

**Software Requirements Specification**

**Document**

**Connect Four Game**

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[2.2 Product Functions](#_jfiik6rjbz8v) 6

[**3. Specific Requirements**](#_tgs2ja23y69a) **16**

[3.2 Functional Requirements](#_ko6y4mz4my7) 16

[3.3. Other Non-Functional Requirements](#_nvqslejc1pcf) 18

[3.3.1. Performance Requirements](#_urx2x7wxmj80) 18

[3.3.2.1 Standards Compliance](#_eeg1nu8yixk5) 18

[3.3.3. Software System Attributes](#_ospr38rf6sm2) 18

[3.3.3.1 Reliability](#_qj8fndthy6rn) 18

[3.3.3.2 Availability](#_dfzsaig13vs9) 18

[3.3.3.3 Security](#_6mz0lp5a1g5w) 18

[3.3.3.4 Maintainability](#_8l40qtpg2477) 18

[3.3.3.5 Portability](#_u6f0rm3cjj7q) 18

[3.3.4 Other Requirements](#_ixhm0o2opaep) 18

**Table of figures**

| Figure number | description |
| --- | --- |
| 1 | Connect Four system environment |
| 2 | Connect Four Main use case diagram |
| 3 | Choose game mode sequence diagram |
| 4 | Choose token color sequence diagram |
| 5 | Play game sequence diagram |
| 6 | Place token sequence diagram |
| 7 | Check available position sequence diagram |
| 8 | Determine winner sequence diagram |
| 9 | Display results sequence diagram |
| 10 | Exit game sequence diagram |

1. **Introduction**
   1. **Purpose**

This software requirements specification (SRS) document is intended to give a complete overview of a game project.

The targeted audience of this document are professors and developers.

* 1. **Scope**

**1.3 Definitions, acronyms and abbreviations**

| **Term** | **Definition** |
| --- | --- |
| Console | Interface which can interact with user’s inputs. |
| Integrated development environment(IDE) | This is a software used to develop software programs. |

**1.4 References**

**1.5 Overview**

In the next two sections of this document, we will present the different functionalities and the system requirements of the Connect four game.

**2.** **Overall description**

This section gives an overview of the game's architecture. This includes product perspective, product functions, user characteristics, constraints, assumptions and dependencies.

**2.1. Product Perspective**

As shown in the figure, there is only the game in its system environment. It doesn't have any external parties.

**Figure 1:Connect four system environment**

**2.1.1. System Interfaces**

The user will play the game via console

**2.1.2. User Interfaces**

none.

**2.1.3. Hardware Interfaces**

None

**2.1.4. Software Interfaces**

None

**2.1.5. Communication Interfaces**

None

**2.1.6. Memory Constraints**

There will be no storage or RAM requirements

**2.1.7. Operations**

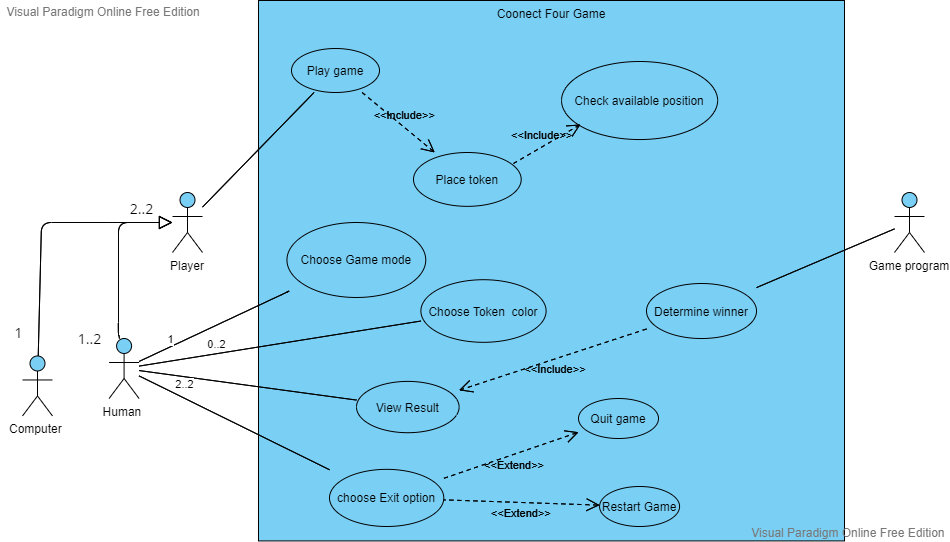
None

**2.1.8. Site adaptation requirements**

None

## **2.2** **Product Functions**

The aim of this part is to give the overview about the different functionalities of the game through the main use case diagram in figure 2.



**Figure 2: Battleship Main use cases**

The rest of this subsection is a detailed description of the different use cases separately where the Cockburn use case template is followed [4].

| **Use Case 10** | **Choose game mode** |
| --- | --- |
| **Goal in context** | to give players different game options. |
| **Scope & Level** | Game. Primary task. |
| **Preconditions** | The program is running |
| **Success End Condition** | One option is selected. |
| **Failed End Condition** | No option is selected. |
| **Primary, Secondary Actors** | Human player n1. |
| **Trigger** | None |
| **DESCRIPTION** | **Figure 3: Choose game options sequence diagram** |
| **EXTENSIONS** | **Branching action** |
| **SUB VARIATIONS** | **Branching action** |
|  | The player may choose:   * One player vs Computer player. * The program can choose the playing strategy:   + Preventing your winning   + Trying to win itself * Two players game. |

| **Related information** | **Choose game mode** |
| --- | --- |
| **priority** | Top priority. |
| **Performance** | The options should be displayed within 1 second. |
| **Frequency** | Every time the program is running. |
| **Channels to actors** | Console. |
| **Open issues** | The terminal faced a technical problem. |
| **Due date** | None |
| **Any other management information** | None |
| **Superordinates** | None |
| **Subordinates** | None |

| **Use Case 11** | **Choose token color** |
| --- | --- |
| **Goal in context** | To give players the ability to choose colors for tokens. |
| **Scope & Level** | Game. Primary task. |
| **Preconditions** | The program is running |
| **Success End Condition** | One color is selected for each player. |
| **Failed End Condition** | No color is selected. |
| **Primary, Secondary Actors** | Human player n1 and Human player n2 |
| **Trigger** | * The game mode is selected. |
| **DESCRIPTION** | **Figure 3: Choose game options sequence diagram** |
| **EXTENSIONS** | **Branching action** |
| **SUB VARIATIONS** | **Branching action** |

| **Related information** | **Choose token color** |
| --- | --- |
| **priority** | Top priority. |
| **Performance** | The colors should be assigned within 1 second. |
| **Frequency** | Every time, the Game mode is selected. |
| **Channels to actors** | Console. |
| **Open issues** | The terminal faced a technical problem. |
| **Due date** | None |
| **Any other management information** | None |
| **Superordinates** | None |
| **Subordinates** | None |

| **Use Case 12** | **Play game** |
| --- | --- |
| **Goal in context** | to start playing the game. |
| **Scope & Level** | Game. Primary task. |
| **Preconditions** | * The program is running. * The action play game is selected. * The game mode is chosen. * The colors of tokens are chosen |
| **Success End Condition** | The game field will appear in the console. |
| **Failed End Condition** | Nothing will appear on the console. |
| **Primary, Secondary Actors** | Human player n1, Human player n2 or Computer player. |
| **Trigger** | Choose game mode is selected. |
| **DESCRIPTION** | **Figure 4: Play game sequence diagram** |
| **EXTENSIONS** | **Branching action** |
| **SUB VARIATIONS** | **Branching action** |

| **Related information** | **Play game** |
| --- | --- |
| **priority** | Top priority. |
| **Performance** | The system should start the game in 1 second. |
| **Frequency** | Every time choose a token color option is selected. |
| **Channels to actors** | Console. |
| **Open issues** | The terminal encountered a technical problem. |
| **Due date** | None |
| **any other management information** | None |
| **superordinates** | None |
| **subordinates** | Place token. |

| **Use Case 13** | **Place token** |
| --- | --- |
| **Goal in context** | to choose a position for the token in the game field. |
| **Scope & Level** | Game, primary task. |
| **Preconditions** | * The program is running on the terminal. * The game mode is chosen. * The colors of tokens are chosen * The game is already started. * The game field is displayed. |
| **Success End Condition** | Each token is placed in one position of the game field |
| **Failed End Condition** | The game field is empty. |
| **Primary, Secondary Actors** | Human player n1, Human player n2 or Computer player. |
| **Trigger** | * Play a game is selected. |
| **DESCRIPTION** | **Figure 05: Place ships sequence diagrams** |
| **EXTENSIONS** | **Branching action** |
| **SUB VARIATIONS** | **Branching action** |

| **Related information** | **Place token** |
| --- | --- |
| **Priority** | Top priority. |
| **Performance** | The tokens are displayed on the console within 1 second. |
| **Frequency** | Until the game field is full. |
| **Channels to actors** | Console. |
| **Open issues** | The terminal encountered a technical problem. |
| **Due date** | None |
| **Any other management information** | None |
| **Superordinates** | choose game option. |
| **Subordinates** | None |

| **Use Case 14** | **Check available position** |
| --- | --- |
| **Goal in context** | to enable players to place the token only in an available position |
| **Scope & Level** | Game. Primary task. |
| **Preconditions** | The program is running |
| **Success End Condition** | Information about the chosen position is displayed. |
| **Failed End Condition** | No information is displayed. |
| **Primary, Secondary Actors** | Human player n1, Human player n2, Computer player |
| **Trigger** | * Choose a position. |
| **DESCRIPTION** | **Figure 3: Choose game options sequence diagram** |
| **EXTENSIONS** | **Branching action** |
| **SUB VARIATIONS** | **Branching action** |

| **Related information** | **Check available position** |
| --- | --- |
| **priority** | Top priority. |
| **Performance** | The information should be displayed within 1 second. |
| **Frequency** | Every time, a placement position is chosen. |
| **Channels to actors** | Console. |
| **Open issues** | The terminal faced a technical problem. |
| **Due date** | None |
| **Any other management information** | None |
| **Superordinates** | None |
| **Subordinates** | None |

| **Use Case 15** | **Determine winner** |
| --- | --- |
| **Goal in context** | to determine whom from the players won the game. |
| **Scope & Level** | Game. Primary task. |
| **Preconditions** | The program is running |
| **Success End Condition** | The game engine determined the winner. |
| **Failed End Condition** | The game engine could not determine the winner. |
| **Primary, Secondary Actors** | The game engine |
| **Trigger** | None |
| **DESCRIPTION** | **Figure 3: Choose game options sequence diagram** |
| **EXTENSIONS** | **Branching action** |
| **SUB VARIATIONS** | **Branching action** |

| **Related information** | **Determine Winner** |
| --- | --- |
| **priority** | Top priority. |
| **Performance** | The checking should be done within 1 second. |
| **Frequency** | Every time, no available positions left for both players. |
| **Channels to actors** | Console. |
| **Open issues** | The terminal faced a technical problem. |
| **Due date** | None |
| **Any other management information** | None |
| **Superordinates** | None |
| **Subordinates** | None |

| **Use Case 16** | **View results** |
| --- | --- |
| **Goal in context** | to let the players know who is the winner |
| **Scope & Level** | Game. Summary. |
| **Preconditions** | * The game was played for at least one time. * the game is over. |
| **Success End Condition** | Results are displayed on the console. |
| **Failed End Condition** | Results are not displayed on the console. |
| **Primary, Secondary Actors** | Human player n1, Human player n2. |
| **Trigger** | * Determine winner |
| **DESCRIPTION** | **Figure 07: Display results sequence diagram** |
| **EXTENSIONS** | **Branching action** |
| **SUB VARIATIONS** | **Branching action** |

| **Related information** | **View results** |
| --- | --- |
| **priority** | Top priority. |
| **Performance** | The results need to be displayed within 1 second. |
| **Frequency** | Every time, the winner is determined. |
| **Channels to actors** | Console. |
| **Open issues** | The terminal faced a technical problem. |
| **Due date** | None |
| **any other management information** | None |
| **superordinates** | None |
| **subordinates** | None |

| **Use Case 17** | **Exit** |
| --- | --- |
| **Goal in context** | To give the player the choice to stop playing or restart again. |
| **Scope & Level** | Game. Summary. |
| **Preconditions** | * The game was played for at least one round. * The winner is determined. * The results are displayed. |
| **Success End Condition** | Leave the game, or start a new round. |
| **Failed End Condition** | stay in the current game. |
| **Primary, Secondary Actors** | Human player n1 |
| **Trigger** | * View results. * Determine winner. |
| **DESCRIPTION** | **Figure 08: Exit game sequence diagram** |
| **EXTENSIONS** | **Branching action** |
| **SUB VARIATIONS** | **Branching action** |

| **Related information** | **Exit game** |
| --- | --- |
| **priority** | Top priority. |
| **Performance** | The response time is 1 second. |
| **Frequency** | Every time, the winner is announced. |
| **Channels to actors** | Console. |
| **Open issues** | The terminal faced a technical problem. |
| **Due date** | None |
| **any other management information** | None |
| **superordinates** | None |
| **subordinates** | None |

**2.3) User Characteristics**

The game can be used by any user, via console. No special knowledge or skills are needed to play, as a game guide will be available.

**2.4) Constraints**

The game should be implemented in the C environment. The device should have a suitable IDE to run the program.

The game will be displayed in the console and the user can interact with the screen using the keyboard and mouse only.

**2.5)**  **Assumptions and Dependencies**

No special assumptions or dependencies have been identified.

# **3.** **Specific Requirements**

This section provides the different requirements of the Connect four game in details.

**3.1 Interface Requirements**

**3.1.1 User Interfaces**

None, since the game is displayed in the console.

**3.1.2 Hardware Interfaces**

None

**3.1.3 Software Interfaces**

None

**3.1.4 Communication Interfaces**

None

## **3.2** **Functional Requirements**

**FN-1: The system shall enable the user to play a fully-functional game:**

All the parts of the game shall be functional, starting from choosing a game mode, choosing color of tokens, placing tokens, checking whether a position is available or not, determining the winner, displaying results until the player exit the game.

**Rationale:** the players will be able to play one game round at least.

**Related Functions:** UC10, UC11, UC12, UC13, UC14, UC15, UC16 and UC17.

**FN-2: The system shall enable the user to be matched against another player:**

The player needs to have a game partner to play against because it's a two-player game regardless of the partner’s type (human player or Computer player).

**Rationale:** This game cannot be played if there is only one player.

**Related Functions:** UC10, UC12.

**FN-3: The system shall enable the user to choose a game mode:**

The game should have two different matching options, the player can choose between a one-player mode or two-players mode.

**Rationale:** to match the player with a human player or a Computer player.

**Related Functions:** UC10.

**FN-4: The system shall enable the user to choose a color for tokens:**

The game should have two different color options, the player can choose one color that represents his/her tokens.

**Rationale:** to differentiate between the tokens that belong to each player..

**Related Functions:** UC11.

**FN-5: The system shall enable the user to place the tokens in the playing field:**

In order to play the game, the tokens need to be displayed in the chosen available position of the playing field, so the players will be able to make their next moves.

**Rationale:** to mark the positions in the playing field and play the game.

**Related Functions:** UC10, UC11, UC12 and UC13.

**FN-6: The system shall inform the user about the available position:**

The system should notify the player about whether a position is available or occupied. It’s not possible to place a token in an occupied spot.

**Rationale:** to place the tokens correctly in the playing field.

**Related Functions:** UC10, UC11, UC12 and UC13.

**FN-7: The system shall enable the computer player to choose the playing strategy randomly:**

The playing strategy should be chosen randomly by the computer player, where the preventing from winning is an intelligent strategy that will make the game harder for the human player and the trying to win itself strategy is easier.

**Rationale:** The Computer player is a developed bot that follows two different programmed strategies.

**Related Functions:** UC10 and UC12.

**FN-8: The system shall enable the user to choose a placement position for tokens:**

Once the player is playing, he/she should be able to place one token at one time in the playing field and replace again after the other player made the placement or his/her token.

**Rationale:** only one token at a point of time can be place by a player.

**Related Functions:** UC10, UC11, UC12, UC13 and UC14.

**FN-9: The system shall be able to determine the winner**:

The system should check the winning conditions for both players to determine the winner.

**Related Functions:** UC10, UC11, UC12, UC13 and UC14.

**FN-10: The system shall enable the user to view the game result**:

The system should display the end result once a game is over.

**Rationale:** to let the player know whether he wins or loses the game.

**Related Functions:** UC10, UC11, UC12, UC13 and UC14.

**FN-11: The system shall enable the user to exit the current game once it is over**:

The system should display two exit options for the players once a game is over. The Human player can choose to play another round or quit the game.

**Rationale:** to let the player know whether he wins or loses the game.

**Related Functions:** UC10, UC12, UC13, UC14, UC15 and UC16.

## **3.3. Other Non-Functional Requirements**

### **3.3.1.** **Performance Requirements**

**3.3.2.** **Design Requirements**

#### **3.3.2.1** **Standards Compliance**

### **3.3.3.** **Software System Attributes**

#### **3.3.3.1** **Reliability**

#### **3.3.3.2** **Availability**

#### **3.3.3.3** **Security**

#### **3.3.3.4** **Maintainability**

#### **3.3.3.5** **Portability**

None

### **3.3.4** **Other Requirements**

None