Lab 3: The fox, goose, and bag of beans puzzle

December 2, 2008

1   Problem definition

The fox, goose, and bag of beans puzzle (or the wolf, sheep, and cabbage puzzle as it is known in the swedish folklore) is a river-crossing puzzle. The basic idea is that a man with a fox, a goose, and a bag of beans needs to cross a river with a boat. The problem is that the boat can only carry himself and one of his items. If the fox is left alone with the goose it will eat it, and if the goose is left alone with the bag of beans it will eat it. Can he get all of them over to the other side, intact? If so, how?

2   Assignment

Implement (in Prolog) the predicate `solvefgb(+State, +Dest, +N, -Trace)`, computing a feasible trace (`Trace`) of river-crossings from an initial state (`State`) to a destination (`Dest`), west or east, in no more than `N` steps. If such a trace cannot be found, the goal should fail. Here, + and − means input and output, respectively.

You are free to choose whatever representation of the state as you see fit. The trace though, has to be a list of pairs, each containing the direction (west or east) and the item carried (maybe none).

3   Hand in

Hand in all the code that you write with reasonable amount of comments describing your implementation. Also, define a predicate that creates the initial state (all items and the boat at the west bank of the river) according to the representation that you use.