



Bilkent University

Department of Computer Engineering

CS 319

Object Oriented Software Engineering *Game of "Risk"*

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1 Introduction

Risk is a strategy board game that is playable from 2 to 6 players. The main objective of the game is to eliminate other individuals from the game by conquering their occupied territories and have every territory in the world. In other words, World Domination!

Each player has their own troops, which can be in several different types, and territories. They distribute their troops to their territories and with these troops, they conquer other's territories or defend their own territories. Also, players draw specific cards that allows them to gain specific amount of troops if they can catch a pattern with these cards such as three cards with the same troop type. The players gather and distribute these troops and they try to occupy as many different territories as possible in a turn. This process is repeated for every other player in every other turn. The game has an arbitrary length. It does not have a time limit.

In order to implement the game, we will use Java and Netbeans for framework.

2 Game Overview

Game of "Risk" is the video game implementation of the board game itself, designed for laptops and desktops. While the basic core of the game does not change, the game tries to fix specific problems that the original game and adds specific updates such as increased amount of player. The game greets the player with a welcome message and then highlights its 3 gameplay options. After the gameplay option is chosen, the pre-game-settings menu appears. The settings menu allows how many players will play and which color will each player be. After the pre-game-settings menu, the game will start.

2.1 Opening Screen

The game's opening screen will have 3 options: Play, Settings and Exit. Play will allow you to start a new game or load a previous game. Settings will allow you to change specific settings.

2.2 Gameplay

Game of "Risk" has got 3 game mods(3 different ways you can play the game): 1-Classical, 2-Time Mod, 3-Golden Territory Mod

2.2.1 Classical

This is the classical version of the Risk Board Game. The game is going to be played in the way the classical board game is played. In their own turns, each player will first receive specific amount of troops that they will distribute, then they will attack to the other territories, then they will redistribute their remaining troops after their conquest process. The conquests will be determined by dice rolls: Based on the number of the troops the territory, the attacker and the defender will throw dices and each higher result that the attacker has will result in decreasing of one troop. However, the number of players is extended. At maximum, 6 players are able to play risk.

2.2.2 Time Mod

This gameplay system is designed specifically to handle the major problem of the classical board game: Taking too much time. The classical game can take hours and in some cases, days. In the pre-game settings menu, the players adjust the time. The gameplay is same with the classical game mod however, the person with the most territories at the end of the time limit wins the game.

2.2.3 Golden Territory Mod

This pre-game-settings makes the players to decide specific places to take. These territories are named as golden territories. Each different player can have different golden territories or each one of them can try to

take the same territory. The person who conquers their selected golden territories wins. Otherwise, the gameplay is the same with the classical game mod.

2.3 Game Map

The game map depicts the political map of Earth, divided into 42 different places. These 42 different places are the territories and players conquer these territories.



Figure 1: Game Map of Game of “Risk” [3]

If the user adjust map to Tamriel in settings, the game map will be changed to the Tamriel world map, which is the world map of the famous fantasy game, *The Elder Scrolls*.



Figure 2: Additional Tamriel Map for Game of "Risk" [2]

2.4 Game Troops

Troops are the units that player uses to conquer territories. There are 5 types of units in Game of "Risk", each with their own attack power, defence power, movement right and cost. Movement right signifies how many times a specific troop can be used in the Attack stage. Cost signifies the how much distribution points you need to give in order to recruit the specified troop. At the beginning of each distribution step, the players receive an amount of distribution points. They spend these points by the costs of the troops that they want to recruit.

Tr o o p T y p	A t t a c k	D e e n c e P	Mo ve me nt Rig ht	C o st
----------------------------------	----------------------------	---------------------------------	-----------------------------------	--------------

e	P o w e r	o w er			
S o l di er	2	1	2	1	
C a v al ie r	1	3	3	3	
C a n n o n	3	2	1	7	
T a n k	4	3	1	9	
Pl a n e	5	3	1	1	2

Figure 3: Table for Troop information

2.5 Settings

2.5.1 Pre-Game-Settings

The users are able to adjust the number of players in the pre-game settings menu.

The users are able to select the gameplay mod in the pre-game settings menu.

The users are able to select the map(World,Tamriel) in the pre-game settings menu.

After selecting adjusting the settings of the game, the users are able to enter the name of the players in the pre-game settings menu.

If the users are playing it on the Time Mod, the users should be able to adjust the time

If the users are playing on Golden Territory Mod, the users should be able to select the golden territories which are the territories that allows the player to win the game if the player occupies that territory.

2.5.2 General Settings

The players are able to adjust the sound and the view screen of the game.

3 Functional Requirements

3.1 New Game, Saving & Slot Spaces

New Game: Users should be able to start a new game, select a mod, arrange their troops, arrange the time(if the game is played on Time Mod) and arrange the golden territory(if the game is played on Golden Territory mod)

Game Saving: Users should be able to save the games they are playing and be able to continue any time that they want.

Slot Spaces: Users should have different slots for games so that they can save multiple games and be able to continue to the game that they choose from the slot.

3.2 Arrangements of the Game

3.2.1 Pre-Game-Settings

The users should be able to adjust the number of players in the game.

The users should be able to adjust the map of the game(World Map or Tamriel Map)

The users should be able to adjust the gameplay mod(Classical, Golden Territory and Time Mod) of the game

If the game is in Time Mod, the users should be able to adjust the clock of the game.

If the game is in Golden Territory Mod, the users should be able to adjust the Golden Territories.

After adjusting the number of players, game mod and map, the users should be able to enter the names of the players.

3.2.2 Gameplay

Distribution Stage: The game first give the players specific distribution points based on their current territories. Then, The user should be able to add a specific troop that they want to the desired territory for recruitment by clicking to the territory in their turns. The user should only be able to recruit troops to the territories that they own. If the user tries otherwise,an error message should pop up, and the game should prevent it. After recruiting, the troop count on the territory should be effected and displayed.

Territory owning: The game should display which user owns which territory clearly to the players. This is done by changing the colors of the territories or highlighting the troop colors in the specific region(if the player has Alaska region, the Alaska territory should be colored in a distinct color and in the middle of the Alaska Territory, the total number of troops in the territory should be seen.

Timing: If the users are playing the game on Time Mod, A clock should show how much time is left for the game to finish.

Hints: If the users are confused about gameplay or specific aspects of the game, there should be a hint button to display helps to the player

Save: Whenever decided, the user should be able to save the game whenever he or she desires. The user has to exit the current game in order to play another loaded game.

Exit: The User should be able to quit the game whenever decided. The user should be able to exit the game through the pause menu where they should click "Exit Game" in the pause menu.

3.3 SETTINGS

The users should be able to adjust the view screen of the game whenever they desire

The users should be able to adjust the volume of the game whenever they desire.

4 Non-Functional Requirements

4.1 Usability

The aim of the game is to be as user friendly as possible.

The users will make 90% of actions by mouse. Only naming a saved game will be handled by keyboard actions.

The writings will be visible by 20 cm.

The player will be able to start a new game within 2 seconds.

4.2 Reliability

The game will have failure probability close to 1%. Our intention is that the game will work accurately without any crashes or bugs. Even if a crash occurs, the game will continue from where it stopped after reopening it.

4.3 Efficiency

The game will satisfy an efficiency constraint. This efficiency constraint is that, the game will handle user interactions as quickly as possible. This quickness term can be considered as:

User interactions:

1. Clicking a button for a specific action and seeing the outcome of that action must take 0.01 seconds. For example, if the user wants to view the Hints, after the user clicks to the hints button, the hints should be open at 0.01 seconds.
2. Typing the name of the players and saving the player names should take 0.01 seconds.
3. After adjusting the game in the Pre-game settings, the game should load at a time less than 0.03 seconds.

4.4 Maintainability

The implementation of the game will be in a style to allow easy understanding of it and allowing possible contribution to it. The Analysis and Design reports will be able to clarify the understanding of the project and its implementation even further.

The game prefers loose coupling in order for more independence of the code and thus allowing more contribution and edition to the code.

4.5 Pseudo Requirements

For the implementation of the code, Java programming language will be used

For the User Interface, JavaFX will be used. We preferred JavaFX instead of Java because JavaFX offers a simpler and better User Interface than Java's.

5 System Models

5.1 Use Case Diagram

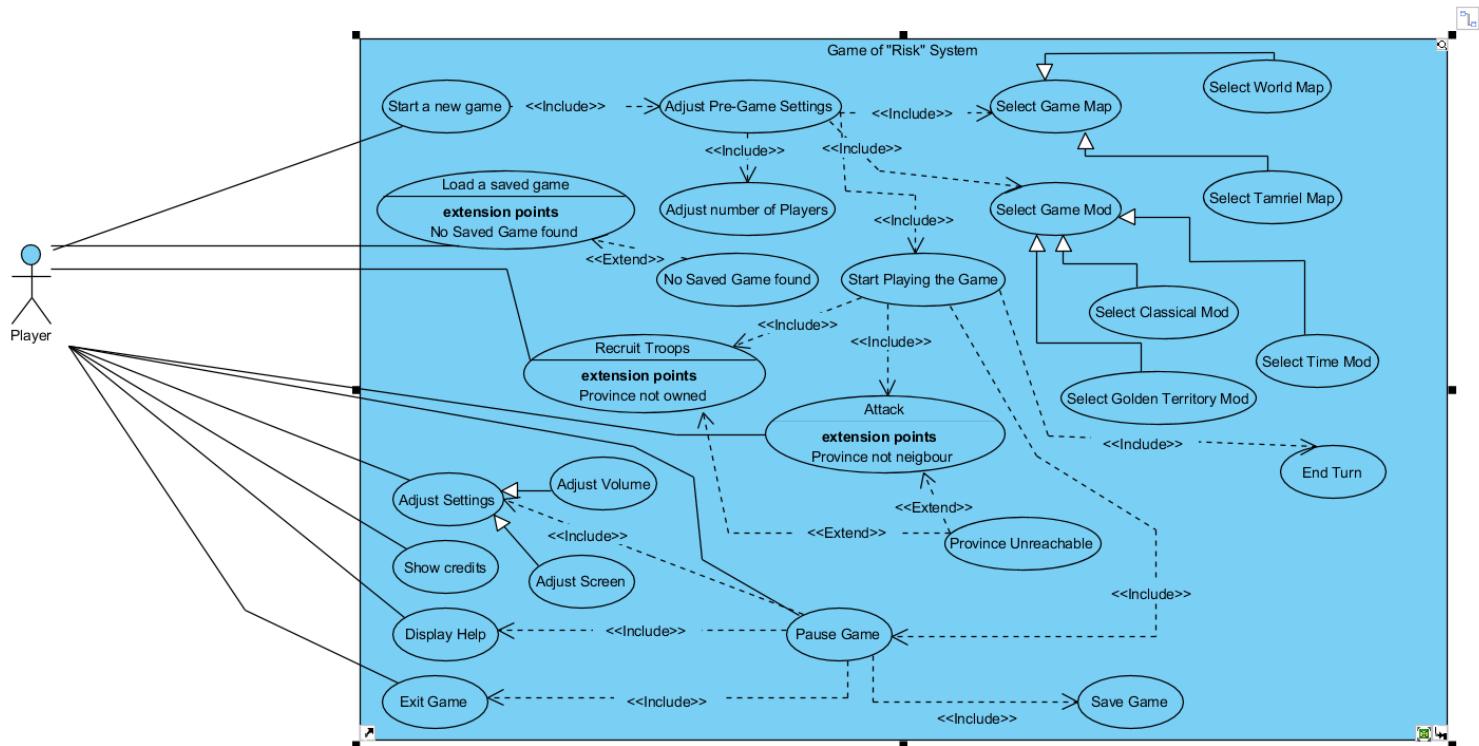


Figure 4: Use Case Diagram

Use Cases in the Use Case Diagram can be understood directly by their names and their relationships with other use cases. However, they require further explanation in order to be understood completely.

1)

Use Case Name	Display Help
Participating Actors	Player
Flow of Events	1. Player starts the game 2. Player selects display

	<p>help</p> <p>Other Flow of events</p> <p>1.Player starts the game</p> <p>2.Player adjusts the pre-game settings</p> <p>3.Player starts to play the game</p> <p>4.Player pauses the game</p> <p>5.Player selects display help</p>
Entry Condition	<p>1.Player selects display help</p> <p>2.Player pauses the game and selects display help</p>
Exit Condition	Player Got help

2)

Use Case Name	Exit Game
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Participating Actors	Player
Flow of Events	<p>1.The player starts the game</p> <p>2.The player exits the game</p> <p>Other flow of events</p> <p>1.The player starts the game</p> <p>2.The player adjusts pre-game settings</p> <p>3.The player starts to play the game.</p> <p>4.The player pauses the game.</p> <p>5.The player selects exit game</p>
Entry Condition	<p>1.Player selects Exit Game</p> <p>2.Player pauses the game and selects Exit Game</p>
Exit Condition	The player exited the game.

3)

Use Case Name	Adjust Settings
Participating Actors	Player
Flow of Events	<p>1.The player starts the game</p> <p>2.The player selects Adjust Settings</p> <p>Other flow of events</p> <p>1.The player starts the game</p> <p>2.The player adjusts pre-game settings</p> <p>3.The player starts to play the game.</p> <p>4.The player pauses the game.</p>

	5.The player selects adjust settings
Entry Condition	1.Player selects Adjust Settings 2.Player pauses the game and selects Adjust Settings
Exit Condition	The player has adjusted the settings

4)

Use Case Name	Adjust Volume
Participating Actors	Inherited from settings
Flow of Events	1.The player chooses adjusts settings 2. The volume adjustment screen

	appears.
Entry Condition	Inherited from Adjust Settings
Exit Condition	Inherited from Adjust Settings

5)

Use Case Name	Adjust Screen
Participating Actors	Inherited from settings
Flow of Events	1.The player chooses adjusts settings 2. The screen adjustment screen appears.
Entry Condition	Inherited from Adjust Settings
Exit Condition	Inherited from Adjust Settings

6)

Use Case Name	Start a new Game
Participating Actors	Player
Flow of Events	1.The player starts the game 2.The player selects start a

	new game.
Entry Condition	The player has chosen to start a new game
Exit Condition	The pre-game settings adjustment screen appears.

7)

Use Case Name	Load a saved game
Participating Actors	Player
Flow of Events	<p>1. The player starts the game.</p> <p>2. The player selects load a saved game.</p> <p>3. The player chooses a saved game.</p>
Entry Condition	The player selects Load a saved game
Exit Condition	The player selects a saved game and starts playing the game.

8)

Use Case Name	Adjust Pre-Game Settings
Participating Actors	Player
Flow of Events	<ol style="list-style-type: none">1.The player starts the game.2.The player selects start a new game.3.Pre-Game Adjustment screen appears.
Entry Condition	Player selects start a new game.
Exit Condition	Player select start playing the game.

9)

Use Case Name	Select Game Map
Participating Actors	Player
Flow of Events	<ol style="list-style-type: none">1.The player starts the game2.Player chooses to start a new game3. The pre-game settings adjustment menu appears

	4. The Player chooses select map menubar.
Entry Condition	The player is in pre-game settings menu.
Exit Condition	The player selected the map of the game.

10)

Use Case Name	Select World Map
Participating Actors	Inherited from Select Map
Flow of Events	<p>1. The player chooses select map in pre-game settings</p> <p>2. The map menubar highlights the possible maps in the game.</p>
Entry Condition	Inherited from Select Map
Exit Condition	Inherited from Select Map

11)

Use Case Name	Select Tamriel Map
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Participating Actors	Inherited from Select Map
Flow of Events	<p>1.The player chooses select map in pre-game settings</p> <p>2. The map menubar highlights the possible maps in the game.</p>
Entry Condition	Inherited from Select Map
Exit Condition	Inherited from Select Map

12)

Use Case Name	Select Game Mod
Participating Actors	Player
Flow of Events	<p>1.The player starts the game</p> <p>2.The player selects start a new game.</p> <p>3.The pre-game settings menu appears.</p> <p>4.The player chooses select mod menubar.</p>
Entry Condition	The player is on the pre-game

	settings
Exit Condition	The player adjusted the game mod.

13)

Use Case Name	Select Classical Mod
Participating Actors	Inherited from Select Game Mod
Flow of Events	<p>1. The player chooses select game mod in pre-game settings</p> <p>2. The game mod menubar highlights the possible maps in the game.</p>
Entry Condition	Inherited from Select Game Mod
Exit Condition	Inherited from Select Game Mod

14)

Use Case Name	Select Time Mod
Participating Actors	Inherited from Select Game Mod
Flow of Events	<p>1. The player chooses select game mod in pre-game settings</p>

	2. The game mod menubar highlights the possible maps in the game.
Entry Condition	Inherited from Select Game Mod
Exit Condition	Inherited from Select Game Mod

15)

Use Case Name	Select Golden Territory Mod
Participating Actors	Inherited from Select Game Mod
Flow of Events	<p>1. The player chooses select game mod in pre-game settings</p> <p>2. The game mod menubar highlights the possible maps in the game.</p>
Entry Condition	Inherited from Select Game Mod
Exit Condition	Inherited from Select Game Mod

16)

Use Case Name	Start Playing the Game
Participating Actors	Player
Flow of Events	<p>1.The player starts the game</p> <p>2.The player chooses to start a new game.</p> <p>3.The player adjusts the game mod, the map in the pre-game settings.</p> <p>4.The player selects start the game in pre-game settings</p>
Entry Condition	The player is in the pre-game settings menu
Exit Condition	The player selects start playing the game in pre-game settings menu.

17)

Use Case Name	Recruit Troops
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Participating Actors	Player
Flow of Events	<p>1.The player starts the game.</p> <p>2.The player selects start a new game.</p> <p>3.The player adjusts the game mod, the map in the pre-game settings</p> <p>4.The player selects start playing the game in pre-game settings.</p> <p>5.Recruit Troops appear</p> <p>Another possible flow of events</p> <p>1.The player starts the game.</p> <p>2.The player selects load a saved game.</p> <p>3.The player selects a saved game.</p> <p>4.The game starts</p> <p>5.Recruit Troops button appear.</p>
Entry Condition	The player is in the game
Exit Condition	The player

	recruited and distributed the selected troops.
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18)

Use Case Name	Attack
Participating Actors	Player
Flow of Events	<p>1.The player starts the game.</p> <p>2.The player selects start a new game.</p> <p>3.The player adjusts the game mod, the map in the pre-game settings</p> <p>4.The player selects start playing the game in pre-game settings.</p> <p>5.Attack button appear</p> <p>Another possible flow of events</p> <p>1.The player starts the game.</p> <p>2.The player selects load a saved game.</p> <p>3.The player selects a saved</p>

	<p>game.</p> <p>4.The game starts</p> <p>5.Attack button appears.</p>
Entry Condition	The player is in the game
Exit Condition	The player attacked a specific territory

19)

Use Case Name	End Turn
Participating Actors	Player
Flow of Events	<p>1.The player starts the game.</p> <p>2.The player selects start a new game.</p> <p>3.The player adjusts the game mod, the map in the pre-game settings</p> <p>4.The player selects start playing the game in pre-game settings.</p> <p>5.End Turn button appear</p> <p>Another possible flow of events</p>

	1.The player starts the game. 2.The player selects load a saved game. 3.The player selects a saved game. 4.The game starts 5.End Turn button appears.
Entry Condition	The player is in the game
Exit Condition	The player ended their turn.

20)

Use Case Name	Pause Game
Participating Actors	Player
Flow of Events	1.The player starts the game. 2.The player selects start a new game. 3.The player adjusts the game mod, the map in the pre-game settings 4.The player selects start

	<p>playing the game in pre-game settings.</p> <p>5.Pause Game button appear</p> <p>Another possible flow of events</p> <ol style="list-style-type: none"> 1.The player starts the game. 2.The player selects load a saved game. 3.The player selects a saved game. 4.The game starts 5.Pause Game button appears.
Entry Condition	The player is in the game
Exit Condition	The player ended their turn.
Use Case Name	Load Game from a Slot
Participating Actors	Player
Flow of Events	<ol style="list-style-type: none"> 1.The player chooses to load game from a slot 2.The saved game opens and the game continues
Entry Condition	The player has clicked play game

	button
Exit Condition	The saved game opens and the game continues

21)

Use Case Name	Save Game
Participating Actors	Player
Flow of Events	<p>1.The player chooses to save the game that he/she is currently playing</p> <p>2.The game is saved.</p>
Entry Condition	The player has clicked the save game button in the pause menu
Exit Condition	The game is saved

22)

Use Case Name	No Saved Game
Participating Actors	Player
Flow of Events	Game gives warning that there is not a saved game.
Entry Condition	Extends Load a Saved Game use case. Player can not find a saved game.

Exit Condition	Player have received an error message on finding a saved game.
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23)

Use Case Name	Province Unreachable
Participating Actors	Player
Flow of Events	Game gives warning that the selected province in the game is unreachable.
Entry Condition	Extends Recruit Troops and Attack use cases. Player can not do the desired activity in the selected province.
Exit Condition	Player have received an error message on selecting the specific province

5.2 Dynamic Models

5.2.1 Scenarios & Sequence Diagrams

5.2.1.1 New Game or Load Game

After the player clicks play game, Slot choosing Screen appears. In the slot choosing screen, the player can

start a new game (If there are available slots) or the player can load a previous game slot. Then, the game loads the game data by reading the save file. The game data consists of game map, troop data of the players and territory data of the players, if a new game has started, these datas are all in initial condition

5.2.1.2 Select Gameplay Mods

If the user decides to start a new game, then 3 gameplay mods will be presented to the player in the pre-game settings. The player will choose one of the 3 mods, and then the game will save the decision to a save slot.

5.2.1.3 Game Settings

If the player has chosen Time Mod, a setting will appear to arrange the time limit. The player will adjust the time and the game will start with the clock arranged by the player

If the player has chosen Golden Territory mod, the setting will appear to arrange which territories are going to be golden territories. The player will adjust the golden territories and the game will start.

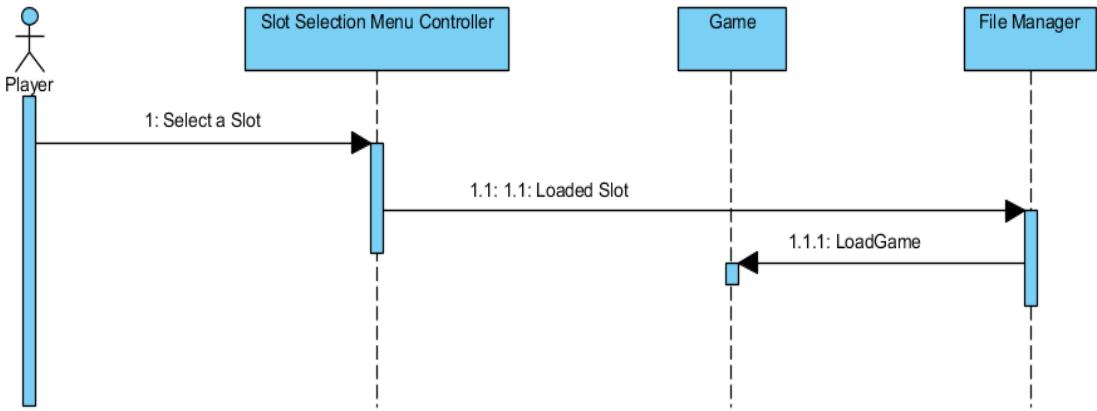


Figure 5: Sequence Diagram of Load Game

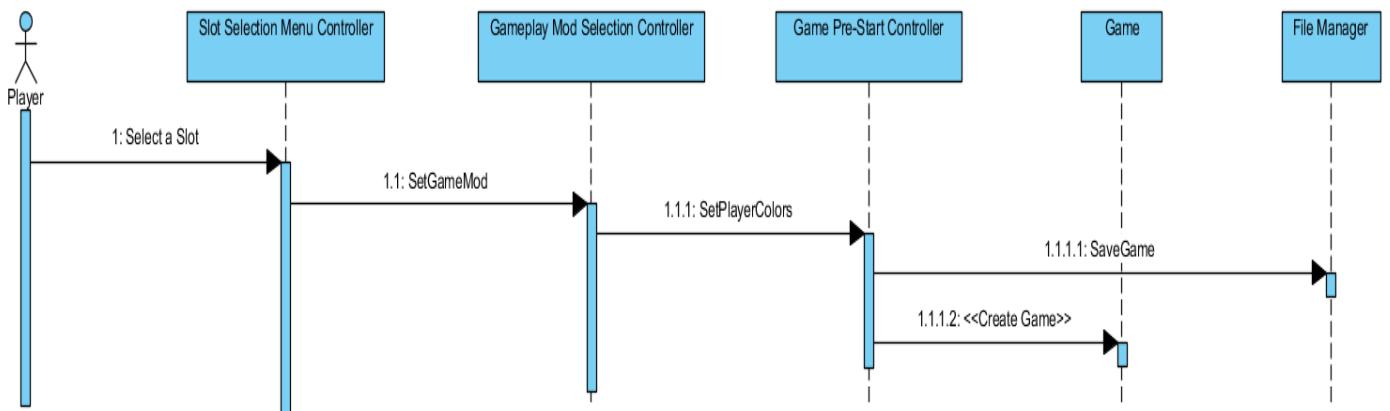


Figure 6: Sequence Diagram of New Game

5.2.1.4 Classical Mod

After creating a new game and choosing to play on Classical Mod, the player will come across with screen in which he/she has to choose the troop color which gives the player a different start. After this, the Game loads and starts. Firstly, The game gives troops to the players on their respected turn. Then, the player distributes their troops. The game checks whether the distribution is applicable. After this the player decides to attack specific locations of his/her opponents. The game checks whether the attack that they have decided is possible. After the attack stage, the distribution stage starts, then the game checks whether the distributions

decided by the player is possible. The sequence diagram is given below:

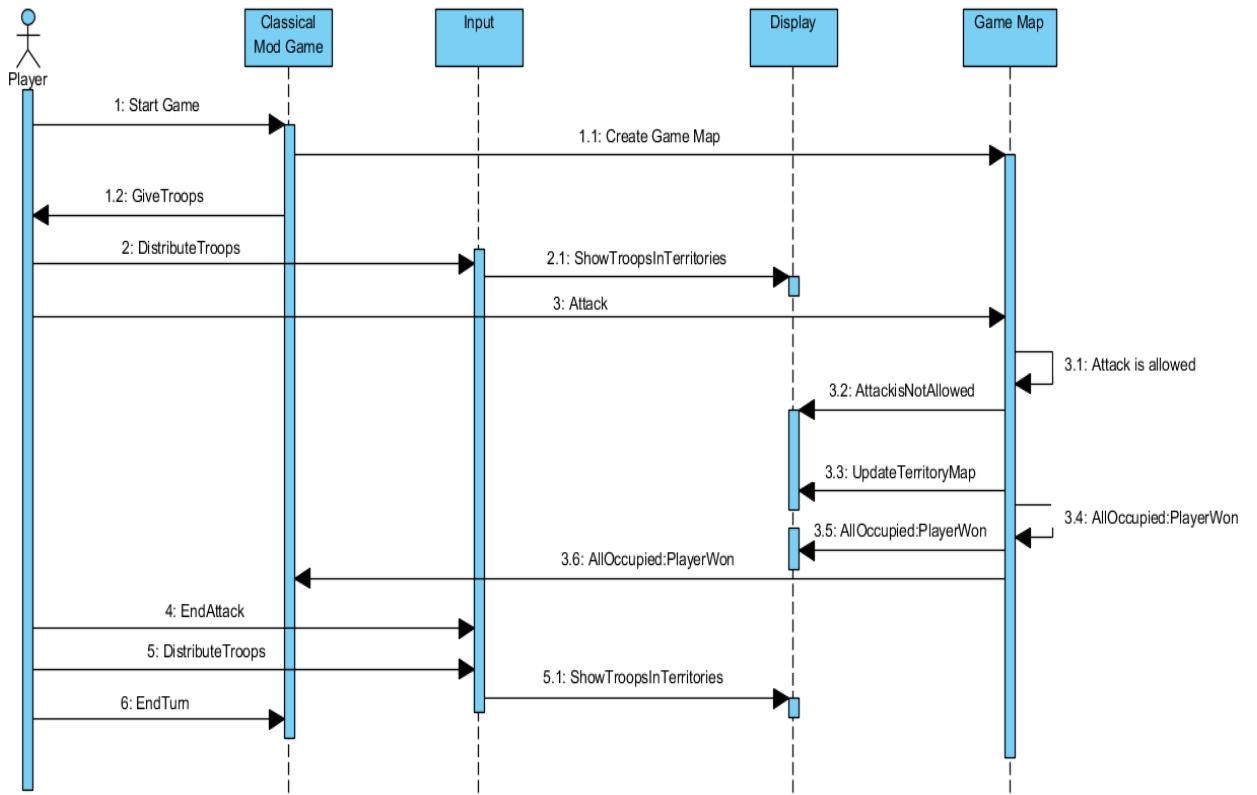


Figure 7: Classical Mod Sequence Diagram

5.2.1.5 Time Mod

The diagram is almost similar to classical mod diagram however, only with the addition of time countdown. The sequence Diagram is given below:

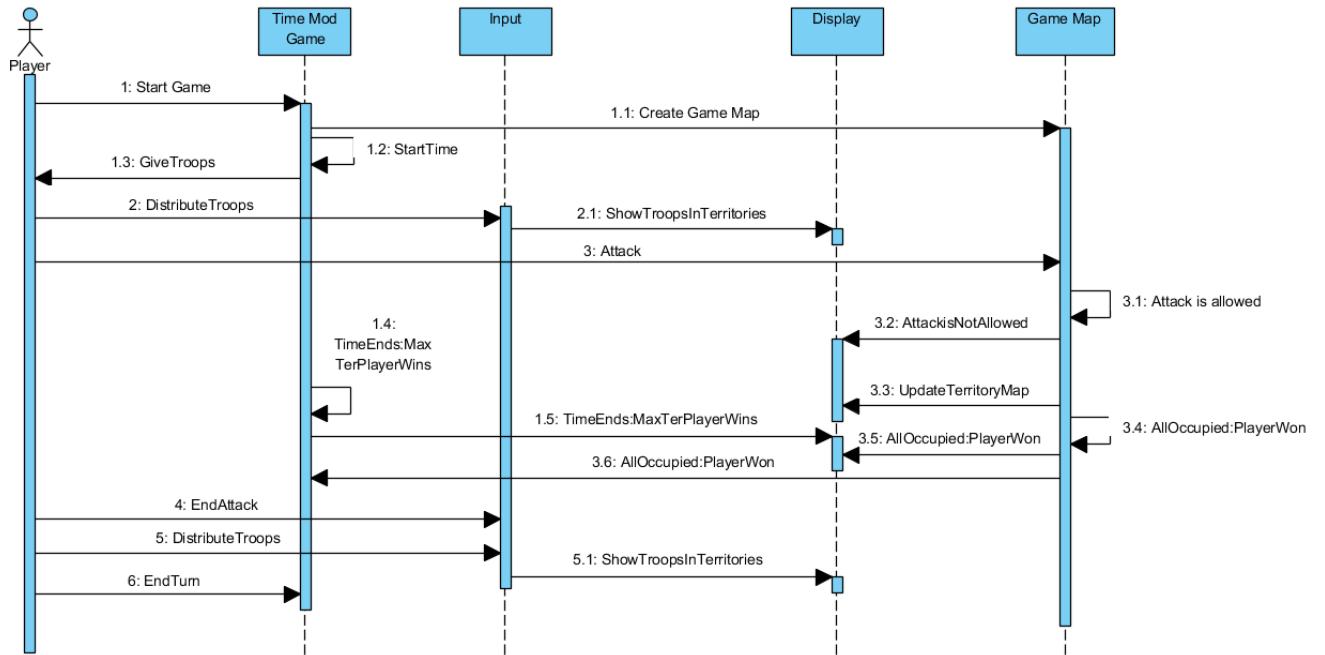


Figure 8: Sequence Diagram of Time Mod

5.2.1.6 Golden Territory Mod

Golden Territory Mod is identical to Classical Game Mod. The only difference is that instead of all territories, the map looks at golden territories

5.2.1.7 Attacking to a Specific Territory

While playing the game, it does not matter which mod, the Recruitment of the Troops is handled as it is being shown in the sequence diagram below. Firstly, the player chooses a territory to recruit troops. Later, the territory manager controls whether the specific territory is owned by the player. If the player owns that territory, then the player chooses a specific troop type to recruit. Then the troop manager adds the specific troop to the territory. Later, the territory is updated and then the map is updated.

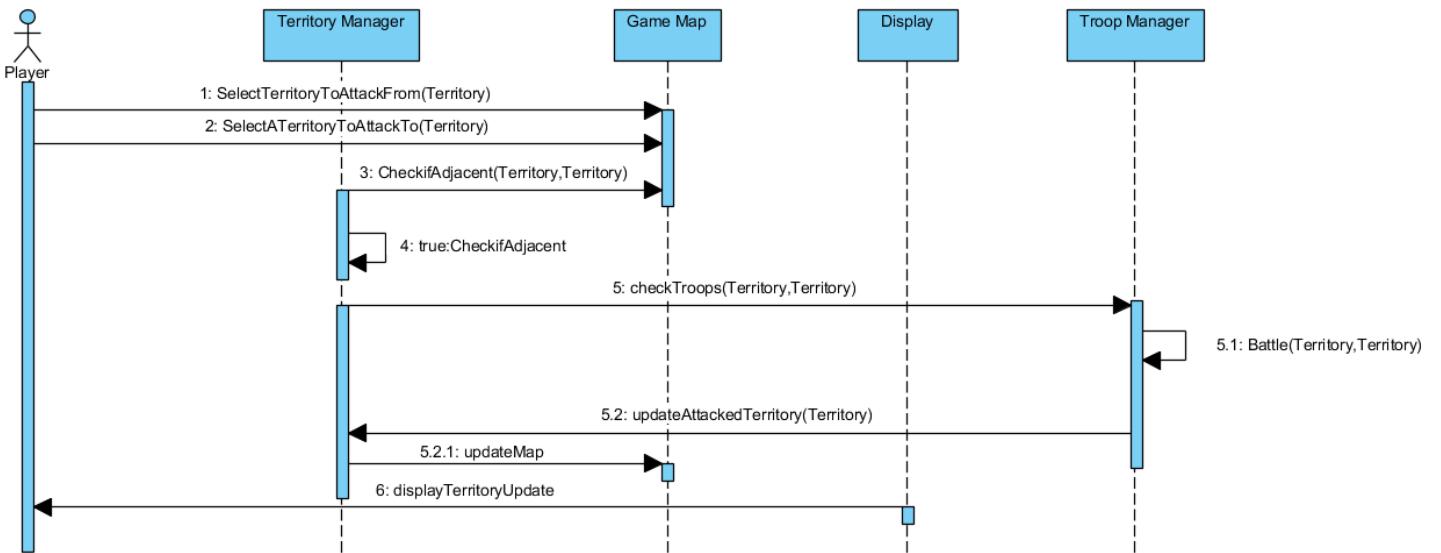


Figure 9: The sequence diagram of the attack function of the game.

5.2.1.8 Recruiting Troops to Territories

While playing the game, it does not matter which mod, the Attacking to a Specific Territory is handled as it is shown in the Sequence Diagram below. Firstly, the player selects a territory to attack from and then the player selects a territory to attack to. Later, the Territory manager and troop manager calculates the outcome of the battle and then the territory manager gets updated along with the map.

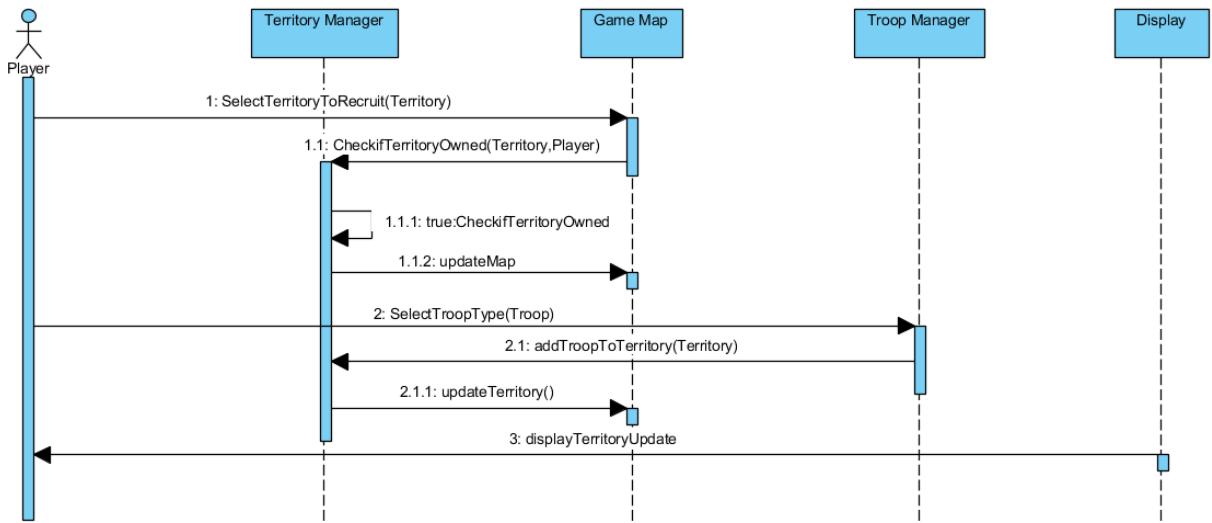


Figure 10:The sequence diagram of the recruit function in the game

5.2.2 State Diagrams

5.2.2.1 Classic Mod Gameplay State Diagram

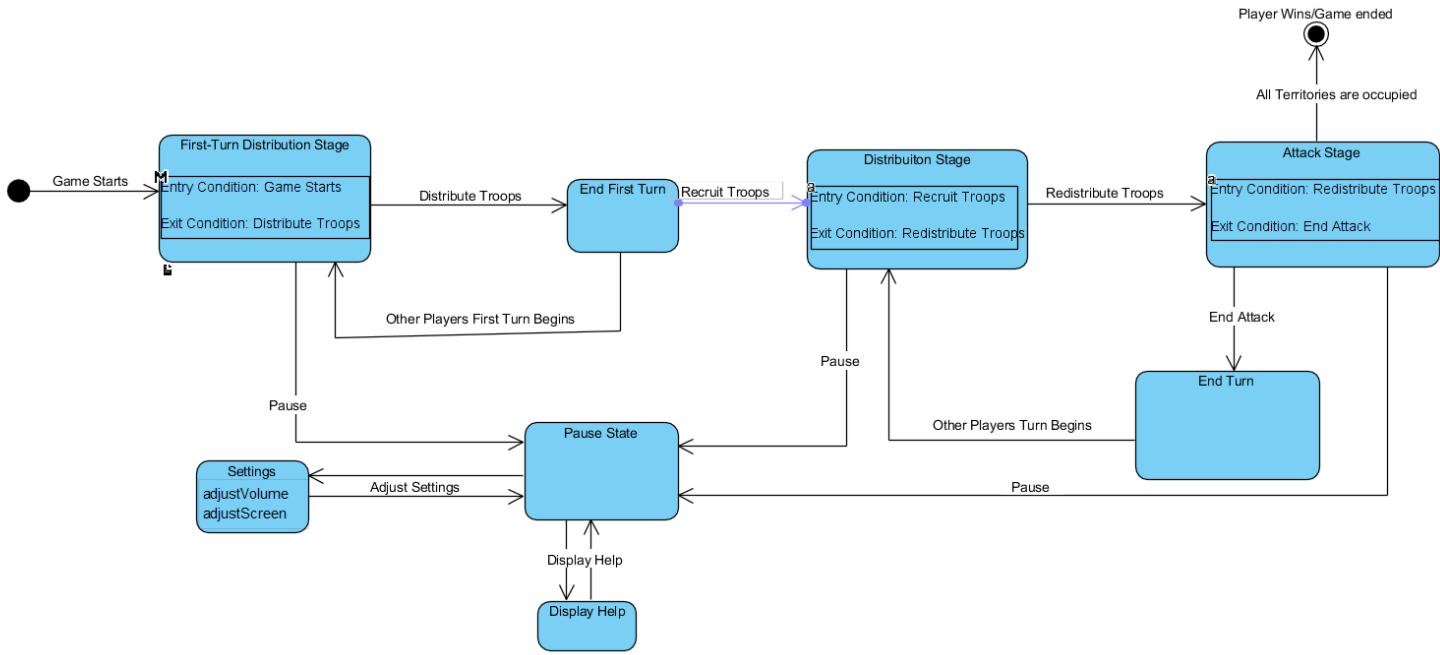


Figure 11: State Diagram of the Classical Mod

In classical mod, player starts in a steady state where the player is able to ask for hint and adjust the settings. Later, the stages of game begins. Firstly, player recruits troops, allowing him/her to enter to First-Turn Distribution Stage, then the player distributes his/her newly gained troops. After this has been repeated for all players. The Distribution Stage begins. The recruit of the troops and the distribution of the troops is done in the distribution stage. Later, the Attack Stage begins, in this stage the player tries to occupy as many territories as possible, if the player occupies all territories, he/she wins the game. Then the player ends the Attack stage. Then the player ends the turn and another players turn begins. The same process continues for another player.

5.2.2.2 Time Mod State Diagram

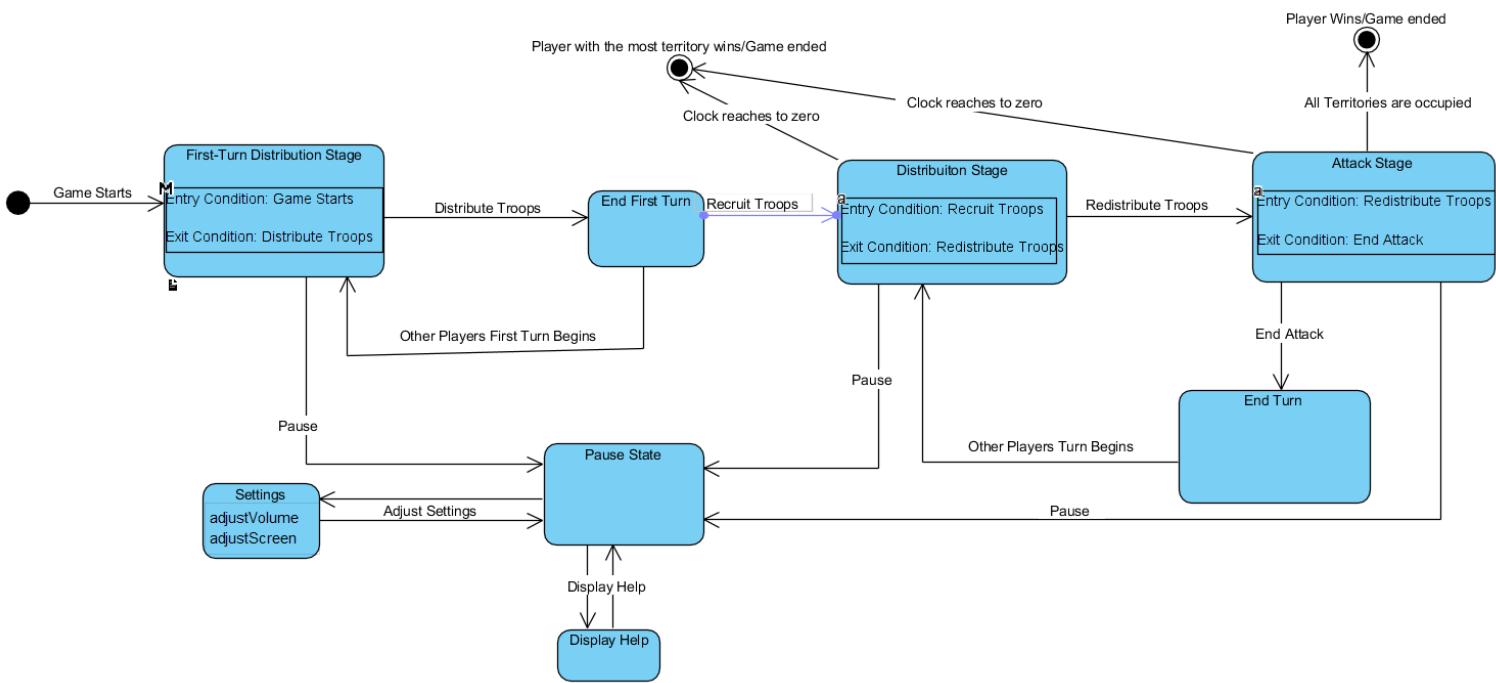


Figure 12: State Diagram of the Time Mod

The time mod is almost identical to the Classical Mod, except the game has a time limit. During the First-Turn distribution stage, distribution stage and attack stage, if the clock reaches to zero, then the player with the most territories wins the game.

5.2.2.3 Golden Territory State Diagram

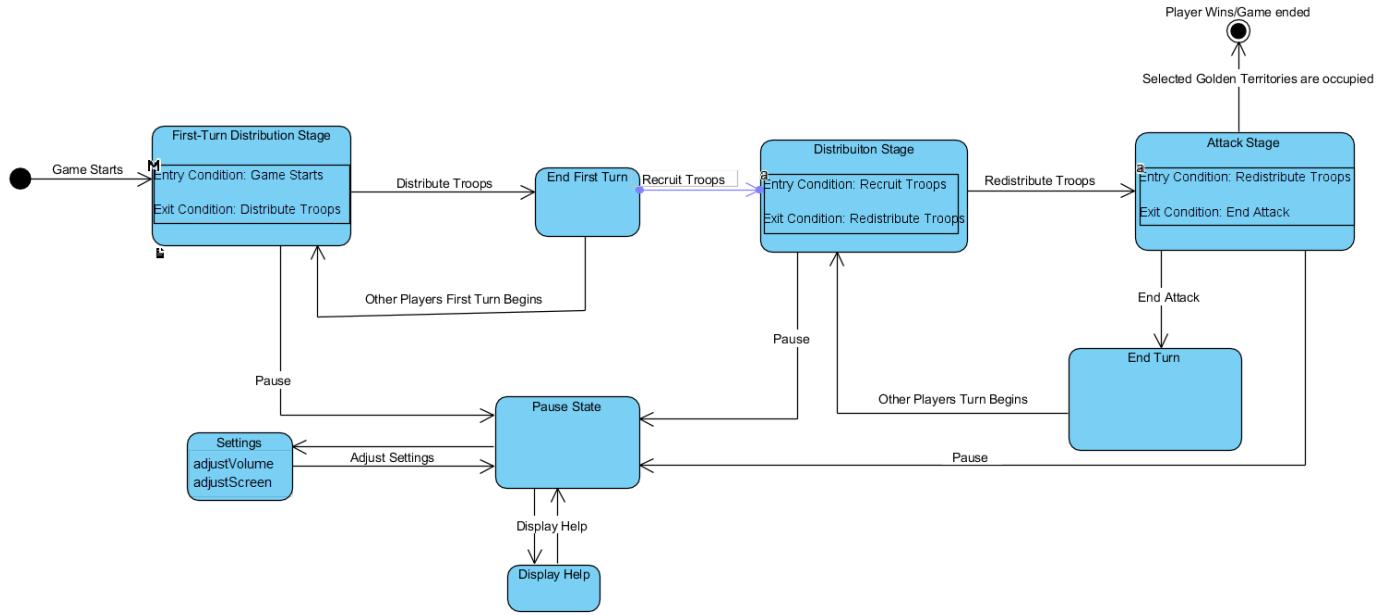
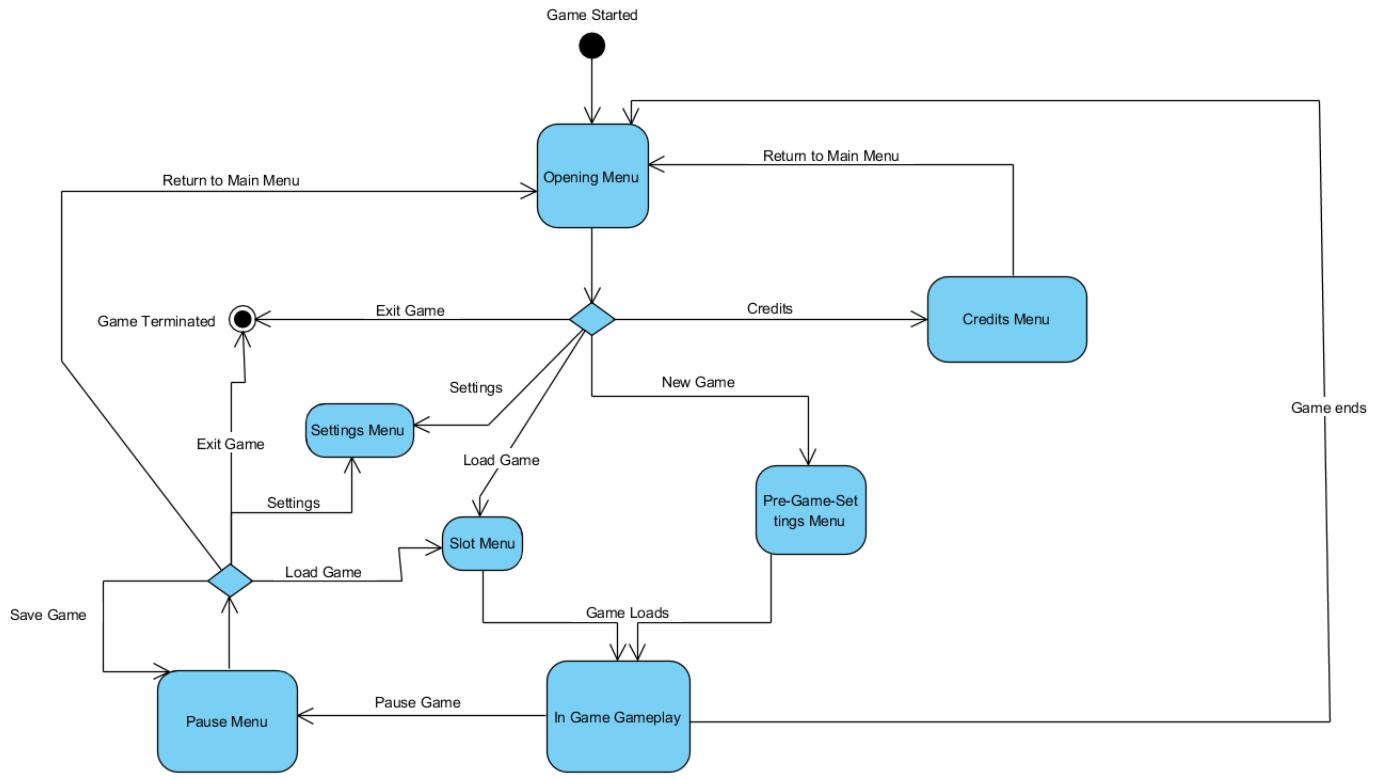


Figure 13: State Diagram of the Golden Territory Mod

The golden territory mod's state diagram is identical to the classical mod's state diagram except the final state occurs when one player occupies the golden territories.

5.2.3 Activity Diagram

5.2.3.1 Menu Operations Activity Diagram



Initially, the game starts and opens the main menu. From the main menu, the players are able to choose from 5 cases: New Game, Slot Menu, Settings Menu, Credits Menu and Exit Game.

Case1 : New Game

In the case player chooses new game, the player then initializes the number of players playing the game, the gameplay mod and the map in the Pre-Game Settings. Then, the game loads and the game starts.

Case2: Slot Menu

In the case the player chooses Slot Menu, the player chooses a previously saved game and then continues to play the game that he/she has previously saved.

Case 3: Settings Menu

In the case the player chooses Settings Menu, the player adjusts the general settings of the game which are the volume and the preference between widescreen and fullscreen. Settings menu is also accessible from the pause menu.

Case4: Credits Menu

In the case the player chooses Credits Menu, the player is able to see the developers of the game and then return to the main menu.

Case5: Exit Game

This is the end situation of the state diagram. The player chooses to close the game in this case

There is also In Game Gameplay state in which the player is able to pause the game to enter to pause menu. Through pause menu, the player is able to access 3 cases: Settings, Slot Menu, Exit Game and itself.

Case 1: Pause Menu

The player can save the game in the pause menu through the pause menu.

Case 2: Slot Menu

In this case, the player stops the current game and plays a previously saved game.

Case 3: Exit Game

The player is able to access the exit the game through pause menu.

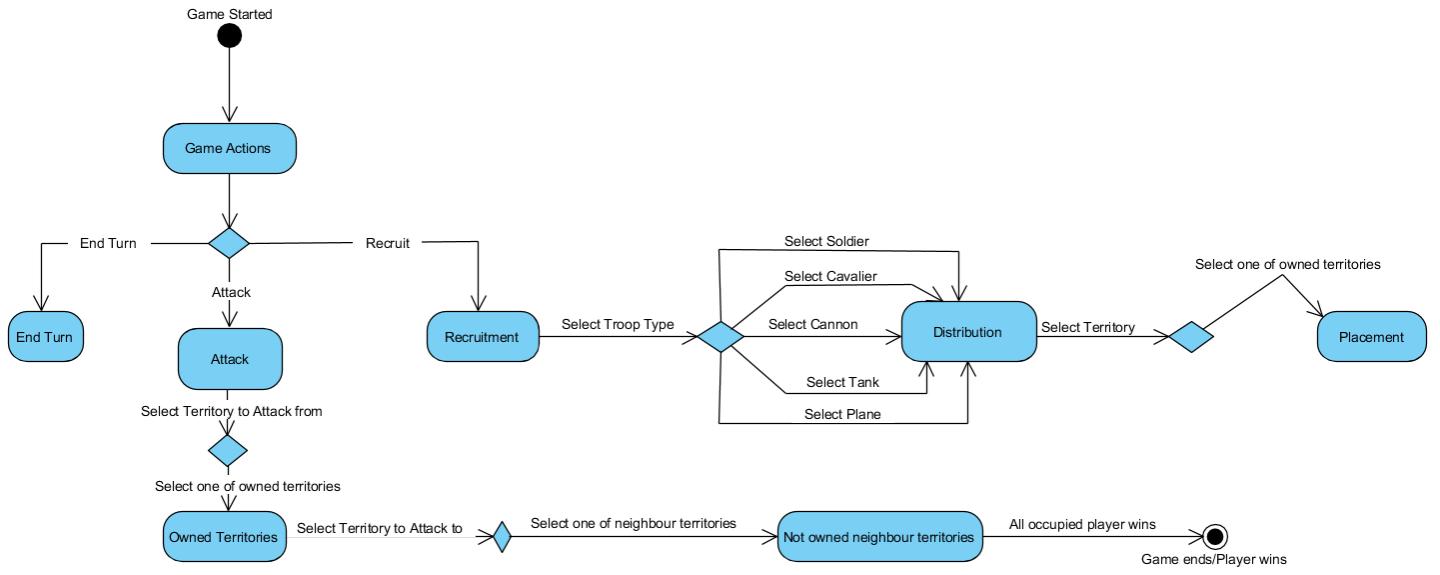


Figure 14: Activity Diagram for in game gameplay

Initially, the map loads and the game starts. Then, the player is able to choose a specific game action: End Turn, Attack and Recruitment.

Case 1: End Turn

In this case, the player ends his/her turn and other player's turn begins.

Case 2: Attack

In this case, firstly, the player chooses a territory to attack from, then based on that territory, the player chooses a specific neighbour territory to attack to. In the activity diagram, these decisions are shown with only one arrow since it is not possible to estimate the number of the territories that a hypothetical player owns and their neighbour territories.

Case 3: Recruitment

In this case, the player first chooses a troop type which can be

Case 1: Soldier, Case 2: Cavalier, Case 3: Cannon, Case 4: Tank, Case 5: Plane.

Later, the player chooses his/her territories to place that specific troop into.

5.2.4 Object and Class Models

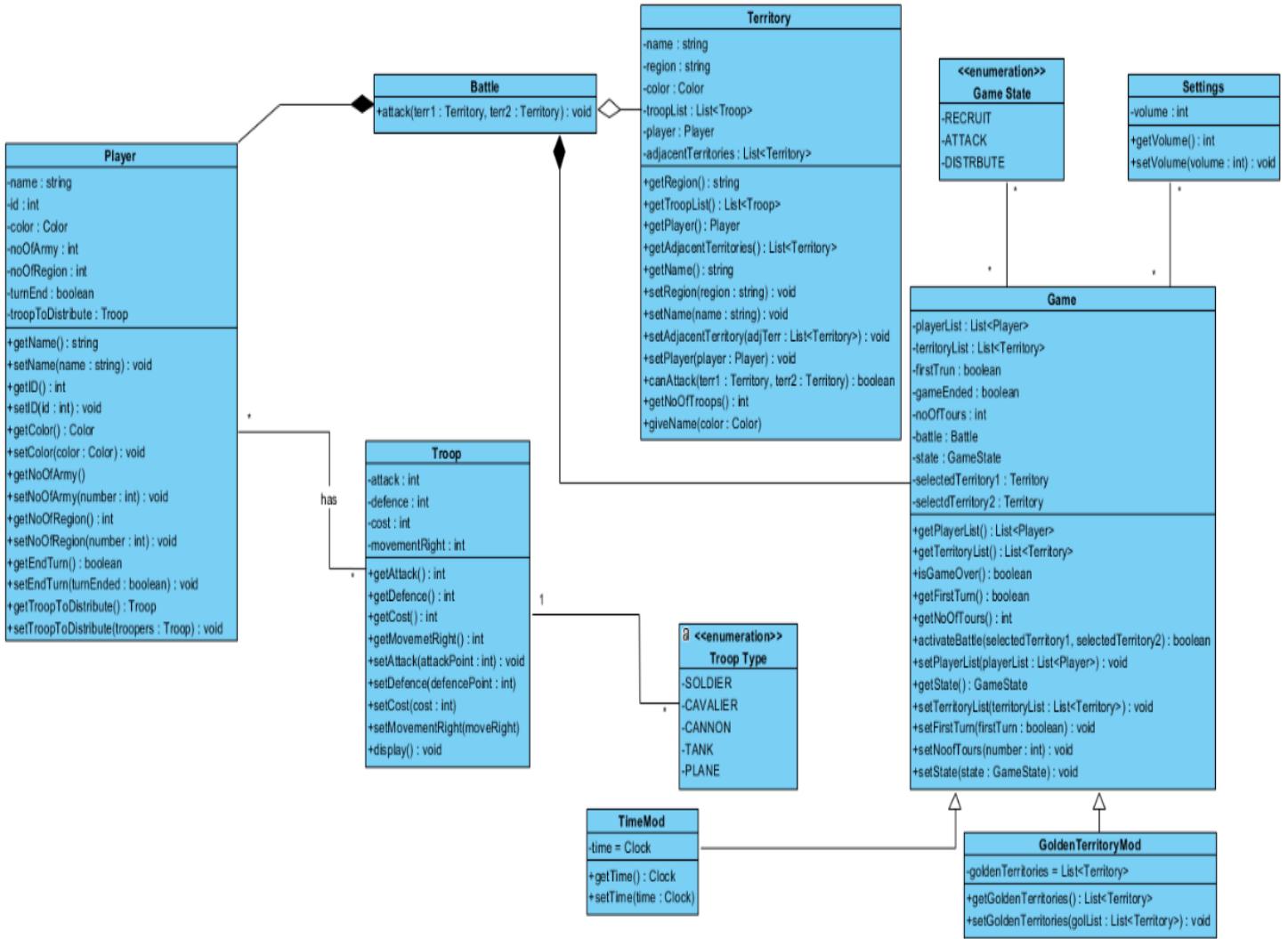


Figure 15: Class Diagram of the Game of "Risk"

Player

Attributes

name: Name of the Player

color: Color of the Player

`id`: the integer representing the Player
`noOfArmy`: number of Units of the Player
`noOfRegion`: number of regions Player has
`troopToDistribute`: an undistributed troop that Player holds
`turnEnd`: boolean representing the end of the Player's turn

Methods

`SetName()`: Sets the Name of the Player
`SetColor()`: Sets the Color of the Player
`SetNoOfArmy()`: Sets the number of Units of the Player
`SetID()`: Sets the ID of the Player
`SetNoOfRegion()`: sets the number of regions Player has
`SetEndTurn()`: sets the `turnEnd` boolean
`SetTroopToDistribute()`: sets the troop to be distributed
`GetName()`: Returns the Name of the Player
`GetColor()`: Returns the color of the Player
`Get NoOfArmy()`: Returns the unitNumber the Player
`GetNoOfRegion()`: Returns the number of regions Player has
`GetEndTurn()`: Returns the `turnEnd` boolean
`GetTroopToDistribute()`: Returns the troop to be distributed

Troop

Attributes

`attack`: The attack modifier of the Troop
`defence`: The defence modifier of the Troop
`cost`: The cost of the troop
`movementRight`: Integer represents movement ability of the Troop

Methods

`SetAttack()`: Sets the attack modifier of the Troop
`SetDefence()`: Sets the defence modifier of the Troop
`SetCost()`: Sets the cost of the Troop

SetMovementRight(): Sets the movementRight variable.
GetAttack(): Returns the attack modifier of the Troop
GetDefence(): Returns the defence modifier of the Troop
GetCost(): Returns the cost of the Troop
GetMovementRight(): Returns movementRight of the Troop
Display(): Displays the attributes of the Troop

Battle

Methods

Attack(): Simulates the attack between Troops in 2 territories

Territory

Attributes

name: Name of the Territory
region: Region Territory in
color: Color of the Territory
troopList: Troops in that Territory
player: The owner of the Territory
adjacentTerritories: Adjacent Territories to this Territory

Methods

SetName(): Sets the name of the Territory
SetTroopList(): Sets the troops on the Territory
SetRegion(): Sets the region the Territory in
SetPlayer(): Sets the owner of the Territory
SetAdjacentTerritory(): Sets the adjacent Territories of the Territory
GetName(): Returns the name of the Territory
GetTroopList(): Returns the troops on the Territory
GetRegion(): Returns the region the Territory in
GetPlayer(): Returns the owner of the Territory
GetAdjacentTerritories(): Returns the adjacent Territories of the Territory
GetNoOfTroops(): Returns the number of Troops on the Territory

GiveName(): -> setColor(): Sets the Color of the Territory

CanAttack(): Returns a boolean representing the attackability between 2 Territories

Game

Attributes

playerList: Collection of Players in the game

territroyList: Collection of Territories in the game

firstTurn: boolean representing the initial turn.

gameEnded: boolean representing the end of the game.

noOfTours: the number of Turns past.

battle: an object representing the battle between 2 Territories

state: the state of the game

selectedTerritory1: Territory in a battle

selectedTerritory2: Territory in a battle

Methods

SetTerritoryList(): Sets the Territory List

SetPlayerList(): Sets the Player List

SetFirstTurn(): Sets the firstTurn boolean

SetState(): Sets the state of the game

SetNoOfTours(): Sets the number of turns in the game

GetTerritoryList(): Returns the Territory List

GetPlayerList(): Returns the Player List

GetFirstTurn(): Returns the firstTurn boolean

GetState(): Returns the state of the game

GetNoOfTours(): Returns the number of turns in the game

IsGameOver(): Checkes whether the game is ended or not

ActivateBattle(): simulates a battle between Troops on 2 Territories

TimeMod

Attributes

time: The time past since the start of the game

Methods

SetTime(): Sets the time.

GetTime(): Returns the time.

GoldenTerritoryMod

Attributes

goldenTerritories: a list of Territories a Player must own to win

Methods

SetGoldenTerritories(): Sets the goldenTerritories

GetGoldenTerritories(): Returns the goldenTerritories

GameState

Enumeration for game states = { Recruit, Attack, Distribute }

TroopType

Enumeration for troop types = { Soldier, Cavalier, Cannon, Tank, Plane }

Settings

Attributes

Volume: integer to control the game sound

Methods

SetVolume(): Sets the volume

GetVolume(): Returns the volume

5.2.5 User Interface



Figure 16: UI of the Main Menu

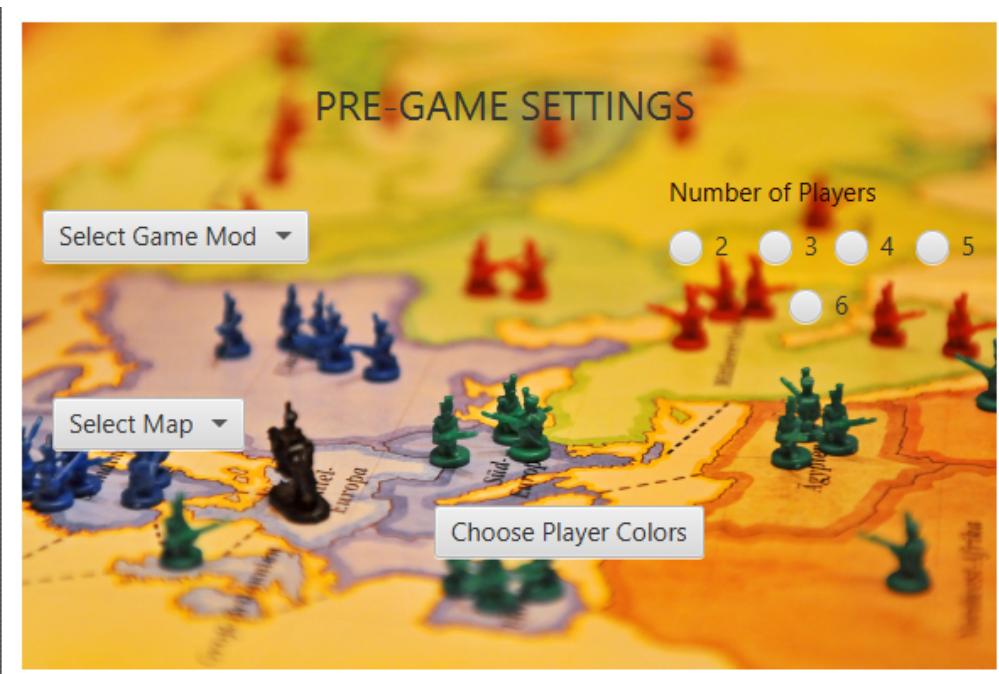


Figure 17: UI of the Pre-Game-Settings

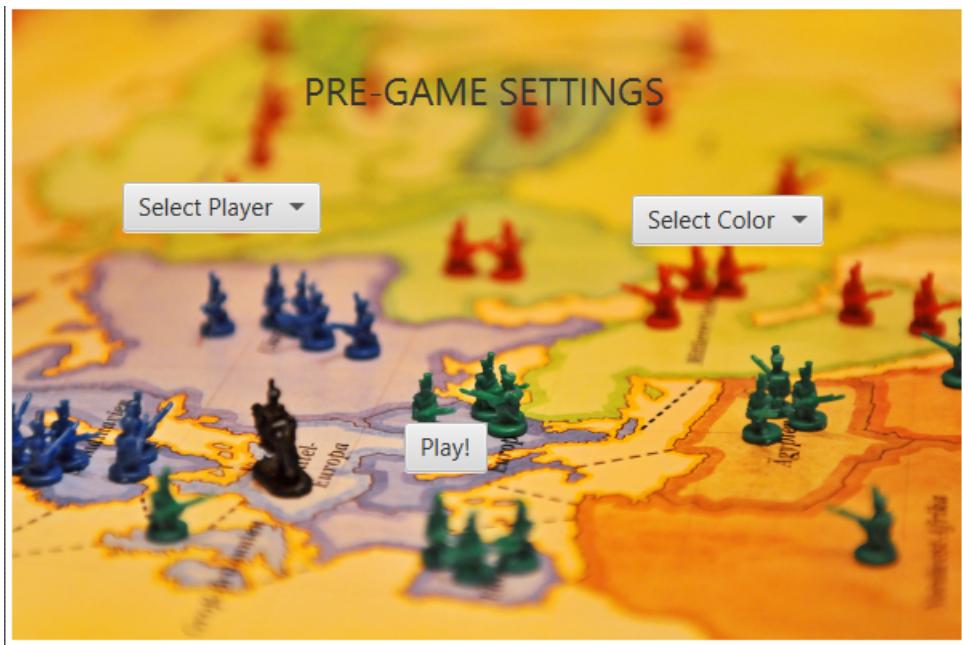


Figure 18: UI of the Pre-Game-Settings

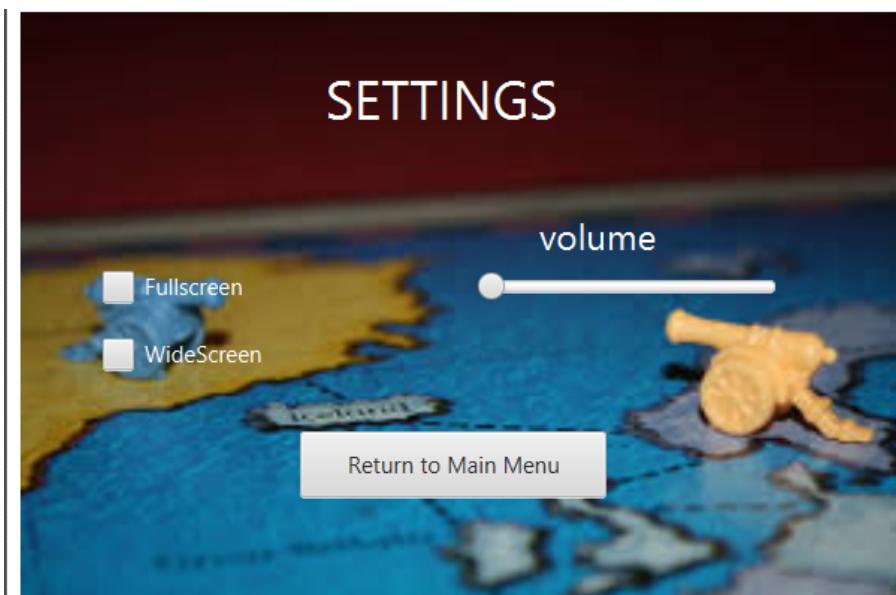


Figure 19: UI of the settings



Figure 20: UI of the gameplay

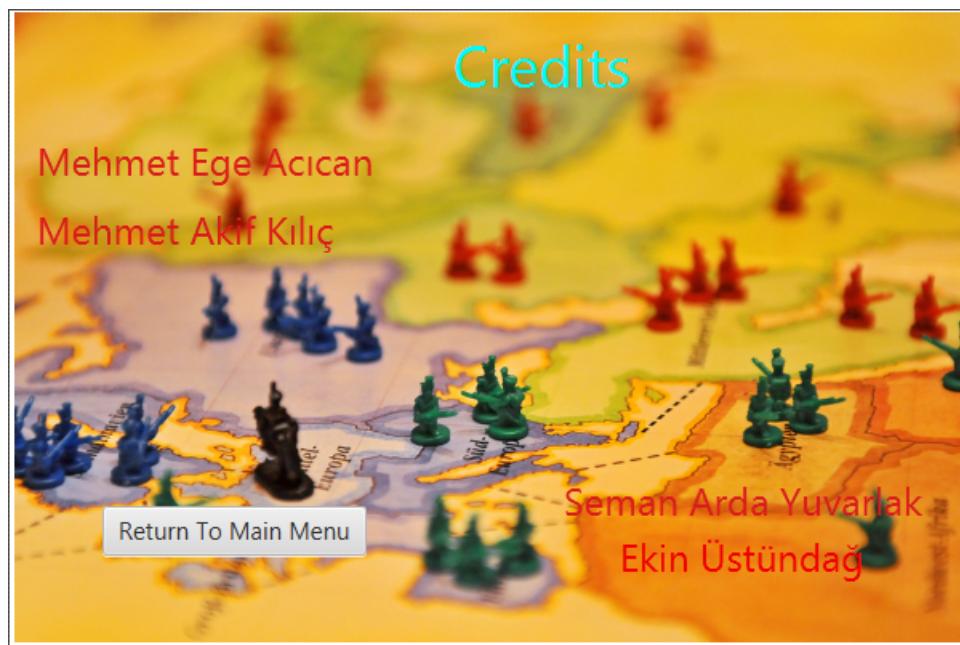


Figure 21: UI of the credits scene

6 Improvement Summary

In the second iteration, we have most importantly updated and removed specific aspects in the functional requirements, specific gameplay aspects and diagrams. The following lists the updates that we had made in the second iteration

- 1-** Gameplay aspect: We have removed the Color quality aspect of our game. This is due to the fact that some of the colors are being too powerful for others and thus every player would want to pick a specific color. For example, black color allowed the player to start with an extra territory.
- 2-** Gameplay Aspect: Instead of presenting the Tamriel as a new gameplay mod, we have decided to allow the player to adjust the map in the Pre-Game-Settings Menu.
- 3-** Functional Requirements: The gameplay requirements is just reduced to two: Distribution and Attack where the player should be able to pick a specific troop type and place it into the desired territory. Attack is designed in a way to allow the player to just choose 2 territories and allow the attack stage to happen.
- 4-** We have updated the use case diagram. The description of the use case diagram was updated as well. The use case is redesigned in order to become more complex and allow the players to fully understand the mechanics of the game.
- 5-** We have updated the class diagram based on the updated design of the code.
- 6-** We have removed Card and Color classes from our implementation since we are not going to rely on card or color effects in our final implementation.
- 7-** We have updated the sequence diagrams by adding two new sequence diagrams that describes the Distribution and Attack mechanics of our game.
- 8-** We have updated the State Diagrams. We have added an additional state that describes the first turn Distribution.
- 9-** We have updated the Activity Diagrams. We have completely created two new activity diagrams based on Menu operations and In game options.

7 References

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