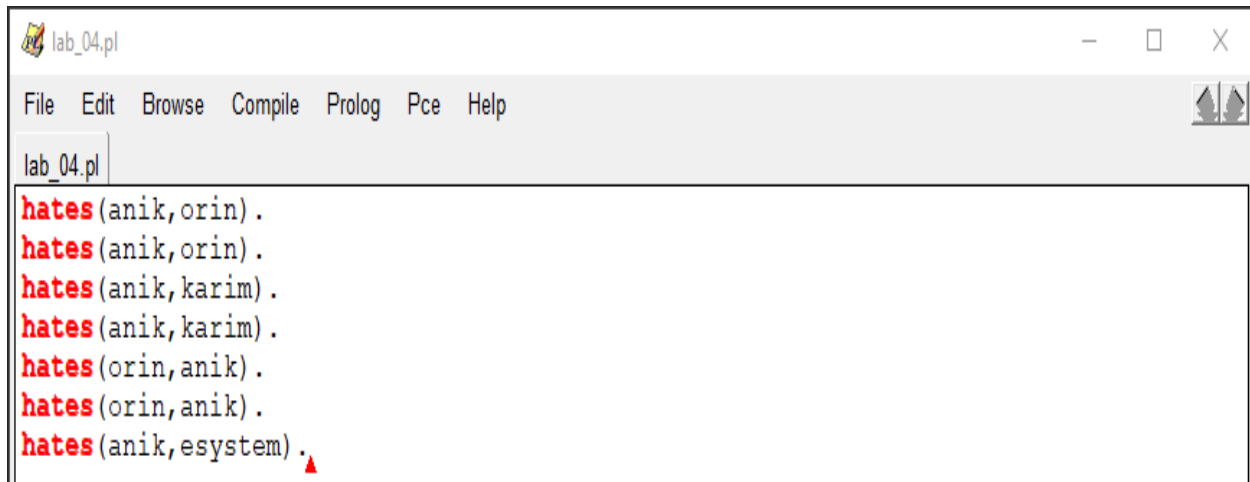
?- likes(anik,kacci),likes(orin,kacci).
false.

?- likes(anik,kacci);likes(orin,kacci).
true .

?- likes(anik,X),likes(orin,X).
X = burger ;
false.

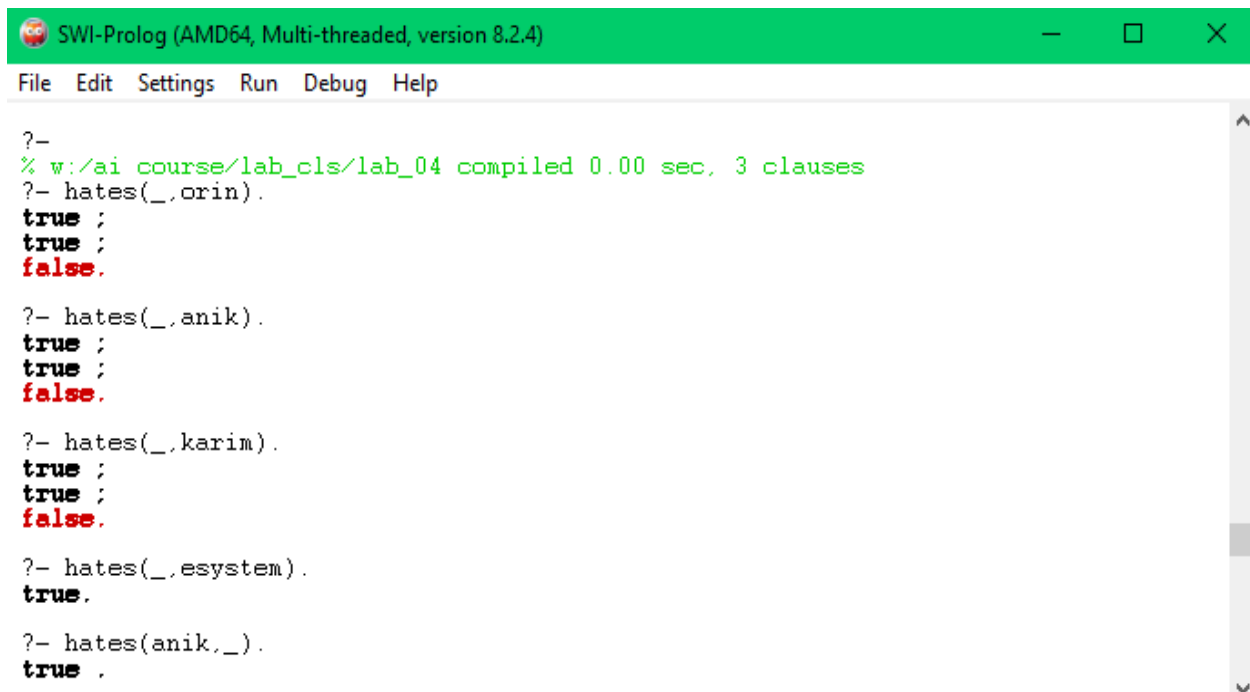
?- likes(anik,X);likes(orin,X).
X = kacci ;
X = burger ;
X = orin ;
X = vaetable ;
X = anik ;
X = burger.
```

Problem 04: How to use anonymous variable in prolog?



```
lab_04.pl
File Edit Browse Compile Prolog Pce Help
lab_04.pl
hates(anik,orin).
hates(anik,orin).
hates(anik,karim).
hates(anik,karim).
hates(orin,anik).
hates(orin,anik).
hates(anik,esystem).
```

Explanation of the code: I input here some facts, then I checked all facts whether it true or false using anonymous variable. Anonymous variable declare symbol is ' _ '. If we want to use anonymous variable in prolog then we have to start by this symbol.



```
SWI-Prolog (AMD64, Multi-threaded, version 8.2.4)
File Edit Settings Run Debug Help
?-
% w:/ai course/lab_cls/lab_04 compiled 0.00 sec, 3 clauses
?- hates(_,orin).
true ;
true ;
false.

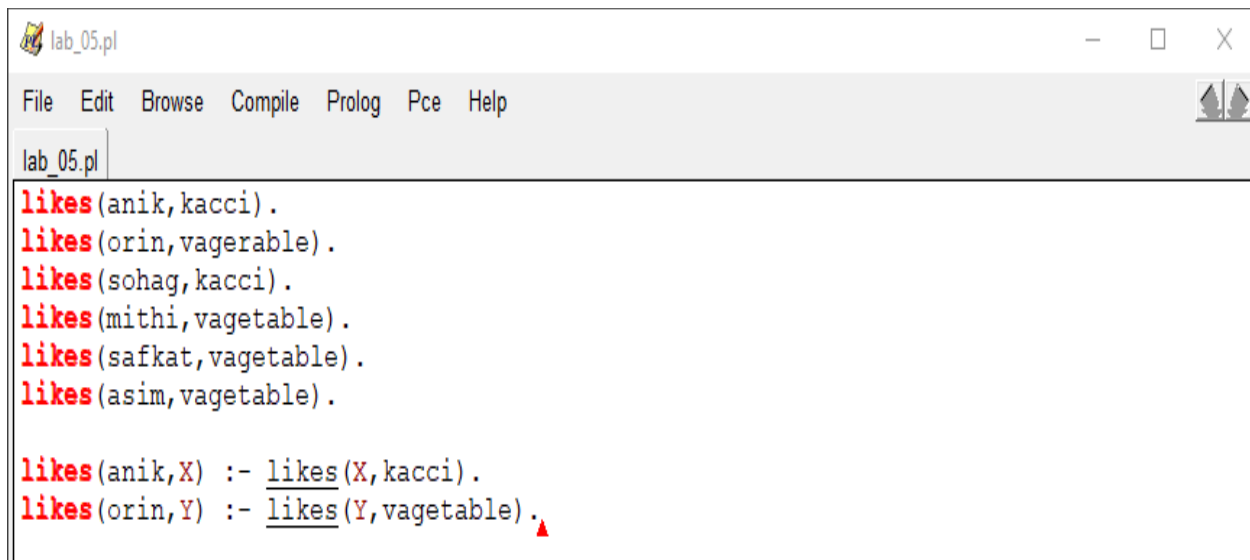
?- hates(_,anik).
true ;
true ;
false.

?- hates(_,karim).
true ;
true ;
false.

?- hates(_,esystem).
true.

?- hates(anik,_).
true .
```

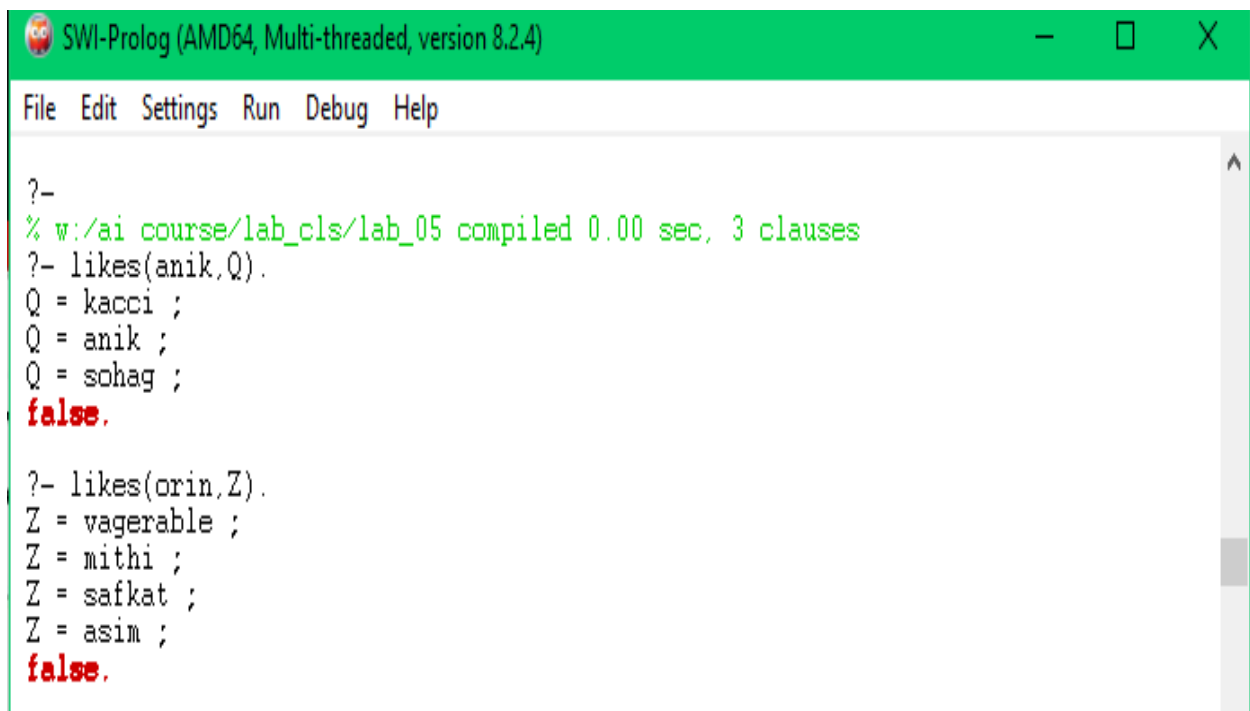
Problem 05: How to use rules with if statement in prolog?



```
lab_05.pl
File Edit Browse Compile Prolog Pce Help
lab_05.pl
likes(anik,kacci).
likes(arin,vagetable).
likes(sohag,kacci).
likes(mithi,vegetable).
likes(safkat,vegetable).
likes(asim,vegetable).

likes(anik,X) :- likes(X,kacci).
likes(arin,Y) :- likes(Y,vegetable).
```

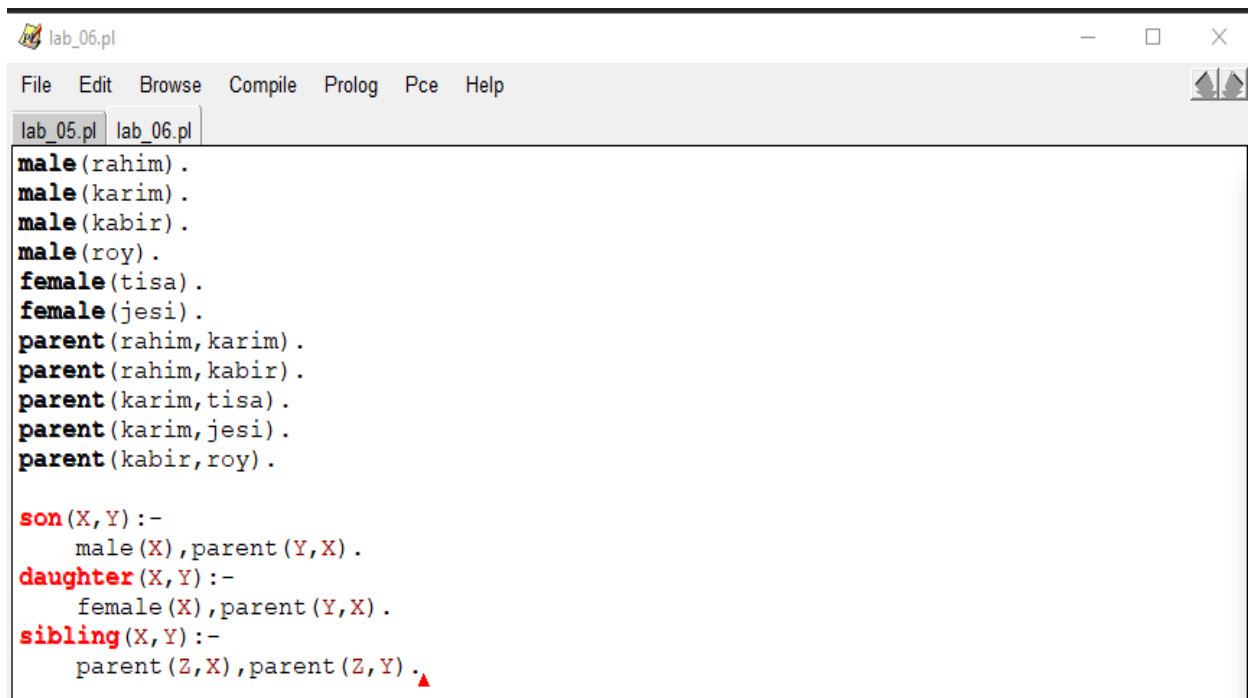
Explanation of the code: Here I used some facts with rules & also if statement. Some of the output displayed through the rules with statement of this program. It is mandatory to write rules, declare variable & add if statement which looks exactly like this - likes(arin,Y) :- likes(Y,vegetable).



```
SWI-Prolog (AMD64, Multi-threaded, version 8.2.4)
File Edit Settings Run Debug Help
?-
% w:/ai course/lab_cls/lab_05 compiled 0.00 sec, 3 clauses
?- likes(anik,Q).
Q = kacci ;
Q = anik ;
Q = sohag ;
false.

?- likes(arin,Z).
Z = vagetable ;
Z = mithi ;
Z = safkat ;
Z = asim ;
false.
```

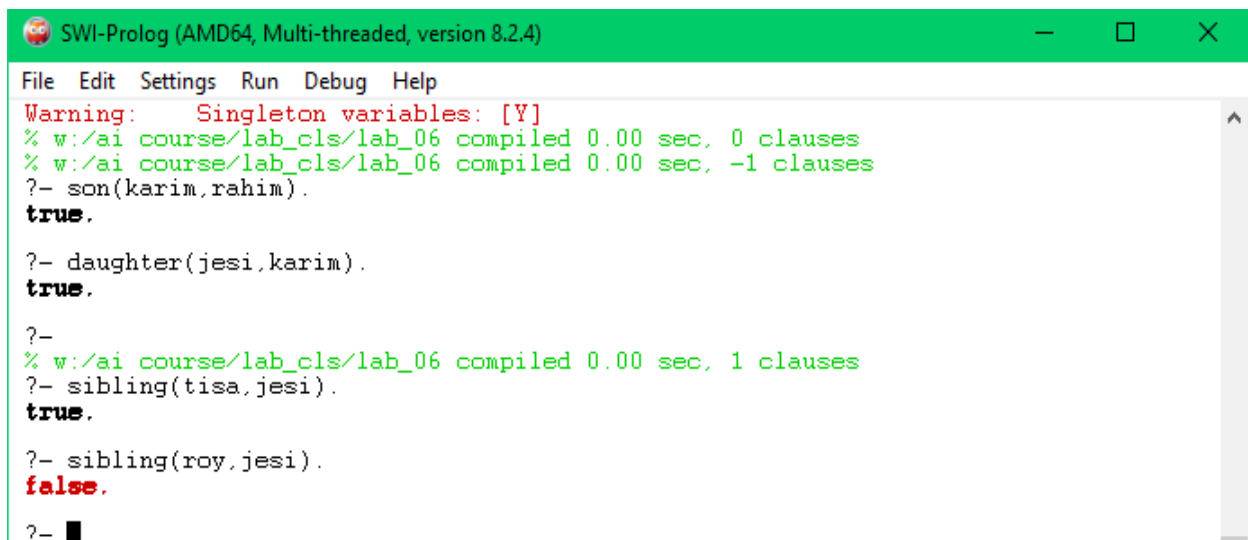
Problem 06: how to implement tree with functions in prolog?



```
lab_06.pl
File Edit Browse Compile Prolog Pce Help
lab_05.pl lab_06.pl
male(rahim).
male(karim).
male(kabir).
male(roy).
female(tisa).
female(jesi).
parent(rahim, karim).
parent(rahim, kabir).
parent(karim, tisa).
parent(karim, jesi).
parent(kabir, roy).

son(X, Y) :-
    male(X), parent(Y, X).
daughter(X, Y) :-
    female(X), parent(Y, X).
sibling(X, Y) :-
    parent(Z, X), parent(Z, Y).
```

Explanation of the code: First of all I have taken some input facts here then i have declared some functions with statement which I can verify the authenticity of the above facts.



```
SWI-Prolog (AMD64, Multi-threaded, version 8.2.4)
File Edit Settings Run Debug Help
Warning: Singleton variables: [Y]
% w:/ai course/lab_cls/lab_06 compiled 0.00 sec, 0 clauses
% w:/ai course/lab_cls/lab_06 compiled 0.00 sec, -1 clauses
?- son(karim,rahim).
true.

?- daughter(jesi,karim).
true.

?- 
% w:/ai course/lab_cls/lab_06 compiled 0.00 sec, 1 clauses
?- sibling(tisa,jesi).
true.

?- sibling(roy,jesi).
false.

?-
```

Learned from the lab

I learned about declarative programming / logical programming from this lab & also basic prolog.

Conclusion

In this lab report I have discussed some of the basics of declarative programming / logical programming with prolog and run the programs.