Bilkent University

Department of Computer Engineering

CS - 319 Object-Oriented Software Engineering

Term Project - Analysis Report

Iteration 1

Project Name : Risk

Group No: 1F

Group Members: Rumeysa Özaydın
Merve Kılıçarslan
Ahmet Serdar Gürbüz
Elnur Aliyev
Osman Burak İntişah

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1. Introduction

Risk game is a strategy game designed by Miro Company in 1957 and published in 1959 by Parker Brothers under the name of “Risk: the Game of Global Domination” [1]. Newer and various of Risk game with complex rules, has been published starting from 1986 until 2006. Later in 2008, Hasbro published a new basic version of the Risk which is a reproduction of the first game [1]. Also many unofficial versions of Risk game with different concepts has been published until this day.

The version, we will take into consideration when implementing the game is the basic Hasbro version however new functionalities will be added to game.

Risk game is a board game that can be played by 2 to 5 people. In the game there is a political map which shows divided territories. There is 5 continents (hence 5 players at most, every player starts with a continent) on the map. Players wait their turn to play, they try to conquer other players’ territories with their armies. Results of the soldier attacks are determined by dice rolls. Until all the defence soldier are finished or the attacker gives up the attack, battle continues. Defence rolls 2 dice at most and attacker roll 1-3 dice and the higher die wins the battle however defence wins in a tie. In every turn, player wins new soldiers according to the number of provinces and continents he/she owns. In the game, players can form alliances with each other however alliance does not mean two players can win the game since game's goal is to conquer every continent so that other players are eliminated from the game.

Our Risk game has the basic features that are described with a few new rules. In the there will be bonus card implemented which are single use cars that helps the player sabotage other players. These cards will be drawn if you successfully conquered a territory in a particular turn. Bonus cards will be allowed to be used at the end of every turn hence it will be affecting the next turn’s rules. Moreover, a new object will be added to the game called “castle” and “coins”. Coins will be given to players in the beginning of the game and the players will continue winning coins with respect to size of their territories. Coins earned can be increased or decreased in very turn. Coins will be used to buy “castle” or soldier in the main game frame. “Castle” will be an object that a player can place in their territories. A territory can have more than one castles and castle will protect the territory by allowing the attacker to use only 1-2 soldier in battle mode.

Since Risk is a strategy and diplomacy based game, implementation will support the multiplayer mode only. This implementation will allow people to have interactions and conversations when attacking and taking provinces. Risk is a logical game hence players wants to think a lot but since the game is not in real life circumstances, measures should be taken to prevent long waiting times. In order to decrease waiting time of other player, a limited time slot will be given to players in which they will have to act or their turn will passed.

Risk game will have two options in the beginning of the game where the host can choose a limited turn mode or a normal mode. In normal mode, winner will be the player who conquered all the other territories. In the limited turn mode, there will a

total turn count for the game and when the turn count is finished, winner will be chosen according to number territories, coins and soldiers.
Among other features, player can choose to turn the sound on or off and to play in a full screen mode.

2. Overview

2.1 Game Grid

Game Grid for the Risk game will a world map with different territories and continents. These territories will be divided by different colors. There will be borderlines or dashed lines between territories which will indicate that these territories are connected. Soldiers and castles will be inserted into a territory.

2.2 Soldiers

There will be one type soldier in the game. Numbers will be used to show the soldier counts in a territory. Soldiers will be used for attacking other territories. Player choose number of soldiers for the attack and will not be able to provide more soldiers for the battle until it ends. Soldiers can be moved between the connected territories only. At least one soldier must be placed in a territory at all times. Soldiers will be given to the players in every turn according to territory number they have or soldiers can be bought with coins.

2.3 Coins

Coin will be given to the player in the beginning and at the end of every turn in the game. Coins given will be calculated proportional to the territories that player holds. Coins can be used to buy castles or soldiers.

2.4 Castle

Castles can only be bought with coins. Castles can be placed into territories to create extra protection for the territory. If a castle exists in a territory, attacker has to attack with at most two soldiers at a time using two dice which will make the defense more advantageous. Castles in the territories will be destroyed after a territory is conquered.

2.5 Bonus Cards

Bonus cards will be given to the players if a player conquers a territory in t a turn. Even if a player conquers multiple territories in a single turn, one bonus card will be given nonetheless. Each bonus card will have different property for player to use.

These properties can be suspending a player one turn, roll 3 dice for defense etc. These cards can be used once and they will be returned to the deck. Bonus card will be used at the end of each turn and will effect the next turn.

2.6 Turns

In the beginning of the game turns of the players will be selected randomly. Starting from the first player, each player will choose their territories one by one. After every territory belongs to a player, game with start with the player who started first in the beginning. In a turn, firstly, player will collect soldiers and place them on the map to the territories that belongs to the player. Secondly, player can choose to attack other territories with a unlimited number of attacks. If the player conquers a territory a bonus card will be given to the player. Afterwards, player can choose to activate the bonus card for the next turn or can buy soldiers and castles. In the end, player will change the placements of the soldiers or add new soldiers then the turn will be finished. Turn must be completed in the respective order some stage can be passed without any action however ordering can’t be change.

2.7 Winning Conditions

There will be two winning conditions according chosen game mode. In normal game, winner will be player who conquered all other continents and territories. In the finite turn mode, game will be finished after a certain number of turns and the winner will be chosen according to the coins, soldiers and territories each player has.

2.8 Game Modes

There will two game modes: Finite Turn and Normal

2.9 Settings

The user will able to modify sound and screen settings for the game.

3. Functional Requirements

In this section, we discuss the functional requirements of our project.

3.1 Start Game

In the beginning, the initial page is the menu. By clicking “Create Game”, user can create a room and also specify the room name, password and game mode. Then the user will be navigated to the waiting room. On the other hand, by clicking “Join Game”, the user can join any room and then again the user will be navigated to the “Waiting Room”. When all the players are ready, the host can start the game.

3.2 Settings

The user will access this screen from the home screen using “Settings” button. The user can manipulate several features of the game like; adjusting music and sound effects level. Also, the user can specify screen resolution.

3.3 How-To-Play

The user will be informed by a tutorial which will be either in video format or gifs.

3.4 Credits

The user will access this screen from the home screen using “Credits” button. Developers of the game and their contact information are listed in addition to the GitHub link of the game.

4.Non-functional Requirements

In this section, we discuss the functional requirements of our project.

4.1 Usability

Risk is a strategy game so the use have to spend time to understand the rules before beginning. Once the user understood the rules, they can easily adapt the interface of the game. The main purpose is to conquer all provinces in the map.

4.2 Reliability

We don’t store user’s data in anywhere since the game does not require to do so. The players can play the game from the same network or from the same computer. Therefore, there will not be any security problems.

4.3 Performance

Since the game can be played from different computers which requires updating the game from all the computers after each turn, there might be some performance issues.

4.4 Supportability

Classes and methods will be well organized in order to fix future problems.

4.5 Extendibility

The game will be implemented with an extendible and well organized design so that new features and new modes can be easily added afterwards. In addition, it can be turned into online multiplayer game.

5. System Models

5.1 Use-Case Diagram

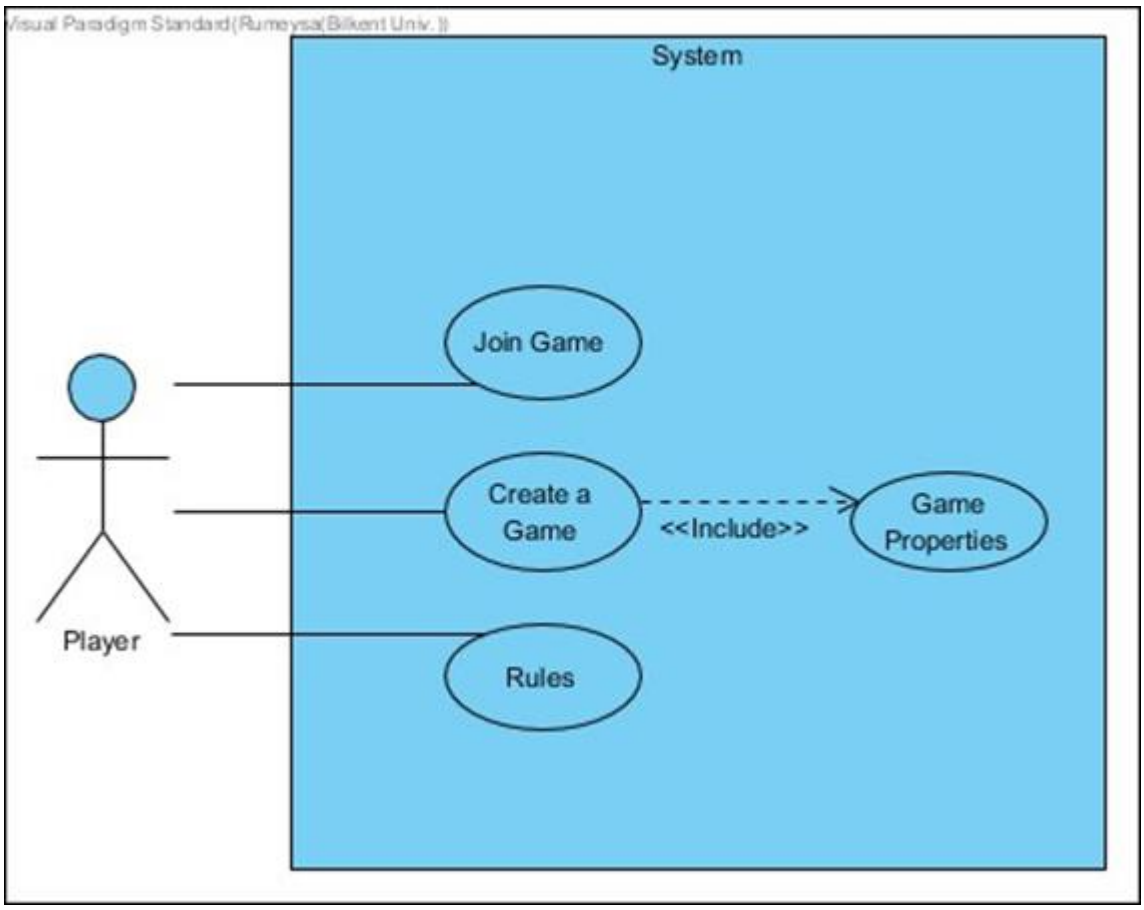


Figure 1: Use Case Diagram for Risk

Use case Name:	Create a Game
Participating actors:	Player
Stakeholders/Interests:	The Player decides to create a new game.
Flow of events:	1.Player pushes create a game 2.Player create a game which can be played from one computer or create a game as a host where the other players join the from the same network. 3.Player choose the number of people to 4-5.
Exit conditions:	System interrupts in between unexpectedly due to external reasons.

Use case Name: Rules

Participating actors:	Host or Player
Stakeholders/Interests:	The Player decides to learn the rules.
Flow of events:	1. Player chooses the How To Play button from the Main Screen. 2. Player learns the game rules
Pre-conditions:	Player must have pressed the Rules button from Main Screen.
Exit conditions:	Player presses back button to Main screen.
Alternative Scenarios:	Player closes application System interrupts due to external factors.

Use case Name: Join a Game

Participating actors:	Player
Stakeholders/Interests:	The Player wants to join a game that s/he selects.
Flow of events:	1. Player determines his/her nickname 2. Player chooses a game from available servers list. 3. Player joins the game.
Exit conditions:	Player presses back button to Main screen.
Alternative Scenarios:	Player closes application System interrupts due to external factors.

Use case Name:	Game Properties
Participating actors:	Player
Stakeholders/Interests:	The Player decide the settings of a game.
Flow of events:	1.Player create a game which can be played from one computer or create a game as a host where the other players join the from the same network. 2.Player determines the number of players to 4 or 5.
Exit conditions:	Player presses back button to Main screen.
Alternative Scenarios:	Player closes application System interrupts due to external factors.

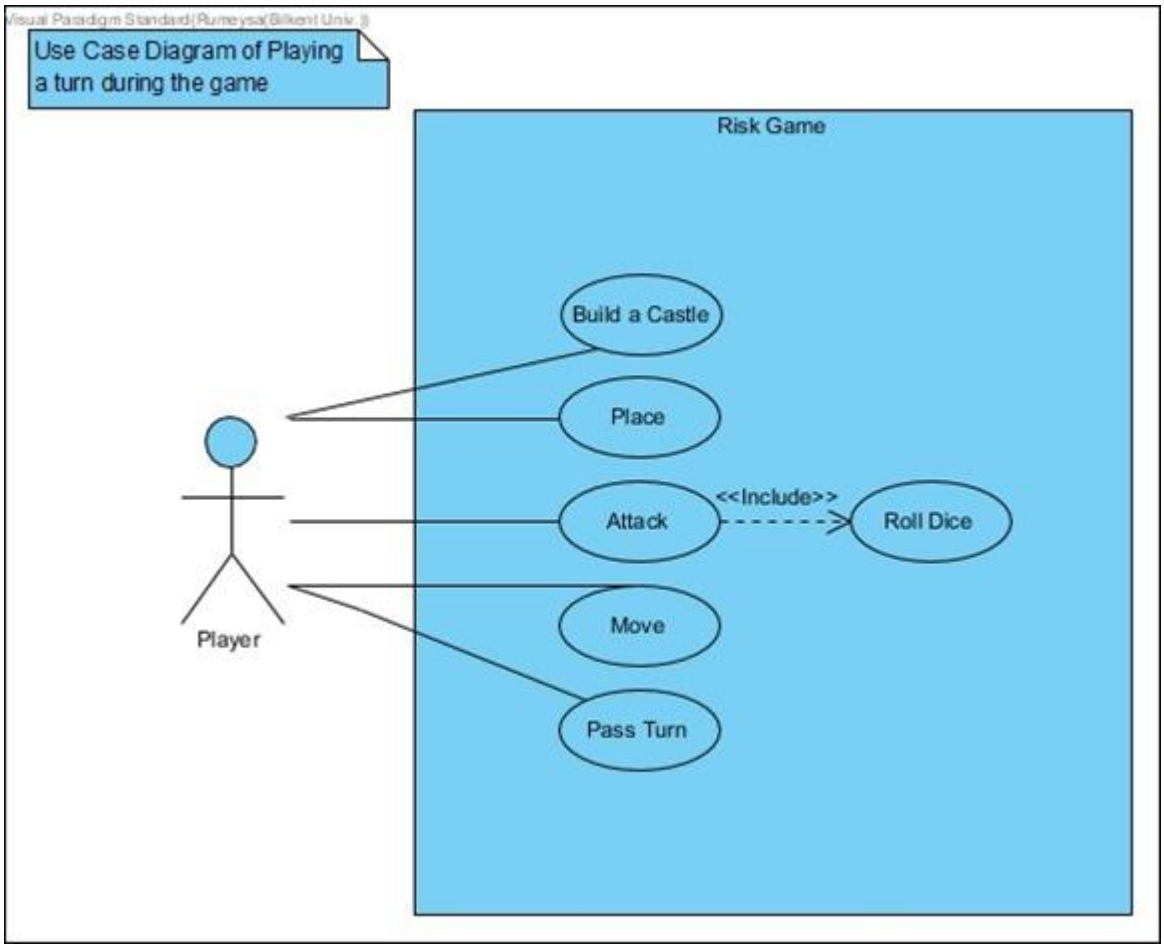


Figure 2: Use Case Diagram of Playing a turn during the game

Use case Name:	Place
Participating actors:	Player
Stakeholders/Interests:	The Player has to choose provinces and place the soldiers.
Flow of events:	1. Player choose a province and increase the number of soldiers in that area 2. If there are remaining soldiers to place, the player has to choose more provinces.
Pre-conditions:	The turn has to be the players'
Exit conditions:	When there is no soldier to place exit from this condition.
Alternative Scenarios:	Player closes application System interrupts due to external factors.

Use case Name:	Move
Participating actors:	Player
Stakeholders/Interests:	The Player has to choose provinces to move soldiers.
Flow of events:	1. Player choose a source province to reduce the soldiers 2. Player choose a destination province to increase the soldiers. 3. If the selected two provinces are connected somehow, the replacement occurs.
Pre-conditions:	The turn has to be the players'
Exit conditions:	Player selects pass turn button
Alternative Scenarios:	Player closes application System interrupts due to external factors.

Use case Name: Attack

Participating actors:	Player
Stakeholders/Interests:	The Player has to choose provinces to attack one another.
Flow of events:	1. Player choose a source province and number of soldiers to attack. 2. Player choose a destination province. 3.If the selected provinces are connected somehow, attack occurs in a random dice rolling.
Pre-conditions:	The turn has to be the players' The Player should not have moved his/her soldiers. The number of soldiers in the source province should be at least one more from the number of soldiers to attack.
Post-conditions:	The player has to roll a dice in order to decide who will win in a fight.
Exit conditions:	Player press the move button. Player press the pass turn button.
Alternative Scenarios:	Player closes application System interrupts due to external factors.

Use case Name: Pass Turn

Participating actors:	Player
Stakeholders/Interests:	The Player wants to end his/her turn
Flow of events:	1. Player press the pass turn button and end his/her turn.
Alternative Scenarios:	Player closes application System interrupts due to external factors.

Use case Name: Build a Castle

Participating actors:	Player
Stakeholders/Interests:	The Player has to choose provinces to build a castle.
Flow of events:	1. Player choose a province to build castle with his/her coin.
Pre-conditions:	The turn has to be the players'
Exit conditions:	Player press the pass turn button.
Alternative Scenarios:	Player closes application System interrupts due to external factors.

Scenarios:

Scenario Name: Winning the game

Participating actors:	Player
Flow of events:	1. The player decides to open Risk Game. 2. The player decides to join a game and presses Join game button. 3. Player attacks to other provinces and defeat them. 4. The player gradually conquers all the surrounding provinces. 5. The player wins the game.
Entry condition:	None
Exit condition:	Player has to conquer all the provinces.
Quality requirements:	None

Scenario Name: Losing the game

Participating actors:	Player
Flow of events:	1. The player decides to open Risk Game. 2. The player decides to join a game and presses Join game button. 3. The player gets defeated at her/his province. 4. The player gradually loses all of her/his territories. 5. The player loses the game.
Entry condition:	None
Exit condition:	The player has to lose all of her/his territories.
Quality requirements:	None

Scenario Name: Increase the number of soldiers

Participating actors:	Player
Flow of events:	1. Each turn players get number of soldiers according to number of territories the occupied. 2. Players can increase the number of soldiers that they can get each turn by getting control of the one whole continent. 3. Players can buy soldiers with their money from market.
Entry condition:	None
Exit condition:	None
Quality requirements:	None

Scenario Name: Gaining and Using the Money

Participating actors:	Player
Flow of events:	1. The player decides to open Risk Game. 2. The player decides to join a game and presses Join game button. 3. Each turn players gain money based on their territories. 4. The player can spend their money to build a tower or buy more soldiers from market.
Entry condition:	None
Exit condition:	None
Quality requirements:	None

Scenario Name: Conquering & Defending a Province

Participating actors:	Player
Flow of events:	1. When the player decides to attack any province, he/she roll the dice according to the number of soldiers he/she attacks. Number of dies that attacking side has is maximum 3. 2. The player who is trying to defend his/her province, defending with the number of soldiers on that particular province. He/she has 2 number of dies at maximum. 3. Depending on the highest number on the dies winning side is chosen. 4. If the maximum number on the dies are equal defending side wins. 5. The losing side of the dice roll losing his/her soldiers.
Entry condition:	Player chooses to attack a province.
Exit condition:	One side loses his/her all soldiers on that province or decides to surrender.
Quality requirements:	The attacking side has to have more than one soldier on the province from which he/she attacked.

Scenario Name: Cards

Participating actors:	Player
Flow of events:	1. The player decides to open Risk Game. 2. The player decides to join a game and presses Join game button. 3. After the game has started each player picks a card which gives them a special ability in the game.
Entry condition:	None
Exit condition:	It lasts until the game is finished.
Quality requirements:	None

Scenario Name: Player Turn

Participating actors:	Player
Flow of events:	1. At the beginning of each turn players get their number of soldiers and select the province to place these soldiers. 2. Second step of each turn is attacking a province. Player can attack until they want to stop, or he/she can skip without attacking any province. 3. As a third step the player can move his/her soldiers to other his/her province which is connected to that province. 4. Players have limited time to play their turn.
Entry condition:	None
Exit condition:	The game ends when a certain threshold for number of turns is reached.
Quality requirements:	None

5.2 Dynamic Models

5.2.1 Sequence Diagram

5.2.1.1 Start the Game

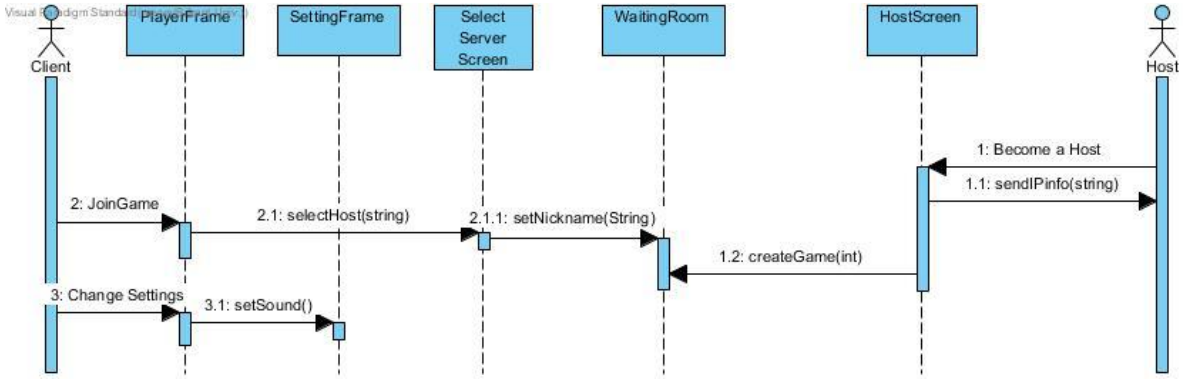


Figure 3: Sequence Diagram for Start the Game

In order to start the game, a host will create the game from host screen and a address will be returned to the host. Address will be given to the other player so that they will be able to play the same game. Each player will choose a nickname and the player's colors will be distributed by the host. In the ready room player will wait and when everyone is ready host will start the game.

5.2.1.2 Play the Game

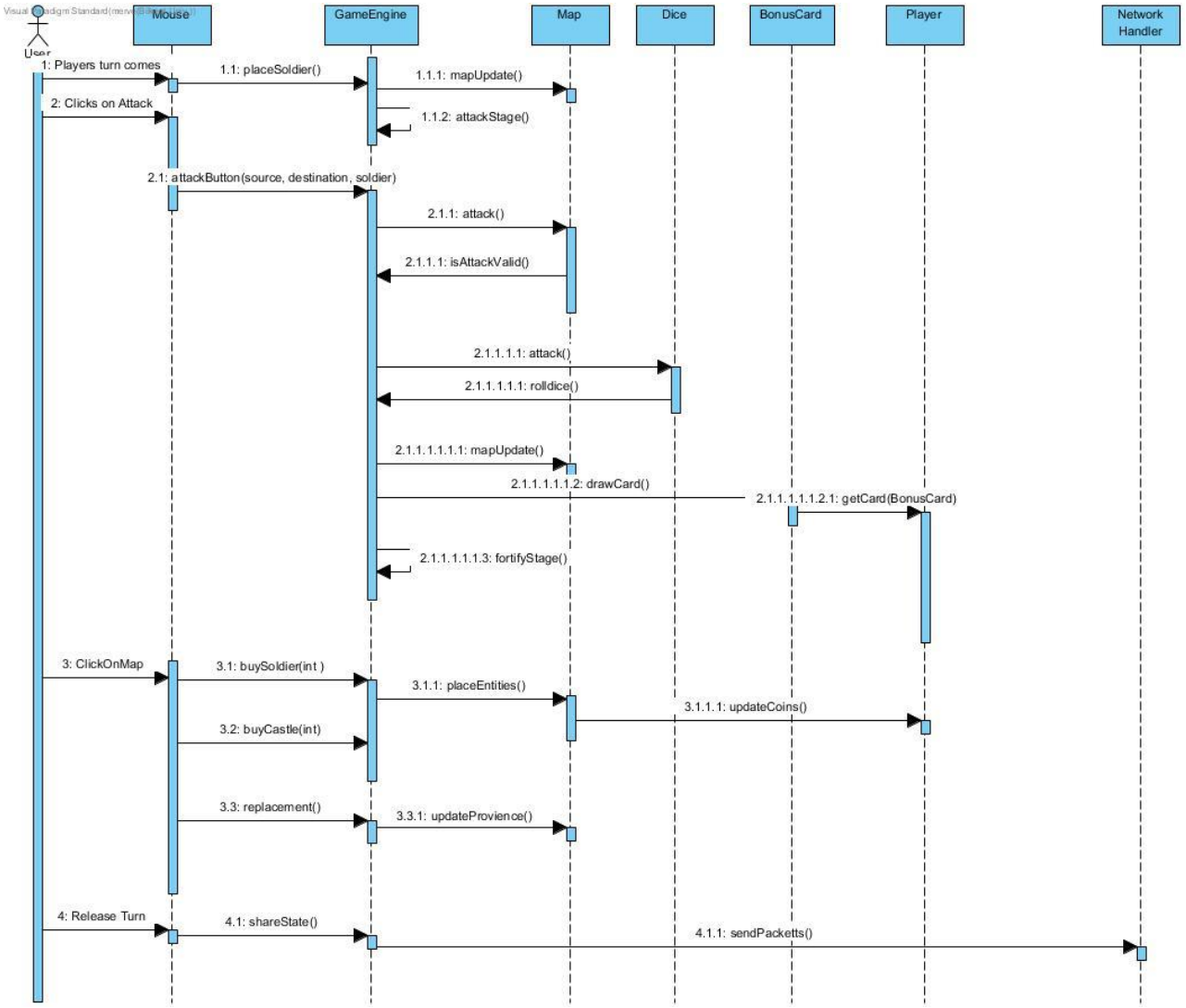


Figure 4: Sequence Diagram for Play the Game

Game will be played according to the rules and when the turn is finished new packets will be sent to the other players.

5.2.2 Activity Diagram

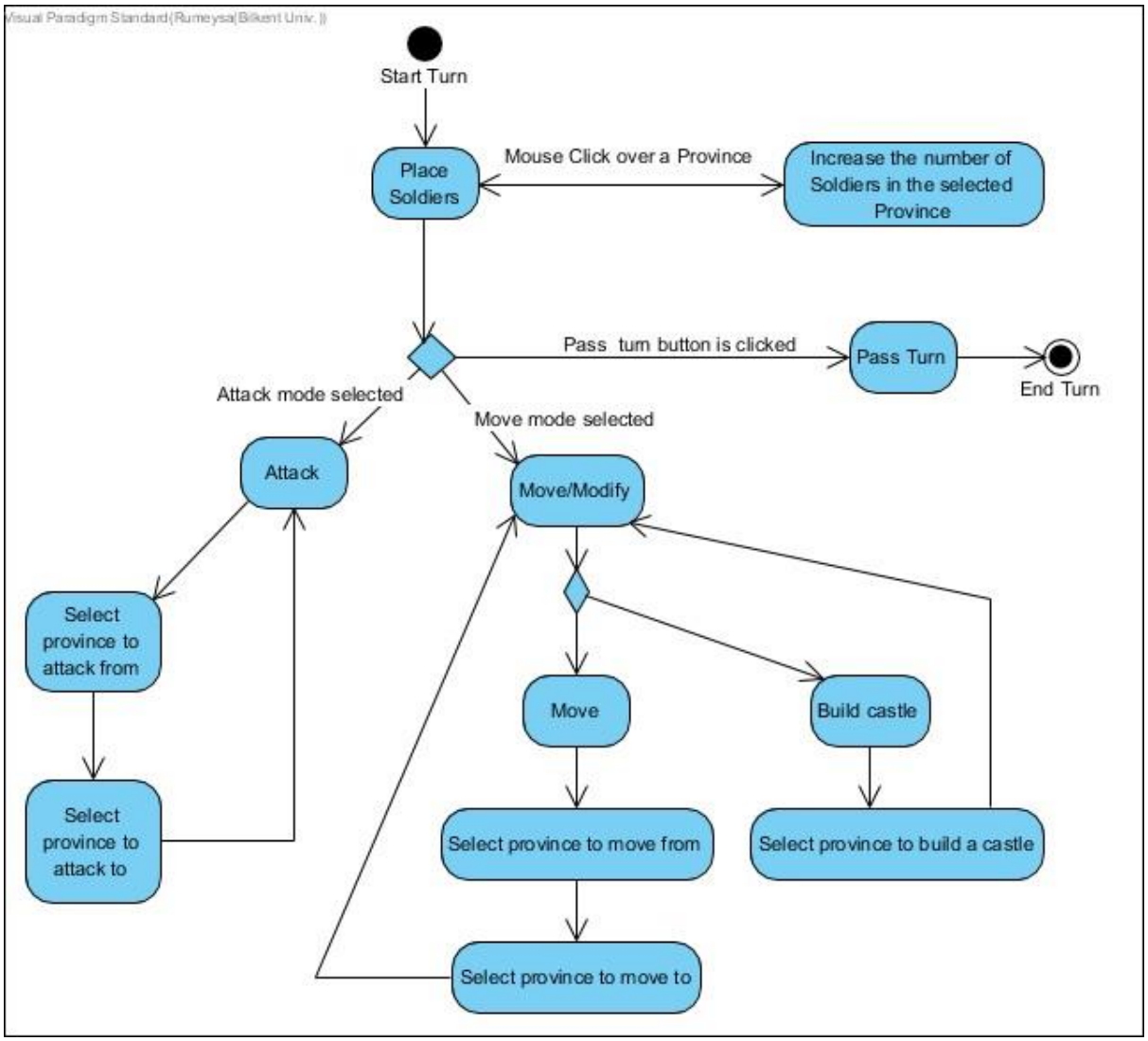
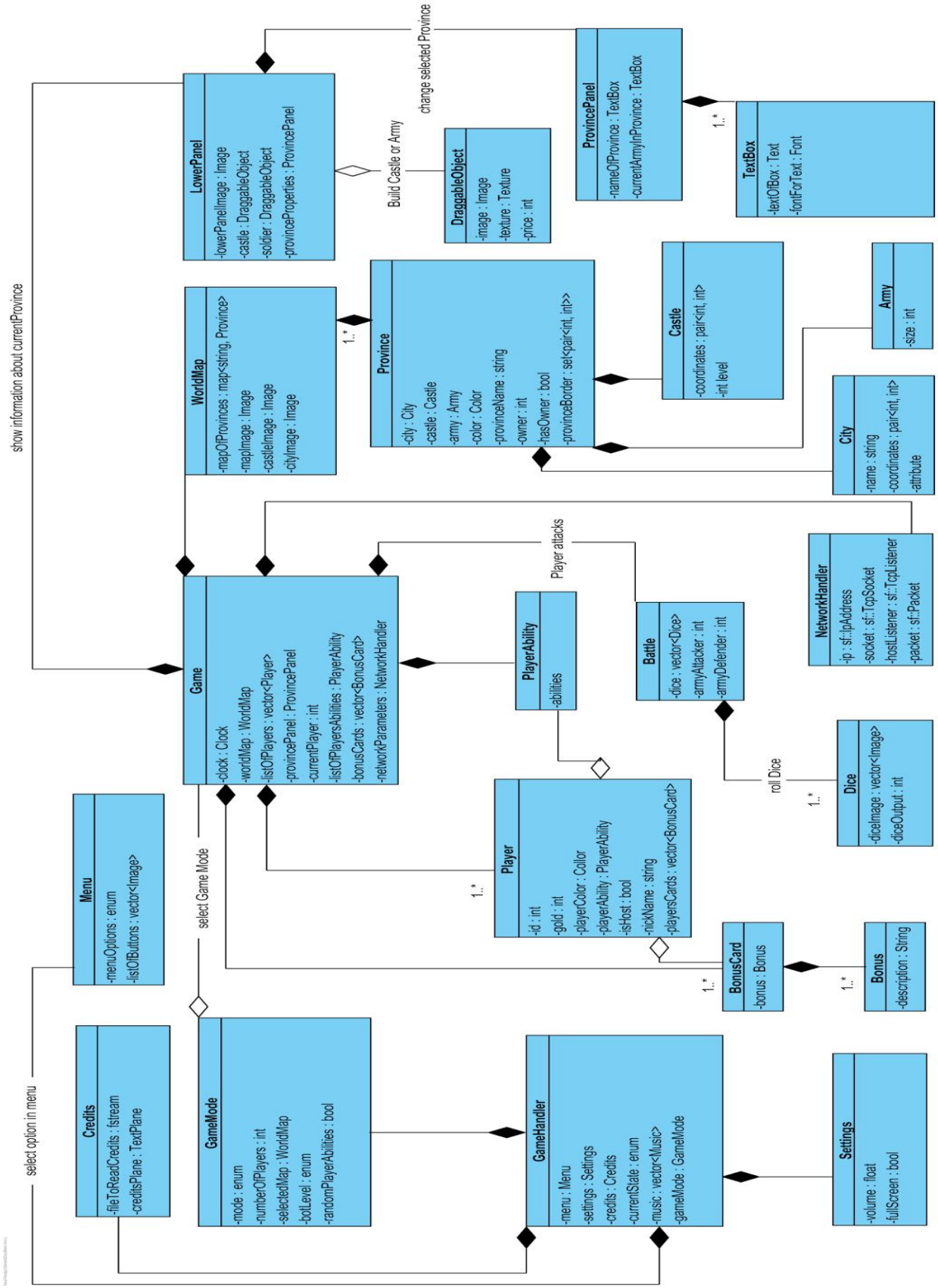


Figure 5: Activity Diagram for each turn

5.3 Object and Class Diagram



5.4 User Interface (Mockups)

Figure 7 : Mockup of the main screen of the game

Figure 8: Mockup of the Settings screen

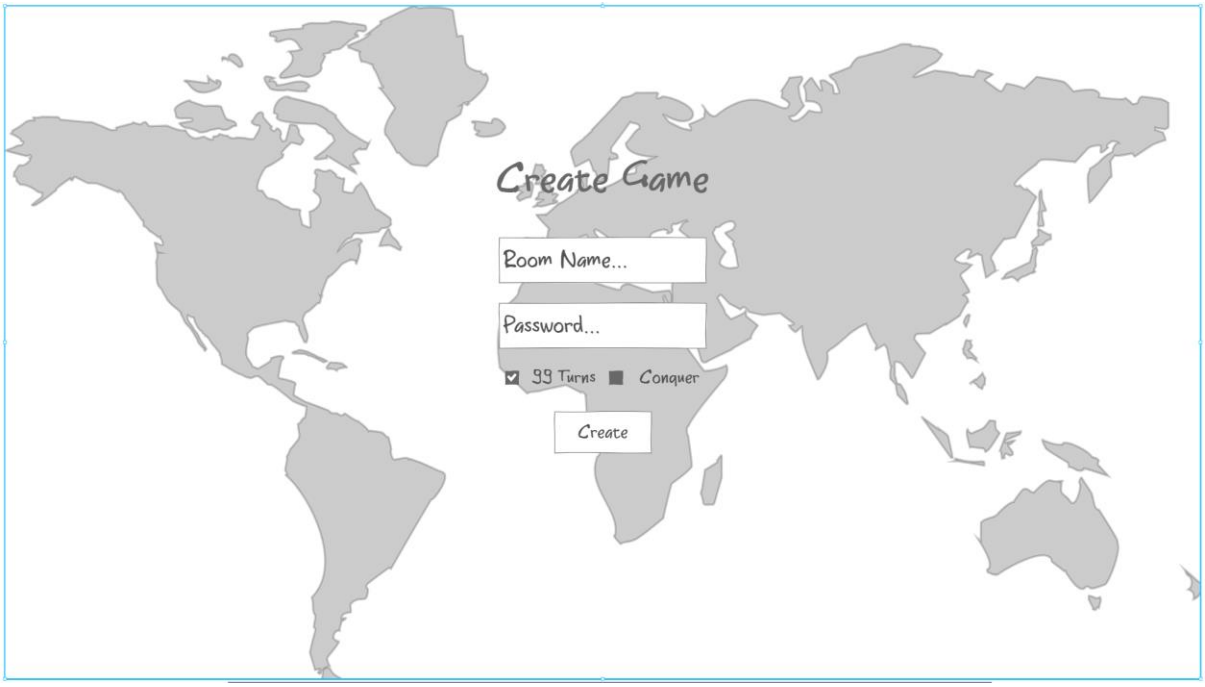


Figure 9: Mockup of the screen creating game as a host

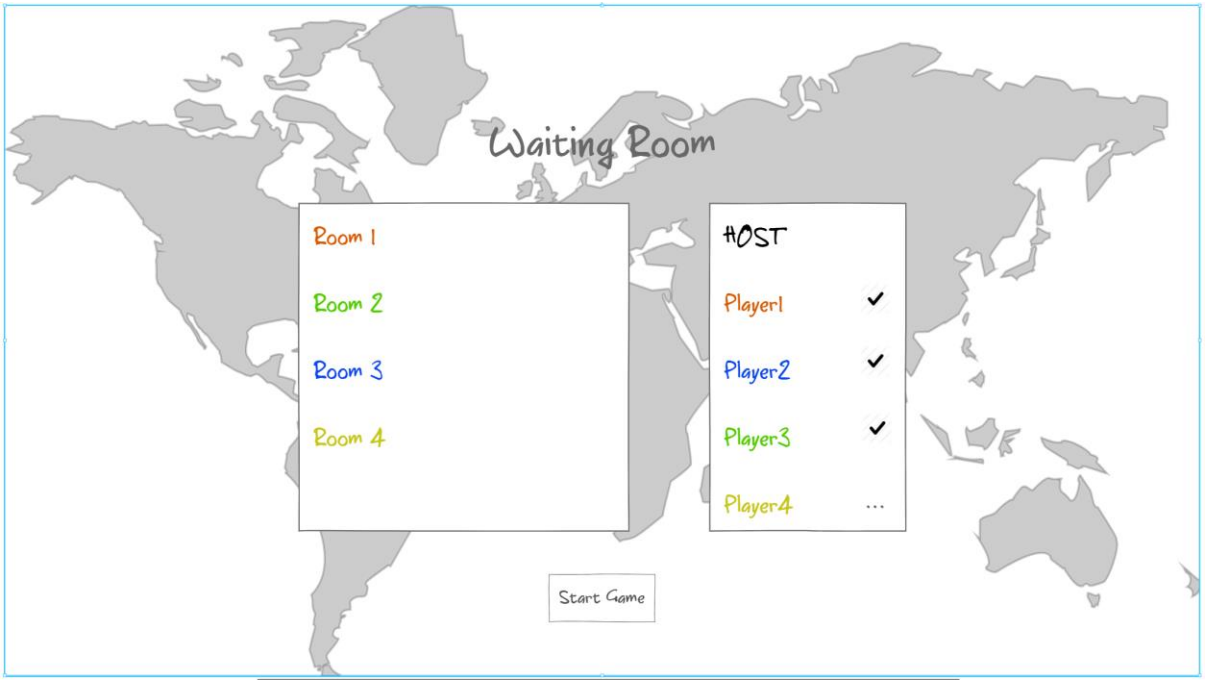


Figure 10: Mockup of the waiting room before the game starts

Figure 11: Mockup of the game play screen

6. References

1. https://www.thesprucecrafts.com/history-of-risk-412339