

Project Name: Texas Hold'em

Team Number: 4

Overview:

A one player card game. The player plays against a computer player with a selectable difficulty. Texas Hold'em is a card game where players are dealt two cards and must make a hand out of those two cards and five community cards. Whoever has a better hand wins, better meaning a hand that is higher on the list of poker hands, or has a higher value if they are the same hand (like both having two of a kind for example). There are several points during the game where a player has several options, to fold or stop playing this hand, to raise or add money to a bet, and to call or match a bet.

At the end of a hand it is determined who wins based on the overall value of the hand vs the other players. When a winner is determined the proper payout is sent to the winner and the deck is shuffled and a new hand is dealt, and the game begins again.

Functional Requirements:

FR1: Upon running the program, the user is asked to input a username.

FR2: After a username is entered, the user's net profit is displayed and the user is prompted to select stakes, buy-in amount, bot difficulty level (or type), and bot buy-in amount (can be different from player buy-in amount).

FR3: Before the game starts, the bot and the user are each dealt a card from a shuffled deck. The highest valued card determines who has dealer position for the first hand. Aces are high. A tie is broken by suit rank (descending alphabetical order).

FR4: The player in the dealer position posts the small blind. The other player posts the big blind. These bets are determined by the stakes that were selected.

FR5: Two cards are dealt to each player to begin the Preflop betting round. The bots cards are face down. The users cards are face up (but only visible to the user).

- A. If the user is in the dealer position, he/she is prompted to either fold, call, or raise.
 - a. A raise size cannot be less than 2x the current bet (for any raise on any round).
 - b. If the user raises, the bot acts based on the provided difficulty logic ...
- B. If the user is not in the dealer position, the bot will act first based on the provided difficulty logic.
 - a. If the bot raises, the user is prompted to either fold, call, or raise.
 - i. If the user raises, the bot acts based on the provided difficulty logic...
 - b. If the bot calls, the user is prompted to either check or raise.
 - i. If the user raises, the bot acts based on the provided difficulty logic...

C. The betting round continues until either condition is met: (Action closed)

- a. A player folds. In this case, the money from the pot gets moved to the money in front of the non-folding player (aka their stack), the dealer position moves, a new hand is dealt, and the Preflop betting round for this new hand begins.
- b. Within the given betting round, both players have acted at least once and have committed an equal number of chips. In this case, the Preflop betting round is over and the hand moves to the next round.

FR6: If the hand is to move to the next round, three community cards are dealt face up in between the players to begin the Flop betting round

- A. If user is NOT in the dealer position, he/she is prompted with action options (check or bet).
 - a. The bot acts based on difficulty logic.
- B. If the user IS in the dealer position, the bot acts first based on difficulty logic.
 - a. If the bot checks, the action options for the user are check or bet.
 - b. If the bot bets, the action options for the user are fold, call, or raise.
- C. The round continues until the action for the round has become closed, which is determined by the conditions found within FR:5.C.

FR7: If the hand is to move to the next round, an additional community card is dealt face up in between the players to begin the Turn betting round. This round is functionally equivalent to the Flop betting round (FR6).

FR8: If the hand is to move to the next round, one final community card is dealt face up in between the players to begin the River betting round. This round is functionally equivalent to the Flop and Turn betting rounds (FR6).

FR8: If neither player has folded after the action has become closed in the River betting round, the bot's cards are revealed and the money in the pot goes to the player with the best 5 card poker hand. A player's hand is composed of the best possible 5 card combination of his/her own cards and the community cards. Hand rankings are as follows:

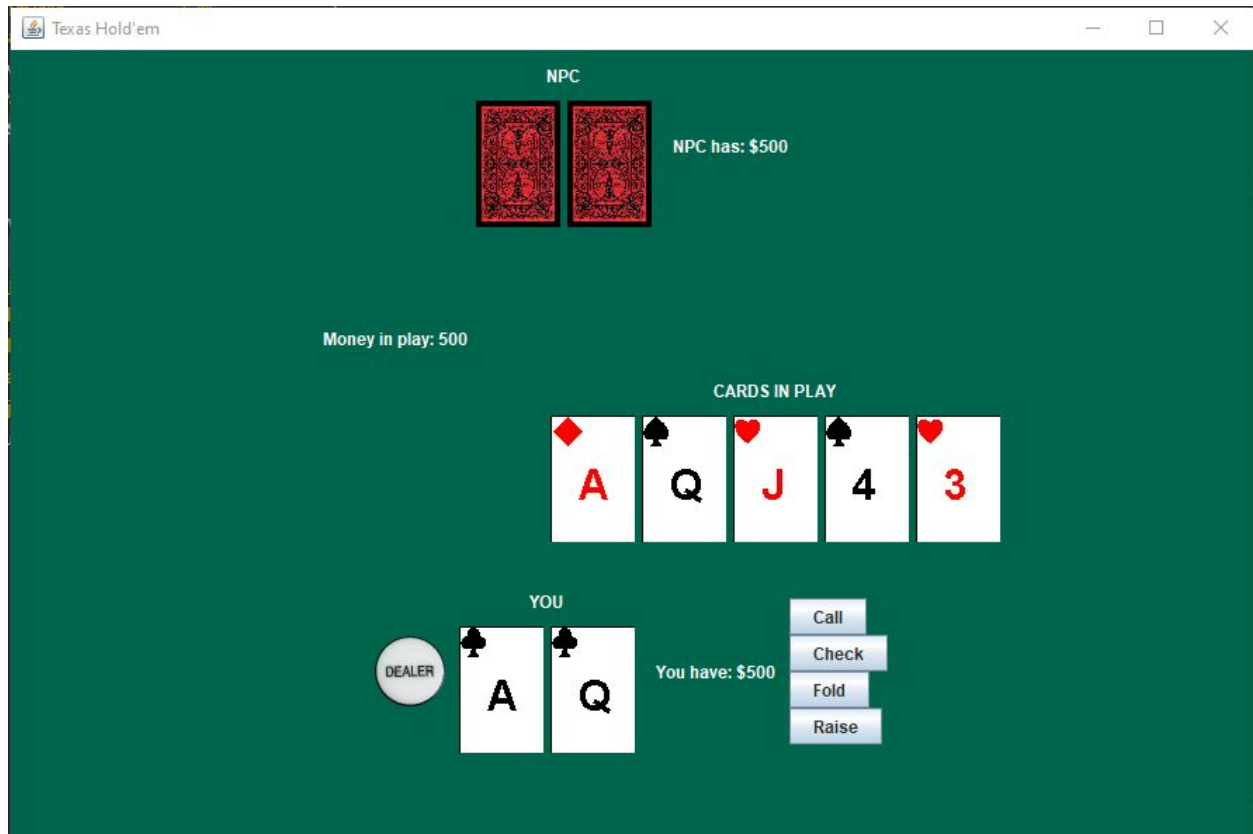
- A. High Card
 - a. A hand that does not meet the requirements of any of the below rankings. Aces are high.
 - b. If there is a tie, the next highest card is checked recursively to break the tie.
- B. One Pair
 - a. A hand that contains two of the same card value.
 - b. A pair of a higher card value beats a pair of a lower card value.
 - c. If both players have the same pair, the player with the highest remaining card wins. This high card is checked recursively.
- C. Two Pair
 - a. A hand that contains two of the same card value for two distinct values.
 - b. The highest pair within the two pairs determines the best hand. If both players have the same highest pair, the value of the lowest pair determines the best hand. If these are also equivalent, the remaining high card breaks the tie.
- D. Three of a Kind
 - a. A hand that contains three of the same card value.

- b. Three of a kind of a higher card value beats three of a kind of a lower value.
 - c. If there is a tie, the remaining high cards are checked recursively to break the tie.
- E. Straight
 - a. A hand which has cards that are consecutive in value.
 - i. Aces can be treated as high OR low.
 - 1. A2345 qualifies.
 - 2. TJQKA qualifies.
 - 3. However, QKA23 does not.
 - b. If both players have a straight, the straight with the highest card wins.
- F. Flush
 - a. A hand whose cards all share the same suit
 - b. If both players have a flush, the highest card is checked recursively to break the tie.
- G. Full House
 - a. A hand composed of three of one card value and two of another card value.
 - b. If both players have a full house, the highest value for the three shared values within the hand breaks the tie. If this value is the same for each player, the highest value for the pair within the hand breaks the tie.
- H. Four of a Kind
 - a. A hand composed of four of one card value.
 - b. If both players have four of a kind, the highest value within the four equivalent cards determines the winner. If both players have the same four equivalent cards, the remaining high card breaks the tie.
- I. Straight Flush
 - a. A hand composed of cards consecutive in value and of the same suit.
 - b. If both players have a straight flush, the highest card within the hand breaks the tie.

FR10: Hands are continued to be dealt and played until the user clicks the quit button. If the user quits, the original buy-in amount is subtracted from the current amount of money in front of him/her and is added to the user's net profit which will be displayed the next time the user logs in.

User Interface Prototype:

(Include a screenshot of the user interface prototype, developed using Java SWING API)



User Interface Requirements:

UIR1: When the user hits the 'Call' button, the FR6-9 is called depending on the state of the game.

UIR2: When the user hits the 'Check' button, the FR6-9 is called depending on the state of the game.

UIR3: When the user hits the 'Fold' button, the FR6-9 is called depending on the state of the game.

UIR4: When the user hits the 'Raise' button, the FR6-9 is called depending on the state of the game.

UIR5: The 'CARDS IN PLAY' will update with each turn to reflect the number of cards in play, either 0, 3, 4, or 5.

UIR6: The 'Money in play' will update with each turn to reflect the amount that has been bet.

UIR7: The NPC money count and user money count will update with each turn.

UIR8: The user's and bot's bet amount will reflect the total amount of the bet for each betting round.

UIR9: The dealer position is graphically indicated with a dealer chip.