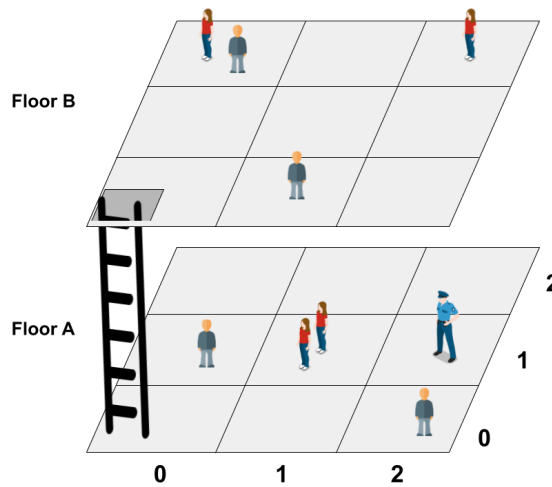


Exercise 1 (8 points)

An agent C is in charge of keeping everybody safe at a party. In particular, a party is considered safe when each cell contains a maximum of one person (to achieve social distancing). Hence, the agents job is to visit cells containing more than one person and make one of the two move to another cell. The task is complete when all cells are safe and do not contain more than one person. C can move in any adjacent cell, horizontally and vertically, but not diagonally. C can move only to empty cells or to cells containing two people to be separated apart. People do not move except when moved by the agent. The figure shows the environment where the party is organised on two floors with a ladder connecting cells $cell - 0 - 0 - A$ and $cell - 0 - 0 - B$. The figure shows also the initial configuration, where the agent C is at location $cell - 2 - 1 - A$.



- Model the problem in PDDL by defining the problem and domain files
- Show one possible sequence of actions leading to a goal state, specifying also all the states traversed to reach the goal.
- Draw the first 3 steps of the tree generated by forward search assuming a perfect heuristic (a heuristic choosing the move in the plan given above). Show all the actions applicable at each of the traversed states.

Exercise 2 (4 points)

Consider the 8-Queens problem (i.e. find a position of the queens on the chess board such that there are no pairs of attacking queens). Show all the representations of the problem that we have discussed. For each of them, briefly address advantages and disadvantages.

Exercise 3 (4 points)

Discuss the heuristics applicable to the search for a solution in a constraint satisfaction problem (CSP).