
**MARMARA UNIVERSITY ENGINEERING FACULTY**

**COMPUTER ENGINEERING**

# CSE3044 -Software Engineering

# Software Requirements Specifications

# Sudoku Classic Game

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# 1. INTRODUCTION

**What is the project?**

In this document, we report the detailed requirements and specifications of classic Sudoku game. This game project is an mobile application for Android devices and it will be implemented using java in the environment Android Studio. It will include graphical user interface, user(solver) and puzzle generator. Generator will be implemented using suitable algorithm. User finds the right solution to the puzzles generated by the generator. Generator creates various number of different Sudoku puzzles at different hardness levels. This project contribute to the different aspects of java programming.

**What is Sudoku?**

Sudoku is an old game which exists before the mobile & web applications as puzzle game. It is found by Japanese and it is categorized as intelligence game. The most important benefit of this game is strengthening memory as it develops the ability of thinking and conducting ideas. We have decided to choose this project, because as a mobile application, Sudoku can be played easier than the paper. It is manually a very difficult job to perform and its need a lot of recalling , reminding and mathematical calculation. [1]

## 1.1 PURPOSE

The main goal for Sudoku is to fill the grid made up of 3×3 subsquares or sub-grids with numbers from 1-9, with the given starting grid which includes various digits given in some cells and each of the numbers 1 to 9 must be written exactly once in each row, column, and subsquares region. There are exactly one solution for each starting states.[2]

## 1.2 SCOPE

The “Sudoku Classic” is a mobile application that aims to make people have fun with more than 20 sudoku puzzles. The application will be free to download from google play store. The game helps to increase mental thinking , vision and logical thinking, so this project improves

the user's thinking capability. The Sudoku puzzle can use symbols or colors instead of numerals, but digits works best. The game has hardness levels easy, medium and hard and in each level there are 10 different games which means 10 different starting grids. In easy level there will be given numbers much more than the hard level.

User's time information during the solving phase will be recorded and informed to the user within the interface and at the end of the game. Best scores of the user will be kept. There will be a go-back button to go back one step at a time and user can push this button as much as wanted and can go back until the starting phase.

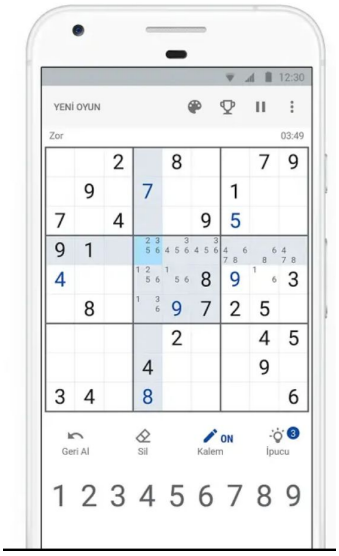


Figure 1. Game Interface [4]

There will be an interface like Figure 1. It is grid and starting state of hard level. It has go-back button and time and numbers to select into cells. These are the similar properties that we will have.

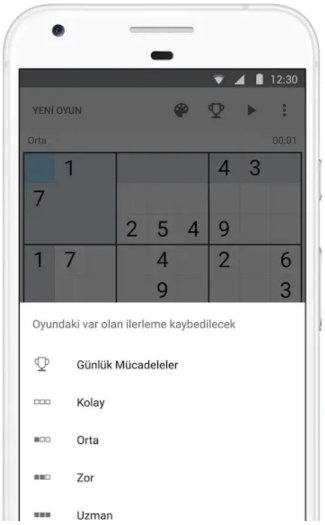


Figure 2. Levels of The Game [4]

There will be another menu interface like Figure 2. But ours will be a little bit different. In our menu there will be easy, medium and hard captions. And when you enter one of them it will open 1 to 10 games. 1 will be open but the other will be locked. When user solve the 1st level 2nd level's lock will open and so on.

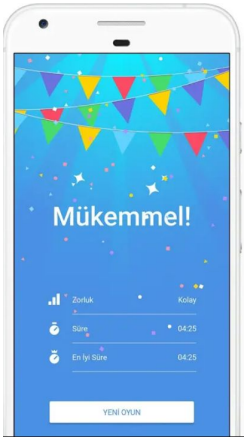


Figure 3.Winning Message [4]

When user solve the game we will show a screen very similar to the Figure 3 to congratulate the user by prompting that you won and here is your score and time informations.

## 1.3 DEFINITIONS, ACRONYMS, AND ABBREVIATIONS

Sudoku: Suuji wa dokushin ni kagiru (Key to Su-Ju) [3]

Sudoku: the numbers (or digits) must remain single.
User: Someone who interacts with the mobile phone application
Grid: A board for the game which consists of 9 blocks.
Block: A 3x3 subgrid
Cell: Individual grids that contains the number

## 2. GENERAL CONSTRAINTS

A Sudoku puzzle may be seem as quite difficult to solve, but the rules of the game are really simple. Solving a sudoku puzzle does not require mathematical knowledge; simple logic is enough. The goal of Sudoku is to enter a digit from 1 to 9 into each cell with considering:
I. Each horizontal row contains each digit exactly once
II. Each vertical column contains each digit exactly once
III. Each subgrid or region contains each digit exactly once

## 3. ASSUMPTIONS AND DEPENDENCIES

Game is dependent on the mobile device. So, we assume that the user owns an Android device which has Android 5.0 and higher. The Limitation of this project that you not access it in your Mobile device other than Android and your desktop. Another assumption for the user that user knows how to play the game and what is the game rules and she/he should start from the first game of the chosen level.

## 4. REQUIREMENTS

## 4.1 FUNCTIONAL REQUIREMENTS

### 4.1.1 Generate a new grid

Sudoku generates a new grid when people click on the “New Game” button. A new grid will be created by considering the hardness level.

#### 4.1.2 Go-back

The users can take back one move when it is clicked.

#### 4.1.3 Keep Score

User will get point for each movement and will get 100 points when the puzzle is solved correctly. All these score and the best score list needed to be kept.

#### 4.1.4 Keep Time

Time information of the user solving the puzzle will be kept as an parameter to do the best game.

#### 4.1.5 Levels

There should be hardness levels in the game in order to referring to all ages and all intelligences.

#### 4.1.6 Checking

The game should be able to check if the entered number on the cell is causing any error and if it does it should give the warning to the user as coloring error causing cells in red.
In addition, the game also check whether the final result is the solution or not.

### 4.2 NON-FUNCTIONAL REQUIREMENTS

The non-functional requirements for the application were identified as follows:

**Usability:**

• The interface of the application should be user-friendly, and give a clear indication of how the user should proceed without having to read any documentation.

• The interface of the game should provide clear error messages to the user if the input is not acceptable.

**Reliability:**

• The game should report the correctness of a user's solution to the given Sudoku puzzle clearly and unambiguously.

**Recoverability:**

• If the user has solved a puzzle incorrectly, then the game should give the user another opportunity to attempt the puzzle and solve it correctly.

**Manageability:**

• The game should present the user with the option of selecting the level of difficulty of the puzzle they would like to solve, to accommodate users of all experience levels.

**Capacity:**

• The game should contain a large number of puzzles, to avoid becoming worldly and former after a few runs.

## 5. APPENDIX

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 9 | | 7 | | | 8 | 6 | |
| | 3 | 1 | | | 5 | | 2 | |
| 8 | | 6 | | | | | | |
| | | 7 | | 5 | | | | 6 |
| | | | 3 | | 7 | | | |
| 5 | | | | 1 | | 7 | | |
| | | | | | | 1 | | 9 |
| | 2 | | 6 | | | 3 | 5 | |
| | 5 | 4 | | | 8 | | 7 | |

Figure 4. Example Grid

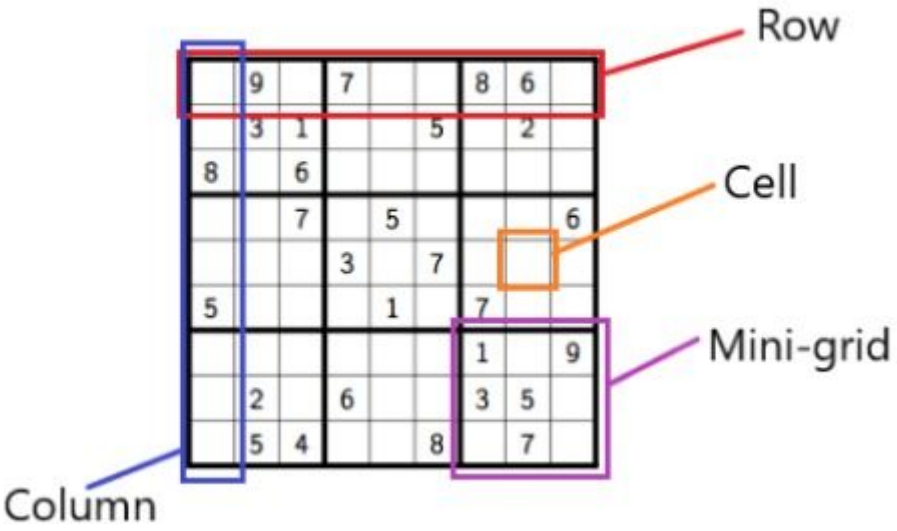


Figure 5. Representations of the Terms

## 6. USE CASE DIAGRAM

It is attached as another single file because of the resolution and legibility of the words. Here there is also a link to access to the file.
https://creately.com/diagram/jt8yhemg/pgSFSMV6OvL161P4cwkPo16g%3D

## 7. WORK SHARING TABLE

| Amine | Ebru | Hale |
|---|---|---|
| Purpose | Appendix | Introduction, Scope, Definitions, References |
| Assumptions and Dependincies | Use-Case Diagram | General Constraints |
| | | Requirements (Functional&Non-Functional) |

Figure 6. Work-sharing table

## 8. REFERENCES

[1] What is Sudoku?, Access Date: March 12, 2019, Link Address;
http://www.sudoku-space.com/sudoku.php

[2] Kendall Frey, Access Date: March 12, 2019, Link Address;
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[4] Sudoku, EasyBrain, Access Date: March 14,2019, Link Address:
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[5] Sudoku Solver, Shashank Vij , Access Date: March 14, 2019, Link Address:
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