

# Software Requirement Specification

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## **Introduction**

This project aims to create a Sudoku game and autosolver. Sudoku is a logic based, combinatorial, number-placement puzzle. Completed puzzles are always a type of Latin square with an additional constraint on the contents of individual regions. For example, the same single integer may not appear twice in the same row, column or in any of the nine 3x3 subregions of the 9x9 playing board. Sudoku is a puzzle game in which a 9x9 grid with a few numbers already filled in is given to the user and the user is expected to solve it by filling in all numbers from 1 to 9 in every row, column and certain 3x3 squares. Because of the dimensions of the grid, no number is repeated along a row, column or 3x3 square.

## **Purpose**

The purpose of this project is to create a Sudoku program and autosolver. This enables the user to play the game as well as the program has the ability to solve the grid as input by the user. Also the program has the ability to generate Sudoku grids of varying levels of toughness.

## **Scope**

It has a scope of verifying the given set of entries by the user and if required, solving the generated Sudoku uniquely. The graphics for the program are used from simple cpp libraries. The program takes its inputs from mouse and the user has the independence to select the numbers to fill in the grid and also to edit them. Finally the user can also submit his/her solution and the program checks whether it is correct or not. The program also provides a solution grid for the sudoku.

## **System Attributes and Requirements**

The whole program relies on complete integration of the hardware and software involved. Hence it is paramount to have appropriate hardware interface for the optimum running of the program.

## **Software Specifications**

The software specifications of this simple yet interesting program are not too much.

- Works in Windows as well as Linux.
- We need OpenCV libraries to be present on the host system of the program.
- We used graphics from EzWindows library to form this program.
- Graphics from simplecpp libraries have been used and hence we need to load these.
- Graphics from stdio and stdlib libraries have been used.
- fstream and time.h libraries have also been used for this program.
- We need a C++ compiler supporting all of these libraries to execute this program.

## Hardware Specifications

The hardware specifications of this program are as follows :

- A minimum of 128 MB RAM (Random Access Memory).
- A minimum of 1 GHz processor.
- Basic Input-Output devices such as Mouse, Keyboard, Monitor

## References

The list of references that are used in making this program are :

### Books

- Cohoon, James P. and Davidson, Jack W., An Introduction to Programming and Object-Oriented Designing
- Arora, Sumita, Computer Science with C++, Dhanpat Rai Co.
- Ranade, Abhiram G., An Introduction to Programming through C++, McGraw Hill Publications.

## Websites

- [www.en.wikipedia.org](http://www.en.wikipedia.org)
- <http://www.youtube.com/watch?v=p-gpaIGRCQI>
- [www.stackoverflow.com](http://www.stackoverflow.com)
- [www.sanfoundry.com](http://www.sanfoundry.com)
- [www.quora.com](http://www.quora.com)
- [www.cplusplus.com](http://www.cplusplus.com)
- [www.cse.iitb.ac.in/~cs101/lecture-slides.html](http://www.cse.iitb.ac.in/~cs101/lecture-slides.html)
- [www.tutorialspoint.com](http://www.tutorialspoint.com)
- [www.codereview.stackexchange.com](http://www.codereview.stackexchange.com)

## Variants

This program makes use of the Classic Sudoku puzzle. The puzzle can have many variants to make it more interesting. Some of the common variations of the classic Sudoku are :

1. Variation in the Grid Sizes : Although the 9x9 grid with 3x3 regions is by far the most common, many other variations exist. Sample puzzles can be 4x4 or 5x5 grids. A 100x100-grid puzzle dubbed Sudokuzilla was published in 2010.
2. Imposing Additional Constraints : One may add limits on the placement of numbers beyond the usual column, row and box requirements. The most common variation requires the diagonal elements also to be unique.
3. Mini Sudoku : This shortened version of game is popularly known as The Junior Sudoku. It involves a 6x6 grid with 3x2 regions. The rules are same with a slight variation
4. Cross Sums Sudoku : Another variant is the combination of Sudoku with Kakuro on a 9x9 grid, called Cross Sums Sudoku in which clues are given in terms of cross sums. Kakuro is a logic puzzle that is often referred to as a mathematical transliteration of the crossword. Puzzles are usually 16x16 in size, although these dimensions can vary widely.

5. Killer Sudoku : This version of the game also combines the elements of Kakuro and Classic Sudoku. It is popularly known as Sumdoku or Addoku.
6. Alphabetical Sudoku : This is the alphabetical variation of Sudoku called the Wordoku. Instead of the numbers, this puzzle contains alphabets.
7. Quadratum latinum : It is a Sudoku variation with Latin numerals. This variation presents no functional difference with a normal Sudoku but adds the visual difficulty of Latin numbers.
8. Hypersudoku : It is one of the most popular variants. The layout is identical to a classic Sudoku puzzle, but with additional interior areas defined in which the numbers 1 to 9 must appear.

For Beta versions we can also change the code of the program to produce the variant puzzles and create the game more interesting and logical.