INTERNATIONAL INSTITUTE OF PROFESSIONAL STUDIES
DEVI AHILYA UNIVERSITY
MCA SEMESTER X

IC-703 Artificial Intelligence

Lab Assignment # 1

1. Represent the following facts in Prolog:

a. Tom is a singer.
b. Mia and john are married
c. ravi is dead.
d. john kills everyone who gives Mia a footmassage
e. Mia loves everyone who is a good dancer.
f. rahul eats anything that is nutritious or tasty.

2. Suppose we are working with the following knowledge base:

```
hasWand(harry).
quidditchPlayer(harry).
wizard(ron).
wizard(X) :- hasBroom(X),hasWand(X).
hasBroom(X) :- quidditchPlayer(X).
```

How does Prolog respond to the following queries?

```
wizard(ron).
wizard(hermione).
wizard(harry).
wizard(Y).
```

3. Define and describe the difference between knowledge, belief, hypotheses and data.

4. Write Prolog clauses for the following management system.

Edward manages Smith and Jackson.
Smith manages Jones, Harris and Peters.
Harris manages Carter and Fletcher.
Jackson manages Harper, Pritchard and Glover.

PERSON	RESPONSIBLE FOR
Jones	Finance
Carter	Sales
Fletcher	Purchases
Peters	Personnel
Harper	Transport
Pritchard	Communications
Glover	Industrial Relations

A person is responsible for a task if he manages someone who is responsible for that task.

Answer the following questions by interrogating the Prolog database.
Is Smith responsible for transport?
Who are responsible for communications?
Who are responsible for sales AND personnel?

5. Implement following problems in Prolog

a. **The Farmer, Wolf, Goat and Cabbage(***a Farmer, Wolf, Goat and Cabbage arrive at a river and wish to cross. There is a boat but it can transport the farmer (only he can row!) and at most one other object at a time. How can the farmer plan to move his entourage from the East bank to the West bank? An additional problem is that if ever the wolf and goat, or goat and cabbage, are left alone then one eats the other!)*

c. **The Monkey and the Banana(***There is a monkey at the door into a room. In the middle of the room a banana is hanging from the ceiling. The monkey is hungry and wants to get the banana, but he cannot stretch high enough from the floor. At the window of the room there is a box that the monkey can use.)*

d. **The Water-jugs Problem**(*there are two jugs, a 4-gallon one and a 3-gallon one. Neither has any measuring markers on it. There is a tap that can be used to fill the jugs with water. How can you get exactly 2 gallons of water into the 4-gallon jug?)*

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Lab Assignment # 2

1. using the fail predicate, write a program that lists four address in a label form each address should list a name, oneline address, city, state and zipcode.
2. explain rules conjunctions and disjunctions with a example and draw AND/OR tree.
3. explain logical variables. explain the difference between logical variables and variables used in procedural language.
4. assume you have a database of results of tennis games played by members of a club. the pairing were not arranged in systematic way, so each player just played some other players. the results are for example:
   beat(ravi,rahul).
   beat(tom,ravi).
   beat(jerry,tom).
   you define a relation
   class(Player, Category)
   that ranks players into categories. you just have three categories:
   winner: every player who won all his or her games is a winner.
   fighter: any player that won some games and lost some.
   sportsman: every player that lost all his or her games.
5. write output and draw AND/OR tree of the following program.

```
talks_about(A,B):-
                know(A,B).
talks_about(P,R):-
                know(P,Q),
                talks_about(Q,R).
```

consider followings facts

```
know(ravi,ram).
know(ram,pat).
know(ravi,fred).
know(fred,ravi).
```

How does Prolog respond to the following queries?
a. goal: talks_about(X,Y).
b. goal: talks_about(fred,X).
c. goal: talks_about(ram,_).
d. goal: talks_about(_,ravi)
e. goal: talks_about(_ , _).

8. write short notes on followings
   a) first order predicate logic
   b) propositional v/s predicate logic
   c) forward chaining v/s backward chaining

d) unification
e) fail predicate
f) input predicate
g) backtracking
h) computable functions and predicates
i) resolution in predicate logic and propositional logic

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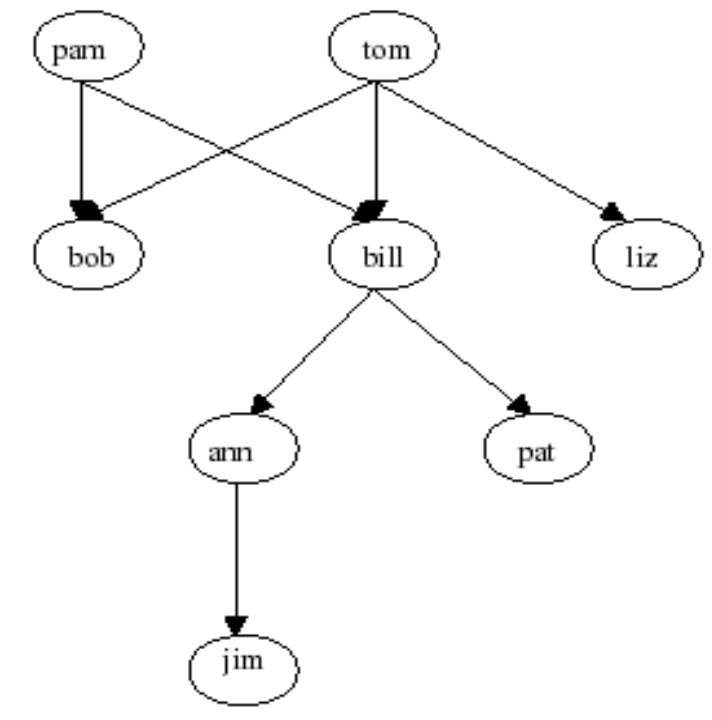
IC-703 Artificial Intelligence

Lab Assignment # 3

1). Genealogy Problem:

1.1. build a knowledge base to represent the parent relationships that can be deduced from the tree:

Genealogic Tree



Problem: 1.2. Build predicates that describe the following family relationships:

a. ***grandparent***
b. mother
c. father
d. brother
e. sister
f. aunt
g. uncle
h. ancestor

consider following facts

male(tom).
male(bob).

male(bil).
male(pat).
male(jim).
female(pam).
female(liz).
female(ann).

2. Composers knowledge base
   Problem:2.1. build a knowledge base to represent the following composers and years of their birth and dead using structures.

   Composers:

Composer	Year of birth	Year of Dead
Beethoven,	1770	1827
Mozart,	1756	1791
Verdi	1813	1901
Bach	1685	1750
Haydn	1732	1809
Vivaldi	1675	1741

*P*roblem:2.2 build rules, allowing to define whether or not a two lifetimes overlap:
overlap(Birth1,Dead1,Birth2, Dead2).
Problem:2.3 build a rule, allowing to define whether or not a two composers are contemporaries :
contemporaries(Composer1,Composer2).

3. consider the following sentences
   a. john likes all kinds of food.
   b. apples are food.
   d. dosa is food.
   c. anything anyone eats and is not killed by is food.
   d. bill eats peanuts and is still alive.
   e. liz eats everything bill eats.

   a. translate these sentences into formulas in predicate logic and prolog clause form.
   b. prove that “john likes dosa” and “liz likes peanuts”.
4. consider the following sentences
   a. tom only likes hard courses.
   b. management courses are easy.
   c. all the courses in the engineering department are hard.
   d. computer engineering is a engineering department course.

   a. translate these sentences into formulas in predicate logic and prolog clause form.
   b. prove that “what course would tom like?”.