Ahsanullah University of Science and Technology

Department of Computer Science and Engineering

Program: Bachelor of Science in Computer Science and Engineering

Course No: CSE 4108

Course Title: Artificial Intelligence Lab

Assignment no:01

Date of Submission: 13.06.2022

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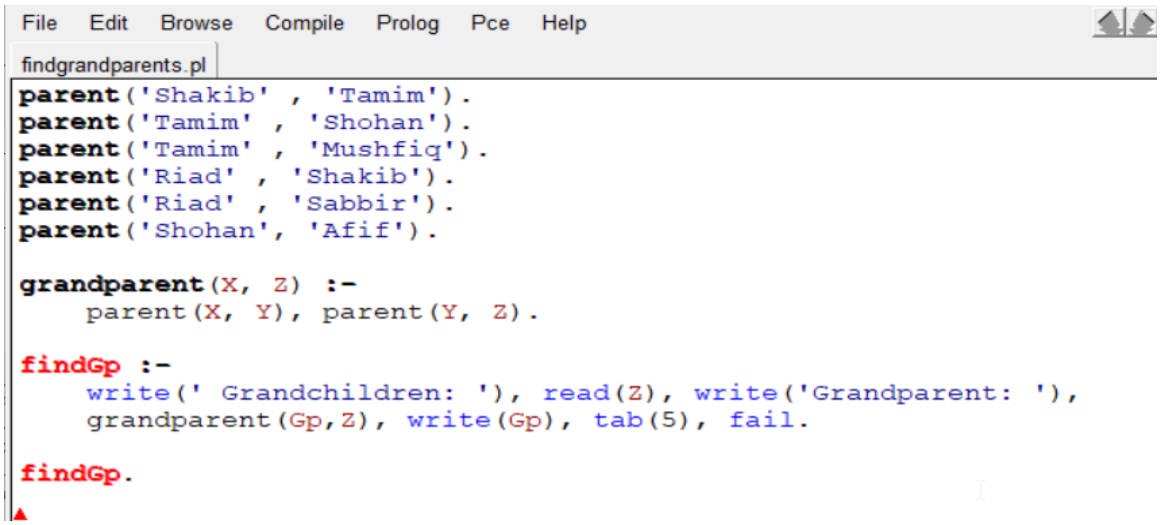
Question 1: Write Python and Prolog codes to find the grandparent(s) of somebody.

Solution:

Prolog Code:

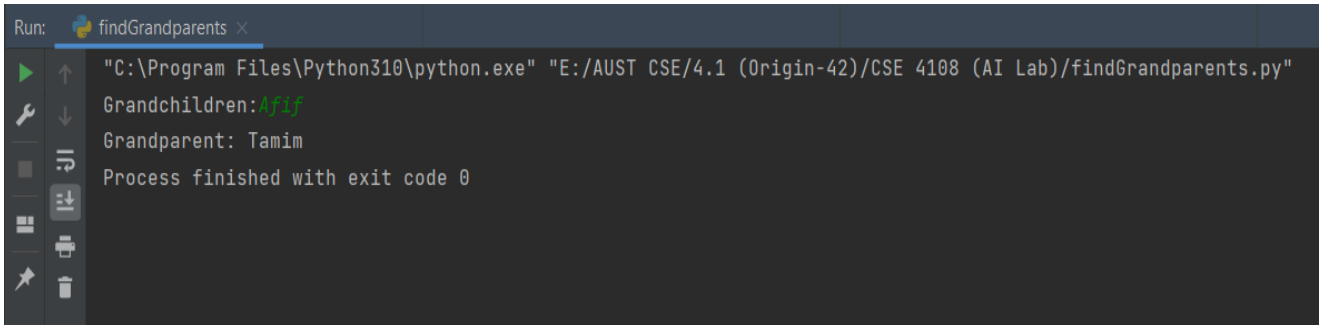
```
parent('Shakib' , 'Tamim').
parent('Tamim' , 'Shohan').
parent('Tamim' , 'Mushfiq').
parent('Riad' , 'Shakib').
parent('Riad' , 'Sabbir').
parent('Shohan', 'Afif').

grandparent(X, Z) :-
   parent(X, Y), parent(Y, Z).

findGp :-
   write(' Grandchildren: '), read(Z), write('Grandparent: '),
   grandparent(Gp,Z), write(Gp), tab(5), fail.

findGp.
```




```
Welcome to SWI-Prolog (threaded, 64 bits, version 8.4.2)
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).

?- findGp.
 Grandchildren: 'Afif'.
Grandparent: Tamim
true.

?- findGp.
 Grandchildren: 'Mushfiq'.
Grandparent: Shakib
true.

?- findGp.
 Grandchildren: 'Shohan'.
Grandparent: Shakib
true.
```

Python Code:

```
tupleList1=[('parent', 'Shakib' , 'Tamim'),
            ('parent', 'Tamim' , 'Shohan'),
            ('parent', 'Tamim' , 'Mushfiq'),
            ('parent', 'Riad' , 'Shakib'),
            ('parent', 'Riad' , 'Sabbir'),
            ('parent', 'Shohan', 'Afif')]
X=str(input("Grandchildren:"))
print('Grandparent:', end=' ')
i,j=0,0
for i in range(6):
    if ((tupleList1[i][0] == 'parent')&( tupleList1[i][2] == X)):
        for j in range(6):
            if ((tupleList1[j][0] == 'parent') & ( tupleList1[i][1] == tupleList1[j][2])):
                print(tupleList1[j][1], end=' ')
```



Question 2: Enrich the KB with ‘brother’, ‘sister’, ‘uncle’ and ‘aunt’ rules in Python and Prolog.

Solution:

Prolog Code:

```
male('Shakib').
male('Tamim').
male('Liton').
male('Shohan').
male('Afif').
female('Zenia').
female('Tanjin').
female('Ayesha').

parent('Shakib' , 'Tamim').
parent('Tamim' , 'Liton').
parent('Tamim' , 'Shohan').
parent('Tamim' , 'Ayesha').
parent('Afif' , 'Shakib').
parent('Shohan' , 'Zenia').
parent('Shohan' , 'Riad').
parent('Shohan' , 'Tanjin').
parent('Riad' , 'Mustafiz').

brother(Y, Z) :-
   parent(X, Y), parent(X, Z), male(Y), not(Y=Z).
sister(Y, Z) :-
   parent(X, Y), parent(X, Z), female(Y), not(Y=Z).
uncle(Y, U) :-
   parent(X, Y), parent(X, Z), parent(Z,U), male(Y), not(Y=U), not(Y=Z).
aunt(Y, U) :-
   parent(X, Y), parent(X, Z), parent(Z,U), female(Y), not(Y=U), not(Y=Z).

findBrother :-
   write(' Siblings: '), read(Z), write('Brother: '),
   brother(Brother,Z), write(Brother), tab(5),fail.
findBrother.

findSister :-
   write(' Siblings: '), read(Z), write('Sister: '),
   sister(Sister,Z), write(Sister), tab(5),fail.
findSister.

findUncle:-
   write(' Niece/Nephew: '), read(Z), write('Uncle: '),
```

```
  uncle(Uncle,Z), write(Uncle), tab(5),fail.
findUncle.
findAunt:-
  write(' Niece/Nephew: '), read(Z), write('Aunt: '),
  aunt(Aunt,Z), write(Aunt), tab(5),fail.
findAunt.
```

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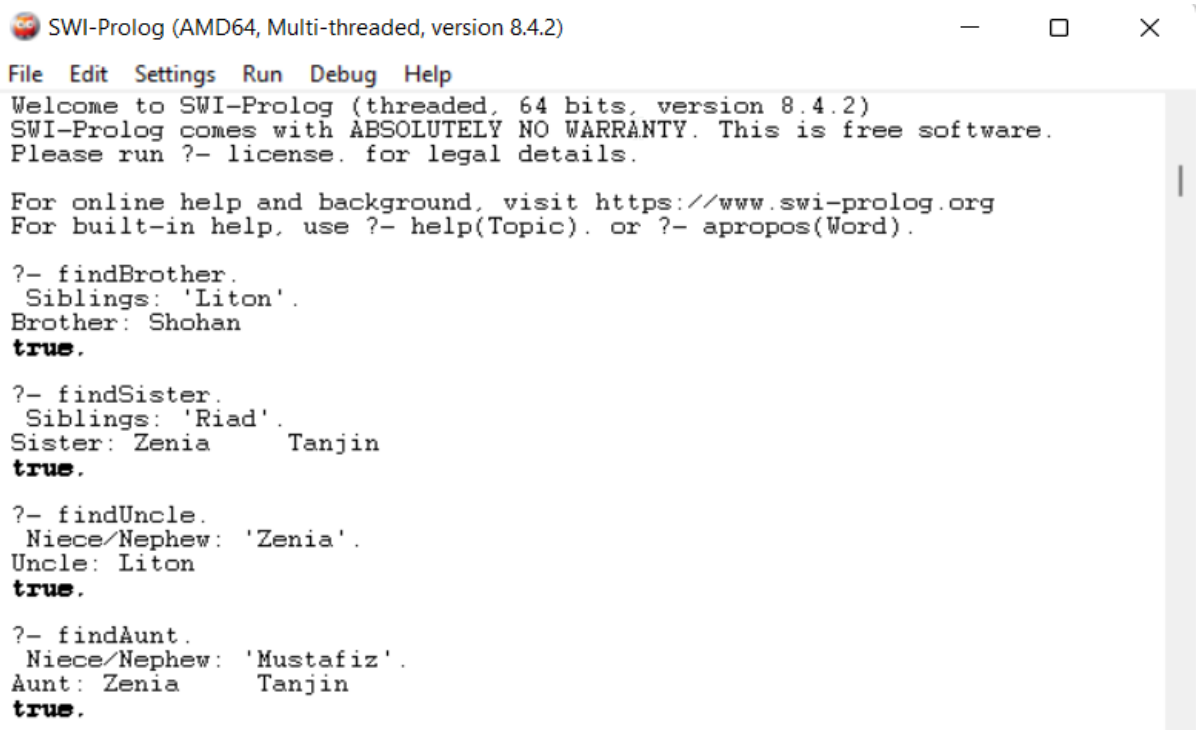
assignment-q2.pl

```
male('Shakib').
male('Tamim').
male('Liton').
male('Shohan').
male('Afif').
female('Zenia').
female('Tanjin').
female('Ayesha').

parent('Shakib' , 'Tamim').
parent('Tamim' , 'Liton').
parent('Tamim' , 'Shohan').
parent('Tamim' , 'Ayesha').
parent('Afif' , 'Shakib').
parent('Shohan' , 'Zenia').
parent('Shohan' , 'Riad').
parent('Shohan' , 'Tanjin').
parent('Riad' , 'Mustafiz').

brother(Y, Z) :-
   parent(X, Y), parent(X, Z), male(Y), not(Y=Z).
sister(Y, Z) :-
   parent(X, Y), parent(X, Z), female(Y), not(Y=Z).
uncle(Y, U) :-
   parent(X, Y), parent(X, Z), parent(Z,U), male(Y), not(Y=U), not(Y=Z).
aunt(Y, U) :-
   parent(X, Y), parent(X, Z), parent(Z,U), female(Y), not(Y=U), not(Y=Z).

findBrother :-
   write(' Siblings: '), read(Z), write('Brother: '),
   brother(Brother,Z), write(Brother), tab(5),fail.
findBrother.

findSister :-
   write(' Siblings: '), read(Z), write('Sister: '),
   sister(Sister,Z), write(Sister), tab(5),fail.
findSister.

findUncle:-
   write(' Niece/Nephew: '), read(Z), write('Uncle: '),
   uncle(Uncle,Z), write(Uncle), tab(5),fail.
findUncle.

findAunt:-
   write(' Niece/Nephew: '), read(Z), write('Aunt: '),
   aunt(Aunt,Z), write(Aunt), tab(5),fail.
findAunt.
```


SWI-Prolog (AMD64, Multi-threaded, version 8.4.2)
File Edit Settings Run Debug Help
Welcome to SWI-Prolog (threaded, 64 bits, version 8.4.2)
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).
?- findBrother.
Siblings: 'Liton'.
Brother: Shohan
true.
?- findSister.
Siblings: 'Riad'.
Sister: Zenia Tanjin
true.
?- findUncle.
Niece/Nephew: 'Zenia'.
Uncle: Liton
true.
?- findAunt.
Niece/Nephew: 'Mustafiz'.
Aunt: Zenia Tanjin
true.

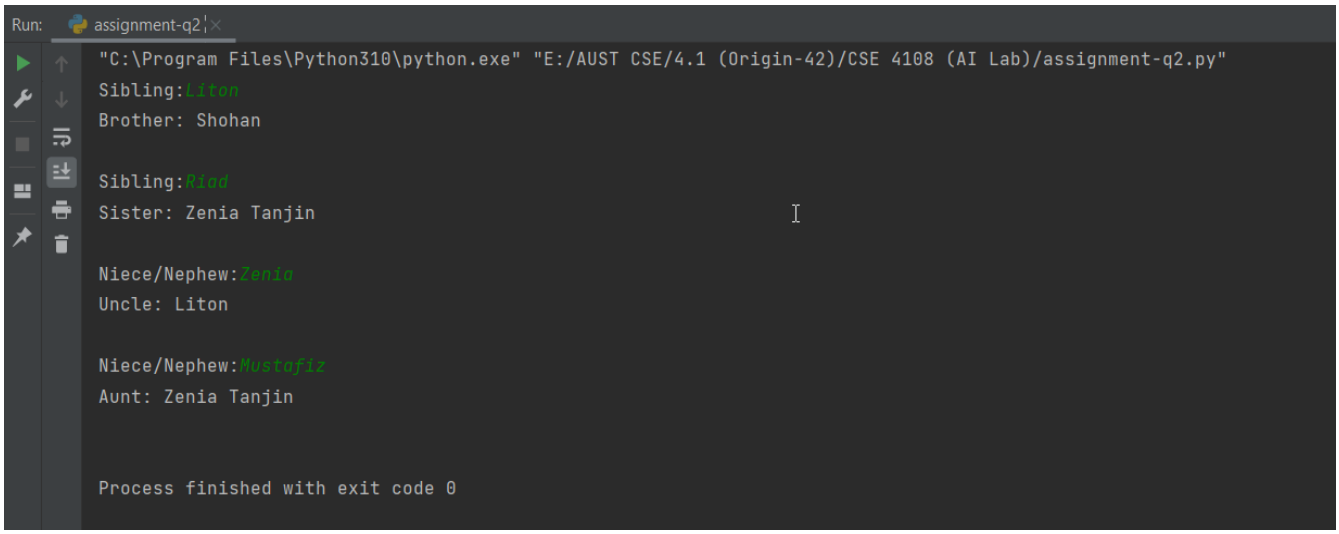
Python Code:

```
tupleList1=[('parent', 'Shakib', 'Tamim'),
        ('parent', 'Tamim', 'Liton'),
        ('parent', 'Tamim', 'Shohan'),
        ('parent', 'Tamim', 'Ayesha'),
        ('parent', 'Afif', 'Shakib'),
        ('parent', 'Shohan', 'Zenia'),
        ('parent', 'Shohan', 'Riad'),
        ('parent', 'Shohan', 'Tanjin'),
        ('parent', 'Riad', 'Mustafiz')]
tupleList2=[('gender', 'Shakib', 'male'),
        ('gender', 'Tamim', 'male'),
        ('gender', 'Liton', 'male'),
        ('gender', 'Shohan', 'male'),
        ('gender', 'Ayesha', 'female'),
        ('gender', 'Afif', 'male'),
        ('gender', 'Zenia', 'female'),
        ('gender', 'Riad', 'male'),
        ('gender', 'Tanjin', 'female'),
        ('gender', 'Mustafiz', 'male')]

X=str(input("Sibling:"))
print('Brother:', end=' ')
i,j,k=0,0,0
for i in range(9):
   if ((tupleList1[i][0] == 'parent') & ( tupleList1[i][2] == X)):
      for j in range(9):
         if ((tupleList1[j][0] == 'parent') & ( tupleList1[i][1] == tupleList1[j][1]) & ( tupleList1[j][2]
!= tupleList1[i][2])) :
            for k in range (10) :
               if((tupleList1[j][2] == tupleList2[k][1]) & (tupleList2[k][2] == 'male')) :
                  print(tupleList1[j][2], end=' ')
print("\n")
X=str(input("Sibling:"))
print('Sister:', end=' ')
i,j,k=0,0,0
for i in range(9):
   if ((tupleList1[i][0] == 'parent') & ( tupleList1[i][2] == X)):
      for j in range(9):
         if ((tupleList1[j][0] == 'parent') & ( tupleList1[i][1] == tupleList1[j][1]) & ( tupleList1[j][2]
!= tupleList1[i][2])) :
            for k in range (10) :
               if((tupleList1[j][2]== tupleList2[k][1]) & (tupleList2[k][2] == 'female')) :
                  print(tupleList1[j][2], end=' ')
print("\n")
X=str(input("Niece/Nephew:"))
print('Uncle:', end=' ')
```

```
i,j,k,l=0,0,0,0
for i in range(9):
    if ((tupleList1[i][0] == 'parent') & ( tupleList1[i][2] == X)):
        for j in range(9):
            if ((tupleList1[j][0] == 'parent') & ( tupleList1[i][1] == tupleList1[j][2]) & ( tupleList1[j][2]
!= tupleList1[i][2])) :
                for k in range (9) :
                    if((tupleList1[j][0] == 'parent') & (tupleList1[j][1] == tupleList1[k][1]) &
(tupleList1[i][1] != tupleList1[k][2])):
                        for l in range (10) :
                            if((tupleList1[k][2] == tupleList2[l][1]) & (tupleList2[l][2] == 'male')) :
                                print(tupleList1[k][2], end=' ')
print("\n")
X=str(input("Niece/Nephew:"))
print(Aunt:', end=' ')
i,j,k,l=0,0,0,0
for i in range(9):
    if ((tupleList1[i][0] == 'parent') & ( tupleList1[i][2] == X)):
        for j in range(9):
            if ((tupleList1[j][0] == 'parent') & ( tupleList1[i][1] == tupleList1[j][2]) & ( tupleList1[j][2]
!= tupleList1[i][2])) :
                for k in range (9) :
                    if((tupleList1[j][0] == 'parent') & (tupleList1[j][1] == tupleList1[k][1]) &
(tupleList1[i][1] != tupleList1[k][2])):
                        for l in range (10) :
                            if((tupleList1[k][2] == tupleList2[l][1]) & (tupleList2[l][2] == 'female')) :
                                print(tupleList1[k][2], end=' ')
print("\n")
```

assignment-q2.py

```python
tupleList1=[('parent', 'Shakib', 'Tamim'),
            ('parent', 'Tamim', 'Liton'),
            ('parent', 'Tamim', 'Shohan'),
            ('parent', 'Tamim', 'Ayesha'),
            ('parent', 'Afif', 'Shakib'),
            ('parent', 'Shohan', 'Zenia'),
            ('parent', 'Shohan', 'Riad'),
            ('parent', 'Shohan', 'Tanjin'),
            ('parent', 'Riad', 'Mustafiz')]
tupleList2=[('gender', 'Shakib', 'male'),
            ('gender', 'Tamim', 'male'),
            ('gender', 'Liton', 'male'),
            ('gender', 'Shohan', 'male'),
            ('gender', 'Ayesha', 'female'),
            ('gender', 'Afif', 'male'),
            ('gender', 'Zenia', 'female'),
            ('gender', 'Riad', 'male'),
            ('gender', 'Tanjin', 'female'),
            ('gender', 'Mustafiz', 'male')]


X=str(input("Sibling:"))
print('Brother:', end=' ')
i,j,k=0,0,0
for i in range(9):
    if ((tupleList1[i][0] == 'parent') & ( tupleList1[i][2] == X)):
        for j in range(9):
            if ((tupleList1[j][0] == 'parent') & ( tupleList1[i][1] == tupleList1[j][1]) & ( tupleList1[j][2] != tupleList1[i][2])) :
                for k in range(10):
                    if((tupleList1[j][2] == tupleList2[k][1]) & (tupleList2[k][2] == 'male')) :
                        print(tupleList1[j][2], end=' ')
print("\n")
X=str(input("Sibling:"))
print('Sister:', end=' ')
i,j,k=0,0,0
for i in range(9):
    if ((tupleList1[i][0] == 'parent') & ( tupleList1[i][2] == X)):
        for j in range(9):
            if ((tupleList1[j][0] == 'parent') & ( tupleList1[i][1] == tupleList1[j][1]) & ( tupleList1[j][2] != tupleList1[i][2])) :
                for k in range(10):
                    if((tupleList1[j][2]== tupleList2[k][1]) & (tupleList2[k][2] == 'female')) :
                        print(tupleList1[j][2], end=' ')
print("\n")

X=str(input("Niece/Nephew:"))
print('Uncle:', end=' ')
i,j,k,l=0,0,0,0
for i in range(9):
    if ((tupleList1[i][0] == 'parent') & ( tupleList1[i][2] == X)):
        for j in range(9):
            if ((tupleList1[j][0] == 'parent') & ( tupleList1[i][1] == tupleList1[j][2]) & ( tupleList1[j][2] != tupleList1[i][2])) :
                for k in range(9):
                    if((tupleList1[j][0] == 'parent') & (tupleList1[j][1] == tupleList1[k][1]) & (tupleList1[i][1] != tupleList1[k][2])):
                        for l in range(10):
                            if((tupleList1[k][2] == tupleList2[l][1]) & (tupleList2[l][2] == 'male')) :
                                print(tupleList1[k][2], end=' ')
print("\n")
X=str(input("Niece/Nephew:"))
print('Aunt:', end=' ')
i,j,k,l=0,0,0,0
for i in range(9):
    if ((tupleList1[i][0] == 'parent') & ( tupleList1[i][2] == X)):
        for j in range(9):
            if ((tupleList1[j][0] == 'parent') & ( tupleList1[i][1] == tupleList1[j][2]) & ( tupleList1[j][2] != tupleList1[i][2])) :
                for k in range(9):
                    if((tupleList1[j][0] == 'parent') & (tupleList1[j][1] == tupleList1[k][1]) & (tupleList1[i][1] != tupleList1[k][2])) :
                        for l in range(10):
                            if((tupleList1[k][2]== tupleList2[l][1]) & (tupleList2[l][2] == 'female') ) :
                                print(tupleList1[k][2], end=' ')
print("\n")
```


Run:
assignment-q2
"C:\Program Files\Python310\python.exe" "E:/AUST CSE/4.1 (Origin-42)/CSE 4108 (AI Lab)/assignment-q2.py"
Sibling:Liton
Brother: Shohan
Sibling:Riad
Sister: Zenia Tanjin
Niece/Nephew:Zenia
Uncle: Liton
Niece/Nephew:Mustafiz
Aunt: Zenia Tanjin
Process finished with exit code 0