Project Requirement and Specification

on

Developing Sudoku

(CSE III Semester Winter Boot Camp project)

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Problem Statement: Design a program using C++ to input the elements in a 9*9 grid with the missing values from the user and print the final grid after following all the rules of Sudoku.

About the Project:

Sudoku is not a mathematical or arithmetical puzzle. It works just as well if the numbers are substituted with letters or some other symbols, but numbers work best. The aim of the puzzle is to enter a numerical digit from 1 through 9 in each cell of a 9×9 grid made up of 3×3 sub-squares or sub-grids, starting with various digits given in some cells; each row, column, and sub-squares region must contain each of the numbers 1 to 9 exactly once. It can be found in many newspapers and magazines around the world. Rules Solving a Sudoku puzzle can be rather tricky, but the rules of the game are quite simple. Solving a Sudoku puzzle does not require knowledge of mathematics; simple logic suffices. The objective of Sudoku is to enter a digit from 1 through 9 in each cell, in such a way that:

I. Each horizontal row contains each digit exactly once
II. Each vertical column contains each digit exactly once
III. Each sub-grid or region contains each digit exactly once

Technologies used in the Project:

I have used C++ language to solve the Sudoku so to execute this, we need an IDE that could support C++. This can be done by installing any IDE with C++ environment like Visual Studio, CodeBlocks, etc. After installing, set up the path to environment variable of the properties of our pc. Then create an empty file in CodeBlocks and save it with any name with cpp extension. Now, we are all set up to write the code according to the problem statement and build the program to see for the errors. If no errors arises, we can run the program and get our corresponding output.

Requirements of project:

Software Requirement: CodeBlocks

Hardware Requirement: 88.221 MB for CodeBlocks

Functions Created:

Sudoku(int arr[9][9], int r, int c): This function takes the matrix, row number and column number as its parameter. It is a recursive function so as to backtrack and to increase the row number and column number in order to move to each sub-grid of the matrix. It will return 1 if all the missing values are filled safely otherwise it will return 0.

Safe(int arr[9][9], int r, int c, int n): This function takes the matrix, row number, column number and n as the numbers from 1-9 one at a time as the function is being called as its parameter. It is a Boolean function to check which number is appropriate to fill in place of the missing values according to the rules of Sudoku. It contains three for-loops to check for the three rules. It returns true only if all the three conditions are satisfied otherwise it returns false.

Print(int arr[9][9]): This function takes the grid of 9*9 as its parameter. This function is called in the main if and only if the function Sudoku returns 1 else the output displayed is “No Solution exists……try again!!!”. This function prints the final solved Sudoku with no missing values.