Bilkent University

Department of Computer Engineering

Monopoly Project Group 2J

Bilopoly: Monopoly's Bilkent version

Analysis Report

Asım Güneş Üstünalp, Mohammed S. Yaseen, Turan Mert Duran, Radman Lotfiazar, Mohammad Elham Amin

Instructor: Eray Tüzün
Teaching Assistants: Barış Ardıç, Emre Sülün, and Elgun Jabrayilzade

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1. Introduction

Monopoly is one of the most popular board games in the 20th and 21th centuries. Monopoly is adopted from The Landlord's Game which was invented in the United states in 1903 by Lizzie Magie. Monopoly was published in 1935 and until now approximately 275 million sets have been sold in 43 languages in 111 countries. It has different editions which leads to increase its popularity including Star Wars, The Lord of the Ring and SpongeBob SquarePants. Based on South China Morning Post Monopoly is popular among people because "it gives them a chance to handle money and make adult investment decisions, practising skills of investment and negotiation that are critical in adult life, but with no danger of real loss" [1]. Therefore, it is a common board game not only for youngsters but also adults who want to practice their different abilities including investment, negotiation and decision making without any danger.

Bilopoly is computer based which we are planning to change and add different rules to the games. However, the main rules and features are not changed, including the fact that it is played with two six-sided dice to move around the game board and players collect rent from their opponents in order to drive them into bankruptcy. In our version of Monopoly we are trying to design Bilkent themed properties instead of the original properties. Furthermore, different features and rules, which are designed in this digital version of the game, lead players to feel different circumstances than the original and other versions of Monopoly.

2. Overview

Our proposed system is a digital version of Monopoly which lets people run it in their Windows machine. After running the game the first page is the menu page. Menu includes buttons for starting a new game, load game, settings and about us. By pressing the Start a new game button the application will ask the users about the number of players and the colors and nicknames which they would choose for representing them during the game. Load game will ask which one of the games you have saved you want to continue. In setting part users are able to increase or decrease the sound. And in about us we will provide concise information about the game and our group.

2.1. Game Play

In our new version of Monopoly, players start the game by pressing the New game button or load a game which they have saved before by pressing the load game button, users have a chance to continue their game from where they left.

If they press the New Game button, they will choose the number of people who will play the game. After that, for each player colors and nicknames should be decided. For initial startings, each player rolls dice and they are arranged according to their dice results. Biggest dice get the first turn and others follow the queue according to their dice results. All of the players start from the beginning location, which is stated on the map. Each player rolls the dice when their turns come. According to their dice results they move and pass places.

When they come to a place and if the place has not been bought by anyone, they need to decide whether they will buy this place or not. Each place has its own market value that was designed before by game makers. The user can buy the place by paying the mortgage value of the place to the bank.

If the place that user came has not been bought by anyone, the user has two options. The user can choose to just do nothing and wait for her/his next round or reroll dice by paying the rerolling payment value that is determined by game algorithms.

If the user has already bought the place, the player can buy vending machines or cafes(similar to houses and hotels from the original game), which increase the payment value of the location, for their places. Values of each place can be found on places' information cards.

If the place that player came has already been bought by someone, users have two options. One of them is that the user who came on someone's property has to pay money to the owner of the place according to the includings (vending machines and cafe) of the place. Second option is that the player can choose to roll dice. If the result of dice is double, the user escapes the payment and leaves the place without paying any money. However, if the user can not roll double dice, the user has to pay double the price. If the user has not enough money to pay, the user can sell his/her ownings to the bank. All of the places can be turned into the game money by selling them to the bank or other users. If the player has not enough owings and money, the player goes bankrupt. Thus, the others can continue their game with one missing player.

2.2. Map

Map of the game consists of 32 different locations. Of these, 20 of them will be Bilkent buildings. 4 of them will be different cafes that can be found on Bilkent University campus. 4 of them will be chance locations where users draw a chance card, they will be located symmetrically on each side of the map. There will be one prison where users visit prisoners. One "Go To Prison" location where people who come to this location will go to prison and stay there for 3 rounds. One "Start location" where players start the game from and take money from the bank for each passing of this location. And one location where all the taxes are collected, if a player arrives at this location he/she takes all the money and taxes that have been paid to the bank and accumulated on that location.

2.3. Settings

In this part the user is able to change the sound effects of the game. Games include different sound effects such as the music of the game, the sound of movement when players move around the board and different sound effects belonging to property and chance locations. The volume of all these sound effects are changeable by accessing this part. Furthermore, setting is not only available after running the game but it is also accessible during the game for changing any of these sounds.

2.4. Properties

There are 20 number of Bilkent buildings where players are able to buy these buildings and build vending machines or cafes there for increasing the rent of the place. These buildings are:

1. Electric Electronic Engineering (EEE)
2. Faculty of Engineering (EA)
3. Faculty of Economics, Administrative and Social Science (A)
4. Faculty of Science (S)
5. Library Main Campus
6. Faculty of Art, Design and Architecture (F)
7. Faculty of Law (B)
8. Faculty of Humanities and Letters (H)
9. Faculty of Business Administration (M)
10. Faculty of Music and Performing Arts (P)

11. Vocational School of Tourism and Hotel (R)
12. Nanotechnology Research Center
13. Sport Center Main Campus
14. Register's Office
15. Health Center Main Campus
16. Vocational School of Computer Technology and Office Management (G)
17. Student Dormitories
18. Bilkent ODEON
19. School of English Language (C)
20. Meteksan Bookstore

Moreover there are 4 different cafes' buildings which players are able to buy and earn money by renting them. These cafes are:

1. Speed-Kirac Cafe
2. Starbucks
3. Mozart Main Campus
4. Cafe Break Main Campus

2.5. Chance cards

There are 4 chance locations where players are able to draw a chance card. These cards give different opportunities or punishments to players. For opportunities we can mention, a "Get Out of Prison" card, win an amount of money card, don't pay the rent for this round card etc. Punishments include, lose an amount of money card, go to prison card, pay the double rent for this round card etc.

Furthermore, players are able to use their chance cards whenever they want, they can use them instantly or use them in the later rounds. They can also trade their cards and sell them to other players.

2.6. Transfer money and properties between players

Players in our version of Monopoly are able to transfer money and properties between themselves. However, these transactions will include some taxes which players have to pay. For transferring money only players who receive the money have to pay %8 of the money to the bank and pay back the whole money whenever the players who give the money ask for that. If players, who receive the money, have not that much cash for paying back the other player is able to ask for properties even if it is worth more than that money they borrow. Nevertheless, For transferring properties both plates have to pay 5% of the price of properties which they receive as tax.

2.7. Invest money

Players are able to invest their money in the bank and get the benefit back. Based on the amount of money and number of rounds they decide to invest, the bank will decide how much money will pay back after finishing that period. These percentages will calculate by application and inform the players every round. These percentages might stay unchanged or change during the game based on the decision of application.

3. Functional Requirement

3.1. New game

3.1.1. Selecting tokens and colors

Players should be able to select tokens and color for indicating the properties they own.

3.1.2. Track money

Players should have some starter money so that they can buy properties, rent, or make deals with other players.

3.1.3. Position

Players’ position must be updated to a new location after their turn.

3.1.4. Chance cards

A deck of chance cards must be present for the players to choose from.

3.1.5. Buying Property

The players should be able to buy a property, which they landed on after rolling the dice, if it is not already owned by other players.

3.1.6. Inventory

Every player must have an inventory which holds all of their properties and belongings.

3.1.7. Trade

The players should have the ability to trade properties and money among each other.

3.1.8. Paying Rent

Players should be able to collect rent from those who are on the properties they own. The amount of rent is determined by some factors. The game needs to calculate the rent based on those factors which are:

1. The original price of that property. If the property was expensive for the property owner to buy, it should generate more rent.

2. Whether the group of properties that this property belongs to are all owned by the same person. If the same person owns all of them then he/she collects more rent from them.
3. Whether the property has any vending machine or cafe on it. If it does, then the rent would be higher.
4. Whether the property owner used any chance card to increase his/her rent income or whether the arriving player used any chance card to decrease his/her rent expenses. For example, there exists a chance card that says "Pay less next time you need to pay rent". If the arriving player uses that card then he/she pays less.

3.1.9. Rerolling the dice

In their turns, the players should be able to reroll the dice when they are unhappy with its results by spending money.

3.1.10. Game Turns

The game is a turn based one. That means every player should finish their actions on their own turn, which includes offering, accepting/rejecting the offers as well.

3.1.11. Building Vending Machines and Cafes

If a player owns all the properties of a group, they should be able to build vending machines or cafes if they have enough money to do so. Before building a cafe, a player first needs to build 3 vending machines on that property. Vending machines and Cafes increase a property's rent.

3.1.12. Investment

The players should be able to invest their money in the bank. The bank would have a fixed interest rate and the players would gain money based on that interest rate.

3.2. Save game

Players should be able to save the current progress of the game. This action is done automatically in specific intervals as well. Hence, in case of any crash or error, the players will be able to continue from where they left off.

3.3. Load game

At the beginning of the game players should be able to continue on with a game they have already saved..

3.4. Settings

3.4.1. Change sound volume

Players should be able to adjust the volume of the game.

3.4.2. Graphics quality

Players must be provided with settings for adjusting graphics quality of the game.

3.4.3. Battery Life

Players should be able to choose battery saver mode.

3.4.4. Play time while on battery matric

Show the user the estimated time they can play while they are on battery.

3.5. How to play

The players may access information screen about how the game is played while playing the as well as before starting the game. Players will be able to learn:

- How the game is played
- What are the rules
- Buttons explanation
- Some UI elements explanation

This screen is important for new players to learn about the game rules and easily play the game. For example, players can learn how to invest in the bank by using information provided in this screen.

3.6. Quit

Allows the user to exit the game. Prompts the user asking if they want to save the current session if there was a game in progress.

4. Non-functional requirement

4.1. Operational Requirements

4.1.1. Reopening the game after the crashes

Having the game crashing in front of them is already a frustrating experience for the users. When they reopen the game it needs to open the latest open session automatically in order not to frustrate them further.

4.1.2. Game Size

Game size is an important issue for the users who don't have much space on their storage devices. To not crowd the storage devices of our users, the game size needs to be small. The size of the game shouldn't exceed 150 MB.

4.1.3. Save Time

After playing the game and before quitting, users wouldn't want to wait long for the game to save. That's why the game should save in less than 5 seconds.

4.1.4. User friendly UI

Having an user friendly UI (User Interface) is important for the users because otherwise they might feel confused and thus feel frustrated. In order not to make them feel confused, there should be at most 10 pressable buttons on the screen at once.

4.1.5. Screen resolution support

The game should run on screens with resolutions: 1366×768, 1920×1080, 1536×864, 1440×900, 1280×720, and 1600x900. These screen resolutions represent 68.14% of the computer screens available in the market [2].

4.1.6. Performance

The game should be high performant in multiple aspects including:

4.1.6.1. Frame Rendering

The frame rendering is an important aspect since it measures what the player is seeing on the screen. It is measured using frame per second (FPS), especially FPS madian. The goal is to run the highest FPS possible; however, the FPS the game provides should be no less than 30 FPS.

4.1.6.2. CPU Usage

The game should maintain low cpu usage, not to crowd the cpu, which causes the computer to slow down. In general, the game can use between 0-100% of the cpu at any time; however, The game should not use more than 70% of the cpu for longer than 5 mins at once. The frequency of these occurrences when the game is using more than 70% of the cpu should also be infrequent: less than twice each 30 minutes.

4.1.6.3. GPU Usage

GPU is where the game renders graphics and shows them on the screen. The game should maintain low GPU usage because intensive GPU usage can cause the FPS to drop and might cause some sluggishness, which in turn affects the user experience negatively. The GPU usage should be adjusted by possibly reducing the resolution of graphic assets to maintain the minimum frame rate of 30 FPS.

4.1.6.4. Battery Usage

Battery life is an important aspect for users using the game on laptops. The game should not drain the battery very quickly and should maximize the play time while the computer is on battery. In general, the game should not increase the battery drain speed by more than 50%.

4.1.6.5. Load Time

For the sake of better user experience the game should load very quickly. It is shown that users in general expect their computers to load faster than their phones or webpages. Additionally, around 66% of the users are willing to wait more than 6 seconds for the mobile or web page game to load [6]; therefore, our desktop game is required to load in no more than 5 seconds.

4.1.7. Player mode

The game should support multiplayer mode. The number of players allowed should range between 2 and 8.

4.2. Development Requirements

The code, architecture design, and diagrams should have the following qualities:

4.2.1. Scalability

The degree to which to which the system facilitates the addition of new features. This quality needs the system to have a clear architecture and loosely coupled components. Any new feature should have only one logical place to be added to.

4.2.2. Testability

“The degree to which a system or component facilitates the establishment of test criteria and the performance of tests to determine whether those criteria have been met”[4]. This is achieved by having the components being loosely coupled and not dependent on each other that each can be tested individually.

4.2.3. Portability

“The ease with which a system or component can be transferred from one hardware or software environment to another” [3]. The system should be loosely coupled and connected to the exterior systems using templates or adapters to reduce the effort when migrating to other systems.

4.2.4. Maintainability

“The ease with which a software system or component can be modified to correct faults, improve performance or other attributes, or adapt to a changed environment” [5]. The system should be loosely coupled that a bug can happen in only one component that is not dependent on any other components. This facilitates the bug fixing since one one component should change and no other components of the system will be affected.

4.2.5. Understandability

The ease with which the system is understood by other programmers. A new programmer should be able to understand the general architecture of the game in less than half an hour and start working in a few hours.

5. Pseudo requirements

5.1. OOP Language

This project is restricted to using a programming language with reasonable object-oriented programming.

5.2. Game Engine Use

Using any library, framework, or any game engine that forces a particular design on the project is strictly prohibited.

6. System Models

6.1. Behavioral Diagrams

6.1.1. Use-Case Model. Figure (6.1.1)

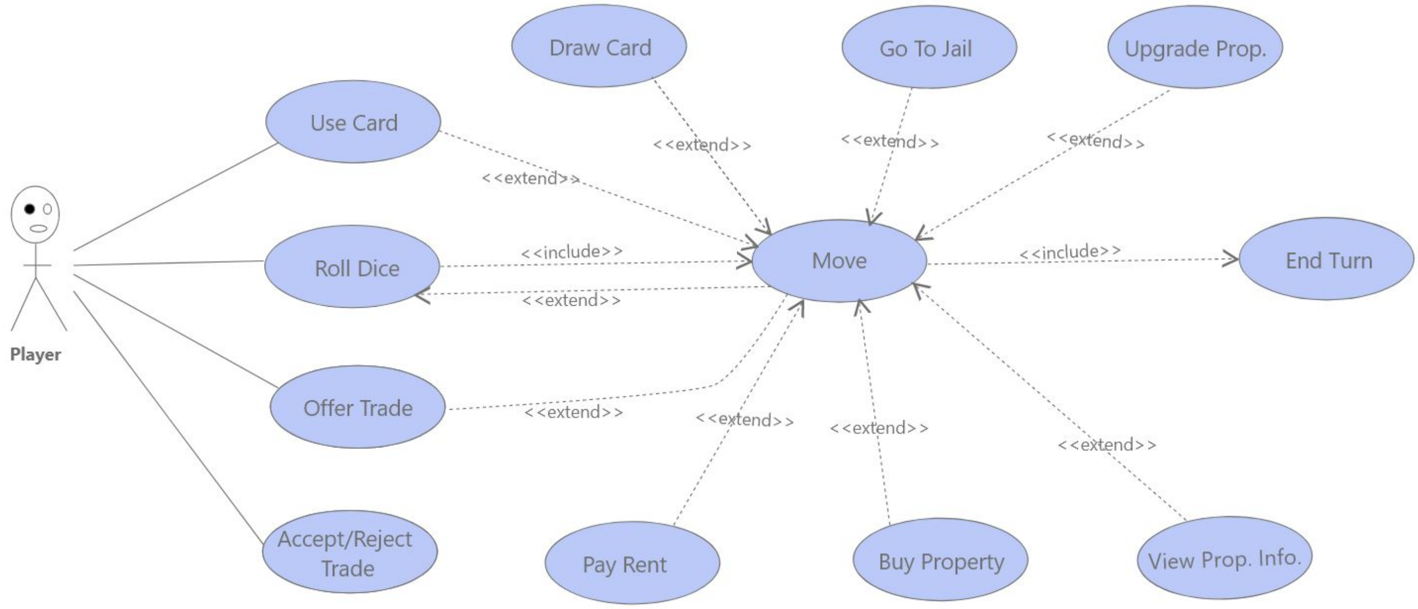


Figure (6.1.1)

6.1.1.1. Play a Turn

Actor: Player

Action:

- Player wants to play their turn
- Player will be provided with alternative options to select from.

Pre Condition:

- It must be the player's turn.

Post Condition:

- Player should choose one of the options provided

Entry Condition:

- Player has to roll the dice to move to another location on the map.

Exit Condition:

- Player must choose one of the alternative options available on the location they landed on.
- Player has to end their turn at the end.

Success Scenario Event stages:

1. Player accept/reject their pending offers(if any).
2. Roll the dice.
3. Player is moved to a new location based on the dice value.
4. Decide what action to take based on the location they land on.
5. Player has money and can pay the rent if needed.
6. Switch turn to the next player.

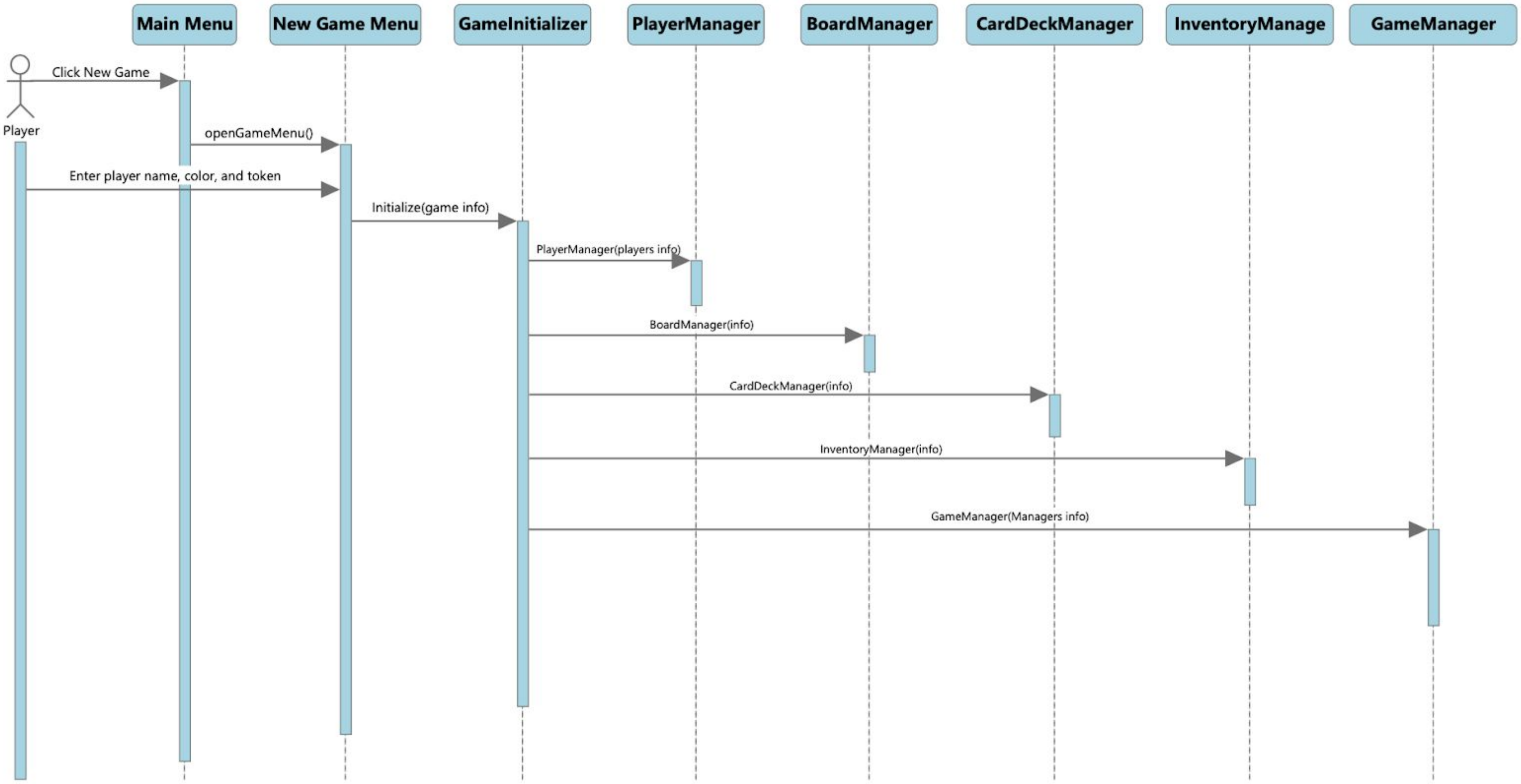
Alternative Event Stages:

1. Player can use a card that they hold.
    a. The use card option is selected.
    b. Instructions on the card are executed.
    c. Control is returned back to the player.
2. Player can offer a trade to another player
    a. Player chooses offer trade option
    b. Player enters offer details
    c. Offer is sent to another player

6.1.2. Scenarios

6.1.2.1. Starting a New Game

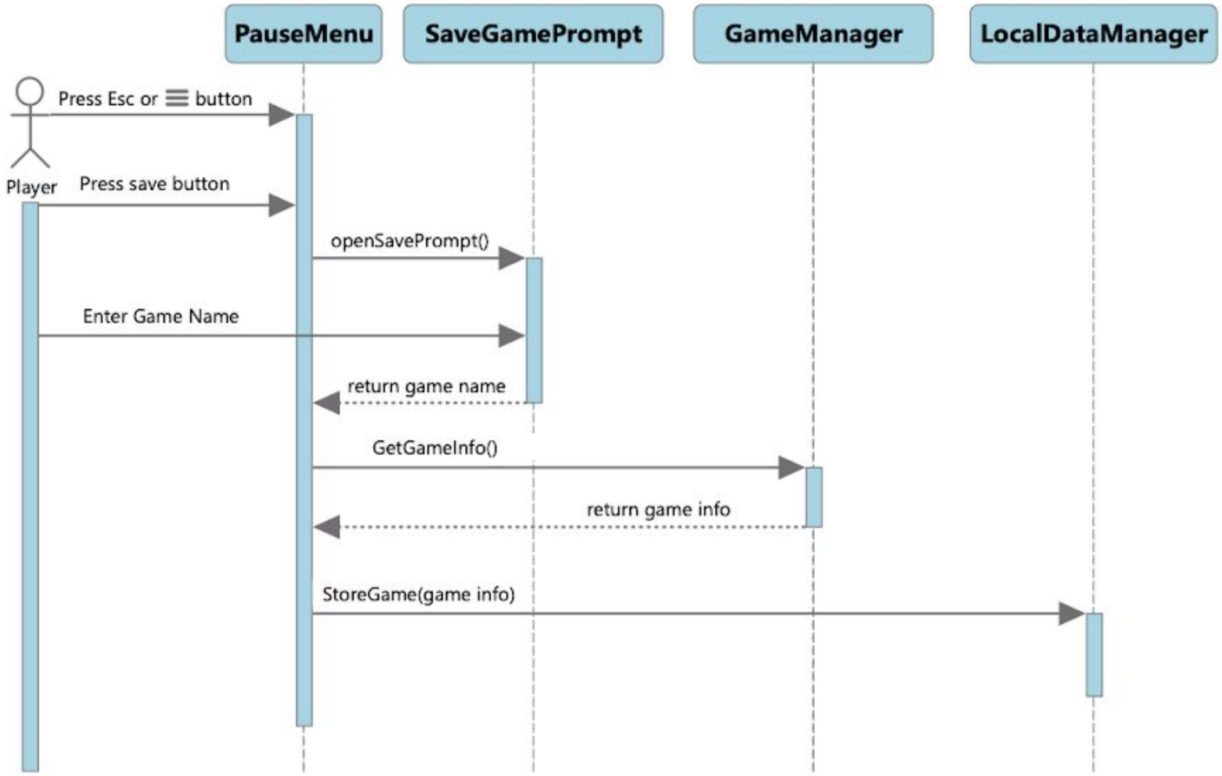
Players want to create a new game. From the main menu they press New Game button which leads them to the new game menu. In this new game menu users choose player count, tokens and colors. After that their new game is initialized by the game initializer according to their decisions. Player manager initializes players, the board manager creates the map and controls changings in the map. Card deck manager initializes cards and inventory manager creates inventory for each player and holds all their properties. Game manager controls all these managers and provides persistence of the game. Figure (6.1.2.1)



(Sequence diagram for starting a new game) Figure (6.1.2.1)

6.1.2.2. Saving Game

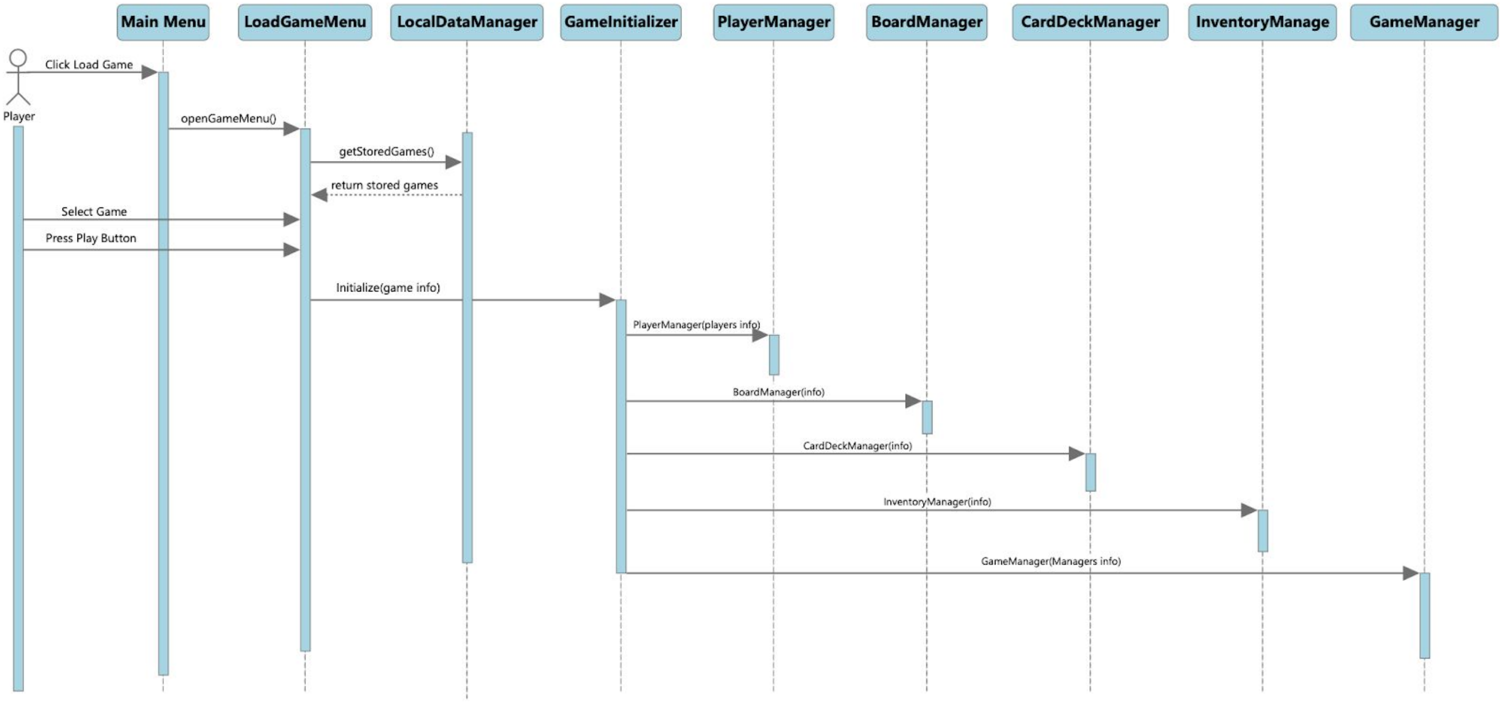
Player wants to save the game to continue from where they left later. User presses the pause button on the game scene. Game stops. By pressing the save button on the pause menu, the save game prompt is opened. Player gives a name to the game which he/she wants to save. All the information is gathered by the game manager. The information is sent to the local data manager to save datas locally. The game is saved by the local data manager thus the scenario ends. Figure (6.1.2.2)



(Sequence diagram for manually saving the game) Figure (6.1.2.2)

6.1.2.3. Loading game

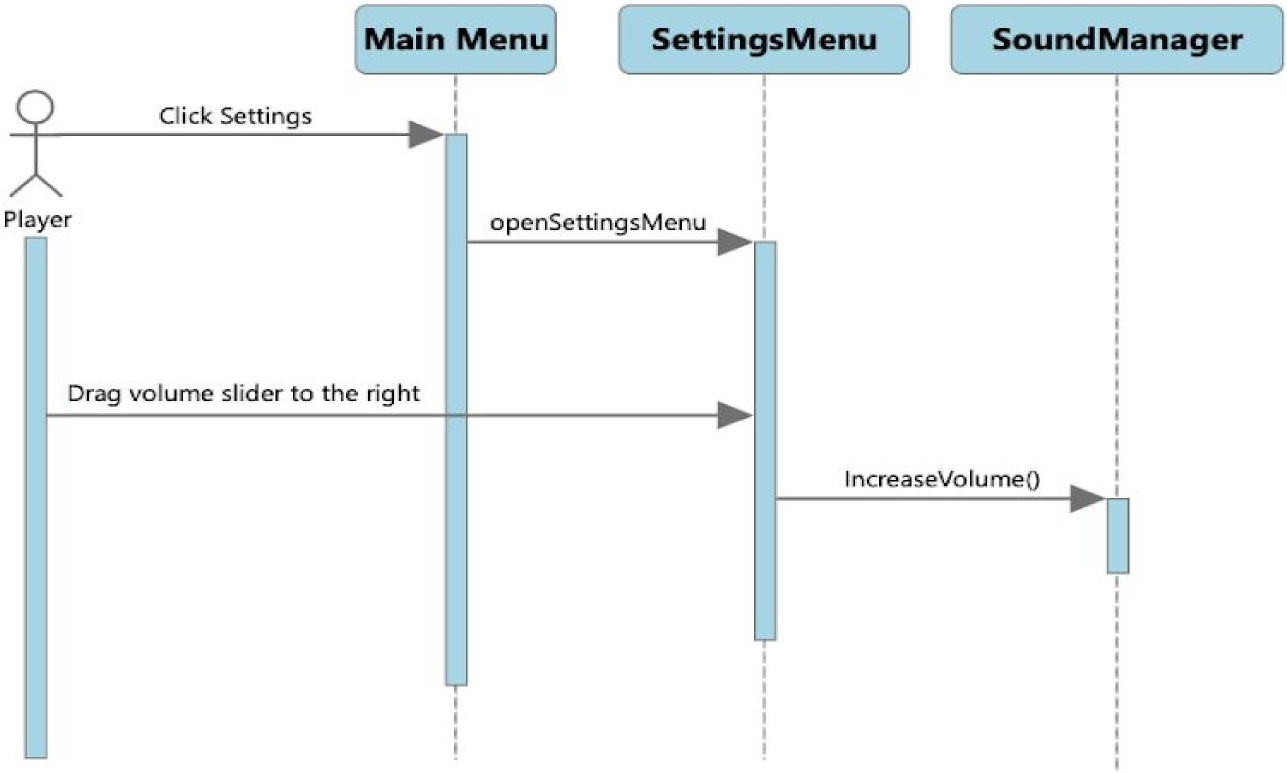
Player wants to continue the game which he/she saved before. User opens the game and from the main menu opens the load game menu by pressing the load game button. Local game menu goes to the local data manager and gets all stored games and lists them to the user. Thus, the user chooses the game which he/she wants to continue. By selecting the game according to the name that is given during the saving scenario and pressing the play button, the game is initialized by the information that is gathered from the local data manager. For initialization, the game initializer creates all the managers (player manager, board manager, card deck manager, inventory manager, game manager) that are needed. Thus, the user continues from where he/she left and the scenario ends. Figure (6.1.2.3)



(Sequence diagram for loading a saved game) Figure (6.1.2.3)

6.1.2.4. Increasing Sounds Volume

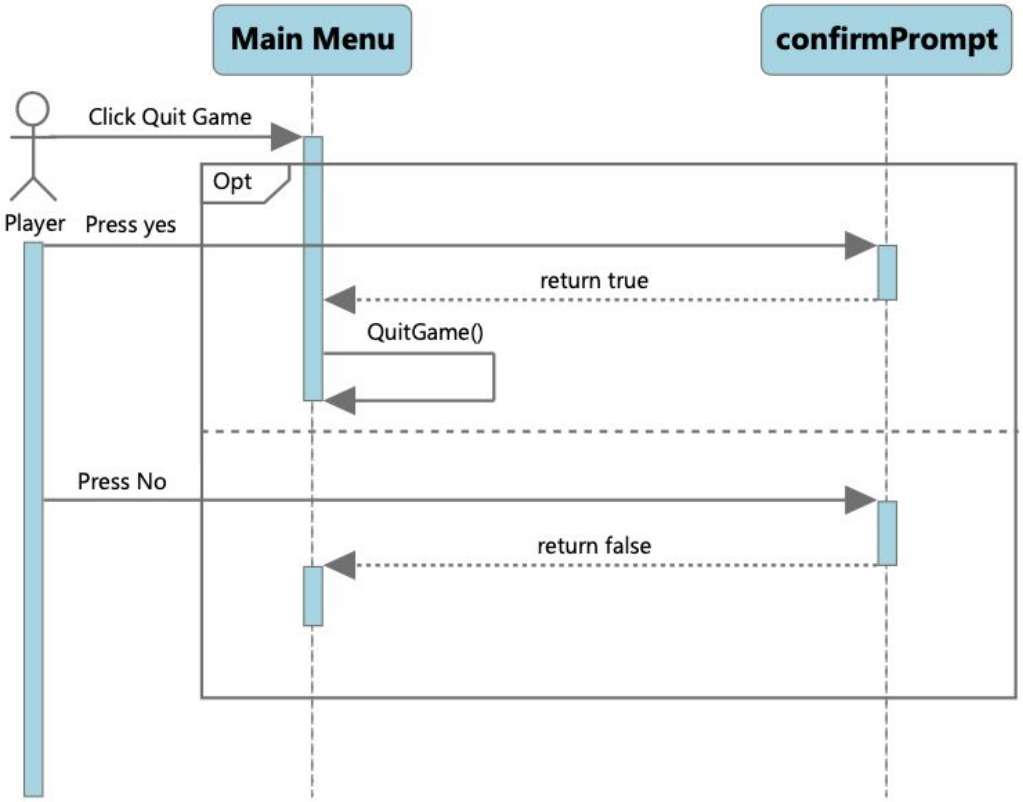
Player wants to increase the volume of effects and background music of the game. From the main menu user opens the settings menu by clicking the settings button. By dragging the volume slider which can be found on the settings menu, the user increases the volume. Settings menu sends changings in volume slider to the sound manager. Thus, the sound manager increases the volume and the scenario ends. Figure (6.1.2.4)



(Sequence diagram for adjusting volume) Figure (6.1.2.4)

6.1.2.5. Quitting

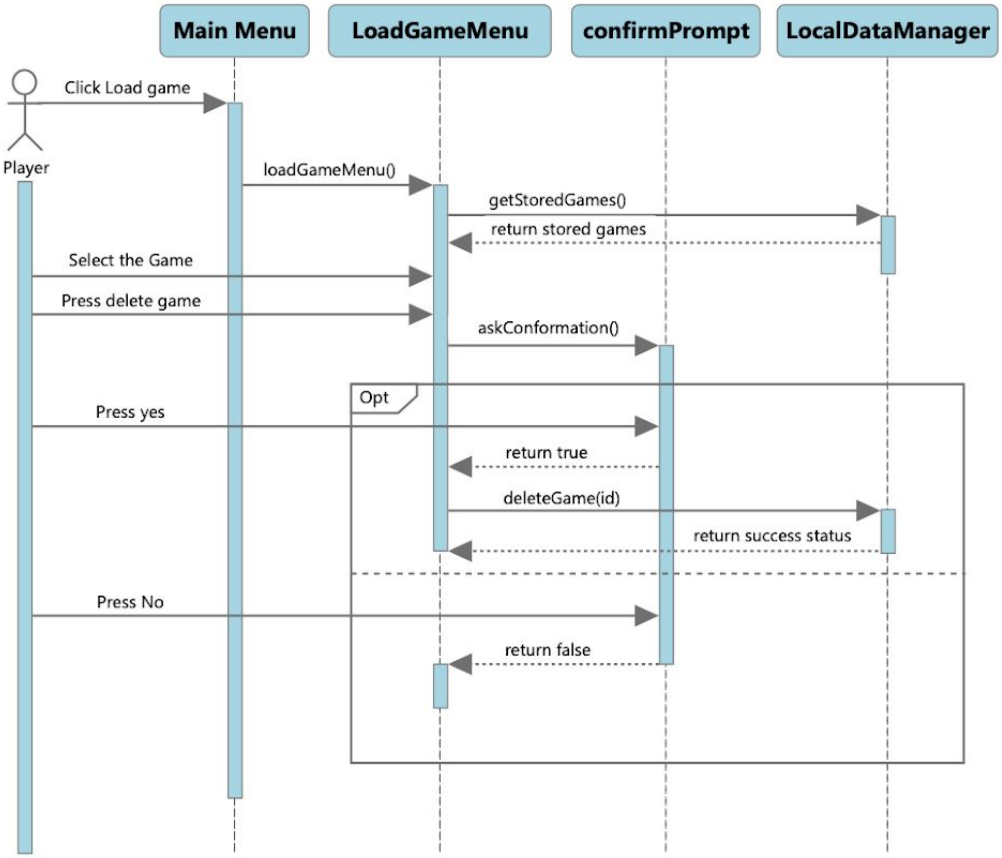
Player wants to quit the game. User presses the quit button from the main menu and the confirm prompt is opened. If the user still wants to quit and he/she is sure, by pressing the yes button on the confirm prompt the main menu calls the quitGame() method and the game is closed and the scenario ends. However, if the user presses no button on the confirm prompt, the user returns the main menu and the scenario ends. Figure (6.1.2.5)



(Sequence diagram for quitting the game) Figure (6.1.2.5)

6.1.2.6. Deleting Saved Game

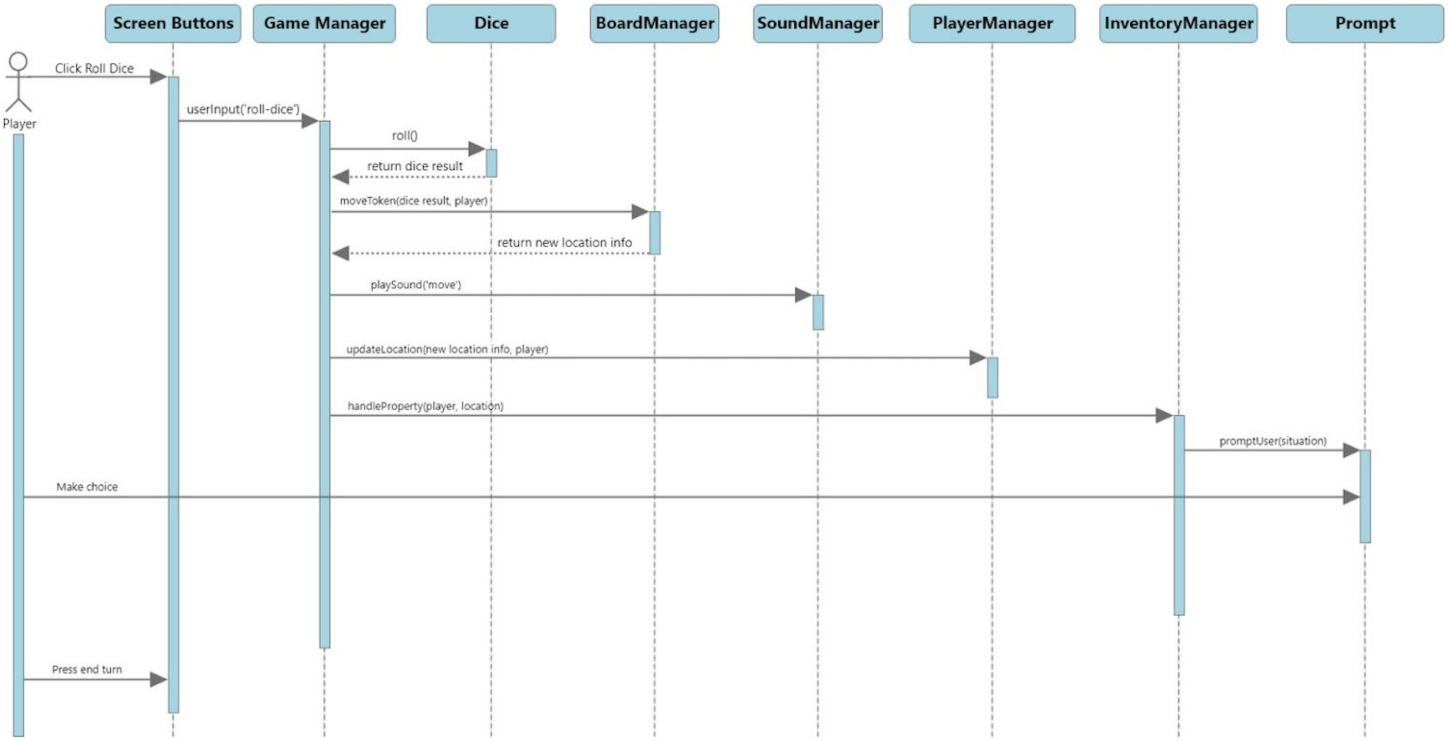
Player wants to delete one of the games which he/she saved locally before. From the main menu, the user presses the load game button. Main menu opens, load game menu and load game menu calls the local data manager to get all stored games before. The Load game menu lists all these stored games to the user to choose which one of them he/she wants to delete. User selects the game from the list and presses the delete game button. Load game menu calls confirm prompts and ask for user confirmation. If the user presses enter, confirm prompt returns true to the load game menu and load game menu goes to the local data manager and calls delete game method with appropriate id of the game. Local data manager returns true and deletes the game, this means that the game is deleted and the scenario ends. If the user presses false on confirm prompt, none of the games are deleted and returns to the main menu thus, scenario ends. Figure (6.1.2.6)



(Sequence diagram for deleting a saved game) Figure (6.1.2.6)

6.1.2.7. Playing a Turn

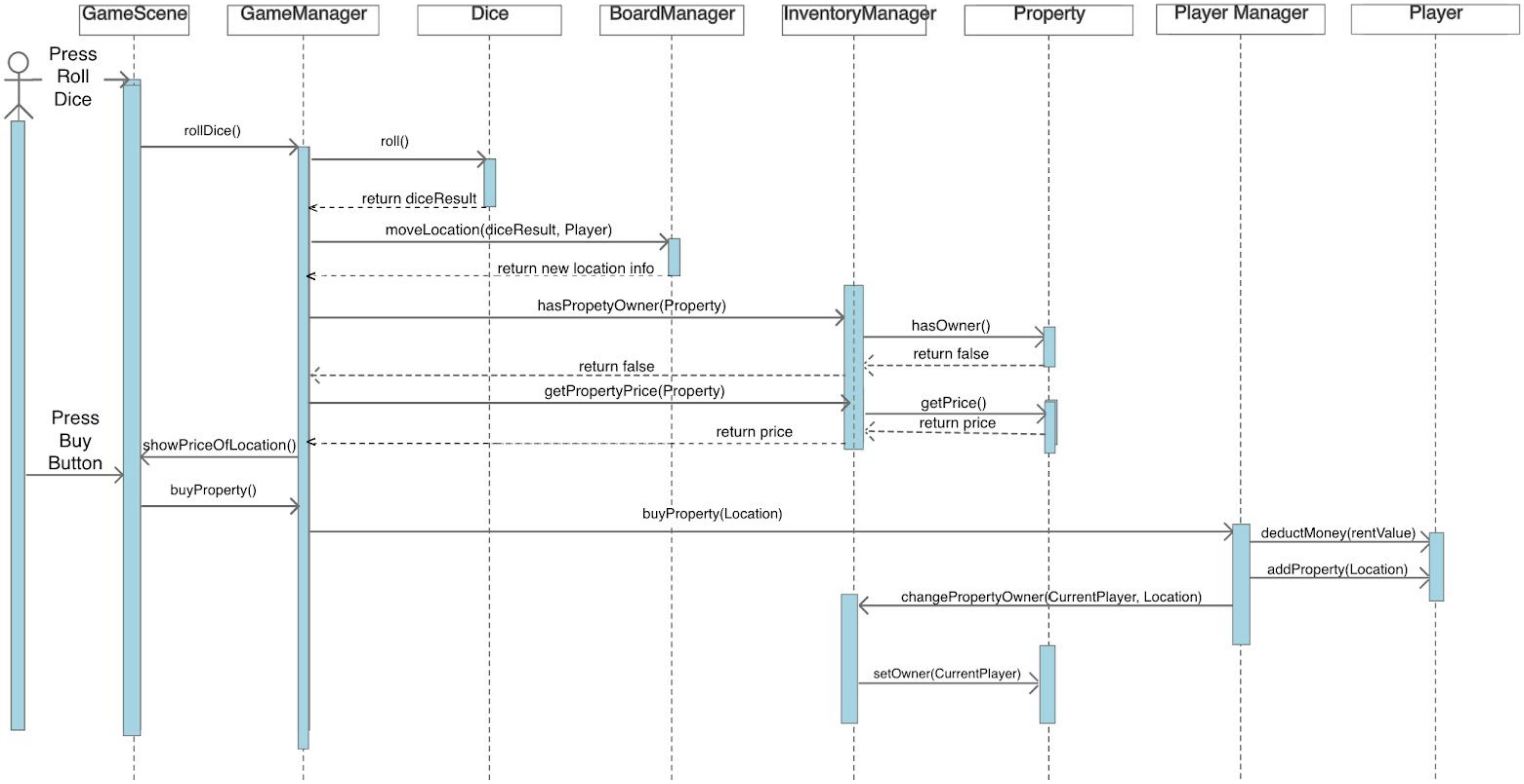
Player wants to play his/her turn. From the game scene, the user firstly presses the rolling dice button. This button returns dice results and according to them the player moves on the board. This movement is handled by the board manager. When these are happening, the game manager triggers the sound manager to play movement sounds. New location of the player is sent to the player manager by the game manager. Inventory manager checks whether this place has been sold or not. If the place is still not sold, the inventory manager triggers a prompt and asks the user for whether the user will buy this place or not. User makes his/her choice then after all these sale transactions are done the user ends his/her turn by pressing the end turn button and the scenario ends. Figure (6.1.2.7)



(Sequence diagram for playing a turn) Figure (6.1.2.7)

6.1.2.8. Buying Property that has not any owner

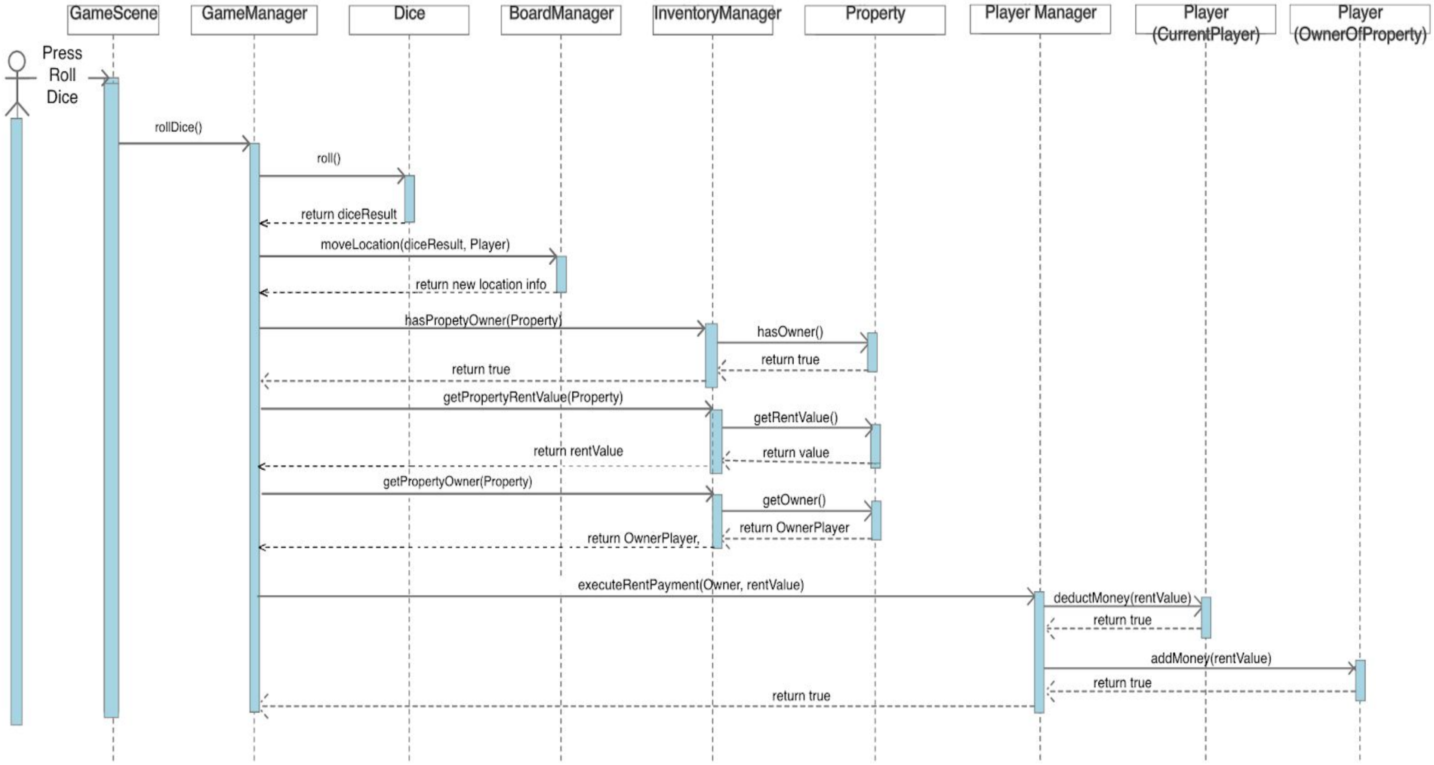
Player wants to buy a property that belongs to the bank. Firstly, the user rolls dice by pressing the rolling dice button and goes where he/she wants to buy according to the dice result. Its' location on the map is updated by the board manager. When it comes to the location, the purchase price of the location is shown by the inventory manager. If a user wants to buy it, he/she can press buy location if he/she has enough money. Thus, the game manager handles taking money from the user and giving him/her this property staff.



(Sequence diagram for buying a property without owner) Figure (6.1.2.8)

6.1.2.9. Paying Rent

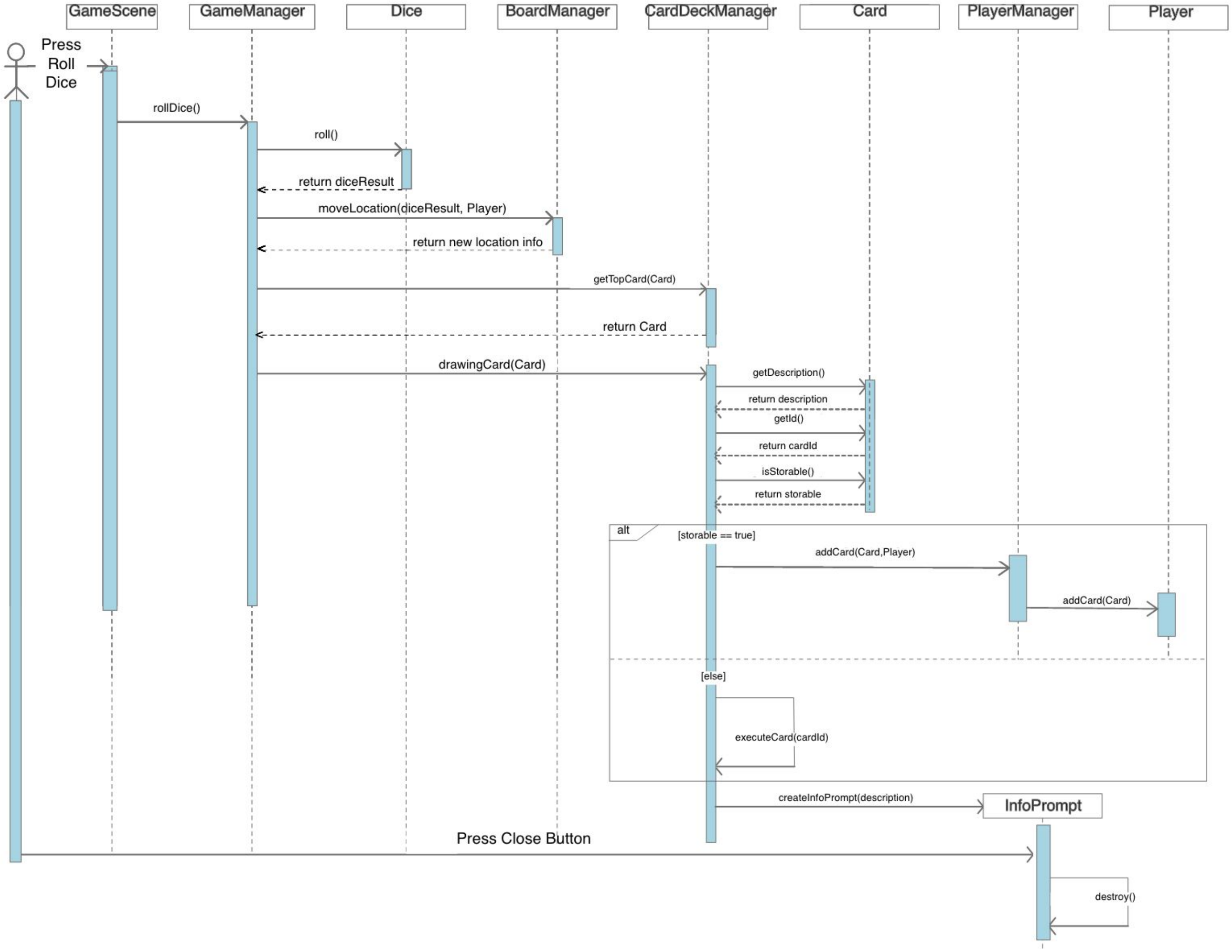
Player rolls dice when his/her turn comes by pressing roll dice button that is available on game scene. Game manager calls Dice to roll dices and it returns dice results. According to these result player moves on the board and comes a property that belongs to the someone else. Board manager returns information about the location and owner of the property. So because it has an owner, game manager calls inventory manager to find how much money the player has to pay for. After returning these result to the game manager, game manager handles money taking from user that came to the property and giving money to the owner of the property.



(Sequence diagram for paying rent) Figure (6.1.2.9)

6.1.2.10. Drawing a Chance Card

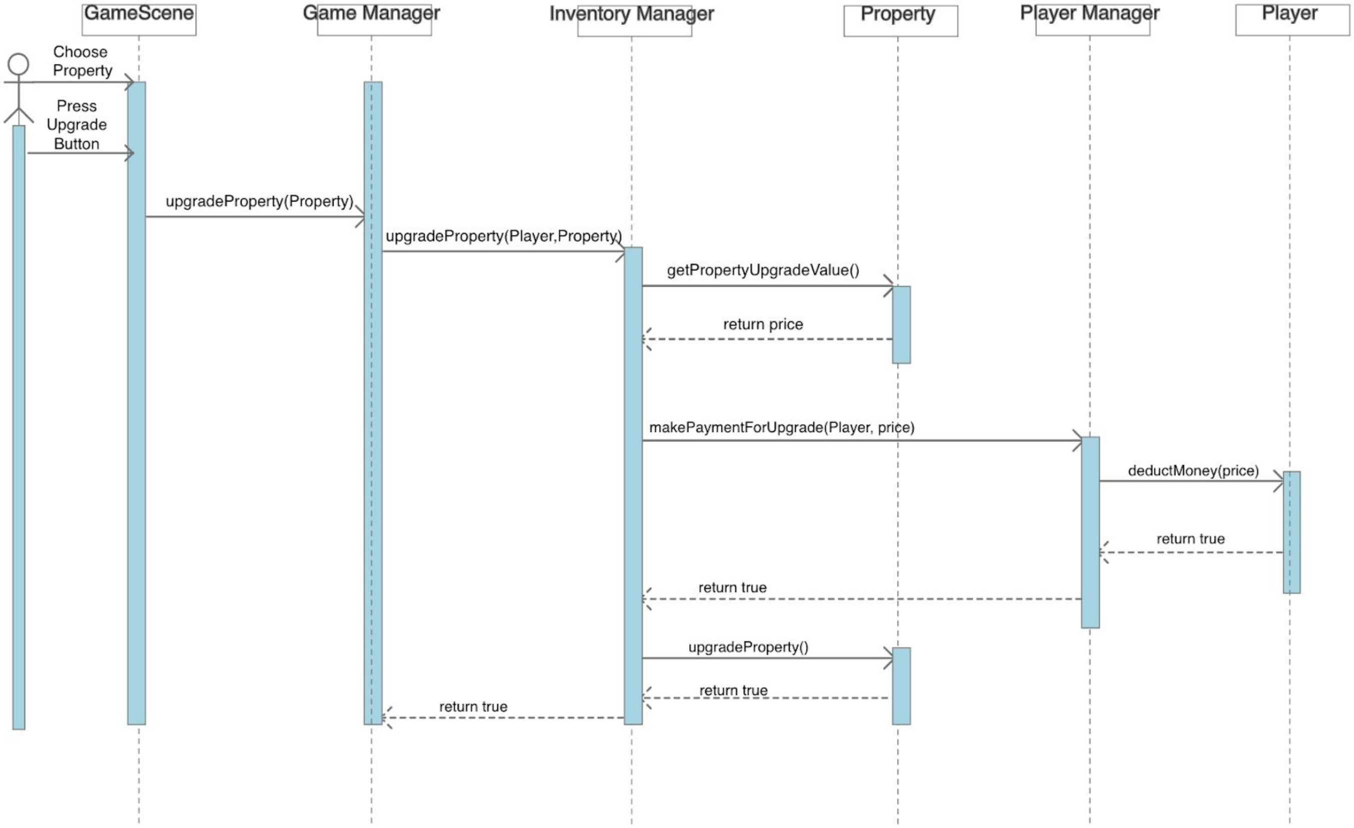
Player rolls dice when his/her turn comes by pressing roll dice button that is available on game scene. Game manager calls Dice to roll dices and it returns dice results. According to these result player moves on the board and comes to a chance card drawing location. Board manager returns information about location and game manager understand it is an card drawing location and calls card deck to get top card. Card deck returns card to the game manager, game manager gets description of the card and according to writings on the card or things that need to be done are handled by Card Deck manager. If it is storable card, card deck manager keeps the card in the inventory of player. If not, card deck manager calls the instructions according to the id of card.



(Sequence diagram for drawing chance card) Figure (6.1.2.10)

6.1.2.11. Upgrading Property

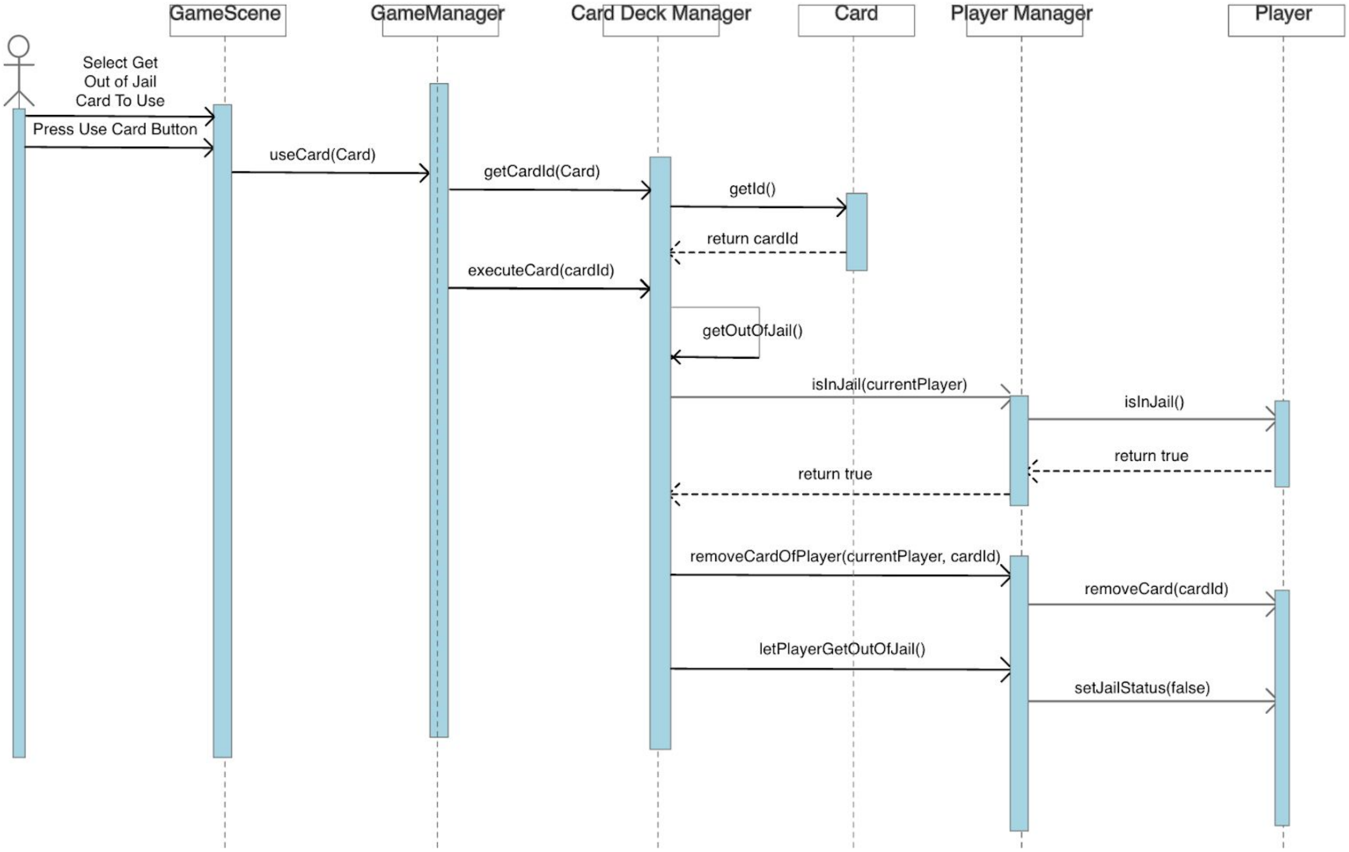
Player is going to choose property that he/she wants to upgrade (buy vending machine or starbucks). After selection player is going to press upgrade button to upgrade his/her property. Game manager calls inventory manager to upgrade property and inventory manager handles all things and calls player manager to deduct money they needed to take from the player. If player has enough money and property didn't reach the top level inventory manager returns true to the game manager that means all instructions applied correctly.



(Sequence diagram for upgrading property) Figure (6.1.2.11)

6.1.2.12. Using Get Out Of Jail Card

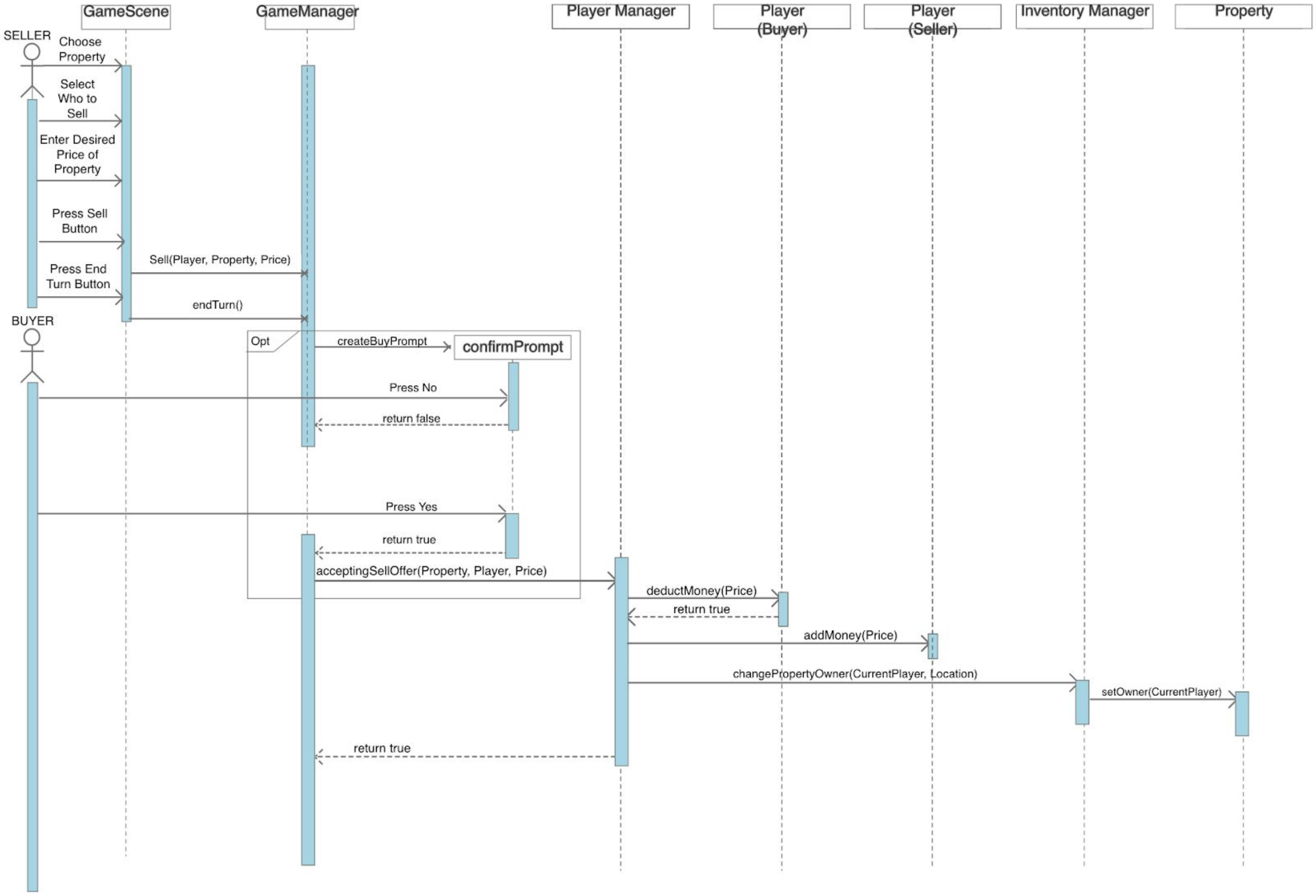
Player is going to choose getting out of jail card and press use card button. GameManager gets card id by sending Card to manager and calls execute card method with its' card id. Card Deck manager understands from card id that it is getting out of jail card and calls its' getOutOfJail() method. It calls player manager to change take the card from the player and change players' situation of jail.



(Sequence diagram for using Get Out of Jail card) Figure (6.1.2.12)

6.1.2.13. Selling a Property To Someone

Seller is going to choose property to sell and choose who to sell. After that player should enter the desired price of property and pressing sell button. This method is calling create buy prompt when buyers' turn comes. If buyer presses no on confirm prompt trade is canceled. However if the player presses yes on confirm prompt, player manager is called by game manager to handle instructions. It takes money from buyer and gives the money to the seller and changes owner of property by interacting with Inventory Manager if all these instructions applied well it returns true.



(Sequence diagram for selling a property) Figure (6.1.2.13)

6.2. Structural Diagrams

6.2.1. Object and Class Model. Figure (6.2.1), (6.2.1-a), (6.2.1-b)

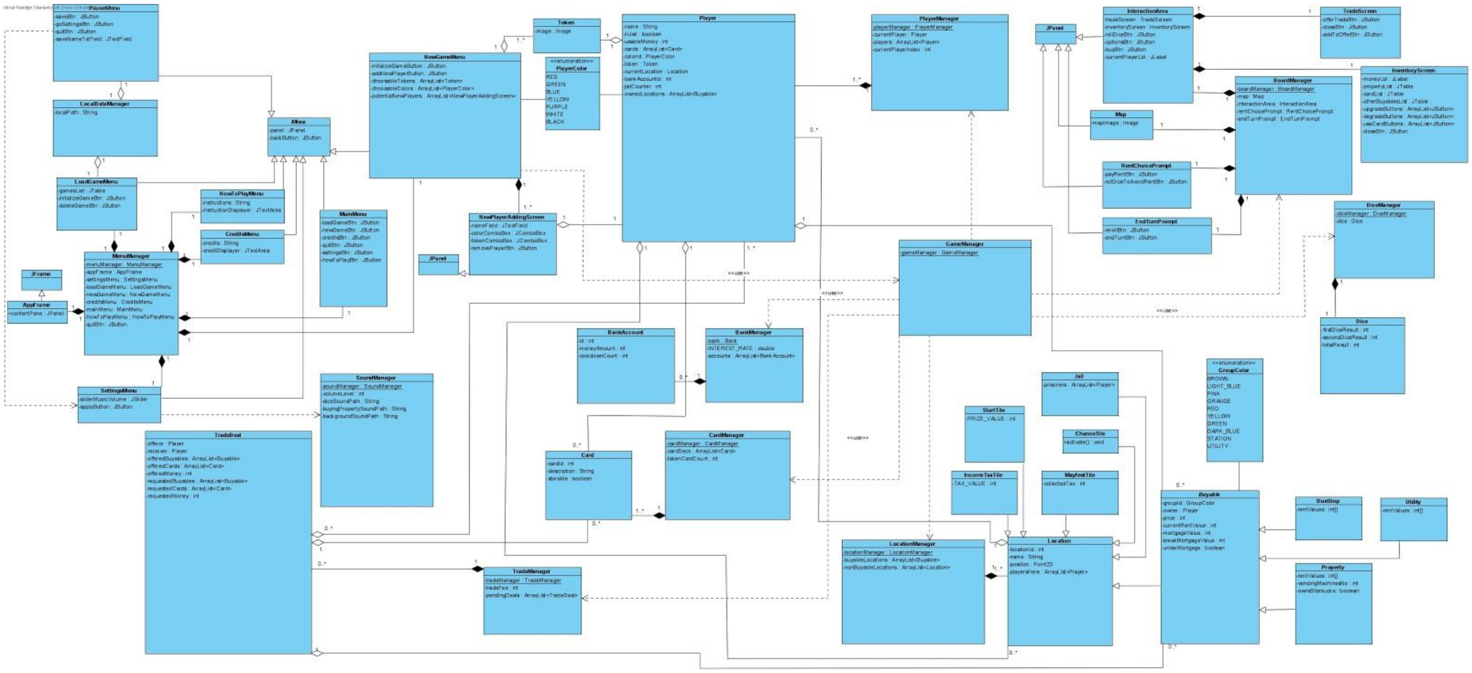


Figure (6.2.1)

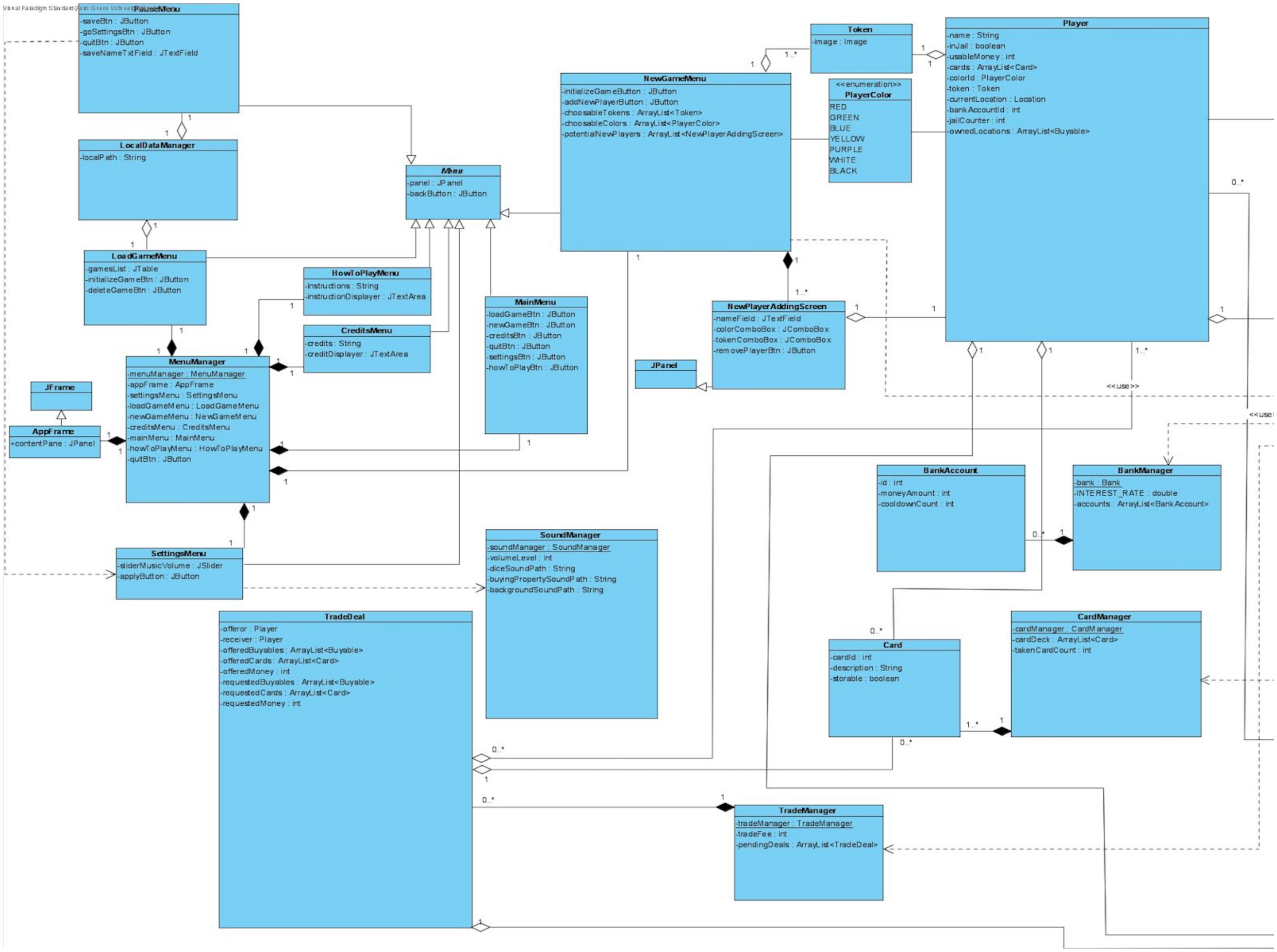


Figure (6.2.1-a): Object diagram (Piece 1)

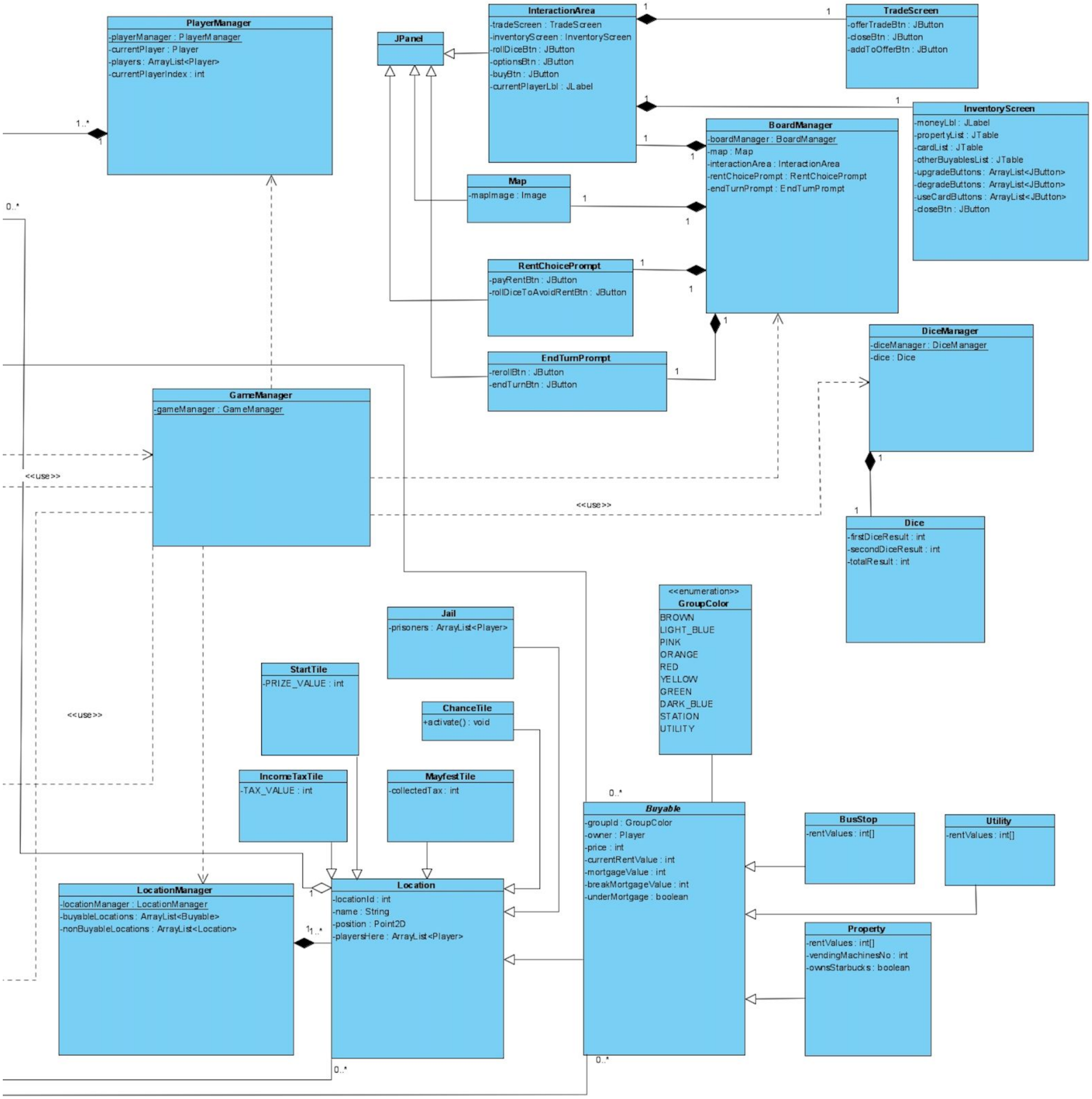
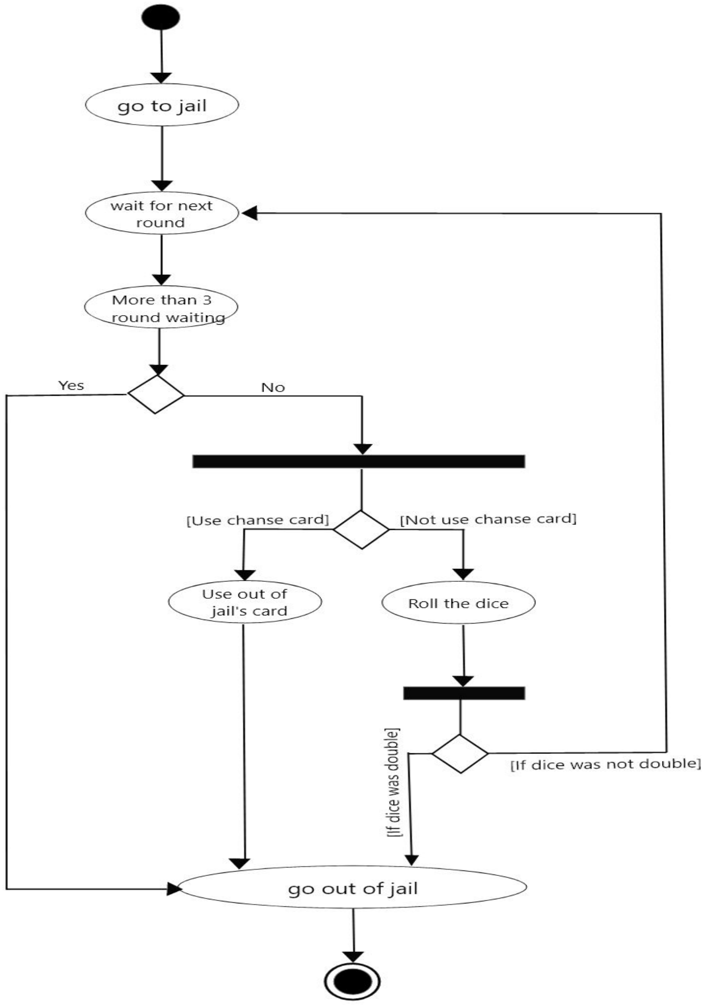


Figure (6.2.1-b): Object diagram (Piece 2)

6.3. Activity Diagram

6.3.1. Get Out of jail

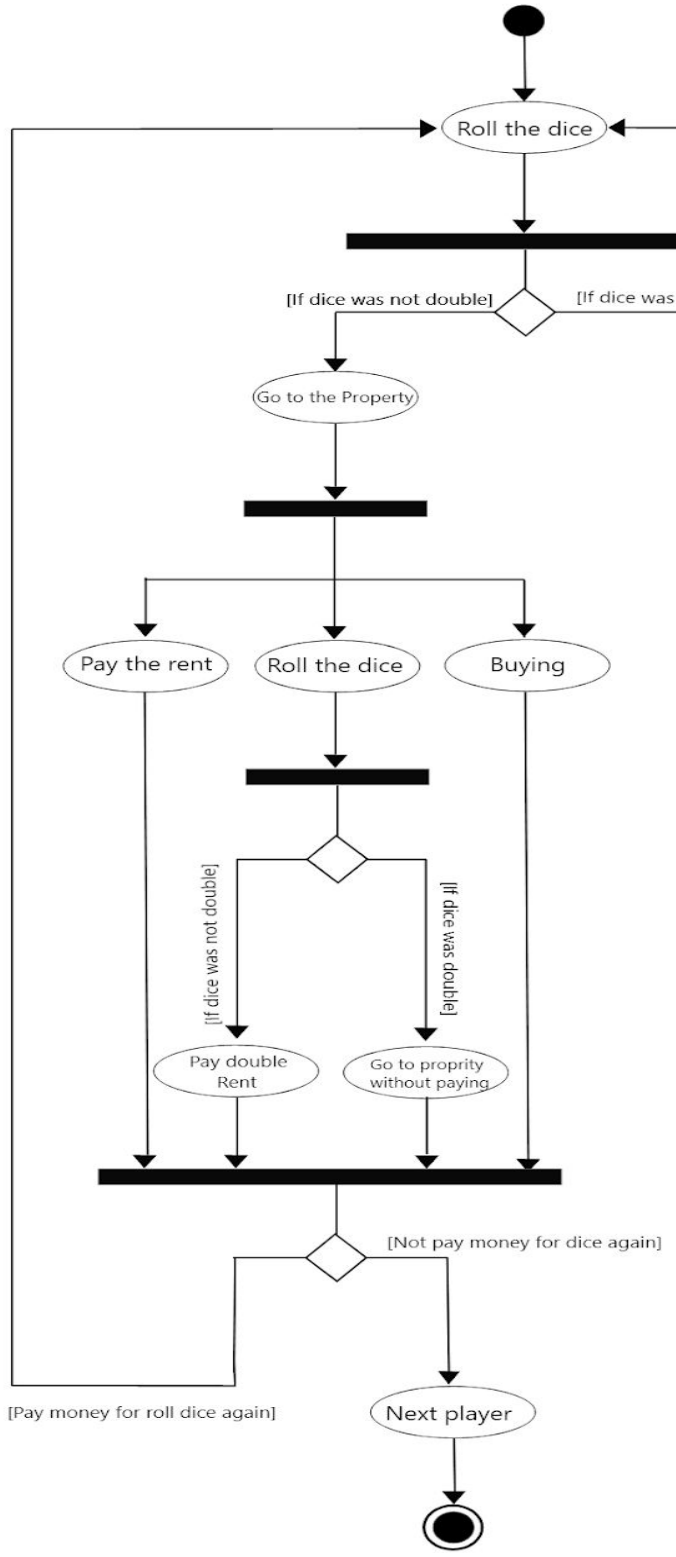
This activity diagram for getting out of jail. For going out of jail there are three possibilities in Bilopoly which is shown in this activity diagram. If the player stays for 3 consecutive rounds in jail, they will finally leave jail after the third round. Other options include rolling the dice or using the out of jail chance card. Using the chance card, a player is able to get out of jail easily by only using the card. Otherwise, the player can roll the dice and if they got double they can get out of jail otherwise, the player has to wait until the next round.



Figure(6.3.1)

6.3.2. Simple Round

This is an activity diagram for rolling dice and going to the property. There are different possibilities which we will discuss here. First of all whether or not your dice is double, if yes therefore, you can go to the property based on your dice numbers and then without paying rent or anything roll the dice again. However if it was not double you have to go to property. After that based on the property which might be bought by a player or not you have to pay rent or buy it respectively. However, in this game there is an opportunity for players to not pay rent. Players are able to roll dice if they have to pay rent in order to avoid paying rent. Therefore, if their dice were double they will not pay any rent and stay there, otherwise they have to pay double the rent. Moreover, there is another option which after paying rent or buying property players are able to pay an amount of money for rolling the dice again.

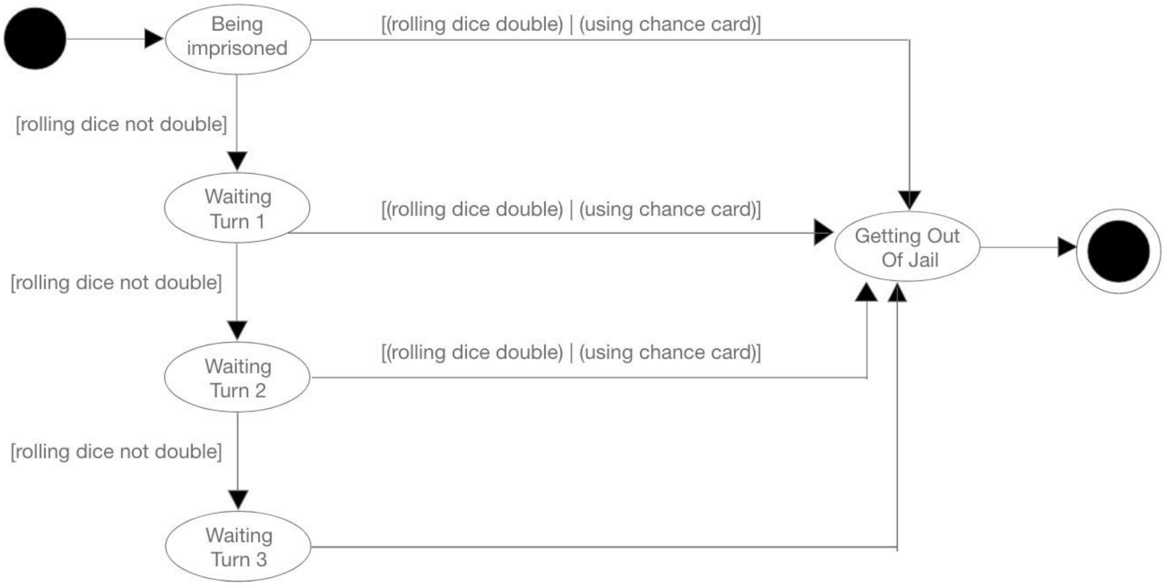

Roll the dice
[If dice was not double]
[If dice was double]
Go to the Property
Go to property and roll the dice Again
Pay the rent
Roll the dice
Buying
[If dice was not double]
[If dice was double]
Pay double Rent
Go to proprity without paying
[Not pay money for dice again]
[Pay money for roll dice again]
Next player

Figure(6.3.2)

6.4. State Diagram

6.4.1. Get out of jail

The same as the activity diagram we design a state diagram for getting out of jail. There are three different possibilities for getting out of jail in Bilopoly. Therefore, our state diagram indicates how these three possibilities apply to the game. First of all check we are in which turn and then gives the player two more opportunities for getting out first of all using the chance card or roll dice. If a player has not chans card for getting out of jail and his/her dice was not double stays in the jail and waits for the next turn. These procedures are repeated two times and in the third turn he/she will release without any condition.

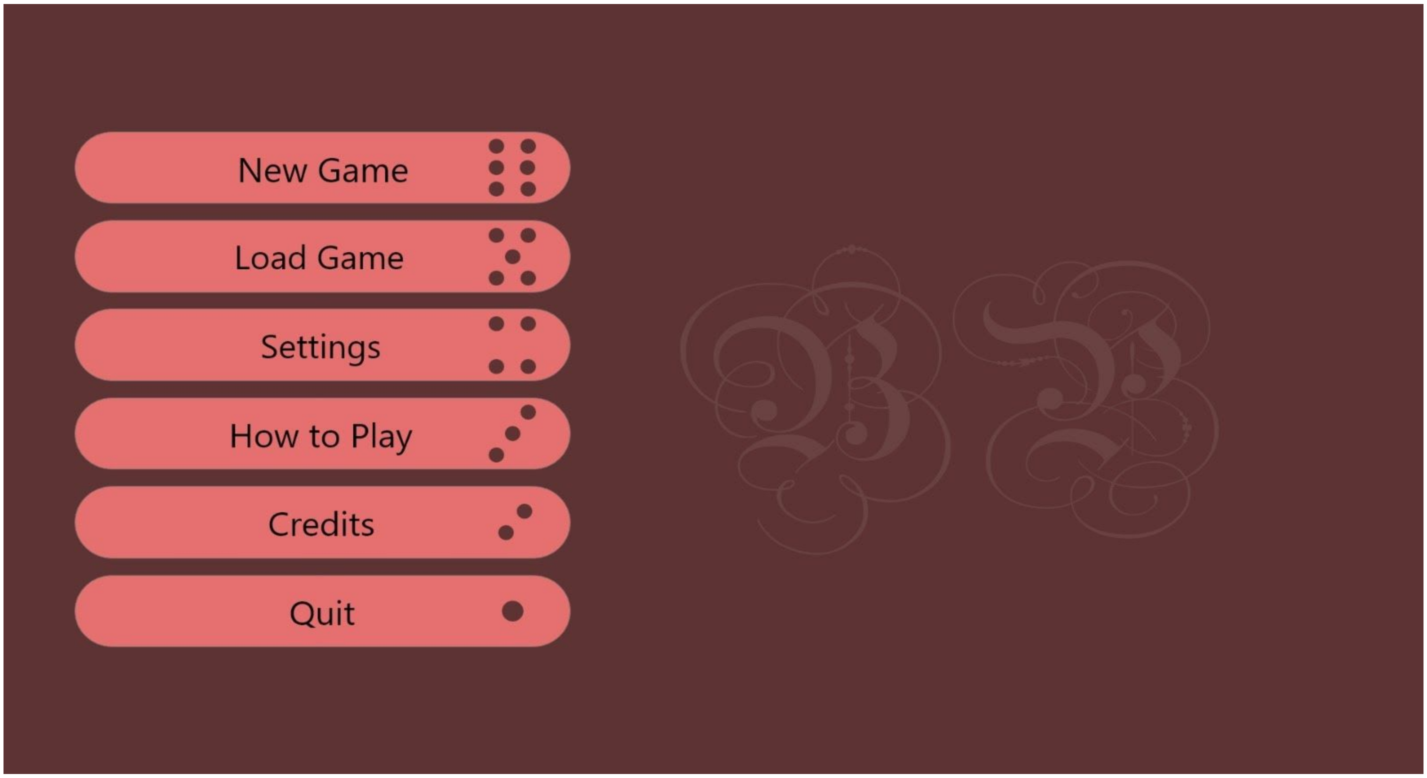

Being imprisoned
[(rolling dice double) | (using chance card)]
[rolling dice not double]
Waiting Turn 1
[(rolling dice double) | (using chance card)]
Getting Out Of Jail
[rolling dice not double]
Waiting Turn 2
[(rolling dice double) | (using chance card)]
[rolling dice not double]
Waiting Turn 3

Figure(6.4.1)

6.5. User Interface

6.5.1. Main Menu

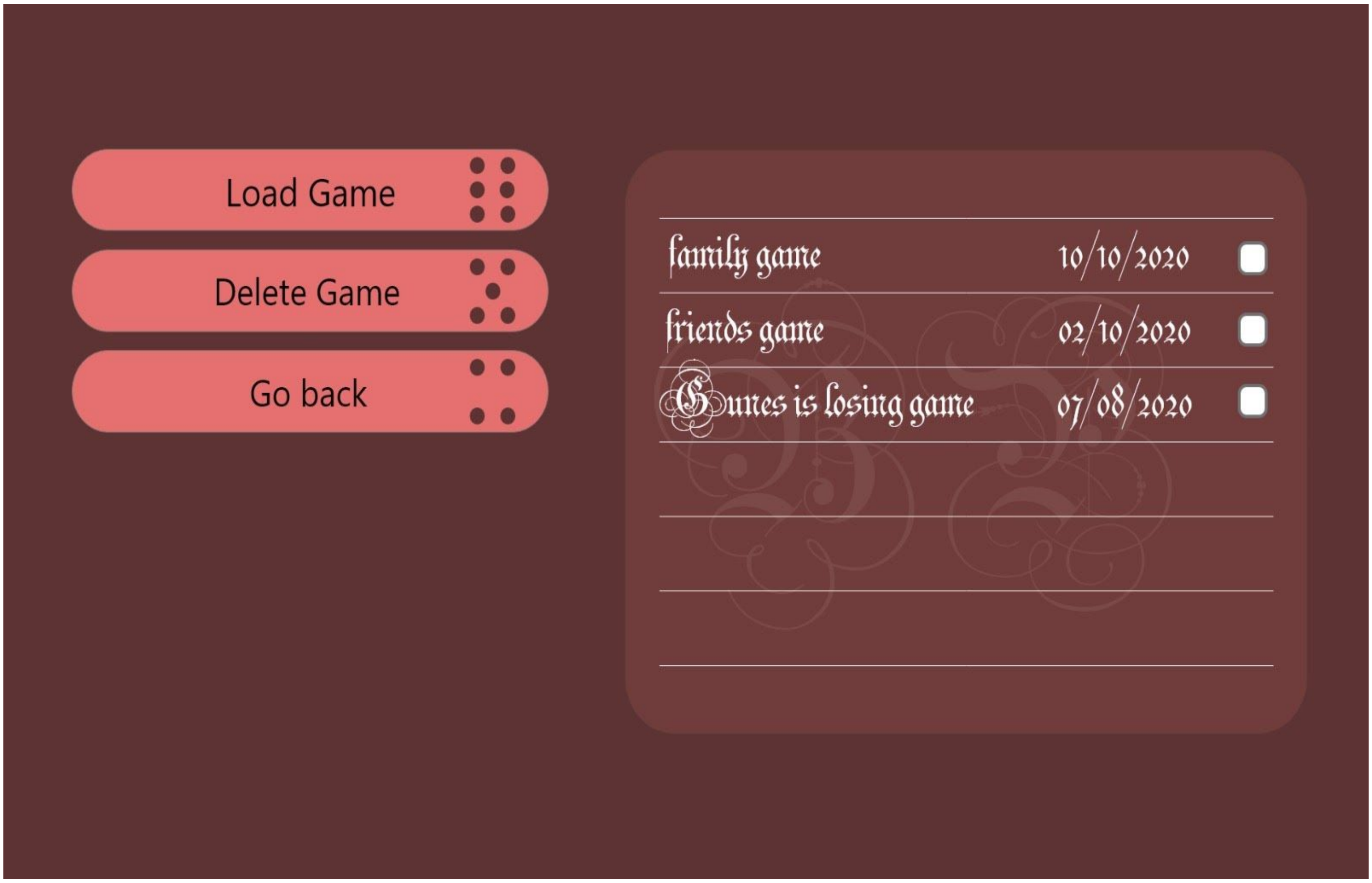
This is the first page which users or players see in the Bilopoly. This page lets the user start the New Game or load his/her previous game and continue his game or delta them. Moreover, players or users are able to learn how they should play and what are the rules for this version of the game. Furthermore, there is an option in this page Credits which gives information about our team. Setting and quit also there are in this page which users are able to use.



(Main Menu) Image (6.5.1)

6.5.2. Load Game

In this page users are encountered when they want to delete their previous saved game or continue that. In this page shows the name which user has chosen for his/her saved game. Moreover, more details about the game is seeable including date. Image (6.5.2)

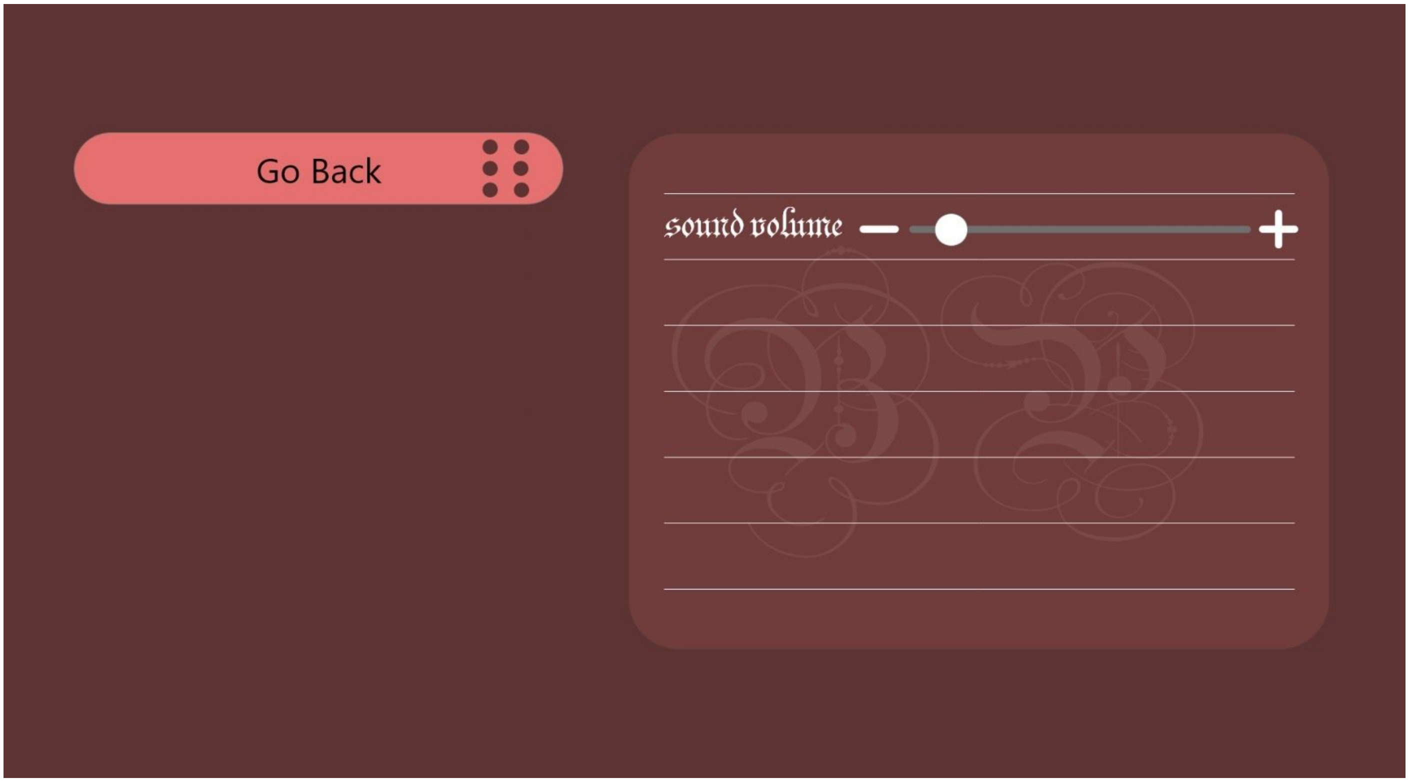


family game	10/10/2020	□
friends game	02/10/2020	□
Gunes is losing game	07/08/2020	□

(Load Game Menu) Image (6.5.2)

6.5.3. Settings

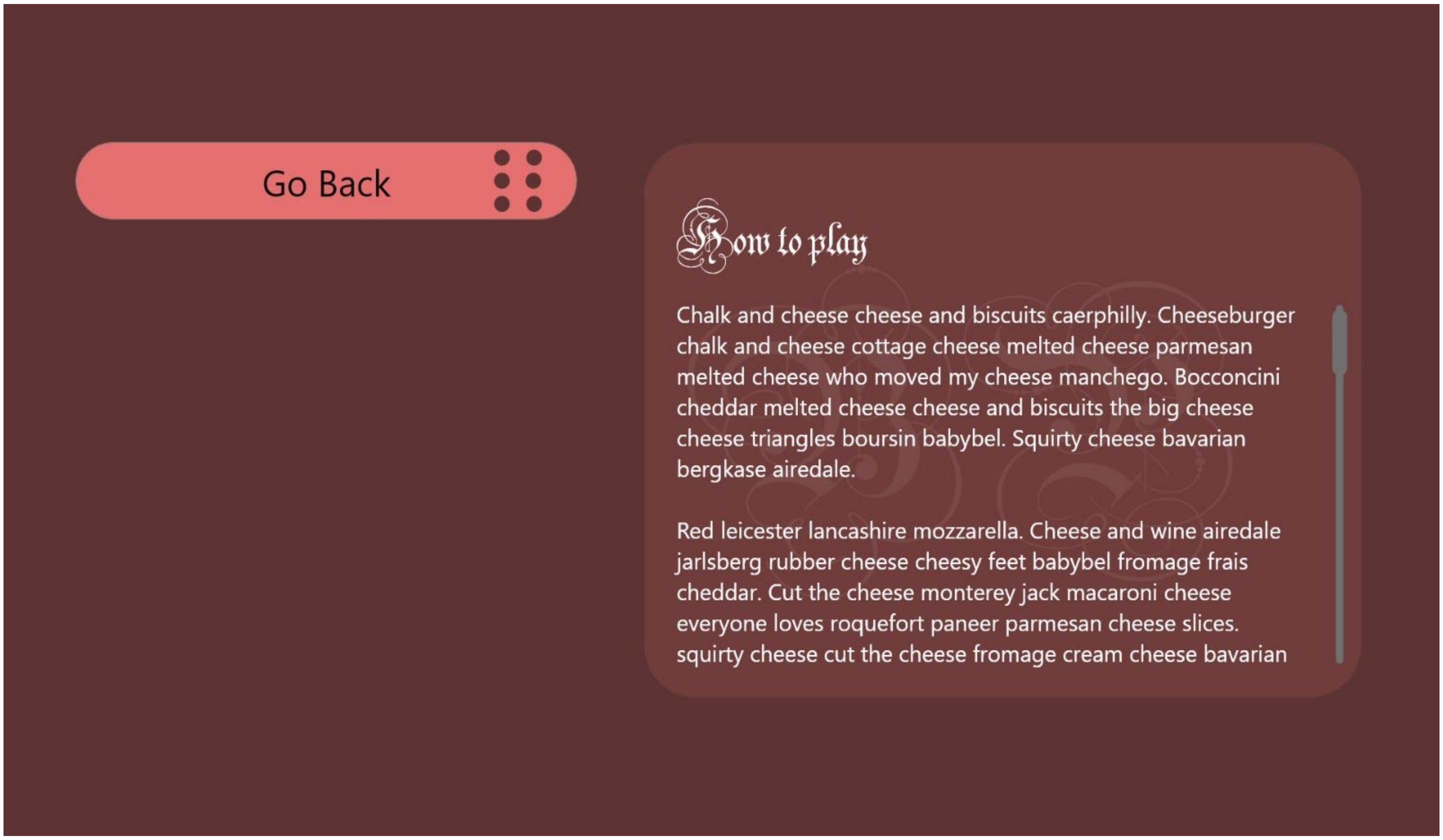
The third option from the main menu is the setting which lets the user alter different parts of the game specially sound. In this picture only mentioned the sound but other options will be included in this part which helps the user feel more customized for the game. Image (6.5.3)



(Settings screen) Image (6.5.3)

6.5.4. How to play

In this part we will provide the user with information about the rules of Bilopoly and how they should play the game. Image (6.5.4)



How to play

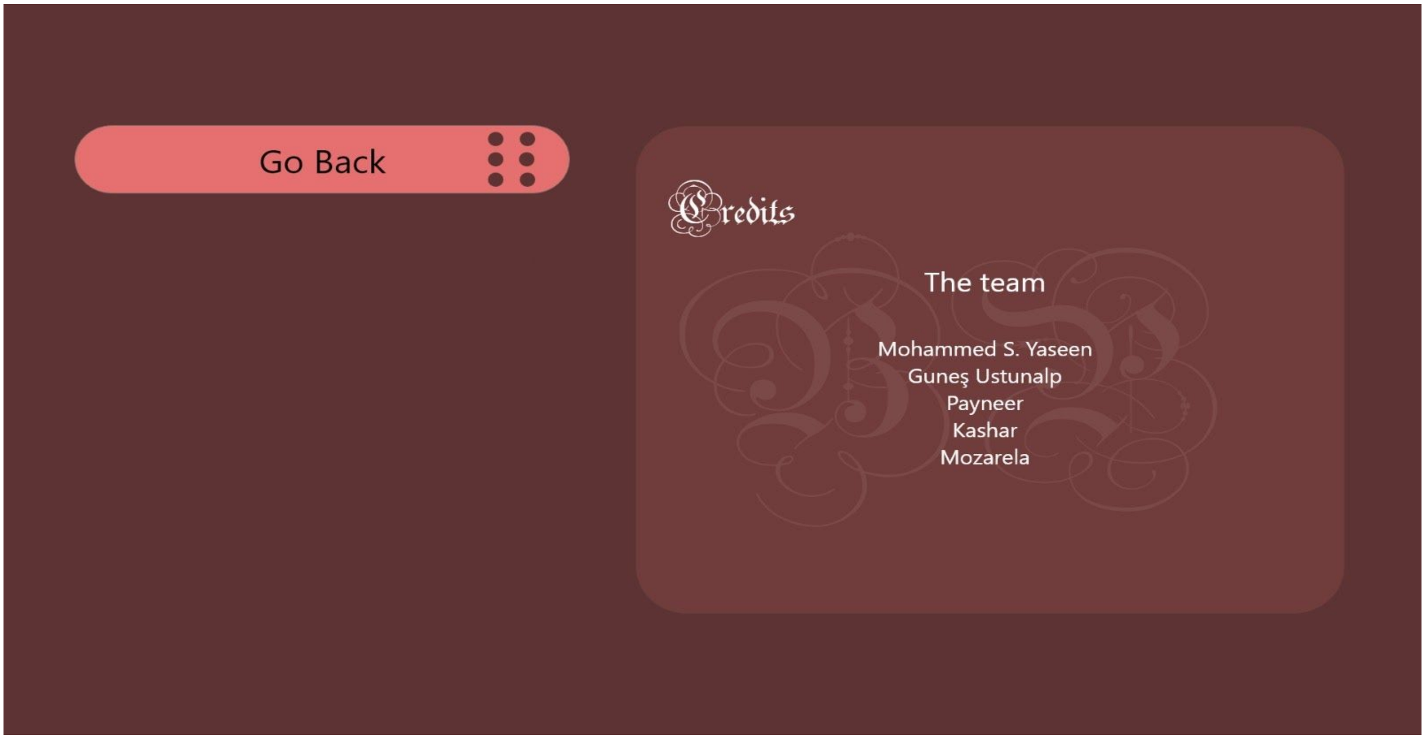
Chalk and cheese cheese and biscuits caerphilly. Cheeseburger chalk and cheese cottage cheese melted cheese parmesan melted cheese who moved my cheese manchego. Bocconcini cheddar melted cheese cheese and biscuits the big cheese cheese triangles boursin babybel. Squirty cheese bavarian bergkase airedale.

Red leicester lancashire mozzarella. Cheese and wine airedale jarlsberg rubber cheese cheesy feet babybel fromage frais cheddar. Cut the cheese monterey jack macaroni cheese everyone loves roquefort paneer parmesan cheese slices. squirty cheese cut the cheese fromage cream cheese bavarian

(How to play screen) Image (6.5.4)

6.5.5. Credits

Our group name of developer and content developer information is available there which users will find out more about our group. Image (6.5.5)



Credits

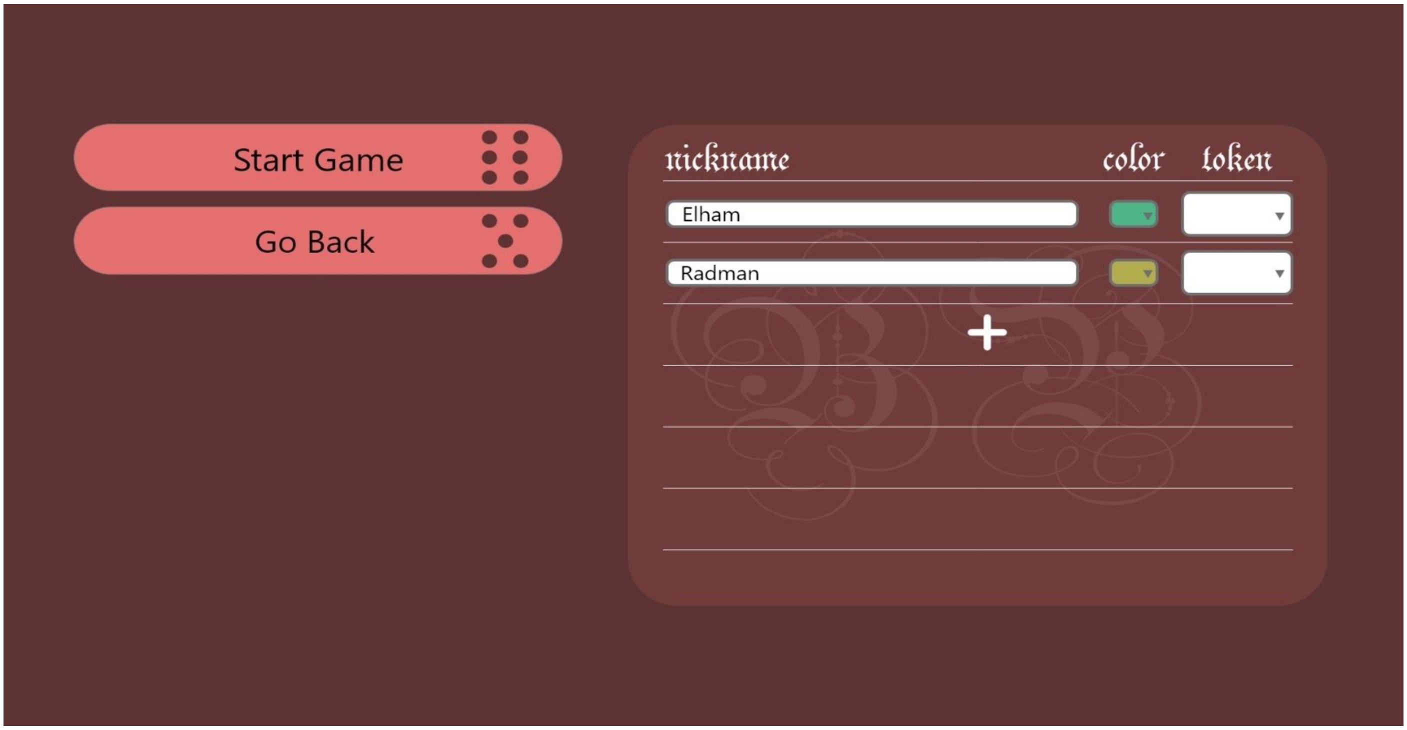
The team

Mohammed S. Yaseen
Guneş Ustunalp
Payneer
Kashar
Mozarela

(Credits screen) Image (6.5.5)

6.5.6. New Game

After clicking on the New Game system will show this page which players are able to choose their nicknames, tokens and colors for representing them in the game. Image (6.5.6)



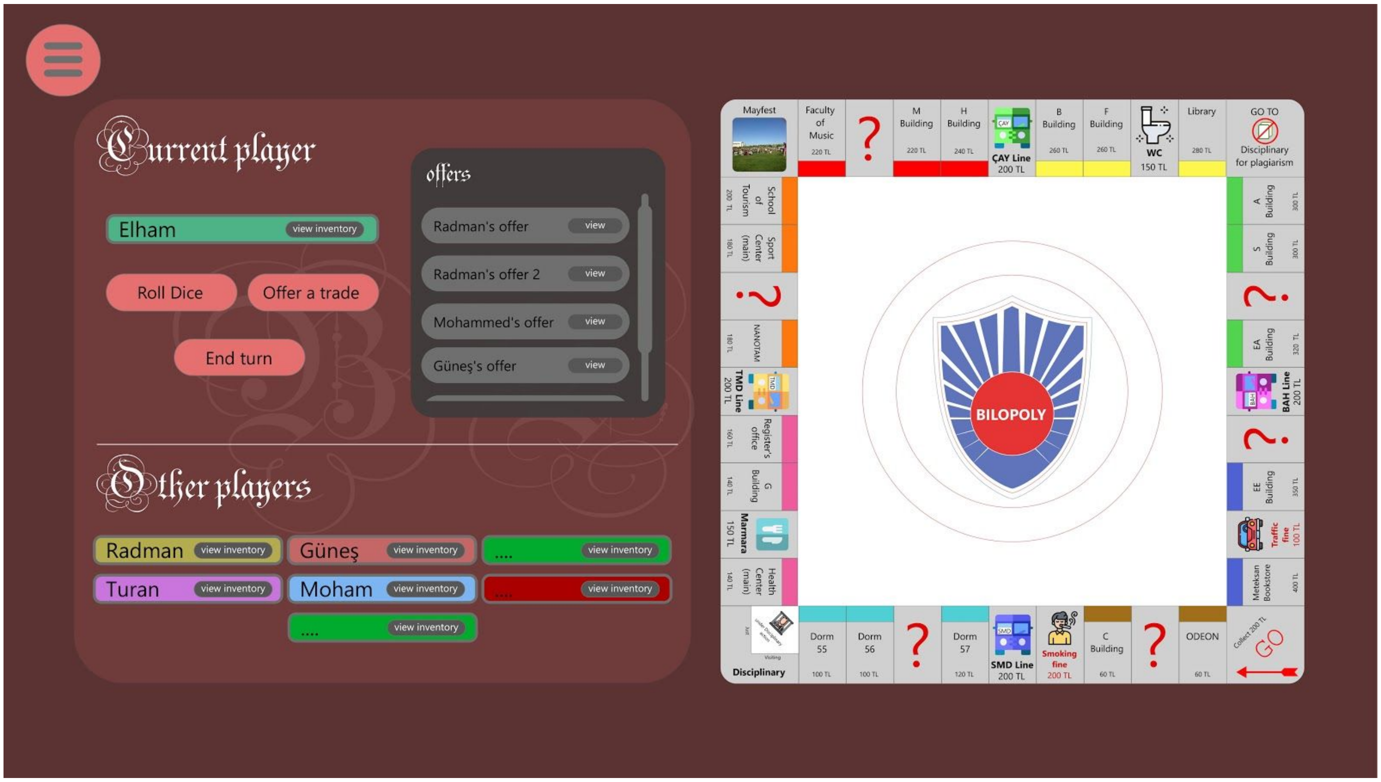
Elham

Radman

(New Game menu) Image (6.5.6)

6.5.7. Game scene

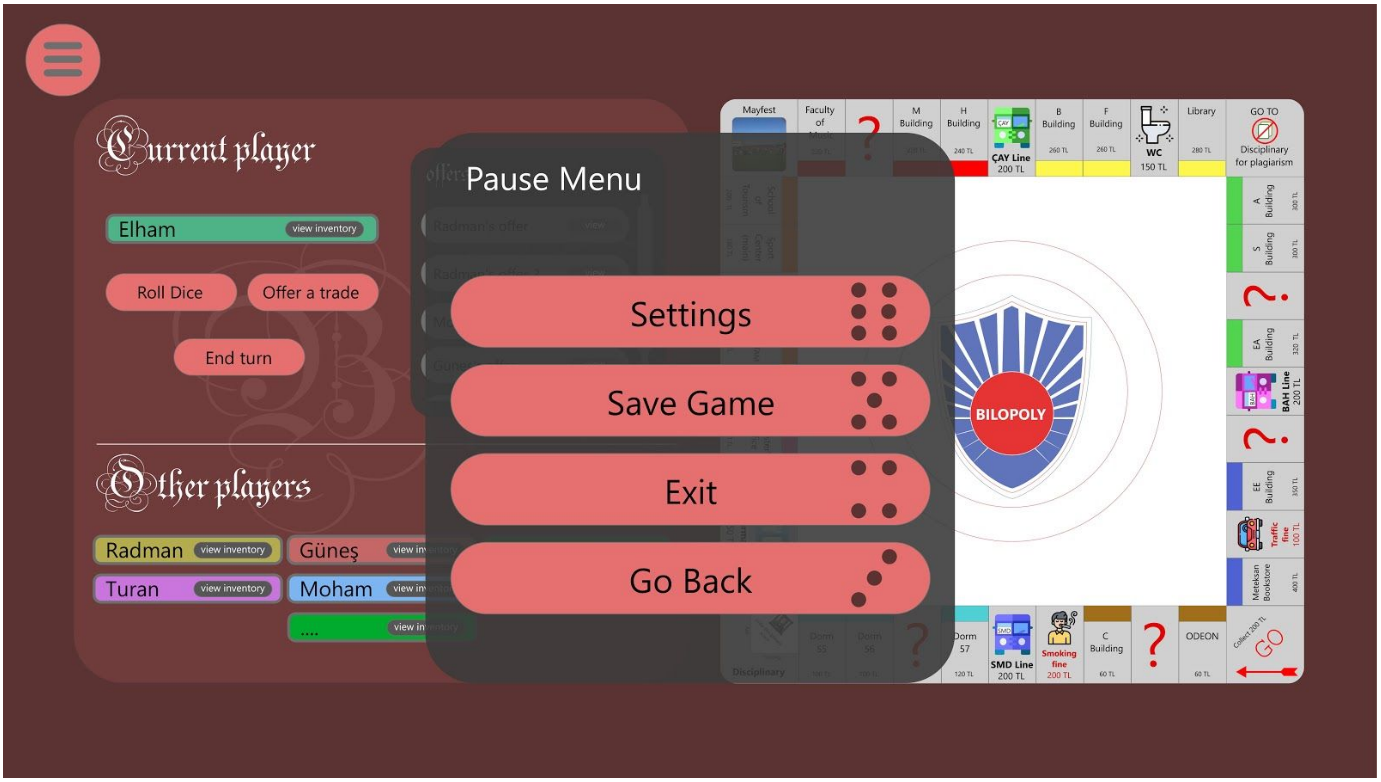
This is the main window the player sees once the game has started. Here, we on the right hand side there is the board, and on the left hand side on the top, it is indicated which player’s turn is this, what offers this player has received, as well as the main actions the player can take, namely: Roll Dice, Offer a trade, and End Turn. Finally, on the bottom part of the right hand side, other players' names are shown. Image (6.5.7)



(Game Scene) Image (6.5.7)

6.5.8. Pause Game

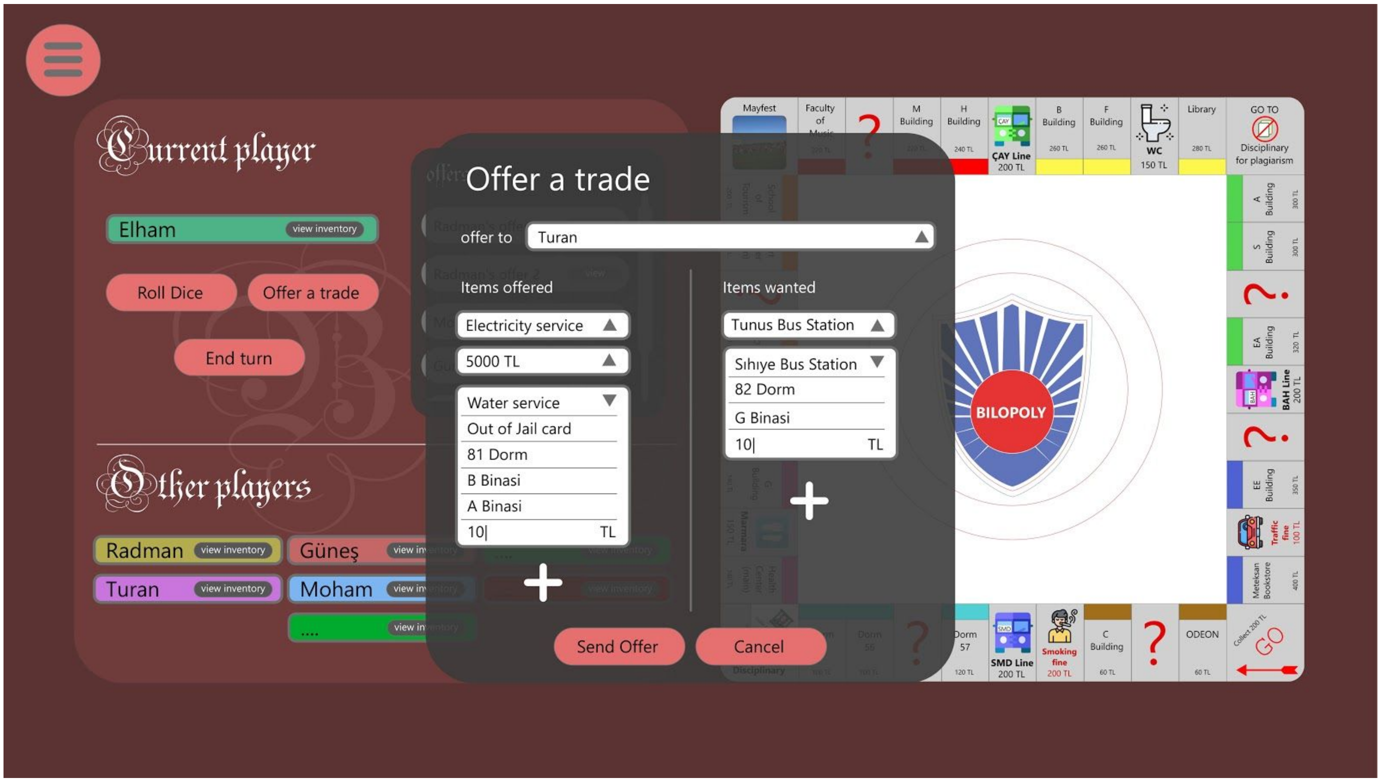
Players during the game are able to change some setting or save their game which is not mentioned in this picture because we are discussing its position. Moreover, for leaving the game players must use this page. Image (6.5.8)



(Pause Screen) Image (6.5.8)

6.5.9. Offering trade

The player can offer a trade by pressing on offer a trade button. After the button is pressed, a pop up will appear, where the player can indicate to whom they want to offer a trade, as well as the items they are trading. Image (6.5.9)



Offer a trade

offer to: Turan

Items offered: Electricity service; 5000 TL; Water service; Out of Jail card; 81 Dorm; B Binasi; A Binasi; 10| TL

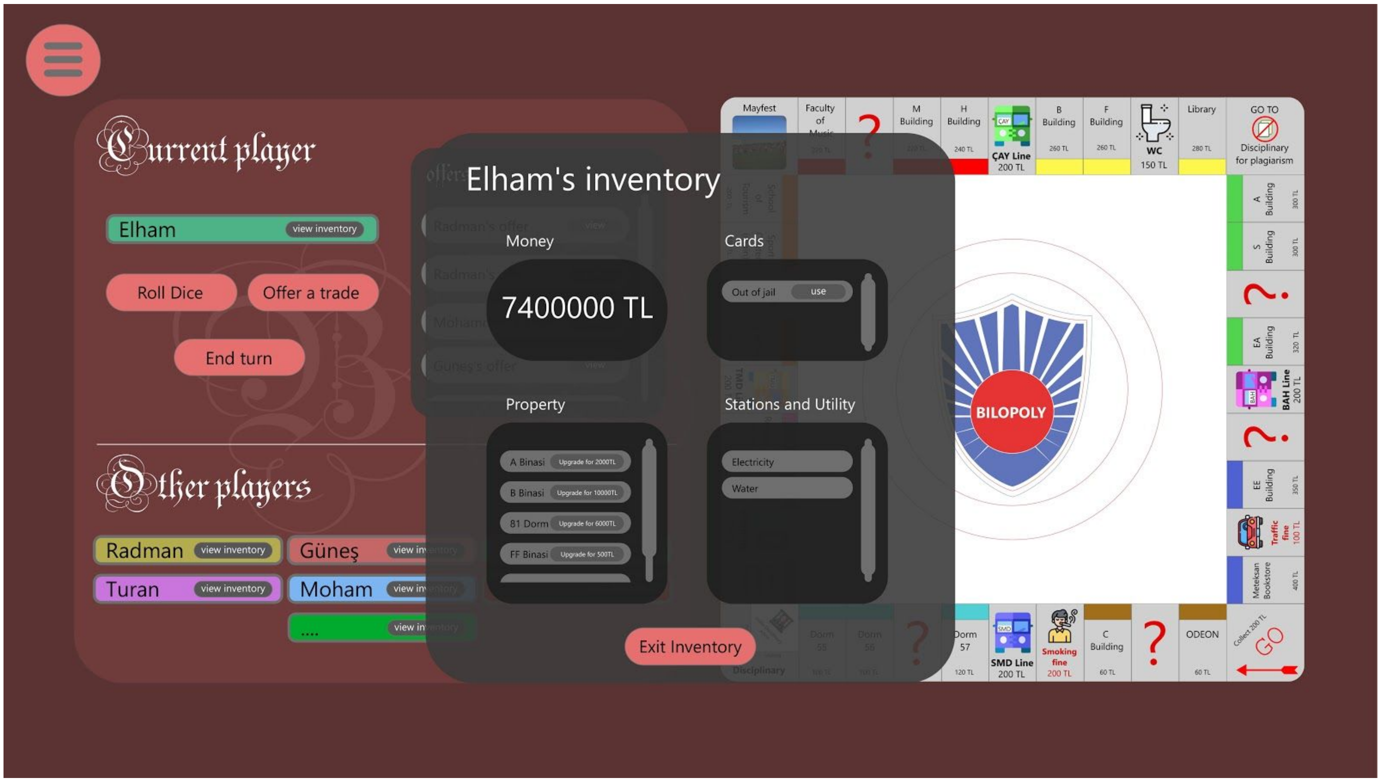
Items wanted: Tunus Bus Station; Sıhıye Bus Station; 82 Dorm; G Binasi; 10| TL

Send Offer | Cancel

(Pending trades menu) Image (6.5.9)

6.5.10. Player’s inventory

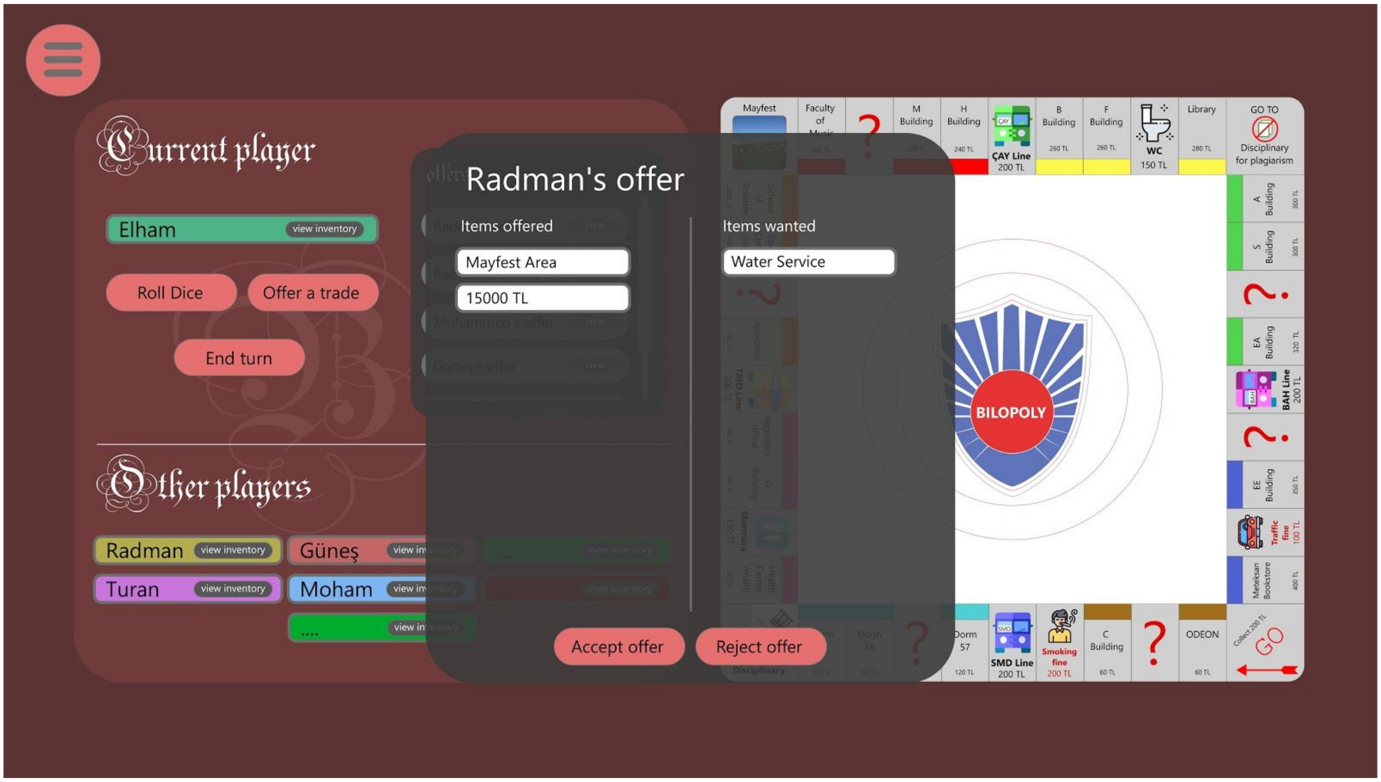
Any player’s inventory can be accessed anytime by pressing on the view inventory button that is beside their name. In the inventory the player can find how much money they have, as well as the properties, stations, utilities, and cards they own . Image (6.5.10)



(Player’s inventory menu) Image (6.5.10)

6.5.11. Accepting or rejecting an offer

A player can see the offers sent to them on the top part of the left hand side. They also can view a particular offer by pressing the view offer, when a pop up would appear. In the popup, a player would see the items offered to them as well as the items wanted from them. Finally, a player can accept or reject the offer using the buttons at the bottom of the pop up . Image (6.5.11)



Radman's offer

Items offered
- Mayfest Area
- 15000 TL

Items wanted
- Water Service

(Accept/Reject offer prompt) Image (6.5.11)

7. References

[1] "How Monopoly came to dominate board games", https://www.scmp.com/lifestyle/arts-culture/article/1596064/how-monopoly-came-dominate-board-games [accessed: Oct 16, 2020].

[2] "Desktop Screen Resolution Stats Worldwide" https://gs.statcounter.com/screen-resolution-stats/desktop/worldwide [accessed: Oct 22, 2020].

[3] "Glossary of Supplementary Definitions" https://pubs.opengroup.org/architecture/togaf9-doc/arch/apdxa.html [accessed: Oct 22, 2020].

[4] "Software Testing and Quality Assurance Glossary" http://www.aptest.com/glossary.html [accessed: Oct 22, 2020]

[5] "Why Is It Important to Measure Maintainability and What Are the Best Ways to Do It?" https://ieeexplore.ieee.org/document/7965364 [accessed: Oct 22, 2020]

[6] "How Loading Time Affects Your Bottom Line" https://neilpatel.com/blog/loading-time [accessed: Oct 25, 2020]