
Knowledge representation

Tutorial 6

8 November 2013

Basic Problem-Solving Strategies

1.

Eight queens puzzle:

The eight queens puzzle is the problem of placing eight chess queens on an 8x8 chessboard so that no two queens attack each other.

Proposed exercises

2. Three thieves have robbed a wine barrel of 24 liters. They would like to divide the wine in three equal parts (8 liters each). Unfortunately, they only have at their disposal three vessels : one of 5 liters, one of 11 liters and one of 13 liters.

Write a prolog program to solve this decanting problem.

3.

8-puzzle (sliding puzzle) :

The 8-puzzle is a smaller version of the slightly better known 15-puzzle.

The puzzle consists of an area divided into a grid, 3 by 3 for the 8-puzzle (4 by 4 for the 15-puzzle). On each grid square is a tile, except for one square which remains empty. Thus, there are eight tiles in the 8-puzzle. A tile that is next to the empty grid square can be moved into the empty space, leaving its previous position empty in turn. Tiles are numbered, 1 to 8 for the 8-puzzle, so that each tile can be uniquely identified.

The aim of the puzzle is to get the configuration where all the tiles are ordered from any given starting configuration.

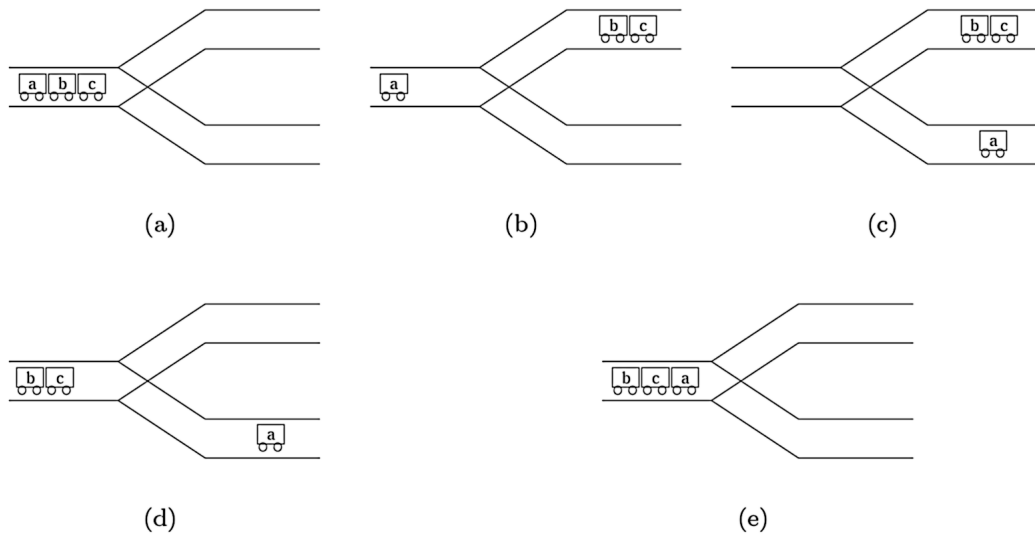
Write a prolog program to solve this puzzle.

(Hint: the puzzle doesn't always have a solution !)

4. You are a train driver. Your train is represented by a list of the form $[c_1, c_2, \dots, c_n]$ where c_i are the cars. The locomotive is supposed to be on the left of the car c_1 but is not explicitly represented.

You are in a marshalling yard and your task is to rearrange the cars in a specific order. The marshalling yard has two sorting tracks where you can push or remove cars.

Here is a example of the rearrangement of the train $[a, b, c]$ to $[b, c, a]$.



Write a prolog program to compute the movements necessary to rearrange a train.