Programming Paradigms

Lab 10. Introduction to Prolog

Inferring types

Exercise 10.1.
Draw the search tree for the query `magic(hermione)`.

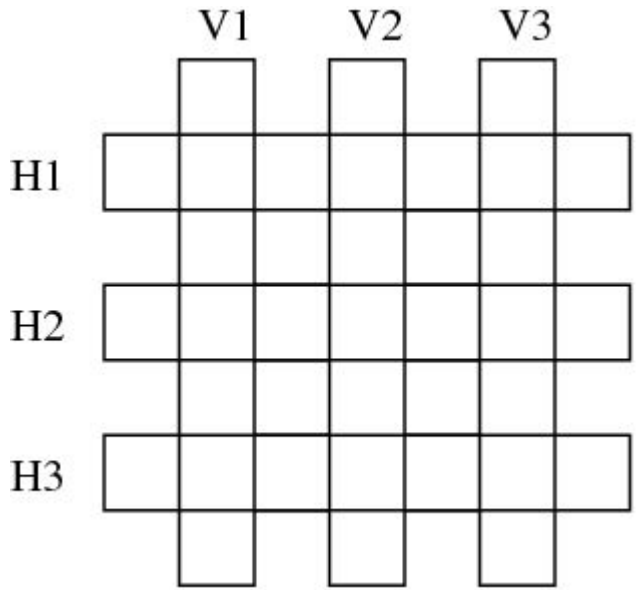
```
house_elf(dobby).
witch(hermione).
witch('McGonagall').
witch(rita_skeeter).
magic(X) :- house_elf(X).
magic(X) :- wizard(X).
magic(X) :- witch(X).
```

Crossword

Exercise 10.2.

Implement a predicate `crossword/6` that solves the following crossword:

```
word(astante,  a,s,t,a,n,t,e).
word(astoria,  a,s,t,o,r,i,a).
word(baratto,  b,a,r,a,t,t,o).
word(cobalto,  c,o,b,a,l,t,o).
word(pistola,  p,i,s,t,o,l,a).
word(statale,  s,t,a,t,a,l,e).
```



Travels

Exercise 10.3.
Implement a predicate `travelFromTo/2` that tells us
whether we can travel (perhaps indirectly) by train between two places.

```
directTrain(saarbruecken,dudweiler).
directTrain(forbach,saarbruecken).
directTrain(freyming,forbach).
directTrain(stAvold,freyming).
directTrain(fahlquemont,stAvold).
directTrain(metz,fahlquemont).
directTrain(nancy,metz).
```

Paths in a graph

Exercise 10.4.
Implement a predicate `path/2` that tells you whether a (directed) path exists.

```
connected(1,2).
connected(3,4).
connected(5,6).
connected(7,8).
connected(9,10).
connected(12,13).
connected(13,14).
connected(15,16).
connected(17,18).
connected(19,20).
connected(4,1).
connected(6,3).
connected(4,7).
connected(6,11).
connected(14,9).
connected(11,15).
connected(16,12).
connected(14,17).
connected(16,19).
```

Travel by different transport

Exercise 10.5.
Write a predicate `travel/2` which determines whether it is possible to travel from one place to another by chaining together car, train, and plane journeys. For example, your program should answer **`true`** to the query `travel(valmont,raglan)` .

```
byCar(auckland,hamilton).
byCar(hamilton,raglan).
byCar(valmont,saarbruecken).
byCar(valmont,metz).

byTrain(metz,frankfurt).
byTrain(saarbruecken,frankfurt).
byTrain(metz,paris).
byTrain(saarbruecken,paris).

byPlane(frankfurt,bangkok).
byPlane(frankfurt,singapore).
byPlane(paris,losAngeles).
byPlane(bangkok,auckland).
byPlane(singapore,auckland).
byPlane(losAngeles,auckland).
```

Travel by different transport: route

Exercise 10.6.

Extend the predicate `travel/3` from Exercise 10.5 so that it not only tells you the route to take to get from one place to another, but also how you have to travel.

```
?- travel(valmont,losAngeles,X)

X  =  goByCar(valmont,metz,
                goByTrain(metz,paris,
                      goByPlane(paris,losAngeles)))
```