# Software Requirements Specification (SRS) : Connect 4

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## 1. Introduction

### 1.1 Purpose

This document outlines the functional and non-functional requirements for the **Connect-Four** Android application. The goal is to deliver a modernized digital version of the classic two-player game, with AI-driven gameplay, an intuitive user interface, and responsive animations.

### 1.2 Scope

The **Connect-Four** app enables players to:

- Compete against another player locally or against an AI opponent.
- Enjoy a clean and modern UI with smooth animations and an undo feature.
- Play on a standard 6x7 grid with accurate enforcement of game rules.

The AI is powered by the Minimax algorithm with Alpha-Beta Pruning, ensuring challenging single-player gameplay.

### 1.3 Definitions, Acronyms, and Abbreviations

- **AI**: Artificial Intelligence.
- **Minimax Algorithm**: A decision-making algorithm used to minimize potential losses in a game.
- **2D Array**: A two-dimensional data structure representing the game grid.

### 1.4 References

- Classic Connect-Four game rules: Wikipedia
- Android Development Documentation: Android Developers

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# 2. Overall Description

## 2.1 Product Perspective

The Connect-Four app is a standalone mobile application designed for Android devices. It provides an engaging and interactive experience for users through single-player and multiplayer modes.

## 2.2 Product Functions

1. **Game Modes**:
    - Single-player: Player vs. AI.
    - Multiplayer: Two players on the same device.
2. **Gameplay Features**:
    - Drop tokens into the grid with touch gestures.
    - Visual indication of moves and win conditions.
    - Undo the last move.
3. **Win Conditions**:
    - Detects four consecutive tokens (horizontal, vertical, diagonal).
    - Declares a draw if the grid is full with no winner.
4. **User Interface**:
    - Modern design with responsive animations.
    - Simple controls for seamless gameplay.

## 2.3 User Characteristics

The target audience includes:

- Casual gamers.
- Fans of strategy games.
- Users of all ages familiar with touch-based interfaces.

## 2.4 Constraints

- The application is built for Android 7.0 (API 24) or higher.
- The AI's performance may vary based on the depth of the Minimax algorithm.
- Limited to local multiplayer (no online support).

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# 3. Specific Requirements

### 3.1 Functional Requirements

| ID | Requirement Description |
|---|---|
| FR1 | The app must allow two players to play locally. |
| FR2 | The app must provide an AI opponent for single-player mode. |
| FR3 | The app must implement the standard 6x7 Connect-Four grid. |
| FR4 | The game must declare a winner when four tokens align horizontally, vertically, or diagonally. |
| FR5 | The game must declare a draw if the grid is full with no winner. |
| FR6 | Players must be able to undo their last move. |
| FR7 | The app must provide visual feedback for every move (e.g., token drop animation). |

### 3.2 Non-Functional Requirements

| ID | Requirement Description |
|---|---|
| NFR1 | The app must load and initialize in under 2 seconds. |
| NFR2 | The AI must calculate its move within 1 second. |
| NFR3 | The UI must be responsive and handle touch gestures smoothly. |
| NFR4 | The app must run on devices with Android 7.0 (API 24) or higher. |
| NFR5 | The app must maintain state consistency after interruptions (e.g., phone calls). |

### 3.3 System Requirements

- **Hardware**: Android device with a minimum of 2 GB RAM.
- **Software**: Android 7.0 (API 24) or higher.

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## 4. Design Constraints

### 4.1 Frameworks and Libraries

- **Android SDK**: For core application development.
- **Coroutines (Kotlin)**: For multithreading in AI computations.

- **Animator API**: For smooth token drop animations.

### 4.2 Development Environment

- Android Studio with Gradle for build automation.

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# 5. Appendices

## A. Assumptions and Dependencies

- Players are familiar with the basic rules of Connect-Four.
- The app assumes a stable device environment during gameplay.