CS171: Expert Systems
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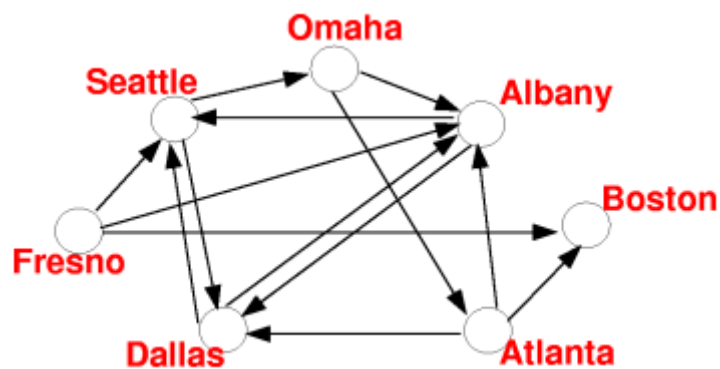University of California, Riverside

Homework Assignment 1

Primer

This is a classical Prolog application. Given the following graph of possible flights between seven US cities:

(graph taken from the web site of the American Mathematical Society, http://www.ams.org)

Write a Prolog program that would check if there is a route from a city A to a city B:

Steps:

1. Encode your database of facts:

    ```
    flight(fresno, seattle).
    flight(seattle, omaha).
    ```

    and so on.

2. Write the rules:

    What does it mean that there is a route from city A to city B? Well, we either have a direct connection, or we can to go from A to some city from which we have a direct connection to B. This is written as:

    ```
    route(A, B) :- flight(A, B).
    route(A, B) :- route(A, X), flight(X, B).
    ```

And that's it.

Now you can ask Prolog if there is a routs from a city to a city, for example:

```
?- route(fresno, atlanta).
```

You do not have to turn in the primer, but it will be useful to code it, as a warm-up, and to get a sense of working in Prolog.

Note that the way the route rule was written is actually a **recursion**.

```
route(A, B) :- flight(A, B).
```

is the base case, and:

```
route(A, B) :- route(A, X), flight(X, B).
```

is the recursive step. Every time we apply the recursive step, we should be getting one city closer to the source.

Homework assignment

To be turned-in on Monday, April 11, 2005, in the discussion section, as a printout.

Given the partial family tree of the gods of the ancient Greeks encoded as a Prolog database:

```
parent(chaos, gaea).
parent(gaea, cyclope).
parent(gaea, chronos).
parent(gaea, coeus).
parent(gaea, oceanus).
parent(uranus, cyclope).
parent(uranus, chronos).
parent(uranus, coeus).
parent(uranus, oceanus).
parent(chronos, hades).
parent(chronos, poseidon).
parent(chronos, zeus).
parent(rhea, hades).
parent(rhea, poseidon).
parent(rhea, zeus).
parent(coeus, leto).
parent(phoebe, leto).
parent(leto, apollo).
parent(leto, artemis).
parent(zeus, apollo).
```

```
parent(zeus, artemis).
parent(oceanus, iapetus).
parent(tethys, iapetus).
parent(hera, ares).
parent(zeus, ares).
male(chaos).
male(cyclope).
male(uranus).
male(chronos).
male(coeus).
male(oceanus).
male(hades).
male(poseidon).
male(zeus).
male(ares).
male(apollo).
male(iapetus).
female(gaea).
female(rhea).
female(leto).
female(hera).
female(phoebe).
female(tethys).
female(artemis).
```

define rules for the following relationships:

a)   father
b)   mother
c)   child
d)   son
e)   daughter
f)   sibling
g)   aunt