2 A Game of UNO

You are to develop an interactive game of UNO between two players. The gameplay for UNO is described at https://www.unorules.com/. Your program should operate as follows.

2.1 Setup

1. UNO cards are represented as variables of the following type:

```c
typedef struct card_s {
      char color[7];
      int value;
      char action[15];
      struct card_s *pt;
} card;
```

You are allowed to add attributes to this definition, but not to remove any. You can also represent colors by using card suits. Red: hearts; Yellow: diamonds; Green: clubs; Blue: spades. The action field is used to denote the function of action cards.

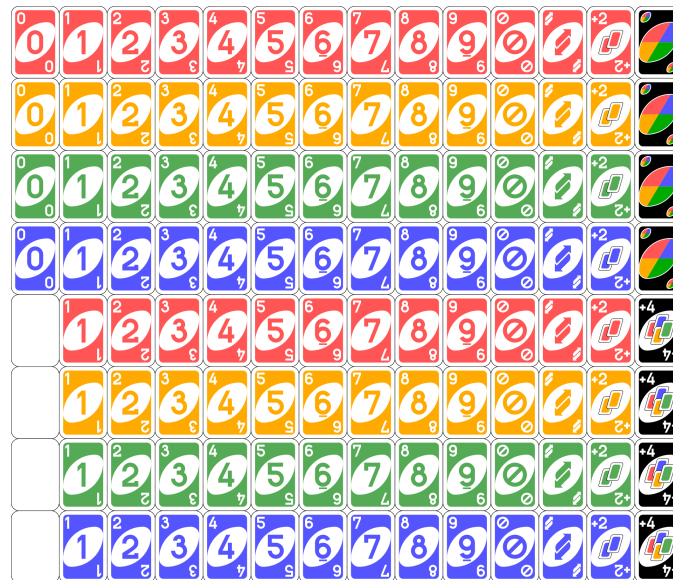2. The game is played using the following deck of cards[1].

Figure 1: The deck of UNO cards.

The following action cards are included:

- **Reverse** – Reverses the order of play.
- **Skip** – When a player places this card, the next player has to skip their turn. If turned up at the beginning, the first player loses his/her turn.
- **Draw Two** – When a person places this card, the next player will have to pick up two cards and forfeit his/her turn, unless the person also plays a draw two card, in which case the next player has to pick up four cards, etc...

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[1]by Dmitry Fomin https://commons.wikimedia.org/w/index.php?curid=29517498.

- **Wild** – This card represents all four colors, and can be placed on any card. The player has to state which color it will represent for the next player. It can be played regardless of whether another card is available.

- **Wild Draw Four** – This acts just like the wild card except that the next player also has to draw four cards as well as forfeit his/her turn. With this card, you must have no other alternative cards to play that matches the color of the card previously played. If you play this card illegally, you may be challenged by the other player to show your hand to him/her. If guilty, you need to draw 4 cards. If not, the challenger needs to draw 6 cards instead.

3. At the beginning, the user can choose to shuffle the deck or load a predefined sequence of cards from a file (for testing).

4. The deck must be implemented by **an array of 108 cards**.

5. Each player's hand must be implemented by **a dynamic list of cards**. The list is initially populated with the cards dealt to each player. The card drawn (played) by each player is added to (deleted from) the respective list.

6. The discard pile is implemented by using the free space in the **deck array of 108 cards**. The deck is reshuffled if it is exhausted and the game has not ended. Only the top card of the discard pile is shown on screen during the game.

2.2 GamePlay

The gameplay and scoring process are described at https://www.unorules.com/.

2.3 Optional Features for Extra Credit

1. **Automate one of the players.** Modify your code to implement one of the players automatically and play according to a strategy of your choice.

2. **Players 2–10.** Allow the game to be played by any number of players from 2–10.

3. **Game Variations.** Implement the following game variations.

   (a) **Progressive Uno.** If a draw card is played, and the following player has the same card, they can play that card and "stack" the penalty, which adds to the current penalty and passes it to the following player.

   (b) **Seven-O.**: When a certain card is played, the player is able to trade hands with another player or with all players. For example, the person who played the 7 card is able to switch all of their cards with another player; the player who played the 0 card is able to make every player exchange all their cards to the next player.

4. **Graphics.** Add graphics to your game. You can print cards using ascii art.

2.4 Sample Execution

Let's Play a Game of UNO

Press 1 to shuffle the UNO deck or 2 to load a deck from a file: 1

The deck is shuffled. Press any key to deal cards

Discard pile: 5♣

Player's one hand: 6♣, 3♣, wild, draw two, 9♥, 2♠, 7♠

Press 1-7 to play any card from your hand, or press zero to draw a card from the deck:5

The 9♥ cannot be placed on top of 5♣

Press 1-7 to play any card from your hand, or press zero to draw a card from the deck:1

Discard pile: 6♣,

Player's two hand: 3♣, 5♥, 2♦, reverse, 6♥, 2♣, 7♠

...

Player's one hand: 9♥

Player one has UNO

Press 1 to play the card from your hand, or press zero to draw a card from the deck:1

Discard pile: 9♥,

Player 1 wins

Would you like to play again (y/n)? n

Bye bye