Ahsanullah University of Science and Technology

Department of Computer Science and Engineering

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Course Title: Artificial Intelligence Lab

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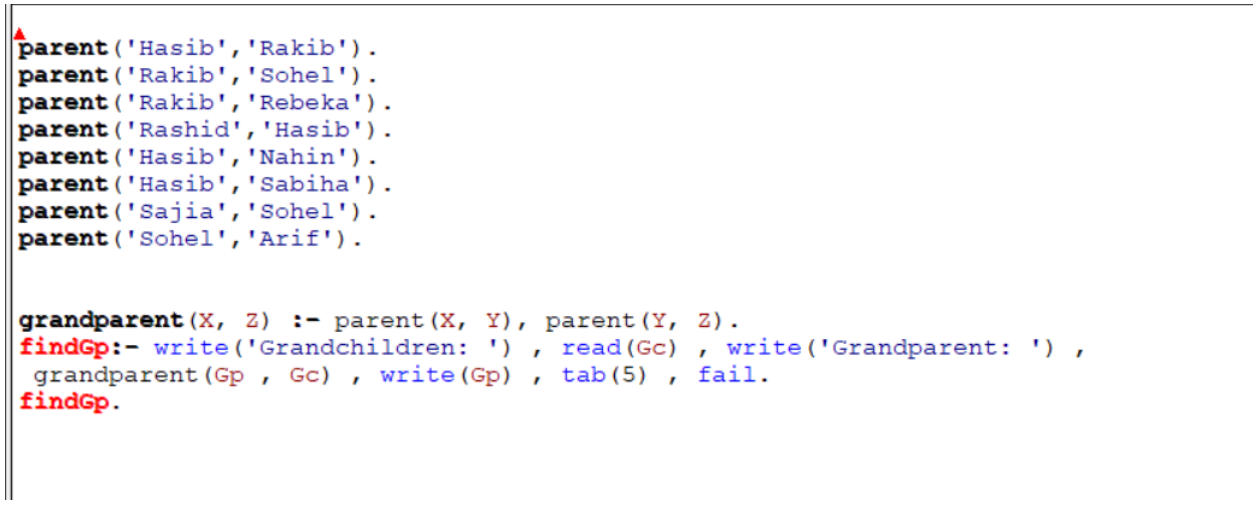
Question 1: Write Python and Prolog codes to find the grandparent(s) of somebody.

Solution:

Prolog Code:

```
parent('Hasib','Rakib').
parent('Rakib','Sohel').
parent('Rakib','Rebeka').
parent('Rashid','Hasib').
parent('Hasib','Nahin').
parent('Hasib','Sabiha').
parent('Sajia','Sohel').
parent('Sohel','Arif').


grandparent(X, Z) :- parent(X, Y), parent(Y, Z).
findGp:- write('Grandchildren: ') , read(Gc) , write('Grandparent: '),
 grandparent(Gp , Gc) , write(Gp) , tab(5) , fail.
findGp.
```



```
parent('Hasib','Rakib').
parent('Rakib','Sohel').
parent('Rakib','Rebeka').
parent('Rashid','Hasib').
parent('Hasib','Nahin').
parent('Hasib','Sabiha').
parent('Sajia','Sohel').
parent('Sohel','Arif').


grandparent(X, Z) :- parent(X, Y), parent(Y, Z).
findGp:- write('Grandchildren: ') , read(Gc) , write('Grandparent: ') ,
 grandparent(Gp , Gc) , write(Gp) , tab(5) , fail.
findGp.
```

Python Code:

```
tupleList1=[('parent', 'Hasib', 'Rakib'),
('parent', 'Rakib' , 'Sohel'),
('parent', 'Rakib' , 'Rebeka'),
('parent', 'Rashid', 'Hasib'),
('parent', 'Hasib' , 'Nahin'),
('parent', 'Hasib' , 'Sabiha'),
('parent', 'Sajia' , 'Sohel'),
('parent', 'Sohel' , 'Arif')]

X=str(input("Grandchild:"))
print('Grandparent:', end=' ')
i,j=0,0
while(i<=7):
 if((tupleList1[i][0]=='parent') & (tupleList1[i][2]==X)):
   for j in range(8):
      if ((tupleList1[j][0] == 'parent') &
          (tupleList1[i][1]== tupleList1[j][2])):
          print(tupleList1[j][1],end=' ')
 i=i+1
```

```
tupleList1=[('parent', 'Hasib', 'Rakib'),
('parent', 'Rakib' , 'Sohel'),
('parent', 'Rakib' , 'Rebeka'),
('parent', 'Rashid', 'Hasib'),
('parent', 'Hasib' , 'Nahin'),
('parent', 'Hasib' , 'Sabiha'),
('parent', 'Sajia' , 'Sohel'),
('parent', 'Sohel' , 'Arif')]

X=str(input("Grandchild:"))
print('Grandparent:', end=' ')

i,j=0,0
while(i<=7):
 if((tupleList1[i][0]=='parent') & (tupleList1[i][2]==X)):
   for j in range(8):
     if ((tupleList1[j][0] == 'parent') &
          (tupleList1[i][1]== tupleList1[j][2])):
          print(tupleList1[j][1],end=' ')
 i=i+1
```

```
Grandchild:Arif
Grandparent: Rakib Sajia
```

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

Prolog Code:

```
male('Hasib').
male('Rakib').
male('Sohel').
male('Rashid').
male('Nahin').
female('Rebeka').
female('Sabiha').
parent('Hasib','Rakib').
parent('Rakib','Sohel').
parent('Rakib','Rebeka').
parent('Rashid','Hasib').
parent('Hasib','Nahin').
parent('Hasib','Sabiha').

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,Z):-brother(X,Y),parent(Y,Z).
auntie(X,Z):-sister(X,Y),parent(Y,Z).

findBr :- write('Name: '), read(P), write('Brother: '),
brother(Br, P), write(Br), tab(5), fail.
findBr.
findSr :- write('Name: '), read(P), write('Sister: '),
sister(Sr, P), write(Sr), tab(5), fail.
findSr.
findUn :- write('Name: '), read(P), write('Uncle: '),
uncle(Un, P), write(Un), tab(5), fail.
findUn.
findAu :- write('Name: '), read(P), write('Aunt: '),
auntie(Au, P), write(Au), tab(5), fail.
findAu.
```

```
male('Hasib').
male('Rakib').
male('Sohel').
male('Rashid').
male('Nahin').
female('Rebeka').
female('Sabiha').
parent('Hasib','Rakib').
parent('Rakib','Sohel').
parent('Rakib','Rebeka').
parent('Rashid','Hasib').
parent('Hasib','Nahin').
parent('Hasib','Sabiha').

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,Z):-brother(X,Y),parent(Y,Z).
auntie(X,Z):-sister(X,Y),parent(Y,Z).

findBr :- write('Name: '), read(P), write('Brother: '),
brother(Br, P), write(Br), tab(5), fail.
findBr.
findSr :- write('Name: '), read(P), write('Sister: '),
sister(Sr, P), write(Sr), tab(5), fail.
findSr.
findUn :- write('Name: '), read(P), write('Uncle: '),
uncle(Un, P), write(Un), tab(5), fail.
findUn.
findAu :- write('Name: '), read(P), write('Aunt: '),
auntie(Au, P), write(Au), tab(5), fail.
findAu.
```

SWI-Prolog (AMD64, Multi-threaded, version 8.4.1)

File Edit Settings Run Debug Help

```
?- sister(X,'Sohel').
X = 'Rebeka' .

?- findBr.
Name: 'Rebeka'.
Brother: Sohel
true.

?- findSr.
Name: 'Sohel'.
Sister: Rebeka
true.

?- findUn.
Name: 'Sohel'.
Uncle: Nahin
true.

?- findAu.
Name: 'Sohel'.
Aunt: Sabiha
true.
```

Python Code:

```
tupleList1=[('parent', 'Hasib', 'Rakib'),
('parent', 'Rakib' , 'Sohel'),
('parent', 'Rakib' , 'Rebeka'),
('parent', 'Rashid', 'Hasib'),
('parent', 'Hasib' , 'Nahin'),
('parent', 'Hasib' , 'Sabiha'),
('parent', 'Sajia' , 'Sohel'),
('parent', 'Sohel' , 'Arif')]

maleList = [ 'Hasib', 'Rakib', 'Sohel', 'Rashid', 'Nahin', 'Arif']
femaleList = [ 'Rebeka', 'Sajia', 'Sabiha']


X=str(input("\nFindBr:"))
print('Brother:', end=' ')

i,j=0,0
while(i<=7):
  if((tupleList1[i][0]=='parent') & (tupleList1[i][2] == X)):
   for j in range(8):
    if ((tupleList1[i][1] == tupleList1[j][1]) & (tupleList1[i][2] !=
tupleList1[j][2]) &
        (tupleList1[j][2] in maleList)):

      print(tupleList1[j][2], end=' ')
  i=i+1

X=str(input("\nFindSr:"))
print('Sister:', end=' ')

i,j=0,0
while(i<=7):
  if((tupleList1[i][0]=='parent') & (tupleList1[i][2] == X)):
   for j in range(8):
    if ((tupleList1[i][1] == tupleList1[j][1]) & (tupleList1[i][2] !=
tupleList1[j][2]) &
        (tupleList1[j][2] in femaleList)):

      print(tupleList1[j][2], end=' ')
  i=i+1
```

```
X=str(input("\nFindUn:"))
print('Uncle:', end=' ')

i,j,k = 0,0,0
while(i<=7):
 if ((tupleList1[i][0] == 'parent') & (tupleList1[i][2] == X)):
   for j in range(8):
    if ((tupleList1[j][0] == 'parent') & (tupleList1[j][2] ==
tupleList1[i][1])):
     for k in range(8):
      if ((tupleList1[k][0] == 'parent') &
          (tupleList1[k][1] == tupleList1[j][1])&(tupleList1[k][2] !=
tupleList1[j][2]) &
          (tupleList1[k][2] in maleList)):
       print(tupleList1[k][2], end=' ')
 i = i + 1

X=str(input("\nFindAn:"))
print('Aunty:', end=' ')

i,j,k = 0,0,0
while(i<=7):
 if ((tupleList1[i][0] == 'parent') & (tupleList1[i][2] == X)):
   for j in range(8):
    if ((tupleList1[j][0] == 'parent') & (tupleList1[j][2] ==
tupleList1[i][1])):
     for k in range(8):
      if ((tupleList1[k][0] == 'parent') &
          (tupleList1[k][1] == tupleList1[j][1])&(tupleList1[k][2] !=
tupleList1[j][2]) &
          (tupleList1[k][2] in femaleList)):
       print(tupleList1[k][2], end=' ')
 i = i + 1
```

```
tupleList1=[('parent', 'Hasib', 'Rakib'),
('parent', 'Rakib' , 'Sohel'),
('parent', 'Rakib' , 'Rebeka'),
('parent', 'Rashid', 'Hasib'),
('parent', 'Hasib' , 'Nahin'),
('parent', 'Hasib' , 'Sabiha'),
('parent', 'Sajia' , 'Sohel'),
('parent', 'Sohel' , 'Arif')]

maleList = [ 'Hasib', 'Rakib', 'Sohel', 'Rashid', 'Nahin', 'Arif']
femaleList = [ 'Rebeka', 'Sajia', 'Sabiha']
```

```
X=str(input("\nFindBr:"))
print('Brother:', end=' ')

i,j=0,0
while(i<=7):
  if((tupleList1[i][0]=='parent') & (tupleList1[i][2] == X)):
   for j in range(8):
    if ((tupleList1[i][1] == tupleList1[j][1]) & (tupleList1[i][2] != tupleList1[j][2]) &
        (tupleList1[j][2] in maleList)):

      print(tupleList1[j][2], end=' ')
  i=i+1

X=str(input("\nFindSr:"))
print('Sister:', end=' ')

i,j=0,0
while(i<=7):
  if((tupleList1[i][0]=='parent') & (tupleList1[i][2] == X)):
   for j in range(8):
    if ((tupleList1[i][1] == tupleList1[j][1]) & (tupleList1[i][2] != tupleList1[j][2]) &
        (tupleList1[j][2] in femaleList)):

      print(tupleList1[j][2], end=' ')
  i=i+1
```

```
X=str(input("\nFindUn:"))
print('Uncle:', end=' ')

i,j,k = 0,0,0
while(i<=7):
 if ((tupleList1[i][0] == 'parent') & (tupleList1[i][2] == X)):
   for j in range(8):
    if ((tupleList1[j][0] == 'parent') & (tupleList1[j][2] == tupleList1[i][1])):
     for k in range(8):
      if ((tupleList1[k][0] == 'parent') &
          (tupleList1[k][1] == tupleList1[j][1])&(tupleList1[k][2] != tupleList1[j][2]) &
          (tupleList1[k][2] in maleList)):
        print(tupleList1[k][2], end=' ')
 i = i + 1

X=str(input("\nFindAn:"))
print('Aunty:', end=' ')

i,j,k = 0,0,0
while(i<=7):
 if ((tupleList1[i][0] == 'parent') & (tupleList1[i][2] == X)):
   for j in range(8):
    if ((tupleList1[j][0] == 'parent') & (tupleList1[j][2] == tupleList1[i][1])):
     for k in range(8):
      if ((tupleList1[k][0] == 'parent') &
          (tupleList1[k][1] == tupleList1[j][1])&(tupleList1[k][2] != tupleList1[j][2]) &
          (tupleList1[k][2] in femaleList)):
        print(tupleList1[k][2], end=' ')
 i = i + 1
```

```
FindBr:Rebeka
Brother: Sohel
FindSr:Sohel
Sister: Rebeka
FindUn:Sohel
Uncle: Nahin
FindAn:Sohel
Aunty: Sabiha

   Program finished with exit code 0
```