FreeCell Game

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1 Introduction

FreeCell is a popular card game that is solitaire-based, which means that only one player is allowed. This game has been incorporated into the Microsoft games that were released with the Windows operating system. In the game,only one standard 52 card deck will be used. For this project, our freecell program will be primarily text-based. Here is a snapshot of the Microsoft Windows [1] version of the game:

2 Basic Rules and Setup

On a regular FreeCell board, there are four columns of 7 cards, and four columns of 6 cards each. This total of eight columns make up the tableau. There are also free cells made up of four piles of cards, and foundations which consist of four piles too. Initially, both the free cells and foundations are empty.

2.1 Objective

The objective of this game is to eventually move all the cards on to the foundations so that each of the four piles has cards of one suit ordered in the sequence: Ace, 2, 3, 4, 5, 6, 7, 8, 9, Jack, King and Queen. When the player is trying to move the card, *the program needs to determine whether the move is legal or not.*

2.2 Moves

1) One card can be moved from the top of one tableau and placed on top of the one of the other tableau when the moved card is one lower than the top card of the other tableau, and the two cards are of different colors (black and red).
2) When more than one cards are piled up in descending order on the top of a tableau, e.g., red 5, black 4, red 3, you can moved all three cards on top of a tableau with top card as black 6.
3) A single card can be placed on the free cell. In such case, free cell serves as a holder. Each free cell can only hold one card each time.
4) Cards from free cell and tableau can be moved to the foundation as long as the cards on the foundation are in ascending sequential order starting from ace, and are of the same suit (Hearts, Spades, Diamonds and Clubs).
5) When any tableau is empty, you can move card or cards that are in consequent descending order to the empty tableau.
6) Final goal of the game is either to have four piles of card on four tableaux each arranged in descending sequential order from Queen to Ace, or the cards are put on four foundations based on suit in ascending sequential order.

Thus, the goal of the program is to be able to realize the above moves and decide whether each move is legitimate.

3 Concerns and Optimization

I. Shuffling cards:
The game shall enable the shuffling process which distributes the card in a random order. When the game is at a deadlock, meaning no more card can be moved, the card order can be rearranged upon shuffling. Therefore, the program needs to be able to identify whether the cards can be moved.
II. Modes:
The game can be played in different modes:
1) time mode sets the time limit of the game
2) step mode limits the number of steps or moves taken to complete the game
So if the game can incorporate time and step calculation, it will certainly further optimize the game itself.
III. Visual display:

This part exceeds the content of program paradigm course. Yet, it would be helpful if visualization can be realized.

References

[1] http://windows.microsoft.com/en-us/windows/freecell