CSE 102 Spring 2024 – Computer Programming Assignment 7

Due on April 24, 2024 at 23:59

In this assignment, you are tasked to implement a board game using arrays and functions. You are not allowed to use pointers and any libraries except the standard input / output library.

Game Description:

The game played on a board with 12 small cups, six on each side, and two large empty cups at each end. Additionally, you will need stones to use as playing pieces inside the cups.

Instructions:

Game Setup

- Place **n** stones in each of the small cups, leaving the large cups empty.
- Designate one side of the board as yours and the other as the computer's.

Gameplay

- Player take turn selecting a cup from its own side.
- The player then distributes the stones from the selected cup counterclockwise, placing one stone in each cup, including their own large cup but excluding the computer's large cup. Distribution restarts from the cup where the last stone lands if the cup isn't empty.
- If the last stone lands in the player's own large cup, it gets another turn.
- If the last stone lands in an empty cup, then the computer takes the turn.
- The computer plays the game on its own by obeying the same rules as the player.
- Player and the computer continue taking turns until one side of the board is empty.

Scoring

- When one side of the board is empty, the game ends.
- The stones in the large cups are counted.
- The player (or computer) with the most stones in their large cup wins the game.

You have to complete the homework by writing the following functions:

Part 1. [20 pts] initializeGame()

This function initializes the game board, which includes placing stones in each of the small cups and leaving the large cups empty. Additionally, it will designate one side of the board as the player's and the other side as the computer's. You have to use a 2D array for implementing the game board. The function takes parameters such as the number of stones **n** to place in each cup, and the board will be initialized.

Part 2. [20 pts] printBoard()

The print board function displays the contents of each cup on the board, including the number of stones in each cup and the designated large cups for the player and the computer. This function will help players make informed decisions during gameplay by allowing them to see the distribution of stones on the board.

The example print of the board:

Part 3. [30 pts] gamePlay()

The function controls the flow of the game, allowing players and the computer to take turns selecting cups and distributing stones. This function will handle player input, validate moves, employ the move, switching the turn between player and computer, check for the end condition of the game (i.e., when one side of the board is empty), and determine the winner based on the final state of the game board. The function returns the winner along with the score.

Part 4. [30 pts] move()

The move function takes parameters such as the selected cup and the board. This function will distribute stones from the selected cup counterclockwise, following the rules of the game. The state of the board has to be updated at each change during the distribution. Print the board after each distribution sequence is done. The distribution continues until special cases occur, such as when the last stone lands in the player's large cup, or when the last stone lands in an empty cup. The **gamePlay()** function takes action based on the return value from this function.

The main function should be as follows:

```
int main()
{
  /* Declare the needed variables. */
  /* Call the initializeGame() function to setup the game.*/
  /* Call the printBoard() function.*/
  /* Call the gameplay() function to start the game.*/
  /* Print the winner along with the obtained score.*/
}
```

IMPORTANT NOTES:

- Submit your homework as a zip file named as your student id (StudentID.zip) and this file should include:
  - YourStudentID.c file
  - A pdf file named "YourStudentID.pdf" including a YouTube link and screenshots of your program outputs. In the video, you are expected to provide a demo of your assignment. For each requested functionality, you must explicitly explain your solution approach and also execute and display the outputs. The video should not exceed 4 minutes. Please ensure that your camera is turned on during the recording.
- Do not use any library other than stdio.h.
- The output format must be as given, do not change it.
- Compile your work with given command “gcc --ansi your_program.c -o your_program”.
- Your work will be evaluated using gcc version 11.4.0.
- For any questions and problems, you can always contact me **via email** (b.koca@gtu.edu.tr), or you can find me in Room 119 during scheduled office hours on April 16, 2024, between 13:30 and 14:30.