The Story Project
Part III - From Here to There

CS343
Fall 2006

This project builds on parts 1 and 2. Compile KM if you have not already done so.

1 Axiomatizing Space

The following axioms are true for all physical objects (PhysObj):
If A is directly south of B, then B is directly north of A. Same for north, east, and west.
If A is directly south, east, or west of B, then all things that are north of B are also north of A.
If A is directly north, east, or west of B, then all things that are south of B are also south of A.
If A is directly north, south, or west of B, then all things that are east of B are also east of A.
If A is directly north, south, or east of B, then all things that are west of B are also west of A.
(Note that this does not entail all possibilities, e.g. if B is directly south of A and C is directly east of A, then we know that C is north of B but that does not follow from these axioms, that's okay.)

If A is in B and B is in C, then A is in C.
If A is in B, then all things that are east, west, north or south of B are also east, west of A.

If there's a path from A to B, then there's also a path from B to A. A is reachable from B if there is a path from A to B. A is also reachable if there is a place C such that there's a path from A to C, and B is reachable from C.

2 The 100-Acre-Wood

Every Animal has a place to live. Winnie, for example, lives in a house. Piglet lives in a tree. Owl lives in a house in a tree. Rabbit lives in a hole. All Bees live in the Bee Tree. Winnie's house, Piglet's tree and Rabbit's hole are all in the 100-Acre-Wood. The tree that has Owl's house in it is also in the 100-Acre-Wood, just like the Bee Tree. Piglet's tree is directly south of Winnie's house. Rabbit's hole is directly east of Winnie's house. Owl's tree is directly east of Piglet's tree, and directly south of Rabbit's hole. Directly east of Rabbit's hole, there's the Bee Tree, and directly north of that is the North Pole. There are paths from Winnie's house to Piglet's tree, from Rabbit's hole to Winnie's house, and from Rabbit's hole to Owl's tree. There's also a path from the Bee Tree to the North Pole. (Note that Owl and Rabbit are individuals, not classes. It just happens to be that Owl is an owl and Rabbit is a rabbit.)

3 Hints

Before you start, read the section on "Defining Transitive Relations" in the KM manual (section 29.2.1., pp 92 - 93). Make sure you create separate direct slots and transitive closure slots, e.g. "directly south" (d-south), and south.
(x has (north (y))) means "to the north of x, there's y." (Not "x is north of y.")

`(x has (in (y)))` means "x is in y", not the other way around.

4   Questions

1. What's directly north of Piglet's Tree? Winnie's House.

   ```
   KM> (the d-north of *PigletsTree))
   (*WinniesHouse)
   ```

2. Is Rabbit's hole east of Piglets tree? Yes.

   ```
   KM> ((the east of *PigletsTree) includes *RabbitsHole)
   (t)
   ```

3. Is Owl's House (directly) in Owl's Tree? Yes.

   ```
   KM> ((the d-in of *OwlsHouse) includes *OwlsTree)
   (t)
   ```

4. Does Owl live in a place in the 100-Acre-Wood? Yes.

   ```
   KM> ((the in of (the lives-in of *Owl)) includes *100AcreWood)
   (t)
   ```

5. Is the North Pole reachable from the Bee Tree? Yes.

   ```
   KM> ((the reachable of *BeeTree) includes *NorthPole)
   (t)
   ```

6. Is the North Pole reachable from Winnie's House? No.

   ```
   KM> ((the reachable of *WinniesHouse) includes *NorthPole)
   NIL
   ```

7. Is there a path from Piglet's Tree to Winnie's House? Yes.

   ```
   KM> ((the path-to of *PigletsTree) includes *WinniesHouse)
   (t)
   ```

8. Buzzy is still a Bee. Does he live in a Tree? Yes.

   ```
   KM> (*Buzzy has (instance-of (Bee)))
   KM> (has-value (the Tree lives-in of *Buzzy))
   (t)
   ```

5   Submitting

Submit using

```
turnin --submit jmugan story3 story3.km story3.txt
```

There is a 20% per day penalty for late submissions. To submit late use

```
turnin --submit jmugan story3-one-day-late story3.km story3.txt
turnin --submit jmugan story3-two-days-late story3.km story3.txt
turnin --submit jmugan story3-three-days-late story3.km story3.txt
```

It is important that you call your files story3.km and story3.txt, otherwise the grading program will not be able to find them.