20CS6033

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**Assignment #1**

**Assigned September 14, 2017**

**Due September 21, 2017 on BB by 11:59PM**

**25 points**

Consider the following knowledge base in FRIL/Prolog

**/\* ((female X)) holds when X is a female \*/**

((female Mary ))  
((female Sandra ))  
((female Juliet ))

((female Lisa ))

**/\* ((male X)) holds when X is a male \*/** ((male Peter ))  
 ((male Paul ))  
 ((male Dick ))  
 ((male Bob ))  
 ((male Harry ))

**/\* ((parent P C)) holds when P is C’s parent\*/** ((parent Bob Lisa ))  
 ((parent Bob Paul ))  
 ((parent Bob Mary ))  
 ((parent Juliet Lisa ))  
 ((parent Juliet Paul ))  
 ((parent Juliet Mary ))  
 ((parent Peter Harry ))  
 ((parent Lisa Harry ))  
 ((parent Mary Dick ))  
 ((parent Mary Sandra ))

Define new predicates for the relations

(a) father

(b) sister

(c) grandmother

(d) cousin

Write the queries corresponding to the following English questions

1. Is it true that Bob is Lisa’s father?
2. Is it true that Juliet is Paul’s mother?
3. Who is Paul’s sister?
4. Who is a grandmother?
5. Who is Mary’s cousin?

Embed these queries in your program, along with some “pp” and “p” statements such that when the file containing the program is loaded into Fril the queries get executed and we can see the answers as well.

Name the file as follows: **groupname1.frl (example BrownJohnsonSmith1.frl)**

At the top of your file in a comment section write the names of your team members.

**Example:** Suppose we want to define the relation “is the brother of” as follows:

“X is the brother of Y” when they

1. have a parent Z in common and
2. X is male and
3. X and Y are not the same person.

In Fril/Prolog this can be expressed as

/\* ((brother X Y)) holds when X and Y have a common parent, X is a male and, X and Y are not the same

**NOTE: This is not the best definition**

\*/

**((brother X Y)**

**(parent P X)**

**(parent P Y)**

**(male X)**

**(negg eq X Y))**

Example execution of the query to the predicate brother:

Fril: Support Logic Programming System ⌐ Fril Systems Ltd (c) 1988-2011

Version 4.984 Created 23-08-2011, 01:56:28

(Restricted Licence : Research / Educational use only)

Fril >reload "AIMA\_Ass1.frl" /\* I had saved my program in this text file \*/

yes

Fril >list all /\* list all is a built in predicate which lists the file content \*/

((brother \_68 \_69) /\* \_68 \_69, etc are internal representations of variables; \*/

(parent \_6f \_68)

(parent \_6f \_69)

(negg eq \_68 \_69))

((parent Bob Lisa))

((parent Bob Paul))

((parent Bob Mary))

((parent Juliet Lisa))

((parent Juliet Paul))

((parent Juliet Mary))

((parent Peter Harry))

((parent Lisa Harry))

((parent Mary Dick))

((parent Mary Sandra))

((male Peter))

((male Paul))

((male Dick))

((male Bob))

((male Harry))

((female Mary))

((female Sandra))

((female Juliet))

((female Lisa))

yes

Fril >?((brother X Y)(pp X Y)) /\* who is whom brother? \*/

Paul

Lisa

yes

Fril >?((brother X Y)(pp X Y)(pp)(fail))

/\* find all pairs (X Y) where X is Y’s brother. Recall that **fail** is a bip which always fails and triggers backtracking \*/

Paul

Lisa

Paul

Mary

Paul

Lisa

Paul

Mary

Dick

Sandra

no

/\* same query different formatting \*/

Fril >?((brother X Y)(p X "is "Y "'s brother")(pp)(fail)) /\* p and pp are also bip’s: print, and pretty print \*/

Paul is Lisa 's brother

Paul is Mary 's brother

Paul is Lisa 's brother

Paul is Mary 's brother

Dick is Sandra 's brother

no

Fril >

**What to turn in:**

* After testing your predicate definitions for (a) – (d) above, include queries to them in the same file containing the knowledge base.
* Then load the file into Fril/prolog window. The queries will be executed automatically.
* Turn in the .frl file which includes the knowledge base, the new predicate definitions and the queries to them.
* At the top of the file, in a comment, you should include your names and a statement of the problem: use /\* …. \*/
* Name your file as follows: **Name1Name2Name3Ass1.frl**, where Name1, Name2 and Name3 are the last names in alphabetical order of your team members.
* For example, if the team members are Smith, Brown, Johnson, the file name should be **BrownJohnsonSmithAss1.frl.**