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Developer: Kris Nickeson
Project: BlackJack ("21")

1.0 Background Information / Current Status:

BlackJack ("21") is a well-known card game played throughout the world. I will be building a multi-player, multi-lingual, text-only (Terminal Window) version. The Players individually compete against the Dealer, but not against each other. A Player beats the Dealer by getting a higher score than the Dealer without going over 21. Game play continues while Player(s) maintain a positive Bank Balance and have not chosen to Quit, or until the game is exited. Currently this version of the game has not undergone any development.

2.0 Terminology:
- 'Hand' – Total of Player's cards. Also refers to each 'round' of game play between deals
- 'Hit' – Dealer provides Player with another card
- 'Stand' – Player takes no more cards and is no longer 'Active' for that Hand
- 'Bust' – Player's Hand total exceeds 21
- 'Push' – Player and Dealer both have a matching score at the end of all game play
- 'Natural' 21 – Player has only two cards: Ace (11pts) and any Face-Card (10pts), totaling 21
- 'Shoe' – Dealer's device to hold multiple decks of cards

3.0 Possible Unique Outcomes of a Hand:
- Player Bust – Player Loses amount of their bet to 'The Bank'
- Dealer Bust – Player Wins amount of their bet from 'The Bank' and keeps original bet $
- Push – No bet $ won or lost by Player: A 'Tie' between Player and Dealer
- Player 'Natural' 21 (No Push) – Player wins 1.5x amount of their bet from 'The Bank' and keeps their original bet $

4.0 Goals and Objectives (Requirements):

Objective 1: Game Configuration File
> 1.1: The game will allow the following configurable parameters to be stored in a local 'config' file
>> 1.1.1: "0" (in quotes) as a config file parameter value informs game to use default value
>> 1.1.2: Language – defaults to English, configurable per player
>> 1.1.3: Number of Players – defaults to 1 in addition to the Dealer
>> 1.1.4: Number of Decks in Shoe – defaults to 6, with a minimum of one, maximum of 8
>> 1.1.5: Player(s) Balance ($) – defaults to $50
>> 1.1.6: Accrued Winnings Limit ($) – defaults to $500
>> 1.1.7: Minimum Bet ($) – defaults to $5
>> 1.1.8: Maximum Bet ($) – defaults to $50
>> 1.1.9: Shuffle Marker – defaults to a random number between 20% (minimum) and 30% (maximum) from end of 'shoe'

Objective 2: Actors

2.1: Player(s) – There will be a Minimum of 1 Player, Maximum of 8 Players in addition to Dealer

2.1.1: Dealer is also a Player and will be played by the computer

2.1.2: Dealer has specific rules that must be followed (see Objectives 6.3.5 – 6.3.9)

Objective 3: Equipment

3.1: Deck of Playing Cards

3.1.1: Deck consists of 52 cards: 13 each, of 4 suits – Hearts, Diamonds, Spades, Clubs

3.1.2: No Jokers will be included in this game

3.1.3: Cards are not shuffled between each Hand

3.1.4: Once enough cards have been dealt that the Shuffle Marker is reached, all cards not in active play are shuffled and the marker is re-placed according to a setting in the game's config file

Objective 4: Betting and Bet Settlement

4.1: Available Bet Values: $1, $5, $25, $100 (Max Bet value stored in config file)

4.2: Player(s) Balance ($) can be stored and retrieved using the game's config file

4.3: Bets are placed at the beginning of each Hand, prior to the Hand being dealt

4.4: Bet Settlement (see Section 3.0 'Possible Unique Outcomes of a Hand')

4.4.1: Occurs at the end of each Hand, or when a Player Busts or Wins with 'Natural' 21

4.4.2: Completed automatically by Dealer (computer) on behalf of 'The Bank'

4.4.3: After a Player Busts and their bet is collected, the bet is never returned, even if the Dealer later loses the Hand to another Player or Busts

Objective 5: Score Calculation

5.1: Card Values are 2, 3, 4, 5, 6, 7, 8, 9 and 10, all scoring the same number of points as the card's value. Jack, Queen and King all score 10 points

5.2: Aces will be implemented as two possible scores: 1 or 11 points

Objective 6: Game Play

6.1: Deal – Proceeds Clockwise from Dealer's left for all Players with Balance > $0 and not 'Quit'

6.1.1: Dealer provides one card to each Player, displaying card's value (face-up)

6.1.2: Dealer takes one 'Hole' card, without displaying its value (face-down)

6.1.3: Dealer provides a 2nd card to each Player, displaying card's value (face-up)

6.1.4: Dealer takes a 2nd card, displaying card's value (face-up)

6.1.5: Optionally Implemented 'Side Rules' are exercised here (see Goal 1.1.1 – 1.1.6)

6.2: Play Loop – Clockwise from Dealer's left until each Player Stands or Busts (marked 'Inactive')

6.2.1: Perform Score Calculation for Players

6.2.2: Determine remaining Active Player(s)

6.2.3: Dealer must check for 'Natural' 21 if their face-up card is Ace or 10pts – (10,J,Q,K)

6.2.4: On 1st Score Calculation after deal – if one Player has a 'Natural' 21, all Players without 'Natural' 21 (including Dealer) Lose this Hand and are marked 'Inactive'

6.2.5: 'Win' Message for Player(s) with 'Natural' 21 (assuming no Push) → exit Play Loop

6.2.6: If Player has 'Natural' 21 and Dealer also has 'Natural' 21 (Push) → exit Play Loop

6.2.7: Prompt Active ('non-Dealer', 'non-Quit') Player: "Hit or Stand?"

6.2.8: Player enters their move (Hit or Stand)

6.2.9: Play Loop moves back to 6.2.1 while Player is marked 'Active'

6.2.10: Play Loop moves to next Player after Player is marked 'Inactive' (Bust or Stand)

6.2.11: Dealer play begins after other Player(s) are Standing or have Busted ('Inactive')

6.2.12: Display Dealer's 'Hole' Card value at start of Dealer play

6.2.13: Dealer's moves are displayed to other Player(s) as they happen

6.2.14: Dealer must Hit when Dealer's Hand <= 17

6.2.15: Dealer must Hit on 'soft' Hand (with Ace=11, Dealer Hand <= 17), and use Ace=1

6.2.16: Dealer must Stand when their Hand exceeds 17 (without Busting)

6.2.17: Play Loop exits once Dealer has Stood or Busted ('Inactive')

6.3: Display Win / Bust / Push Results for Player(s) and Dealer

6.4: Perform Bet Settlement

6.4.1: Display a message showing total money Won or Lost during most recent Hand

6.4.2: Display message if a Player(s) Bank Balance becomes $0, also mark Player 'Quit'

6.4.3: Player(s) 'Bust the House' if their Balance ($) exceeds 'Accrued Winnings Limit'

6.4.4: 'Busting the House' triggers message and forces game exit

6.5: Game Concludes with message if all players are out of money or have Quit

6.6: While Active Player(s) remain, Display message(s) prompting each Player(s) to 'Play Again' or 'Quit'

5.0 Optional Phase II Development:

'Side Rules': Discuss each game play option and whether or not it should be implemented

- Double Down – Player doubles their bet after the initial deal, forcing one more card to be dealt. No further Hits allowed for this Player. If Player wins, 'The Bank' pays the doubled bet amount
- Split Hand – Only possible when both initially dealt cards have same rank (2 Aces, 2 Fours, etc). Played as 2 separate Hands, Player must match original bet on Split Hand
- Insurance – If Dealer has an Ace exposed, Players may take "insurance," an additional side-bet that pays 2x if Dealer has BlackJack (21)
- Surrender – Player can exit the Hand after the initial deal, forfeiting half their bet
- Player Win Bonus – Player Hits at least 5 times without busting: Paid at 2x
- 'Swedish Pub' Version – When Player and Dealer tie at 17, 18 or 19, Dealer wins

Display a list of the most recent 10 Players that have 'Busted the House' at end of game

Develop 'GUI Version' of game:
- Implement graphical cards, shoe and table, menus, Hit/Stand buttons
- Provide keyboard and mouse interface to the game
- Screen and menu colors and overall look/feel will be configurable by Player(s)
- Custom Deck (front and back) and table images may be chosen by Player

Develop Online Version of game:

- Extend 'GUI Version' to include play online via web browser interface
- Provide functionality to play game from Players' unique computers over a network

6.0 Stakeholders:

Name	Feedback
Kris Nickeson	3rd S&R and PFD Complete
James Camire	Insert Feedback Here
Mike Downard	Insert Feedback Here

7.0 Scope (Work to be Performed):

Work to be performed	Time Estimate
Class Diagrams	3-5 days
Code Development	2-3 weeks
Debugging & QC	2-5 days
Document and Deploy	1 day

BlackJack "21"
Process Flow Diagram