Logic Programming Question

Fall 2004 – Qualifier Examination

August 2, 2004

Question 1 [35 pts]

Use the constraint logic programming with finite domains that we have seen in class to solve the following logic puzzle. Harriet, upon returning from the mall, is happily describing her four shoe purchases to her friend Aurora. Aurora just loves the four different kinds of shoes that Harriet bought (ecru espadrilles, fuchsia flats, purple pumps, and suede sandals), but Harriet can't recall at which different store (Foot Farm, Heels in a Handcart, The Shoe Palace, or Tootsies) she got each pair. Can you help these two figure out the order in which Harriet bought each pair of shoes, and where she bought each? The following facts are known:

- Harriet bought fuchsia flats at Heels in a Handcart.
- The store she visited just after buying her purple pumps was not Tootsies.
- The Foot Farm was Harriet's second stop.
- Two stops after leaving The Shoe Place, Harriet bought her suede sandals.

Write a constraint logic program that finds out in which store each pair of shows has been bought, and in which order. Make sure to clearly separate the part where constraints are set up from the part where the labeling is conducted.

Question 2 [25 pts]

Consider the following program P:

```
a :- b, c.
a :- a, b.
b.
c :- d, b.
c :- b.
e :- c, a.
f :- d, e.
g :- h.
```

Answer the following questions:

1. Show the result of the application of the T_P operator zero, one, two, and three times.
2. Compute the minimal model of the program P
3. Add the following rules to the program

   ```
   d :- not h.
   h :- not d.
   ```

   Compute the stable models of the new program.

Question 3 [40 pts]

In class we studied the notion of meta-interpreter and have seen how it can be used to modify the way Prolog programs are executed. For example, the simplest meta-interpreter is:

```
solve(true) :- !.
solve((G1,G2)) :- !, solve(G1), solve(G2).
solve(G) :- clause(G,Body), solve(Body).
```

Point A [25 pts]

Provide a simple meta-interpreter that executes Prolog programs by always selecting the atom in the goal with the smallest number of matching clauses.

Point B [15 pts]

Provide a simple meta-interpreter that executes Prolog programs by always selecting the atom in the goal that has been present in the goal for the longest period of time.