

CMPSC 201 Homework 4

Due Date: Monday, 07/27/2015, 11:55 PM

Objectives

- Be able to create and call programmer-defined functions
- Be able to use arrays in functions
- Be able to use pass-by-reference arguments

Description

Create a console program to simulate the outcome of a card game for 2-6 players. The program will read input from a file, described below, containing all the information about the game. The game consists of one or more rounds where each player plays one card. Each round also has a lead suit (card symbol). The winner of the round is the player with the highest rank (card number) in the same suit as the lead suit. Note that rank 1 (A) is the highest rank. The winner of the round receives one point for each card in the round that matches the lead suit. For example, if the lead suit is clubs, and the four players play 7 of clubs, 9 of diamonds, 6 of hearts, and 3 of clubs, the winning card is 7 of clubs and the player receives 2 points. After all the rounds, the player with the most total points wins.

Input File Format:

The first line of the file contains the number of players, N. The next N lines the names of the players, one per line. The next line contains the number of rounds, K. The rest of the file consists of K lines, where each line contains the information for one round: the lead suit, followed by N pairs of rank and suit representing the cards in the round in the same order as the corresponding player names. The card ranks are integers from 1-13 and the card suits are one of S, H, C, or D (spades, hearts, clubs, diamonds). An input file for a game with 3 players and 2 rounds might look like the following:

```
3
George
Susan
Mike
2
C 4 H 5 D 3 C
H 10 H 6 D 6 H
```

You are to define and use the following functions in your program, whose prototypes are shown in Example 1:

- `printRound()`: This function takes the ranks and suits of the cards in the round as arrays, the number of players, and the lead suit as arguments. It does not return a value. The function should print out a visual representation of the round with the lead suit followed by the cards. You should print the card ranks for 2-10 as numbers and the card ranks for 1, 11, 12, and 13 as A, J, Q, and K respectively. Print the suits as letters. Your output should look like the examples below. Optional: Alternatively, you can print the suits with special characters 3-6. Try the following line of code in a test program: `cout << (char)3 << " " << (char)4 << " " << (char)5 << " " << (char)6 << endl;`
- `playRound()`: This function takes the ranks and suits of the cards in the round as arrays (in player order), the number of players, and the lead suit as input arguments. It returns an integer corresponding to the winner of the round and saves the score in a pass-by-reference parameter. The winner of the round is the player with the highest rank card in the lead suit (a player with a

Homework 4

higher-rank card in another suit loses). Note that rank 1 (A) should beat all other ranks. The score for the round is the number of cards with the lead suit. You can assume that there will be at least one card in the lead suit and that there will be no duplicate cards (same rank and suit) in the same round.

- `printScoreboard()`: This function takes the winners and scores of each round as arrays, the array of player names, and the number of rounds as arguments. It does not return a value. The function should print out a formatted table with the winner's name and score for each round. Your output should look like the examples below.
- `gameWinner()`: This function takes the ranks and suits of the cards in the round as arrays, and the number of rounds as input arguments. It returns an integer corresponding to the winner of the game and saves their total score in a pass-by-reference parameter. If there is a tie, you can break the tie by comparing the player's names.

Your program should read from the input file in `main()` and use these functions to print each round and calculate the winners. There will be at most 6 players and at most 50 rounds. You will need to maintain several arrays in `main()`. After all the rounds are finished, the program should calculate the final winner and print out the result.

Requirements:

- Include a header comment with your name, the date, a short description of the program, the expected input, the processing needed, and the output.
- Use the provided function prototypes below. You may also define any additional helper functions you want.
- Do not use any global variables. You should pass values as arguments to functions.
- The program format should be as discussed in class (function prototype, function call, function definition).
- Do not allow any out-of-bounds array accesses.
- If your submission does not compile, you will receive 0 points. Fix any syntax errors.

Submission:

Upload your **C++ source file (.cpp)** to the Homework 4 dropbox on ANGEL. You may submit as many times as you want, but we will use only latest submission for grading.

Examples

Console output is shown in `plain fixed-width font`, and user input is shown in **bold underlined fixed-width** font.

Example 1: Function prototypes

```
void printRound(const int ranks[], const char suits[], int numPlayers,
char lead);
```

```
int playRound(const int ranks[], const char suits[], int numPlayers,
char lead, int &score);
```

```
void printScoreboard(const int winners[], const int scores[], const
string names[], int numRounds);
```

```
int gameWinner(const int winners[], const int scores[], int numRounds,
int &score);
```

Homework 4

Example 2: Program input and output sample rounds.txt (Input file)

```
5
Sally
Thomas
Betsy
James
Richard
9
H 5 H 3 H 10 H 6 H 7 H
C 7 S 8 S 4 H 4 C 5 D
C 10 C 9 D 10 D 13 C 1 C
H 1 D 1 H 1 S 11 H 12 H
D 12 D 1 D 13 D 10 D 11 D
S 4 H 3 D 10 S 8 H 12 D
S 7 S 9 H 10 D 3 S 12 S
C 13 C 13 D 12 C 11 D 1 C
H 9 H 4 C 4 S 4 H 4 D
```

Console output:

```
(H) |5H| |3H| |10H| |6H| |7H|
Betsy wins the round for 5 points.
(C) |7S| |8S| |4H| |4C| |5D|
James wins the round for 1 points.
(C) |10C| |9D| |10D| |KC| |AC|
Richard wins the round for 3 points.
(H) |AD| |AH| |AS| |JH| |QH|
Thomas wins the round for 3 points.
(D) |QD| |AD| |KD| |10D| |JD|
Thomas wins the round for 5 points.
(S) |4H| |3D| |10S| |8H| |QD|
Betsy wins the round for 1 points.
(S) |7S| |9H| |10D| |3S| |QS|
Richard wins the round for 3 points.
(C) |KC| |KD| |QC| |JD| |AC|
Richard wins the round for 3 points.
(H) |9H| |4C| |4S| |4H| |4D|
Sally wins the round for 2 points.
```

Round	Winner	Score
1	Betsy	5
2	James	1
3	Richard	3
4	Thomas	3
5	Thomas	5
6	Betsy	1
7	Richard	3
8	Richard	3
9	Sally	2

Richard wins the game with 9 total points.