

Test Report

Test Scenarios

Test ID	Req, function or functionality being tested	Test Description	Input	Expected result
T01	Use case 1, R105, R106	Test the program's buttons for the desired action when pressed during the play of a hand (i.e. the Dealer can deal cards and end the game).	"Deal Next Hand" and "Deal Auto" button clicked	-On "Deal Next Hand" clicked the program will deal only one hand of cards to each active player as well as the dealer then wait for input from the interface. -On "Deal Auto" clicked the program will deal hands automatically without input from the user until the "End Game" button is clicked
T02	Use case 1, R077, R078, R080	Test the program's ability to correctly receive player actions (hitting, standing, double down).	On a dummy player program, send a hit, stand, and double down action	The game will receive the action from the player program and correctly execute the corresponding action
T03	Use case 2, R081, R083, R084, R103	Test the program's ability to select a shoe type, as well as publish and start a game.	Select shoe type and click corresponding button, then press the "Start Game" button	-On Shoe selection, the corresponding shoe_type will be set in the game_instance object and a game will be published to the player program. -On "Start Game" pressed the game will begin and the first round of cards will be dealt
T04	Use case 2	Test the ability of a player program to connect to the dealer program and join a game	Player will subscribe to a game	The dealer will receive a Player object and accurately pull the information into the game and display the relevant information
T05	R005	Test the player_instance suggest_move() function	All possible cases of the dealers face up card and player hand values	Output string will match the lookup table based off of the dealers up card and the players hand
T06	R006, R070	Test that a game cannot be started until at least one player has joined the game, and more more than 7 players can be in a game at a time	Attempt to start a game with 0 players. Join players one by one until 10 players have attempted to join	If no players have joined the game will not let the user start the game. If more than 0 players are in the game, the player count will be accurate and will be allowed to start the game. If 7 players are in a game and an 8 th tries to join they will not be added to the game
T07	R009	Test that IDL objects are sent and received accurately over OpenSplice	Send an IDL Game and Dealer object to a player program	The player program receives the IDL object and the information in that object matches what was sent
T08	R014	Test Scenario 1 of 10 – Dealer always has blackjack	Cards are dealt randomly to players but the dealer always has blackjack	Dealer will automatically win, flipping and showing the face down card without dealing a second round of cards unless a player has blackjack also, in which case that player will push
T09	R014, R104	Test Scenario 2 of 10 – Players always have blackjack	The dealer is dealt a hand randomly and all players are dealt a blackjack	The players should automatically win unless the dealer also has blackjack in which case everyone will push
T10	R014, R061	Test Scenario 3 of 10 – Dealer hit automation	Dealer is dealt hand values from 4 to 20	Dealer will always hit when total hand value is less than a soft 17, otherwise it will stand

T11	R014, R104	Test Scenario 4 of 10 – Player wins every time	Players are dealt a minimum hand value of 19, and the dealer will receive a 18 hand value	Dealer will lose every time and display the winners
T12	R014, R104	Test Scenario 5 of 10 – Dealer wins every time	Players are dealt a 10 and a 5 and will stand every time. The dealer will receive two 10s	The dealer will win every time and it will be displayed
T13	R014, R021, R104	Test Scenario 6 of 10 – Everyone gets blackjack	The whole table will be dealt a blackjack	The whole table will automatically push
T14	R014, R050, R104	Test Scenario 7 of 10 – All players receive 19 then hit	Every player is dealt a hand value of 19 then automatically hits, receiving a card with a value higher than 2	Every player will bust and lose the hand
T15	R014, R107	Test Scenario 8 of 10 – All players receive two 2s then double down	Every player will receive a pair of 2s then double down	The dealer will deal only one more card to every player
T16	R014, R063, R074	Test Scenario 9 of 10 – Players and dealer receive 7 cards	All players will be dealt a pair of twos then hits 5 times until reaching 7 cards then will stand. The dealer will also only receive cards with a 2 value	Each player and the dealer will have 7 cards in there hand
T17	R014, R063, R086	Test Scenario 10 of 10 – Players receive all 2s	Every player is dealt cards of a 2 value and hits every time	After a player receives 7 cards they will automatically win
T18	R016	Test the dealing algorithm for an infinite shoe type	Call deal_hand() then deal_one_hand() 140 times, recording the cards dealt	There will be at least one card in the 52 card deck that is dealt more than 8 times
T19	R017	Test the dealing algorithm for an 8-deck shoe	Call deal_hand() then deal_one_hand() 120 times, recording the cards dealt	There will not be any cards in a 52 card deck that will be dealt more than 8 times
T20	R019, R075	Test the program's ability to check player moves	Attempt the following invalid blackjack moves: splitting at any point, hitting when the current hand value is greater than 19, hitting after a stand action	Dealer will disregard the move and not act on that action
T21	R036	Test the ability to automatically boot players	Deal cards to a player and after 7 seconds attempt to make a move	The players move will be disregarded because they have already been removed from the game
T22	R043	Test the initial deal of cards	Call deal_hand() 500 times checking the number of cards dealt to each player	The number of cards dealt each time will never be anything other than 2
T23	R052	Test the order in which cards are dealt	Fill the shoe with a predefined set of cards then call deal_hand()	Each player will have a hand matching the predefined hand from the shoe
T24	R064	Test "End Game" button	After a game has been started click the "End Game" button	The program will exit
T25	R087	Test that the program can only play one game at a time	After a game has begun a player will try to join the game	The player program will not be allowed to join the game
T26	R088	Test that active player index is properly published to the player	While playing a game the dealer will publish the active player index	The player program will receive the index of the player currently making a move
T27	R089	Test the change between player states	Play 3 games of blackjack with 7 players observing the player action during and after that players turn	After the dealer publishes player X as the active player that players action changes to the corresponding action published to the dealer from the player program
T28	R091	Test the accuracy of publishing the game state to the player	Start a game to to trigger a game state change	The game state changes to playing and the player receives the game object with the updated game state
T29	R093	Test the 8-deck shoe shuffling	Play enough hands that less than or equal to 45 cards remain in the shoe	In between hands the game will check the amount of cards remaining in the shoe and if it is less than or equal to 45, the deck will automatically be reset and reshuffled

T30	R094	Test the random shuffling of the 8-deck shoe	Create 100 game objects and compare the order of the 8-deck shoe	No shoe will be ordered the same way when compared against each other
T31	R096	Test the update of the shoe iterator	Deal cards tracking the number of cards that were dealt	If 16 cards were dealt the shoe_iter variable in the game_instance object will increment by 16
T32	R101	Test the table card counting abilities	Deal 100 cards in 3 differently pre-defined patterns	The game_instance variable table_count will match exactly with the expected table count variable
T33	calc_card_values()	Test proper operation of the game_instance function calc_card_values()	Pass in values from 0 to 55	Values outside the range of 1-52 will return a blank card. Values inside of the range of 1-52 will return a card_t object with the correct corresponding values.
T34	deal_cards()	Test proper operation of the game_instance function deal_cards()	Call the function for 1 through 7 players tracking the number of cards dealt	The program will deal exactly 2 cards to every player and 2 to the dealer
T35	deal_one_card()	Test proper operation of the game_instance function deal_one_cards()	Call the function for 1 through 7 players tracking the number of cards dealt	The program will only deal one card to each player
T36	dealer_hand_value()	Test proper operation of the game_instance function dealer_hand_value()	Set the cards in the dealers hand to 50 different combinations of cards producing at least 1 hand value for every number in the range 2-21	The function will return a positive integer value that correctly corresponds to the cards in the dealers hand
T37	clean_table()	Test proper operation of the game_instance function clean_table()	At the end of a hand call clean_table()	neither the dealer nor any active player will have any cards in their hand, and no cards will be displayed in the gui
T38	player_instance()	Test the constructor for the player_instance object after receiving a IDL Player object	Pass in a IDL Player object	All the relevant variables will match the passed in Player object
T39	hand_value()	Test proper operation of the player_instance function hand_value()	Set the cards in the player hand to 50 different combinations of cards producing at least 1 hand value for every number in the range 2-21	The function will return a positive integer value that correctly corresponds to the cards in the dealers hand
T40	clean_hand()	Test proper operation of the player_instance function clean_hand()	Add cards to a players hand then call the the clean_hand() function	The player will have no more cards left in there hand and no cards being displayed on the gui
T41	itos()	Test the helper function for proper string conversion	Pass in a series of integer variables from 1 to 10	The returned string will be properly converted to a string

Test results

Test ID	Test Passed	Error or bug description	Fix
T01	Untested		
T02	Untested		
T03	Untested		
T04	Untested		
T05	31 Failures	Failed 31 times by outputting the wrong values than expected	Change values in hard coded look up table to correct values, 6 failures unfixed
T06	Untested		
T07	Untested		
T08	Passed		
T09	Passed	Player still needs to give a stand action when receiving blackjack	Loop now continues to next player when a player starts with blackjack
T10	Passed	Dealer is hitting hard 17	Added condition for hard 17 to dealer play loop
T11	Passed		

T12	Passed		
T13	Passed		
T14	Passed	Dealer keeps playing when all players have won/busted	Fixed by adding flag that all players are finished, set to false if player stands or doubles down and doesn't bust
T15	Passed		
T16	Passed	At end of shoe, dealing each player 7 cards, it would crash cause the shuffle was set at 45	Shuffle changed to be at 56
T17	Failed	Player is allowed to hit past 7 cards, they just won't display, the hand value will increase based on the next card	Not fixed, game plays more logically with this implementation.
T18	Untested		
T19	Untested		
T20	Untested		
T21	Untested		
T22	Untested		
T23	Untested		
T24	Untested		
T25	Untested		
T26	Untested		
T27	Untested		
T28	Untested		
T29	Untested		
T30	Untested		
T31	Untested		
T32	Untested		
T33	Untested		
T34	Untested		
T35	Untested		
T36	Untested		
T37	Untested		
T38	Untested		
T39	Untested		
T40	Untested		
T41	Untested		

Requirements Update

Date Added	Req_ID	Description	Last Modified	Source	F/NF	Mod/Del	Reason for Mod/Del
2/17/18	001	The system will be written in the C++ programming language	2/24/18	From Requirements Doc	NF		
2/17/18	002	The system will use the FLTK library for implementation of GUI	2/24/18	From Requirements Doc	NF		
2/17/18	003	This program will cleanly compile with the use of the -Wall flag	2/24/18	From Requirements Doc	NF		
2/17/18	004	The program shall be stable enough to run for at lease one full game of blackjack (defined as enough hands to go through an entire 8 deck shoe)	2/24/18	From Requirements Doc	F	MOD	Poor wording, and unclear
2/17/18	005	The program shall use a blackjack strategy look up table to provide move suggestions to the user	2/24/18	From Requirements Doc	F	MOD	Requirement was to vague and non specific
2/17/18	006	Each game instance shall allow one to seven players and one dealer to play a game of blackjack	2/24/18	From Requirements Doc	F		
2/17/18	007	The system shall be implemented with 2 separate programs, a Dealer, and a Player	2/24/18	From Requirements Doc	NF	MOD	no more Pit boss program
2/17/18	008	The communication between programs shall be implemented using the pub/sub middle-ware package OpenSplice	4/23/18	From Requirements Doc	NF	MOD	Re-worded to be more accurate
2/17/18	009	This system shall communicate in accordance with one IDL file used by all instances	2/24/18	From Requirements Doc	F		

2/17/18	010	The Player shall begin the game with a balance of \$500USD to be used for bets	4/23/18	From Requirements Doc	F	DEL	Does not pertain to the system being implemented
2/17/18	011	The Player shall be allowed to play a game until their balance is \$0 or their balance is less than the min bet	4/23/18	Derived from Requirements	F	DEL	Does not pertain to the system being implemented
2/17/18	012	A Player's balance shall not at any point be below \$0, or negative	4/23/18	Derived from Requirements	F	DEL	Does not pertain to the system being implemented
2/17/18	013	The Dealer instance shall support 3 different kinds of shoes: Test, Infinite, and 8 Deck	2/24/18	Derived from Requirements	NF		
2/17/18	014	The Test Shoe shall support 10 pre-defined scenarios and will act as a specific test sequence designed for system verification.	2/24/18	Derived from Requirements	F		
2/17/18	015	Each player shall receive the same cards in Test mode	5/2/18	Derived from Requirements	F	DEL	Conflicts with desired test scenarios
2/17/18	016	The Infinite Shoe shall deal cards by selecting a randomly generated number in the range of 1 - 52, and assigning a card value based off of that number	2/24/18	Derived from Requirements	F		
2/17/18	017	The 8-Deck Shoe shall consist of 8 standard 52 card decks	2/24/18	Derived from Requirements	F		
2/17/18	018	The Dealer GUI shall show the dealer's dealt cards face up and sometimes face down, each players dealt cards, the point value of each players hand, the current count at the table, and the expected action from each player following basic strategy	4/23/18	Derived from Requirements	F	MOD	
2/17/18	019	The Dealer shall check each player's move before committing it to the game to see if that move is valid	4/23/18	From Requirements Doc	F	MOD	
2/17/18	020	The Dealer shall not allow any Players to split cards unless the two cards being split are of the same card value	4/23/18	Derived	F	DEL	Card splitting no longer needs to be dealt with
2/17/18	021	The Dealer shall not allow the Player to take any further action once they have been dealt a Blackjack	2/24/18	Derived	F		
2/17/18	022	The Player program shall allow 5 strategies of play: Manual, By the Book, Conservative, Reckless, and Card Counting	4/23/18	Derived from Requirements	F	DEL	Does not pertain to the system being implemented
2/17/18	023	Manual strategy for the player shall let the user make all decisions of play via the GUI interactions	4/23/18	Derived from Requirements	F	DEL	Does not pertain to the system being implemented
2/17/18	024	By the Book strategy for the Player shall automatically make decisions and actions in the game for the user following basic blackjack strategy	4/23/18	Derived from Requirements	F	DEL	Does not pertain to the system being implemented
2/17/18	025	Conservative strategy for the Player shall automatically make decisions and actions in the game for the user where it never takes a card when the Player's current hand value is 12 or more, and takes a card otherwise	4/23/18	Derived from Requirements	F	DEL	Does not pertain to the system being implemented
2/17/18	026	Reckless strategy for the Player shall automatically make decisions and actions in the game for the user where it takes a card when the Player's current hand value is 20 or less	4/23/18	Derived from Requirements	F	DEL	Does not pertain to the system being implemented
2/17/18	027	Card Counting Strategy for the Player shall automatically make decisions and actions in the game for the user where a card counting strategy chosen by the specific user is implemented	4/23/18	Derived from Requirements	F	DEL	Does not pertain to the system being implemented
2/17/18	028	The Player GUI shall display the Dealer's cards, the player's cards, and the player's own financial situation	4/23/18	From Requirements	F	DEL	Does not pertain to the system being implemented
2/17/18	029	The minimum table bet allowed to be placed by the Player shall be \$5USD	4/23/18	From Discussion Questions	F	DEL	Does not pertain to the system being implemented

2/17/18	030	The Dealer shall publish the type of shoe being used to all Players at the table	4/28/18	From Discussion Questions	F	DEL	Not possible with current IDL configuration
2/17/18	031	The Player shall display the cards of all other active players, the dealer, as well as their own.	4/23/18	From Discussion Questions	F	DEL	Does not pertain to the system being implemented
2/17/18	032	All instances of the table shall display the current card count of the table.	4/23/18	From Discussion Questions	F	DEL	Duplicate of req 18
2/17/18	033	The balances in the game will be represented in USD.	4/23/18	From Discussion Questions	NF	DEL	Program doesn't deal with player balances
2/17/18	034	The Dealer shall only allow the Player to split cards of the same value a maximum of 2 times per hand.	4/23/18	From Discussion Questions	F	DEL	Splitting is no longer handled
2/17/18	035	The Player shall be allowed to leave the game when a hand is done being dealt.	4/23/18	From Discussion Questions	F	DEL	A player can leave the game at any time but will be removed after 7 seconds
2/17/18	036	The Dealer shall allow the Player currently being dealt a maximum of 7 seconds from the time their turn begins to make a decision before removing them from the game and moving on to the next player.	2/24/18	From Discussion Questions	F		
2/17/18	037	The Player shall place wagers in fixed increments of \$1USD	4/23/18	From Discussion Questions	F	DEL	Does not pertain to the system being implemented
2/17/18	038	The Player shall be allowed to place a wager up to the amount of their current balance.	4/23/18	From Discussion Questions	F	DEL	Does not pertain to the system being implemented
2/17/18	039	The standard 52 card deck shall consist of 4 Suits (Hearts, Clubs, Diamonds, Spades) that will be evenly distributed, and each suit will have one card for each value of 2-10, jack, king, queen, and ace.	2/24/18	From Video	NF		
2/17/18	040	The cards shall be represented in the card_t object, passed over open splice	4/23/18	From Video	NF	MOD	Implementation called for this to change
2/24/18	041	A card's value during the game will be equal to: 2-10 will hold their face value, face cards will be worth 10, and aces will be worth 1 or 11 based on what benefits the Player	2/24/18	From Video	NF		
2/24/18	042	The Dealer shall not allow the Player to change the amount of their initial bet once the hand has been dealt.	4/23/18	From Video	F	DEL	Dealer doesn't deal with player bets
2/24/18	043	The Dealer shall deal 2 cards to each player to start the hand	2/24/18	From Video	F		
2/24/18	044	The Dealer shall deal themselves 1 card face up to be seen by the Players, and 1 card face down	2/24/18	From Video	F		
2/24/18	045	Only the Dealer shall be allowed to change the face up boolean attribute during a game	4/23/18	Derived	F	DEL	Requirement is weak and does not effect the system at all
2/24/18	046	The game is won by the Player if the combined value of their cards is higher than the combined value of the dealers cards, given the Players value is not higher than 21 and the Dealer's value has either exceeded 21 or is greater than 16.	2/24/18	Derived	NF		
2/24/18	047	When any player wins, the player shall receive an addition to their balance in the amount equal to their bet, and receive their bet back into their balance excluding when a player wins with Blackjack	4/23/18	Derived	F	DEL	Does not pertain to the system being implemented

2/24/18	048	When the Player receives Blackjack, which is their 2 first cards being valued at 21, they shall receive an addition to their balance in the amount of 150% their bet, as well as their bet back in their balance immediately as long as the Dealer's value is not also 21.	4/23/18	Derived	F	DEL	Does not pertain to the system being implemented
2/24/18	049	When the hand is over and the Dealer's cards value is equal to the Player's cards value, the game will result in a push. Meaning no winner, and no loser.	4/23/18	Derived	NF	MOD	
2/24/18	050	When the Player's combined card value exceeds 21, they shall automatically lose and the Dealer moves on to the next Player or ends the hand.	4/23/18	From Video	F	MOD	
2/24/18	051	The Dealer shall deal cards to the current Player until either the value of their hand exceeds 21, they choose to stand, or the maximum amount of cards has been dealt.	4/26/18	Derived	F	MOD	Updated for accuracy
2/24/18	052	The Dealer shall deal cards to the rightmost Player first, dealing each player 1 card, then itself, before dealing the second round of cards.	4/23/18	Derived	F	MOD	
2/24/18	053	The Dealer shall start giving cards to the rightmost Player first, before moving to each existing Player to the left, dealing themselves last	4/23/18	From Video	F	DEL	Duplicate of req 52
2/24/18	054	The Player shall be allowed to Double Down; Doubling their bet and only receiving one additional card for that hand.	4/23/18	From Video	F	DEL	Does not pertain to the system being implemented
2/24/18	055	The Player shall notify the Pit Boss when Doubling Down with a bet lower than their initial bet	4/23/18	From Video	F	DEL	The system does no have a pit boss
2/24/18	056	The Player shall notify the Pit Boss when Doubling Down on a hand that is worth 12 or higher	4/23/18	From Video	F	DEL	The system does no have a pit boss
2/24/18	057	The Player shall be allowed to Surrender after receiving their first two cards, but not after receiving additional cards.	4/23/18	From Video	F	DEL	IDL does not allow for a surrender move
2/24/18	058	When a Player Surrenders, they shall receive half of their bet back in their balance, their hand is over, and their cards will be removed.	4/23/18	From Video	F	DEL	IDL does not allow for a surrender move
2/24/18	059	After the initial deal, the Dealer shall deal all Players before themselves.	4/23/18	From Video	F	DEL	Duplicate of req 52
2/24/18	060	The Dealer shall follow the same procedure every time when dealing themselves.	4/23/18	From Video	F	DEL	Requirement does not specify what the procedure is and it unnecessary
2/24/18	061	The Dealer's procedure for dealing itself will be as follows: takes a card on all hands 16 and lower, must stand on 17-21, if hand exceeds 21 after taking a card, Dealer busts and all remaining Players win.	4/23/18	From Video	F	MOD	
2/24/18	062	The Dealer shall not be allowed to change the shoe type once a game has started.	2/24/18	Derived from Requirements	F		
2/24/18	063	The maximum number of cards 1 user shall be allowed to receive is 7.	4/23/18	From IDL	F	MOD	
2/24/18	064	The Dealer UI shall have an End Game button that shall end the game and quit the program.	2/24/18	Derived	F		
2/24/18	065	The GUI shall display a clock for each Player showing their remaining time to take action.	4/26/18	Derived	F	MOD	
2/24/18	066	The Dealer GUI shall display the current status of all Player's in the game.	2/24/18	Derived	F		

2/24/18	067	The Player GUI shall have a widget that allows a bet to be decided.	4/23/18	Derived	F	DEL	Does not pertain to the system being implemented
2/24/18	068	The GUI for all users shall display the UID of all users in the current game.	4/23/18	Derived	F	DEL	UID is too large to display on the screen
2/25/18	069	The Player shall be allowed use the GUI to make decisions on whether to take a card, stand, double down, or split.	4/23/18	Derived	F	DEL	Does not pertain to the system being implemented
2/25/18	070	The start button shall be click-able once at least 1 Player has joined the game.	5/2/18	Derived	F	DEL	Duplicate of req 082
2/25/18	071	The Player shall be able to see all available games being published by Dealers.	4/23/18	Derived	F	DEL	Does not pertain to the system being implemented
2/25/18	072	The Player shall have the button to leave a game displayed at all time when in a game.	4/23/18	Derived	F	DEL	Does not pertain to the system being implemented
2/25/18	073	The Dealer shall have a button for each shoe option to host a table on the opening screen.	4/26/18	Derived	F	MOD	Updated for accuracy
2/25/18	074	The Dealer shall deal 1 card to the Player upon a hit action, after the initial deal.	4/23/18	Derived	F	MOD	
2/25/18	075	If the Dealer deals a card and the Player's hand is lower than 19, the dealer shall wait for the Player's next request.	4/23/18	Derived	F	MOD	
2/25/18	076	The UI shall display all user's current hand values.	5/2/18	Derived	F	DEL	Duplicate of req 18
2/25/18	077	When the Player's publishes that it is hitting, the player_action_t shall be changed from "idle" to "hitting".	4/23/18	Derived	F	MOD	
2/25/18	078	When the Player's publishes that it is standing, the player_action_t shall be changed from "idle" to "standing".	4/23/18	Derived	F	MOD	
2/25/18	079	When the Player click's the Button to split, the player_action_t shall be changed from "idle" to "standing" and published, changed back to "idle", and the Player shall increase their bet by 100%.	4/23/18	Derived	F	DEL	Splitting is no longer handled, improperly worded
2/25/18	080	When the Player's publishes that it is doubling down, the player_action_t shall be changed from "idle" to "doubling".	4/23/18	Derived	F	MOD	
2/25/18	081	When the shoe type has been selected the Dealer shall create and publish a Game instance (game state, UID, dealer UID, and player states) and set the game_state to waiting_to_join to allow players to see the game being published.	4/23/18	Derived	F	MOD	
2/25/18	082	When at lease 1 player has joined the Dealers game, the start button shall appear to start the game when clicked, and the game_state shall be changed to waiting.	4/26/18	Derived	F	MOD	
2/25/18	083	Once the Dealer clicks the start game button, the game_state shall be changed to playing.	3/11/18	Derived	F	MOD	Poor Wording
2/25/18	084	Once the Dealer changes the game state to playing, the first hand shall be dealt and the game will begin.	4/23/18	Derived	F	MOD	
2/25/18	085	The system shall be stable enough to support at least 3 separate hands per Player.	4/23/18	Derived	F	MOD	Updated for clarity
2/25/18	086	If the Player has been dealt 7 cards and publishes a hit action, the Player shall automatically win the hand and cards will be removed.	5/6/18	Derived	F	DEL	Max number of cards reduced to fit screen. Makes more sence to allow players to hit as many times as possible, the card just wont be displayed

2/25/18	087	The Dealer shall only be allowed to host 1 game at a time.	3/15/18	Derived	F		
2/25/18	088	When the game state is 'playing', the Dealer shall publish the index of the current active player	3/16/18	Derived	F		
2/25/18	089	The Player shall have player action set to 'idle' until the Dealer publishes that Player's index in the current game as the 'active_player'	3/17/18	Derived	F		
2/25/18	090	The game shall keep track of and display all cards currently in the game.	4/23/18	Derived	F	MOD	
2/25/18	091	The Dealer shall publish the state of the entire game every time it changes.	5/2/18	Derived	F	MOD	Updated for accuracy
2/25/18	092	The Dealer shall display game feedback to all current Players of the game.	4/23/18	Derived	F	DEL	Unspecific and vague with no relevance to system implementation
2/25/18	093	The Dealer shall shuffle the deck when there are less than or equal to 56 cards remaining in an 8 deck shoe.	5/2/18	Derived	F	MOD	Changed the minimum number of cards to 56 from 45 because 45 cards are not enough to deal the whole table
2/25/18	094	The cards drawn shall be shuffled/sorted randomly with the use of a random number generator.	5/2/18	Derived	F	MOD	Updated for accuracy
2/25/18	095	The Dealer shall only play out the remaining hand and then reshuffle once there is 25 cards remaining in the 8 deck shoe	4/23/18	Derived	F	DEL	Redundant/Conflicting with req 93
2/25/18	096	The cards in the shoe shall be updated when the each card is dealt.	3/24/18	Derived			
2/25/18	097	When the Dealer ends the game, the player's shall receive back the current bet in their balance if the hand had not completed.	4/23/18	Derived	F	DEL	Does not pertain to the system being implemented
2/25/18	098	The shoe type shall be displayed to all users over OpenSplice.	4/28/18	Derived	F	DEL	Duplicate requirement of req 30, also not possible with current IDL configuration
2/25/18	099	The Player shall be shown options for all 3 playing type at all times during game play.	4/23/18	Derived	F	DEL	Does not pertain to the system being implemented
2/25/18	100	The Player shall be allowed to switch between playing types at any point during the game.	4/23/18	Derived	F	DEL	Does not pertain to the system being implemented
2/25/18	101	The table count shall be implemented using the High-Low Card Counting Strategy	3/29/18	Derived	F		

2/26/18	102	<p>The High-Low Card Counting Strategy shall be calculated as follows:</p> <p>RANK VALUE</p> <table> <tr><td>2</td><td>+1</td></tr> <tr><td>3</td><td>+1</td></tr> <tr><td>4</td><td>+1</td></tr> <tr><td>5</td><td>+1</td></tr> <tr><td>6</td><td>+1</td></tr> <tr><td>7</td><td>0</td></tr> <tr><td>8</td><td>0</td></tr> <tr><td>9</td><td>0</td></tr> <tr><td>10</td><td>-1</td></tr> <tr><td>J</td><td>-1</td></tr> <tr><td>Q</td><td>-1</td></tr> <tr><td>K</td><td>-1</td></tr> <tr><td>A</td><td>-1</td></tr> </table> <p>For example, if the first ten cards to come out of the shoe were 3, 5, K, 7, Q, A, 8, 5, 4, 2, then the running count would be 1 +1 -1 +0 -1 -1 +0 +1 +1 +1 = +2.</p>	2	+1	3	+1	4	+1	5	+1	6	+1	7	0	8	0	9	0	10	-1	J	-1	Q	-1	K	-1	A	-1	3/30/18	Derived	NF		
2	+1																																
3	+1																																
4	+1																																
5	+1																																
6	+1																																
7	0																																
8	0																																
9	0																																
10	-1																																
J	-1																																
Q	-1																																
K	-1																																
A	-1																																
2/26/18	103	Once the game has started, the dealer instance will automatically deal at least one hand of blackjack.	4/23/18	Derived	F	MOD	Design changed to add functionality																										
4/23/18	104	At the end of each hand the game screen shall display the winners and losers of that hand	4/23/18	Derived	F	MOD																											
4/23/18	105	When the deal one hand button is pressed the game will play one hand of blackjack	4/23/18	Student addition	F																												
4/23/18	106	When auto deal is selected the game shall deal each hand one after another until the end game button is selected.	4/23/18	Student addition	F																												
4/26/18	107	A player shall not be allowed to hit after they have doubled down.	4/26/18	Student addition	F																												
4/26/18	108	A player shall not be allowed to hit after they have chosen to stand	4/26/18	Student addition	F																												
4/26/18	109	The game screen shall display the amount of cards left in the shoe, on an 8-Deck shoe type	4/26/18	Student addition	F																												

Test Summary

Although, we ran out of time to fully test our program we did a lot of unit testing in the design phase and we are pretty confident in the stability of our program. We have observed a few bugs that we ran out of time to fix and with further testing I am sure we would find many more bugs in our program. It is not a perfect deliverable product, but we can run a game for a long time without crashing, and we have not observed a crash in a while after a few fixes. Overall the testing process was a good experience for us and if time permitted us to complete the testing phase, we are confident that we would have a very stable and accurate system in place.