

# Project Requirement Analysis

## of Sudoku Game

Course: 0714 02 CSE 3104

Course Name: Software Engineering and Information Systems Project /Fieldwork

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**Project Name:** Sudoku Game

**Domain:** Puzzle Game / Software Engineering Project

**Platform:** Mobile

## **1. Introduction**

### **1.1 Purpose**

The project aims to develop a Sudoku puzzle game where system provides puzzles, players can solve them, and get hints from the system. The system will provide multiple difficulty levels and track game progress locally without using a database.

### **1.2 Scope**

- Standard 9×9 Sudoku board.
- Different difficulty levels.
- Puzzle validation, hints, and solver.
- Save/resume game using local file storage or in-memory state (instead of database).
- Timer and scoring (session-based).

## **2. Functional Requirements**

### **2.1 Core Features**

#### **Game Board**

- Show a 9×9 Sudoku grid.
- Input numbers (1–9) in empty cells.
- Erase/reset options.

## **Puzzle Generation**

- Generate puzzles dynamically using algorithms.
- Four difficulty levels: Easy, Medium, Hard, Expert.

## **Puzzle Solving**

- Backtracking algorithm for solving puzzles automatically.
- Option for user to request auto-solve.

## **Validation**

- Check user moves in real-time (row, column, box).
- Full puzzle validation after completion.

## **Hints**

- Show possible values for a selected cell.
- Limited number of hints per game.

## **Timer & Score System**

- Stopwatch to track solving time.
- Session-based scoring system (does not need database).

## **Save & Resume**

- Save progress to a **local file (e.g., JSON, text file)**.
- Resume from saved state.

## **Undo/Redo**

- Keep a move history in memory for undo/redo operations.

## **2.2 Optional Advanced Features (Still Without DB)**

### **Custom Puzzle Input**

- Let users enter their own puzzle and solve it.

### **Daily Challenge (Local)**

- Generate one puzzle per day (stored in file).

### **Theme Support**

- Dark and Light mode.

### **Multiple Grid Sizes**

- Support for 4×4, 9×9, or 16×16 boards.

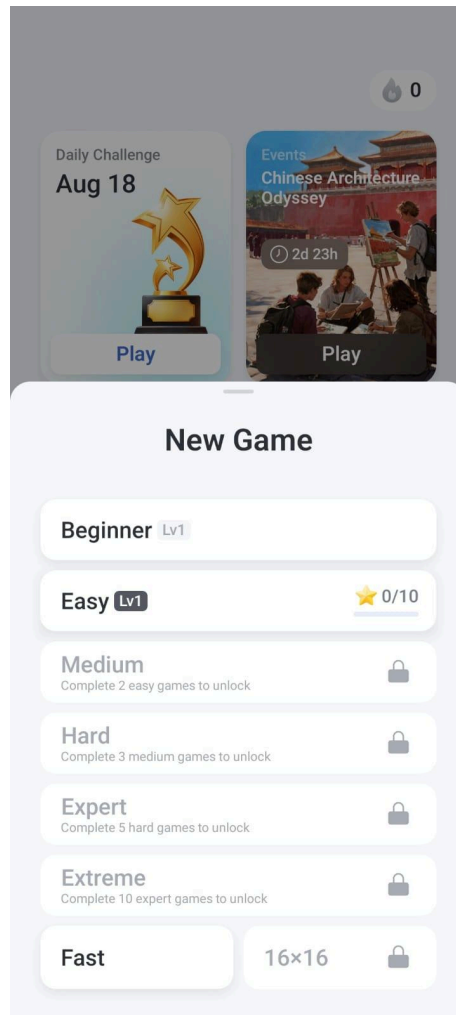
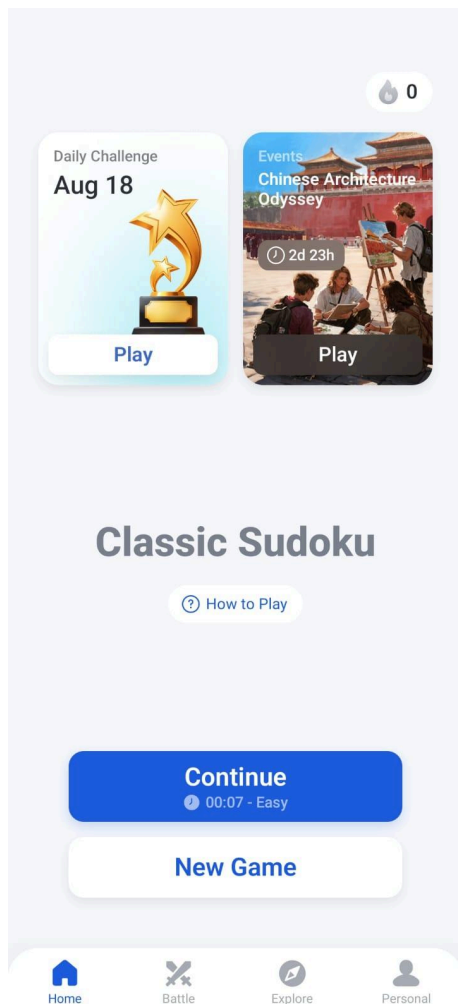
## **3. Non-Functional Requirements**

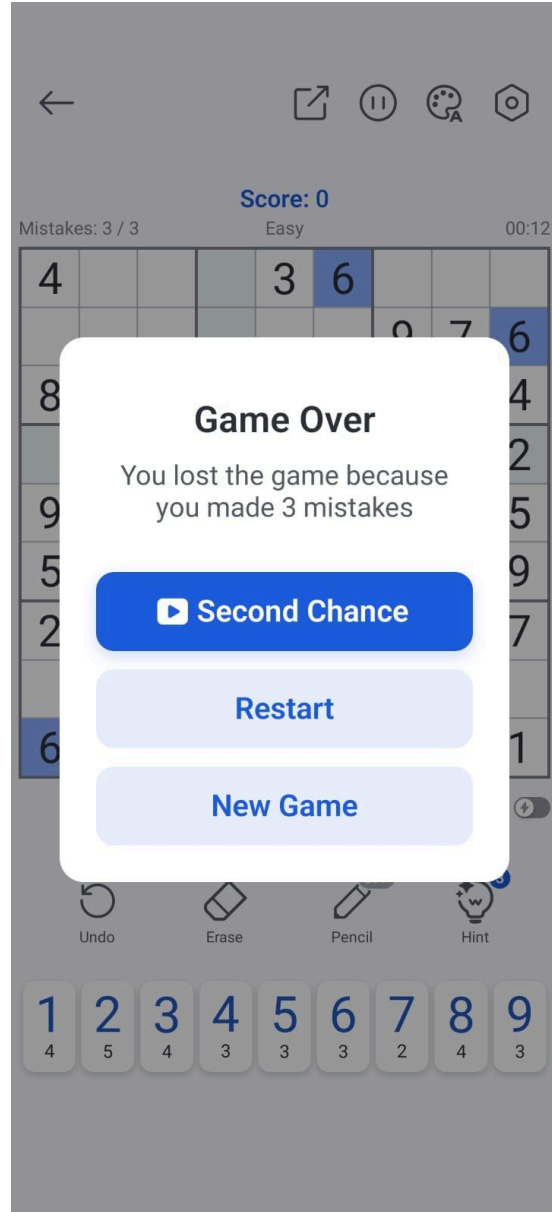
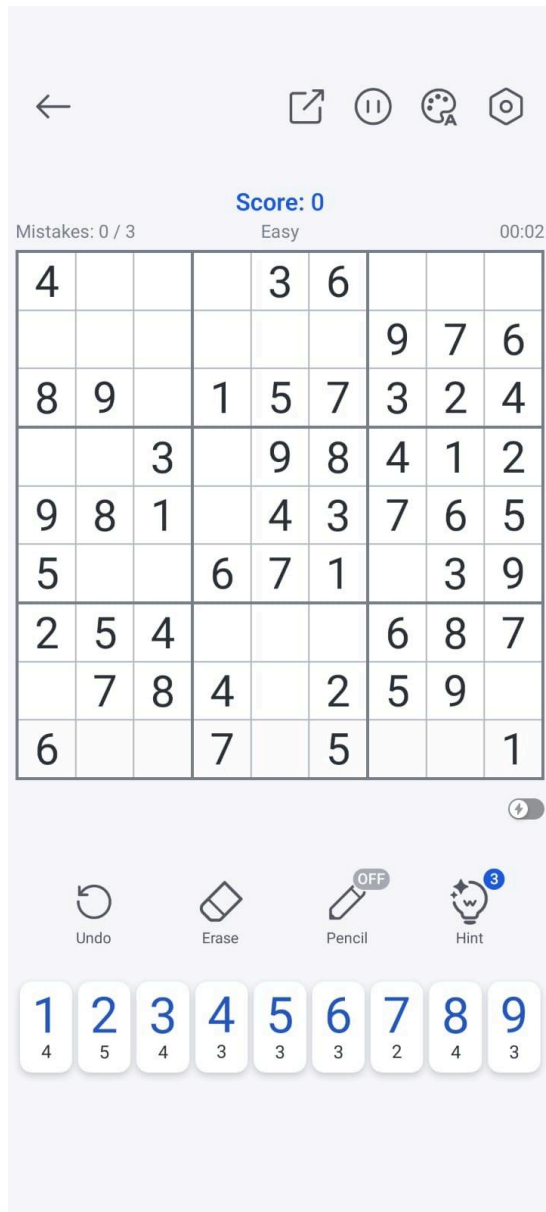
- **Usability:** Intuitive and clean interface.
- **Performance:** Solver completes within 2 seconds.
- **Portability:** Cross-platform (Windows/Linux/Android/Web).
- **Scalability:** Easy to add new features without DB.
- **Reliability:** Save files should restore puzzles correctly.

## 4. User Interface Requirements

- **Main Menu:** New Game, Continue, Settings, Exit.
- **Game Screen:** 9×9 grid, number pad, hint, undo/redo, timer.
- **Settings:** Difficulty selection, theme toggle.

### 4.1 UI Design(Demo) :





## 5. System Requirements

### 5.1 Hardware

- Minimum: Dual-core CPU, 2 GB RAM.
- Recommended: Quad-core CPU, 4 GB RAM.

## 5.2 Software

- Programming Language: Python (Tkinter/Pygame), Java (JavaFX), C++ (Qt), or Flutter (for mobile), Dart.
- File Handling: JSON, TXT, or XML for saving progress (instead of DB).

## 6. Use Case

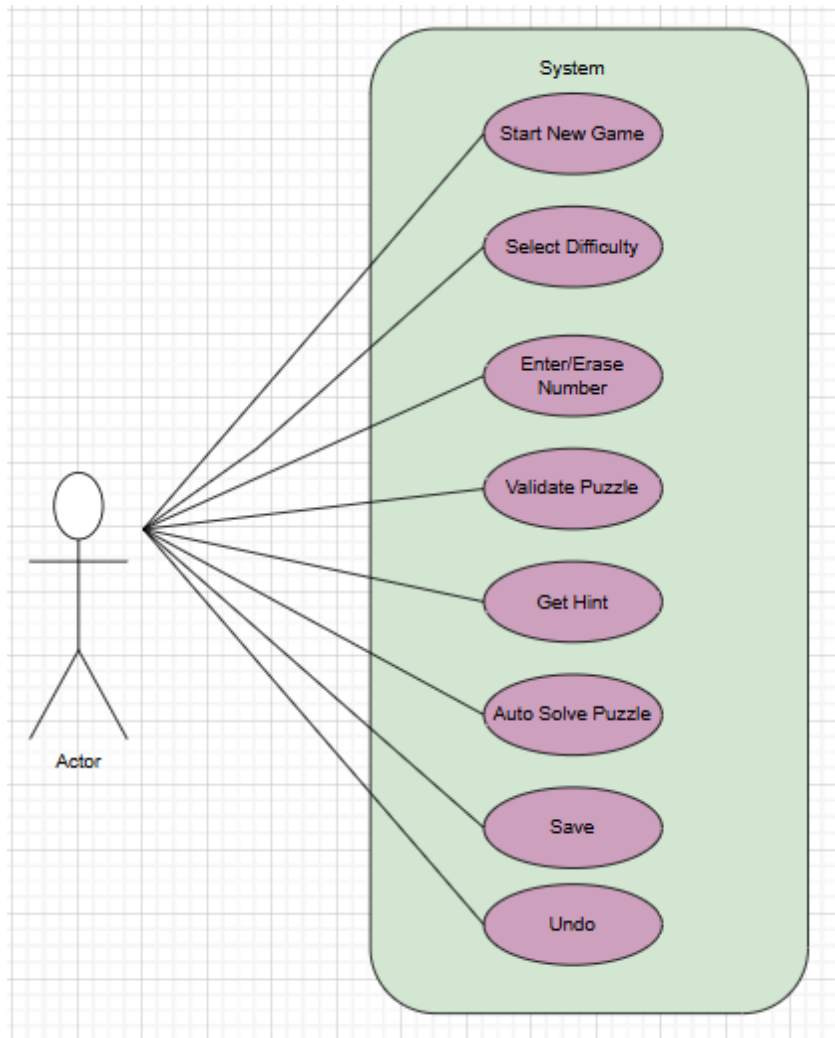
### Actors:

- Player
- System

### Use Cases:

- Start New Game
- Select Difficulty
- Enter/Erase Number
- Get Hint
- Validate Puzzle
- Auto Solve Puzzle
- Save/Load Game (via file system)
- Undo/Redo Move

## 6.1 Use Case Diagram



## 7. Future Enhancements

- Multiplayer (via network, no DB).
- Puzzle sharing via text file.
- AI-based difficulty tuning.
- Voice control input.



## **8.Conclusion**

The Sudoku Game project demonstrates core software engineering practices through puzzle generation, solving, validation, and a user-friendly interface without requiring a database. The UML diagrams clearly define system interactions, and the project meets its goals of being simple, scalable, and enjoyable. Future enhancements like multiplayer or online features can make it even more engaging.