BILKENT UNIVERSITY
DEPARTMENT OF COMPUTER ENGINEERING

CS319 - Object-Oriented Software Engineering

Project Name: Seven Wonders

Analysis Report

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1. Introduction

Seven Wonders is a board game in which player needs to advance the wonder in terms of several aspects and collect the most victory points to win the game. It features representations of ancient civilizations, military conflicts and economic activity. The game can be played with 2-7 players. There are seven ancient wonders from where game's name comes and each player chooses one of these wonders to compete with each other by developing it.

In this project, our purpose is to digitalize the Seven Wonders board game to make it more attractive and funny.

2. Current System

Seven Wonders is a board game created by Antoine Bauza in 2010 and originally published by Repos Production in Belgium [1]. There are seven 'Wonder Board'. The game includes a card drafting mechanic and three decks of cards, which represent different ages I,II and III. In each age, 7 cards are randomly dealt to each player. Once per turn, each player selects a card to play from their hand, then passes the remaining cards.

3. Overview

3.1. Cards

The main component of the game is cards. There are seven types of age cards, representing different types of structures, which are determined by the color of their background: Red cards (military structures) contain 'shield' symbols; these are added together to give a player's military strength, which is used in conflict resolution at the end of each age.

Yellow cards (commercial structures) have several effects: they can grant coins, resources and/or victory points or decrease the cost of buying resources from neighbors.

Green cards (scientific structures): each card has one of three symbols. Combinations of the symbols are worth victory points.

Blue cards (civic structures): all grant a fixed number of victory points.

Brown cards (raw materials) provide one or two of the four raw material resources used in the game (wood, ore, clay brick and stone).

Grey cards (manufactured goods) provide one of the three manufactured goods used in the game (glass, papyrus and textiles).

Purple cards (guilds) generally grant victory points based on the structures a player and/or his neighbors have built.

3.2. Wonder Board

There are seven 'Wonder Board', each of which are depictions of Antipater of Sidon's original Seven Wonders of the Ancient World, which are Rhodos, Alexandria, Ephesos, Babylon, Olympia, Halikarnassos, and Gizah. Each board has two different sides selected before the game by players. There are 3 steps on each side to complete.

3.3. Coin

Coin is used for commercial stuff in the game. Players can purchase items from neighbours by using coins.

3.4. Conflict tokens

Conflict tokens are used when an age is over. After finishing the first and second ages, conflict tokens are taken regarding neighboring cities' military situation comparing each other. If a player has a higher total than that of a neighboring city, that player takes a Victory token corresponding to the Age which just ended (Age I: +1, Age II: +3 or Age III: +5). If a player has a lower total than that of a neighboring city, that player takes a Defeat token (-1 victory point)

4. Functional Requirements

4.1. Play Game

The user can play the game against 3 bot players. If the user get the most victory points against these opponents, the user wins the game.

4.1.1 Pick card

Player should pick a card from the hand if hand has two or more cards.

Build card

Player may build a picked card by paying its cost or having another card specified on the picked card.

Discard card

Player may discard the picked card and get three coins.

Bury card

Player may bury the picked card to build stages of wonders.

4.1.2 Trade

Players can buy resource from their neighbours by paying its cost.

4.1.3 Make war

Neighbour players make a war at the end of the each age.

4.2 Change settings

User can volume on or off in the settings.

5. Non-functional Requirements

5.1. Usability

The users can easily play a game via computer. They do not carry the deck in their hand and easily pick a card on the screen by clicking. If the user even does not know how to play this game, then s/he can take a look at ‘how to play’ section of the main menu and easily get the point.

5.2. Supportability

Digital version of this game can run on any device Java RE 8 installed owing to the Java Virtual Machine.

5.3 Performance

After player picks their card to play bots choosing their cards and playing should take at most 1 second.

An average user should be able to start playing the game 10 seconds after launching the game (Provided they know how the game works).

5.4 User-friendly Interface

Interface should be user friendly (no unnecessary buttons or text) that the only difficulty should be playing the game itself.

6. System Model

6.1 Use Case Diagram

This part gives information about the main use case model of Seven Wonders and detailed explanations of the use case model.

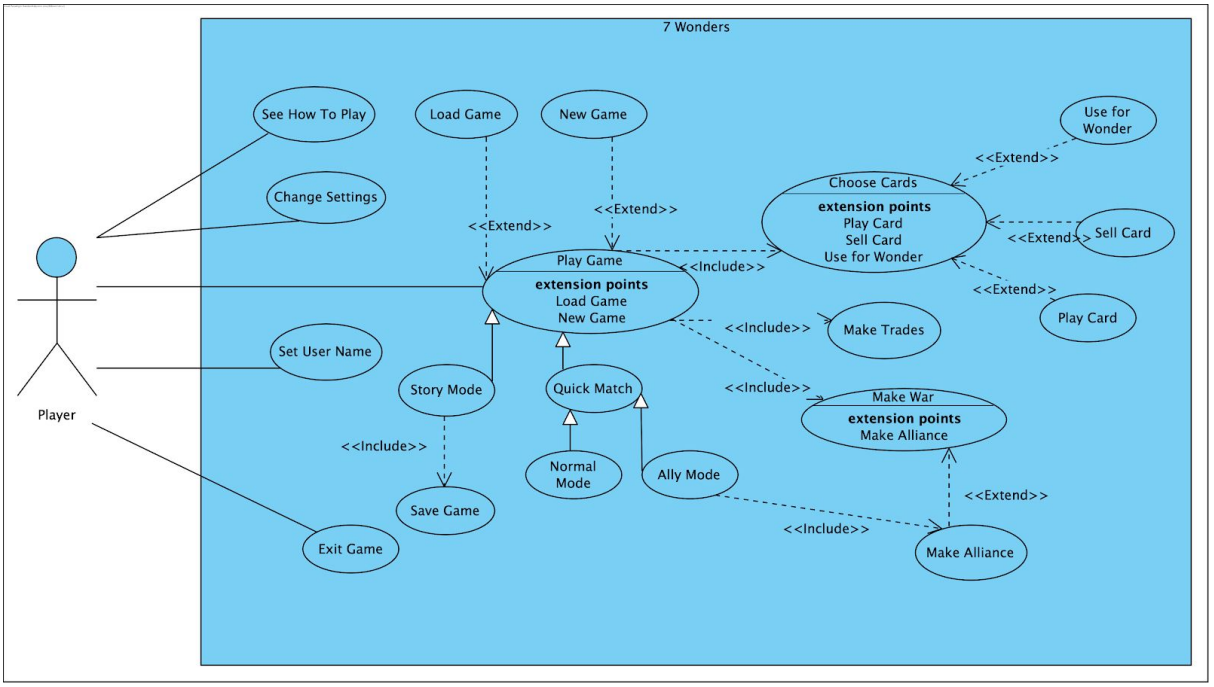

Figure 1: Use Case Diagram

6.1.1. See How to Play

Use Case Name: See How to Play
Primary Actor: Player

Stakeholders and Interests:

- Player doesn't know the game and wants to learn how to play.
- System shows the description of the game.

Entry Condition: Player selects "How to Play" from Main Menu.
Exit Condition: Player selects "Main menu" to return to the main menu.

Success Scenario Event Flow:

1. System shows the description of the game.

Alternative Flows:

A. If the actor wants to return main menu:
   A.1. Actor selects “Main Menu” to return main menu.
   A.2. System shows main menu.

6.1.2. Change Settings

Use Case Name: Change Settings

Primary Actor: Player

Stakeholders and Interests:

- Player wants to disabling game sounds or enabling game sounds.
- System updates itself according to player’s choices.

Pre-condition: For first time running, game options will be set as default.
Post-condition: Game settings are updated.

Entry Condition: Player clicks “Options” from the main menu or pause menu.
Exit Condition: Player selects “Save” to return menu.

Success Scenario Event Flow:

1. Player selects and enter to “Options”.
2. Game options will be displayed inside of Option screen.
3. Player make changes to the options according to his or her desires.
4. System updates the new settings.

Alternative Flows:

A. If player wants to return menu:
   A.1. Player selects “Save” from the screen.
   A.2. Game settings are updated.
   A.3. Player returns the menu.

6.1.3. Quick Match

Use Case Name: Quick Match

Primary Actor: Player

Stakeholders and Interests:

- The main goal of the game is collecting the more victory points than other players.

Pre-condition: For the first time running, options will be set as default.
Post-condition: Winner of the game will be announced.

Entry Condition: Player selects “Start New Game” from the main menu then selects the “Quick Match” from the “Mode Selection Menu”.
Exit Condition: Player selects “Return to main menu” from pause menu.

Success Scenario Event Flow:

1. Player sets his or her nickname.
2. Player chooses a wonder type.
3. Player chooses ally mode or normal mode.
4. Game starts and every player gets a wonder randomly.
5. Game starts at first age.
6. Players begin to choose a card and send the others to the next to them.
7. This flow of cards continues until each player gets 6 cards in an age.
8. At the end of the age each player makes battles with his or her neighbors.
   Game repeats the steps 4-5 three times to finish all ages.
9. System calculates each player’s victory points.
10. Announce the winner and leaderboard.

Alternative Flows:

A. Player wants to exit game before finishing the game:
   A.1. Player pauses the game.
   A.2. Player selects “Return main menu”.
   A.3. System shows the main menu.

6.1.4. Story Mode

Use Case Name: Story Mode

Primary Actor: Player

Stakeholders and Interests:

- The main goal of the game is completing the story mode with different challenges.

Pre-condition: For the first time running, options will be set as default.
Post-condition: Game will congratulate the player and show credits.

Entry Condition 1: Player selects “Start New Game” from the main menu then selects the “Story” from the “Mode Selection Menu”.
Entry Condition 2: Player selects “Load Game” from the main menu and chooses a game from the saved games.
Exit Condition: Player selects “Return to main menu” from pause menu.

Success Scenario Event Flow:

1. Player set his or her nickname.
2. Game starts and every player gets a wonder randomly.
3. Game explains the story and give a task to player.
4. Game starts at first age.
5. Players begin to choose a card and send the others to the next to them.
6. This flow of cards continues until each player gets 6 cards in an age.
7. At the end of the age each player makes battles with his or her neighbors.
   Game repeats the steps 4-5 three times to finish all ages.
8. System calculates each player’s victory points.
9. If the player completed the task and the game is not finished, return to second stage of event flow with the next story.

Alternative Flows:

A. Player wants to exit game before finishing the game:
   A.1. Player pauses the game.
   A.2. Player selects “Return main menu”.
   A.3. System shows the main menu.

B. Player did not completed the current task:
   B.1. The game alerts that the mission has failed.
   B.2. Player return to second stage of the event flow with the same story.

6.1.5. Exit Game

Use Case Name: Exit Game
Primary Actor: Player

Stakeholders and Interests:
- Player wants to close the game.

Pre-condition: Player should be in the main menu.

Entry Condition: Player selects “Exit Game” from the main menu.

Success Scenario:
1. Player selects “Exit Game” from the main menu.
2. System close the game.

6.2 Class Diagram

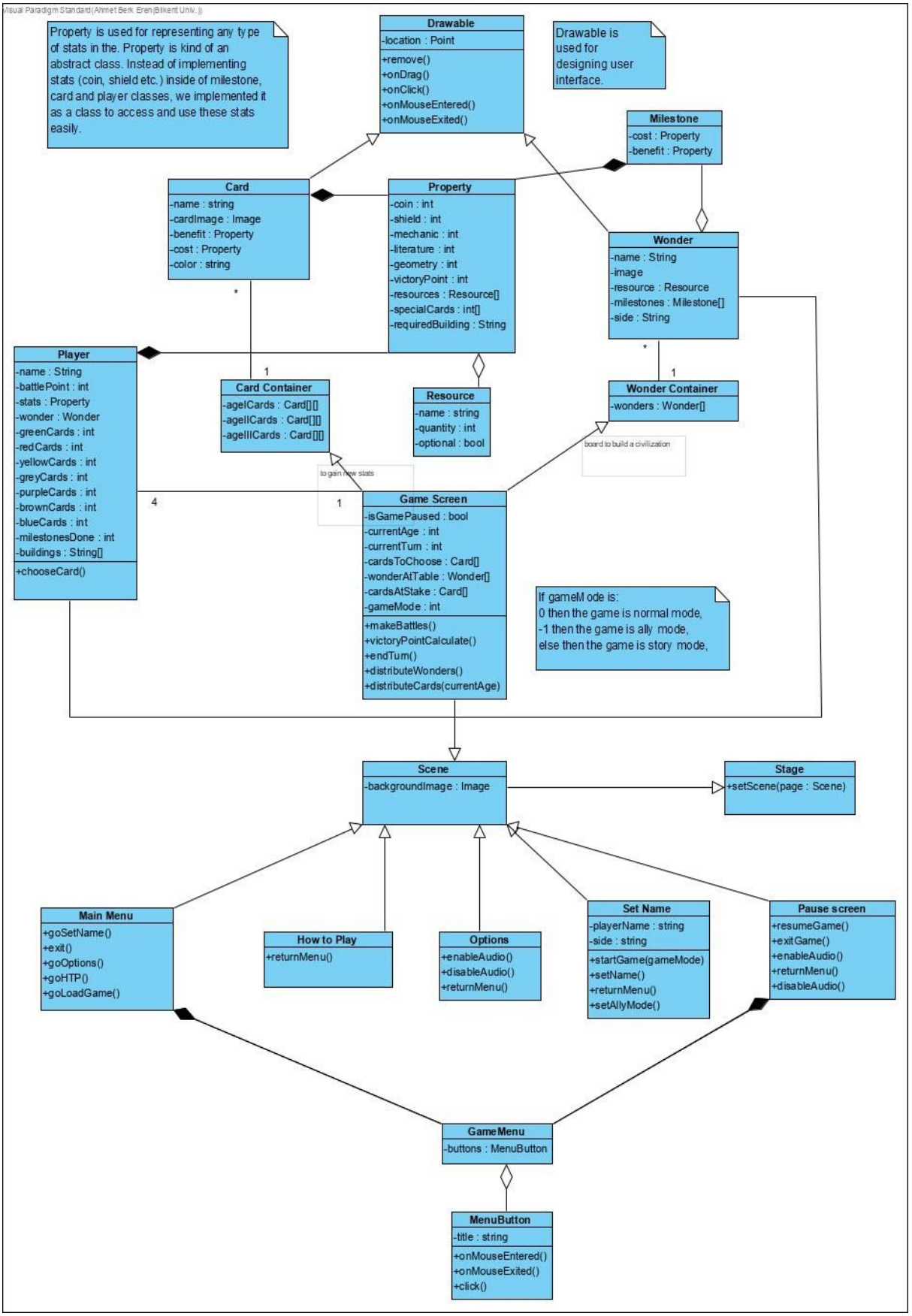

Figure 2: Class Diagram

6.3 Dynamic Models

6.3.1 Sequence Diagram

6.3.1.1 Options

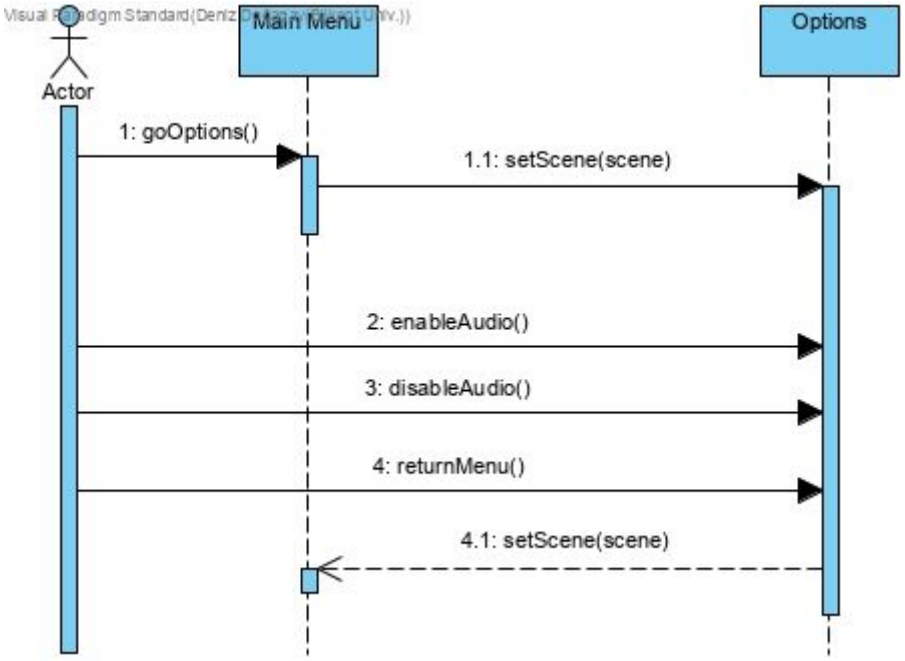

Figure 3: Sequence Diagram for Options

Options is the screen in which the user can enable or disable audio, and go back to main menu.

6.3.1.2 How To Play

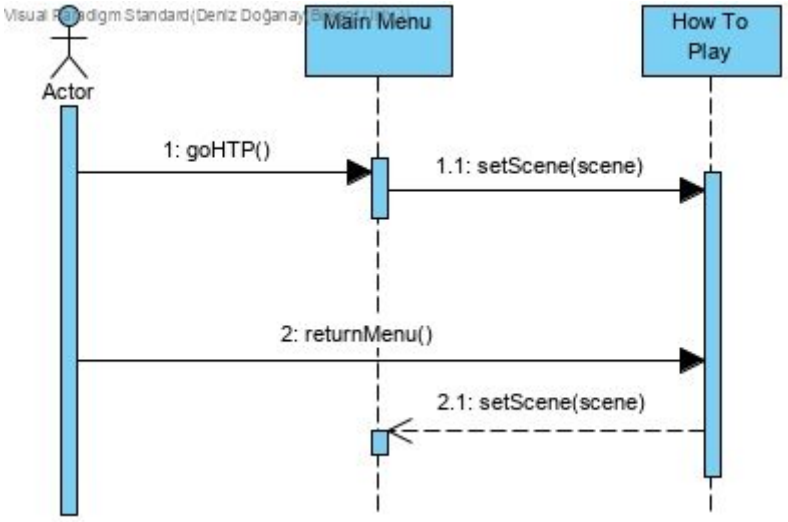

Figure 4: Sequence Diagram for How to Play

How to play is the screen where the user can learn about the game mechanics. The user can go back to main menu from here.

6.3.1.3 Load Game

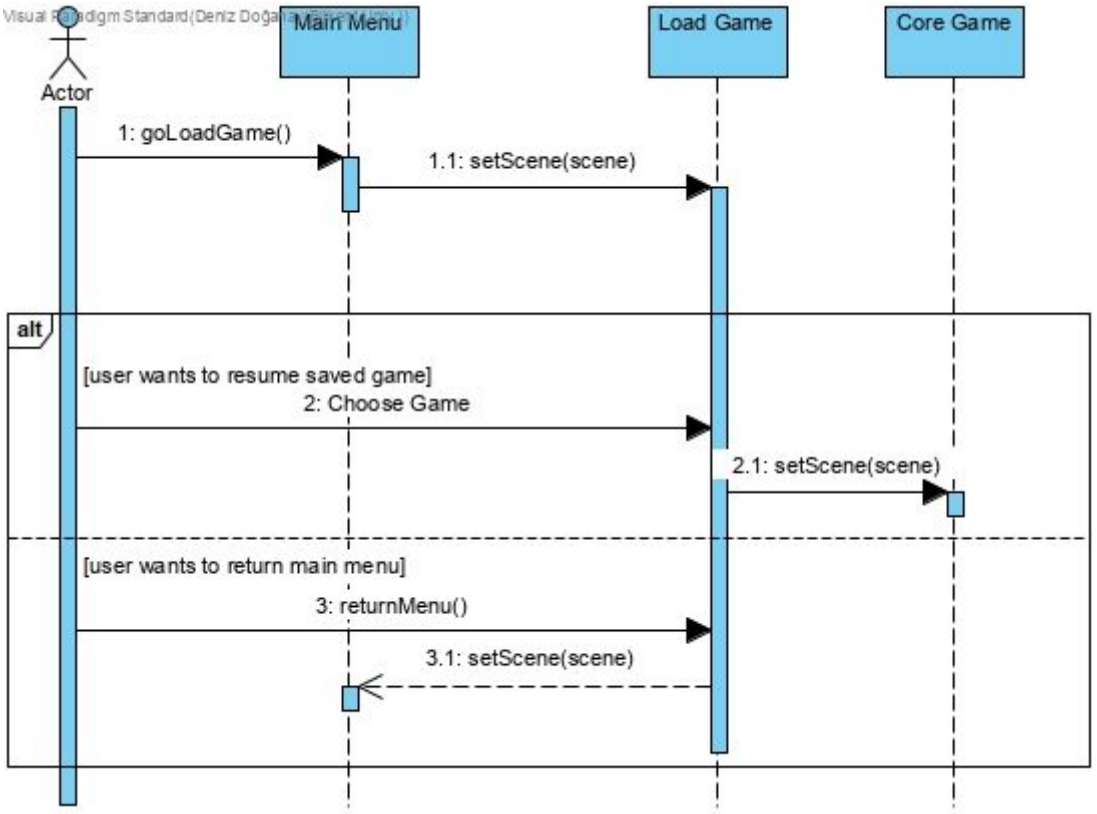

Figure 5: Sequence Diagram for Load Game

Load Game is the screen where the user can resume a previous Story Mode game. The game is automatically saved when the user completes every single game in Story Mode, and the player can continue playing Story Mode where they left, from this screen.

6.3.1.4 Set Game

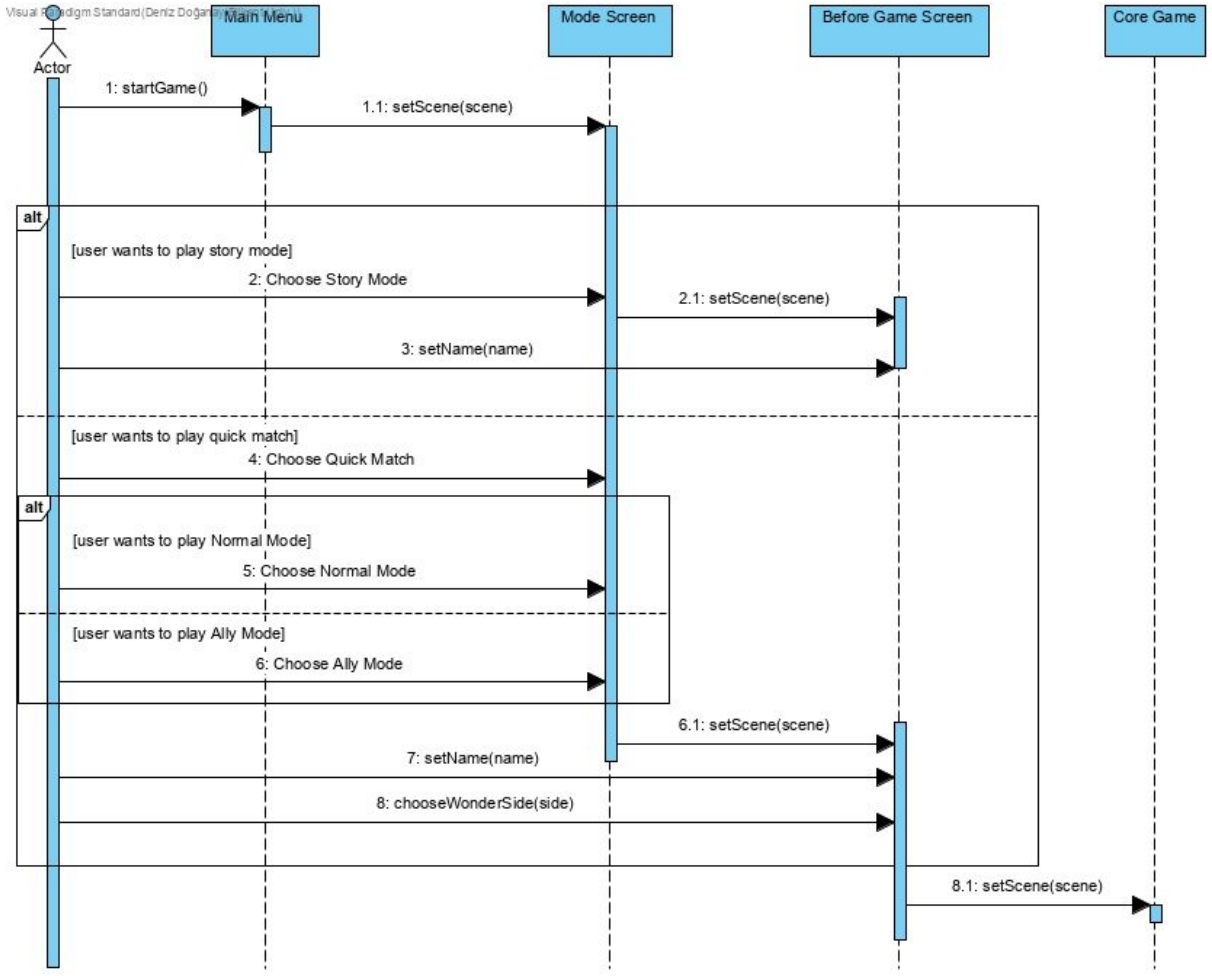

Figure 6: Sequence Diagram for Set Game

Set Game is the screen that comes up when the user wants to start a new game. The user has two options; Story Mode or Quick Match. If the user chooses Story Mode, they can set their nickname and start playing. In Story Mode, the user will have to win a number of games in increasing difficulty to complete the story. If the user chooses Quick Match, they have two further options; Normal Mode or Ally Mode. The difference between them is in Ally Mode, rather than playing solo, the user will team up with the player in front of them. When an age ends, the wars between the user and the right and left players will include the military power of the player in front of the user as well, in the user's favor. Furthermore, when all three ages end, teams will have cumulative victory points. This is a mode to increase strategical options and allow a player to enhance their economy while their teammate focuses on their military power. If the user wants to play Quick Match, they have the option of

choosing a wonder side before the game too, in addition of setting a nickname.

6.3.1.5 Core Game

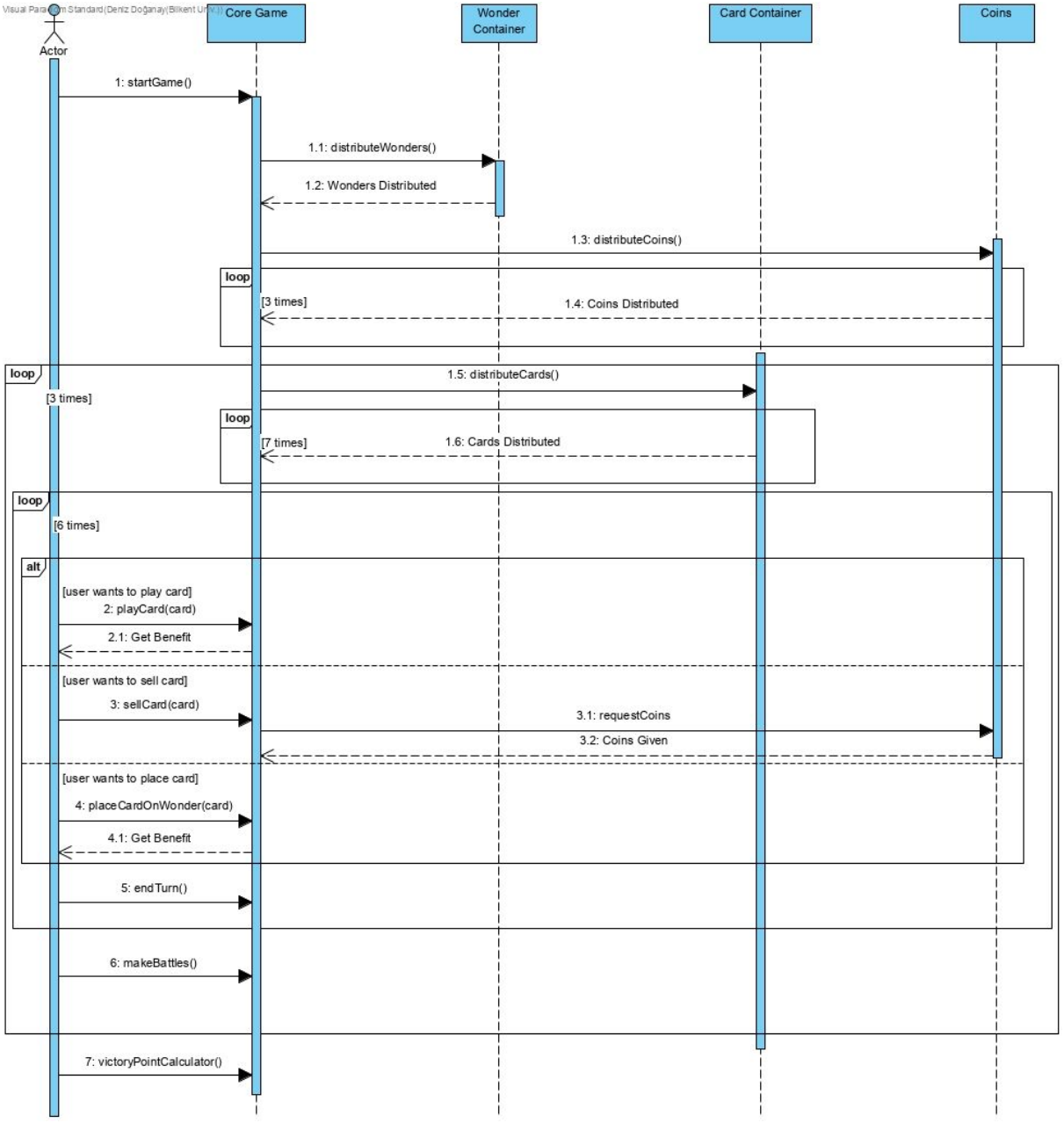

Figure 7: Sequence Diagram for Core Game

When the user starts a new game or loads a previous Story Mode, the game begins. Wonders are distributed and 7 of Age I cards and 3 coins are distributed to each player. Each turn, the user has 3 options; either play a card, sell a card, or place card on their wonder, if required conditions are met.

User gets 3 coins if they choose to sell the card; or gets specific benefits, if they choose to play the card or place the card. After the user makes their choice, they pass the remaining cards to the player right to them, and get remaining cards from the player left to them. This process goes on 6 times, until only one cards remains in each player's hand. Battles take place against left and right players. Then the next age begins with the specific age cards. After all 3 ages are completed in this way, each player's victory points are calculated and the winner is decided.

6.3.2 Activity Diagram

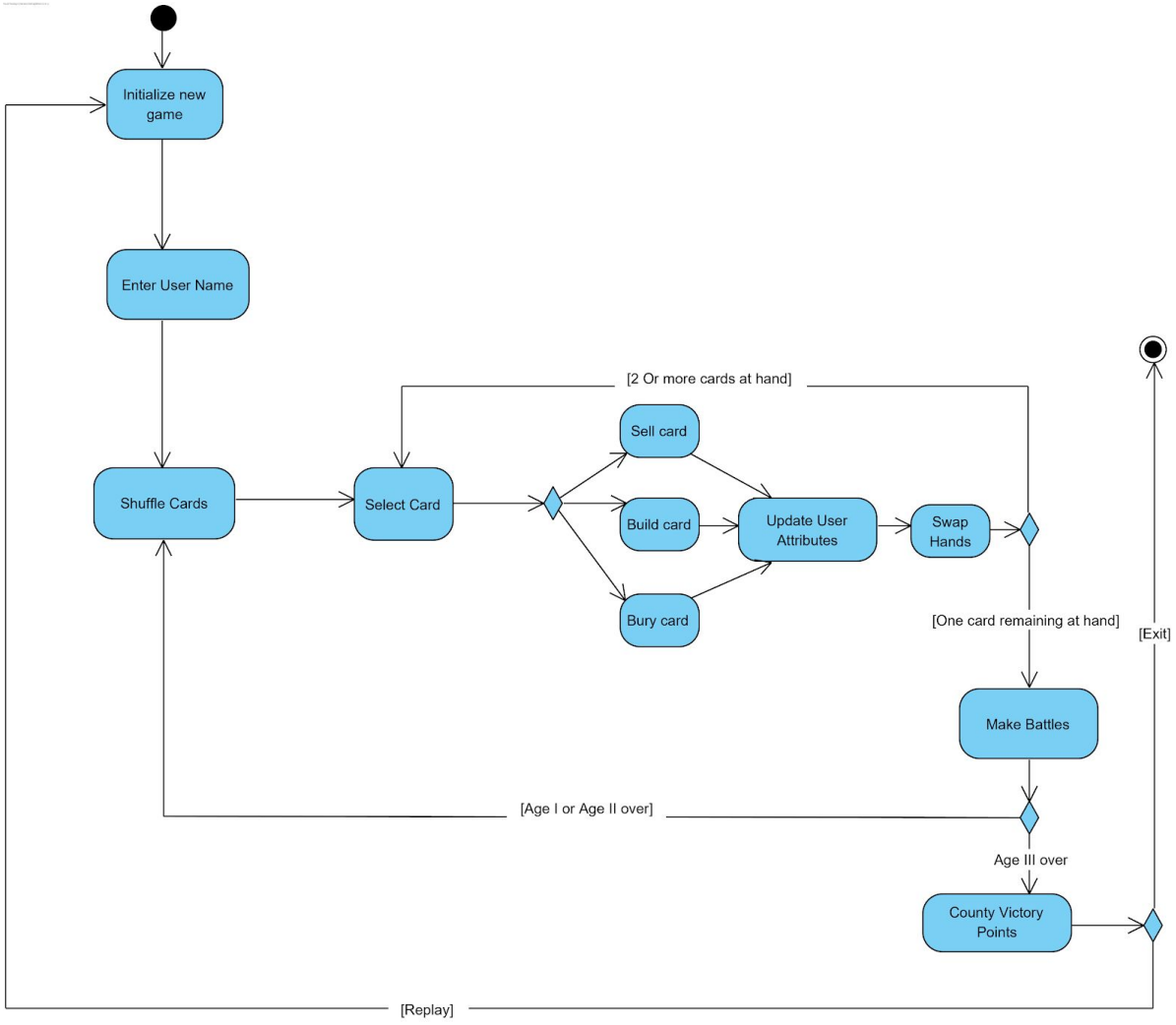

Figure 8: Activity Diagram

6.3.3 State Diagram

6.3.3.1 State Diagram for Wars and Ages

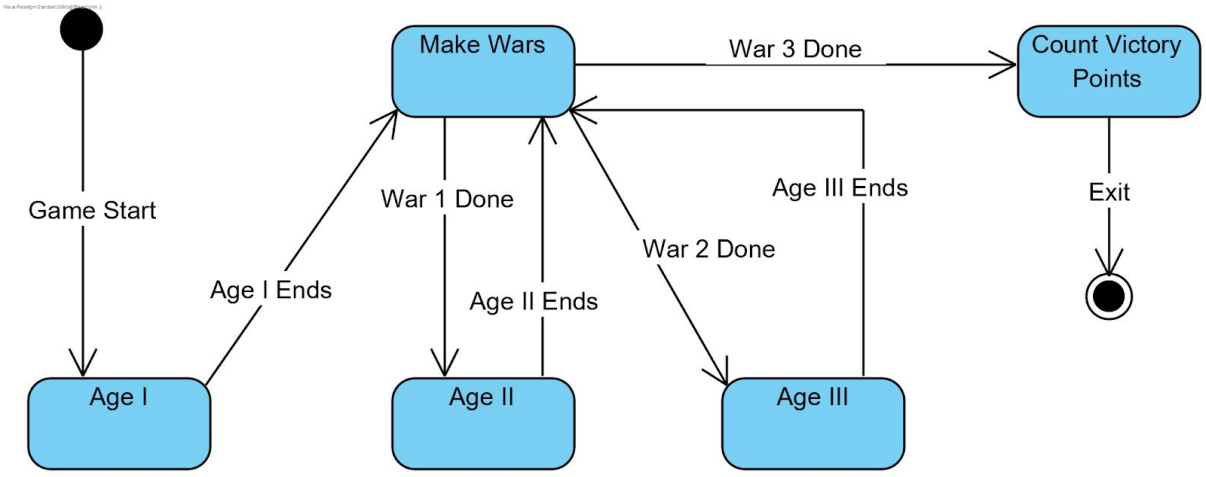

Figure 9: State Diagram for Wars and Ages

6.3.3.2 State Diagram for Win-Lose Conditions

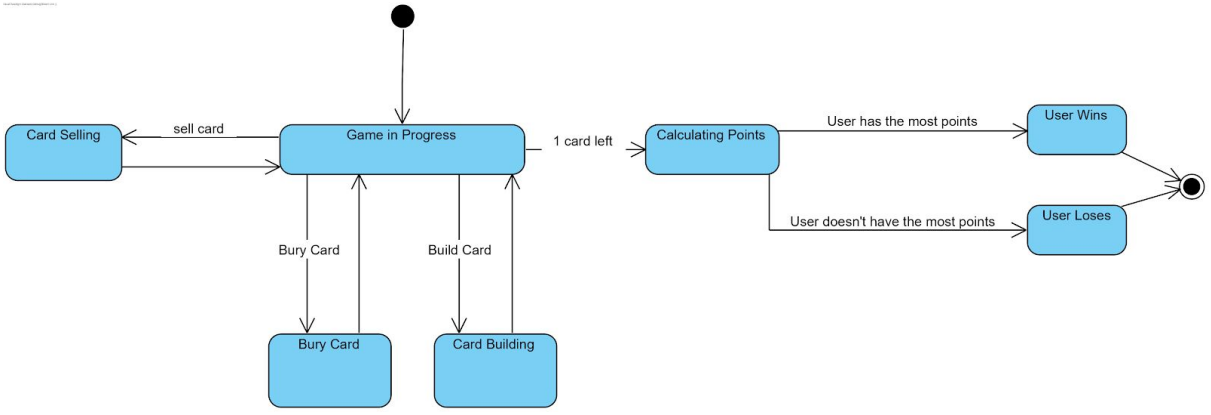

Figure 10: State Diagram for Win & Lose

6.3.4 User Interface

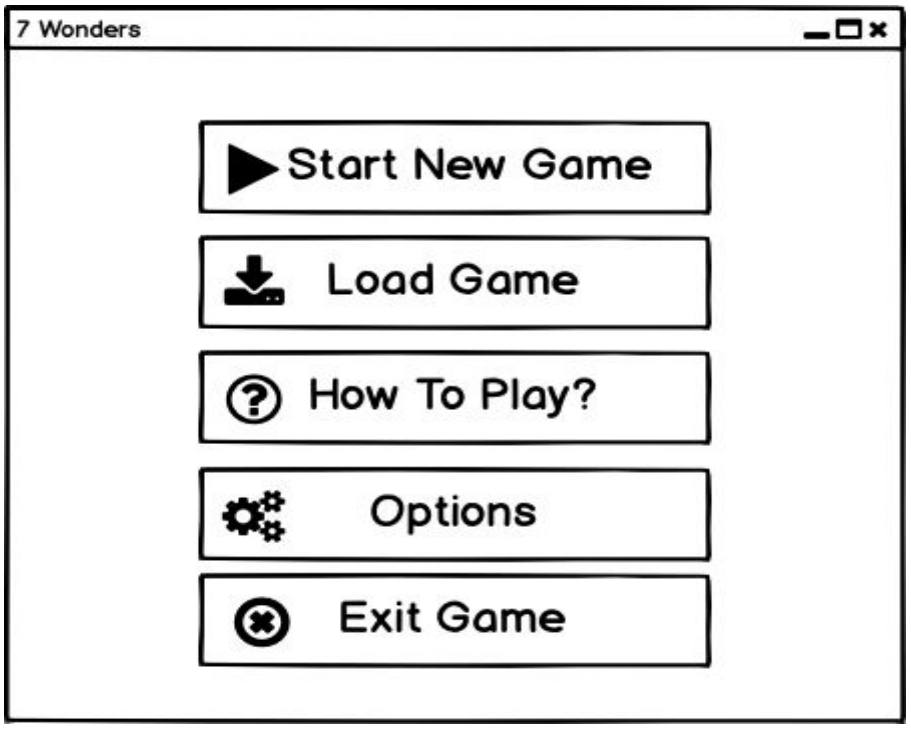

Figure 11: Main Menu Screen

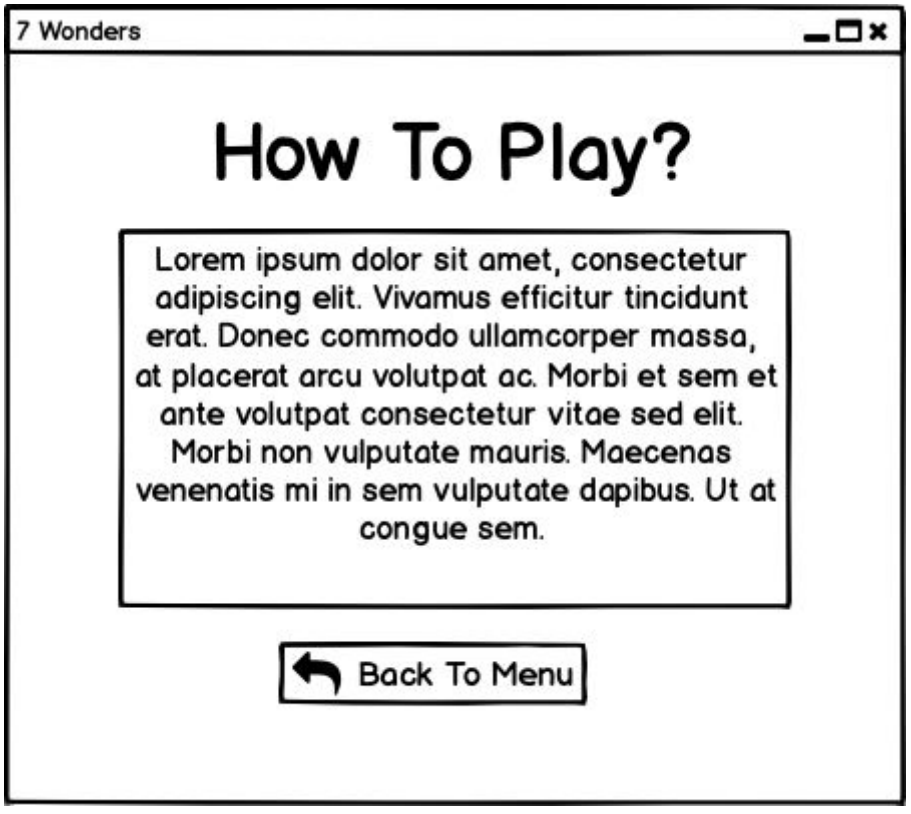

Figure 12: How To Play? Screen

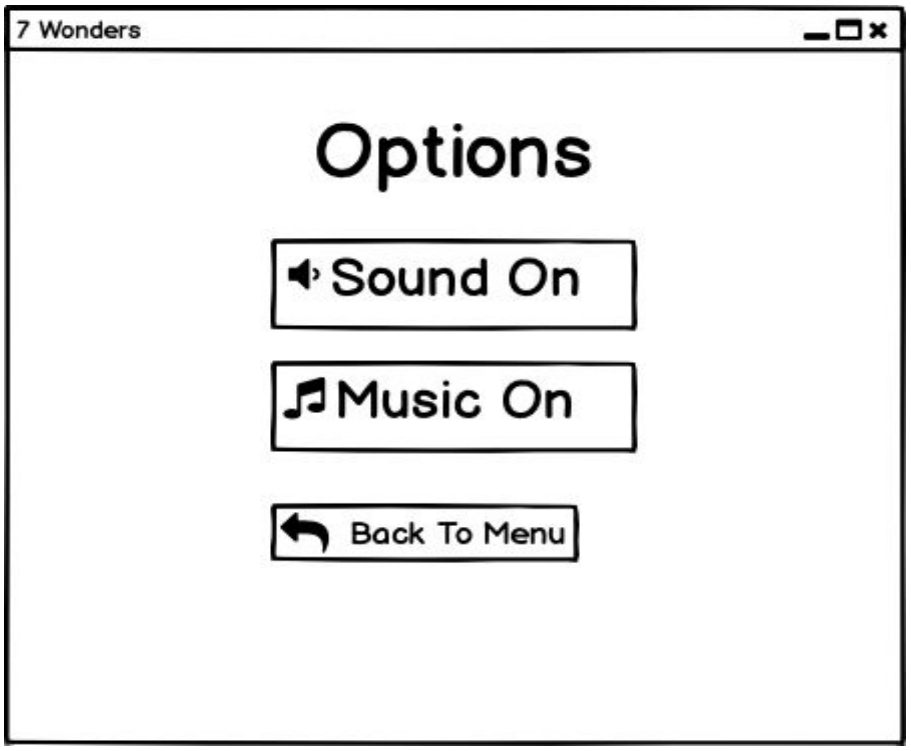

Figure 13: Options Screen

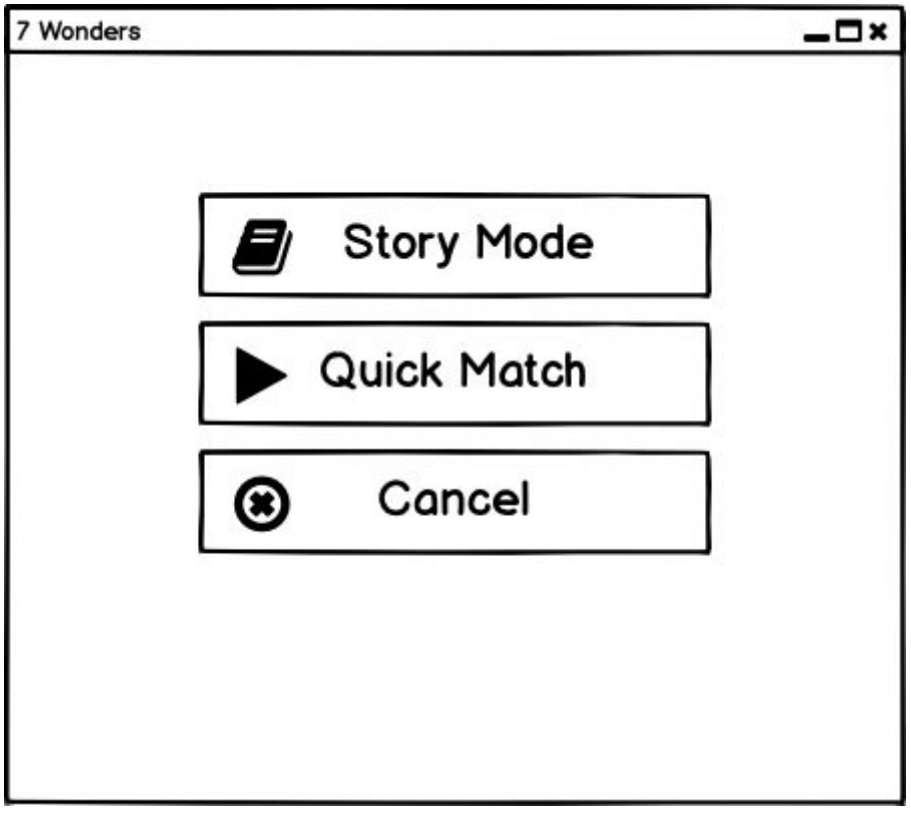

Figure 14: Mode Selection Menu

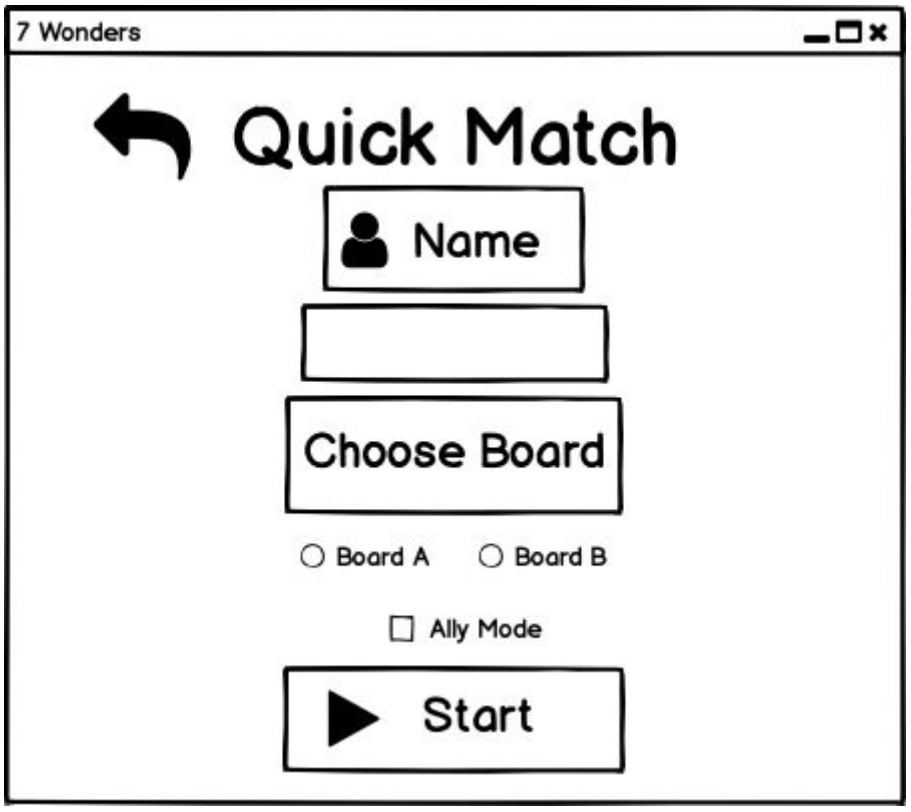

Figure 15: Before Game Screen for Quick Match

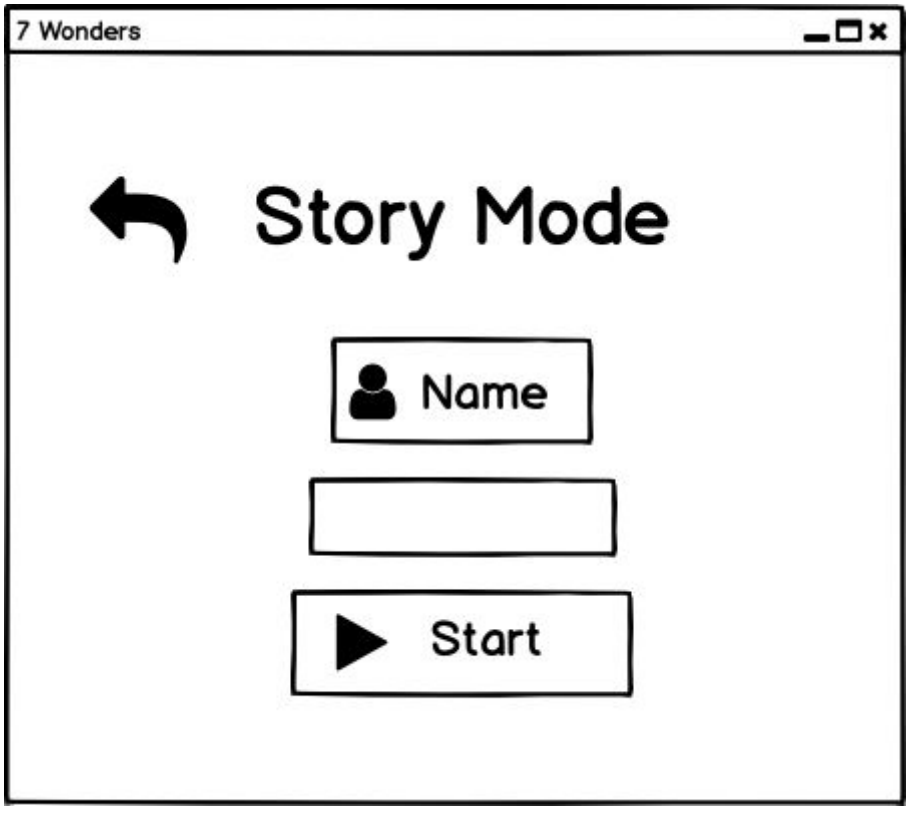

Figure 16: Before Game Screen for Story Mode

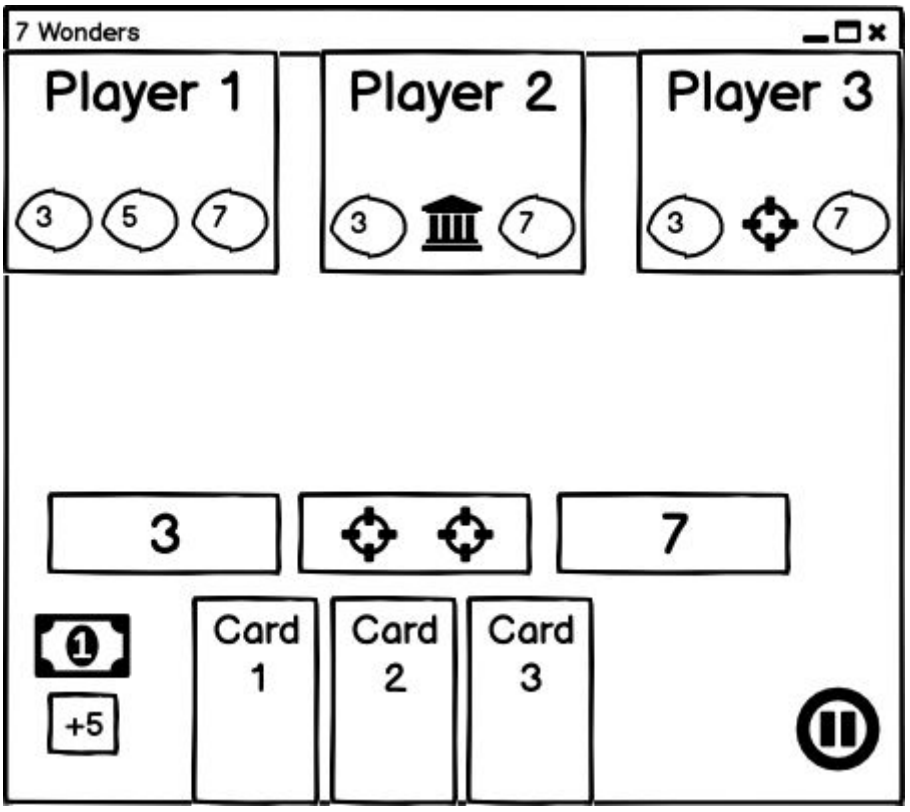

Figure 17: Game Screen

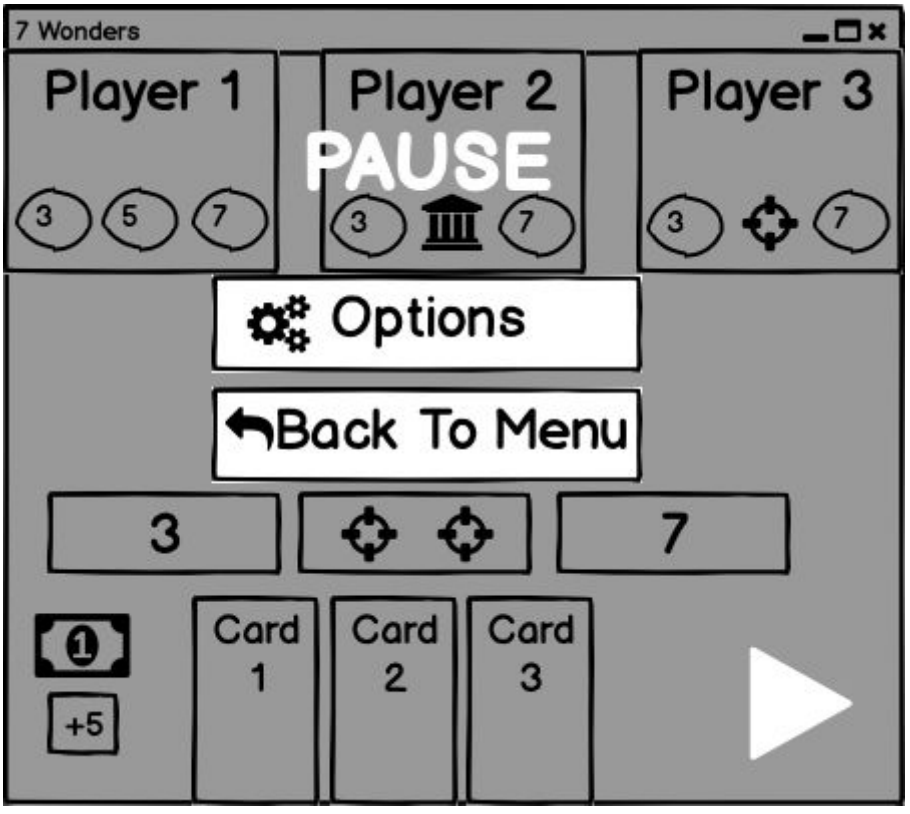

Figure 18: Pause Game Screen

7. Improvement Summary

- New features are added: ally mode and story mode
- Use case diagram, activity diagram, state diagrams and sequence diagrams are slightly changed regarding new features.
- Non-functional requirements part is changed and two new requirements are added.

8. Glossary & References

[1] https://board-games-galore.fandom.com/wiki/7_Wonders