

Sudoku Project Report

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November 2019

1 Introduction

This project is dedicated to developing a 4x4 Sudoku game with an additional pattern solver functionality on C language. Sudoku is a puzzle in which players insert the numbers one to nine into a grid consisting of nine squares subdivided into a further nine smaller squares in such a way that every number appears once in each horizontal line, vertical line, and square. Our motivation was to create something which was never done on C language before, at the same time user friendly and enjoyable for the user to play. Sudoku is based on a very simple concept, so anyone can learn how to play it in a jiffy. However, only few can truly master it

2 Background

We selected Sudoku as a project because programming it utilizes all of the programming concepts taught to us and is a fun game to increase one's IQ. As such, Sudoku is a game which not only benefits its creator but it's players just as much. We primarily did our research on understanding sudoku logic and learning sudoku programming concepts from the following websites. Code-Analysis Code-Analysis

3 Project Specifications

Nested for loops

Do while loop

While loop

Switch-case

If-else conditions

1D and 2D arrays

Functions

Filing

Structure

4 Problem Analysis

Input:

Option selection

User entered values in blank cells

Sudoku pattern

Process:

Checks if a value is repeated in the same row

Checks if a value is repeated in the same column

Checks if a value is repeated in the same box (consisting of 4 unit/spaces)

Checks if there are any blanks cells left

Checks if pattern is solved by player (player has won).

Calculates player lives based on incorrect attempts

Calculates High score (if player successfully solved the pattern)

Output

Displays inputted values

Displays You win(If pattern is solved)

Displays lives

Displays You lose(if you lose 10 lives)

Displays solved Sudoku pattern (if pattern solver option is selected)

5 Solution Design

In Sudoku solver option user must input values of a valid Sudoku pattern from left to right first, until all first-row elements are inputted, then moving down a column and repeating the process. In game option you enter the row and column to want your cursor to be on as asked. Menu where player can decide between playing the game or using the Sudoku solver. High score is calculated on the basis of remaining player lives. Player lives are deducted on every incorrect attempt. The program displays game over when user runs out of 10 lives. Checking function checks every output and if it is incorrect minuses one life. Function to check if any remaining values need to be inputted. Sudoku solver displays the solved pattern for the inputted pattern

6 Implementation and Testing

The Sudoku game we programmed meets the criteria mentioned in the project proposal, works effortlessly and does not crash regardless of the input. The game has a nifty menu with simple commands so just about anyone can learn how to play the game.

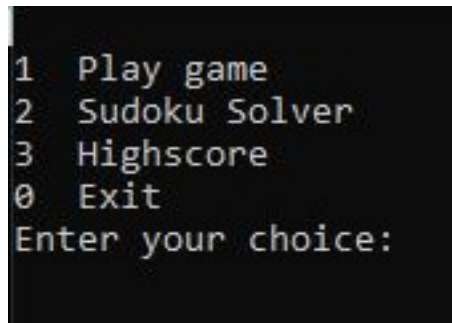


Figure 1: Game Menu

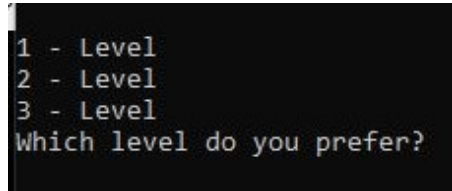


Figure 2: Level Menu

7 Project Breakdown structure

Umar: Sudoku checker function Bilal Arshad: Compilation of all functions into one, high score filing, Sudoku game design and functions testing. Saad Khan: Sudoku solver, Project report

8 Conclusion

Sudoku is a logic-based number placement Puzzle. Its objective is to fill a grid in such a way that each column, row or each 2x2 box does not contain the same sentence. Features of Sudoku includes: A menu to choose between playing sudoku game or using sudoku solver to obtain a solved pattern, Calculation of player high score based on player performance, player lives(number of incorrect attempts player can give before its game over), checking function to find incorrect inputted values, another function to check if all values are inputted and sudoku solver to give solutions of sudoku puzzles in case the player is stuck on a puzzle.

9 Results

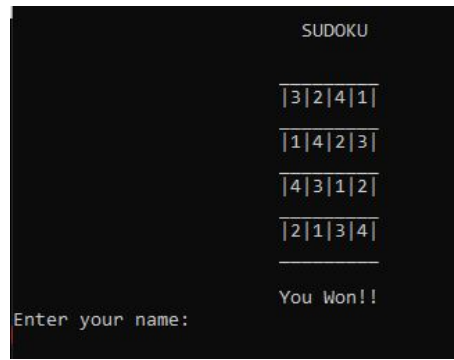


Figure 3: Game Won

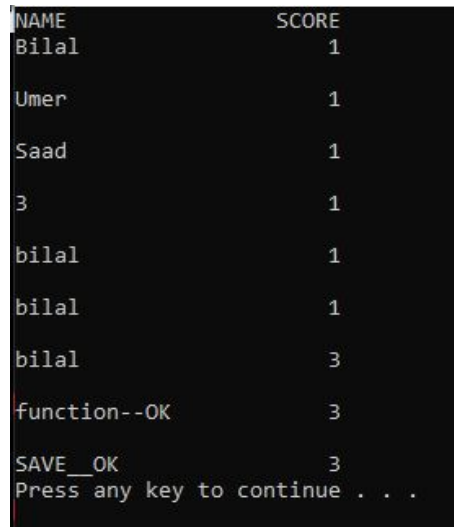


Figure 4: High score

```
SUDOKU

|2|1|1|3|
|1|1|2|4|
|4|2|3|1|
|1|3|4|2|

The solution is Incorrect!

YOU LOST
Press any key to continue . . .
```

Figure 5: Game lost

```
Error, file does not exist!!
-----
Process exited after 3.447 seconds with return value 1
Press any key to continue . . .
```

Figure 6: No high score

```
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Process exited after 2.574 seconds with return value 0
Press any key to continue . . .
```

Figure 7: Exit function

```

Enter the sudoku pattern.Enter 0 for any blank cells
0
1
1
3
2
2
0
1
0
1
0
0
3
3
4
2
1
Here is the solved Sudoku puzzle!
4 1 3 2
2 3 1 4
1 2 4 3
3 4 2 1
Press any key to continue . . .

```

Figure 8: Sudoku solver: solving

```

Enter the sudoku pattern.Enter 0 for any blank cells
1
0
3
0
3
0
0
2
4
3
2
1
0
0
0
3
Here is the solved Sudoku puzzle!
1 2 3 4
3 4 1 2
4 3 2 1
2 1 4 3
Press any key to continue . . .

```

Figure 9: Soduku Solver: solving another