Blackjack Game

Project 2

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Game Explanation:

This game is designed and coded based on famous blackjack game commonly played in casino. In this game, player plays the game with dealer.

In the beginning, game register the name of the player and asks players how many chips she wants to buy. I am assuming each chip is worth one dollar.

Game starts with dealer serves two cards to player. If cards are face cards (11 to 13), they are assumed as 10. If either of the card is 1, it is assumed as 11. If both are 1, then only the first one is assumed as 11 otherwise player will bust. I am saving total of the cards in sum variable.

Now it is dealer's turn. Dealer will open only one card. If it is a face card, it will be assumed as 10 and if 1, it is counted as 11. Dealer total is also saved dealer sum variable.

Now back to player one. Player 1 decides whether she wants to stand (no more card) or she wants to take the hit (new card). Based on the choice corresponding actions are taken. A loop is made so that player can draw multiple cards until she decides to stand, or she busts out or she gets blackjack (21).

Once player finish drawing her cards, again it is dealer's turn. Dealer draws her second card. If is a face card, it is considered as 10. If it is 1, either it will be taken as 11 or just 1 based on total is less than 21 or it exceeds 21. If dealer total is less than 16, dealer must draw another card. So, a do-while loop is used for dealer to draw multiple cards. If dealer total reaches 17 to 20, dealer is not allowed to draw more cards. If dealer total gets to 21, it is a blackjack for her.

Then we decide who wins based on player total and dealer total. If dealer total > player total, dealer wins and player loses her bet, if player total is more than dealer, player wins dealer's bet. If their total is same or both get blackjacks, then it is draw and both get their money back.

At the end, dealer asks whether player wishes to play more. If yes, game continues otherwise it is terminated.

Through out the program, all message exchanges and results are stored in txt file for casino owner to review later.

Some of the features like double the bet by player or split options are not coded due to lack of time and non-availability of functions and arrays.

Suhaani's BlackJack Game (project 2)

In Project 2, I worked on the v2 of the Blackjack game. I refactored the code and made it a smooth working blackjack game. In v2, I added the following features:

I made following functions to restructure the code:

a) `void gameintro(vector<string>& log, int& balance, string& playername)`

This function introduces the game to the player, ask her name and the amount of chips (money) player wants to play. It saves the log in the "Log vector, reads name in player name and chips in balance. All variables are passed by reference as they get updated in the function.

b) `void gamebegin(vector <string>& log, int& playersum, int& dealersum, string& playercards,string& dealercards)`

In the function game begins, dealer opens player's 2 cards and one for herself. It saves dealer number in dealersum and sum of player's 2 cards in playersum. PlayerCards and dealercards are to save string of cards dealt. It could have being saved in array but due to lack of time, I am using string variables. Log is again to save log.

c) `bool playermove(vector<string>& log, int& playersum, string& playercards, int balance[][2], bool& playerBust, int const BET, int const session)`

In this function I have written code for opening player cards. Player can open as many card as she wants until she chooses to stand or she busts out. Balance is to save the current chips player has and accounts for what dealer lost.

d) `void dealermove(vector<string>& log, int& dealersum, string& dealercards, int balance[][2], bool& dealerBust, int const BET, int const session)`

This functions takes care of dealer move. Dealer has to take out cards until he hits 17 or more. Below 17, he has to keep on taking cards. dealerBust is a Boolean variable to record whether busted out or not. Session is keep track of which session is going on. When they start playing, it is first session.

e) `void gameresult(vector<string>& log, int playersum, int dealersum,int balance[][2],int session, int BET, bool playerBust,bool dealerBust)`

This function calculates who win the game or it is draw. If playerBust is true, then dealer has won, it dealerBust is true, then it means, dealer has won. If nobody busted out, their card sum is compared and decided who has won the game.

f) bool newgame(int pbalance)

This function asks question whether player wants to start a new session or want to quit the game.

g) I have drastically reduced the code in the main loop and moved to functions. Here is my code in the main loop.

```
gameintro(log, balance[0][0], playername);

        while (gamemasterloop) {

      gamebegin(log, playersum, dealersum, playercards, dealercards);

        while (gameloop) { //execute player has no blackjack. loop for player to takeout more cards untill stand, burst or blackjack

        gameloop=playermove(log, playersum, playercards, balance, playerBust, BET, session);

        }

        if (!playerBust) {

        dealermove(log, dealersum, dealercards, balance, dealerBust, BET, session);

        }

      gameresult(log, playersum, dealersum, balance, session, BET, playerBust,dealerBust);

      playmore=newgame(balance[0][0]);

        if (playmore){
```

```
            playersum = 0;
            dealersum = 0;
            dealerflag = true;
            gameloop = true;
            playerBust = false;
            dealerBust = false;
                session++;
            }
            else {
            gamemasterloop = false;
            }
            }
return 0;
```

Cross Reference for Project 2

You are to fill-in with where located in code

Chapter	Section	Topic	Where Line #"s	Pts	Notes
6		Functions	29		
	3	Function Prototypes	29	4	Always use prototypes
	5	Pass by Value		4	
	8	return	164	4	A value from a function
	9	returning boolean	303	4	
	10	Global Variables		XXX	Do not use global variables -100 pts
	11	static variables		4	
	12	defaulted arguments		4	
	13	pass by reference	218 48	4	
	14	overloading		5	
	15	exit() function		4	
7		Arrays			
	1 to 6	Single Dimensioned Arrays		3	
	7	Parallel Arrays		2	
	8	Single Dimensioned as Function Arguments		2	
	9	2 Dimensioned Arrays	218	2	Emulate style in book/in class repositiory
	12	STL Vectors	29	2	
		Passing Arrays to and from Functions	123	5	
		Passing Vectors to and from Functions	123	5	
8		Searching and Sorting Arrays			
	3	Bubble Sort		4	
	3	Selection Sort		4	
	1	Linear or Binary Search		4	
****** Not required to show			Total	70	Other 30 points from Proj 1 first sheet tab

Cross Reference from Project 1

You are to fill-in with where located in code

Chapter	Section	Topic	Where Line #"s	Pts	Notes
2	2	cout			
	3	libraries	14	5	iostream, iomanip, cmath, cstdlib, fstream, string, ctime
	4	variables/literals			No variables in global area, failed project!
	5	Identifiers			
	6	Integers	50	1	
	7	Characters	171	1	
	8	Strings	53	1	
	9	Floats No Doubles	125	1	Using doubles will fail the project, floats OK!
	10	Bools	123	1	
	11	Sizeof *****			
	12	Variables 7 characters or less	126		All variables <= 7 characters
	13	Scope ***** No Global Variables			
	14	Arithmetic operators			
	15	Comments 20%+	139	2	Model as pseudo code
	16	Named Constants			All Local, only Conversions/Physics/Math in Global area
	17	Programming Style ***** Emulate	134		Emulate style in book/in class repositiory
3	1	cin	39		
	2	Math Expression			
	3	Mixing data types ****			
	4	Overflow/Underflow ****			
	5	Type Casting	83	1	
	6	Multiple assignment *****			
	7	Formatting output	71	1	
	8	Strings	53	1	
	9	Math Library	14	1	All libraries included have to be used
	10	Hand tracing ******			
4	1	Relational Operators			
	2	if	134	1	Independent if
	4	If-else	196 - 210	1	
	5	Nesting	201, 341	1	
	6	If-else-if	287 - 291	1	
	7	Flags *****			
	8	Logical operators	287	1	
	11	Validating user input	286	1	
	13	Conditional Operator	297	1	
	14	Switch		1	
5	1	Increment/Decrement	361, 238	1	
	2	While	341	1	
	5	Do-while	178	1	
	6	For loop		1	
	11	Files input/output both		2	
	12	No breaks in loops ******			Failed Project if included
****** Not required to show			Total	30	

Output and Input Examples

Output/Input Ex. 1:

```
This is Suhaani's blackjack game. You play against the dealer
------------------------------------------------------------------
What is your name?
SGUPTA

Welcome SGUPTA to Suhaani's Blackjack game
How many chips do you want to buy? (Each is worth one dollar)

50
SGUPTA is playing Suhaani's blackjack with 50 dollars
------------------------------------------------------------------

New game session of blackjack started by dealer
------------------------------------------------------------------
Dealer serving your first two cards. Here it goes...
Your cards : 10, 10
Total= 20

Dealer's Turn..Dealer open her first card...

3

Dealer Total is : 3

-----------------------------------------------------
Your turn now.....
do you want stand or hit? (h for hit / s for stand)
s
You chose to stand..., Now dealer will take the turn

Now dealer is opening her second card...

Dealer cards are 3, 2
Dealer total is : 5
(Dealer total is 16 or less. Hence dealer will have to hit)
Dealer cards are 3, 2, 3
Dealer total is : 8
(Dealer total is 16 or less. Hence dealer will have to hit)
```

Dealer cards are 3, 2, 3, 9
Dealer total is : 17
(Dealer total is 17 or more. Hence dealer will have to stand)

You Won
Dealer paid you $1
Your new balance is : $51

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 10, 4
Total= 14

Dealer's Turn..Dealer open her first card...

2

Dealer Total is : 2

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 10, 4, 9 total = 23

Player busted out, Dealer WON!
Player lost her 1 dollar bet to dealer
Your new balance is : $50

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 8, 9
Total= 17

Dealer's Turn..Dealer open her first card...

10

Dealer Total is : 10

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
s
You chose to stand..., Now dealer will take the turn

Now dealer is opening her second card...

Dealer cards are 10, 10
Dealer total is : 20
(Dealer total is 17 or more. Hence dealer will have to stand)

Dealer Won!. Your 1 $ bet went to the dealer
Your new balance is : $49

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your second card is 1. Hence it is treated as 11
Your cards : 5, 11
Total= 16

Dealer's Turn..Dealer open her first card...

7

Dealer Total is : 7

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 5, 11, 10 total = 26

Player busted out, Dealer WON!
Player lost her 1 dollar bet to dealer
Your new balance is : $48

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 10, 8
Total= 18

Dealer's Turn..Dealer open her first card...

9

Dealer Total is : 9

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
s
You chose to stand..., Now dealer will take the turn

Now dealer is opening her second card...

Dealer cards are 9, 10
Dealer total is : 19
(Dealer total is 17 or more. Hence dealer will have to stand)

Dealer Won!. Your 1 $ bet went to the dealer
Your new balance is : $47

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 5, 10
Total= 15

Dealer's Turn..Dealer open her first card...

9

Dealer Total is : 9

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 5, 10, 10 total = 25

Player busted out, Dealer WON!
Player lost her 1 dollar bet to dealer
Your new balance is : $46

Do you want to continue playing? yes(y)/No(n)

Output/Input Ex. 2:

```
This is Suhaani's blackjack game. You play against the dealer
------------------------------------------------------------
What is your name?
SGupta

Welcome SGupta to Suhaani's Blackjack game
How many chips do you want to buy? (Each is worth one dollar)

100
SGupta is playing Suhaani's blackjack with 100 dollars
------------------------------------------------------------------

New game session of blackjack started by dealer
------------------------------------------------------------------
Dealer serving your first two cards. Here it goes...
Your cards : 5, 10
Total= 15

Dealer's Turn..Dealer open her first card...

10

Dealer Total is : 10

-----------------------------------------------------
Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 5, 10, 2 total = 17

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
s
You chose to stand..., Now dealer will take the turn

Now dealer is opening her second card...

Dealer cards are 10, 5
Dealer total is : 15
(Dealer total is 16 or less. Hence dealer will have to hit)
```

Dealer cards are 10, 5, 7
Dealer total is : 22
dealer busted out, you WON!
Dealer lost her 1 dollar bet to you
Your new balance is : $101

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 2, 10
Total= 12

Dealer's Turn..Dealer open her first card...

Dealer first card is 1, hence it is treated as 11
11

Dealer Total is : 11

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 2, 10, 6 total = 18

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
s
You chose to stand..., Now dealer will take the turn

Now dealer is opening her second card...

Dealer cards are 11, 8
Dealer total is : 19
(Dealer total is 17 or more. Hence dealer will have to stand)

Dealer Won!. Your 1 $ bet went to the dealer
Your new balance is : $100

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 5, 10
Total= 15

Dealer's Turn..Dealer open her first card...

5

Dealer Total is : 5

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 5, 10, 10 total = 25

Player busted out, Dealer WON!
Player lost her 1 dollar bet to dealer
Your new balance is : $99

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 10, 4
Total= 14

Dealer's Turn..Dealer open her first card...

10

Dealer Total is : 10

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 10, 4, 7 total = 21

Wow! you hit a blackjack..
Now dealer is opening her second card...

Dealer cards are 10, 2
Dealer total is : 12
(Dealer total is 16 or less. Hence dealer will have to hit)
Dealer cards are 10, 2, 10
Dealer total is : 22
dealer busted out, you WON!

Dealer lost her 1 dollar bet to you
Your new balance is : $100

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 3, 10
Total= 13

Dealer's Turn..Dealer open her first card...

8

Dealer Total is : 8

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 3, 10, 3 total = 16

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 3, 10, 3, 6 total = 22

Player busted out, Dealer WON!
Player lost her 1 dollar bet to dealer
Your new balance is : $99

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 3, 10
Total= 13

Dealer's Turn..Dealer open her first card...

4

Dealer Total is : 4

Your turn now.....

do you want stand or hit? (h for hit / s for stand)
h
Your cards : 3, 10, 10 total = 23

Player busted out, Dealer WON!
Player lost her 1 dollar bet to dealer
Your new balance is : $98

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 10, 5
Total= 15

Dealer's Turn..Dealer open her first card...

Dealer first card is 1, hence it is treated as 11
11

Dealer Total is : 11

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 10, 5, 1 total = 16

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
s
You chose to stand..., Now dealer will take the turn

Now dealer is opening her second card...

Dealer cards are 11, 10
Dealer total is : 21
(Dealer total is 17 or more. Hence dealer will have to stand)

Dealer got blackjack!!
Dealer Won!. Your 1 $ bet went to the dealer
Your new balance is : $97

Do you want to continue playing? yes(y)/No(n)
y

Dealer serving your first two cards. Here it goes...
Your cards : 10, 6
Total= 16

Dealer's Turn..Dealer open her first card...

5

Dealer Total is : 5

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 10, 6, 10 total = 26

Player busted out, Dealer WON!
Player lost her 1 dollar bet to dealer
Your new balance is : $96

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 3, 10
Total= 13

Dealer's Turn..Dealer open her first card...

10

Dealer Total is : 10

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 3, 10, 5 total = 18

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
s
You chose to stand..., Now dealer will take the turn

Now dealer is opening her second card...

Dealer cards are 10, 8
Dealer total is : 18
(Dealer total is 17 or more. Hence dealer will have to stand)

Your total is equal to that of dealer's. Game draws. You get your bet back

---
Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 10, 10
Total= 20

Dealer's Turn..Dealer open her first card...

3

Dealer Total is : 3

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
s
You chose to stand..., Now dealer will take the turn

Now dealer is opening her second card...

Dealer cards are 3, 7
Dealer total is : 10
(Dealer total is 16 or less. Hence dealer will have to hit)
Dealer cards are 3, 7, 2
Dealer total is : 12
(Dealer total is 16 or less. Hence dealer will have to hit)
Dealer cards are 3, 7, 2, 8
Dealer total is : 20
(Dealer total is 17 or more. Hence dealer will have to stand)

Your total is equal to that of dealer's. Game draws. You get your bet back

---
Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...

Your cards : 4, 2
Total= 6

Dealer's Turn..Dealer open her first card...

10

Dealer Total is : 10

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 4, 2, 10 total = 16

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
h
Your cards : 4, 2, 10, 10 total = 26

Player busted out, Dealer WON!
Player lost her 1 dollar bet to dealer
Your new balance is : $95

Do you want to continue playing? yes(y)/No(n)
y
Dealer serving your first two cards. Here it goes...
Your cards : 10, 10
Total= 20

Dealer's Turn..Dealer open her first card...

3

Dealer Total is : 3

Your turn now.....
do you want stand or hit? (h for hit / s for stand)
s
You chose to stand..., Now dealer will take the turn

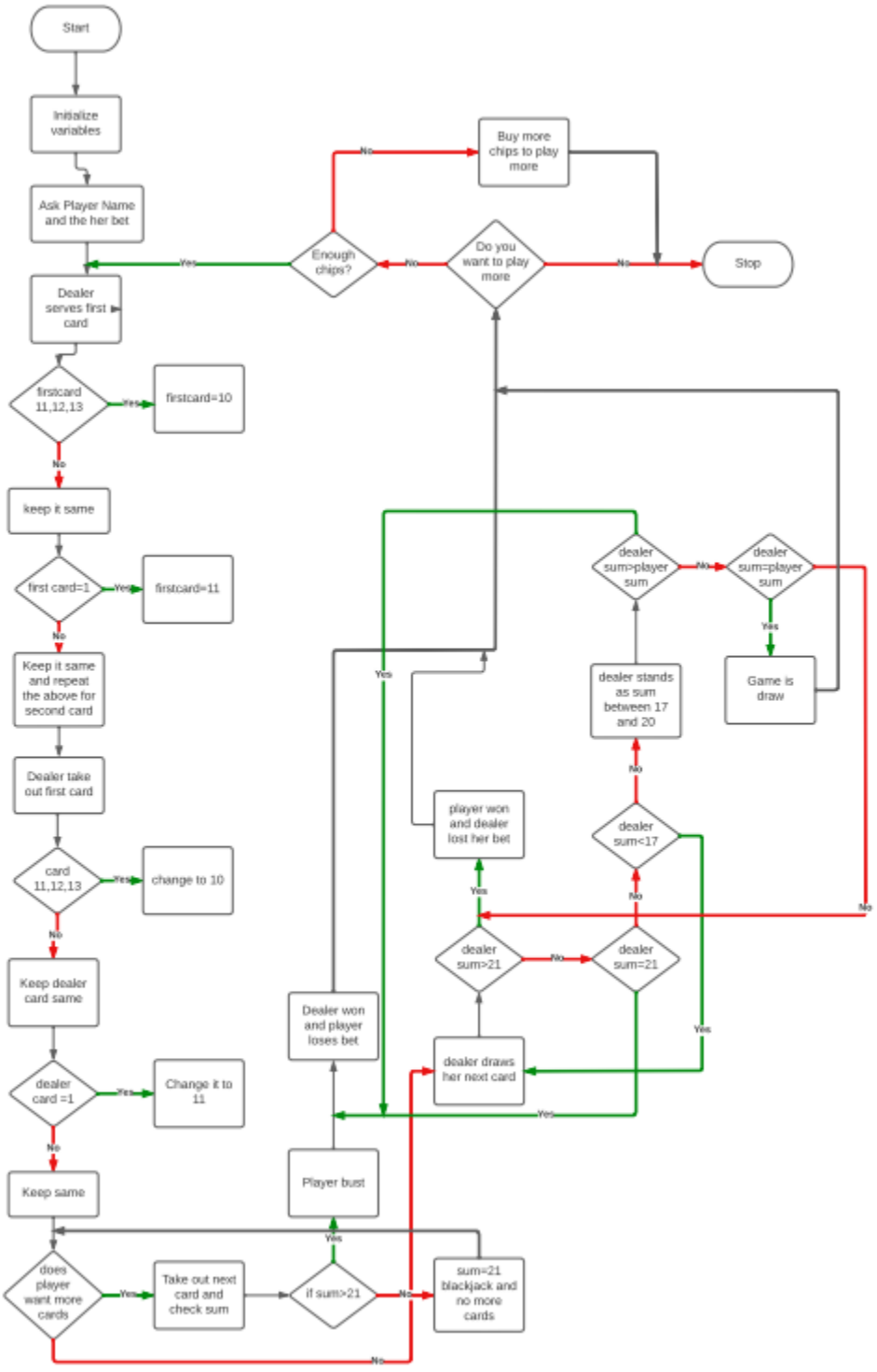
Now dealer is opening her second card...

Dealer cards are 3, 11
Dealer total is : 14
(Dealer total is 16 or less. Hence dealer will have to hit)
Dealer cards are 3, 11, 7
Dealer total is : 21
(Dealer total is 17 or more. Hence dealer will have to stand)

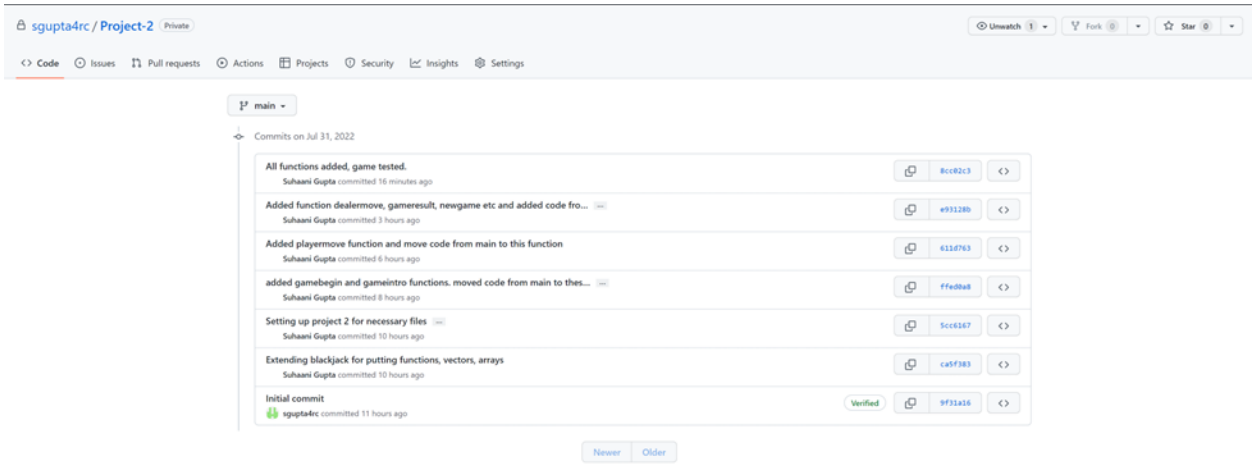
Dealer got blackjack!!
Dealer Won!. Your 1 $ bet went to the dealer
Your new balance is : $94

Do you want to continue playing? yes(y)/No(n)

Blackjack Game Flowchart



[Link for PDF version for Flowchart]



^repository on github of various versions

Final Code:

```
/*
 * To change this license header, choose License Headers in Project Properties.
 * To change this template file, choose Tools | Templates
 * and open the template in the editor.
 */

/*
 * File:   main.cpp
 * Author: Suhaani Gupta
 *
 * Created on June 24, 2022, 1:36 AM
 */

#include <iostream>
#include <cstdlib> //for rand and srand
#include <cstdio>
#include <string>
#include<ctime>
#include <fstream>
#include <vector>
using namespace std;

// User Libraries

// Global Constants
//Mathematical/Physics/Conversions, Higher dimensional arrays

//Function Prototypes
void gameintro(vector<string>& log, int& balance, string& playername) {
    string str;

    cout << "This is Suhaani's blackjack game. You play against the dealer" << endl;
    cout << "----------------------------------------------------------------" << endl;
    cout << "What is your name?" << endl;
    getline(cin, playername);
    cout << endl;
    cout << "Welcome " << playername << " to Suhaani's Blackjack game" << endl;
    cout << "How many chips do you want to buy? (Each is worth one dollar)" << endl << endl;
    cin >> balance;
```

```
    cout << playername << " is playing Suhaani's blackjack with " << to_string(balance) << "
dollars" << endl;
    cout << "----------------------------------------------------------------------" << endl << endl;
    str = playername + " is playing with " + to_string(balance) + " Dollars";
    cout << "New game session of blackjack started by dealer "<<endl;
    cout << "----------------------------------------------------------------------" <<endl;
    log.push_back(str);//pushing log to log vector
}

void gamebegin(vector <string>& log, int& playersum, int& dealersum, string&
playercards,string& dealercards) {

    int firstcard;
    int secondcard;
    int dealercard;
    string str;


    srand(time(NULL));
    str = "Dealer serving your first two cards. Here it goes... \n";
    cout << str;
    log.push_back(str);

    firstcard = 1 + (rand() % 13);//generating different values using rand ranging from 1 to 13
    if (firstcard >= 11 && firstcard <= 13) //it is face card. Assume it 10
        firstcard = 10;

    secondcard = 1 + (rand() % 13);//generating different values using rand ranging from 1 to 13
    if (secondcard >= 11 && secondcard <= 13) //second card is face card. Assume it 10
        secondcard = 10;

    if (firstcard == 1) { //if ace card
        firstcard = 11; //assume 11
        cout << "your first card is 1. Hence it is treated as 11" << endl;
        // bjfile<<"your first card is 1. hence it is treated as 11"<<endl;//writing log to file
    }

    if (firstcard != 11 && secondcard == 1) { //if first not Ace, then assume second 11
        cout << "Your second card is 1. Hence it is treated as 11" << endl;
        log.push_back("Your second card is 1. Hence it is treated as 11 \n");
        secondcard = 11;
    }

    playersum += firstcard;
```

```
    playersum += secondcard;
    playercards = to_string(firstcard) + ", " + to_string(secondcard);

    cout << "Your cards : " << playercards << endl << "Total= " << playersum << endl << endl;
    str= "Your cards : " + playercards + "\n Total= " + to_string(playersum) + "\n \n";
    log.push_back(str);

    if (playersum == 21) {//it is blackjack for player
        cout << "Wow! you hit a blackjack.." << endl;
        log.push_back("Wow! you hit a blackjack..\n");
    }

    //Now dealer will open his first card
    //.....................................................................
    cout << "Dealer's Turn..Dealer open her first card..." << endl<<endl;
    log.push_back("Dealer's Turn..Dealer open her first card...\n \n");

    dealercard = 1 + (rand() % 13);//generating different values using rand ranging from 1 to 13

    if (dealercard >= 11 && firstcard <= 13) {//dealer got face card,make it 10
        dealercard = 10;
    }
    if (dealercard == 1) {
        dealercard = 11;
        cout << "Dealer first card is 1, hence it is treated as 11" << endl;
        log.push_back("Dealer first card is 1, hence it is treated as 11\n");
    }
    cout << dealercard << endl;
    str = dealercards + "\n";
    log.push_back(str);
    dealersum += dealercard;
    dealercards = to_string(dealercard);
    cout << endl;
    cout << "Dealer Total is : " << dealersum << endl << endl;
    str = "Dealer Total is : " + dealersum + '\n';
    log.push_back(str);

    //.....................................................................
    cout << "-----------------------------------------------------" << endl;
}

bool playermove(vector<string>& log, int& playersum, string& playercards, int balance[][2],
bool& playerBust, int const BET, int const session) {
```

```
    float f;
    char response;
    int newcard;
    string str;
    cout << "Your turn now....."<<endl;
    cout << "do you want stand or hit? (h for hit / s for stand) " << endl;
    log.push_back("do you want stand or hit? (h for hit / s for stand) \n");
    cin >> response;

    if (response == 'h' || response == 'H') { //player wants to takeout another card
        newcard = 1 + (rand() % 13);//generating different values using rand ranging from 0to13
        if (newcard >= 11 && newcard <= 13)//face card. So make it 10
            newcard = 10;

        if (newcard == 1 && (playersum + 11) <= 21)//assume new card 11 if sum is less than 21,
otherwise be it 1
            newcard = 11;
        playersum += newcard;
        playercards = playercards + ", " + to_string(newcard);

        cout << "Your cards : " << playercards << " total = " << playersum << endl<<endl;
        str = "Your cards : " + playercards + " total = " + to_string(playersum)+ " \n \n";
        log.push_back(str);


        if (playersum == 21) { //blackjack for player
            cout << "Wow! you hit a blackjack.." << endl;
            log.push_back("Wow! you hit a blackjack..\n");
            return false;//stop game inner innerloop
        }

        if (playersum > 21) { //player is busted and dealer wins
            playerBust = true;
            return false; //stop game inner loop

        }
    }//end of response if

    else { //player choses to stand. No more cards
        cout << "You chose to stand..., Now dealer will take the turn" << endl << endl;
        log.push_back("You chose to stand..., Now dealer will take the turn \n \n");
        return false;//stop inner loop
    }
```

```
} //end of player move function

void dealermove(vector<string>& log, int& dealersum, string& dealercards, int balance[][2],
bool& dealerBust, int const BET, int const session) {
    char c;
    int dealercard;
    bool dealerflag = true;
    string str;
    cout << "Now dealer is opening her second card..." << endl<<endl;
    log.push_back("Now dealer is opening her second card...\n \n");

    do {
        dealercard = 1 + (rand() % 13);//generating different values using rand ranging from 0to13

       if (dealercard >= 11 && dealercard <= 13) //dealer got face card. make it 10
            dealercard = 10;

       if (dealercard == 1 && ((dealersum + 11) <= 21)) //dealer will treat 1 as 11 only when is less
than 21
            dealercard = 11;

        dealersum += dealercard;
        dealercards = dealercards + ", " + to_string(dealercard);
        cout << "Dealer cards are " << dealercards << endl;
        cout << "Dealer total is : " << dealersum << endl;
        str = "Dealer cards are " + dealercards+"\n \n";
        log.push_back(str);
        str = "Dealer total is : " + dealersum + '\n';
        log.push_back(str);

        if (dealersum > 21){
            dealerflag = false;
            dealerBust = true;
        }

        else if ((dealersum >= 17) && (dealersum <= 21)) { //dealer has to stand
            cout << "(Dealer total is 17 or more. Hence dealer will have to stand)" << endl << endl;
            log.push_back("Dealer total is 17 or more. Hence dealer will have to stand \n \n");
            dealerflag = false;

            if (dealersum == 21)
            cout << "Dealer got blackjack!!" << endl;
        }
```

```
        else {
            cout << "(Dealer total is 16 or less. Hence dealer will have to hit)" << endl;  //must for
dealer to take out new card
            log.push_back("Dealer total is 16 or less. Hence dealer will have to hit \n \n");
        }

    } while (dealerflag);

}

void gameresult(vector<string>& log, int playersum, int dealersum,int balance[][2],int session, int
BET, bool playerBust,bool dealerBust) {
    string str;
    if (dealerBust) {
        cout << "dealer busted out, you WON!" << endl;
        log.push_back("dealer busted out, you WON! \n");
        balance[0][0] += BET;
        balance[0][1] -= BET;

        cout << "Dealer lost her " << BET << " dollar bet to you" << endl;
        str = "Dealer lost her " + to_string(BET) + " dollar bet to you \n";
        log.push_back(str);
        cout << "Your new balance is : $" << balance[0][0] << endl;
        str = "Your new balance is : $" + to_string(balance[0][0])+ '\n';
        log.push_back(str);
    }

    else if (playerBust) {
        cout << "Player busted out, Dealer WON!" << endl;
        log.push_back("Player busted out, Dealer WON! \n");
        balance[0][0] -= BET;
        balance[0][1] += BET;

        cout << "Player lost her " << BET << " dollar bet to dealer" << endl;
        str = "Dealer Won " + to_string(BET) + " dollar bet from you \n";
        log.push_back(str);
        cout << "Your new balance is : $" << balance[0][0] << endl;
        str = "Your new balance is : $" + to_string(balance[0][0]) + '\n';
        log.push_back(str);

    }

    else if (dealersum > playersum) {
        cout << "Dealer Won!. Your " << BET << " $ bet went to the dealer" << endl;
```

```
        str = "Dealer Won!. Your " + to_string(BET) + " $ bet went to the dealer \n";
        log.push_back(str);
        balance[0][0] -= BET;
        balance[0][1] += BET;
        cout << "Your new balance is : $" << balance[0][0] << endl;
        str = "Your new balance is : $" + to_string(balance[0][0]) + '\n';
        log.push_back(str);
    }
    else if (playersum > dealersum) {
        cout << "You Won" << endl;
        cout << "Dealer paid you $" << BET << endl;
        //  bjfile<<"You Won"<<endl;//writing log to file
        //  bjfile<<"Dealer paid you $"<<BET<<endl;//writing log to file
        balance[0][0] += BET;
        balance[0][1] -= BET;
        cout << "Your new balance is : $" << balance[0][0] << endl;
        // bjfile<<"Your new balance is : $"<<balance<<endl;//writing log to file

    }
    else if (playersum == 21 && dealersum == 21)
    {
        cout << "Both dealer and you got blackjacks. Hence it is draw. Your bet is returned" <<
endl;
    }
    else {
        cout << "Your total is equal to that of dealer's. Game draws. You get your bet back" << endl
<< endl;
        // bjfile<<"Your total is equal to that of builder's. Game draws. You get your bet
back"<<endl<<endl;//writing log to file

    }
}

bool newgame(int pbalance) {
    char response;
    std::cout << "-------------------------------------" << endl;
    std::cout << "Do you want to continue playing? yes(y)/No(n)" << endl;
    std::cin >> response;
    if (response == 'n' || response == 'N') {
        cout << "Thanks for playing Suhaani's blackjack" << endl;
        cout << "Your current balance is " << pbalance << " dollars" << endl;
        cout << "Return counters and take your money back" << endl;
        cout << "-----------------------------------------";
        return false;
```

```
    }
    else if (response == 'y' || response == 'Y')
        if (pbalance == 0) {
            cout << "Your balance is zero. Hnece you cannot play more. Buy more counters" <<
endl;
            return false;
        }
        else
            return true;

    else {
        cout << "Wrong key is selected. Terminating game session" << endl;
            return false;

    }

}
//Execution Begins Here
int main(int argc, char** argv) {
    //Initialize the Random Seed

    //Declare Variables
    int const ROWMAX = 100; //assume player will play maximum 100 sessions in the play

    bool gameloop = true;
    bool dealerflag = true;
    bool playerBust = false;
    bool gamemasterloop = true;
    bool dealerBust = false;
    bool playmore = true;

    int playersum = 0;
    int dealersum = 0;
    int BET = 1;
    int session = 1;

    string playercards;
    string dealercards;
    string playername;

    vector <string> log;
    int balance[ROWMAX][2] = { {} }; //array to save current balance points.

    gameintro(log, balance[0][0], playername);
```

```
    // Initialize Variables

    //Map inputs to outputs -> The Process

    //Display Results
    while (gamemasterloop) {
        gamebegin(log, playersum, dealersum, playercards, dealercards);

        while (gameloop) { //execute player has no blackjack. loop for player to takeout more cards
untill stand, burst or blackjack
            gameloop=playermove(log, playersum, playercards, balance, playerBust, BET, session);
            }
        if (!playerBust) {
            dealermove(log, dealersum, dealercards, balance, dealerBust, BET, session);
        }
        gameresult(log, playersum, dealersum, balance, session, BET, playerBust,dealerBust);

        playmore=newgame(balance[0][0]);

        if (playmore){
            playersum = 0;
            dealersum = 0;
            dealerflag = true;
            gameloop = true;
            playerBust = false;
            dealerBust = false;
            session++;
        }
        else {
            gamemasterloop = false;
        }
    }


    //Exit stage right
    return 0;
}
```