Project Demo

Project: Straight

Group Member: Yuqi Bai (20849507, y78bai)

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Before Starting

Run the Executable

The user can provide an optional integer argument seed, used to initialize the random number when starting the program. Games that are started with the same seed value have the same sequences of deals. If no seed is provided, the seed will be set to a random integer.

No seed provided.

```
D:\cs246\final>straights
```

A seed is provided.

```
D:\cs246\final>straights 246
```

Set Players

For each player, if we want it to be a computer player, press 1, 2, or 3 to set the level; if we want it to be a human player, press any other key. Computer players with different levels use different strategies, which will be illustrated later. After setting all players, the game starts. The player with the 7 of the spades goes first.

```
D:\cs246\final>a
Is player1 a human or a computer?
Press 1, 2, or 3 to set the level of computer;
Press any other key if this is a human
1
Is player2 a human or a computer?
Press 1, 2, or 3 to set the level of computer;
Press any other key if this is a human
2
Is player3 a human or a computer?
Press 1, 2, or 3 to set the level of computer;
Press any other key if this is a human
3
Is player4 a human or a computer?
Press 1, 2, or 3 to set the level of computer;
Press any other key if this is a human
h
A new Round begins. It's Player1's turn to play.
Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades:
Your hand: KC 2C TC JS AC 2H JH 6H 4H 7S 6D 8S 7H
Legal plays: 7S
```

Between Rounds

When the hands of all four players are empty, a round ends. It prints the cards that players discarded and calculates their scores. Then the deck is shuffled again and a new round begins.

```
Cards on the table:
Clubs: A 2 3 4 5 6 7 8 9 T J Q K
Diamonds: A 2 3 4 5 6 7 8 9 T J Q K
Hearts: 4 5 6 7 8 9 T J Q K
Spades: 3 4 5 6 7 8 9 T J Q K
Your hand: 3H
Legal plays: 3H
play 3H
Player4 plays 3H.

Player1's discards: 2H
Player1's score: 0 + 2 = 2
Player2's discards: 2S AH
Player2's score: 0 + 3 = 3
Player3's discards: AS
Player3's score: 0 + 1 = 1
Player4's discards:
Player4's score: 0 + 0 = 0
A new Round begins. It's Player2's turn to play.
Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades:
```

When a round ends, if anyone's score is at least 80, the ends. It prints the winner(s) and the program terminates.

```
Player1's discards: TD KD QH KS
Player1's score: 69 + 48 = 117
Player2's discards: 3D AD QS
Player2's score: 75 + 16 = 91
Player3's discards: JD QD KH
Player3's score: 42 + 36 = 78
Player4's discards: 2D
Player4's score: 67 + 2 = 69
Player4 wins!

D:\cs246\final>
```

```
Player1's discards: QH
Player1's score: 77 + 12 = 89
Player2's discards: 3D AD JH
Player2's score: 44 + 15 = 59
Player3's discards: KH
Player3's score: 29 + 13 = 42
Player4's discards: TH 2D 2H AH
Player4's score: 27 + 15 = 42
Player3 wins!
Player4 wins!

D:\cs246\final>
```

Command

Play

If it is valid to play the specified card, this card will be removed from the player's hand and placed on the table.

```
Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades: 7
Your hand: 7C QC 6C 5C 3C 9D 4S TH QS AS KD 4C 5S
Legal plays: 7C
play 7C
Player3 plays 7C.

Cards on the table:
Clubs: 7
Diamonds:
Hearts:
Spades: 7
```

We can also type the command like this:

```
Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades: 7
Your hand: 7C QC 6C 5C 3C 9D 4S TH QS AS KD 4C 5S
Legal plays: 7C
play
7C
```

or this:

```
Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades: 7
Your hand: 7C QC 6C 5C 3C 9D 4S TH QS AS KD 4C 5S
Legal plays: 7C
play 7 C
```

If the command is invalid, an error message will be printed. This player needs to type in a new command.

If this player has no legal cards to play, it prints as follows.

```
Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades: 7
Your hand: 2S JD KS AH 3S TS 5D 9C 9S TD 9H 5H 8C
Legal plays:
play 2S
Invalid! You have no legal cards to play. You must discard.
play KC
Invalid! You have no legal cards to play. You must discard.
```

If this player has some legal cards but the card he/she chooses is not legal, it prints as follows.

```
Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades:
Your hand: KC 2C TC JS AC 2H JH 6H 4H 7S 6D 8S 7H
Legal plays: 7S
play KC
Invalid! This card is not legal to play
play 0C
Invalid! This card is not legal to play
```

Command Discard

If it is valid to discard this card, this card will be removed from this player's hand and added to his/her discard pile.

```
Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades: 7
Your hand: 2S JD KS AH 3S TS 5D 9C 9S TD 9H 5H 8C
Legal plays:
discard 2S
Player2 discards 2S.

Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades: 7
Your hand: 7C QC 6C 5C 3C 9D 4S TH QS AS KD 4C 5S
```

We can also type the command like this:

```
Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades: 7
Your hand: 2S JD KS AH 3S TS 5D 9C 9S TD 9H 5H 8C
Legal plays:
discard J D
Player2 discards JD.
```

or this:

```
Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades: 7
Your hand: 2S JD KS AH 3S TS 5D 9C 9S TD 9H 5H 8C
Legal plays:
discard
J D
Player2 discards JD.
```

If the command is invalid, an error message will be printed. This player needs to type in a new command.

If this player has some legal cards to play, it prints as follows.

```
Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades: 7
Your hand: 7C QC 6C 5C 3C 9D 4S TH QS AS KD 4C 5S
Legal plays: 7C
discard 7C
Invalid! You can't discard a card because you have at least 1 legal play
discard KK
Invalid! You can't discard a card because you have at least 1 legal play
```

If this play has no legal cards but the card he/she chooses is not in hand, it prints as follows.

```
Cards on the table:
Clubs:
Diamonds:
Hearts:
Spades: 7
Your hand: 2S JD KS AH 3S TS 5D 9C 9S TD 9H 5H 8C
Legal plays:
discard 99
Invalid! This card is not in your hand
discard AS
Invalid! This card is not in your hand
```

Command Deck

This command prints the contents of the deck in order, 13 cards per line. Each line is a player's hand at the beginning of this round.

```
Cards on the table:
Clubs: 7
Diamonds:
Hearts:
Spades: 7
Your hand: 4D KH QH 2D AD QD 3D 3H 7D 8D 6S JC 8H
Legal plays: 7D 6S
deck
KC 2C TC JS AC 2H JH 6H 4H 7S 6D 8S 7H
2S JD KS AH 3S TS 5D 9C 9S TD 9H 5H 8C
7C QC 6C 5C 3C 9D 4S TH QS AS KD 4C 5S
4D KH QH 2D AD QD 3D 3H 7D 8D 6S JC 8H
```

Command Quit

This command terminates the program immediately

```
Cards on the table:
Clubs: 7
Diamonds: 5
Hearts:
Spades: 5 6 7 8
Your hand: 4D KH QH 2D AD QD 3D 3H 7D 8D JC 8H
Legal plays: 4D 7D
quit

D:\cs246\final>
```

Command Ragequit

In a player's turn, if he/she types in "ragequit", a level-2 computer player will take over from now on. Details about computer players and level will be demonstrated later.

```
Cards on the table:
Clubs: 7
Diamonds: A 2 3 4 5 6 7 8
Hearts: A 2 3 4 5 6 7 8
Spades: 5 6 7 8 9
Your hand: TD 2S JC QS 3S JS QD 9D
Legal plays: 9D
ragequit
Player3 ragequits. A level-2 computer will take over
Player3 plays 9D.
```

Unknown Commands

Unknown commands are ignored until a valid command is typed.

```
Cards on the table:
Clubs: 7
Diamonds:
Hearts:
Spades: 6 7
Your hand: KC 2C TC JS AC 2H JH 6H 4H 6D 8S 7H
Legal plays: 8S 7H
nothing
test
play 7H
Player1 plays 7H.

Cards on the table:
Clubs: 7
Diamonds:
Hearts: 7
Spades: 6 7
```

Computer Player

Level 1

Computer players either play or discard a card automatically in a turn, no other operation.

Level 1 computer players are noobs, they play the card with the <u>highest rank</u> if they have a legal play, or discard the card with the <u>highest rank</u> if they don't have a legal play.

* Discarding the card with the greatest rank seems to be the worst strategy, but I'm not sure about the strategy of playing cards.

Level 2

Level 2 is the intermediate level. If they have some legal cards, they play the <u>first</u> one; if they have no legal cards, they discard the <u>first</u> card in hand.

Level 3

Level 3 computer players are smart. They always play or discard the card that has the <u>lowest rank</u>. Again, I assume that playing a card that has the <u>lowest rank</u> is a good strategy.

Level 1 Demo

Here, all players are computer players of level 1.

```
Cards on the table:
Clubs: 7 8 9
Diamonds: 6 7 8 9 T J Q
Hearts: 7 8 9
Spades: 6 7 8 9 T J Q K
Your hand: 3H JC AS KH 5D 2D 3S KD
Legal plays: 5D KD
Player1 plays KD.

Cards on the table:
Clubs: 7 8 9
Diamonds: 6 7 8 9 T J Q K
Hearts: 7 8 9
Spades: 6 7 8 9 T J Q K
Your hand: 6C 2S JH 3D QH 3C 4S AH
Legal plays: 6C
Player2 plays 6C.

Cards on the table:
Clubs: 6 7 8 9
Diamonds: 6 7 8 9 T J Q K
Hearts: 7 8 9
Spades: 6 7 8 9 T J Q K
Your hand: 5H 2H 6H KC TC 5C TH 5S
Legal plays: 6H TC 5C TH 5S
Player3 plays TH.

Cards on the table:
Clubs: 6 7 8 9
Diamonds: 6 7 8 9 T J Q K
Hearts: 7 8 9 T
Spades: 6 7 8 9 T J Q K
Your hand: QC AD 4D 4C 4H 2C AC
Legal plays:
Player4 discards QC.

Cards on the table:
Clubs: 6 7 8 9
Diamonds: 6 7 8 9 T J Q K
Hearts: 7 8 9 T
Spades: 6 7 8 9 T J Q K
Your hand: 3H JC AS KH 5D 2D 3S
Legal plays: 5D
Player1 plays 5D.
```

Level 2 Demo

Here, all players are computer players of level 2.

```
Cards on the table:
Clubs: 3 4 5 6 7 8 9 T J Q
Diamonds: 4 5 6 7 8
Hearts: 4 5 6 7 8 9
Spades: 6 7
Your hand: TD KD JS 9S QH KS AC
Legal plays:
Player1 discards TD.

Cards on the table:
Clubs: 3 4 5 6 7 8 9 T J Q
Diamonds: 4 5 6 7 8
Hearts: 4 5 6 7 8 9
Spades: 6 7
Your hand: AS 3H JH 8S 2S 4S 9D
Legal plays: 3H 8S 9D
Player2 plays 3H.

Cards on the table:
Clubs: 3 4 5 6 7 8 9 T J Q
Diamonds: 4 5 6 7 8
Hearts: 3 4 5 6 7 8 9
Spades: 6 7
Your hand: JD KC 3S QD KH 5S
Legal plays: KC 5S
Player3 plays KC.

Cards on the table:
Clubs: 3 4 5 6 7 8 9 T J Q K
Diamonds: 4 5 6 7 8
Hearts: 3 4 5 6 7 8 9
Spades: 6 7
Your hand: AH 2H 2D 2C TS TH
Legal plays: 2H 2C TH
Player4 plays 2H.

Cards on the table:
Clubs: 3 4 5 6 7 8 9 T J Q K
Diamonds: 4 5 6 7 8
Hearts: 2 3 4 5 6 7 8 9
Spades: 6 7
Your hand: KD JS 9S QH KS AC
Legal plays:
Player1 discards KD.
```

Level 3 Demo

Here, all players are computer players of level 3.

```
Cards on the table:
Clubs: 4 5 6 7 8 9
Diamonds: A 2 3 4 5 6 7 8
Hearts: 6 7
Spades: A 2 3 4 5 6 7 8
Your hand: TD 3H QC QH JC JH 9S
Legal plays: 9S
Player4 plays 9S.

Cards on the table:
Clubs: 4 5 6 7 8 9
Diamonds: A 2 3 4 5 6 7 8
Hearts: 6 7
Spades: A 2 3 4 5 6 7 8 9
Your hand: 4H JD QD KC KH JS AH
Legal plays:
Player1 discards AH.

Cards on the table:
Clubs: 4 5 6 7 8 9
Diamonds: A 2 3 4 5 6 7 8
Hearts: 6 7
Spades: A 2 3 4 5 6 7 8 9
Your hand: QS AC 5H TH KS 9D 3C
Legal plays: 5H 9D 3C
Player2 plays 3C.

Cards on the table:
Clubs: 3 4 5 6 7 8 9
Diamonds: A 2 3 4 5 6 7 8
Hearts: 6 7
Spades: A 2 3 4 5 6 7 8 9
Your hand: 2H KD TC TS 9H 2C 8H
Legal plays: TC TS 2C 8H
Player3 plays 2C.

Cards on the table:
Clubs: 2 3 4 5 6 7 8 9
Diamonds: A 2 3 4 5 6 7 8
Hearts: 6 7
Spades: A 2 3 4 5 6 7 8 9
Your hand: TD 3H QC QH JC JH
Legal plays:
Player4 discards 3H.
```

Computer Players Comparison

When computer players play a game, usually a level 3 computer wins and a level 1 computer has the highest score, but not always.

Player 1 is a level 1 computer, player 2 is a level 2 computer, player 3 and 4 are level 3 computers. To clearly demonstrate the difference, the score limit is changed from 80 to 5000.

```
Player1's discards: KH KC QH JH TH
Player1's score: 4993 + 59 = 5052
Player2's discards: 9H QC
Player2's score: 4726 + 21 = 4747
Player3's discards: AS AD
Player3's score: 3531 + 2 = 3533
Player4's discards:
Player4's score: 3291 + 0 = 3291
Player4 wins!

D:\cs246\final>
```