Requirements and Analysis Document for MemoryShape

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1. Introduction

This document will be an analysis of the project requirements for MemoryShape and define what the users can expect from the application.

1.1 Purpose of application

The purpose of MemoryShape is to provide a fun, engaging and challenging single player game. The application aims not only to entertain the user, but also to exercise her memory. MemoryShape targets users of all ages, with its fun, colourful shapes and variously difficult game modes.

1.2 General characteristics of application

MemoryShape is a desktop application available for Windows, Mac and Linux. The application's title screen features the MemoryShape logo and functional buttons for starting a game, checking out the leaderboard, toggling the sound on and off and closing the application.

Starting a game will generate a board with a grid of cards, each featuring a shape with a specific colour. The user will get the chance to memorise the grid of cards or a sequence of cards, depending on the game mode, before they are flipped to face the board. In the game's standard mode each of the combinations of shape and colour on the board will be displayed one by one on the screen above the board. It is then up to the player to remember and match each of the cards being displayed with its counterpart in the grid. Choosing the wrong card will result in losing one of your lives. If the player gets all of the cards right before losing her last life, she will move onto the next, more difficult level. The frenzy mode works similarly to the standard mode, with the difference that there are several cards with the same shape and colour. The sequence mode will show a sequence of cards on the display to be memorised by the player, who is then supposed to recreate the sequence by clicking on a grid of face up cards in the right order.

The leaderboard consists of a list of the user's best runs, each spot featuring the player's name and score, as well as the game mode she played in order for the user to track her progress, compete with her friends and to motivate her to improve her memory. The leaderboard is also saved between sessions.

1.3 Scope of Application

MemoryShape is played using only the mouse cursor, with either a mouse or a trackpad. The application supports use by one player at a time, although it is possible to challenge your friends for the top spots on the leaderboards by changing the nickname of the player between runs. You can also team up and work together by simply cooperating during a run.

MemoryShape includes three different, but equally fun, game modes of varying difficulty, so that all users can exercise their memory in a fun way that suits them. The leaderboard and scoring system provide the user with motivation to keep trying and to improve. The sense of accomplishment experienced by the user for each level she clears brings excitement for the next one. MemoryShape is perfect for those trying to improve their memory or who just want to have fun killing some time.

1.4 Definitions, acronyms and abbreviations

- **MVC** - Model View Controller: A design pattern to structure the code on a large scale.[1]
- **GUI** - Graphical User Interface: The visual interface of the program, seen by the user.[2]
- **UML** - Unified Modeling Language: A diagram describing how different parts of the program work together.[3]
- **Domain model** - A domain model is a visual representation of conceptual classes in the model.[4]
- **User Story** - A small story that describes a type of user, what they want, why they want it, and how to achieve it.[5]
- **Definition of done** - An agreement on when a user story is completed.

2. Requirements

The following text describes the requirements set up for the project to be finished and considered as successful.

2.1 User Stories

Functional Requirements:
Implemented:
The player needs to be able to:

1 -*Start a new game.*

a . Enter the player's name.
b. Choose a game mode.
c. Start a game from the game mode selector.
b . Be presented with cards to remember.
c . Be presented with cards on a display above the board that can be match with the board cards.

2 -*Play the game.*

Sequence mode:

a. click the display.

- i. see a sequence of cards on the display to memorise.

b. Select a card on the board.

- i. get visual feedback based on the selected card.
  - 1. see the selected card turn green if it was a match.
  - 2. see the selected card turn red if it was not a match.
  - 3. see the selected card on the display.

c. see how many lives they have left.

- i. lose a life when they select a wrong card.

d. get points.

- i. see their final score when the game is over.

e. proceed to the next level when they have completed the previous one.

- i. be presented with a new, more challenging board.

Standard and Frenzy mode:

a. see the cards on the board face up so they can memorise them.

b. click the display to flip the cards face down.

- i. see the requested card on the display.

c. select a card on the board.

- i. get visual feedback based on the selected card.
  - 1. see the selected card turn green if it was a match.
  - 2. see the selected card turn red if it was not a match.
  - 3. see a new card on the display if it was a match.

d. see how many lives they have left.

- i. lose a life when they select a wrong card.

e. get points.

- i. see their final score when the game is over.

f. proceed to the next level when they have completed the previous one.

- i. be presented with a new, more challenging board.

3- *On Game Over*

a. be notified when the game is over.

b. see their score and their reached level.

c. proceed with playing the game.

- i. start a new game.
- ii. go back to the main menu.

4- *On Game Paused*

a. resume the game.

b. go back to the main menu.

c. exit the application.

5- *Check the leaderboard*

a. be presented with the ten highest scores achieved on their device.

i. see the amount of points gathered on each of the best runs.

ii. see the name entered with each of the scores.

iii. see the game mode that was played when that particular score was reached.

6 -*Exit the game*

a. exit the game from the Paused Menu

b. exit the Game from the Main Menu

Unimplemented:

1-Hear music while playing MemoryShape

a. change sound options

i. mute the sounds

ii. unmute the sounds

iii. regulate the volume

Non Functional Requirements:

1-*Usability:* The user is not expected to have more than basic computer knowledge to be able to play the game. The game aims to be simple to understand and interact with. Instructions are available in the README document.

2-*Reliability*: N/A

3-Performance: The application should perform fast, the response time should be short and appear immediate to the user.

4- Packaging: The application can be run from maven and from the command terminal.

2.2 Definition of Done

Acceptance criteria for a user story to be defined as done :

- The implemented functionality should be successfully tested
- Possible bugs should be fixed
- Possible exceptions should be handled
- Code has been reviewed by another member of the development team
- Possible merge conflicts should be resolved
- Finally the functionality should be pushed to the master branch

2.3 User Interface

Upon running the application the start screen will appear (as seen in figure 1). The view features several interactable buttons each of which will show a different user interface, with the exception of the mute button which simply toggles the game sounds on and off. The first iteration of the main menu user interface was a sketch made in Figma and featured more buttons that were later removed (see figure 2).

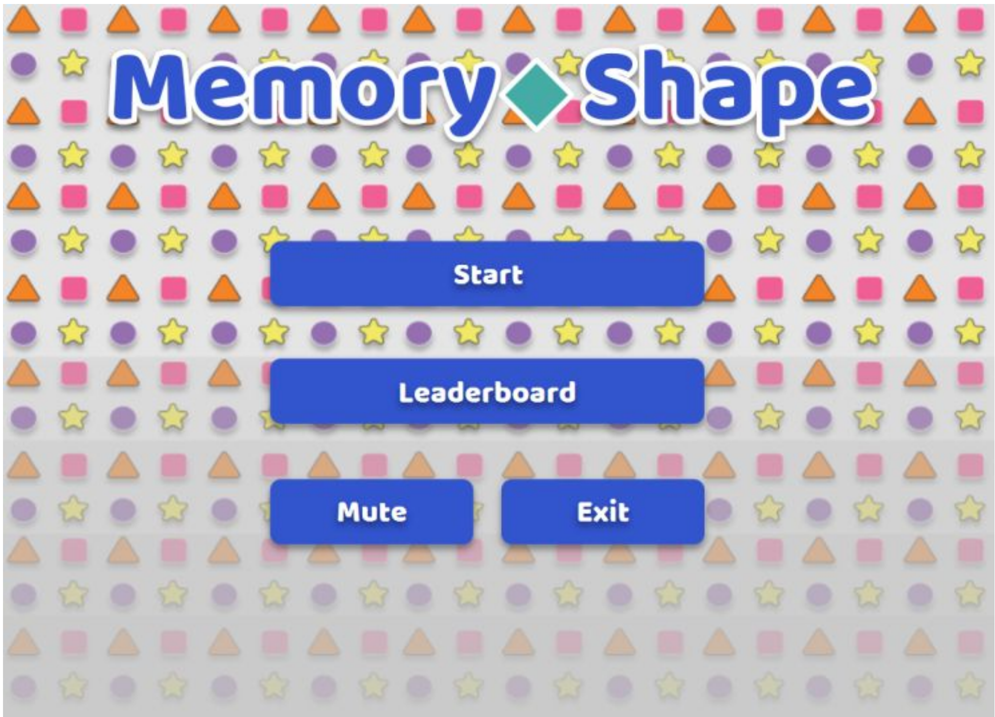


Figure 1: The MemoryShape main menu.

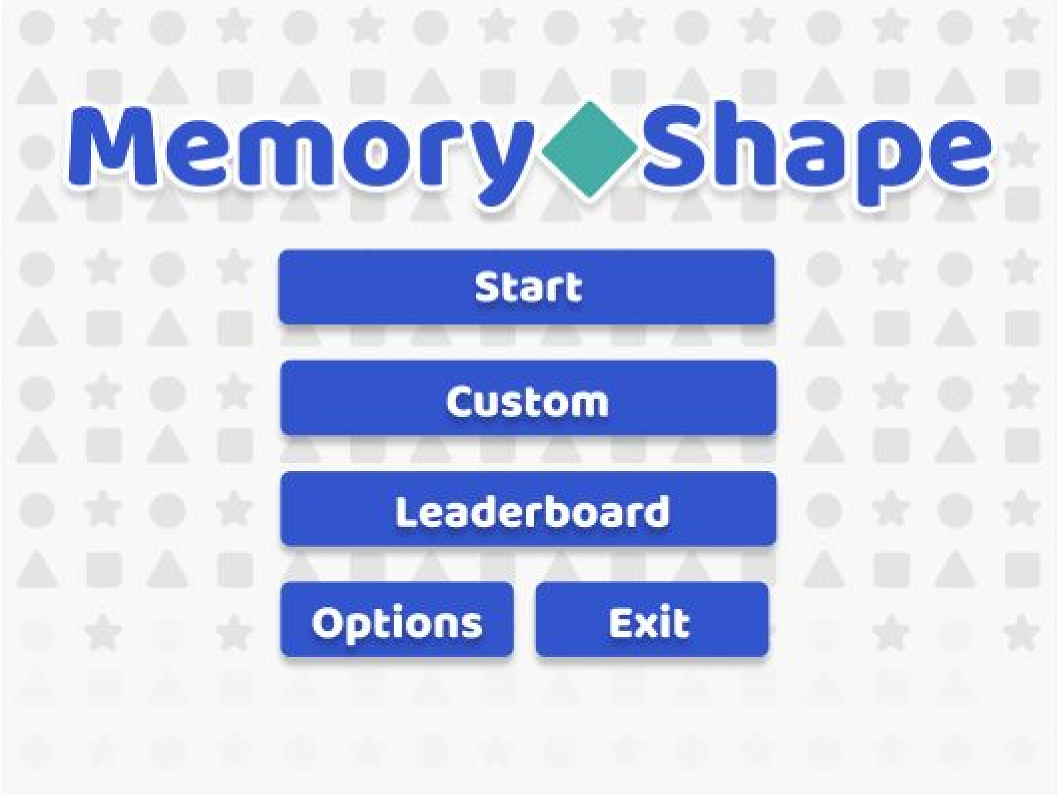


Figure 2: Sketch of the MemoryShape main menu.

Pressing the button labeled “Start” will show a menu for selecting game mode and entering your name (see figure 3). The green button in this GUI will start a new game.

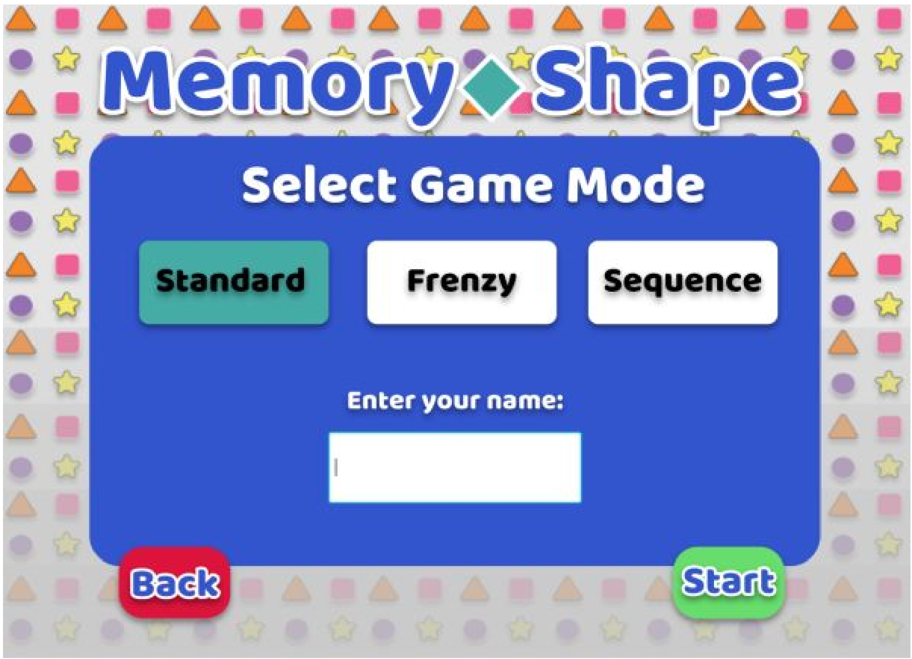


Figure 3: The MemoryShape select game mode user interface.

The user interface shown during the game features a board with a grid of cards placed below a display, and a menu button in the top right corner (as seen in figure 4). Clicking a face down card will flip it, revealing its shape and colour. The menu button in the top right corner brings out a popup window with menu options (shown in figure 5).

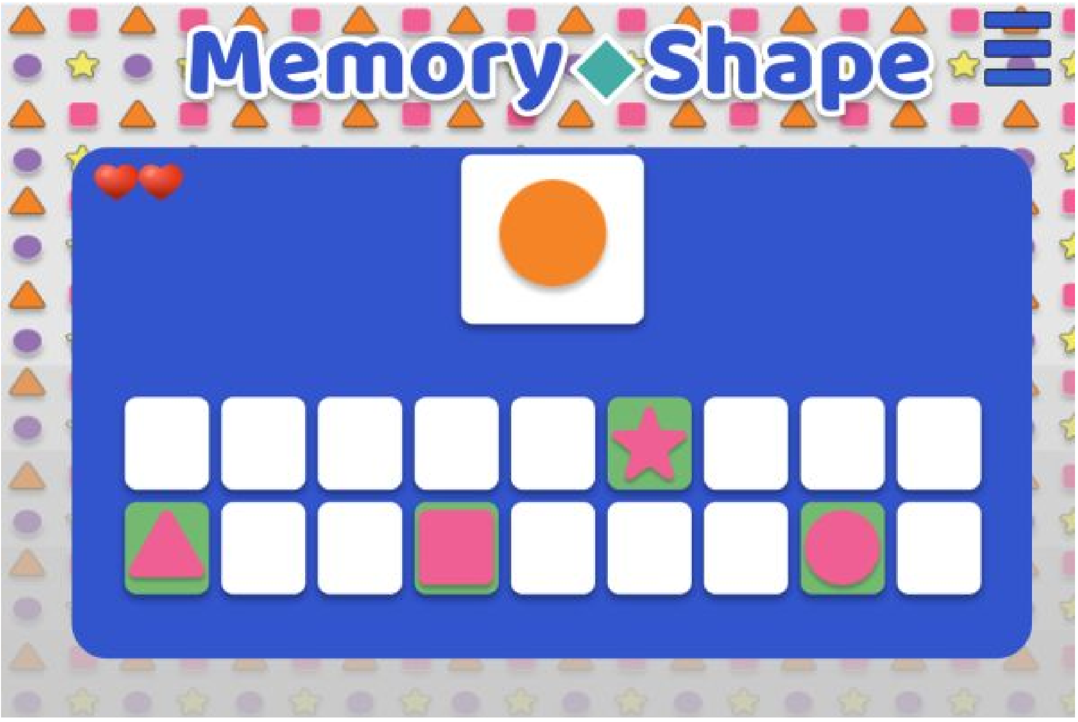


Figure 4: The MemoryShape board screen in standard mode.

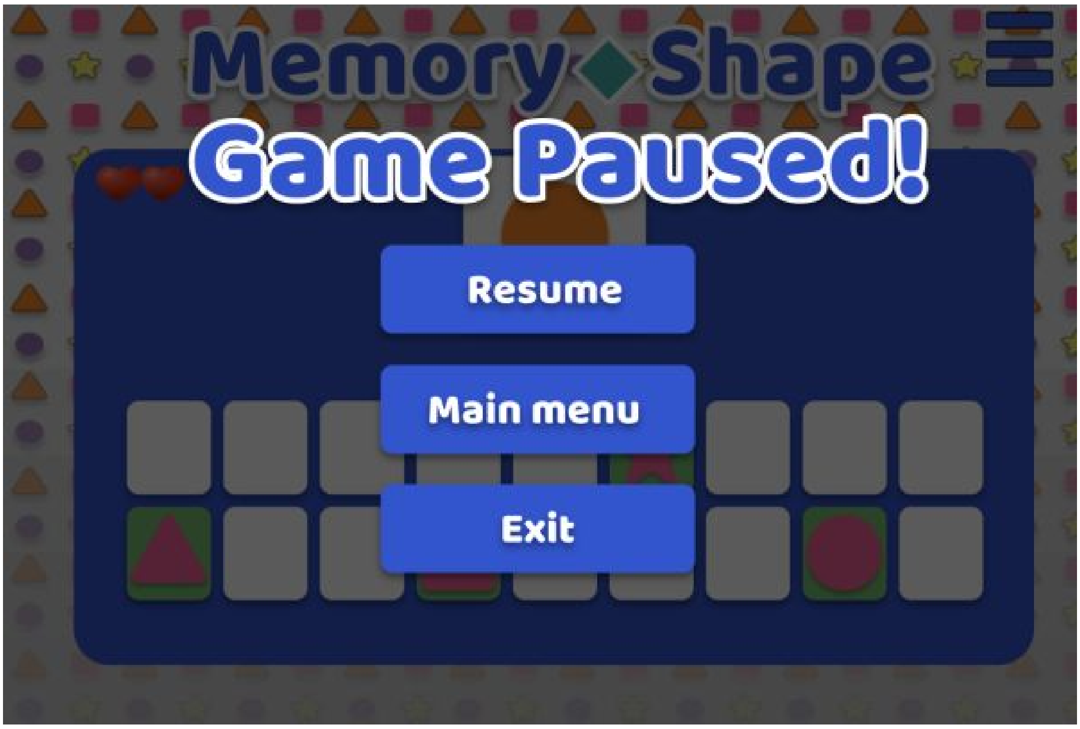
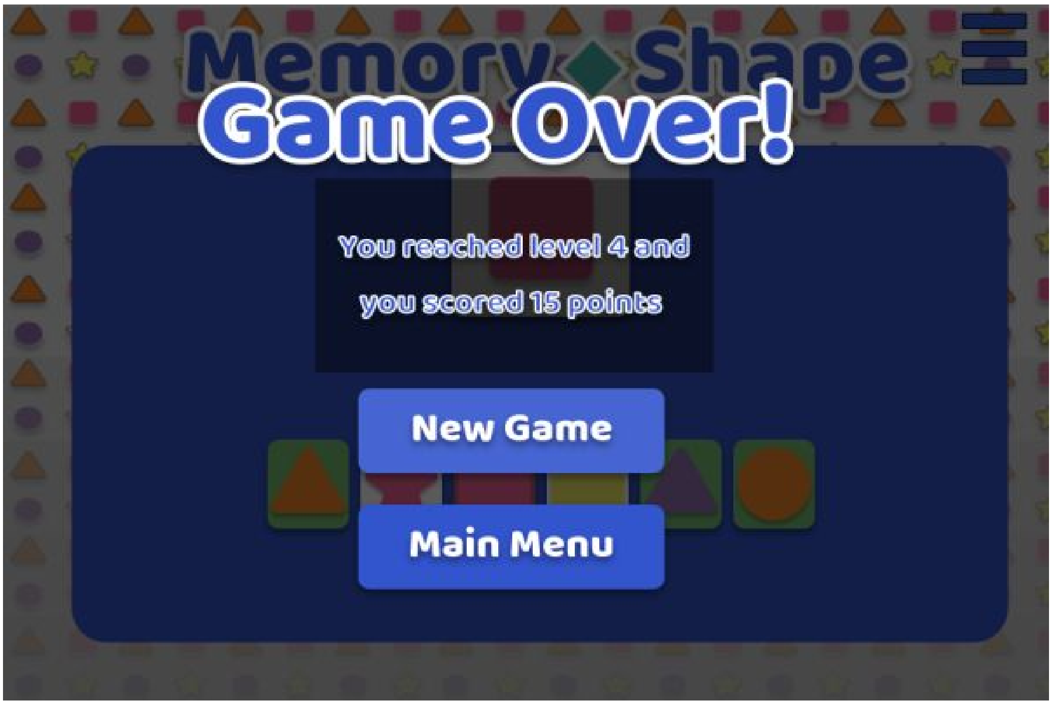


Figure 5: The MemoryShape pause menu.

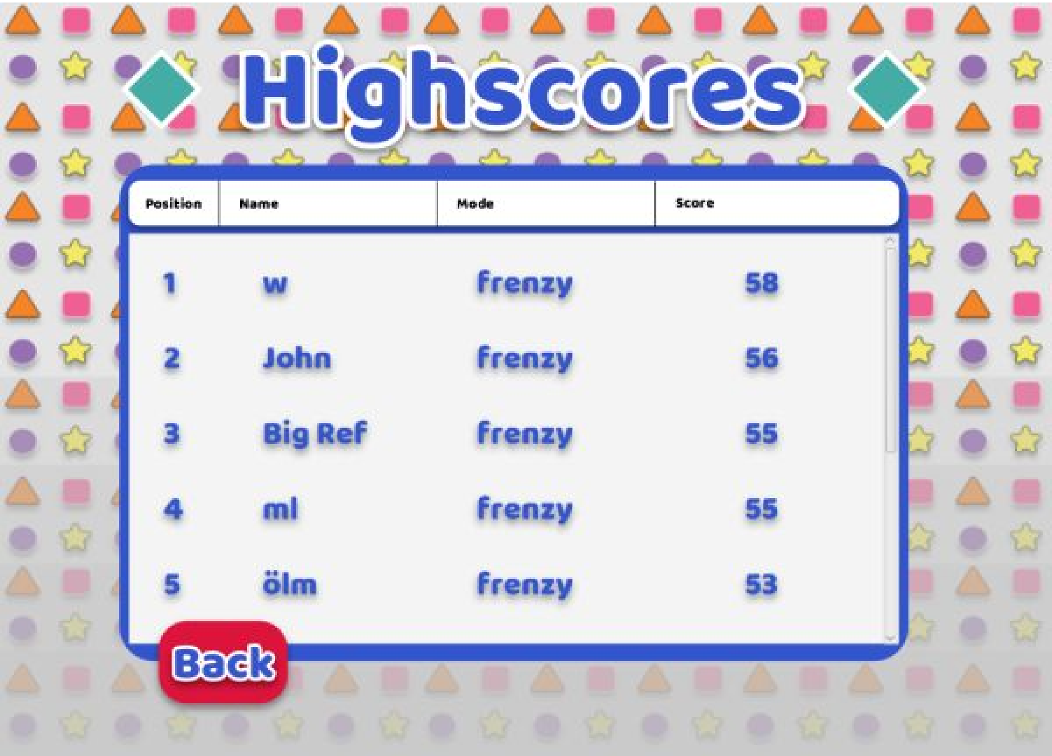
Failing to get all the cards right before losing all of your lives will result in the game over menu popping up (as seen in figure 6). The menu features navigational buttons for starting a new game and for going to the main menu, as well as your score and the level you reached.



You reached level 4 and you scored 15 points

Figure 6: The MemoryShape game over screen.

Pressing the leaderboard button in the main menu will take the user to a list view of the best scores that have been achieved on the device (see figure 7). The button labeled "Exit" closes the application upon being clicked.



Position	Name	Mode	Score
1	w	frenzy	58
2	John	frenzy	56
3	Big Ref	frenzy	55
4	ml	frenzy	55
5	ölm	frenzy	53

Figure 7: The MemoryShape leaderboard screen.

3. Domain model

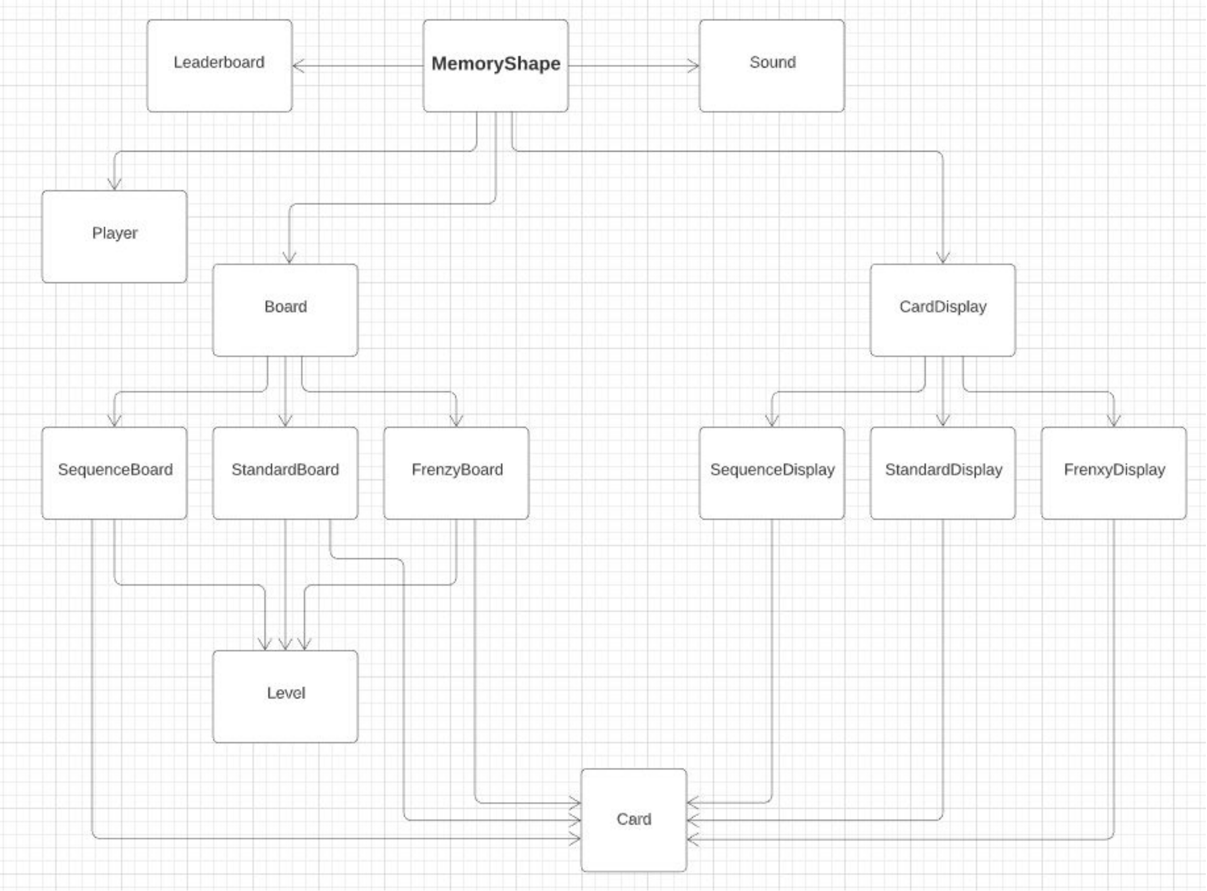


Figure 8: MemoryShape's domain model.

3.1 Class Responsibilities

- **Game (MemoryShape)** - Contains all the parts required to run the gameplay. Acts as a facade for the entire model, by hiding the complexity of the model and communicating with other packages in the program.
- **Player** - Contains the player related data, such as: name, lives and score.
- **Card** - A clickable figure that contains a shape with a specific colour.
- **CardDisplay** - A display that shows the next card the player is supposed to select. There are three kinds of CardDisplays, one for each game mode, and they each show the cards in a different way.
- **Board** - The playing field under the display, which contains a grid of clickable cards. There are three kinds of Boards, one for each game mode.
- **Leaderboard** - Contains a list of saved highscores from previous runs to be displayed on the leaderboard.

References

[1] T. Reenskaug, J. Coplien, *The DCI Architecture: A New Vision of Object-Oriented Programming*. Artima Developer, 20 March 2009. Retrieved 1 October 2020. [Online]. Available: https://web.archive.org/web/20090323032904/https://www.artima.com/articles/dci_vision.html

[2] Nationalencyklopedin, *GUI*. Retrieved 3 October 2020. [Online]. Available: https://www.ne.se/uppslagsverk/encyklopedi/l%C3%A5ng/gui-(grafisk-yta)

[3] Source Making, *UML: Introduction*. Retrieved 3 October 2020. [Online]. Available: https://sourcemaking.com/uml/introduction

[4] C. Larman, *Applying UML and Patterns. An Introduction to Object-Oriented Analysis and Design and the Unified Process.* Second edition. 2001.

[5] Visual Paradigm, *What is user story?*. Retrieved 3 October 2020. [Online]. Available: https://www.visual-paradigm.com/guide/agile-software-development/what-is-user-story/