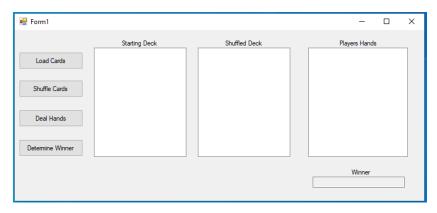# School of Applied Sciences And Technology
Department of IST
Program: CNT

CMPE 1666-ICA06- Fisher-Yates Shuffling Algorithm

In this ICA, you will use the fisher Yates algorithm to shuffle a deck of 52 cards, deal a hand to each of 10 players and find a winner.

Create an application with the UI shown below.

In the form class, declare a struct to store attributes for a card. The struct will have 4 members, namely suit and rank, points and Symbol. The suits will be from :Heart, Diamonds, Club and Spade. Declare an **enum** type for the suit.

The ranks will be: the numbers 2..14, with 11, 12, 13 and 14 representing respectively Jack, Queen, King and Ace.

At the form level, declare and initialize a card deck as an array of 52 cards and a 2D array of 10x5 of cards. The 2D array will store the cards for each player in a row (This will be performed by the method **DealHands()**, below). Also, declare and initialize an int array of size 10, called **playerPoints**, to store the total points for each player.

Create a method called **createCard()**. It has as parameter a suit and a rank. It creates and returns a struct of type Card. It calculates the points for each card by assigning a weight to each of the suit as per the table below, and the points for each card is obtained from **weight x the rank**

Suit	Weight
Heart	4
Diamond	3
Club	2
Spade	1

The Symbol for a card will be assigned as the rank if the value is in the range 2..10. Otherwise it will be the symbol for the rank, i.e J, Q, K or A.

In the form constructor, use the method **createCard()** to assign a card with a unique suit-rank combination to each element of the deck of cards. The card will also be assigned the points and symbol.

Add a method **CardTostring()** that returns a string of the form "Card: <suit> <symbol> Points: <points>, for a card. This returned string will be used for display in the listboxes (see the sample runs).

Add a method **ShuffleCards()**, that shuffles your deck of cards using the Fisher-Yates Algorithm.

Add a method **DealHands()** that has as parameters a deck of cards and a 2D array. It iterates through the deck of cards and distributes the cards among the players. In each round each player is given a card. The total points for each player must also be calculated and assigned to the array playerPoints.

Add a method **DetermineWinner()** that iterates through the 2D array, calculates the sum of points in each row and determines the winner row.

Implement the event handlers for the click events of the buttons as follows:

- The button "Load Cards" will cause the current card deck to be displayed in the Listbox with the label "**Starting Deck**".
- The button "**Shuffle Cards**" will cause the method ShuffleCards() to be called. The Shuffled Cards will then be displayed in the "**Shuffled Deck**" listbox.
- The button "**Deal Hands**" will call the method **DealHands()** to distribute the cards among the players. The player hands and total points for each player will be displayed in the Players Hands listbox.
- The button "**Determine Winner**" will iterate over the **playerPoints** array, determine the winner and display the winner and total points in the read-only textbox. In case of ties, you need only display the first winner.

Anchoring: Pin the

Sample Run:

Form1 — ☐ ✕

Starting Deck

Load Cards	
Shuffle Cards	
Deal Hands	
Determine Winner	

Starting Deck

Card	Points
Card:Heart 2	Points: 8
Card:Heart 3	Points: 12
Card:Heart 4	Points: 16
Card:Heart 5	Points: 20
Card:Heart 6	Points: 24
Card:Heart 7	Points: 28
Card:Heart 8	Points: 32
Card:Heart 9	Points: 36
Card:Heart 10	Points: 40
Card:Heart J	Points: 44
Card:Heart Q	Points: 48
Card:Heart K	Points: 52
Card:Heart A	Points: 56
Card:Diamond 2	Points: 6
Card:Diamond 3	Points: 9
Card:Diamond 4	Points: 12
Card:Diamond 5	Points: 15
Card:Diamond 6	Points: 18
Card:Diamond 7	Points: 21
Card:Diamond 8	Points: 24
Card:Diamond 9	Points: 27
Card:Diamond 10	Points: 30
Card:Diamond J	Points: 33
Card:Diamond Q	Points: 36
Card:Diamond K	Points: 39
Card:Diamond A	Points: 42
Card:Club 2	Points: 4
Card:Club 3	Points: 6
Card:Club 4	Points: 8
Card:Club 5	Points: 10
Card:Club 6	Points: 12
Card:Club 7	Points: 14
Card:Club 8	Points: 16
Card:Club 9	Points: 18
Card:Club 10	Points: 20
Card:Club J	Points: 22
Card:Club Q	Points: 24
Card:Club K	Points: 26
Card:Club A	Points: 28
Card:Spade 2	Points: 2
Card:Spade 3	Points: 3
Card:Spade 4	Points: 4
Card:Spade 5	Points: 5
Card:Spade 6	Points: 6
Card:Spade 7	Points: 7
Card:Spade 8	Points: 8
Card:Spade 9	Points: 9
Card:Spade 10	Points: 10
Card:Spade J	Points: 11
Card:Spade Q	Points: 12
Card:Spade K	Points: 13
Card:Spade A	Points: 14

Shuffled Deck

Card	Points
Card:Club 7	Points: 14
Card:Diamond K	Points: 39
Card:Diamond 2	Points: 6
Card:Club 10	Points: 20
Card:Club 3	Points: 6
Card:Club Q	Points: 24
Card:Club A	Points: 28
Card:Diamond J	Points: 33
Card:Spade 7	Points: 7
Card:Diamond 9	Points: 27
Card:Heart 4	Points: 16
Card:Club 2	Points: 4
Card:Spade 4	Points: 4
Card:Heart 5	Points: 20
Card:Heart J	Points: 44
Card:Diamond Q	Points: 36
Card:Heart 3	Points: 12
Card:Diamond 4	Points: 12
Card:Club J	Points: 22
Card:Heart 10	Points: 40
Card:Heart 9	Points: 36
Card:Club 9	Points: 18
Card:Diamond 10	Points: 30
Card:Spade 5	Points: 5
Card:Spade 10	Points: 10
Card:Diamond 3	Points: 9
Card:Club K	Points: 26
Card:Diamond A	Points: 42
Card:Heart 6	Points: 24
Card:Club 4	Points: 8
Card:Spade A	Points: 14
Card:Spade Q	Points: 12
Card:Spade 3	Points: 3
Card:Heart 7	Points: 28
Card:Diamond 6	Points: 18
Card:Diamond 5	Points: 15
Card:Heart 8	Points: 32
Card:Spade 8	Points: 8
Card:Heart K	Points: 52
Card:Club 8	Points: 16
Card:Diamond 7	Points: 21
Card:Heart 2	Points: 8
Card:Spade 2	Points: 2
Card:Spade 9	Points: 9
Card:Heart Q	Points: 48
Card:Spade K	Points: 13
Card:Diamond 8	Points: 24
Card:Club 5	Points: 10
Card:Spade 6	Points: 6
Card:Spade J	Points: 11
Card:Club 6	Points: 12
Card:Heart A	Points: 56

Players Hands

Player 1

Card:Club 7	Points: 14
Card:Heart 4	Points: 16
Card:Heart 9	Points: 36
Card:Spade A	Points: 14
Card:Diamond 7	Points: 21
Total: 101

Player 2

Card:Diamond K	Points: 39
Card:Club 2	Points: 4
Card:Club 9	Points: 18
Card:Spade Q	Points: 12
Card:Heart 2	Points: 8
Total: 81

Player 3

Card:Diamond 2	Points: 6
Card:Spade 4	Points: 4
Card:Diamond 10	Points: 30
Card:Spade 3	Points: 3
Card:Spade 2	Points: 2
Total: 45

Player 4

Card:Club 10	Points: 20
Card:Heart 5	Points: 20
Card:Spade 5	Points: 5
Card:Heart 7	Points: 28
Card:Spade 9	Points: 9
Total: 82

Player 5

Card:Club 3	Points: 6
Card:Heart J	Points: 44
Card:Spade 10	Points: 10
Card:Diamond 6	Points: 18
Card:Heart Q	Points: 48
Total: 126

Player 6

Card:Club Q	Points: 24
Card:Diamond Q	Points: 36
Card:Diamond 3	Points: 9
Card:Diamond 5	Points: 15
Card:Spade K	Points: 13
Total: 97

Player 7

Winner

Player5- Points:126

Rubric

Item	Marks	Penalties
UI Design (40%) • UI is as directed. • Tab Order is Correct. • Display Format correct. • Anchoring as required	12	
Code Design and Implementation (60%) • All buttons working as required • Shuffling Algorithm working • DealHands Working • Winner properly designated • All displays happening as required	18	
Documentation: • Programmer Block • Well commented code • Appropriate Variable Names • Proper spacing between blocks of code • Control names are consistent and appropriate.		Penalties: -1 to -6 based on instructor's judgement