



IQ Puzzler

Analysis Report

Game Of Objects

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1.Introduction:

IQ Puzzler Pro is the ultimate board game for people who enjoy fitting pieces together. You are given a set of solid, pre-defined shapes, made of marble sets of 3 or 4, and asked to place them in the board map. In each board map chosen, you first place the mandatory pieces in the way it is described in the current map settings, which you cannot relocate. Then, by using the leftover pieces, you try to fill the rest of the board with each piece in its correct placement. There is only one possible course of action per map, pushing the player to his limits.

By changing the board face you play, you are allowed to change the game mode. With an isometric surface on the back-side board, player is faced with new challenges to overcome and conquer. Also, with the 3D game mode, pieces are placed on top of each other, with aim to form a perfect pyramid, while pushing you to change your perspective.

2.Overview:

Our project is going to be a 2D to 3D implementation of IQ Puzzler Pro in Windows OS with additions to the base project with new features that enable a multiplayer game mode as well as new playstyles like time bomb and rotating map that make the play more difficult.

2.1 Gameplay

IQ Puzzler Pro is a single player game, with potential to be multiplayer, with both 2D and 3D play styles. The player chooses the map to play and faced with the problem, where the non-moving shapes are different each time and forces the player to ponder unique way to place his given pieces. By dragging and rotating the given shapes the map is slowly filled to the point of no empty spaces, in which case every shape must have been placed correctly.

2.2 Map

The map will have a constant background colour or theme, that will have different scenarios in them in each different map. The maps each, with its pre-defined solid shapes, enable a different playthrough for the player.

2.3 Shapes

Shapes will be located in the container next to map. They will have a shape of one of the pre-determined shapes like “Z”, “L” and etc. They will be able to rotate and change the direction they face to fit the right place. Each piece will have a colour for the ease of differentiating them from each other.

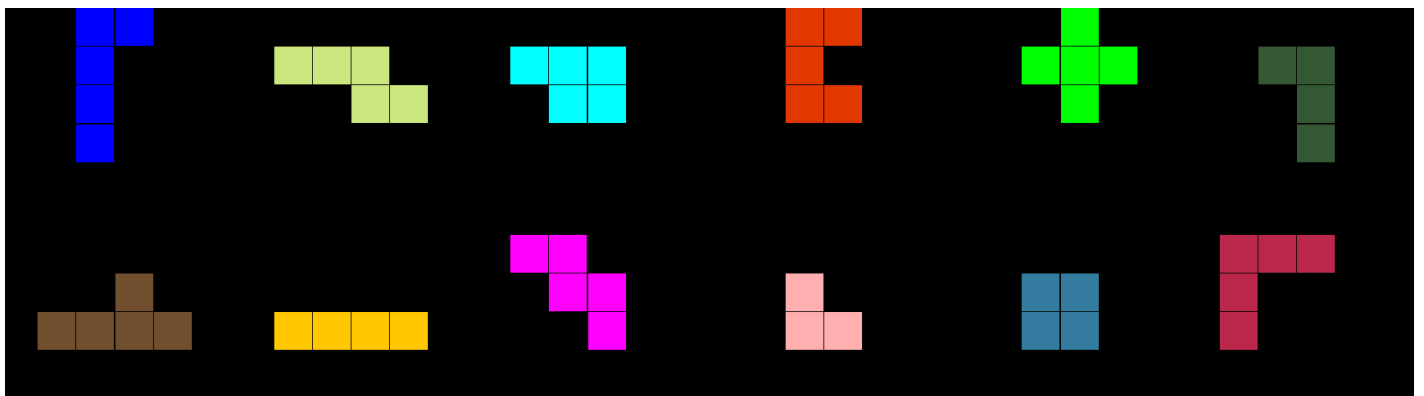


Figure 1 - Shapes

2.4 Game Modes

There will be 2 main game modes, Single player and Multiplayer. In multiplayer you try to beat your opponent with your score, which you get based on the number of moves you do and the time it takes for you to

complete the level. In single player you can choose one of the game modes of “Casual”, “Time Bomb” or “Rotating Map”.

2.4.1 Casual

In this mode player is given the basic game, with no time-limits or any other constraining factors. The sole purpose is to finish the level, casually. There is no score being tracked.

2.4.2 Time Bomb

Time Bomb game mode forces the player to think fast and act faster. Player has to find the right combination of shape placements and finish the level before the time bomb, with a pre-defined given time, goes off. Each move the player does is counted and will reduce the score he gets in the end.

2.4.3 Rotating Map

In this game mode, map is rotated every once in a while, in either clockwise or counter-clockwise direction. The direction of the rotation is

random. The player not only has to work it out and find the correct placements, but also has to be quick enough to place the shape in its right place before the map rotates. The player's score is based on the number of moves he does.

2.5 Settings

The player has the choice to adjust the volume of the game music and the clicking sounds. Also, player can change the colour of the shapes, background, time limit and screen mode.

3. Functional Requirements

In order to have a fully-working and enjoyable game, we have mainly 6 functional requirements.

3.1 Additional Requirements

- We have decided adding language option for users in the Settings panel.
- There will be Achievements section in the Statistics panel for increasing the competition.

- We are also adding save button in the game for players to continue their unfinished puzzle.
- We are adding our gameplay video(which is on YouTube¹) in the How To Play panel for users to understand the game better.

3.2 Play Game

IQ Puzzler's main goal is increasing the problem-solving ability by filling the given grid with specific shapes. Therefore, we have to design shapes and grids. Players can access game from main menu. First, the grid will be constructed according to players' choices of game modes and levels (Check 3.2). Right side of each map (if the game is multiplayer there will be 2 maps) there will be remain shapes that can rotate by clicking the right mouse button and symmetrical by clicking the middle mouse button(for 2D game). Players will try to put shapes into the grid by using mouse(drop and drag) for filling the grid and completing levels. Shapes cannot be put over the another shape and player can relocate every shape except the shapes that are already located at the beginning of each level. At the top side there will be time and move count because these features are important for players to observe their performance.

1 <https://www.youtube.com/watch?v=SNXOSsaRS38&feature=youtu.be>

When players finish the game there will be a pop-up screen to show them their time and move score. After finishing each level players will be able to play the next level until the very last.

3.3 Game Modes & Levels

Players can access this screen from Main Menu also. First players will decide their game dimension: 2D or 3D. After that, players must choose the player mode; as we explained at **2.4** there are two main player modes: Single and Multiplayer. If players select the multiplayer mode there will be two identical maps with same selected level in the game and opponents will try to finish first. There are 2 more game modes (other than the casual) which are expected to increase the challenge: Time Bomb and Rotating Map (check 2.4).

Players can also select different levels. There are 20 levels for each game mode and each level is getting harder to solve than previous one. Players must unlock the next level by finishing the current level. After unlocking levels players can choose any level with any game mode.

3.4 How To Play

Players can access this screen from Main Menu. This screen will have information about general rules of IQ Puzzler and also game modes explanation. This information will help to players to understand the game and play it without any trouble. Players can also access this screen during the game by pressing “P”.

3.5 Settings

This screen will be also available at Main Menu. By entering this screen players will be able to change some qualities for their choices. Players can also access this screen by pressing “O” during the game. Settings:

- Adjustment of volume
- Colour of background
- Colour of shapes
- Time limit
- Fullscreen/Windowed

3.6 Statistics

Players can access their statistics from Main Menu. There are several kinds of statistics that game will be recording during the match. Information are:

- Total time spent
- Average time spent per game
- Total move count
- Average move count per game
- Count of plays of each game mode
- Best time for each level
- Less move count for each level

This information will make our game more competitive and more addictive for players. Players can also access this screen by pressing “S”.

3.7 Credits

In this screen, information related to the developers of the game(Game of Objects) is located. There will be our e-mails in this screen in order to provide our users to send their feedback and suggestions.

4. Non-Functional Requirements

Our game will support several non-functional requirements in order to have a exclusive structure, that enhances users' overall game experience.

4.1 Additional Requirements

- We are adding ambient music as well as clicking, dragging and dropping sound effects to increase game experience.

4.2 Performance

In order to make our game working in good performance we are planning to create our shapes, Maps, and Interface with Java Swing library and also we will be adding extra animations that will not affect our frame rate to our shapes' movement and Map's rotation (in rotating map game mode). We will be focusing on implementing our game with real-life response time and as high as 60 FPS (frame per second) as we can do. Since we have 6 different panels the time it takes for game to transition between these panels will be less than 50 ms. Also, system requirements of our game will be as low as possible which is almost every computer with have JAVA Development Kit with maximum 3MB memory space requirement.

4.3 Usability

Since original IQ Puzzler game can be played by everyone above 6 years old, our game's visual features will be clear enough to identified by everyone. In order to achieve this, we will implement our shapes with 12 vivid colours that are differentiable easily. Also our grid's colour will compliment that of the shapes. Boxes that form the shapes as well as the grid will be 1cm^2 to make them easily interactable.

4.4 Extendibility

We are already planning to extend our game from original IQ Puzzler board game. We have added multiplayer choice and three different game modes.

5. System Models

We have created several visual system models to demonstrate the overall strcuture of the game which will help us in the design and implementation stages.

5.1 Use-Case Model

This is the basic use case model for our game that shows what players can access through main menu.

Visual Paradigm Standard (seio@Bilkent Univ.)

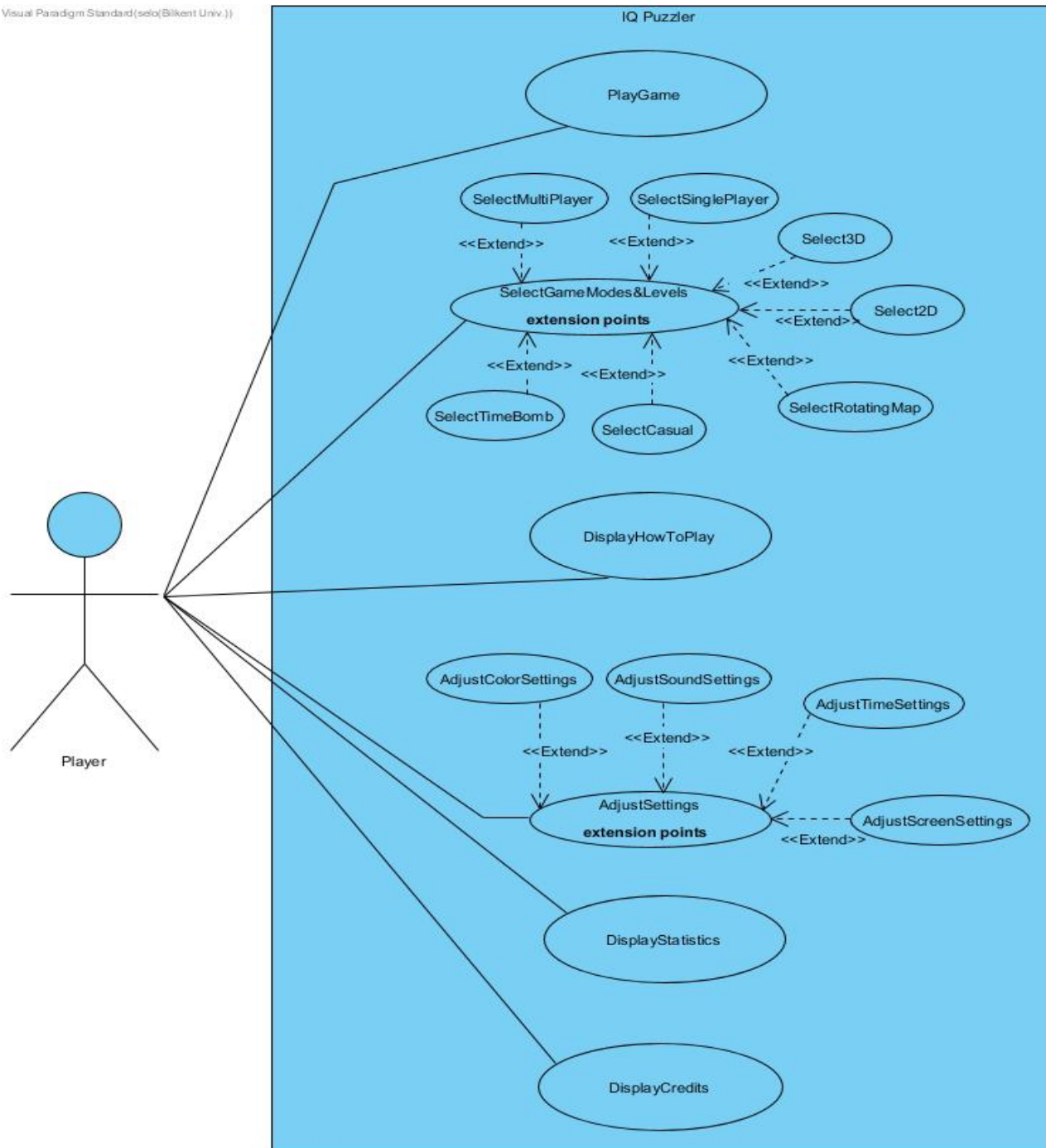


Figure 2 – Use Case Model

Use Case #1

Use Case : Play Game

Primary Actor : Player

Stakeholders and Interests:

- Player/Players want to play the game
- System create the game and starts it

Pre-conditions:

- Player must be in the main menu

Entry conditions:

- Player selects the “Play Game” button from main menu
- Player should have been chosen the game mode

Exit conditions:

- Player successfully finished the game by completing all levels

Success Scenario Event Flow:

1. Player selects “Play Game” button from main menu
2. Player moves shapes by holding mouse left key
3. Player fills the map until no space left
4. Player finished the level and goes to next level
5. Player repeats steps 2 to 5

6. Player finished the Single Player Casual 2D mode. (If there is no pre-designated game mode or dimension)

Use Case #2

Use Case : SelectGameMode&Levels

Primary Actor : Player

Stakeholders and Interests:

- Player wants to choose game mode and level
- System goes to GameMode screen
- System constructs the game according to choices of Player

Pre-conditions :

- Player must be in the Main Menu

Entry conditions:

- Player selects “GameModes & Levels” button from main menu screen

Exit conditions:

- Player presses “Back” button

Success Scenario Event Flow:

1. Player selects “GameModes & Levels” button from main menu screen
2. System displays GameMode screen.
3. Player selects dimension: 2D or 3D
4. Player selects number of player: Single or Multi

5. Player selects GameMode : Casual , TimeBomb or RotatingMap (if single player chosen)
6. Player selects the unlocked level
7. Player presses “Back” button
8. System displays Main Menu

Use Case #3

Use Case : Display How To Play

Primary Actor : Player

Stakeholders and Interests:

- Player wants to learn how to play IQ Puzzler
- System goes to HowToPlay screen

Pre-conditions :

- Player must be in the Main Menu or in the game

Entry conditions:

- Player selects “How To Play” button from main menu
- Player presses “P” during the game

Exit conditions:

- Player presses “Back” button
- Player presses “Esc” from keyboard

Success Scenario Event Flow:

1. Player selects “How To Play” button from main menu
2. System displays How To Play screen

Alternative Event Flow:

1. Player presses “P” during the game
2. System displays “How To Play” screen

Use Case #4

Use Case : Display Settings

Primary Actor : Player

Stakeholders and Interests:

- Player wants to adjust the settings
- System goes to Settings screen
- System changes the game settings according to choices of Player

Pre-conditions :

- Player must be in the Main Menu

Entry conditions:

- Player selects “Settings” button from main menu
- Player presses “O” during the game

Exit conditions:

- Player presses “Back” button
- Player presses “Esc” from keyboard

Success Scenario Event Flow:

1. Player selects “Settings” button from main menu
2. System displays Settings screen
3. Player adjusts colour settings
4. Player adjusts time settings
5. Player adjusts sound settings
6. Player adjusts screen settings
7. Player presses “Back” button
8. System changes setting according to Player’s choices

Alternative Event Flow:

1. Player presses “O” during the game
2. System displays “Settings” screen
3. Same steps of Success Scenario Event Flow from 3 to 8.

Use Case #5

Use Case : Display Statistics

Primary Actor : Player

Stakeholders and Interests:

- Player wants learn statistics
- System goes to Statistics screen

Pre-conditions :

- Player must be in the Main Menu or in game

Entry conditions:

- Player selects "Statistics" button from main menu
- Player presses "S" during the game

Exit conditions:

- Player presses "Back" button
- Player presses "Esc" from keyboard

Success Scenario Event Flow:

1. Player selects "Statistics" button from main menu
2. System displays Statistics screen

Alternative Event Flow:

1. Player presses "S" during the game
2. System displays "Statistics" screen

Use Case #6

Use Case : Display Credits

Primary Actor : Player

Stakeholders and Interests:

- Player wants to give feedback
- System goes to Credits screen

Pre-conditions:

- Player must be in the Main Menu

Entry conditions:

- Player selects “Credits” button from main menu

Exit conditions:

- Player presses “Back” button
- Player presses “Esc” from keyboard

Success Scenario Event Flow:

1. Player selects “Credits” button from main menu
2. System displays Credits screen

5.2 Dynamic Models

5.2.1 Sequence Diagrams

5.2.1.1 Start Game and Select Game Mode

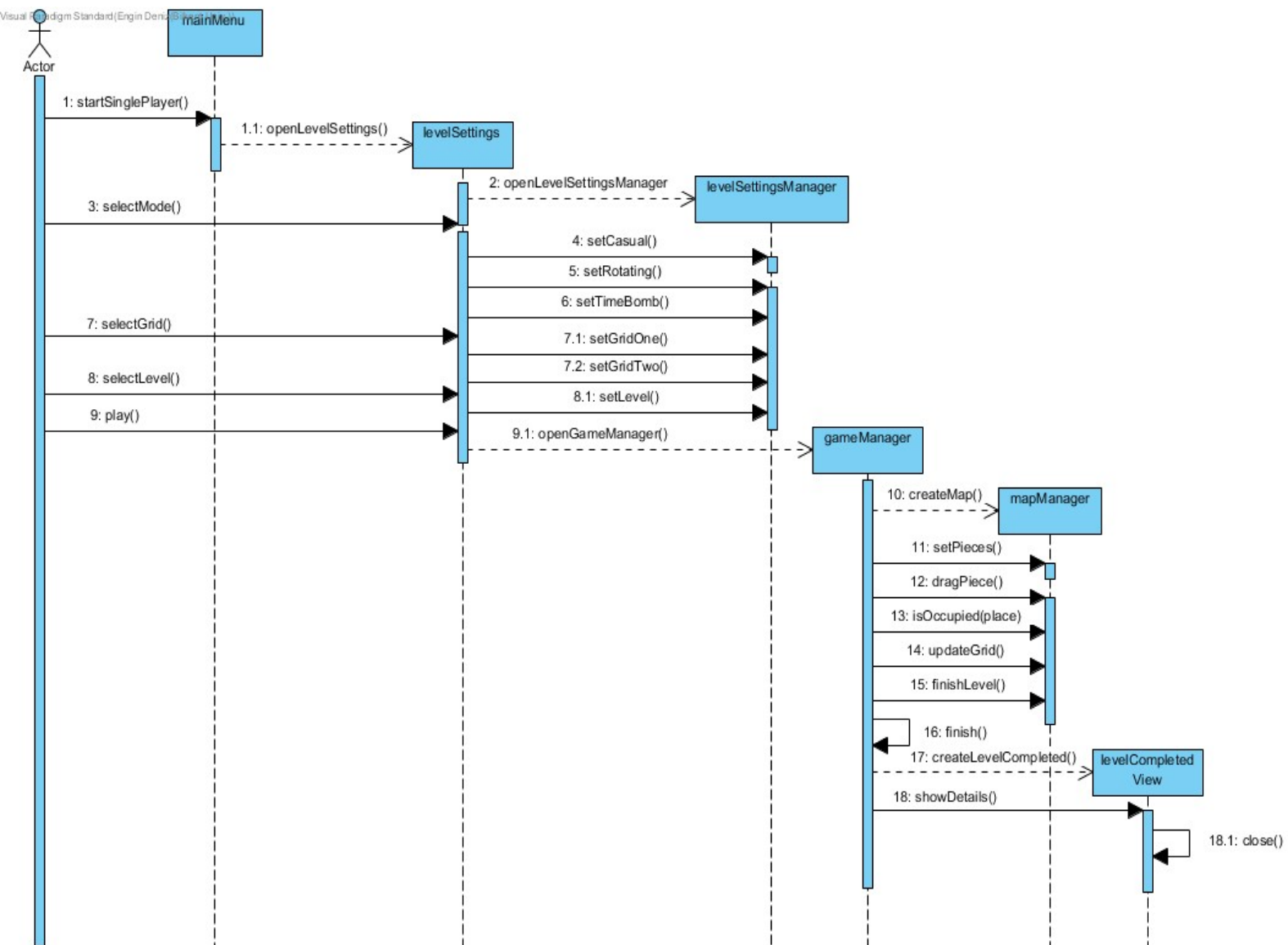


Figure 3 - Sequence Diagram for Starting and Finishing the Game

Scenario: Starting a new game

Player wants to start the game. Player enters the main menu and selects one of the modes; single player or multiplayer. After mode selection, player needs to decide settings of the mode before the game starts. Player should select the following options;

- Mode
- Grid
- Level

After all of those are finished, the game is initialized by the level settings manager. The creation of the grid, the pieces on the screen is identified by the game manager. When the grid and pieces are now placed, according to game mode, player starts to play the game. Player should put the right pieces to the accurate locations so that the level is completed

5.2.1.1 Start Game and Select Game Mode

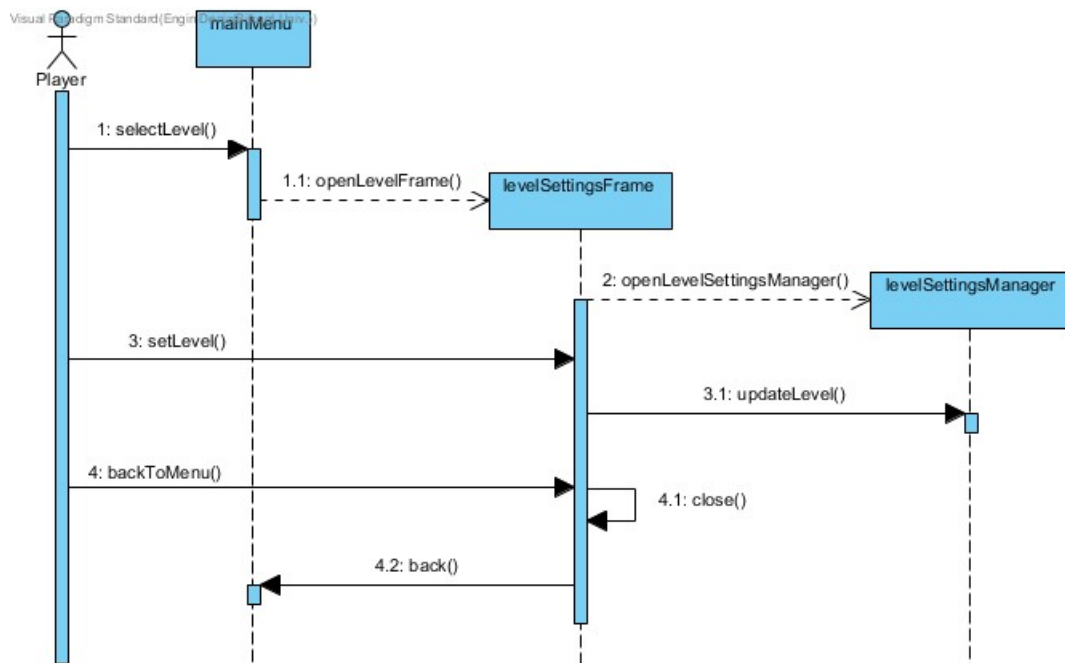


Figure 4 - Sequence Diagram for Level Selection

Scenario: Player wants to select a level as wish

When the player clicks the level select button, user is going to see a level selection panel. And player will be able to change the level before the game starts.

5.2.1.3 Display Credits

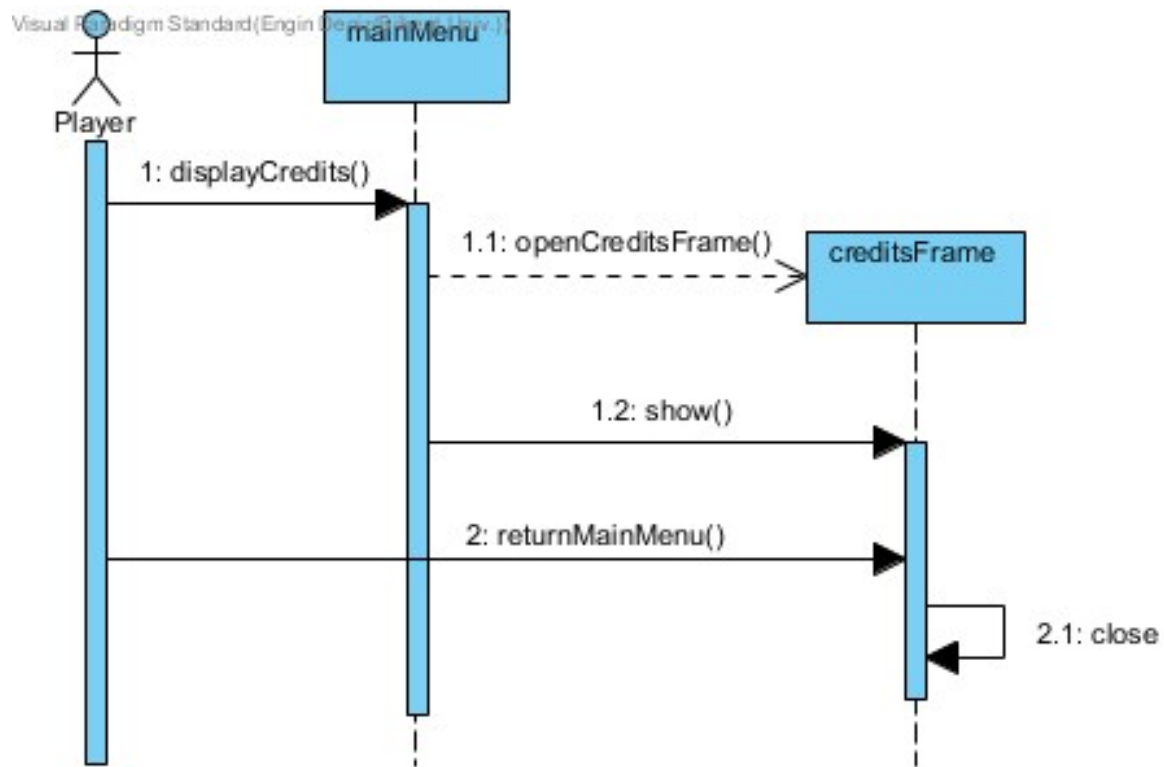


Figure 5 - Sequence Diagram for Displaying Credits Panel

Scenario: Player wants to see the credits panel

When the player clicks the credits button, he or she is going to see a credits panel which consists of some information about the developers of the game.

5.2.1.4 Display How To Play

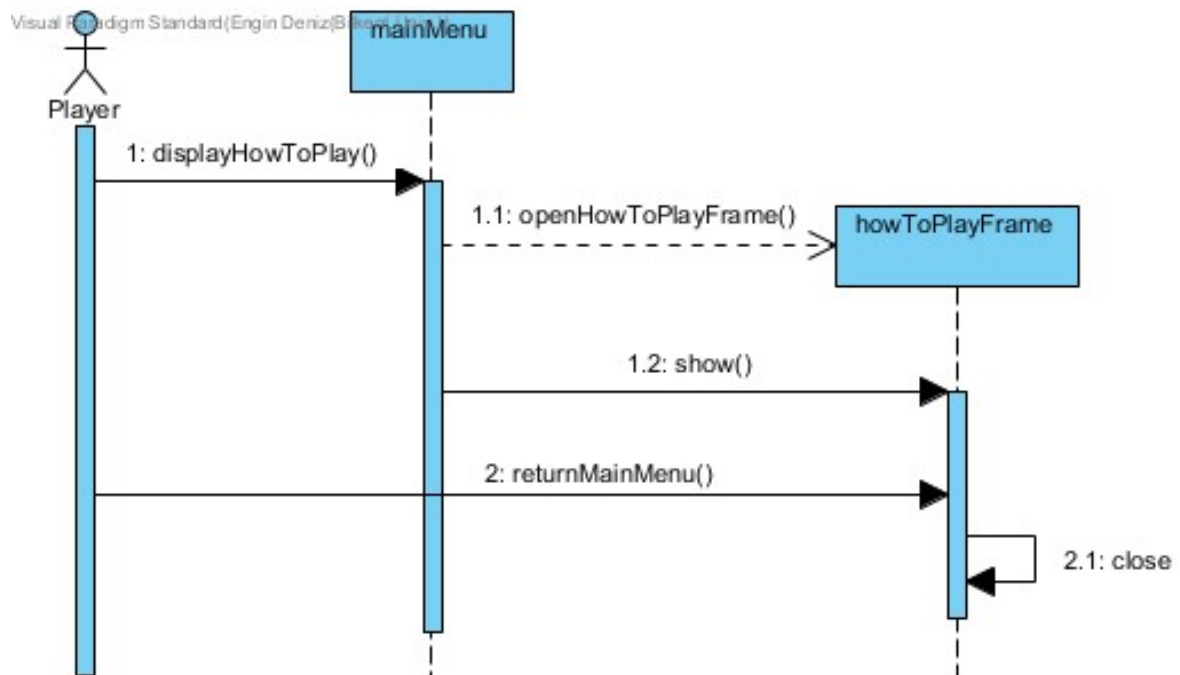


Figure 6 - Sequence Diagram for Displaying How To Play Panel

Scenario: Player wants to know the rules of the game

When the player clicks the how to play button, he or she is going to see a panel which consists of information about rules of the game. This panel is as same as the credits panel except their information.

5.2.1.5 Display Statistics

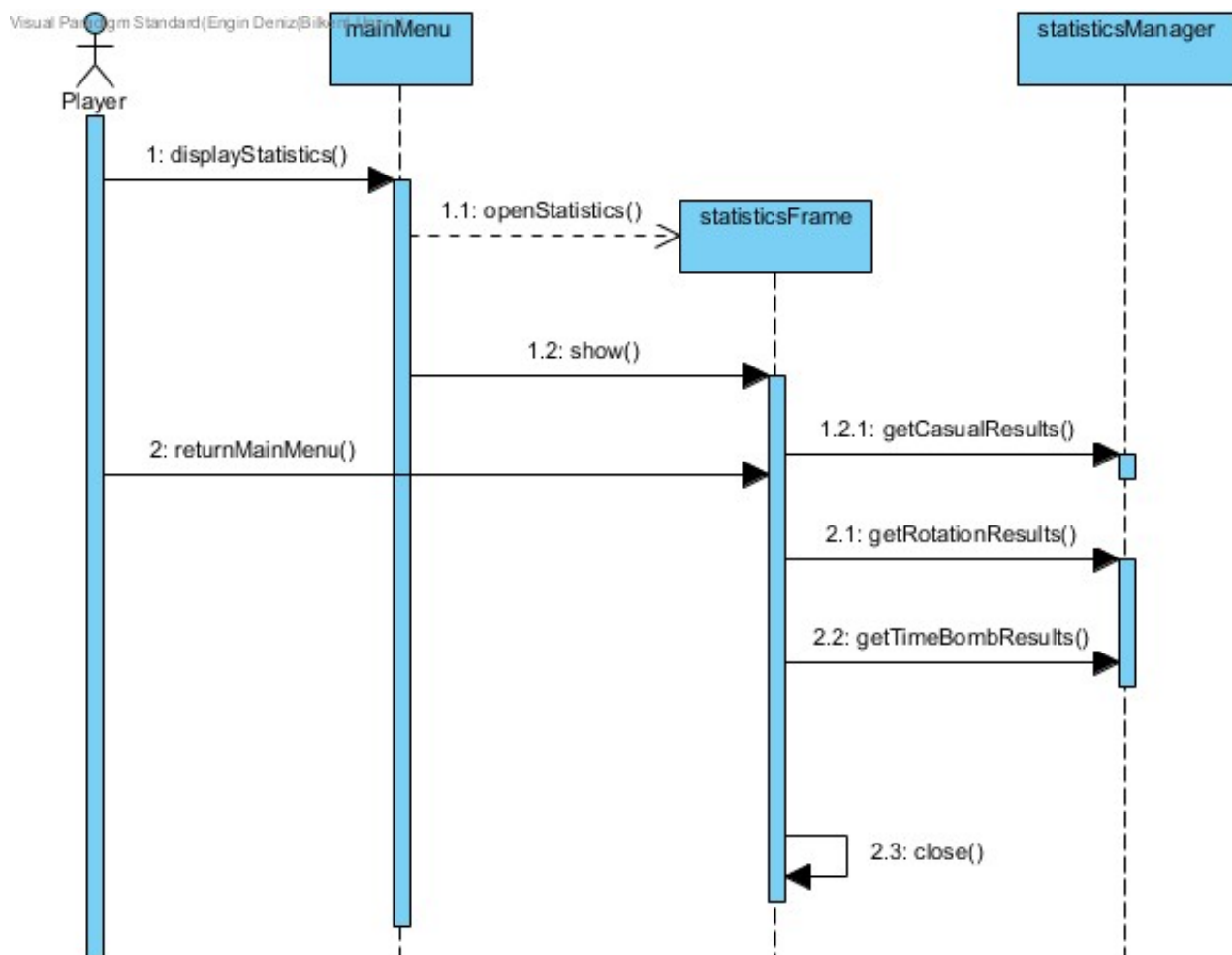


Figure 7 - Sequence Diagram for Display Statistics

Scenario: Player wants to know the statistics of the game

If the players clicks the statistics button, he or she will be able to see the statistics of the game according to game mode, best time, total time spent and best move count.

5.2.1.6 Change Settings

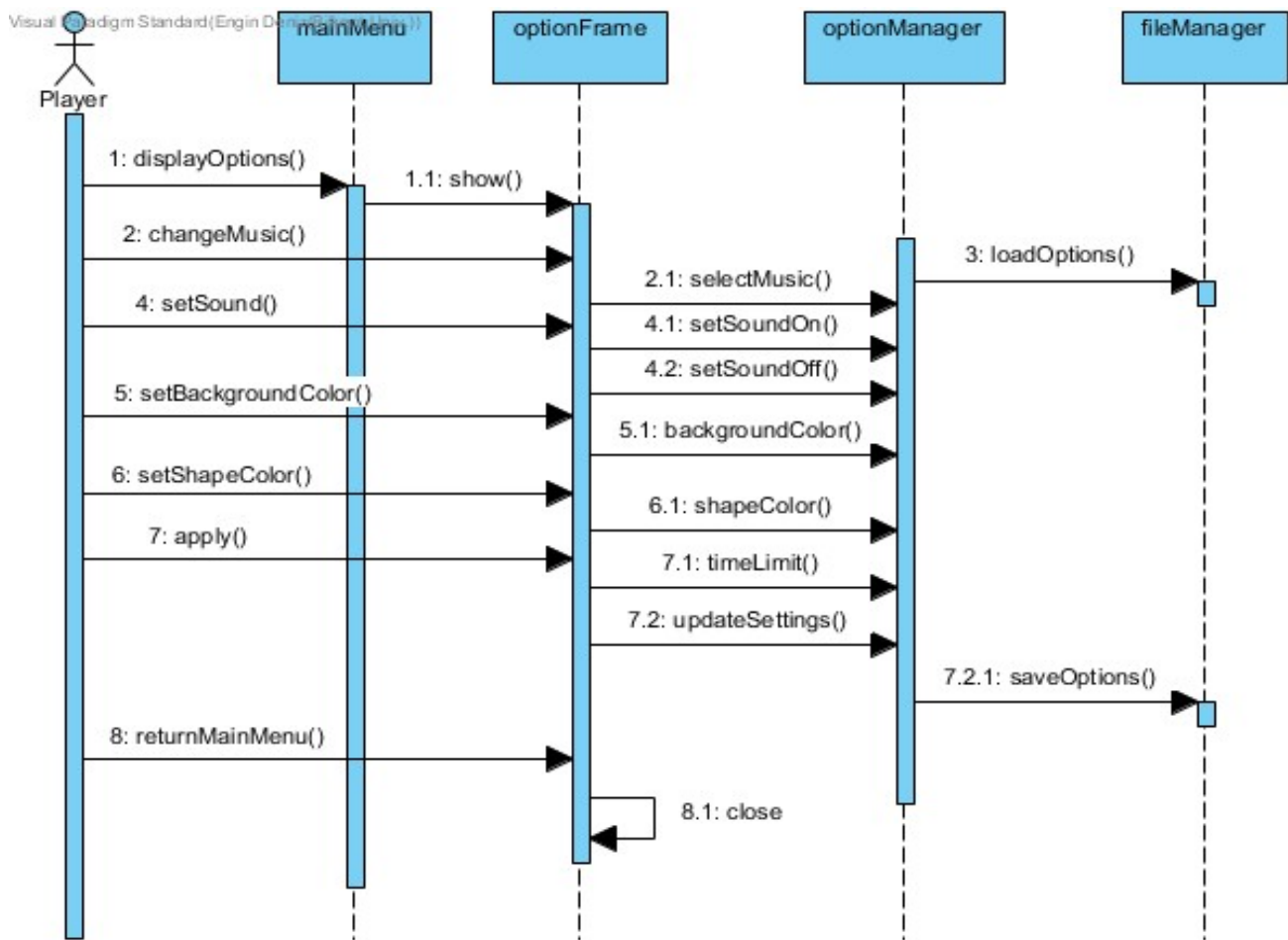


Figure 8 - Sequence Diagram for Changing Settings

Scenario: Player pushes the settings button

Player wants to adjust the settings according to preferences. When the player goes to the settings panel, he or she can select the settings as follows;

- Change Music
- Set Sound
- Set Background Colour
- Set Shape Colour

- Set Time Limit

After the player applies those changes, selected settings will be saved and when the player intends to play the game, he or she will begin the game with his or her options.

5.2.2 Activity Diagram

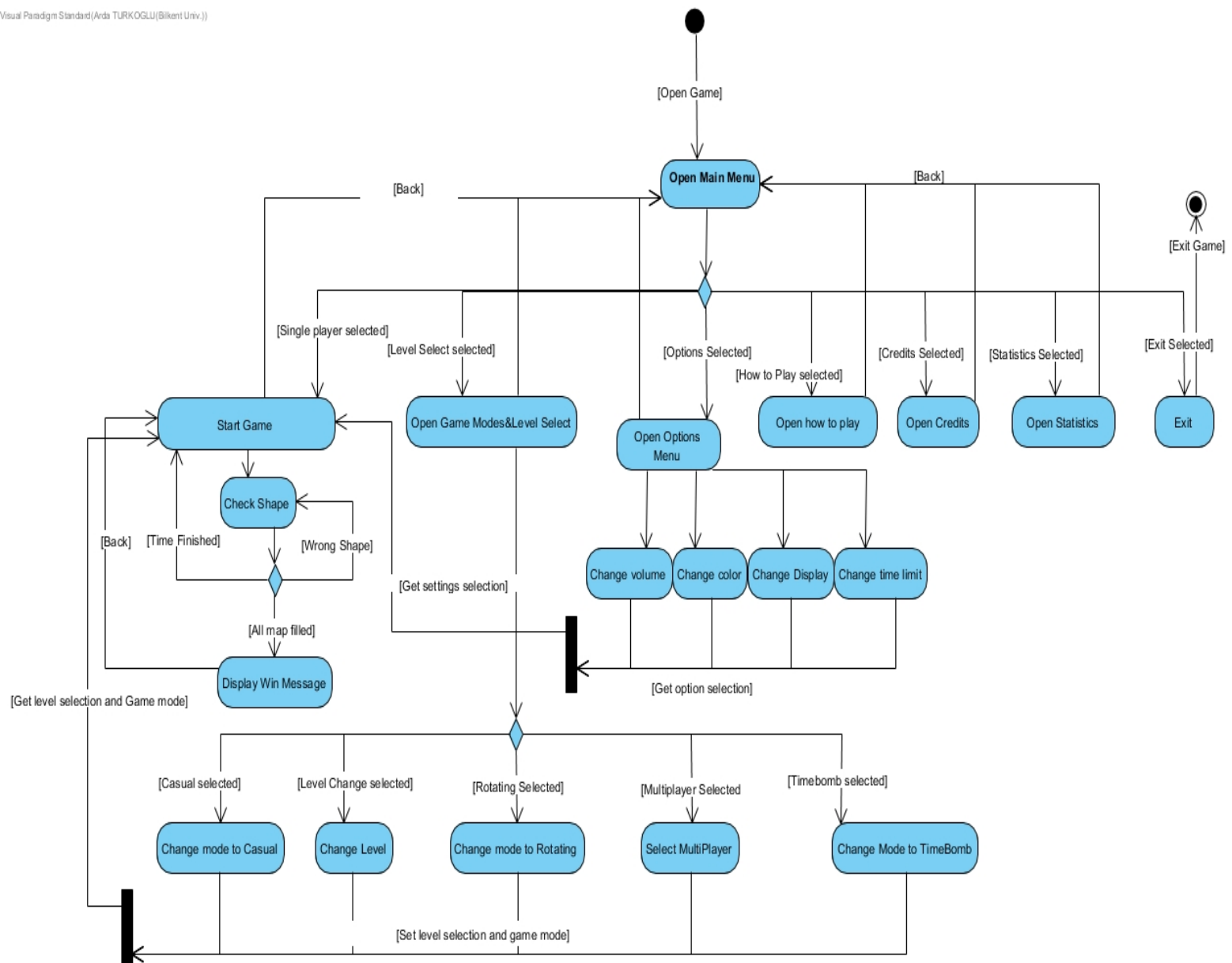


Figure 9 - Activity Diagram

Diagram starts with Open Main Menu activity. From there system can flow to other menu activities according to user selection. There are only 2 special activities which are Check Shape and Display Win Message. These activities control game status and implement the game logic inevitably. Other activities are accessible through control flow by the user selection.

5.3 State Diagrams

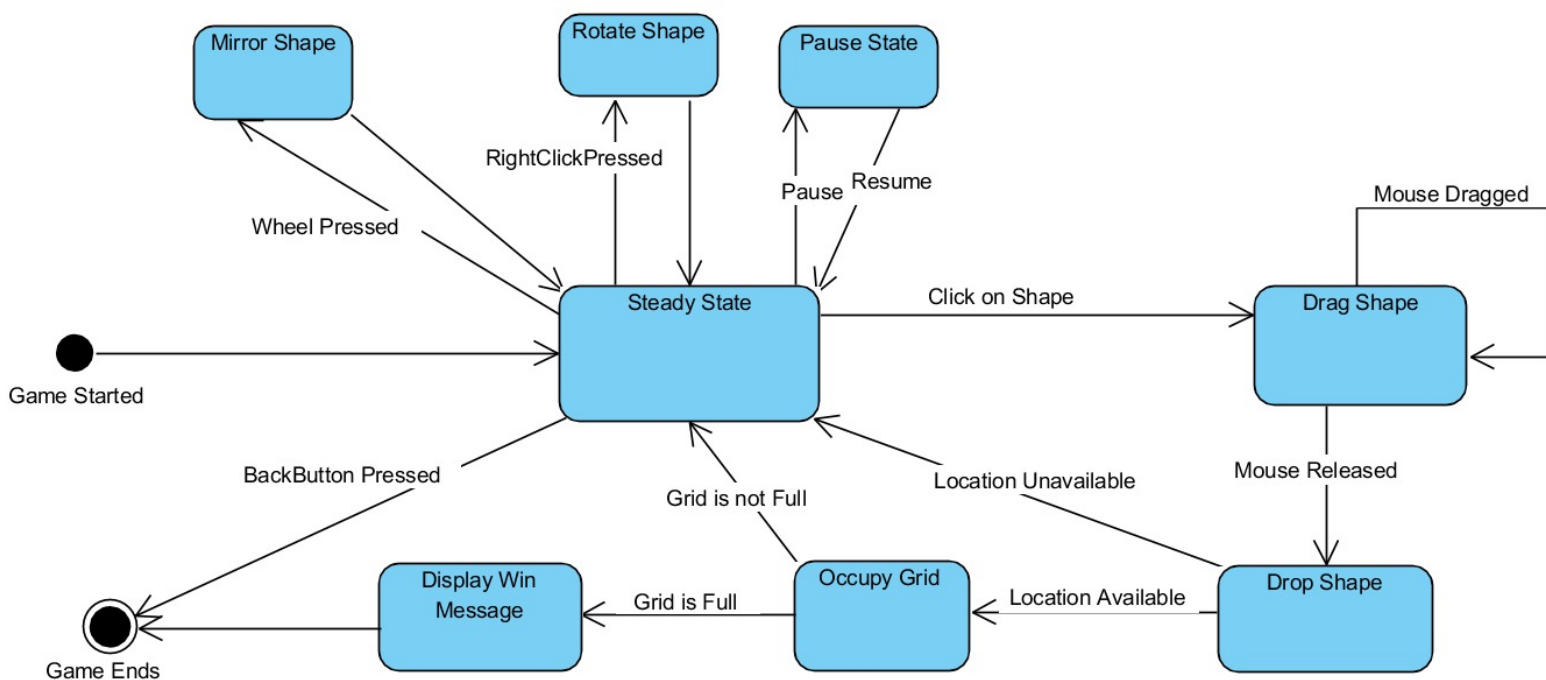


Figure 10 - State Diagram of Casual Mode

This state diagram begins with Steady state which is basically the game on resume. According to the user interactions state will change. If user presses right mouse or middle mouse state will change to Rotate Shape or Mirror

Shape state respectively. If player presses pause button state will change to Pause State until the player resumes the game. If user left clicks and drags the mouse the state will change to Drag Shape state until mouse input is ceased then state will change to Drop Shape state. If the current location of shape is empty, state will change to Occupy Grid state then if grid is full state will change to Display Win Message state and game will end but if not state will return Steady State. If location is already occupied state will immediately change to Steady State.

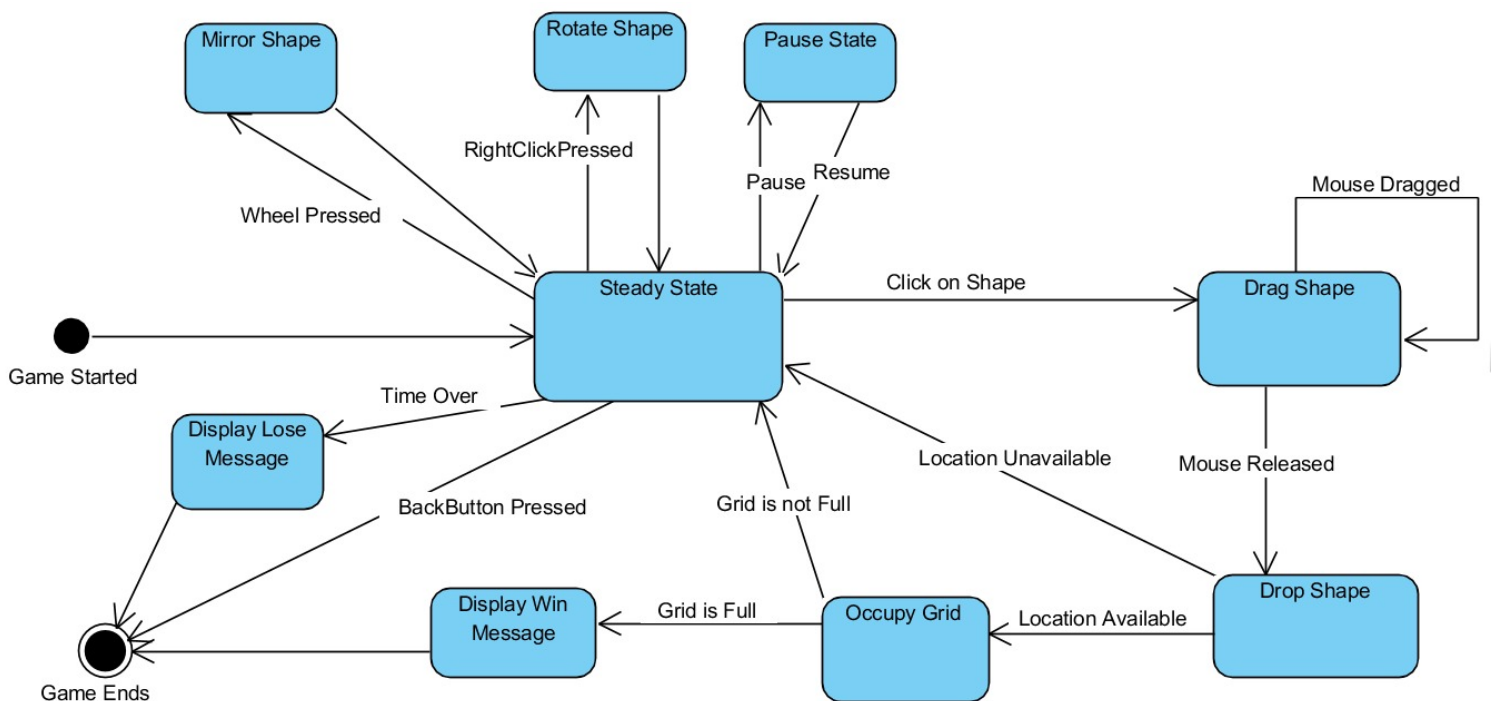


Figure 11 - State Diagram of TimeBombMode

Only difference between the two diagrams is Display Lose Message state which is triggered when designated time is over.

5.4 Class Diagram

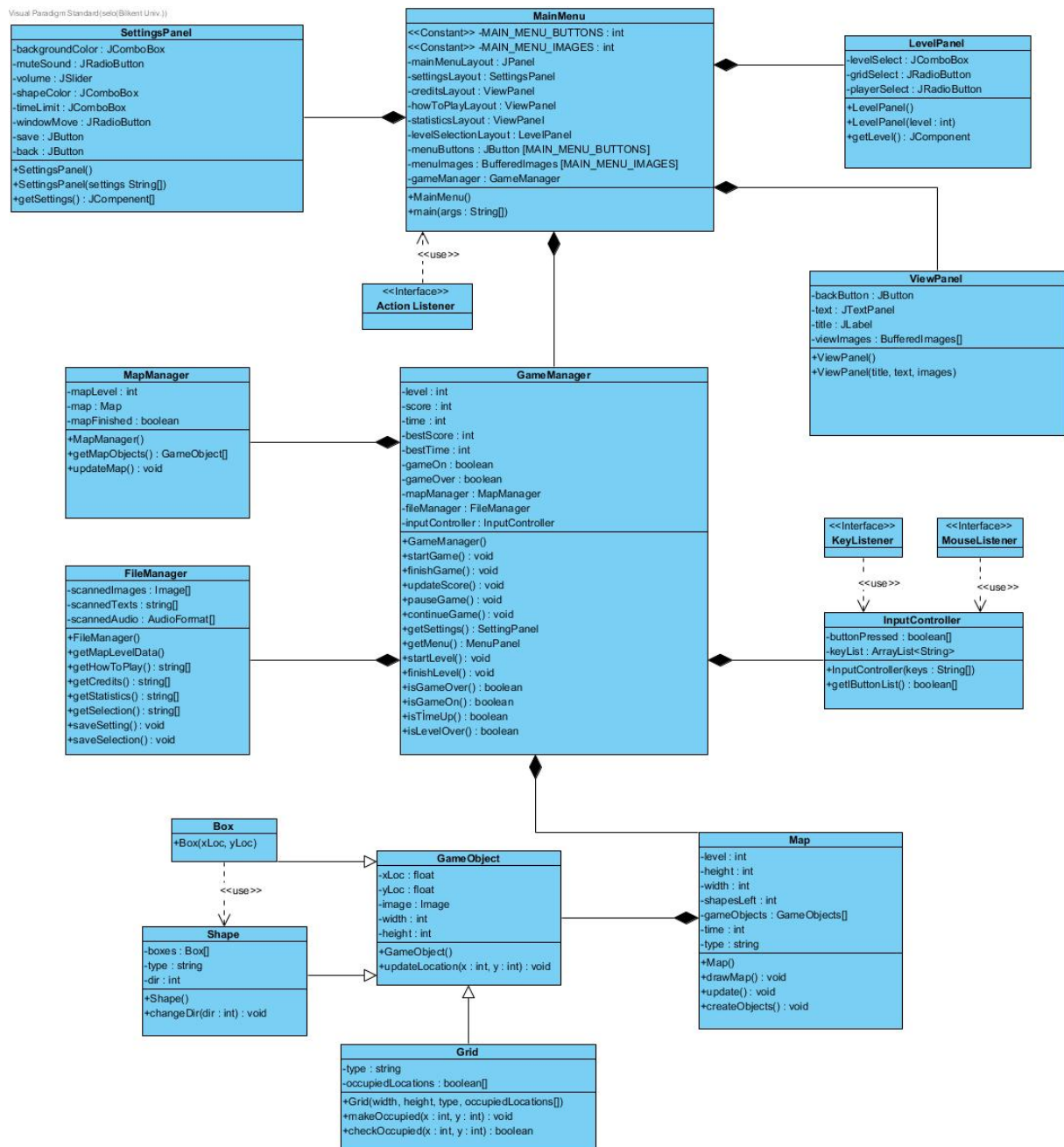


Figure 12- Class Diagram

This is the basic class diagram that we want to implement. It is not fully finished but it is some kind of an outline for our design and implementation process.

5.5 User Interface – Navigational Path and Mock-ups

5.5.1 Navigational Path

Visual Paradigm Standard (Zafar Qamar@Bilkent Univ.)

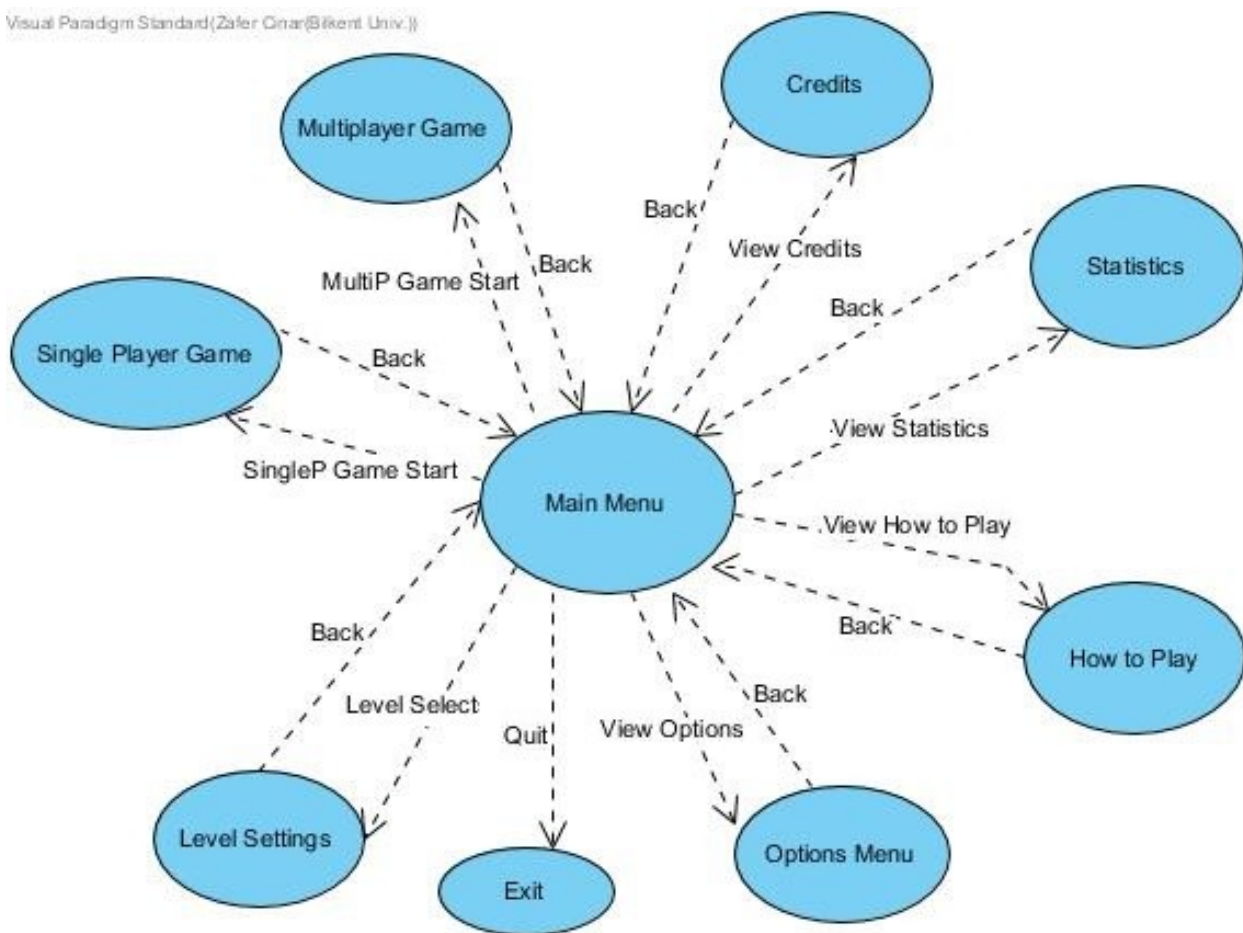


Figure 13 - Navigational Path

This path shows how user can interact with different branches of the game.

5.5.2 Mock-ups

These mock-ups are visual representation of how our game will look like.

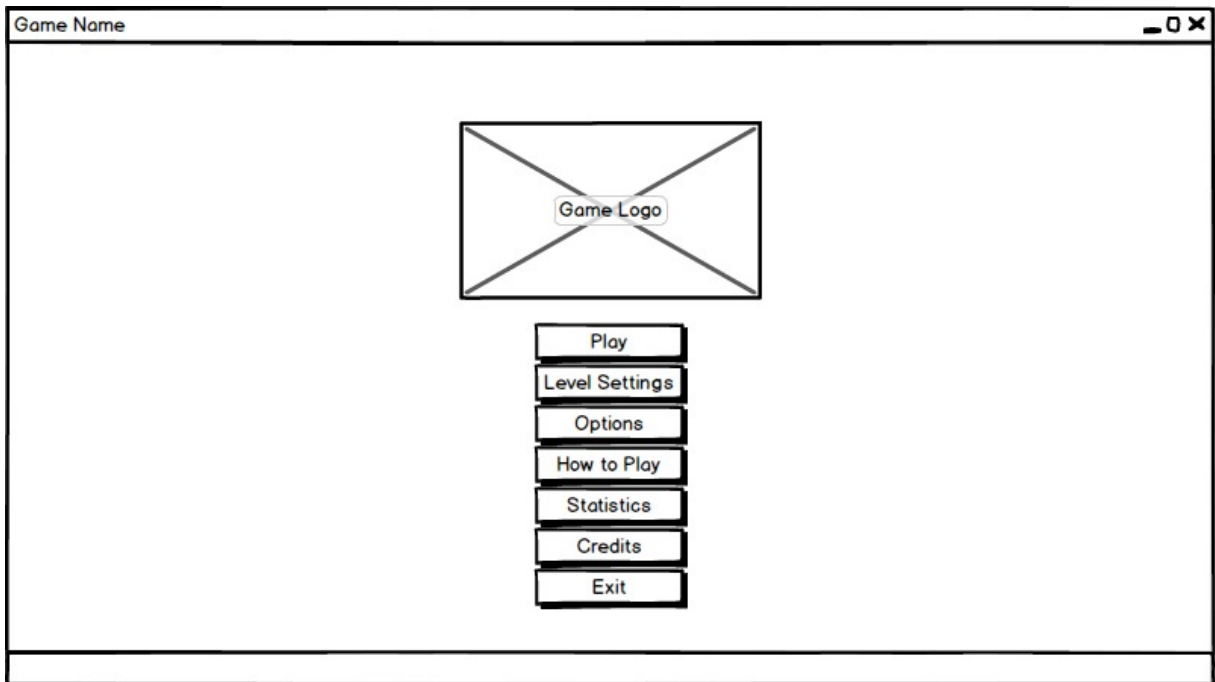


Figure 14- Main Menu Mock-up

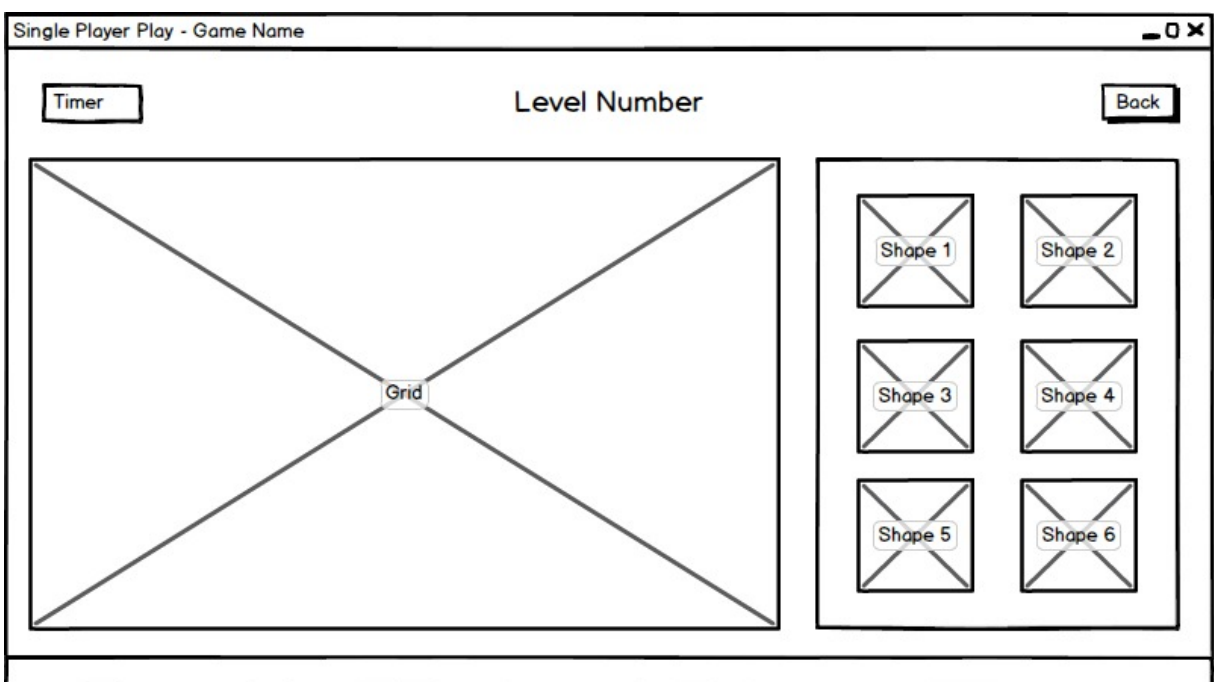


Figure 15 - In Game Mock-up(single player)

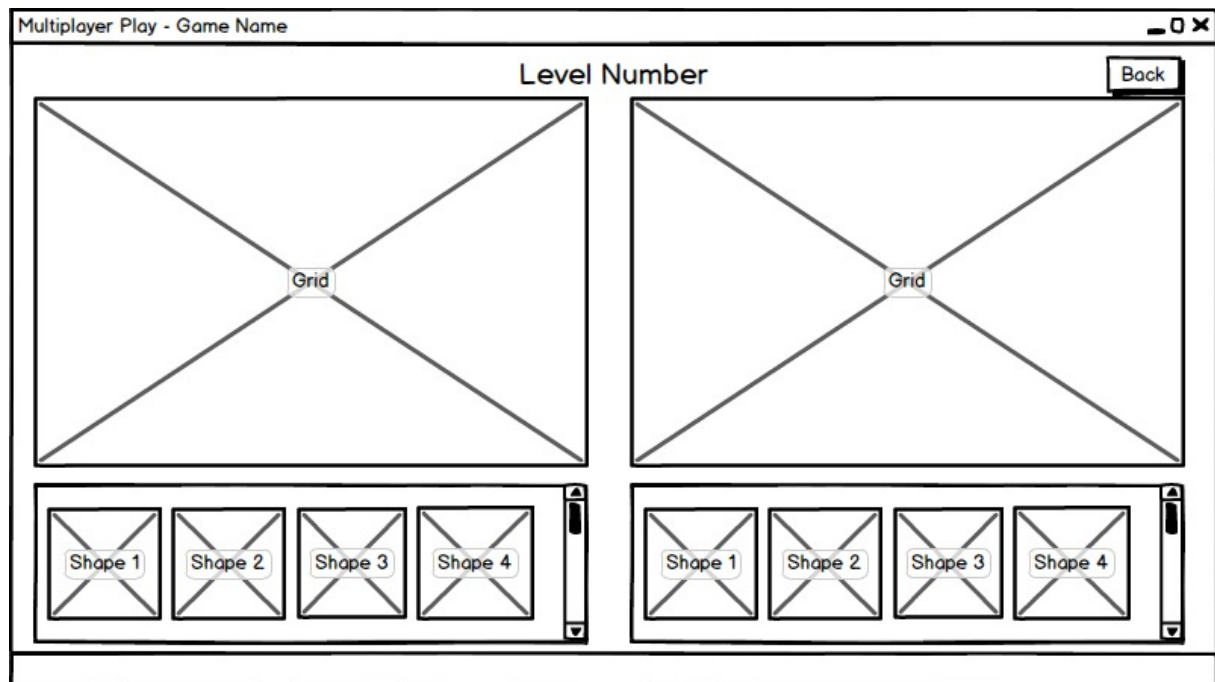


Figure 16 - In Game Mock-up(multiplayer)

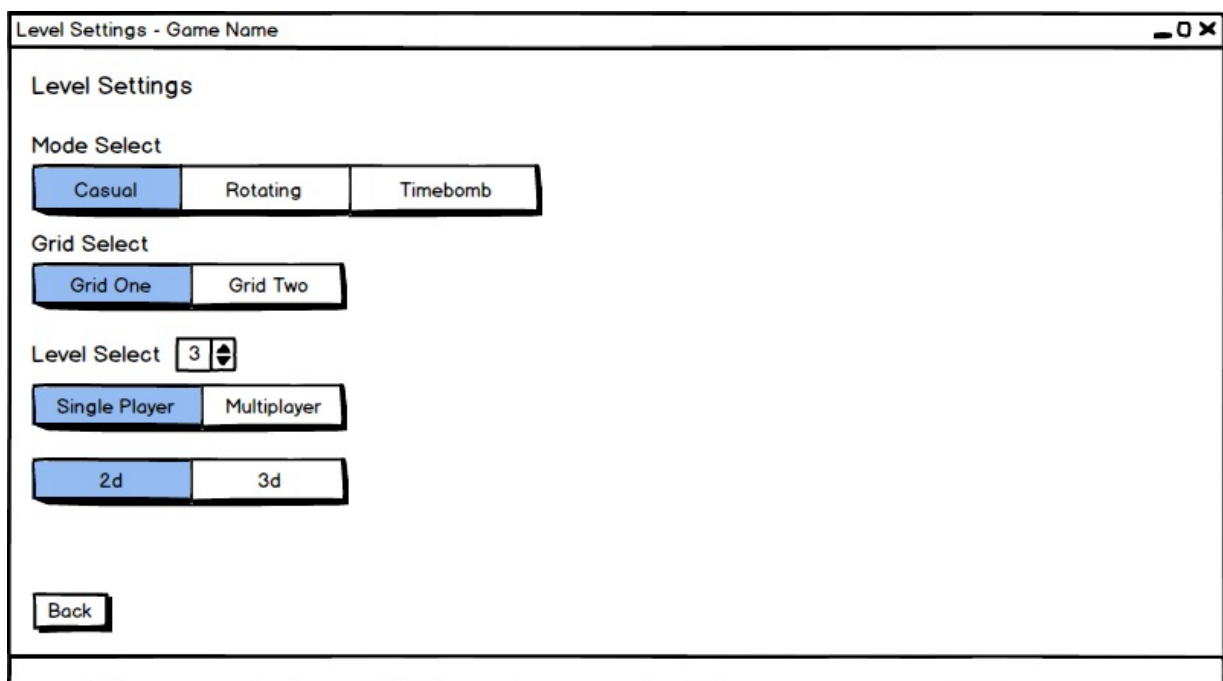


Figure 17 - Level Settings Mock-up

Statistics - Game Name

Statistics

Grid:

1
2

Level:

3

Back

Casual Mode

Best Time:

Player Name:
Name1

Time:
Time1

Move Count:
Count1

Best Move Count:

Player Name:
Name2

Time:
Time2

Move Count:
Count2

Total Time Spent:
Time

Avg Time:
Time

Total Move Count:
Count

Avg Move Count:
Count

Play Count:
Count

Rotation Mod:

Best Time:

Player Name:
Name1

Time:
Time1

Move Count:
Count1

Best Move Count:

Player Name:
Name2

Time:
Time2

Move Count:
Count2

Total Time Spent:
Time

Avg Time:
Time

Total Move Count:
Count

Avg Move Count:
Count

Play Count:
Count

Time Bomb M

Best Time:

Player Name:
Name1

Time:
Time1

Move Count:
Count1

Best Move Count:

Player Name:
Name2

Time:
Time2

Move Count:
Count2

Total Time Spent:
Time

Avg Time:
Time

Total Move Count:
Count

Avg Move Count:
Count

Play Count:
Count

Figure 18 - Statistics Panel Mock-up

Options - Game Name

Options

Sound Setting

Background Color

Shape Colors

Shape 1

Shape 2

Shape 3

Shape 4

Shape 5

Shape 6

Shape 7

Shape 8

View

Full Screen

Windowed

Time Limit

3

minutes

Back

Figure 19 - Settings Panel Mock-up

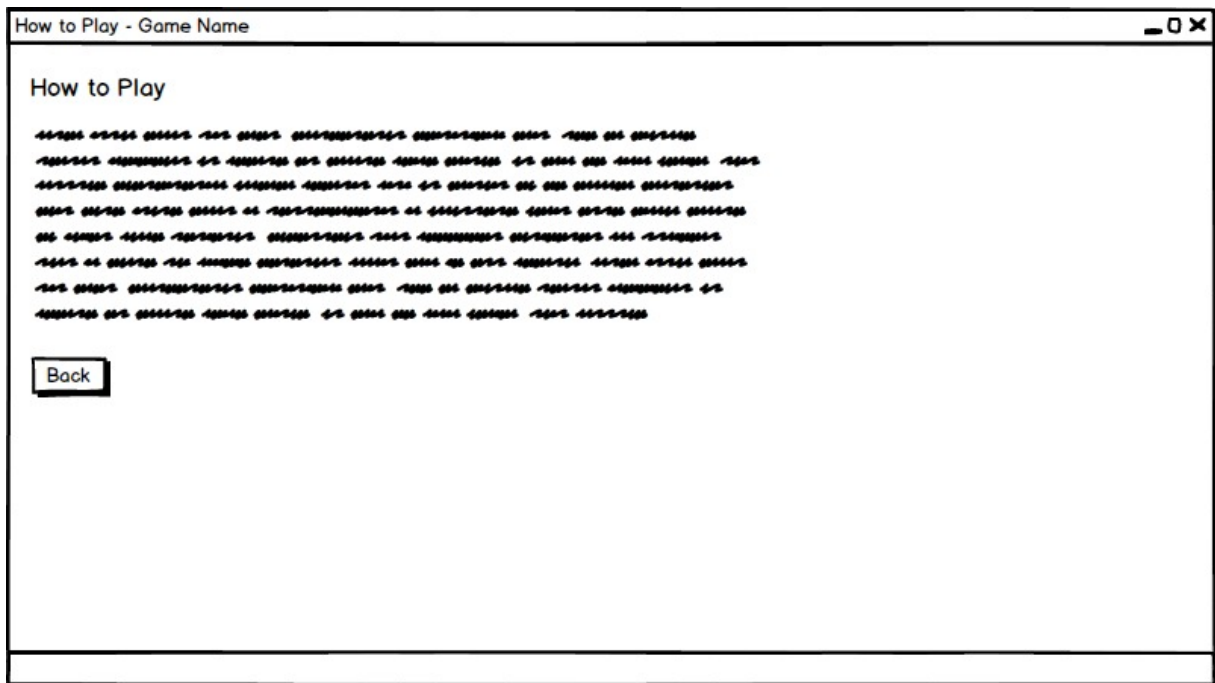


Figure 20 - How To Play Panel Mock-up

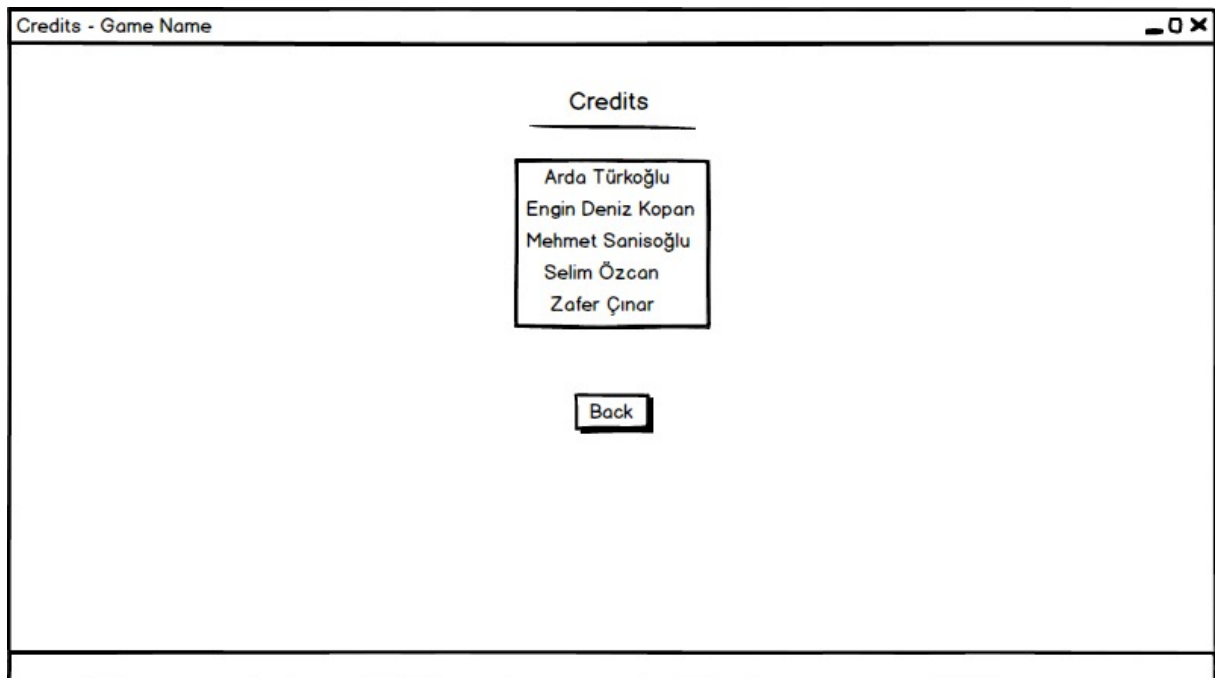


Figure 21 - Credits Panel Mock-up

6. References

- “IQ Puzzler Pro.” *IQ Puzzler Pro - SmartGames*,
www.smartgames.eu/uk/one-player-games/iq-puzzler-pro.