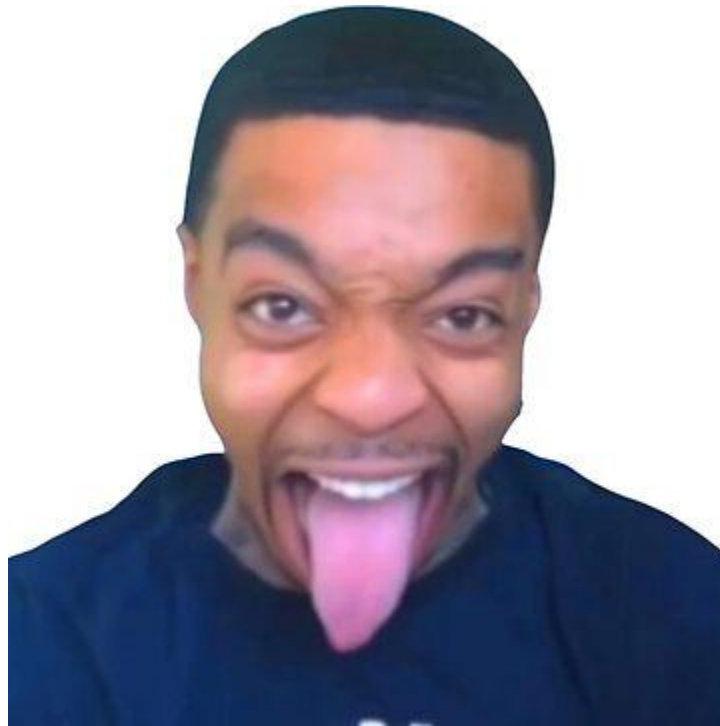


FTC Poker

v0.1



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Glossary:

Poker Rules:

The dealer hands out two cards to each player. Each player places bets in a clockwise direction from the dealer. The first player(left of the dealer) establishes a starting bet which the next player can **call**, **fold**, or **raise**. If a player chooses to **fold**, the game continues without them. If a player chooses to **raise**, the current bet amount is raised to the player's desired amount on top of the existing bet. Once each player has placed a bet, the first round of the game has been completed. The dealer then places three cards facing up in the middle of the table. For each consecutive round, an additional card is placed until a maximum of five cards is reached. Once all five cards are placed, each player compares their two cards with the cards on the table. The winner of the round is determined by the player with the best **hand**. The game continues until one player wins all the points, leaving no remaining points among other players. This player is declared the winner of the game.

Poker Terms:

Rank:

The rank of a card is denoted as A, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, and K.

Suit:

The suit of a card is denoted as spades, clubs, diamonds, and hearts.

Pot:

The total amount wagered by each player added up. Winner of a round is awarded with the pot.

Call:

When a player matches a bet amount during a betting round.

Check:

When a player chooses not to raise or fold, however, they can still fold, call, or raise later in the same round.

Fold:

When a player chooses to forfeit the round and discard one's hand.

Raise:

When a player increases the bet of the current round. This is usually done when a player has a strong hand and is hoping to convince the opposing players that they have a weak hand and that they should fold. This tactic can also be used even if the player doesn't have a strong hand and is referred to as a **bluff**.

Dealer:

Every round, the responsibility of the dealer will rotate clockwise by 1. The dealer is in charge of distributing the cards and handling the bets placed by players. The dealer can still participate in the round.

Big Blind:

Every round, a player that is two positions to the left of the dealer has a mandatory bet to place into the pot. This guarantees that there is something to play for each round. 2

Small Blind:

One position away from the big blind, they also have to place a mandatory bet half of the big blind to help make the pot worth playing for. The small blind will also move clockwise each round by 1 player.

Hands:

Hands are listed in order of highest to lowest strength.

Royal Flush:

This hand includes a 10, Jack, Queen, King, and Ace of the same **suit**(all diamonds, clubs, hearts, or spades). If a player has a royal flush hand, then they are automatically the winner of the round.

Ex:



Straight Flush:

This hand includes 5 consecutive cards in sequence made up of the *same suit*. In the example given, the hand consists of 5 cards from 4-8, and all are clubs, so it is a straight flush.



4 of a Kind:

This hand includes 4 cards of the *same rank* and a fifth card of *any rank*. In the example given, the hand consists of 4 jacks and 1 7, so the jacks make up a 4-of-a-kind.



Full House:

This hand includes 3 matching cards of 1 **rank** and 2 match cards of another **rank**. In the example given, the hand consists of 3 10's and a pair of 9's, creating a full house.



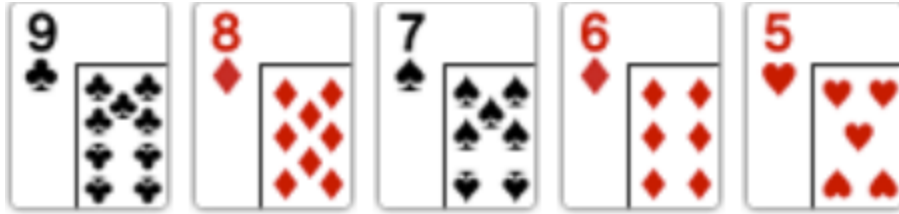
Flush:

This hand includes any 5 cards of the same **suit**, but not in sequential order. In the example given, the hand consists of only spades, which create a flush.



Straight:

This hand includes 5 cards of consecutive **rank** but from more than one **suit**. In the example given, the hand consists of 5 cards in sequence, but are not of the same suit, making a straight.



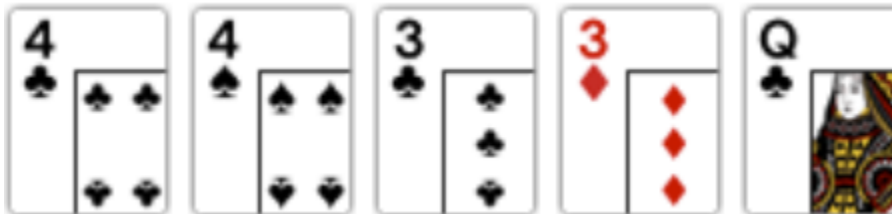
3 of a Kind:

If a player has a hand consisting of 3 cards of the same **rank**, the player has a **3 of a kind**. In the example below, the hand consists of 3 7's, which constitute a 3 of a kind.



2 Pair:

If a player has two pairs of distinct ranks, then the player has a **2 pair**. In the example below, the hand consists of a pair of 4's and a pair of 3's, which constitute a 2 pair.



Pair:

If a player has a hand consisting of two cards of the same **rank**, the player has a pair. In the example below, the hand consists of two aces, which constitute a pair.



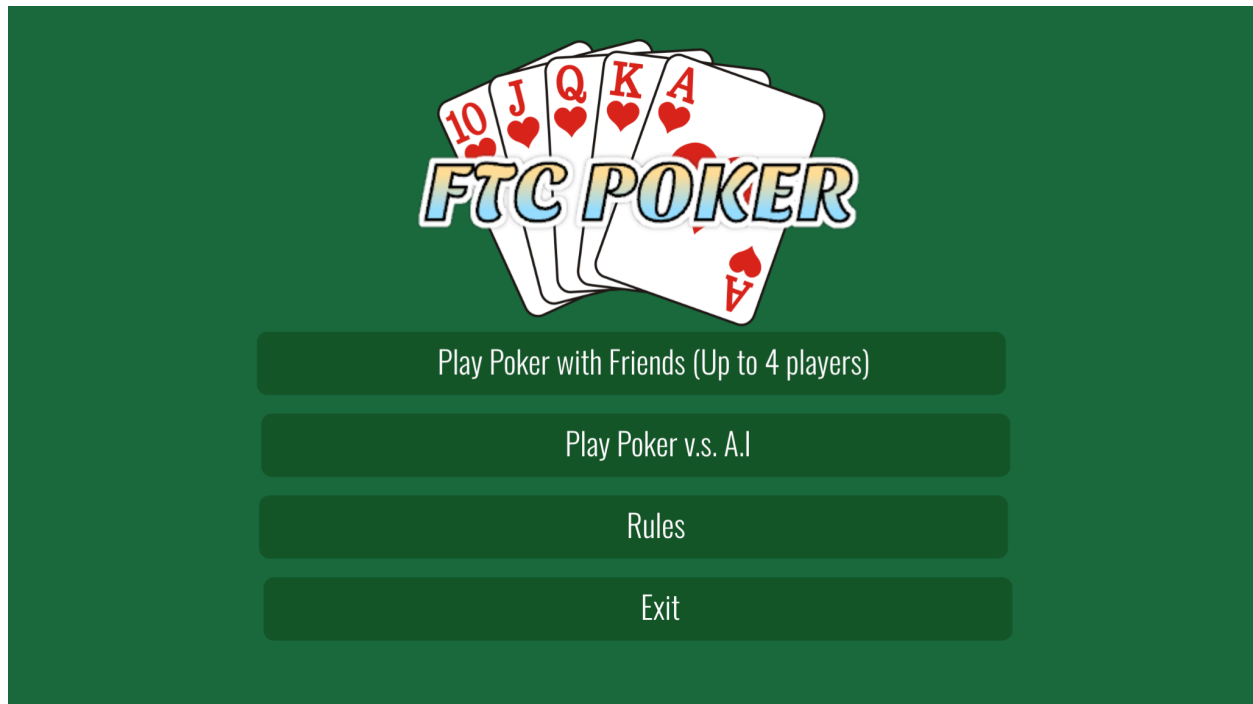
High Card:

When a player's hand does not match any of the hands listed above, the highest card is used to compare with other players. In the example below, there are no combinations for the hand, so the highest card, the jack, is played.

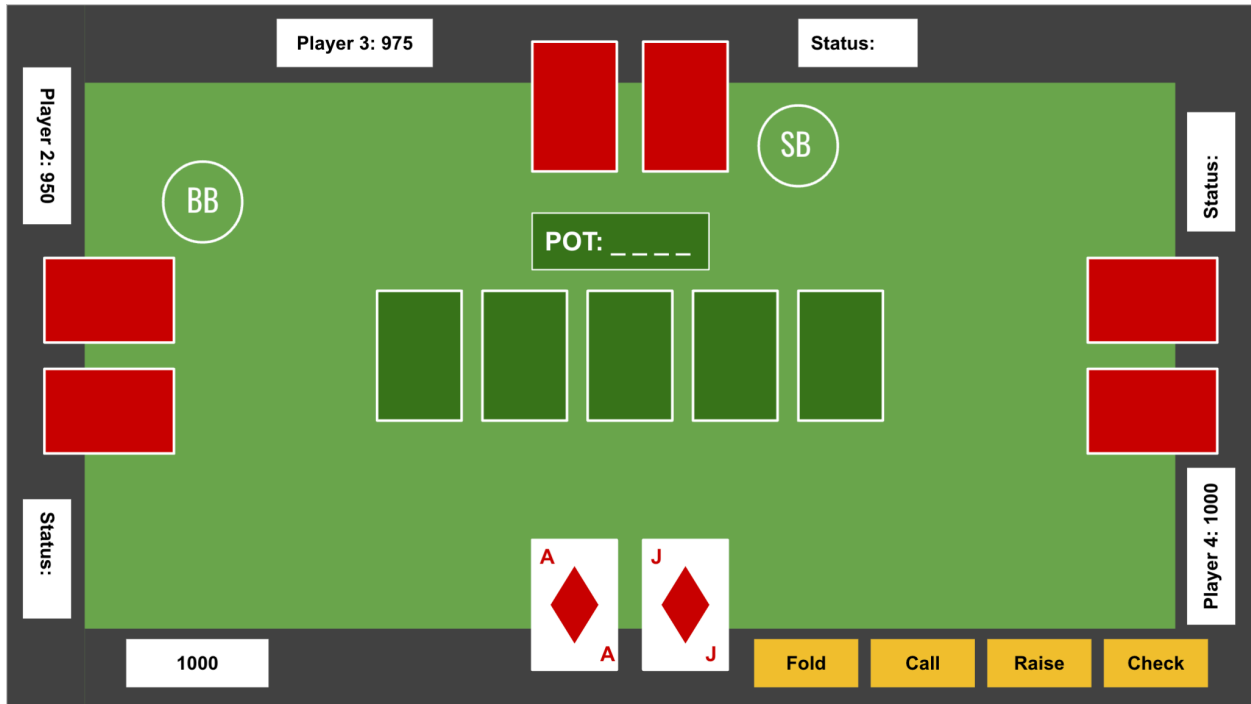


Online Poker:

1.1 Usage scenario (+ sketch of a typical screenshot)



The poker program will prompt the user to select an option from the main menu. The options allow the user to play with friends (up to 4 players including the user) as well as play against an A.I. poker bot. The rules option allows the user to view the rules of poker and the exit option exits the program.



A square table is generated with a player on each side of the table. The user can only see their cards. Alternatively, all players can see the balance of each player in the game, who the big/small blind is, and the total amount in the pot.

1.2 Goals

- Create a software program where a user can interactively play poker against a computer and/or friends through the internet.
- Create a working and interactive GUI to go along with our game
- Implement the basic functions listed under 2.1 in the program specifications
- Teamwork
 - Distribute tasks evenly among team members
 - Work efficiently amongst each other
 - Collaborate respectfully and professionally
- Meet all deadlines
- Implement the optional advanced options
- Have fun!

1.3 Features

Game interface:

- Check button
- Raise button

- Fold button
- Call button
- GUI implementation
- Turn-based gameplay(up to 4 players)

Menu:

- Player versus Players
- Player versus AIs
- Rules
- Exit

Implementation:

- Menu
- Menu Options
- User v.s AI
- User chooses color
- Create Chessboard
- Create Pieces
- Create Functionality for each pieces
- Check win conditions
- Check legal moves
- Castling
- En Passant

Installation:

2.1 System Requirements

- Operating system: Linux Red Hat Enterprise Linux (RHEL) Technology 7 or 8
- Hardware: PC Hardware (x86_64 server)
- Dependent Libraries
 - Math Library
 - Standard C Library
 - GTK 2.0 Library installed (for graphics)
- Disk space: estimated ~10 MB, less than 2GB

- I/O: Mouse
 - Keyboard may be used for some initial implementation.

2.2 Setup and configuration

- Launch any program that can run linux and connect to the EECS Linux servers
 - crystalcove, zuma, bondi, laguna
- Download the .gz package by typing: `tar -xvzf Poker V1.0 src.tar.gz`
- Extract the files from the compressed package
- Change the directory to src: type `cd Poker V1.0 src`
- Type "make" to start the engine
- Type `./poker` to start the chess game

2.3 Uninstalling

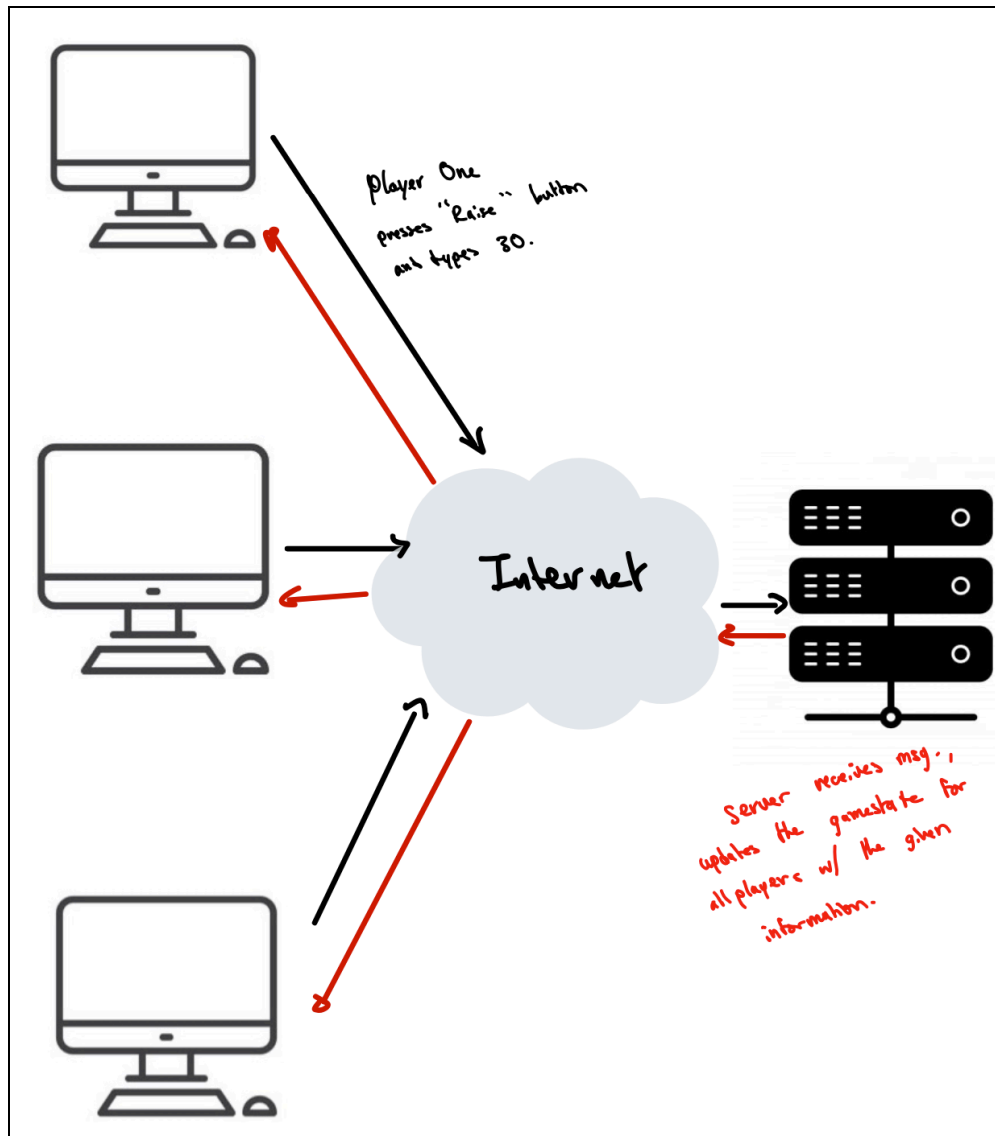
- Installation and uninstallation will be done using Linux terminal.
 - Type `rm -rf Poker V1.0 src.tar.gz`

Poker Program Functions and Features:

User input + program output + screenshot

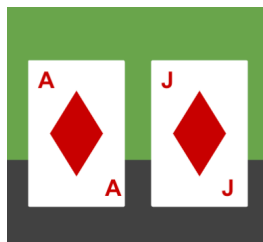
3.1 Client / Server Communication Function

- User input: Starting program initializes client, user must connect to proper server / port. Every following function in this section will be from the client side.
- Program Output: Server establishing connections with the players and taking in user input to change the gamestate of players. Essentially, the functions below will send a unique message to the server, which will then adjust the gamestate accordingly.
 - Ex: When a player decides to raise, the client side will send a message along the lines of `PLAYER_3 CHOICE_2 RAISE_20`, which tells the server to call the `PlayerAction` function to adjust the values of `player3` as well as the pot and update the gamestate.
- Basic graphic of client / server communication concept:



3.2 CreateDeck Function

- User Input: N/A, from initialization
- Program Output: Creates a deck of 52 unique cards for dealing.
- Deck will contain pointer to suit and rank for each deck count
- Deck itself will contain the array of deck count



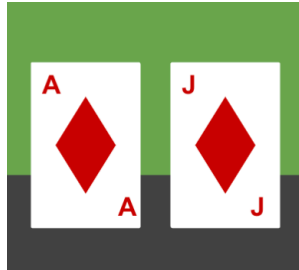
3.3 ShuffleDeck Function

- User Input: N/A, deck is automatically shuffled at the start of each round.
- Program Output: Shuffled deck of cards (shown below) next to player action buttons



3.4 DealHand Function

- User Input: N/A, start of each round
- Program Output: Dealing the initial hands for each player
 - After dealing initial hands for each player, the deck should remove handed cards from the array and move the count of next cards by index of -1



3.5 CreateTable / DeleteTable Function

- User Input: N/A, initializes with program / round starting.
- Program Output: Deals cards to each player, 2 cards in the middle, and initializes all the point values and actions + other misc items.



3.6 Menu Function

- User Input: Selection of menu choice + desired orientation of user
- Program Output: Generates Poker Table with specifications.
 - If Poker w/ Friends is selected, the user is prompted w/ their desired orientation as well as an inputted username. This mode supports up to 4 players including the user, with the empty spots being replaced with AI bots.
 - If Poker vs. AI is selected, the user chooses their desired orientation, and the other 3 seats are filled with AI bots.
- Main Menu Screenshot:



3.7 PlayerAction (Check, Call, Raise, Fold, etc.) Functions

- User Input: Clicking on the respective action button (mainly Check, Call, Raise, or Fold).
- Program Output: Program updates the user's points as well as the overall pot based on what action was made.
- Screenshot: Initial Action options: Prompting user how much points they want to bet if raise is called



3.8 HandCheck Function

- User Input: N/A, runs after each round to see valid players.
- Program Output: Returns if the player has any possible hands to play or not (aka if they have folded or are still in the game).

3.9 InitialBet Function (pre-flop round)

- Assigns big or small blind to specific player
- Small blind: determines the initial bet
- Big blind: bets the double of small blind
- Big blind and small blind are unable to fold
- Orientation clockwise, starting from small blind
- Call - bets the same amount as big blind
- Raise - bets greater than 2 times of big blind's bet
- Fold - Player willingly concedes the round, does not gain or lose any money
 - Game will continue without that player
- Function will display what the users choice was
 - Ex. "Player 1 has folded!"

3.10 Bet function (flop round)

- Call - bets the same amount as previous player
- Raise - bets greater than 2 times of previous player's bet
- Check - Player chooses not to bet, however, player cannot choose check option if previous player bets
- Fold - Player willingly concedes the round, does not gain or lose any money
 - Game will continue without that player
- Function will display what the users choice was
 - Ex. "Player 1 has folded!"

3.11 RoundFunction (from preflop -> flop -> turn -> river round)

- Each round ends when all players have made an action and they bet same amount of money (either check or call)
- Increment the integer round when condition is fulfilled
- Each integer would represent the round (flop, turn, river)

3.12 Winner/Payout Function

- When RoundFunction returns integer of river round + 1, gives points to the winner from the collected pot
- Winner will be determined by the poker hand hierarchy
- If players have same card hierarchy, tie breaker function is called

3.13 Tie breaker function

- When users have the same card hierarchy, it follows the rules below. Also explained in the glossary section.

High Card: If no other hand combination is present, the player with the highest card value wins.

Pairs : If one or more players have a pair, the player with the next highest card wins.
(Kicker)

Two pairs : If top pairs are equal, the player with the highest second pair wins. If both pairs are equal, the condition from pair (Kicker) breaks the tie.

Three of a kind : Higher ranking pair wins

Straights : Straights with highest ranking card wins

Flush : Flush with highest ranking card wins. If highest ranking cards are the same, next highest card is being compared

Full House : Higher ranked set of three cards wins

Four of a kind : Higher ranked set of four cards wins

Royal Flush : Split the pot between royal flushes

Returns winner and pot amount

3.14 AI Poker Bot Function

- User Input: If player selects User vs. AI in menu function
- Program Output: Will generate 3 AI bots to play with the player, will make valid moves, has the same choices as the user and will make decisions based on hand generated.

3.15 GUI Function

- User Input: N/A, initializes with program start
- Program Output: Displays a GUI interface for all the functions listed above, allowing the player to click on buttons to prompt some action instead of manually typing on their keyboard.
 - GTK 2.0 Library will be used

Back Matter:

Copyright:

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Error Messages:

- Include possible common errors/user error?
- If an incorrect/invalid option is selected: print "Invalid option! Try again."
- If time runs out: print "time is out" → Auto folds
- If any invalid action is made, display the error message "Invalid option!".
 - Ex: If a bet is made that exceeds the user's own point value, then the program will display an error message.

Index:

Hand **3-6, 15**

Check **3, 8, 12, 13, 14**

Raise **3, 8, 10, 13, 14**

Fold **3, 13, 14**

Call **3, 9, 14**

Big Blind **4, 14**

Small Blind **4, 8, 14**

High Card **6, 14**

Pair **6, 14**

Two Pair **6, 14**

Three of a Kind **6, 15**

Straight **5, 15**

Flush **5, 15**

Full House **5, 15**

Four of a Kind **5, 15**

Straight Flush **4, 15**

Royal Flush **4, 15**

Pot **3**

Payout **14**

Client **10**

Server **9, 10**

GTK Library **9, 15**