Sudoku Game Development – Approach Document

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Project Title: Development of a Polished Sudoku Game in Unity

# 1. Objective

The objective of this project is to develop a fully functional, visually polished Sudoku game using the Unity game engine. The game will feature procedural puzzle generation, a clean and intuitive user interface, input validation, difficulty modes, and responsive feedback to enhance player engagement and usability.

# 2. Scope

This project includes:  
- Interactive 9×9 Sudoku grid with selectable and editable cells  
- Puzzle generation and unique solution validation using backtracking  
- Difficulty levels (Easy, Medium, Hard)  
- User input validation and error highlighting  
- Cell highlighting for selection, related rows, columns, and boxes  
- Timer and game restart functionality  
- Responsive UI layout suitable for desktop and WebGL

# 3. Tools and Technologies

|  |  |
| --- | --- |
| Component | Tool / Technology |
| Game Engine | Unity 2022.3 (2D Project) |
| Programming Language | C# |
| UI Framework | Unity Canvas System |
| Puzzle Algorithm | Backtracking |
| Target Platforms | PC, WebGL |

# 4. Project Components

## 4.1 Game Design

- Flat modern visual style with a light color palette  
- Clear, readable UI with consistent font usage (e.g., Open Sans)  
- Highlighting and feedback for ease of play and reduced user error

## 4.2 Core Functional Modules

a. SudokuCell.cs

* - Manages input, highlighting, and editability of a cell  
  - Validates digit entry (1–9 only)

b. GameManager.cs

* - Handles board loading, input response, win detection, and UI updates  
  - Manages locked cells and game flow

c. SudokuGenerator.cs

* - Generates full Sudoku puzzles using recursive backtracking  
  - Masks cells based on difficulty to create playable puzzles  
  - Ensures uniqueness of solutions

d. BoardData.cs

* - Stores original puzzle and solution  
  - Provides utility functions for puzzle validation

# 5. Development Phases

|  |  |  |
| --- | --- | --- |
| Phase | Tasks | Estimated Time |
| 1 | Unity project setup, UI grid, and prefab creation | Day 1 |
| 2 | Implement puzzle generator and solver | Day 2–3 |
| 3 | Input handling, validation, and cell highlighting | Day 4 |
| 4 | Build GameManager logic, timer, and restart functions | Day 5 |
| 5 | UI polish (fonts, spacing, color feedback), menu screens | Day 6 |
| 6 | Testing, refinement, and optional WebGL/PC export | Day 7–8 |

# 6. Expected Outcome

- A complete Sudoku game with clean and modern UI  
- Input validation and solution checking system  
- Export-ready for PC or WebGL with responsive UI  
- Efficient and reusable codebase structured for future expansion

# 7. Conclusion

This project targets the delivery of a production-ready Sudoku game within a short development cycle of one to two weeks. It will demonstrate proficiency in game logic, user interface design, and the Unity game engine, making it a strong addition to both academic and personal portfolios.