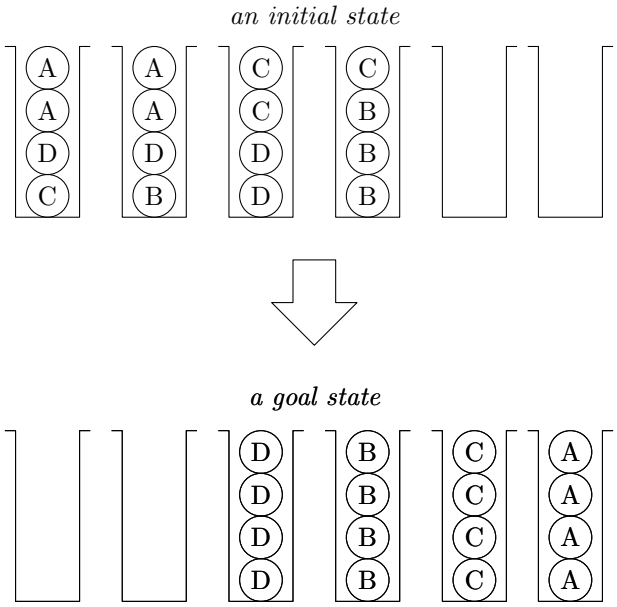
CSS324 Homework Assignment

Ball Sort Puzzle: We have 16 balls. Each ball is labeled by either A, B, C, or D. We also have 6 stacks. Each stack can contain 4 balls. The 16 balls are randomly placed in 4 stacks. Two stacks are left empty. The goal of this puzzle is to sort the balls by label, so that 4 non-empty stacks contain 4 balls of the same label. There are two restrictions:

1. Only the top ball of each stack can be moved, and
2. A ball can only be placed on top of another ball of the same label or in an empty stack.

The following figure shows an example of the ball sort puzzle with an initial state and a possible goal state. Note that given an initial state, there may be multiple goal states.



Write a Python program that accepts stacks of balls as input, conducts a *Uniform-Cost Graph Search*, and displays a solution as shown in the following example.

The program should output "No solution" when a given puzzle cannot be solved.

Input

```
A A C C
A A C B
D D D B
C B D B
```

Output

```
Step 0
A A C C . .
A A C B . .
D D D B . .
C B D B . .

Step 1
A A C . . .
A A C B . .
D D D B . .
C B D B C .

Step 2
A A . . . .
A A C B . .
D D D B C .
C B D B C .


...
```

Rules

1. If you are an undergraduate student, you are encouraged to pair with another undergraduate student and submit this assignment as a group work. I will set up a post in Google Classroom so that you can write comment there if you want to find a partner.
2. If you are a graduate student, you need to work alone.
3. Submit your work via Repl.it before September 20, 2021; 11:59AM. Late submission will not be accepted and be graded 0.
4. Your program may be composed of multiple Python source files, but the main program should start from `main.py`.
5. A code plagiarism detection program will be used to check the similarity of the submitted programs. The programs with similarity $> 90\%$ will receive 0.
6. Additional rules may be announced via Google Classroom.