



Free Cell

Siv Lu, Maggie Xiao

Game



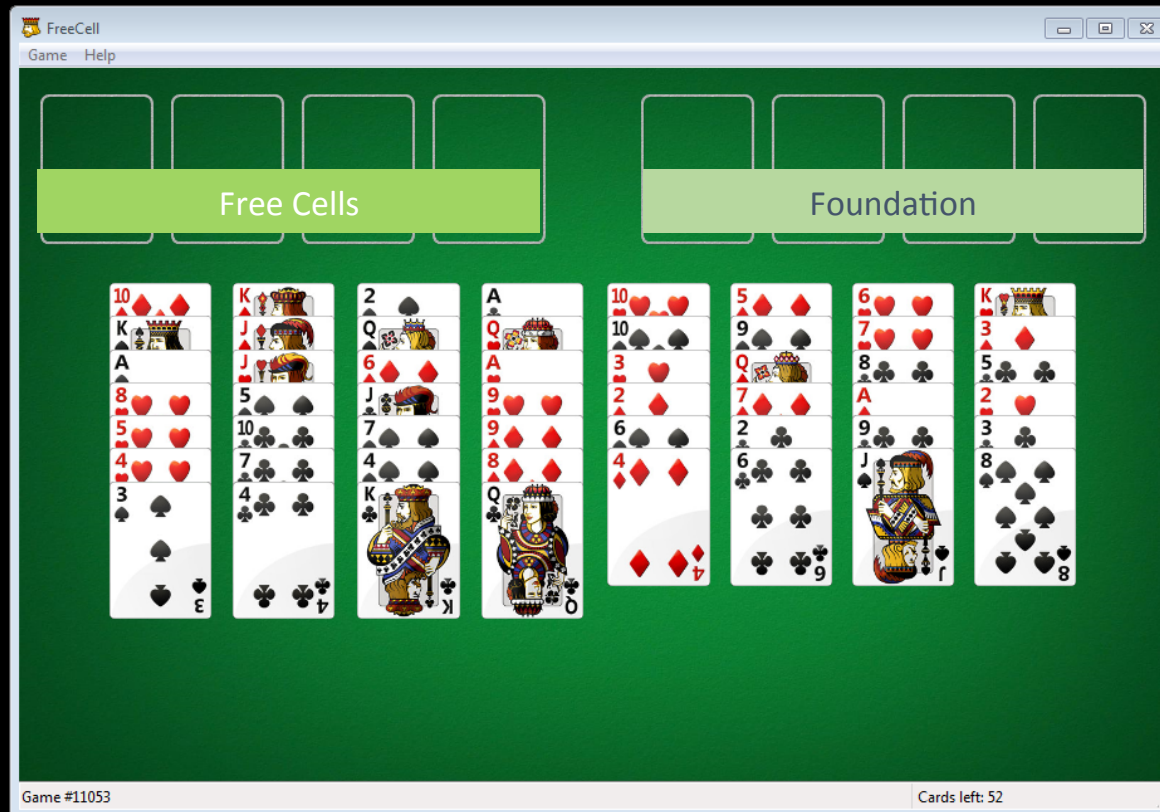
Implementation



Demo

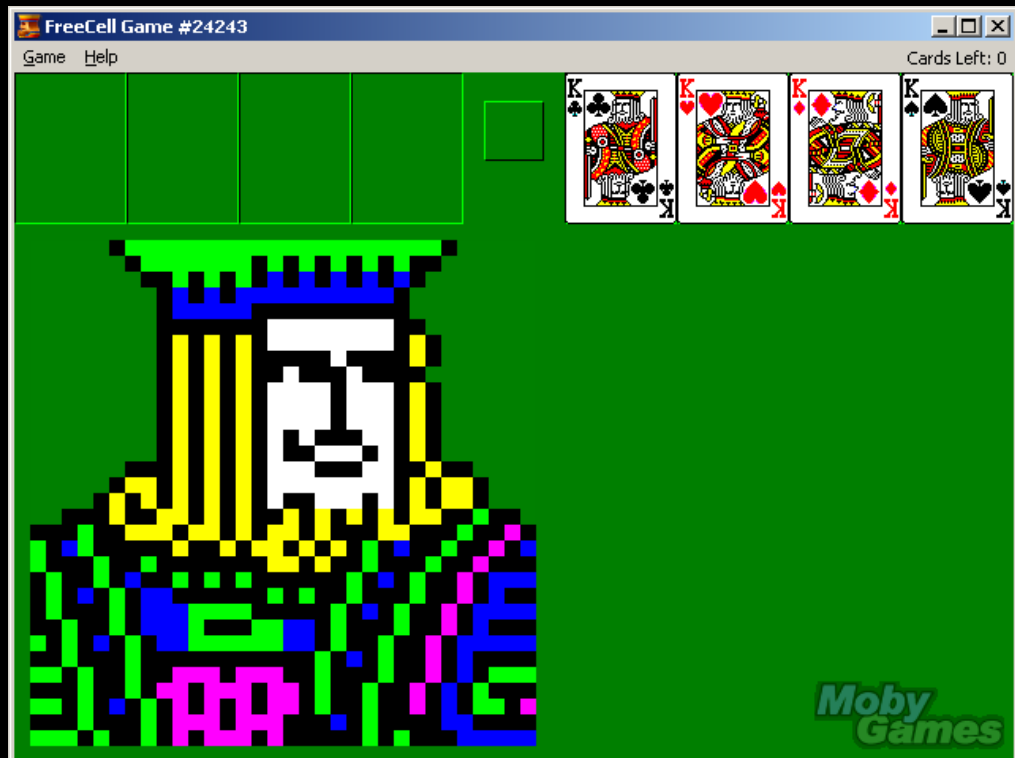
Graphic Based--FreeCell

- 8 piles of cards facing up which you can rearrange by moving cards.
- 4 Free Cells
- 4 Foundations



Goals

- Move all the cards on to the 4 foundations
- OR
- Card in descending orders with alternative colors
(in each pile)



Our Text-based Free Cell

“Free Cells” temporarily store single cards

Build foundations starting with ace, by ascending value, and by suit.

```
-----Free Cell-----||-----Foundation-----
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| NA | NA | NA | NA |  | H0 | S0 | D0 | C0 |
|  |  |  |  |  |  |  |  |  |  |  |  |
-----
***** Pile 1:[DT][SQ][DJ][C7][H2][D7][C6]
-----
***** Pile 2:[C8][CK][SA][CA][H6][D5][S5]
-----
***** Pile 3:[HJ][S2][C9][H7][D6][HT][CQ]
-----
***** Pile 4:[S3][S9][H3][D8][SK][ST][S7]
-----
***** Pile 5:[S8][S6][D3][S4][D2][CT]
-----
***** Pile 6:[H4][C3][HQ][C5][H9][HA]
-----
***** Pile 7:[CJ][DQ][DK][DA][C4][HK]
-----
***** Pile 8:[C2][H5][H8][SJ][D4][D9]
-----
```

Rules

❖ Movable Card

freecell or rightmost cards

❖ Movable String of Cards

descending order of alternative colors

❖ Move one card

Free Cell

Foundation

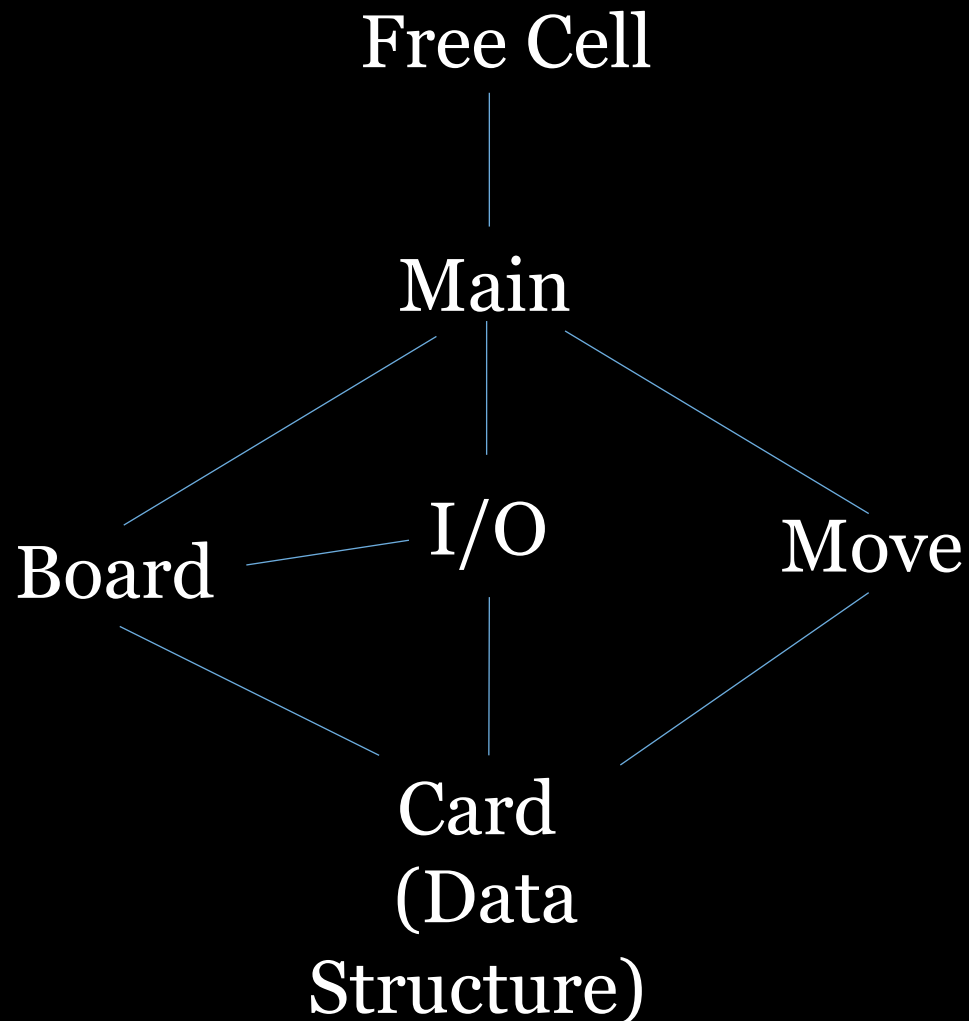
Pile

❖ Move multiple cards

Pile \leftrightarrow Pile

```
-----Free Cell-----||-----Foundation-----
| NA | | NA | | NA | | NA | || | H0 | | S0 | | D0 | | C0 |
|----| |----| |----| |----| || |----| |----| |----| |----|
***** Pile 1:[S6][HT][D9][HA][CJ][CT][D8]
-----
***** Pile 2:[H4][HJ][C2][D7][H8][C7][SA]
-----
***** Pile 3:[S5][CK][H6][S7][C3][H5][C6]
-----
***** Pile 4:[C8][H3][CA][D2][S2][SJ][C5]
-----
***** Pile 5:[DK][H2][H7][DT][D5][S3]
-----
***** Pile 6:[DQ][H9][SK][S9][DJ][D4]
-----
***** Pile 7:[DA][CQ][SQ][D6][HQ][S8]
-----
***** Pile 8:[C4][D3][ST][C9][S4][HK]
-----
```

High Level Design



Makefile

```
freecell: freecell_io.o freecell_board.o  
freecell_move.o freecell_main.c card.o  
        cc card.o freecell_move.o freecell_board.o  
freecell_io.o freecell_main.c -o freecell
```

```
io.o: freecell_io.h freecell_io.c freecell_board.h  
        cc -c freecell_io.c -std=c99
```

```
board.o: freecell_board.c freecell_board.h  
        cc -c freecell_board.c -std=c99
```

```
move.o: freecell_move.c freecell_move.h card.h  
        cc -c freecell_move.c -std=c99
```

```
card.o: card.c card.h  
        cc -c card.c -std=c99
```

Functionality

Board

- Setup_board
- Cleanup_board
- Shuffle_piles

I/O

- Get_and_parse_input
- Print_out_mannual
- Print_out_board

Move

- Move_one_card
- Move_multiple_cards
- Check_winning_status

Logic

Select Mode



Setup Board

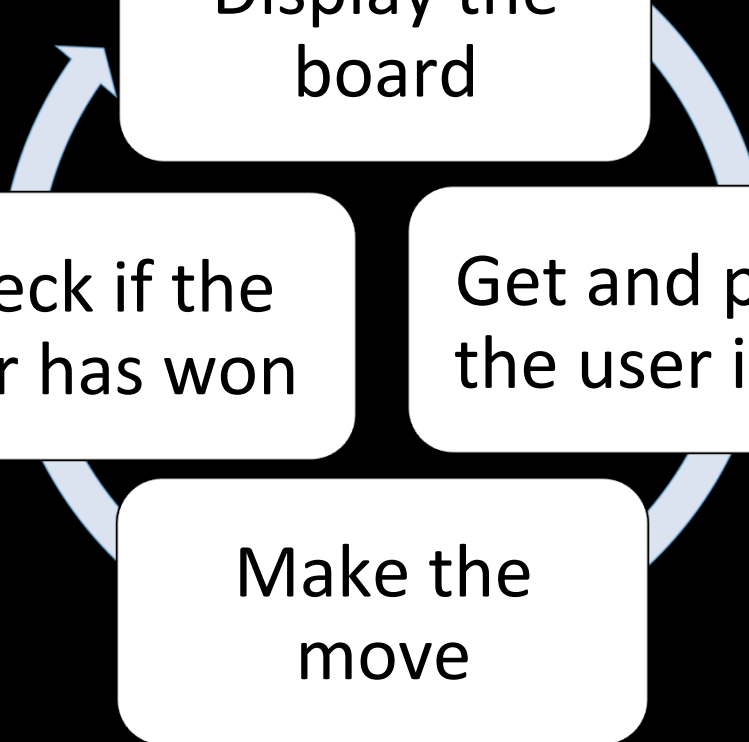


Display the
board

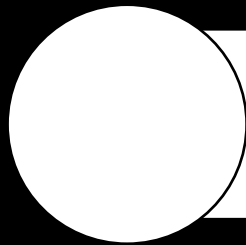
Get and parse
the user input

Check if the
user has won

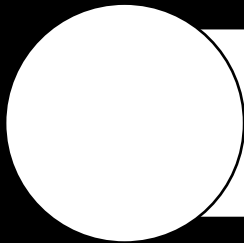
Make the
move



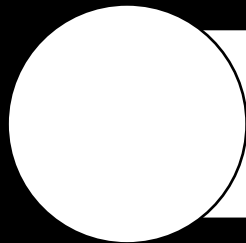
Data Structure and Highlights



Linked List, Array



Signal Handling



Shuffle Algorithm

ReadMe File

```
README - Notepad
File Edit Format View Help

FreeCell Solitaire README File
Created on 05/01/2014
Created by Siv Lu, Maggie Xiao
=====WELCOME=====

Thank you for playing our FreeCell Solitaire. This readme file contains
detailed information on how to play the game. It also contains design
decisions and implementation details.
=====

I. GENERAL INFORMATION
=====

WHAT IS FREECELL?
=====
FreeCell has been a popular card game for Microsoft windows for more than
two decades.
Our version is a text-based FreeCell Game which also has a board that mimics
the graphic-based board environment.
=====

GAME RULES
=====

                welcome to FreeCell Solitaire!

        on the board, you will see four free cells on the top left side of
the board, and four foundations on the top right side of the board.
        Initially, they are all empty. Your goal is to eventually move all the
cards on to the foundations so that each of the four piles has cards of
identical suit ordered in the same sequence in ascending suit sequence
from bottom to top.
        There are also eight piles of cards (originally 52 cards) facing up
which you can rearrange by following the legal moves:
=====
1) The card at the end of each list is free to be moved to the free cell.
However, it is better to keep the free cells empty if possible.
=====
2) One card can be moved from the end of one pile and placed on top of
another pile as long as the moved card is one lower in number than the top
card (the last card on the pile) of this other pile, and is of different
color than that top card. For example, you can move "Heart A"(red) on top
of "Spade 1"(black).
=====
3) In the case of more than one card are piled up in descending order on
the top of a list: for instance, Heart 5(red), Spade 4(black), Diamond 3
(red); you may move all three cards on top of a pile with top card Club 6
(black).
=====
4) Empty piles can be occupied by any card of your choice, yet do not waste
```

```
README - Notepad
File Edit Format View Help

5) Cards from the FreeCell and piles 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.
=====
6) The final goal of the game is either to have four piles of cards on
four piles ones each arranged in descending order from king to Ace, or the
cards are placed on four foundations based on suit in ascending order. You
may shuffle the cards if you are at a deadlock.
=====

COMPILATION
=====
1. Download or copy the file "freecell.zip" to your device.
2. Unzip the all documents
3. Open terminal and cd to the directory that contains all files
4. To compile, type "make freecell"
5. The output executable file is called "freecell"6. To clean up, type "make clean"
=====

CHOOSE A MODE
=====
You can choose to play the game with a timer or not.

1. type "./freecell" to play the version that is not timed
2. type "./freecell -t" to play the timed version. You will have 5 minutes
to finish the game. If you don't finish within 5 minutes, you will lose.
=====

MOVE CARDS
=====
There are two ways to move a card, or a series of cards.

1. Type just the "card", to move a card either at the end of a pile or in
freecell. The program will firstly check if this selected card can be
moved to foundation, and if it can, it will move the card to foundation.
Otherwise this card will be moved to FreeCell, if there is slot left. If
both conditions fail, the program will print out an error message.

2. Type "card pilenum" to move a card at the end of a pile, or a card that is
in the middle of a pile along with the cards following it to another
pile, specified by "pilenum".

Note that the "card" should be a initial of a suit in capital, followed by
a number. The number specifies the value of the card. Some special ones are
Ace, Ten, Jack, Queen, King, which are represented as 'A', 'T', 'J', 'Q' and
'K'. Also note that "pilenum" should be an integer value between 1 and 8.
=====

BUILTIN COMMANDS
=====
o "shuffle": to shuffle the cards in piles. You have unlimited times to use
this command.
o "print": to print the board. Sometimes your screen can be filled with too
```

How to Play our Game

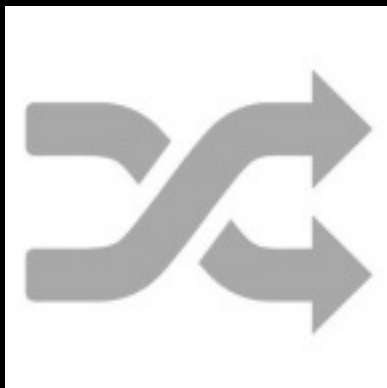
1. Type "Card"

- move to foundation
- move to freecell

2. Type "Card Pile Number"

- move one card
- move multiple cards

Features



SHUFFLE



MANUAL



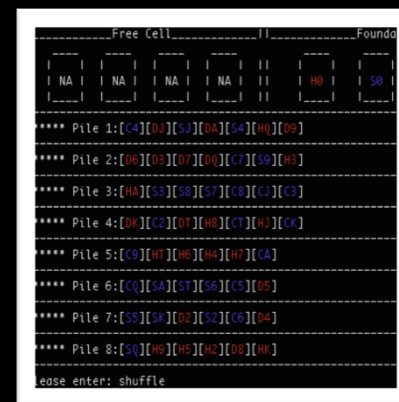
SOUND



TIMER



COLOR



RETRIEVE