

Course Project Phase 3



This is the third phase of the course project where you will finish implementing the game we started. In Phase 1 and Phase 2, you implemented the Business tier objects. In this phase, you are provided a Presentation tier in **gui_blackjack.py**, a partially implemented GUI application which allows the player to play the blackjack game. You will complete the game by implementing a few methods in this file. You will also implement a few additional methods in the **Blackjack** class.

GUI Application:

Here's a sample run of the GUI application:

A screenshot of a Python GUI application titled "Blackjack". The window has a light gray background and standard window controls (minimize, maximize, close). The interface is organized into sections. At the top, there are two text input fields: "Money:" with the value "\$65.0" and "Bet:" with the value "20". Below these is a section for the "DEALER" with a "Cards:" field showing "Queen♦ Ace♦ 4♥ 8♠ Ace♠" and a "Points:" field showing "24". The next section is for the "YOU" player, with a "Cards:" field showing "3♣ Ace♣ 3♣" and a "Points:" field showing "17". Below the player's cards are two buttons: "Hit" and "Stand". At the bottom, there is a "RESULT:" field displaying the message "Yay! The dealer busted. You win!". Below the result field are two buttons: "Play" and "Exit".

How the GUI application works:

- The player must enter a bet in the Bet text field and then click the Play button to start a new game.
- The player can click on the Hit or Stand button to hit or stand.
- The program uses the Money field to display the amount of money that the player has.
- The program uses the Bet field to get the amount of the bet from the player.
- The program uses the Cards and Points fields to display the cards and points for the dealer and the player. In the Cards fields, display the hand using a short display.
- The program uses the Result field to display messages to the player. These messages should include whether the user needs to place a bet, whether the user has won or lost, user should click play before clicking hit or stand, play is already underway and so on.

For your convenience, the rules of the game, that were provided in Phase 2, are also provided here in the Appendix. Please read those to get a better idea of the game.

Don't be discouraged by the length of this document or the rules of the game listed in the Appendix. Just follow the instructions and you will have no problem getting the game to work 😊

Step 1: Update Blackjack class:

You have already implemented many of the methods of the **Blackjack** class in the Phase 2. Add the following two methods to the class:

1. **takeDealerTurn(self)**: Method to play dealer's turn as described in the rule 3.e in the Appendix. This method first lets the dealer draw one more card (second card) for himself. Then the dealer must draw cards until he has a total of 17 or more.
2. **determineOutcome(self)**: Method looks at player's and dealer's hand and decides who the winner is as per the instructions given in rules 3.f and 4. The method also updates self.money accordingly and returns a string giving details of the result. Here are some of the possible results: *"Sorry. You busted. You lose."*, or *"Yay! The dealer busted. You win!"* or *"Hooray! You win!"*, *"Blackjack! You win!"*, *"You push"* and so on.

Step 2: Update BlackjackFrame class:

You are given a partially implemented Presentation tier (**BlackjackFrame** class) in **gui_blackjack.py** file. Download it and study the existing code. It has the following methods already implemented:

- **__init__(self)**: Constructor
- **initComponents(self), makeButtons1(self), makeButtons2(self)**: Methods that set up the UI components including the labels, text entry fields and buttons.
- **exit(self)**: Event handler for the Exit button

You will not change these methods. Try running this program as provided. Of course, three buttons – Play, Hit and Stand - do nothing. You will implement helper methods and three event handlers for these buttons:

- **displayPlayer(self), displayDealer(self)**: Helper methods that can be used to update the various text entry fields. Use these in the event handlers you will be writing.
- **displayResult(self)**: Helper method to update the result of the game. It calls the determineOutcome method to decide what the outcome of the game is. It also updates the result and the money fields in UI. Useful in the event handlers.

- **playerCanPlayTurn(self):** Helper method to check if the game is underway so that player can play a turn. Useful in the event handlers.
- **play(self):** Method to start a new game. Method checks that the game is not already underway, if so, gives feedback in the results field and returns. Otherwise, verifies that the bet amount is valid. If not valid, gives feedback in the results field and returns. If a game is not underway and the bet amount is valid, starts the game by setting the bet on the game object, calling **setupRound** and displaying player and dealer's cards and points. Finally, before returning, the method checks for a blackjack and takes needed actions.
- **hit(self):** Method confirms that user can play a turn. If not returns, else calls the **takePlayerTurn** and reports the player state by calling **displayPlayer**. Next checks if the player is busted, if so, ends the game and updates the result by calling **displayResult**.
- **stand(self):** Method confirms that user can play a turn, if not returns. Otherwise ends the game and has the dealer play his turn. It then reports the dealer state by calling **displayDealer**. Finally updates the result by calling **displayResult**.

Multiple sample runs of **gui_blackjack.py** file with the completed game are attached as **blackjack-final-*.jpg**. Please review these to understand what the output should look like in various situations. Please submit edited versions of **blackjack.py** and **gui_blackjack.py** files with block-comment at the top.

Appendix: Game Rules (Same as provided in Phase 2)

Here's the description of a simplified version of the game of Blackjack which we are developing. (Look up online the rules of the actual game if you wish)

1. The basic objective of the game is that the player wants to have a hand value that is closer to 21 than the dealer's, without going over 21.
2. The game begins by the player having a starting balance.
3. In each round of the game,
 - a. The player first places a bet. The amount must be less than or equal to the player's current balance.
 - b. Next, the dealer sets up the round by:
 - i. Starting with a fresh new deck, new playerHand and a new dealerHand.
 - ii. Dealing two cards to the player, and one card to himself.
 - c. Next, the player plays her hand by repeatedly indicating whether to draw another card ("hit") or stop at the current total ("stand"). Player bases this decision based on the value of the hand using this rule: Cards 2-10 have face value; King, Queen, Jack are worth 10; and Aces are either a 1 or an 11 — whichever makes the hand value not go over 21. E.g., if player has an Ace and a King, the Ace should be counted as 11 so that hand value is 21. However, if the

player has two Aces – one of them should be counted as 1 so that the hand value is $11+1 = 12$ (instead of $11+11=22$ which will go over 21).

- d. If the player draws a card (by indicating “hit”) and that card makes player’s hand value go over 21, player hand is a bust. That is an automatic loser. Otherwise, the dealer continues to deal a card until the player indicates a “stand” or the player hand busts.
 - e. Once the player plays her hand (either by ending the current round by indicating “stand” or “bust”), the dealer plays his hand: first he draws one more card for himself, and then must draw cards until he has a total of 17 or more. The dealer has no choice in how to play the hand. He must continue taking cards until his total is at least 17.
 - f. Once both the player and the dealer have played hands, the winner is decided, and the bet is settled:
 - i. If player hand busts, the player is the loser, and she loses her bet amount.
 - ii. If the dealer busts by going over 21, the player wins her bet.
 - iii. If both the player and the dealer didn’t bust, then if the dealer’s hand total is higher than the player’s, the player lose the bet. Otherwise, if the player hand total is higher than the dealer’s, the dealer loses and pays the player her bet amount.
 - iv. If the player and the dealer tie, with the same exact total, it is called a “push”, and the player does not win or lose the bet.
4. Declaring a hand Blackjack: There is an additional rule which declares a hand a natural or a Blackjack. If a player's first two cards are an ace and a "ten-card" (a face card or 10), giving her a count of 21 in two cards, this is a natural or "Blackjack" and this is an automatic win for the player and the player gets ***one and a half times the amount of her bet.***