Algorithms and Data Structures

Coursework report: Tic-Tac-Toe

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# Introduction

The problem was to make a functioning game of tic-tac-toe. This was to allow two players to play a game of tic-tac-toe; each taking turns until one of them wins or the game ends with a draw. The game features validation for when the user picks a space that’s already occupied.

# Design

My design approach was to break down the logic of the program in to separate functions. Below I will outline the logic used in each function.

createBoard()

This function uses a one-dimensional array of chars to store the values of the grid and then I print those values in the shape of a 3x3 grid. This function is called at the start of each turn and will clear the current board and then print the same grid but with values updated from the previous turn.

player1() and player2()

Each player has a function which takes an integer from the user and changes the corresponding space on the grid to the letter of that player. Then an integer is updated to the value of the player who’s turn is after. Turns are handled by an if statement which checks the value of an integer and calling the player function matching the value of the integer.

win()

The win function checks the grid for all 8 win conditions of each player and returns an integer based on which player has the win condition. It also returns a third value if the game is a draw. If there are no win conditions present then it returns a default value which is used to keep the while loop running.

Main()

The main function contains a while loop which runs while an integer equals calls the createBoard() function to draw the current board, then it runs the if statement responsible for deciding which player can take their turn and finally it sets the while loop condition to the output of the win() function.

After the while loop there is an if statement which displays a victory message for whichever player has won or a draw message if the game is a draw. This is determined by the output of win().

Finally the program terminates when the user presses any key by using System(“pause”).

# Enhancements

If I had enough time I would have implemented these features:

* Validation for user selecting a value out of the grid.
* An option to undo the previous move via implementing a stack and saving the board state on each turn.
* An option to replay games from memory.
* An option to play another game after the first one finishes.
* An option to expand the grid size.

# Critical Evaluation

All of the features work really well apart from the validation for a space already taken. In this feature the error message will display for a split second and then disappear. The reason for this is that every time the board is created the screen is cleared so the message is displayed towards the end of the loop and then it is cleared. I think it would work if I implemented a while loop in each player function and have the loop break after a valid input is taken.

# Personal Evaluation

During this project I have learned some of the basic C syntax.

The greatest challenge I faced was how to get the board to update each turn. This was dealt with by using System(“cls”) to clear the screen at the start of the createBoard() function which is called at the start of each turn.

My performance has not been very good as I would have been able to implement the undo function and replay function at a minimum in the allotted time. I have just done the bare minimum for a passing grade.

# References

Stackoverflowcom. 2019. Stack Overflow. [Online]. [1 April 2019]. Available from: <https://stackoverflow.com/questions/9726922/how-to-print-the-array>

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