MARMARA UNIVERSITY ENGINEERING FACULTY

COMPUTER ENGINEERING

CSE3044 -Software Engineering

Design Specification Document

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.

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. DESIGN CONSIDERATIONS

2.1 Assumptions

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.

2.2 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

2.3 System Environment

Application will be developed on Windows operating system while using Android Studio.

Each user shall need an Android compatible mobile device, smart phones or tablets.

3. ARCHITECTURE
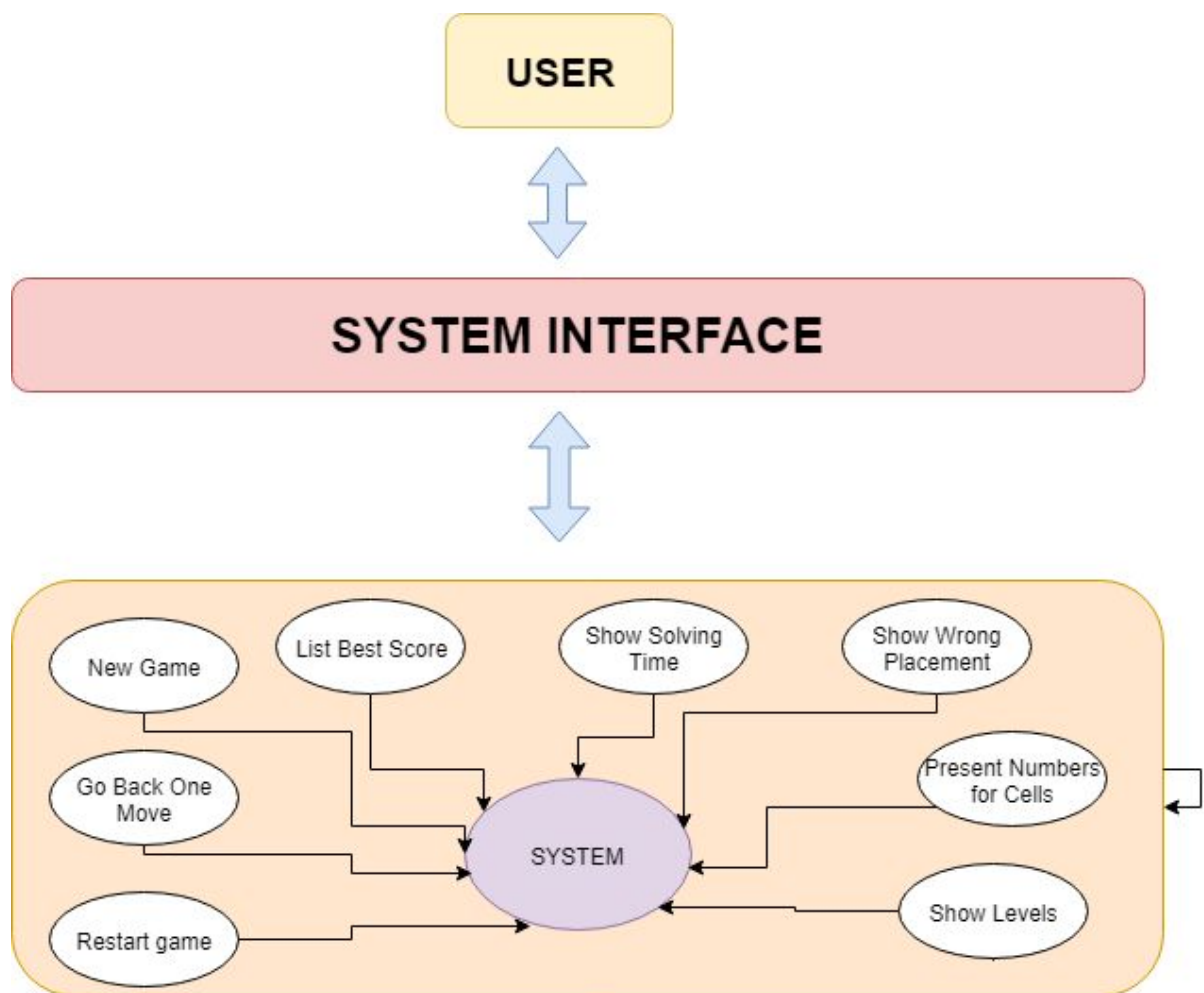
3.1 System Design

3.1.1 Block Diagram of Sudoku

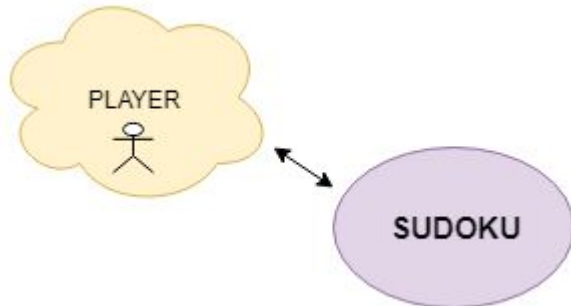**Figure 1. Block Diagram**

3.1.2 Context Diagram of Sudoku

Figure 2. Context Diagram

3.1.3 System Decomposition

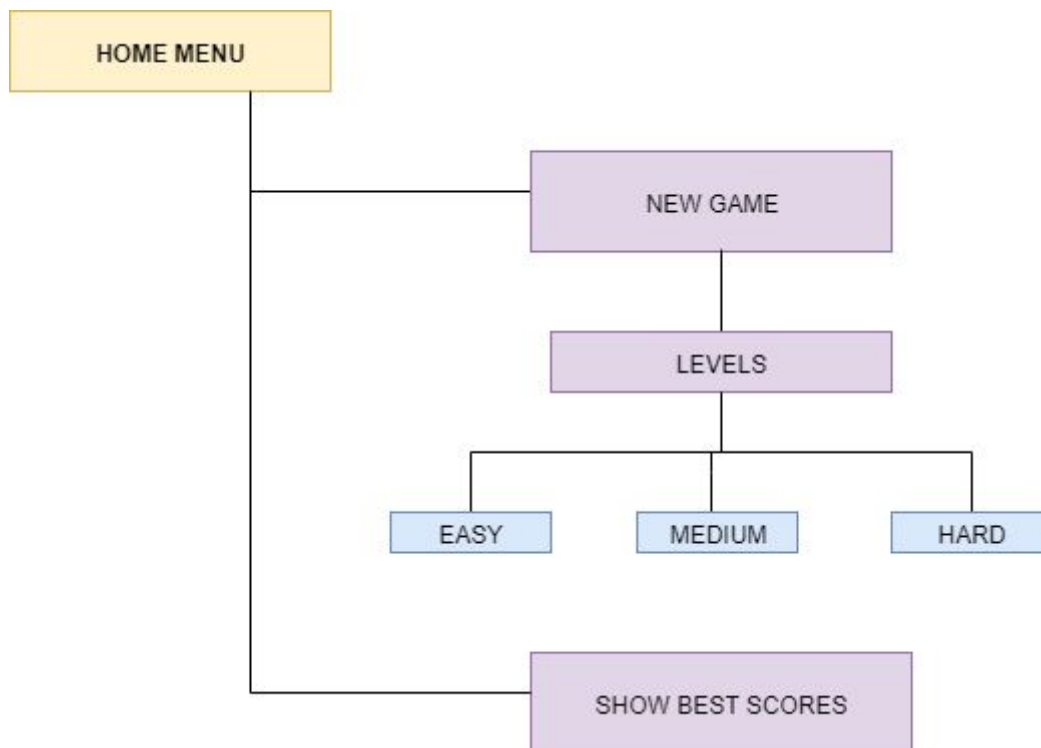The diagram below represents whole system as a decomposed version.

Figure 3. Decomposition Diagram

3.1.4 Data Design

Database is required in order to obtain a well-played Sudoku. We will use SQLlite database in order to hold the data. We will keep the information of the current state of the player and

last leaved state will be held. For each game there is an initial and final state of the board, this also will be held in the database. Score for each game will be kept during game until game is over, after that if the score is best score it is kept too.
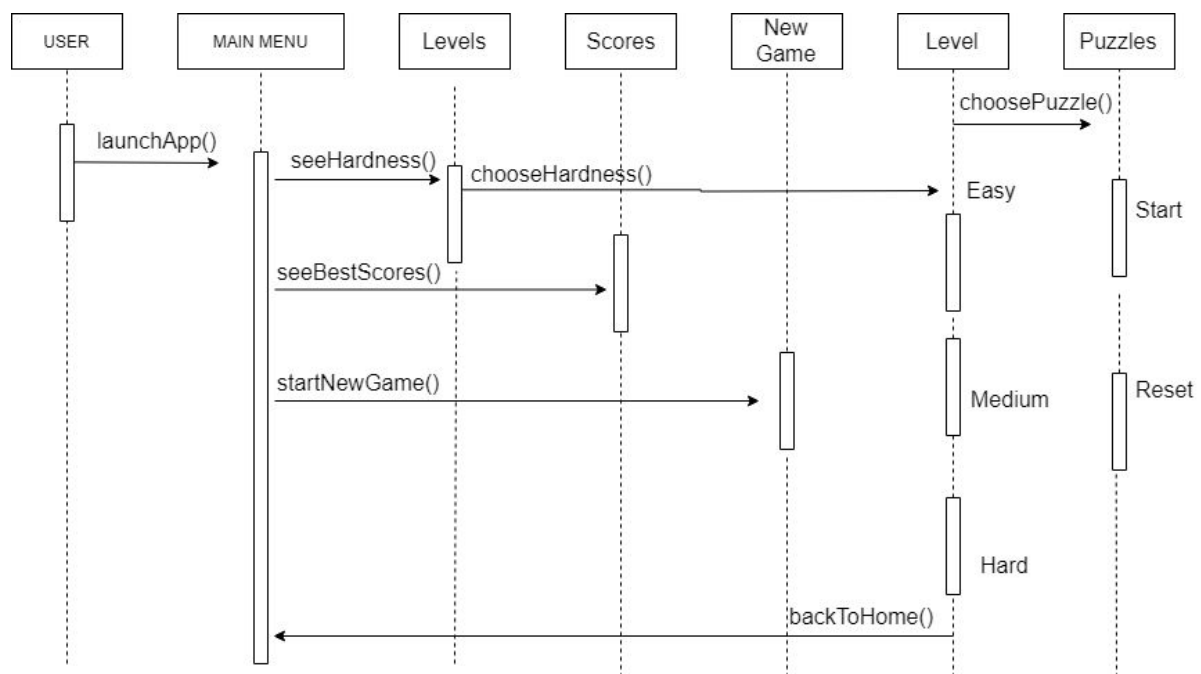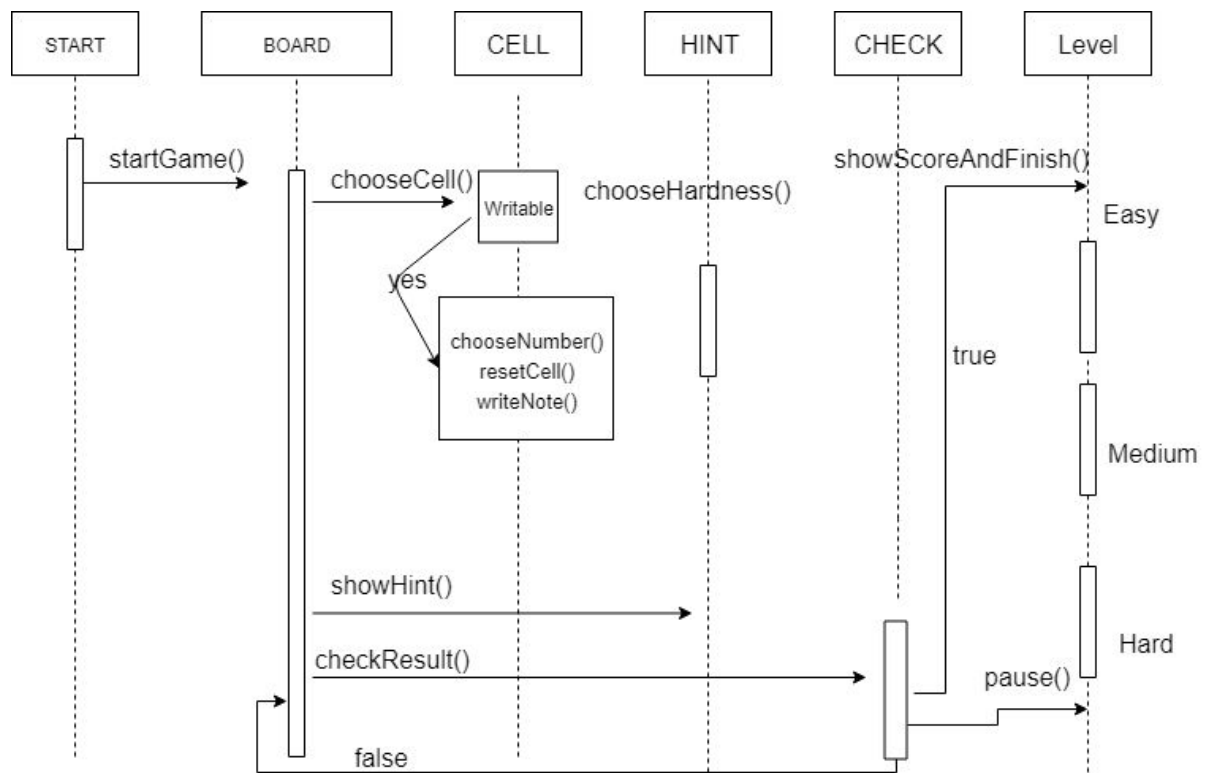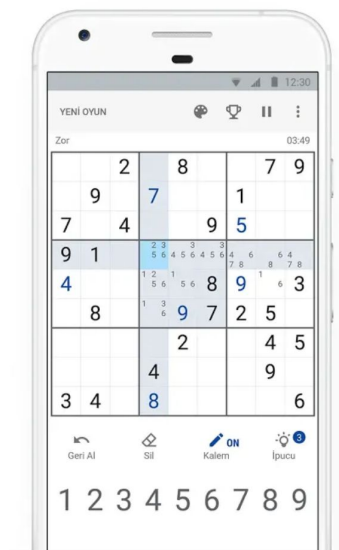
3.1.5 Component Design

Figure 4. Sequential Diagram for Game Interface

We divide game sequential diagram into two part since it is not suitable for one page. Below is the gaming part.
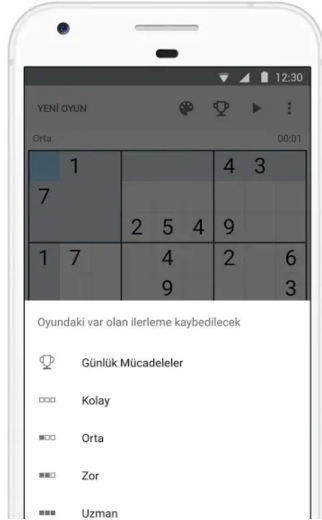
**Figure 5. Sequential Diagram of Playing Part**

3.1.6 User Interface Design

Figure 6. Game Interface [4]

There will be an interface like Figure 6. 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 7. Levels of The Game [4]

There will be another menu interface like Figure 7. 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 lock will open and so on.
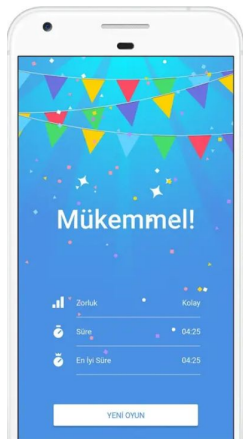
Figure 8. Winning Message [4]

When user solve the game we will show a screen very similar to the Figure 8 to congratulate the user by prompting that you won and here is your score and time informations.

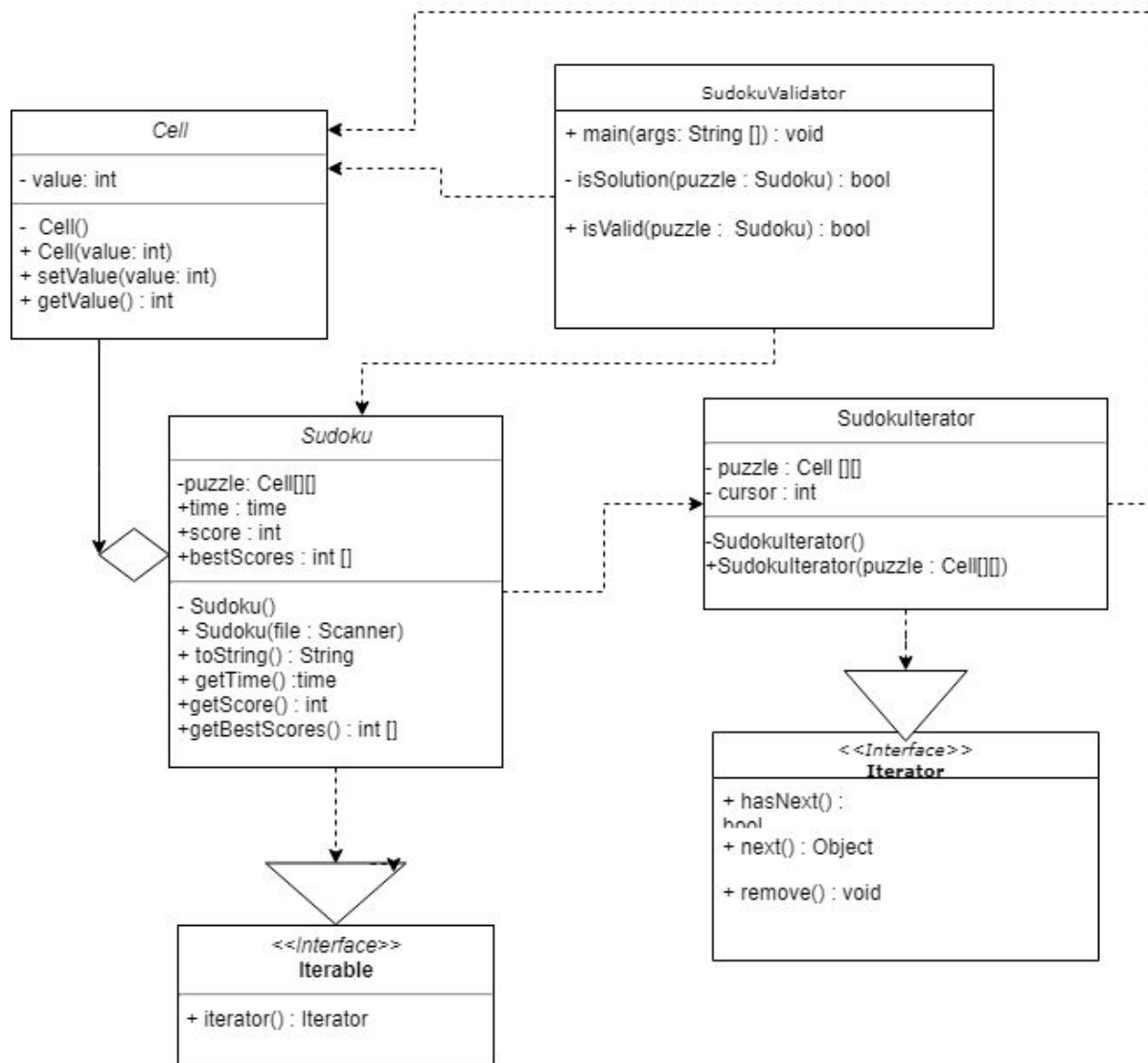## 3.2 Class Diagram

Class diagram of the project is in below.

Figure 9. Class Diagram

4. WORK SHARING TABLE

Amine	Ebru	Hale
1	1,2,3,4	1,2,3,4

Figure 10. Work-sharing table

5. REFERENCES

[1] What is Sudoku?, Access Date: March 12, 2019, Link Address;

 http://www.sudoku-space.com/sudoku.php

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[3] Access Date: March 13, 2019, Link Address:

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