Cs319 Term Project

Section 3

Group 3D

Nomanleft

Iteration 2 Analysis Report

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1.Introduction

In our project, we will implement Walls & Warriors board game to a PC environment. The original game setting includes a game board, 4 walls of different shape, 1 high tower, 3 blue knights and 4 red knights. Players then place the knights and high towers to the game board in the way game’s challenge booklet suggest. Once the setup is completed, players may start the game. The purpose of the game is placing the walls on the selected challenge in such a way that all the red knights are left outside the walls while all the blue knights and the high tower is inside. Once this achieved the given challenge is considered solved. The booklet has 80 of such challenges. Our implementation has many expansions and changes over the original one. A major difference is beside the original challenge solving mode, there will be time trial mode where the player will solve as many puzzles as he/she can against time and a sandbox mode where the player can design he/she's own challenge and then play it. Alongside the new mods, original gameplay's challenge design will be expanded as well. Different landforms such as hills or lava pits; the variety of characters with distinct attributes such as giant which covers two unit ground, battering-rams that requires more unit of walls to complete will save gameplay from monotony by enforcing player to think new ways of solving the puzzle. A set of boosters will be available player's aid to complete the challenge rather easily. Each level completion will include some gold reward so that player can refill boosters from the shop ones they finish. Besides the gold, depending on the number of steps taken towards the completion, a level can be completed with up to three stars, which shows player's puzzle solving skills.

2.Overview

2.1.Gameplay

The aim of the game is keeping all friendly warriors and the tower inside the walls and all enemy warriors outside of the walls by placing walls in a way to accomplish this purpose. Walls can be rotated to try different possibilities. Boosters can be used to make walls put easily by changing the type of the ground or moving a warrior or hiding a warrior. The user will earn more gold if he/she finishes the game by trying fewer actions.

2.2.Characters

A soldier can be enemy or friendly. All friendly soldiers must be inside walls while all enemy soldiers must be outside of walls.

Peasant is friendly only. Peasant does not have to be inside walls, however, if it is inside walls more gold will be earned to award protecting peasants.

Battle Ram is enemy only. In the direction of ram’s head, there must be two walls, otherwise, the ram will break it so the puzzle cannot be completed.

2.3.Map and Zones

A map is a nxn matrix consisted of different zones. A map can be in different shapes by making some zones unavailable or void.

Inside the map, **ground** zones are just normal zones where any character or wall can be there.

Lava zones are zones which nothing can be put, however, lava zones can be transformed into a ground by using fill booster.

Mountain zones are again zones which nothing can be put there, however, they can be transformed into a ground by using dig booster.

Bush zones are zones that soldiers can hide in them so they do not have to be inside walls since they hide. Bush zones are not initially existed but can be created by using hide booster.

Tower zones are similar to soldiers actually. They must be inside the walls in order to solve the puzzle. Also, nothing changes tower zones.

Wall zones are zones that user has put walls. They are not initially existed but they exist when a user put a wall. Walls can be put only on the ground zones.

2.4.Boosters

There are four boosters, two of them can be applied to characters and other two of them can be applied to zones.

Hide booster can be used only on a friendly soldier in order to hide it so it does not have to be inside walls. When a hide booster is used a bush zone appears on the zone that soldier stays.

Move booster can be used on every character to move them only one unit next so that putting walls and keeping friendly soldiers inside, enemy soldiers outside becomes easier.

Dig booster can be used only on mountain zones to transform them into ground zones.

Fill booster can be used only on lava zones to transform them into ground zones.

2.5.Point System

The user will gain points as he/she completes the level by trying fewer actions or saving peasants too. The user will gain golds according to his/her points. The highest score of the user on a specific level will be displayed while choosing a level. Golds can be spent on the shop in order to buy boosters.

3.Requirements

3.1.Functional Requirements

3.1.1.Play Game

There will be 3 different game modes as follows:

3.1.1.1. Play Normal Game

The player can play this mode by clicking Play Game from the menu. When clicked a panel that contains all the level will appear. Then the player can choose the next one or one of the previous challenges to play. The selected challenge will get loaded.

In the challenge, the player must complete a puzzle which requires him to build walls that leave all the enemy knights out while keeping his knights in. The player may need to consider the properties of different characters and elements while solving the challenge.

3.1.1.2. Time Trial

This mode can be opened from the menu by clicking the Time Trial button. Although logic for passing the challenges are the same here, in this mode player has to solve as many challenges as possible within a time limit. Unlike the normal mode, the order of levels is randomized here.

3.1.1.3. SandBox

The third mode SandBox allows players to design their own levels. In the menu, upon clicking sandbox option player encounters two options, create a level or play level. When create level is selected, the player places the enemy knights, different tile types and boosters in a valid combination to make a custom-made level. The second option play level allows the player to play the levels he/she made. The custom made levels are stored locally.

3.1.2.Shop

Upon completing a challenge in the normal mode player is rewarded with some amount of gold which can be used to buy boosters from the shop. Different kind of boosters helps the player to complete the level easier. We have designed 4 kind of boosters:

- **Hide** booster when used on a friendly knight it can be left outside the walls.
- **Move** booster when used on a friendly knight it moves one square.
- **Dig** booster which can be used on mountains to destroy them. Normally, player can’t put walls to mountains.
- **Fill** booster which turns the lava tiles to normal ground tils. Normally, player can’t put walls to lava.

The shop can be opened from the main menu.

3.1.3.Options

The player can access this screen from the main menu. In this panel, the player can adjust sound levels and mute or unmute them. Also, different themes are available for the player to change the appearances of the in-game characters.

3.1.4.How To Play

From the menu, the player can open this panel by clicking how to play button. This panel contains information about the basics of the game such as:

- the purpose of the game, win/lose conditions,
- features of different boosters,
- attributes of different characters and tiles,
- instructions for different game mods.

3.1.5.Credits

This panel can be opened from the menu and it contains information about the developers and maybe the artwork used (if any).

3.2.Non-Functional Requirements

3.2.1.Easy to Learn User Interface

The user interface plays a big role in our game since the crucial parts of the game such as placing walls, using boosters, customizing maps will be heavily dependent on the user interface. W&W is originally a board game that address a variety of age group. We aim to keep this feature. Our user interface must be easy to learn and use.

3.2.2.Customization

To increase the immersion to the game we thought of adding a character customization option which will allow the player to choose a theme for the character visuals. Each different character type will have its own image.

3.2.3 Immersive Ambiance

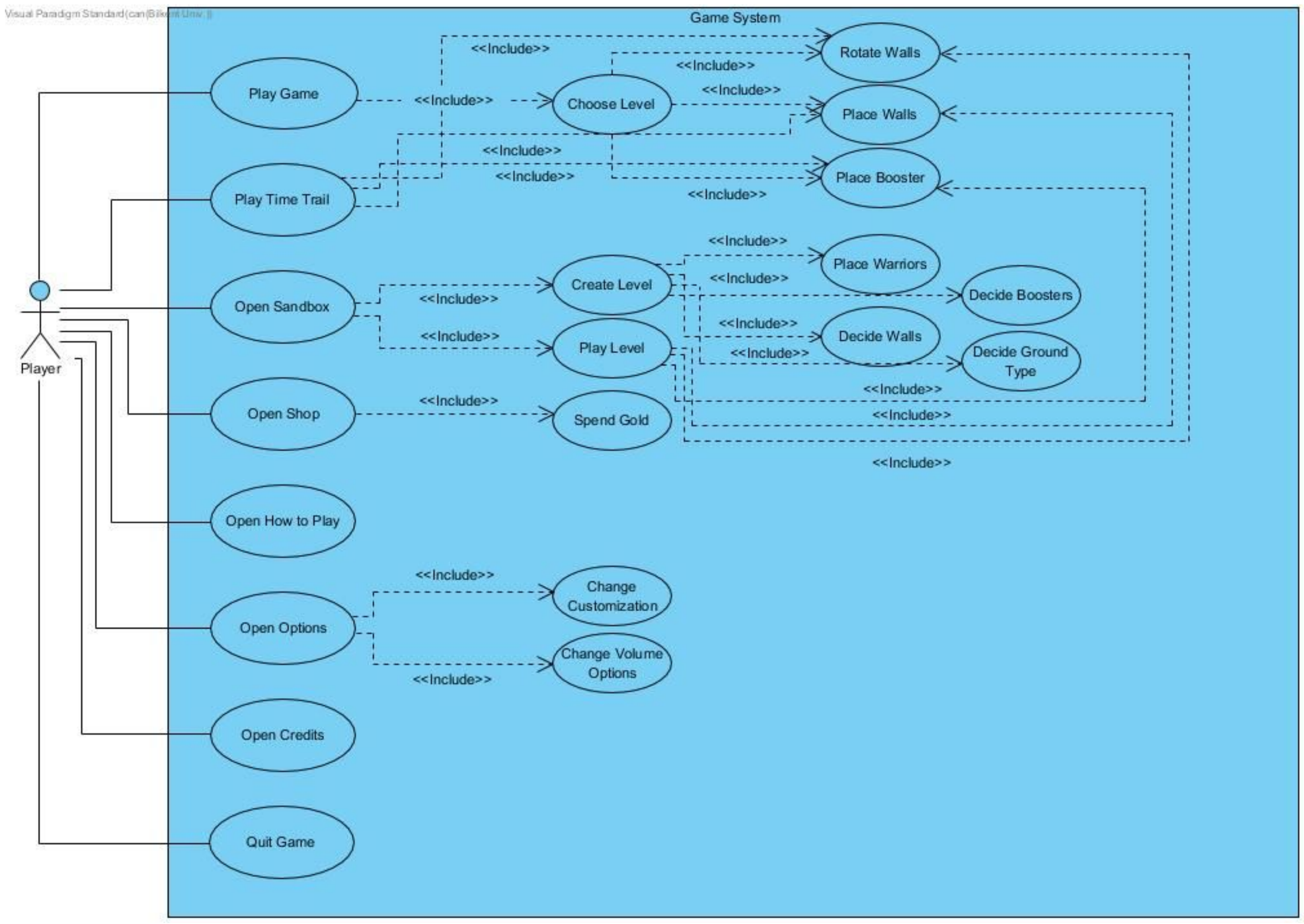
W&W have a historical theme related to medieval times. In our game too, we want to make players get into the flow of the game. For that we will put different background and character images to menu and panels. We will also include songs that will improve gaming experience.

3.2.4 Extendable Design

We want to keep our implementation simple and understandable so that it can be expanded as desired by anyone or its sub modules can be used in other projects. Beside the software side, levels will be kept as simple files so that more levels can be added easily.

4.System Models

4.1.Use Case Model



➢ Use Case #1

Use Case: Play Game
Primary Actor: Player
Stakeholders and Interests:
- Player selects play the game
- System shows levels

Pre-conditions:
- Player must be in the main menu.

Post-conditions:
Entry-conditions:
- Player should see any available level.

Exit conditions:
- Player selects back button.

Success Scenario Event Flow:
1. Player chooses Play game button.

Alternative Event Flows:
1. Player chooses back button to return menu.

➢ Use Case #2

Use Case: Choose Level
Primary Actor: Player
Stakeholders and Interests:
- Player selects level.
- System opens that level and lets player to play.

Pre-conditions:
- Player must be clicked play game button.

Post-conditions:
Entry-conditions:
- Player should choose any available level.

Exit conditions:
- Player selects back button to exit level panel.

Success Scenario Event Flow:
1. Player chooses Play game button.

Alternative Event Flows:
1. Player enters the level.
2. Player completes level.
3. Player gets point according to his/her performance.

➢ Use Case #3

Use Case: Rotate Walls
Primary Actor: Player
Stakeholders and Interests:
- Rotation of wall changes.

Pre-conditions:
- Player must be clicked to the level which he want.

. • Level should be available.
Post-conditions:
Entry-conditions:
- Player can rotate walls by the menu at right.

Exit conditions:
- Player selects back button to exit level.

Success Scenario Event Flow:
1. Player decide which wall to rotate.
2. Player rotates wall 90 degree at the direction he want.

Alternative Event Flows:
1. Player exits level without finishing it.

➢ Use Case #4

Use Case: Place Walls
Primary Actor: Player
Stakeholders and Interests:
- Place of wall changes.

Pre-conditions:
- Player must be clicked to the level which he want.

. • Level should be available.

Post-conditions:
- Player must drag the wall to the available ground.

Entry-conditions:
- Player can drag the wall the any place.

Exit conditions:
- Player selects back button to exit level.

Success Scenario Event Flow:
1. Player decides which wall to move.
2. Player changes the location of wall by dragging.
3. Player puts the wall to the available place.

Alternative Event Flows:
1. Player exits level without finishing it.

➢ Use Case #4

Use Case: Use Boosters
Primary Actor: Player
Stakeholders and Interests:
- Tile type changes.
- Soldier moves

Pre-conditions:
- Player must be clicked to the level which he want.

. • Level should be available.

Post-conditions:
- Player must drag the booster to the available ground or select soldier to move.

Entry-conditions:
- Player can apply the booster to the tiles or the soldier..

Exit conditions:
- Player selects back button to exit level.

Success Scenario Event Flow:
1. Player decides which booster to use.

Success Scenario Event Flow A:
1. Player changes the tile according to booster.

Success Scenario Event Flow B:
1. Player moves the soldier by the booster.

Alternative Event Flows:
1. Player exits level without finishing it.

➢ Use Case #6

Use Case: Play Time Trial
Primary Actor: Player
Stakeholders and Interests:
- The aim is to finish levels by solving puzzles as much as player can.
- Next levels are uploaded as player passes.

Pre-conditions:
- Player must be on main menu:

Post-conditions:
- Time has to end.

Entry-conditions:
- Player must click to the play time trial button on the menu.

Exit conditions:
- Player selects back button to exit level.
- Time ends so game ends.

Event Flow:
1. Player chooses Play Time Trial button.
2. Player passes levels in time.

Success Scenario Event Flow A:
3A. Time ends.

Alternative Event Flow B:
3B. Player chooses back button to return menu.

➢ Use Case #7

Use Case: Open Sandbox
Primary Actor: Player
Stakeholders and Interests:
- The aim is opening SandBox mode.

Pre-conditions:
- Player must be on main menu:

Post-conditions:
Entry-conditions:
- Player must click to Sandbox button on the menu.

Exit conditions:
- Player selects back button to exit sandbox mode.

Success Scenario Event Flow:
1. Player chooses SandBox button.

Alternative Event Flow A:
2A. Player chooses back button to return menu.

➢ Use Case #8

Use Case: Create Level
Primary Actor: Player
Stakeholders and Interests:
- The aim is to create a new level to be solved.
- Map must have a solution.

Pre-conditions:
- Sandbox button must be clicked.

Post-conditions:
Entry-conditions:
- Player must click to create level button.

Exit conditions:
- Player selects back button to return the main menu.

Success Scenario Event Flow:

1. Player chooses to create level button.
2. An environment to create a level show up.

Alternative Event Flow A:

3A. Player chooses back button to return menu.

- ➢ Use Case #9

Use Case: Play Level
Primary Actor: Player
Stakeholders and Interests:

- The aim is to play a level which is created by users.

Pre-conditions:

- Sandbox button must be clicked.

Post-conditions:
Entry-conditions:

- Player must click to play level button.

Exit conditions:

- The player selects back button to return the main menu.

Success Scenario Event Flow:

1. Player chooses to play level button.
2. A level shows up.

Alternative Event Flow A:

3A. Player chooses back button to return menu.

- ➢ Use Case #10

Use Case: Open How to Play
Primary Actor: Player
Stakeholders and Interests:

- The aim is to open and learn how to play.

Pre-conditions:

- How to play button must be clicked.

Post-conditions:
Entry-conditions:

- Player must click to how to play button.

Exit conditions:

- Player selects back button to return the main menu.

Success Scenario Event Flow:

1. Player chooses to how to play button.
2. A description of the game with images and texts shows up.

Alternative Event Flow A:

3A. Player chooses back button to return menu.

- ➢ Use Case #11

Use Case: Place Warriors
Primary Actor: Player
Stakeholders and Interests:

- Player places warriors to make a custom level.

Pre-conditions:

- Sandbox button must be clicked.

Post-conditions:
- Placement must be in a valid tile.

Entry-conditions:
- Player must select and drag a warrior from the panel to the map.

Exit conditions:
- Player places the warrior to a valid tile.
- Player releases the warrior to a invalid place or tile.
- Player releases the warrior back to the panel.

Success Scenario Event Flow:
1. Player selects and drags the warrior to map.
2. Player releases the warrior to a valid tile.
3. Warrior is placed to the tile successfully.

Alternative Event Flows:
if player releases the warrior to a invalid place or puts it back to the panel:
1. Warrior returns to the panel.

➢ Use Case #12

Use Case: Decide Boosters
Primary Actor: Player
Stakeholders and Interests:
- Player choses boosters to use in the custom made level.

Pre-conditions:
- Sandbox button must be clicked.

Post-conditions:
Entry-conditions:
- Player must click to the boosters from the panel to include them.

Exit conditions:
- Player checks boosters.
- Player unchecks boosters.

Success Scenario Event Flow:
1. Player checks boosters.
2. Boosters gets included to the level when custom level making is completed.

Alternative Event Flows:
if player doesn’t complete the custom level:
1. Level and booster choices are not saved.

➢ Use Case #13

Use Case: Decide Walls
Primary Actor: Player
Stakeholders and Interests:
- Player chooses different shaped walls to use in the custom made level.

Pre-conditions:
- Sandbox button must be clicked.

Post-conditions:
Entry-conditions:
- Player must click to the walls from the panel to include them.

Exit conditions:
- Player checks walls.
- Player unchecks walls.

Success Scenario Event Flow:

1. Player checks walls.
2. Walls gets included to the level when custom level making is completed.

Alternative Event Flows:

if the player doesn’t complete the custom level:

1. Level and wall choices are not saved.

➢ Use Case #14

Use Case: Decide Ground Type
Primary Actor: Player
Stakeholders and Interests:

• Player places different tile types to customize the level map.

Pre-conditions:

• Sandbox button must be clicked.

Post-conditions:
Entry-conditions:

• Player must drag tiles from the panel to the map.

Exit conditions:

• Player places the tile to the map.
• Player places the tile back to the panel.

Success Scenario Event Flow:

1. Player places the tile to the map.
2. The map is saved when the customization complete.

Alternative Event Flows:

if player doesn’t complete the custom level:

1. Level and custom map are not saved.

➢ Use Case #14

Use Case: Open Shop
Primary Actor: Player
Stakeholders and Interests:

• Player enters the shop to buy boosters.

Pre-conditions:

• Shop button in the menu must be clicked.

Post-conditions:
Entry-conditions:

Shop button in the menu must be clicked.

Exit conditions:

• Player clicks back button in the shop panel to return to the menu.

Success Scenario Event Flow:

1. Player clicks the shop button while in the menu.
2. Shop panel appears.

Alternative Event Flows: if player does not complete the process of spending gold and presses the back button,

1. The amount of gold will not be deducted from the inventory of the player.

➢ Use Case #16

Use Case: Open Options
Primary Actor: Player
Stakeholders and Interests:
- Player selects Options button
- System shows Customization and Volume Options

Pre-conditions:
- Player must be in the main menu.

Post-conditions:
Entry-conditions:
- Player should see current volume settings and default customization settings.

Exit conditions:
- Player selects back button.

Success Scenario Event Flow:
1. Player chooses Options button.

Alternative Event Flows:
1. Player chooses back button to return menu.

➢ Use Case #17

Use Case: Change Volume Options
Primary Actor: Player
Stakeholders and Interests:
- Player scrolls the volume bar of system music.
- System gets the given volume and adjusts the game music accordingly .

Pre-conditions:
- Player must be clicked Options button.

Post-conditions:
Entry-conditions:
- Player should choose the appropriate music volume.

Exit conditions:
- Player selects back button to exit Change Volume panel.

Success Scenario Event Flow:
1. Player chooses Options button.

Alternative Event Flows:
1. Player chooses Options button.
2. Player chooses desired music volume.
3. System changes the music volume accordingly.

➢ Use Case #18

Use Case: Change Customization
Primary Actor: Player

Stakeholders and Interests:
- Player selects Change Customization button.
- System displays the available customization options.

Pre-conditions:
- Player must be clicked Options button.

Post-conditions:
Entry-conditions:
- Player must select a customization option.

Exit conditions:
- Player selects back button to exit Change Customization panel.

Success Scenario Event Flow:
1. Player presses Options button.
2. Player presses Change Customization button.
3. Player chooses the desired customization option.

- ➢ Use Case #19

Use Case: Open Credits
Primary Actor: Player

Stakeholders and Interests:
- Player selects Credits button.
- System shows credits about developers.

Pre-conditions:
- Player must be in the main menu.

Post-conditions:
Entry-conditions:
- Player should see the credits text content.

Exit conditions:
- Player selects back button.

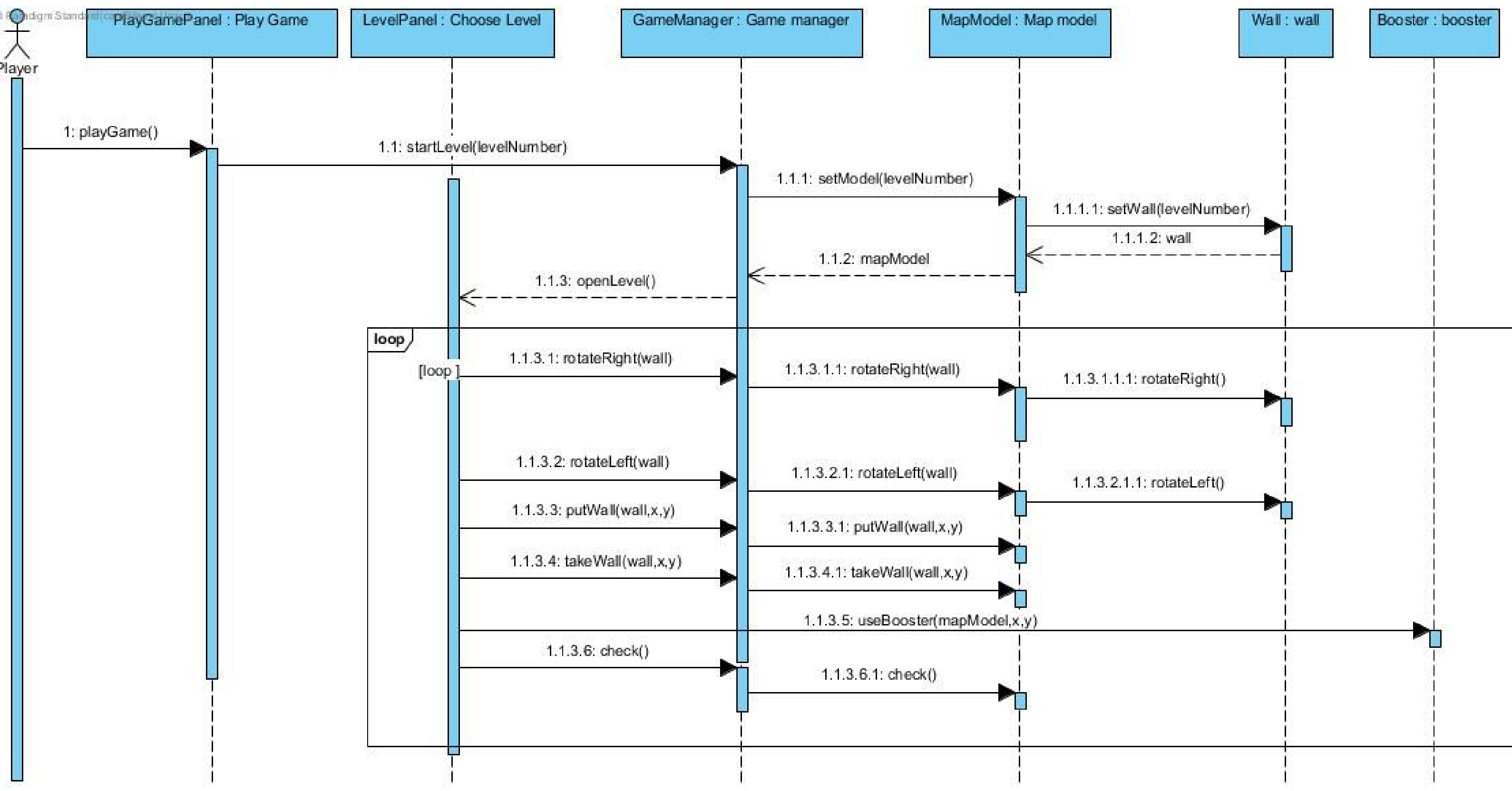
Success Scenario Event Flow:
1. Player chooses Credits button.

Alternative Event Flows:
1. Player chooses back button to return menu.

4.2.Dynamic Models

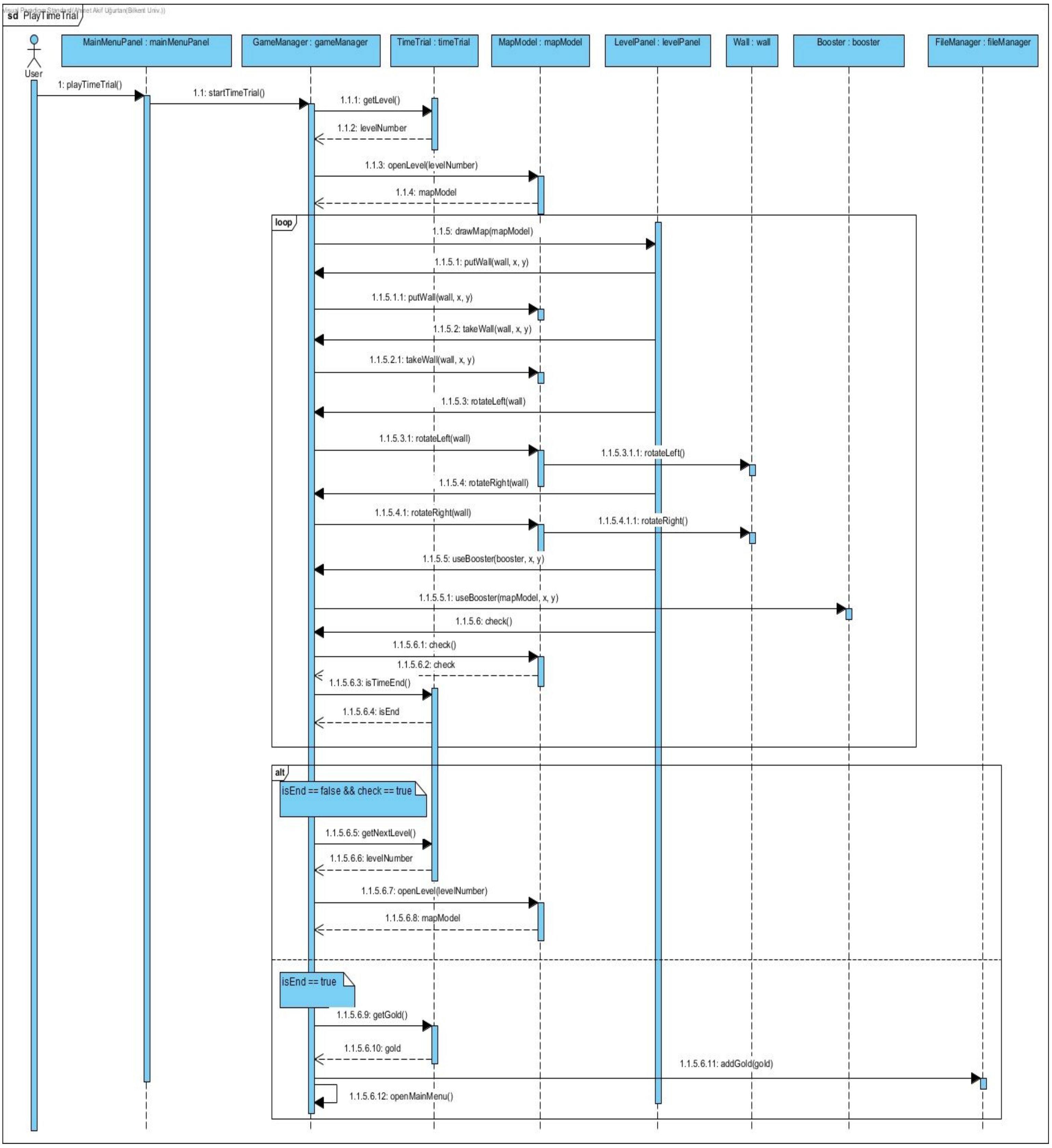
4.2.1.Sequence Diagram

4.2.1.1.Play Game Sequence


Player
PlayGamePanel : Play Game
LevelPanel : Choose Level
GameManager : Game manager
MapModel : Map model
Wall : wall
Booster : booster
1: playGame()
1.1: startLevel(levelNumber)
1.1.1: setModel(levelNumber)
1.1.1.1: setWall(levelNumber)
1.1.1.2: wall
1.1.2: mapModel
1.1.3: openLevel()
loop
[loop]
1.1.3.1: rotateRight(wall)
1.1.3.1.1: rotateRight(wall)
1.1.3.1.1.1: rotateRight()
1.1.3.2: rotateLeft(wall)
1.1.3.2.1: rotateLeft(wall)
1.1.3.2.1.1: rotateLeft()
1.1.3.3: putWall(wall,x,y)
1.1.3.3.1: putWall(wall,x,y)
1.1.3.4: takeWall(wall,x,y)
1.1.3.4.1: takeWall(wall,x,y)
1.1.3.5: useBooster(mapModel,x,y)
1.1.3.6: check()
1.1.3.6.1: check()

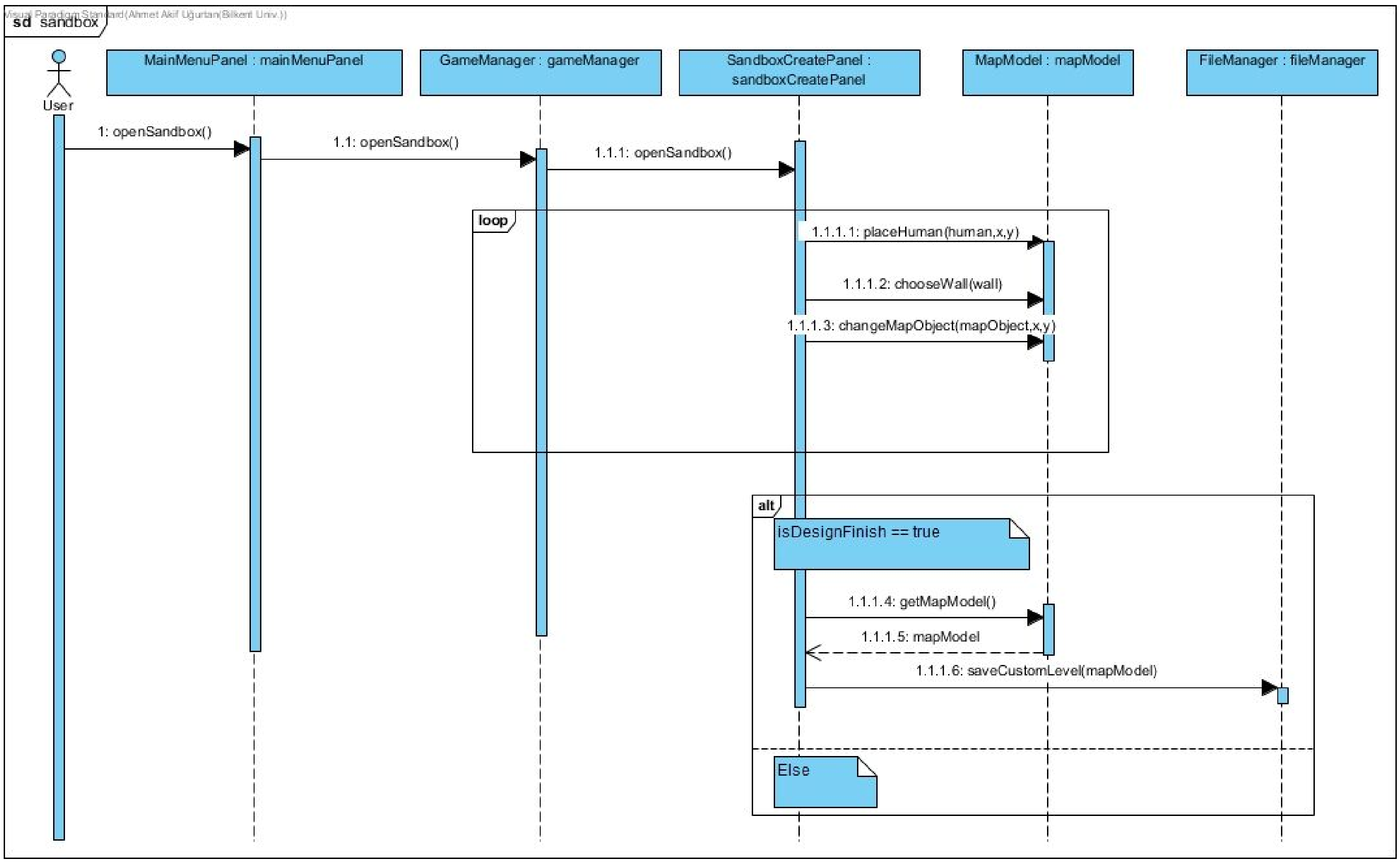
Scenario: User wants to start the game. He/she opens the play game panel from the menu panel. After opening play game panel he/she is able to choose levels but these levels will be available when you pass previous levels. With the level panel, the user selects the level he wants and the game will be initialized by the game manager. After that, GameManager sends the level's information to the map controller and map will be set. The user can play the game afterward. User able to rotate walls from the UI. In order to place walls, he/she has to place available place. There are two types of boosters: 1) Human Booster 2)Tile Booster. The user needs to use these boosters to the correct places to advance the game. When the user finishes the level he/she returns to the level panel.

4.2.1.2.Play Time Trial Sequence


Visual Paradigm Standard(Ahmet Akif Uğurtan(Bilkent Univ.))
sd PlayTimeTrial
User
MainMenuPanel : mainMenuPanel
GameManager : gameManager
TimeTrial : timeTrial
MapModel : mapModel
LevelPanel : levelPanel
Wall : wall
Booster : booster
FileManager : fileManager
1: playTimeTrial()
1.1: startTimeTrial()
1.1.1: getLevel()
1.1.2: levelNumber
1.1.3: openLevel(levelNumber)
1.1.4: mapModel
loop
1.1.5: drawMap(mapModel)
1.1.5.1: putWall(wall, x, y)
1.1.5.1.1: putWall(wall, x, y)
1.1.5.2: takeWall(wall, x, y)
1.1.5.2.1: takeWall(wall, x, y)
1.1.5.3: rotateLeft(wall)
1.1.5.3.1: rotateLeft(wall)
1.1.5.3.1.1: rotateLeft()
1.1.5.4: rotateRight(wall)
1.1.5.4.1: rotateRight(wall)
1.1.5.4.1.1: rotateRight()
1.1.5.5: useBooster(booster, x, y)
1.1.5.5.1: useBooster(mapModel, x, y)
1.1.5.6: check()
1.1.5.6.1: check()
1.1.5.6.2: check
1.1.5.6.3: isTimeEnd()
1.1.5.6.4: isEnd
alt
isEnd == false && check == true
1.1.5.6.5: getNextLevel()
1.1.5.6.6: levelNumber
1.1.5.6.7: openLevel(levelNumber)
1.1.5.6.8: mapModel
isEnd == true
1.1.5.6.9: getGold()
1.1.5.6.10: gold
1.1.5.6.11: addGold(gold)
1.1.5.6.12: openMainMenu()

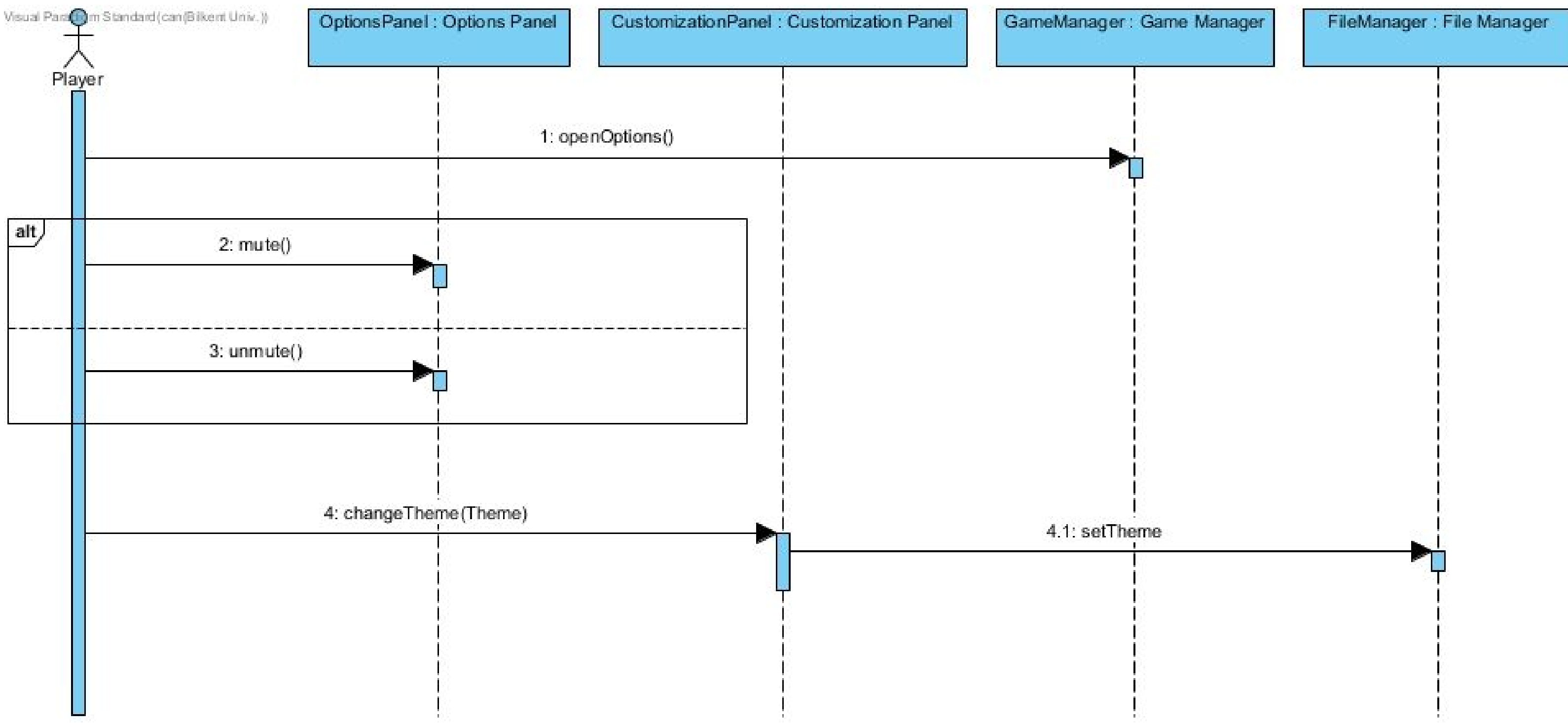
Scenario: User wants to play time trial challenge. He/she clicks time trial button on the main menu. GameManager takes the request and timeTrial class chooses a random level then GameManager sends a request to the mapModel to create the randomly chosen level. After, mapModel returns the current map to the LevelPanel via GameManager. LevelPanel displays the map, the boosters, the point etc. to the user. User clicks a booster then a zone on the map to user or user chooses a wall then a zone on the map to put the wall centered on that zone or user chooses a wall and clicks the rotate button on the wall to rotate wall. All these actions with id and position first go to GameManager then mapModel . mapModel performs necessary modifications and returns the current map. LevelPanel displays the current map. If the time is not end and a solution is provided for a level, then a random new level is created and user tires to solve this while time is continuing. If the time is end, then time trial challenge is finished and timeTrial class calculates the gold user earned and writes it in the file by FileManager.

4.2.1.3.SandBox


sd sandbox
Visual Paradigm Standard(Ahmet Akif Uğurtan(Bilkent Univ.))
User
MainMenuPanel : mainMenuPanel
GameManager : gameManager
SandboxCreatePanel : sandboxCreatePanel
MapModel : mapModel
FileManager : fileManager
1: openSandbox()
1.1: openSandbox()
1.1.1: openSandbox()
loop
1.1.1.1: placeHuman(human,x,y)
1.1.1.2: chooseWall(wall)
1.1.1.3: changeMapObject(mapObject,x,y)
alt
isDesignFinish == true
1.1.1.4: getMapModel()
1.1.1.5: mapModel
1.1.1.6: saveCustomLevel(mapModel)
Else

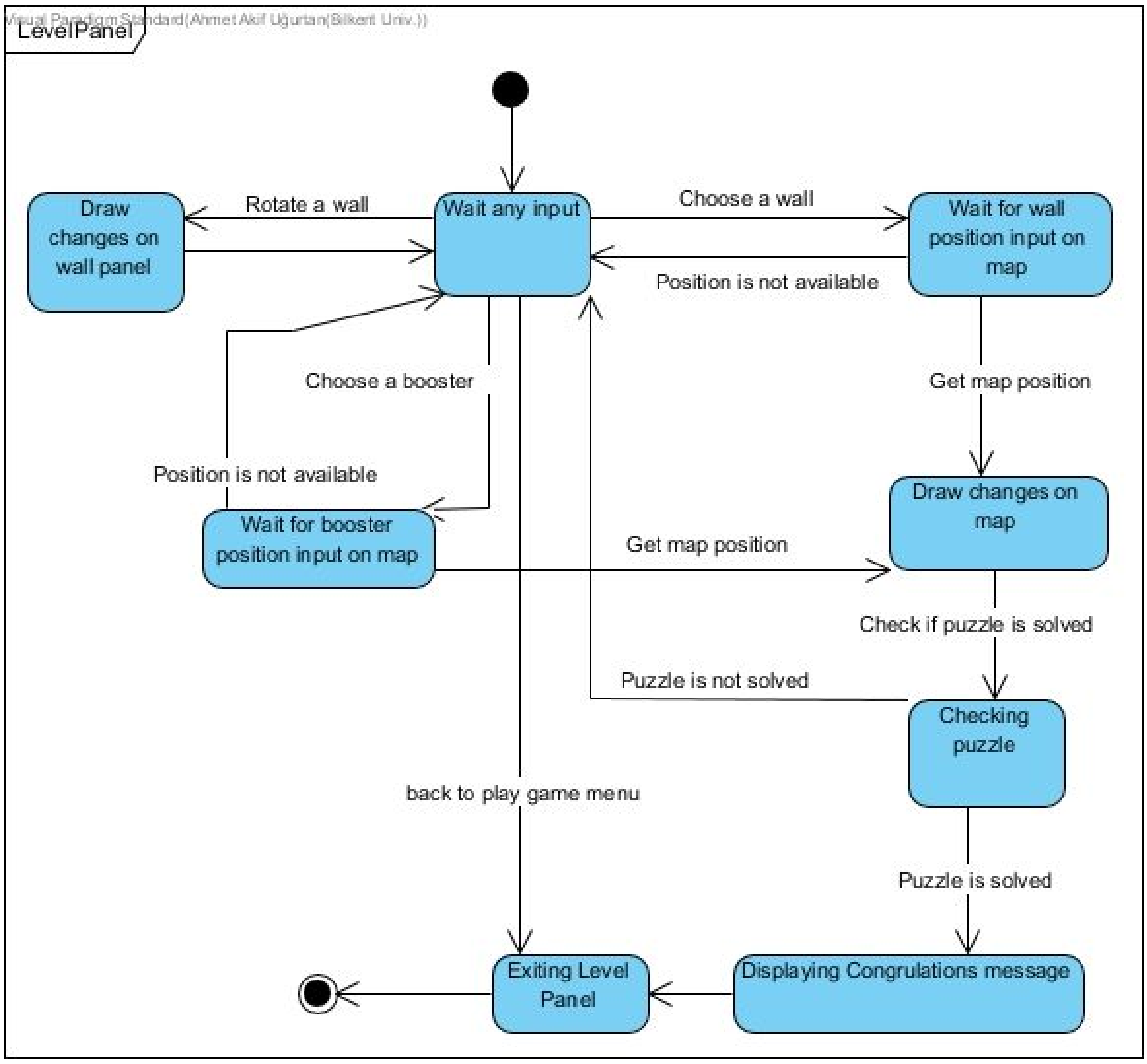
Scenario: User wants to create a custom level. User clicks sandbox button on the main menu. GameManager opens SandboxPanel. The user can decide which type of walls will be used, or where soldiers will stay or where peasants will stay or the type of zones. All these actions will be done through onclicks and panels in the SandboxPanel and all changes will be saved on MapModel class.

4.2.1.4 Options


Visual Paradigm Standard (can(Bilkent Univ.))
Player
OptionsPanel : Options Panel
CustomizationPanel : Customization Panel
GameManager : Game Manager
FileManager : File Manager
1: openOptions()
alt
2: mute()
3: unmute()
4: changeTheme(Theme)
4.1: setTheme

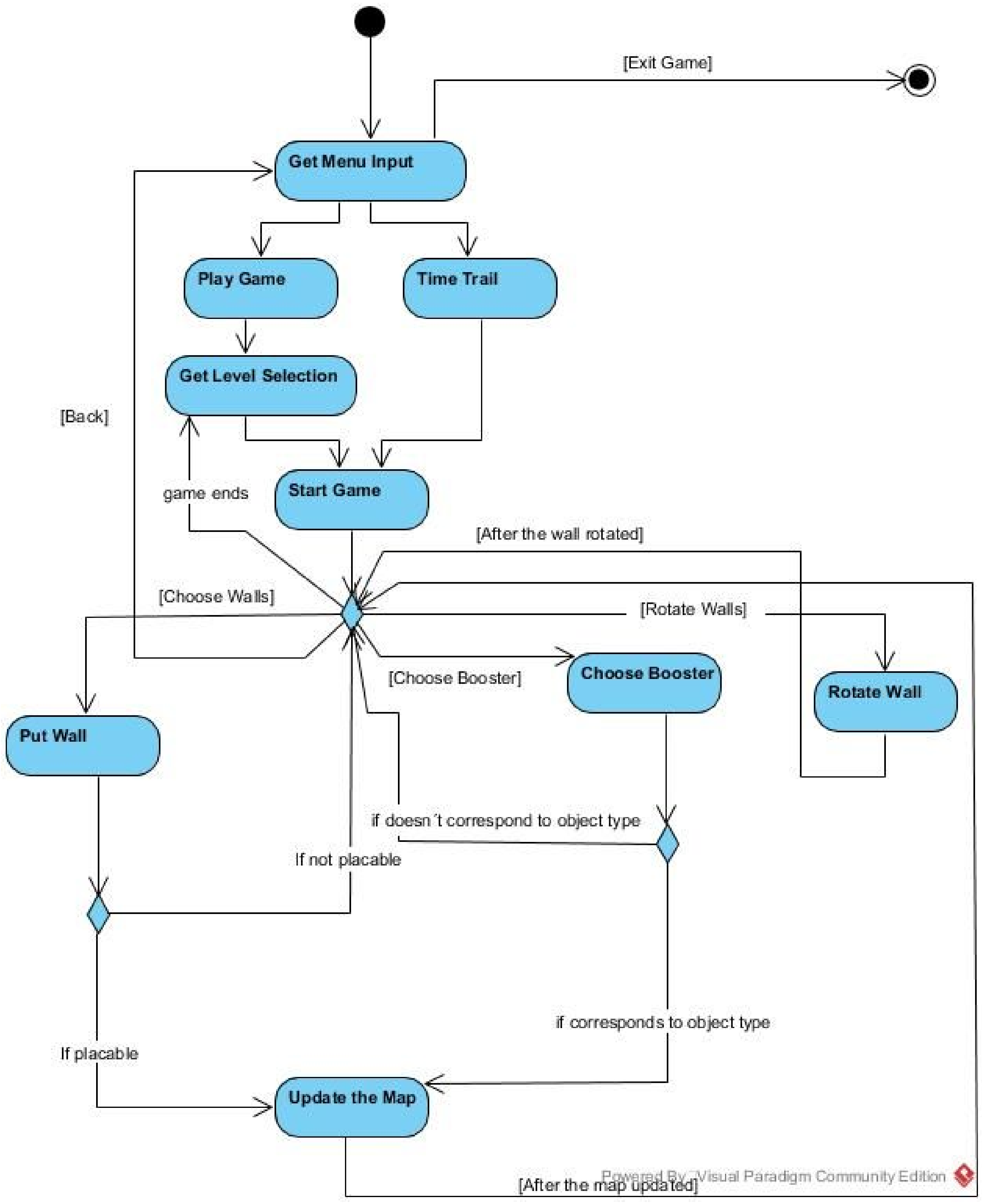
Scenario: User wants to change options so he clicks options button. Game Manager opens the options panel. Here the user can mute the sounds or if it's muted he can unmute it by clicking the checkbox. Player can also change the theme by clicking any themes button. This theme will be stored in FileManager and will be changed by CustomizationPanel. Player can go back with or without making any changes by clicking back button.

4.2.2. State Diagram


Visual Paradigm Standard(Ahmet Akif Uğurtan(Bilkent Univ.))
LevelPanel
Draw changes on wall panel
Rotate a wall
Wait any input
Choose a wall
Wait for wall position input on map
Position is not available
Choose a booster
Get map position
Position is not available
Draw changes on map
Wait for booster position input on map
Get map position
Check if puzzle is solved
Puzzle is not solved
Checking puzzle
back to play game menu
Puzzle is solved
Exiting Level Panel
Displaying Congrulations message

State diagram for Level Panel which is the panel where game is being played.

4.2.3.Activity Diagram



Initially, the system waits for the user input. The user might start the game, or exit the game. If the user exits, the system goes to the final node. If the user starts the game, he/she can start either normal game or time trial challenge. In normal game option, the user selects a level to play. In time trial, the game chooses the level automatically. Both ways continue with starting the game. Inside the game, the user can rotate walls to try different solutions. The user can try to place walls, if the zone is placable then the game updates the map with walls. The user can use boosters by choosing which type he/she is gonna use then after that the game updates the map. When the game ends, the user can choose another level to play. The user can go back and exit the game anytime.

4.3.Object and Class Model

Booster: Booster class is a subclass of MapController class and it represents the boosters in the game. In this game, we provide some boosters via shop system. The player can buy and use boosters in the game. These boosters divide into 2 subclasses.

HumanBooster: This booster is a subclass of Booster class and it represents the boosters which are only for human objects. This class divides into 2 subclasses.

Hide: This booster is a subclass of HumanBooster and it allows the player to hide a soldier with bush.

Move: This booster is a subclass of HumanBooster and it allows the player to move a soldier for one tile.

TileBooster: This booster is a subclass of Booster class and it represents the boosters which are only for tile objects. This class divides into 2 subclasses.

Dig: This booster is a subclass of TileBooster and it allows the player to dig a single mountain tile.

Fill: This booster is a subclass of TileBooster and it allows the player to fill a single lava tile.

MapModel: MapModel class is the class to get the corresponding map to the level and update the map during the use of different features of the game such as boosters and putting the wall to the desired place and etc.

MapObjectFactory: MapObjectFactory class is the class to store the corresponding maps for each levels and to pass them to MapModel class.

Tile: Tile class is a subclass of MapObject class and it represents the tiles in the map. It has two operators in order to return whether a tile can be filled or dug. Tile class divides into six subclasses.

Ground: Ground class is a subclass of Tile class and it represents a zone on the map as a ground.

Lava: Lava class is a subclass of Tile class and it represents a zone on the map as lava.

Mountain: Mountain class is a subclass of Tile class and it represents a zone on the map as a mountain.

Bush: Bush class is a subclass of Tile class and it represents a zone on the map as bush.

Tower: Tower class is a subclass of Tile class and it represents a zone on the map as a tower.

WallTile: WallTile class is a subclass of Tile class and it represents a zone on the map as a wall if some part of wall stays in the zone.

OptionsPanel: Information about the sound settings kept in this class. Player can adjust volume level or can mute/unmute all sounds all together by this class. CustomizationPanel class is instanced in this class.

CustomizationPanel: Images and the buttons of the themes are kept in this class. Selected theme is also kept here. Player’s theme selection is done through this class.

GameManager: GamaManager class is responsible for transitions between the panels and creation of the new game. Depending on the user input it might get the level choice from the PlayGamePanel and start the chosen level or TimeTrial class calls playTimeTrial function to initialize the time trial mode.

ShopPanel: This class keeps the gold amount player has. When player clicks to a booster to buy in the shop panel this class handles it.

MainMenuPanel: This class handles all the button clicks in the main menu. When a player clicks any button in the menu MainMenuPanel instance invokes the GameManager instance to load the panel associated with that button.

PlayGamePanel: The panel that appears after clicking the play game button associated with this class. When player clicks a level button in the level choice panel this class invokes GameManager to initialize it.

TimeTrial: This class keeps the information about the TimeTrial mode such as, high score, levelCount and time. Changing level during the gameplay handled here as well.

FileManager: This class basically keeps all the data of the whole project. İt takes the files of musics, images, arraylist of normal and sandbox levels and etc. from the project directory.

HowToPlayPanel: The panel that appears after clicking the How to Play button in the Main Menu. It keeps the instructions and tips about how to play the game and the aim of game with image file.

SandboxMenuPanel: The panel that appears after clicking the Sandbox button in the Main Menu. İt displays the options of Sandbox feature which are create a new level or play a custom level.

SandboxCreatePanel: The panel that appears after clicking the Create Level button in the Sandbox Menu panel. İt keeps and displays the new created level and the options of deciding among walls, humans and tiles in order to create a new level.

CreditsPanel: The panel that appears after clicking the Credits button in the Main Menu. It keeps and displays the data about the developers of the game.

LevelPanel: This class keeps the data about the levels panel that appears to the user after clicking the Play Game button in order to determine which level he/she wants to play. It keeps the levels that are available to the user, the list of all levels and the collection of different combinations of walls for different levels in order to display as Levels panel.

GamePanel: GamePanel is the panel that is consisted of the map objects.

Wall: This class keeps variations of different types of walls and rotateWall(angle: int) method which does the rotation operation in game.

WallPanel: WallPanel is the panel that displays the walls on the game map.

MapController: This class keeps the array of all default maps which are different in each level. It holds the map and modifies in the change of positions of objects.

MapObject: This class keeps the data of all objects including human characters and tiles. It holds the position of each object on the map and it sends the data of position of objects to MapController class in order to modify the display of the game. isGround() method of this class determines whether the given position Point is ground or consists of any object.

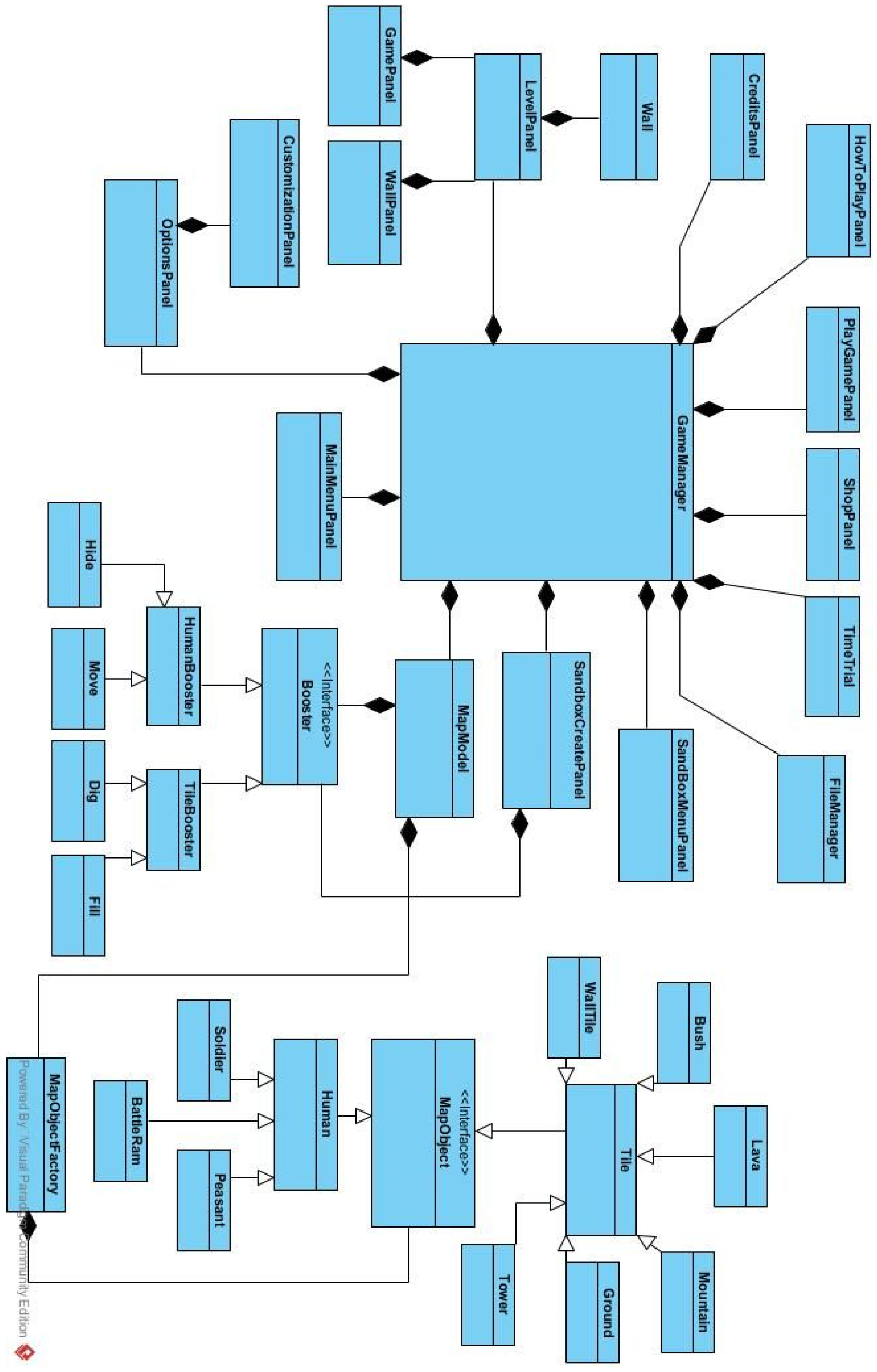
Resources: This class keeps the Arraylist of all image sources that are used inside the map display of the game.

Human: This class is a subclass of MapObject class and it represents the human characters inside the map. It keeps the data about whether the human character is movable (or hideable) or not. It has isEnemy attribute in order to determine the human character is whether enemy or not.

Soldier: Soldier class is a subclass of Human class and it represents the soldier characters on map of the game.

Peasant: Peasant class is a subclass of Human class and it represents the peasant characters on map of the game.

BattleRam: BattleRam class is a subclass of Human class and it represents special character which requires double wall in order to border it and complete the level.


GameManager
GamePanel
LevelPanel
Wall
WallPanel
CreditsPanel
HowToPlayPanel
CustomizationPanel
OptionsPanel
PlayGamePanel
ShopPanel
TimeTrial
FileManager
MainMenuPanel
SandboxCreatePanel
SandBoxMenuPanel
MapModel
<<Interface>>
Booster
HumanBooster
TileBooster
Hide
Move
Dig
Fill
<<Interface>>
MapObject
Tile
WallTile
Bush
Lava
Mountain
Ground
Tower
Human
Soldier
BattleRam
Peasant
MapObjectFactory
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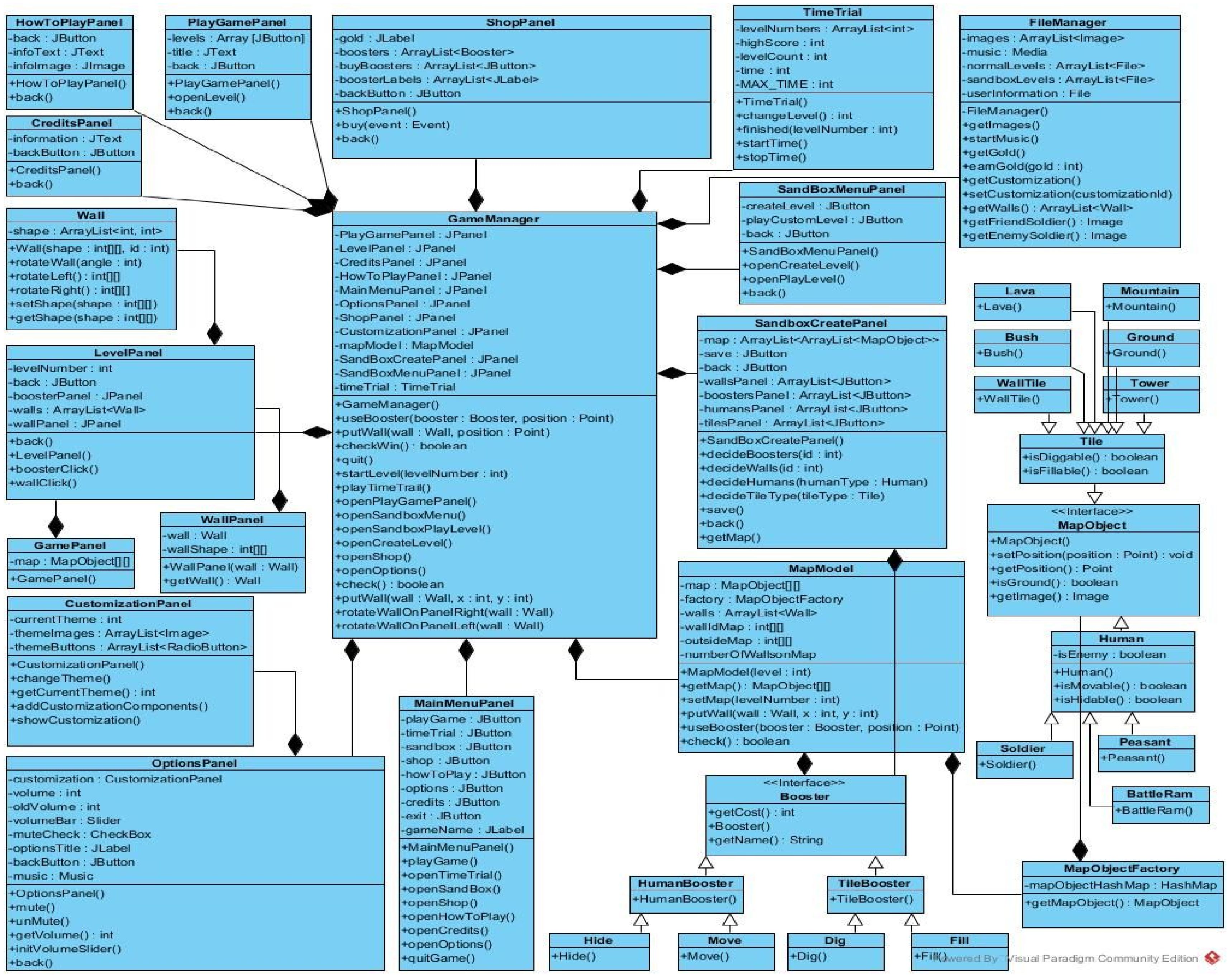
HowToPlayPanel
-back : JButton
-infoText : JText
-infoImage : JImage
+HowToPlayPanel()
+back()
PlayGamePanel
-levels : Array [JButton]
-title : JText
-back : JButton
+PlayGamePanel()
+openLevel()
+back()
ShopPanel
-gold : JLabel
-boosters : ArrayList<Booster>
-buyBoosters : ArrayList<JButton>
-boosterLabels : ArrayList<JLabel>
-backButton : JButton
+ShopPanel()
+buy(event : Event)
+back()
TimeTrial
-levelNumbers : ArrayList<int>
-highScore : int
-levelCount : int
-time : int
-MAX_TIME : int
+TimeTrial()
+changeLevel() : int
+finished(levelNumber : int)
+startTime()
+stopTime()
FileManager
-images : ArrayList<Image>
-music : Media
-normalLevels : ArrayList<File>
-sandboxLevels : ArrayList<File>
-userInformation : File
-FileManager()
+getImages()
+startMusic()
+getGold()
+earnGold(gold : int)
+getCustomization()
+setCustomization(customizationId)
+getWalls() : ArrayList<Wall>
+getFriendSoldier() : Image
+getEnemySoldier() : Image
CreditsPanel
-information : JText
-backButton : JButton
+CreditsPanel()
+back()
Wall
-shape : ArrayList<int, int>
+Wall(shape : int[][], id : int)
+rotateWall(angle : int)
+rotateLeft() : int[][]
+rotateRight() : int[][]
+setShape(shape : int[][])
+getShape(shape : int[][])
GameManager
-PlayGamePanel : JPanel
-LevelPanel : JPanel
-CreditsPanel : JPanel
-HowToPlayPanel : JPanel
-MainMenuPanel : JPanel
-OptionsPanel : JPanel
-ShopPanel : JPanel
-CustomizationPanel : JPanel
-mapModel : MapModel
-SandBoxCreatePanel : JPanel
-SandBoxMenuPanel : JPanel
-timeTrial : TimeTrial
+GameManager()
+useBooster(booster : Booster, position : Point)
+putWall(wall : Wall, position : Point)
+checkWin() : boolean
+quit()
+startLevel(levelNumber : int)
+playTimeTrail()
+openPlayGamePanel()
+openSandboxMenu()
+openSandboxPlayLevel()
+openCreateLevel()
+openShop()
+openOptions()
+check() : boolean
+putWall(wall : Wall, x : int, y : int)
+rotateWallOnPanelRight(wall : Wall)
+rotateWallOnPanelLeft(wall : Wall)
SandBoxMenuPanel
-createLevel : JButton
-playCustomLevel : JButton
-back : JButton
+SandBoxMenuPanel()
+openCreateLevel()
+openPlayLevel()
+back()
LevelPanel
-levelNumber : int
-back : JButton
-boosterPanel : JPanel
-walls : ArrayList<Wall>
-wallPanel : JPanel
+back()
+LevelPanel()
+boosterClick()
+wallClick()
SandboxCreatePanel
-map : ArrayList<ArrayList<MapObject>>
-save : JButton
-back : JButton
-wallsPanel : ArrayList<JButton>
-boostersPanel : ArrayList<JButton>
-humansPanel : ArrayList<JButton>
-tilesPanel : ArrayList<JButton>
+SandBoxCreatePanel()
+decideBoosters(id : int)
+decideWalls(id : int)
+decideHumans(humanType : Human)
+decideTileType(tileType : Tile)
+save()
+back()
+getMap()
Lava
+Lava()
Mountain
+Mountain()
Bush
+Bush()
Ground
+Ground()
WallTile
+WallTile()
Tower
+Tower()
Tile
+isDiggable() : boolean
+isFillable() : boolean
GamePanel
-map : MapObject[][]
+GamePanel()
WallPanel
-wall : Wall
-wallShape : int[][]
+WallPanel(wall : Wall)
+getWall() : Wall
<<Interface>>
MapObject
+MapObject()
+setPosition(position : Point) : void
+getPosition() : Point
+isGround() : boolean
+getImage() : Image
CustomizationPanel
-currentTheme : int
-themeImages : ArrayList<Image>
-themeButtons : ArrayList<RadioButton>
+CustomizationPanel()
+changeTheme()
+getCurrentTheme() : int
+addCustomizationComponents()
+showCustomization()
MapModel
-map : MapObject[][]
-factory : MapObjectFactory
-walls : ArrayList<Wall>
-wallIdMap : int[][]
-outsideMap : int[][]
-numberOfWallsonMap
+MapModel(level : int)
+getMap() : MapObject[][]
+setMap(levelNumber : int)
+putWall(wall : Wall, x : int, y : int)
+useBooster(booster : Booster, position : Point)
+check() : boolean
Human
-isEnemy : boolean
+Human()
+isMovable() : boolean
+isHidable() : boolean
MainMenuPanel
-playGame : JButton
-timeTrial : JButton
-sandbox : JButton
-shop : JButton
-howToPlay : JButton
-options : JButton
-credits : JButton
-exit : JButton
-gameName : JLabel
+MainMenuPanel()
+playGame()
+openTimeTrial()
+openSandBox()
+openShop()
+openHowToPlay()
+openCredits()
+openOptions()
+quitGame()
OptionsPanel
-customization : CustomizationPanel
-volume : int
-oldVolume : int
-volumeBar : Slider
-muteCheck : CheckBox
-optionsTitle : JLabel
-backButton : JButton
-music : Music
+OptionsPanel()
+mute()
+unMute()
+getVolume() : int
+initVolumeSlider()
+back()
Soldier
+Soldier()
Peasant
+Peasant()
<<Interface>>
Booster
+getCost() : int
+Booster()
+getName() : String
BattleRam
+BattleRam()
HumanBooster
+HumanBooster()
TileBooster
+TileBooster()
MapObjectFactory
-mapObjectHashMap : HashMap
+getMapObject() : MapObject
Hide
+Hide()
Move
+Move()
Dig
+Dig()
Fill
+Fill()
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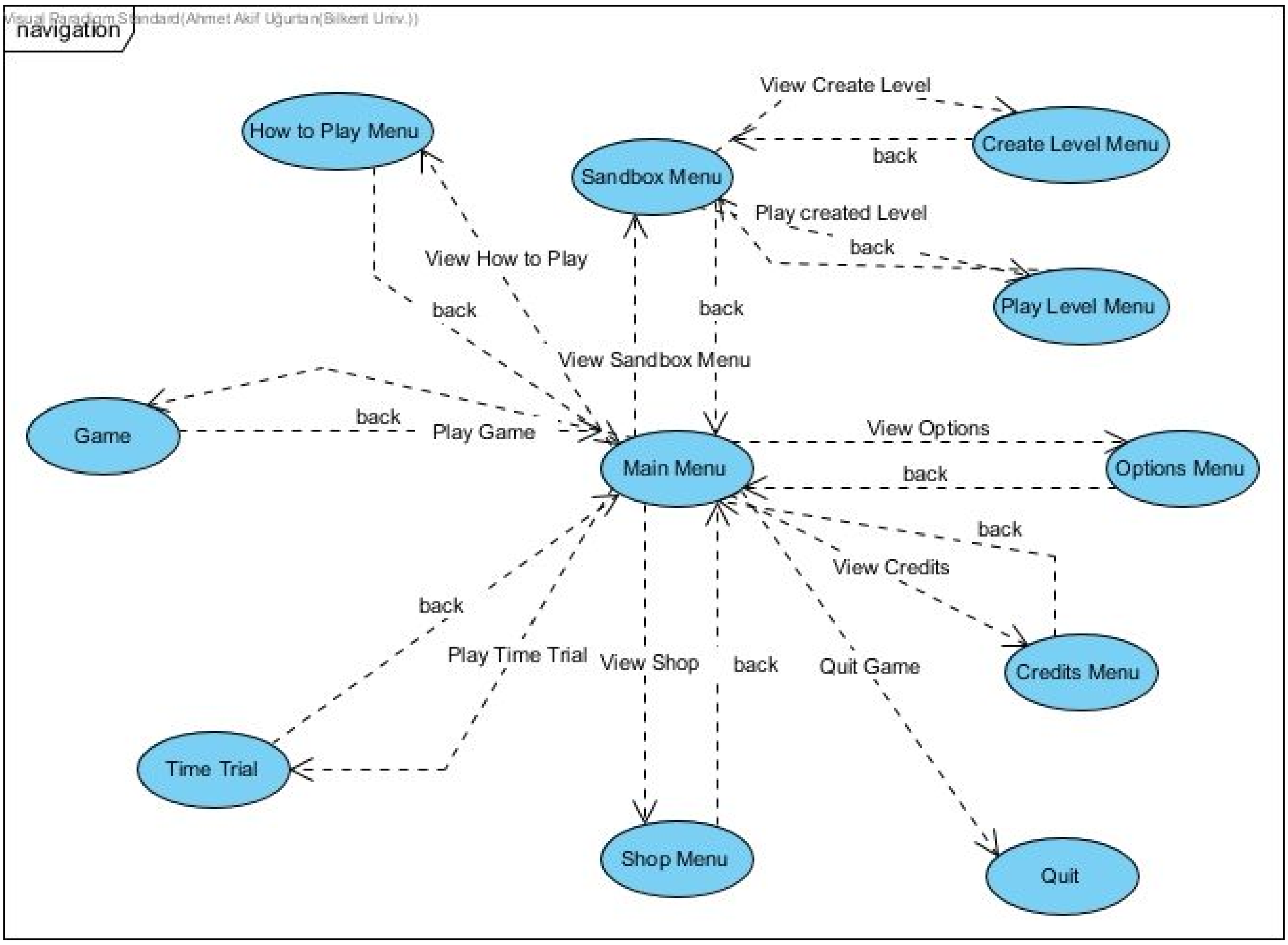
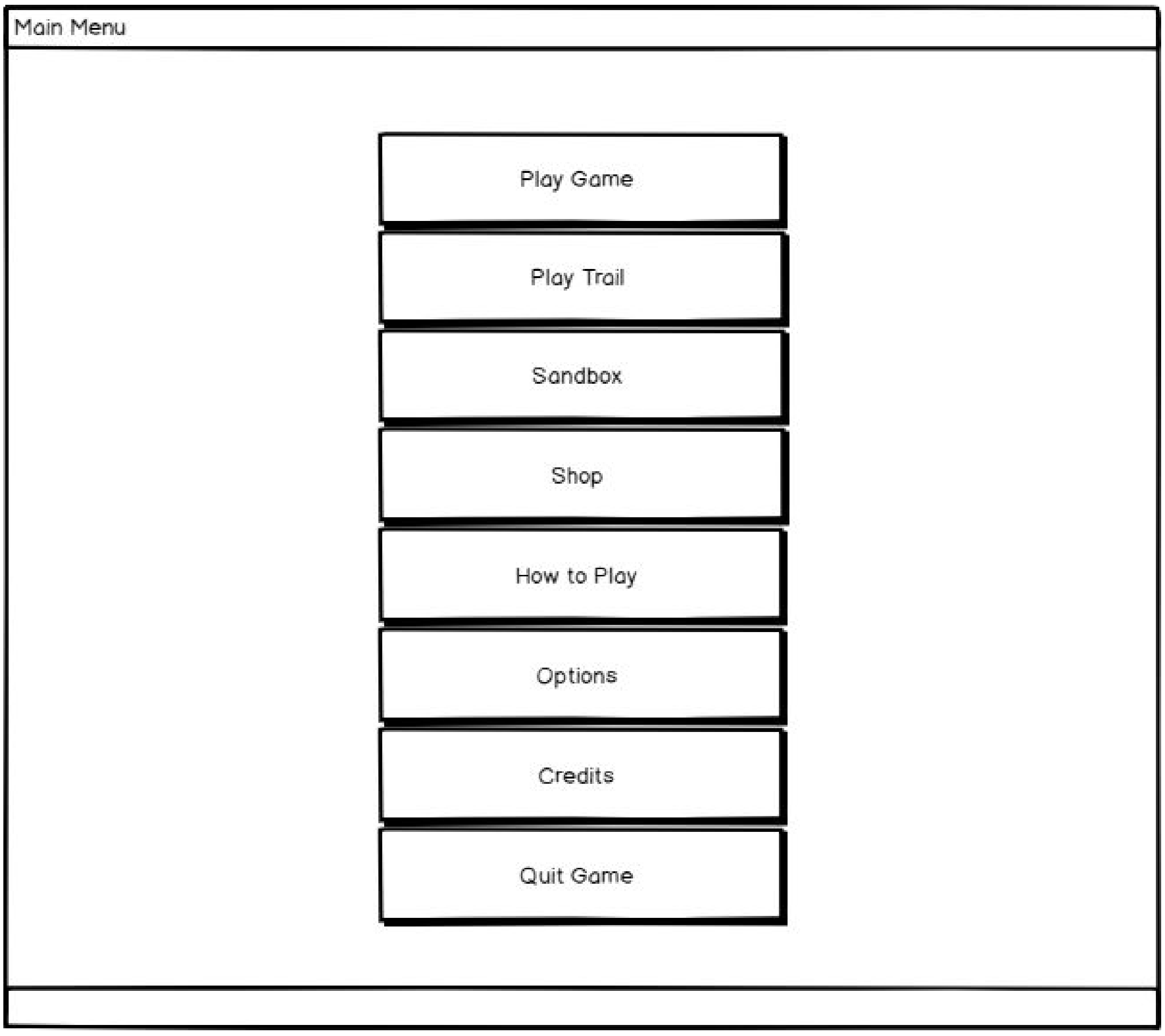
4.4.User interface

4.4.1.Navigational Paths

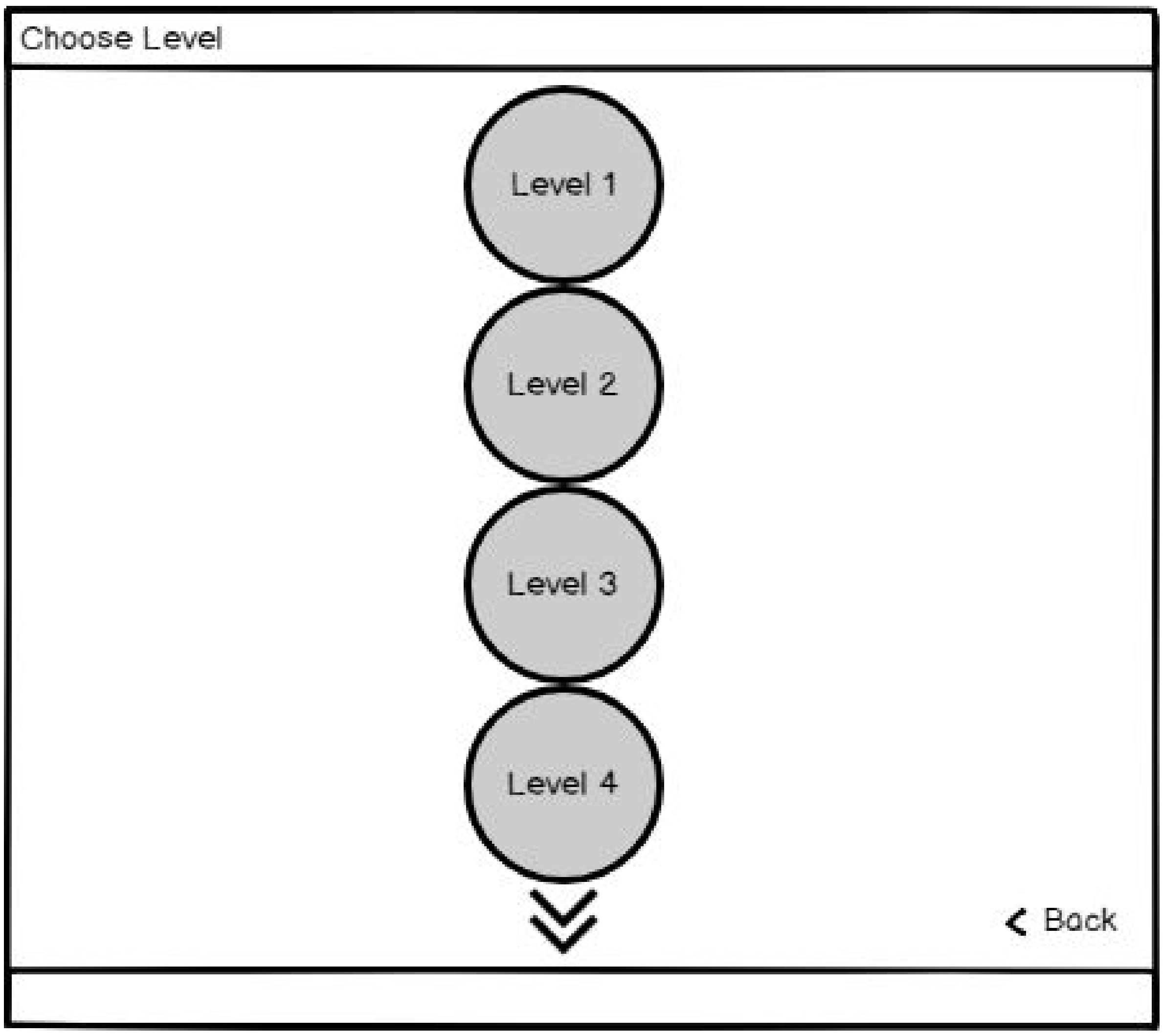


4.4.2.Mockups

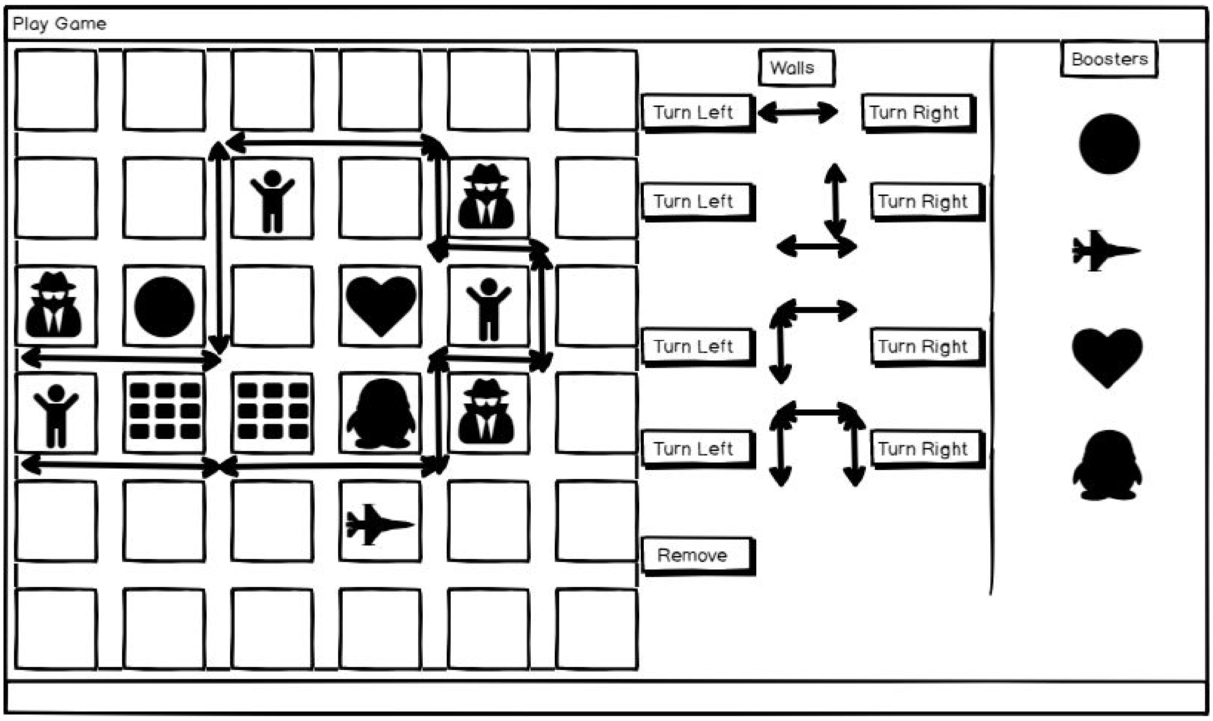
4.4.2.1. Main Menu



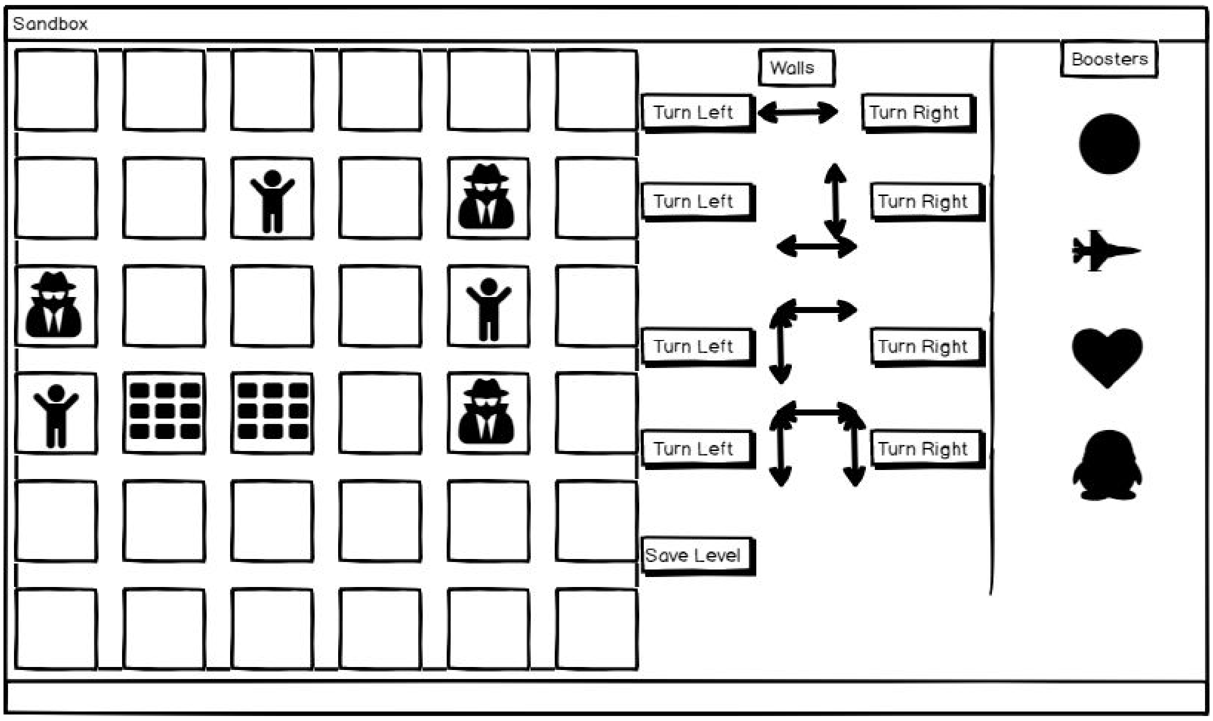
4.4.2.2.Choose a Level



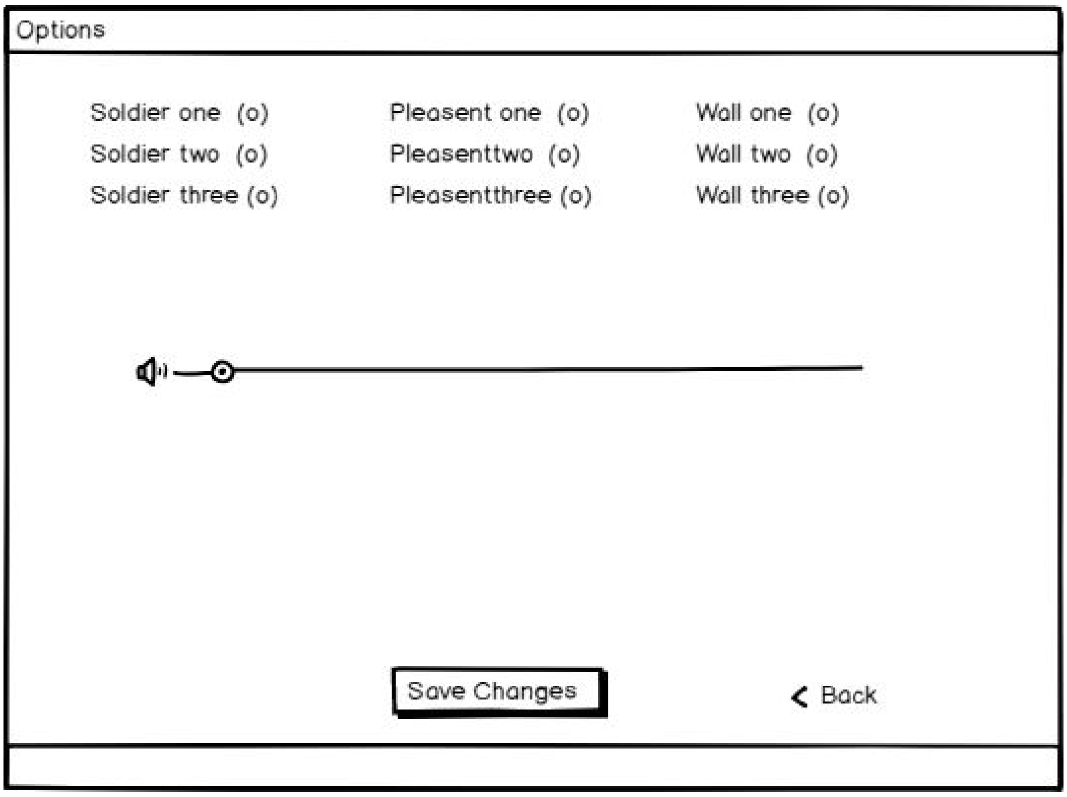
4.4.2.3. Play game



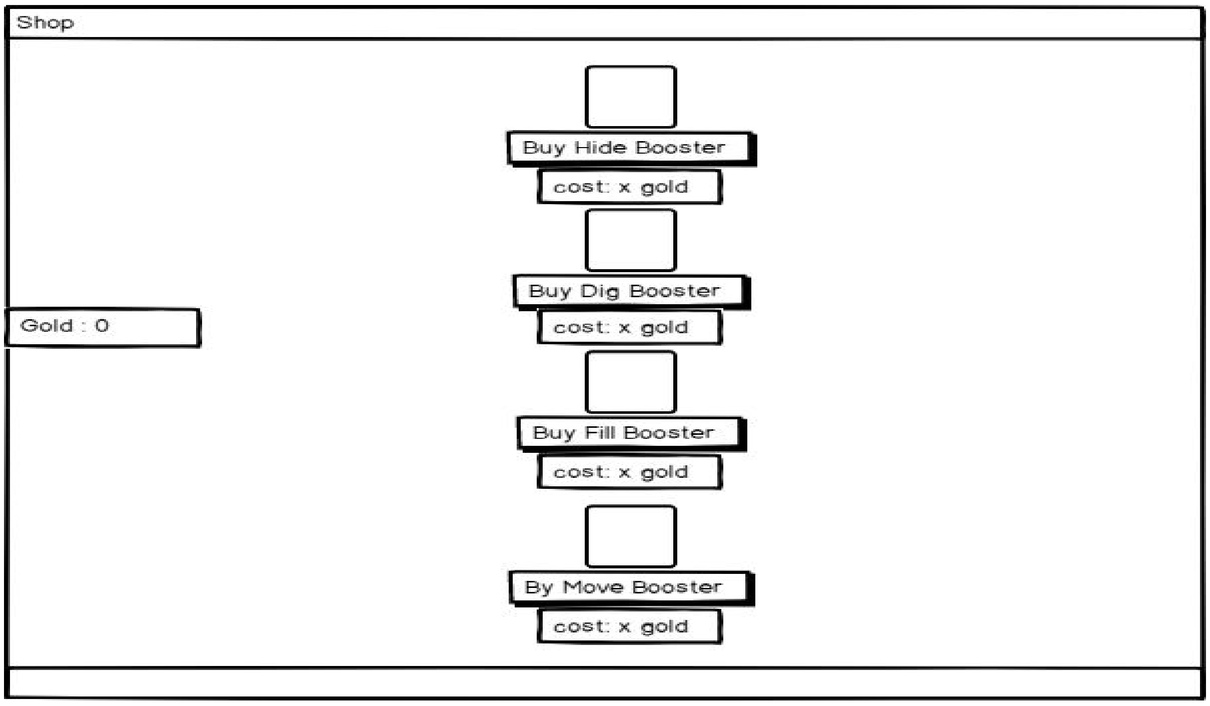
4.4.2.4. SandBox



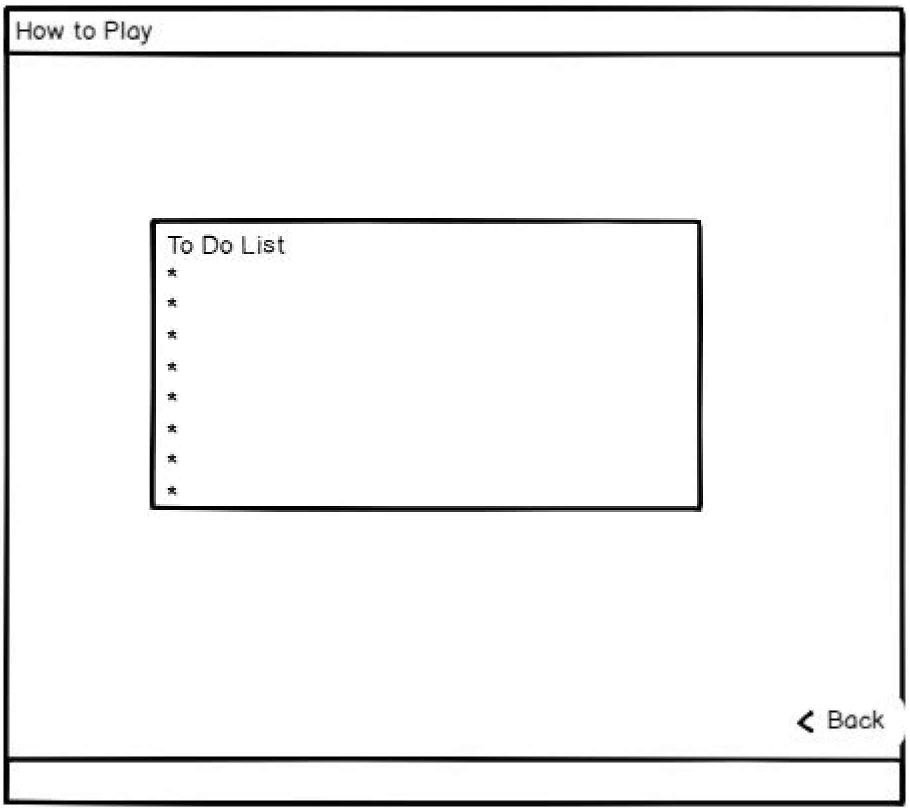
4.4.2.5. Options



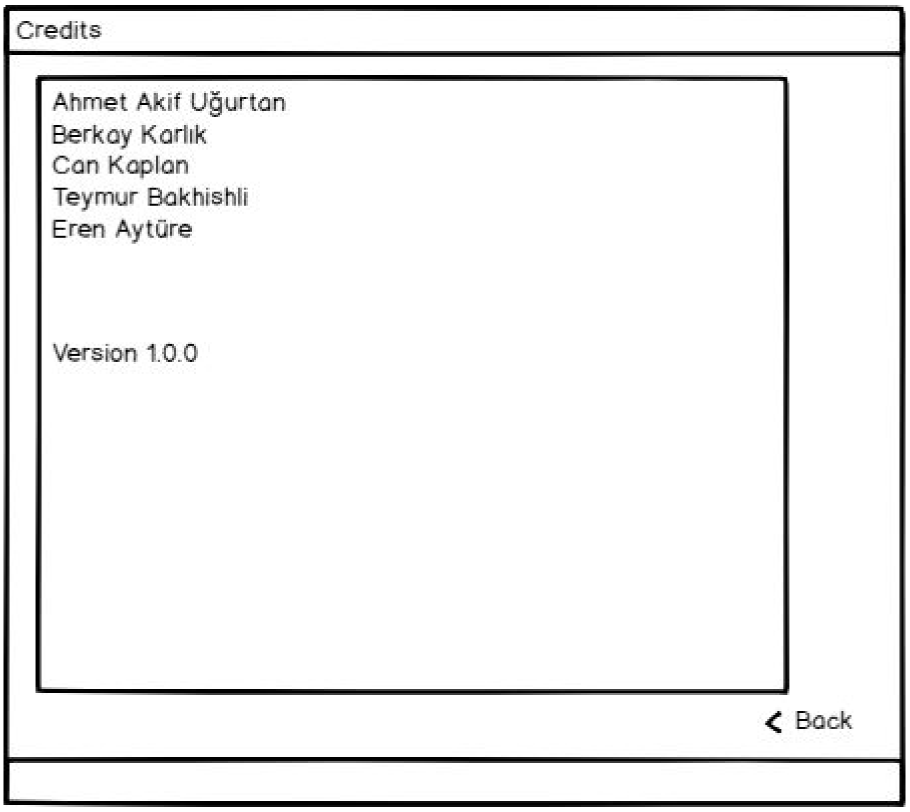
4.4.2.6. Shop



4.4.2.7. How to Play



4.4.2.8. Credits



5.References

[1] Original game:
https://www.smartgames.eu/uk/one-player-games/walls-warriors

[2] Project repository:
https://github.com/ahmtakf/nomanleft

[3] Google Docs:
https://drive.google.com/open?id=1XG6o6dRXjm__YIZ1-E4sUItFPgZGlEuK