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War

— *The Card Game*
Project 2

Introduction

I continued to work on the card game, **War**. The main concepts we learned in the second half of the semester were functions, arrays, vectors, sorting, and searching. The project's first iteration had to exclude these concepts, so the code was very messy, repetitive, and inefficient. With functions, I made the code look more organized and cut down on over 100 lines of code originally. Most of the work was done on implementing the new concepts learned by using multiple arrays to display data and stats after the user decided to stop playing.

The Traditional Rules of Game

1. A deck of 52 cards are shuffled and divided evenly with each player receiving 26 cards placed face down.

2. Each player turns up a card at the same time, and whoever has the higher value card takes both as a form of points.

3. If the cards are the same rank, it is a war. Then each player places one more card down. Whoever has the higher card takes both piles (4 cards)

4. If the turned-up is a war again, then repeat *step 3*. Then whoever has the higher card takes both piles (6 cards). And so on.

5. The player who ends the game with the most cards wins the game.

The Rules In My Game

For the most part, the rules are the same. The only difference between my program and the traditional game is the win condition. Rather than the player with a higher value card adding the newly received cards into their deck, they will put the cards aside, each card worth one point. This means that will split 52 points between the two players, and whoever has more wins at the end of the game. This allows ties to be possible. But it also means that it will give a score to you depending on the percentage of cards you earned out of the 52 cards in the deck. You are allowed to play as many times as you'd like, and when you wish to quit, it will display the data of the games to you.

Things Implemented in Project 2

With the game already being fully functional without using functions, 2D arrays, and vectors, I focused on enhancing the look and adding more feedback to the game.

Code organized into functions:

1. Assigning card1 value is now in a function
2. Assigning card2 value is now in a function
3. The deck is now generated and randomized in a function

New features:

1. The randomized deck is printed before the game starts via a 2D array
2. Uses static int to keep count of how many games are played
3. Uses vector to hold scores
4. Prints all the scores of the games played and then sorted them
5. Prints each game next to its score using parallel arrays
6. Uses binary search to find which element of the sorted scores is a tied game
7. Can enter 'x' to exit the program via exit(0)

Flowchart

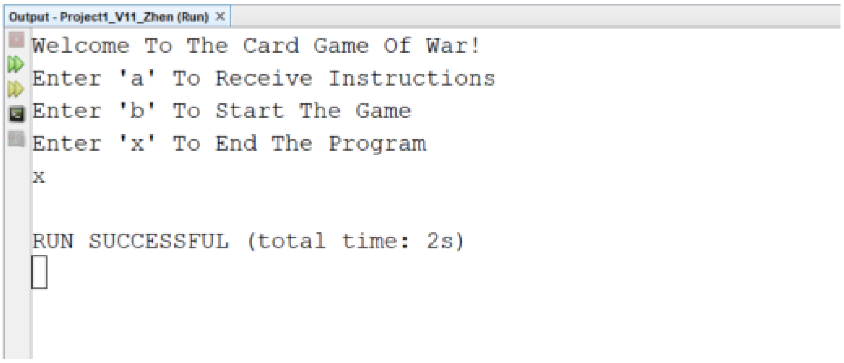
See attached file in folder.

Pseudocode

```
● Make array or deck of 52 cards and initialize in order
● Use rand to generate positions of elements in the list randomly
● Have the user enter B to play the game
● While user input is B

● Until all 52 cards in the deck are played
● Draw a card from the deck for player 1
● Draw a card from the deck for player 2
● If player1's card is greater, they gain 2 points
● If player2's card is greater, they gain 2 points

● If the cards are equal
● Draw a card for each player again
● If the cards are equal, draw again
● Else if player1's card is greater, they get all the cards from the war
● Else if player2's card is greater, they get all the cards from the war

● After all 52 cards are played
● Player1 wins if their score is greater
● Player2 wins if their score is greater
● It's a tie if they have the same amount of points
● User's score is their cards gained divided by 52
● Ask user if they would like to play again
● If user input is 'b', play again
● Else, continue to the stats page

● Print array of scores gathered
● Sort the scores and print them again
● Use binary search to determine where the tie is if any
● Output the game number next to the score for that game using parallel arrays
● Output to a file
```

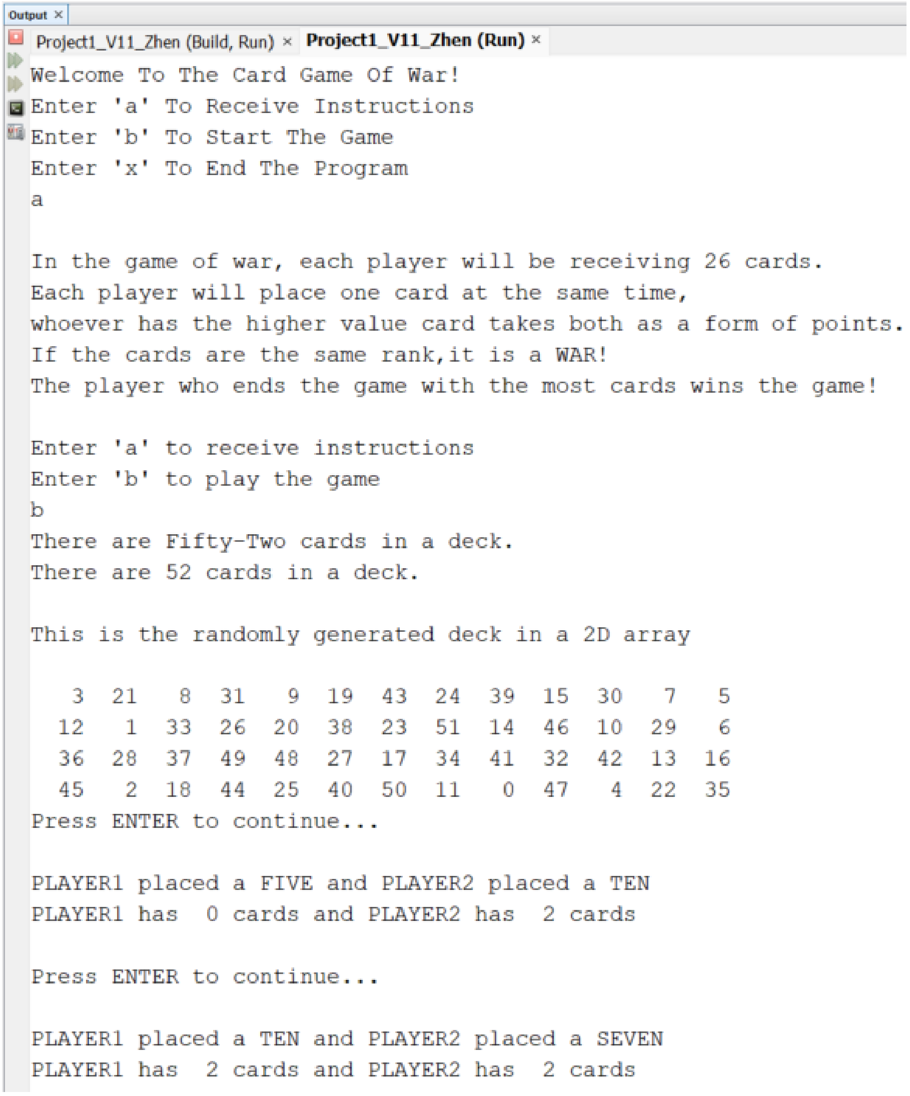
Images of Output

1



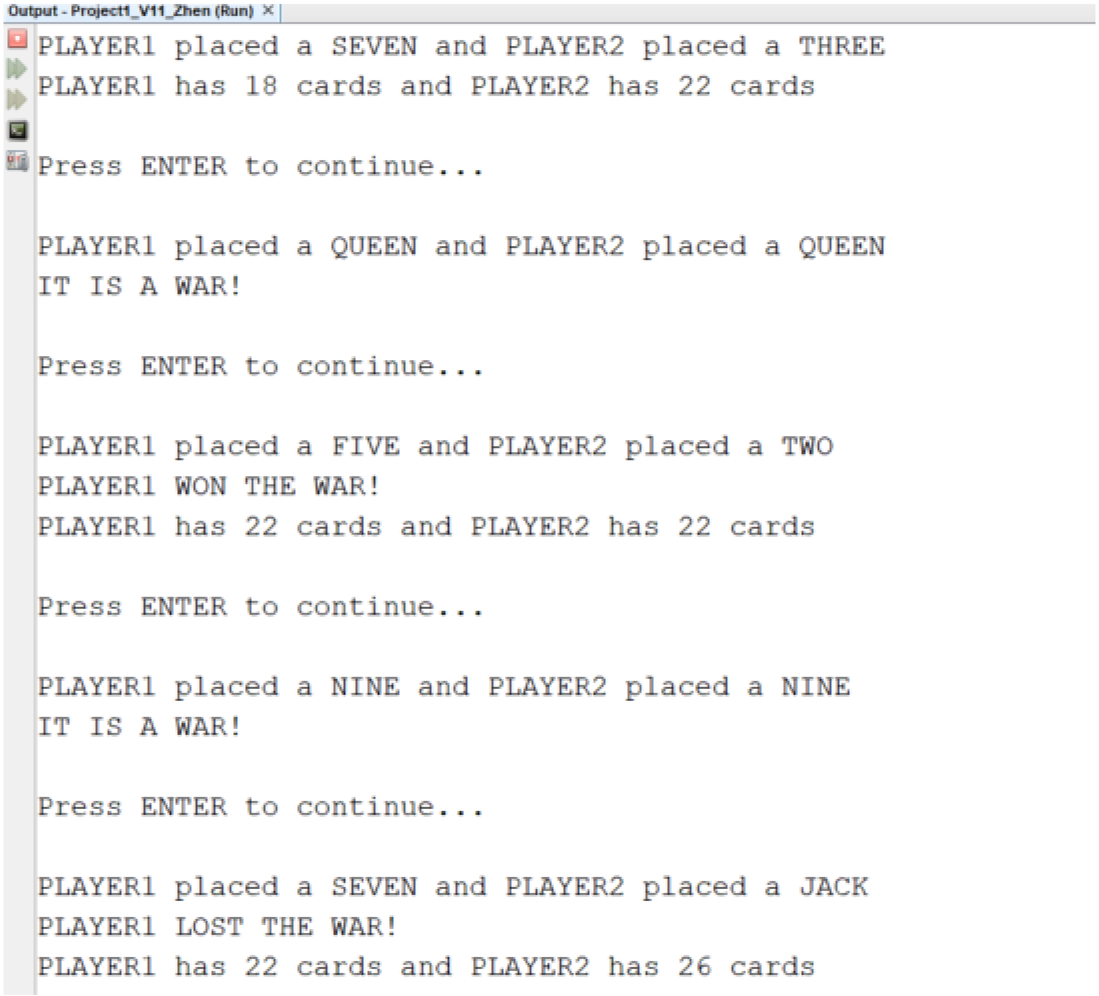
```
Welcome To The Card Game Of War!
Enter 'a' To Receive Instructions
Enter 'b' To Start The Game
Enter 'x' To End The Program
x

RUN SUCCESSFUL (total time: 2s)
```

2



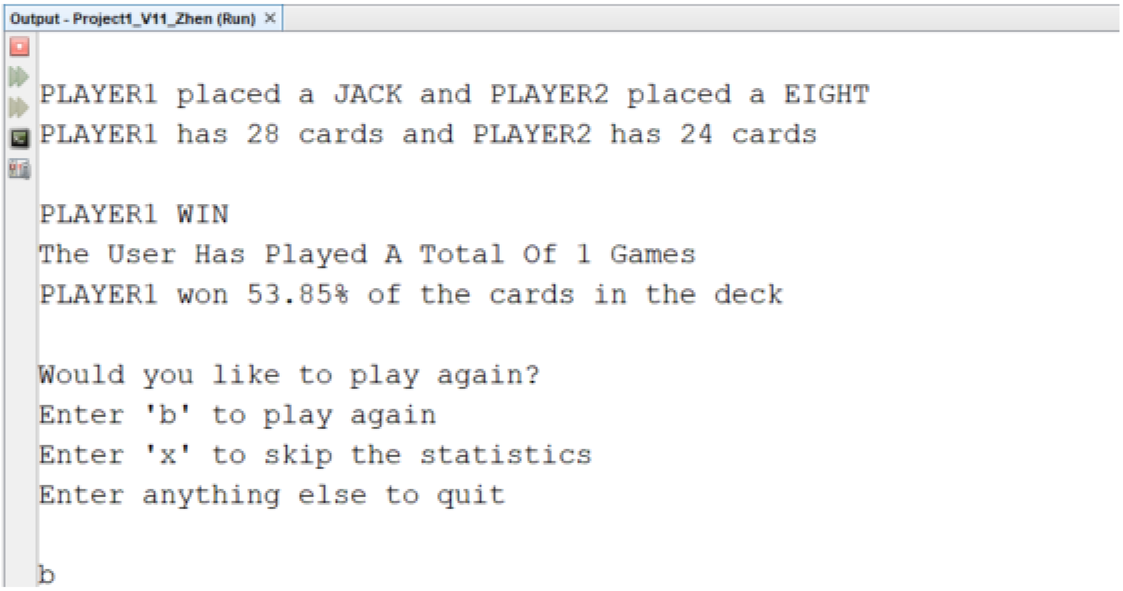
```
Welcome To The Card Game Of War!
Enter 'a' To Receive Instructions
Enter 'b' To Start The Game
Enter 'x' To End The Program
a

In the game of war, each player will be receiving 26 cards.
Each player will place one card at the same time,
whoever has the higher value card takes both as a form of points.
If the cards are the same rank,it is a WAR!
The player who ends the game with the most cards wins the game!

Enter 'a' to receive instructions
Enter 'b' to play the game
b
There are Fifty-Two cards in a deck.
There are 52 cards in a deck.

This is the randomly generated deck in a 2D array

   3  21   8  31   9  19  43  24  39  15  30   7   5
  12   1  33  26  20  38  23  51  14  46  10  29   6
  36  28  37  49  48  27  17  34  41  32  42  13  16
  45   2  18  44  25  40  50  11   0  47   4  22  35
Press ENTER to continue...

PLAYER1 placed a FIVE and PLAYER2 placed a TEN
PLAYER1 has  0 cards and PLAYER2 has  2 cards

Press ENTER to continue...

PLAYER1 placed a TEN and PLAYER2 placed a SEVEN
PLAYER1 has  2 cards and PLAYER2 has  2 cards
```

3



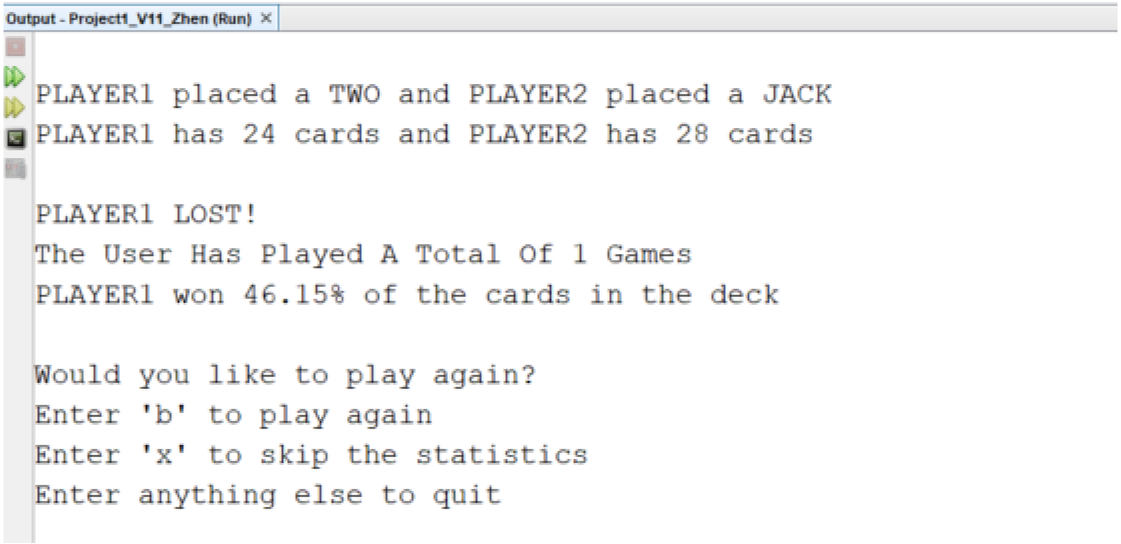
```
PLAYER1 placed a SEVEN and PLAYER2 placed a THREE
PLAYER1 has 18 cards and PLAYER2 has 22 cards

Press ENTER to continue...

PLAYER1 placed a QUEEN and PLAYER2 placed a QUEEN
IT IS A WAR!

Press ENTER to continue...

PLAYER1 placed a FIVE and PLAYER2 placed a TWO
PLAYER1 WON THE WAR!
PLAYER1 has 22 cards and PLAYER2 has 22 cards

Press ENTER to continue...

PLAYER1 placed a NINE and PLAYER2 placed a NINE
IT IS A WAR!

Press ENTER to continue...

PLAYER1 placed a SEVEN and PLAYER2 placed a JACK
PLAYER1 LOST THE WAR!
PLAYER1 has 22 cards and PLAYER2 has 26 cards
```

4



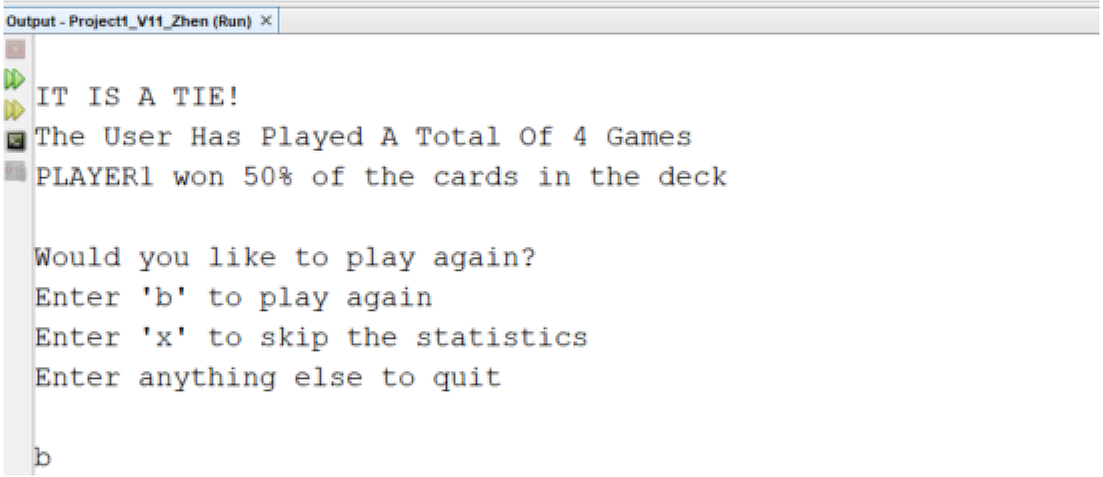
```

PLAYER1 placed a JACK and PLAYER2 placed a EIGHT
PLAYER1 has 28 cards and PLAYER2 has 24 cards

PLAYER1 WIN
The User Has Played A Total Of 1 Games
PLAYER1 won 53.85% of the cards in the deck

Would you like to play again?
Enter 'b' to play again
Enter 'x' to skip the statistics
Enter anything else to quit


b
```

5



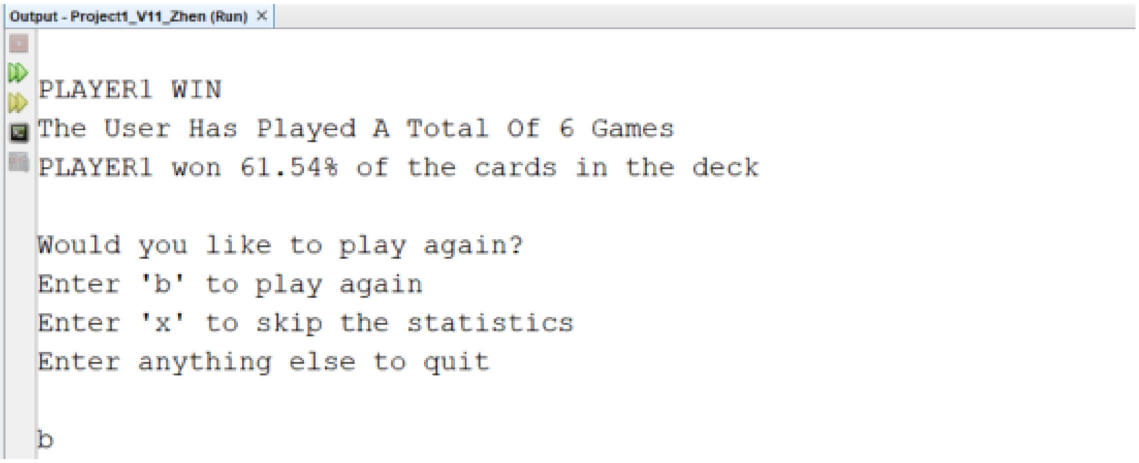
```
PLAYER1 placed a TWO and PLAYER2 placed a JACK
PLAYER1 has 24 cards and PLAYER2 has 28 cards

PLAYER1 LOST!
The User Has Played A Total Of 1 Games
PLAYER1 won 46.15% of the cards in the deck

Would you like to play again?
Enter 'b' to play again
Enter 'x' to skip the statistics
Enter anything else to quit
```

6



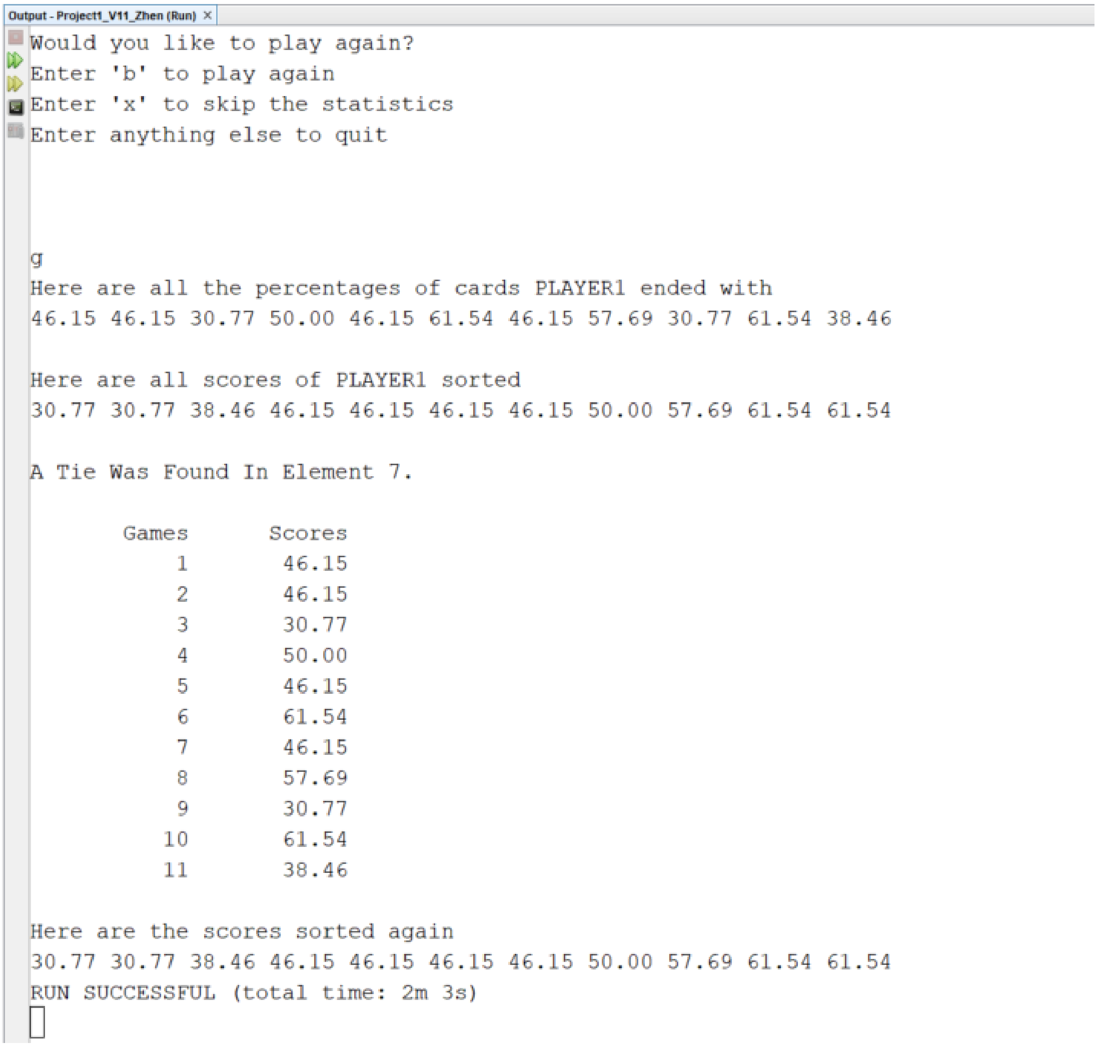
```
IT IS A TIE!
The User Has Played A Total Of 4 Games
PLAYER1 won 50% of the cards in the deck

Would you like to play again?
Enter 'b' to play again
Enter 'x' to skip the statistics
Enter anything else to quit

b
```

7



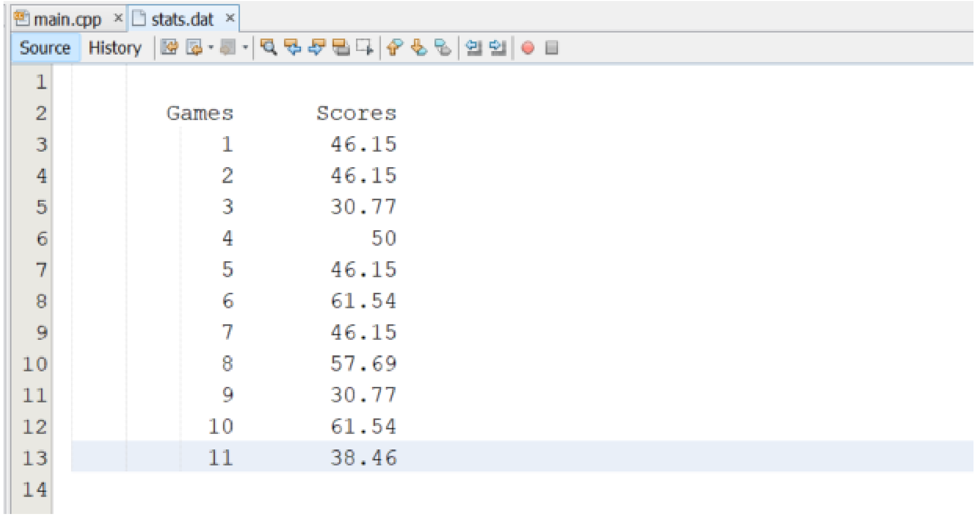
```
PLAYER1 WIN
The User Has Played A Total Of 6 Games
PLAYER1 won 61.54% of the cards in the deck

Would you like to play again?
Enter 'b' to play again
Enter 'x' to skip the statistics
Enter anything else to quit

b
```

8



```
Would you like to play again?
Enter 'b' to play again
Enter 'x' to skip the statistics
Enter anything else to quit



g
Here are all the percentages of cards PLAYER1 ended with
46.15 46.15 30.77 50.00 46.15 61.54 46.15 57.69 30.77 61.54 38.46

Here are all scores of PLAYER1 sorted
30.77 30.77 38.46 46.15 46.15 46.15 46.15 50.00 57.69 61.54 61.54

A Tie Was Found In Element 7.

       Games      Scores
           1       46.15
           2       46.15
           3       30.77
           4       50.00
           5       46.15
           6       61.54
           7       46.15
           8       57.69
           9       30.77
          10       61.54
          11       38.46

Here are the scores sorted again
30.77 30.77 38.46 46.15 46.15 46.15 46.15 50.00 57.69 61.54 61.54
RUN SUCCESSFUL (total time: 2m 3s)
```

9



```

       Games      Scores
           1       46.15
           2       46.15
           3       30.77
           4          50
           5       46.15
           6       61.54
           7       46.15
           8       57.69
           9       30.77
          10       61.54
          11       38.46

```