Ain Shams University

Faculty of Computer and Information Sciences

OOP Project 2020

Game Box

(Sokoban, Arkanoid, Tetris and AI-XO)

Team ID: G 43

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1.Introduction

We wanted to design and implement a new and extended version of some well-known games, **Sokoban, Tetris, Arkanoid and AI-XO**. As all of us have been played those games when we were children, we decided to implement those 4 games with passion and create a Game Box. Also the structure of the games seemed compatible with the content of our course such that the game can be implemented with a manner of object oriented programming.

Our Game Box was made with

- Java and JavaFX (GUI)
- OOP Concepts:
    - Inheritance
    - Encapsulation
    - Polymorphism
    - Abstraction
- Design Patterns (Singleton and Factory)
- AI (Min Max Algorithm).

We choose JavaFX because it provides easy and smooth graphics and UI design properly while it does not make the integration of the objects difficult.

2.Overview

2.1 Gameplay

First of all, To run the project well you should follow the next steps :

1- Make Sure that the project file's name is "Game-Box"
2- Then 'copy' the project file
3- Open partition C and 'paste' the file
4- Use any IDE and take the code to it and run then Enjoy!

Why should you follow those steps carefully?

Because, we're using files to read and write data and it's defined by this way in code implementation.

To download the project and see all the commits with its description you can click here:

Game Box on GitHub

2.2 Sokoban

Menu :

- New Game
  - To open the Game for the first time and start from level 1
- Continue
  - Continue from last level, the player reached
- Practice
  - is a new Mode, we added. It enables the player to access all the levels **(100 levels)** easily without any restrictions.
  - he can do that by buttons to go to next or previous level.
- Help
  - If the player is new to our Game, this option'll be so useful to him.
  - There's some another options inside "Help" and they are:
    - Controls
    - Essentials
    - Rules
    - Screen Shots
- Back
  - To return back to the Home Page which has all the games to choose from
- Exit
  - To close the Game.

Features in Sokoban :

- The Game has 100 levels
- Pipes
  - They enables the player to move from somewhere to else
- Pressure Pad and Gates
  - There'll be a closed Gate and It opens only if there's a thing presses on it.
- Practice Mood
  - To make the player practice and access any level that he wants
- Repeat Button
  - If the player made a mistake and he wanted to repeat the level
- Time
- Number of Moves
- Score
  - It's calculated using an equation in terms of the time and num. of moves
- Design Patterns
  - In the implementation of Sokoban we used:
    - Singleton Pattern.

2.3 Arkanoid

Menu :

- Start Arkanoid
  - To open the main Game
- High Scores
  - It shows players' name and scores
  - It shows them in descending order
- Settings
  - Play Sounds
  - Stop Sounds
  - Brightness
  - Darkness
  - Back
- Draw Your Level
  - You can draw your level and put any bricks you want
- Enemy
  - To access the Enemy level
- Back
  - To return back to the Home Page which has all the games to choose from
- Exit
  - To close the Game.

Features in Arkanoid :

- Power-Ups "Capsules"
  - Fast : to increase the ball's speed
  - Slow : to decrease the ball's speed
  - Expand : to expand the paddle
  - Shrink : to shrink the paddle
  - +100, +50 : to increase the score
  - Heart : to increase the number of lives
- Draw Your Level
  - You can draw your level and put any bricks you want
- Enemy Level
- Score
- Design Patterns
  - In the implementation of Arkanoid we used:
    - Singleton Pattern.

2.4 Tetris

Menu :

- New Game
  - It opens another menu and that menu has:
    - Easy
    - Medium
    - Hard
- How to play
  - It shows the controls and how to play the game
- Back
  - To return back to the Home Page which has all the games to choose from
- Exit
  - To close the Game.

Features in Tetris :

- Show next Shape
- Score
  - It’s increased when the player pressed on down key from keyboard
  - And also when the row is complete and it’s about to be removed
- Lines
  - Here we find the number of lines that have been removed
- Rotation
  - When the plyer presses on UP key from keyboard, the shape will rotates and change
- The Game has a variety of difficulty and each of them differs from the other in shapes’ speed
  - Easy
  - Medium
  - Hard
- Design Patterns
  - In the implementation of Tetris we used:
    - Singleton Pattern
    - Factory Pattern.

2.5 AI-XO

Menu :

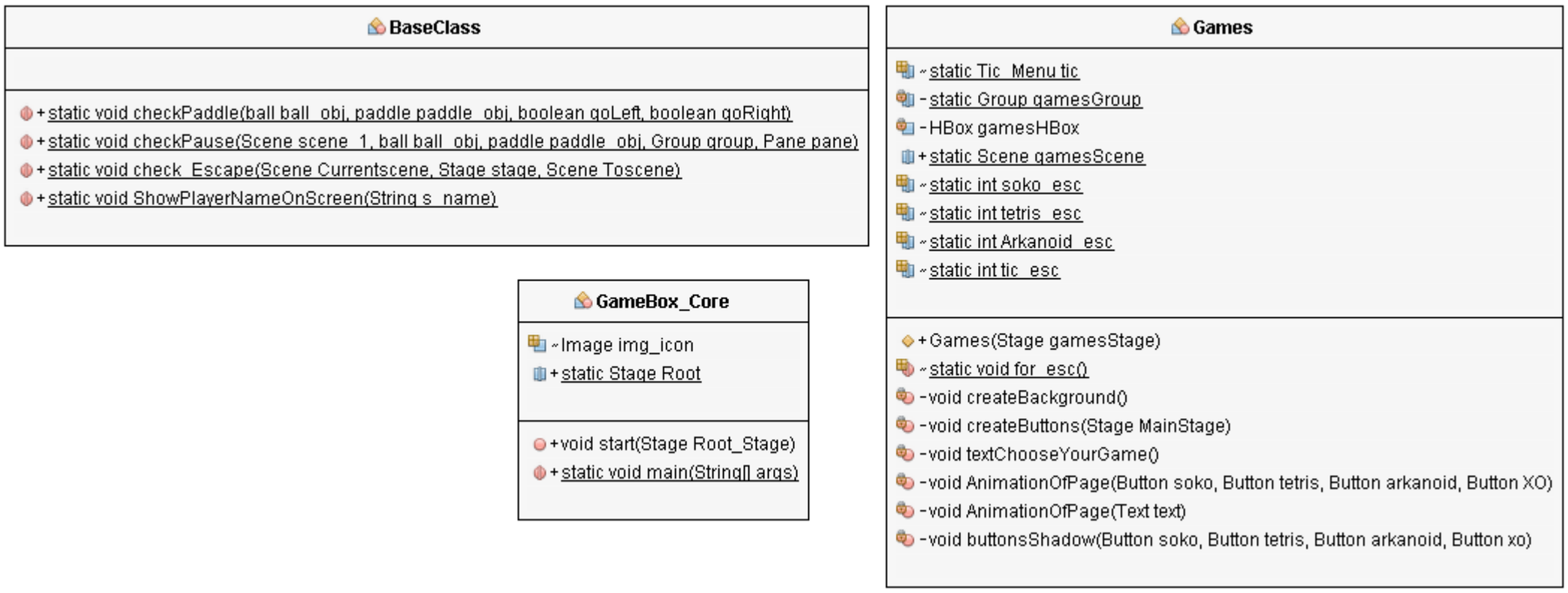
- Player VS PC
  - Using AI “Min Max Algorithm”
- Player VS Player
- Back
  - To return back to the Home Page which has all the games to choose from
- Exit
  - To close the Game.

Features in AI-XO :

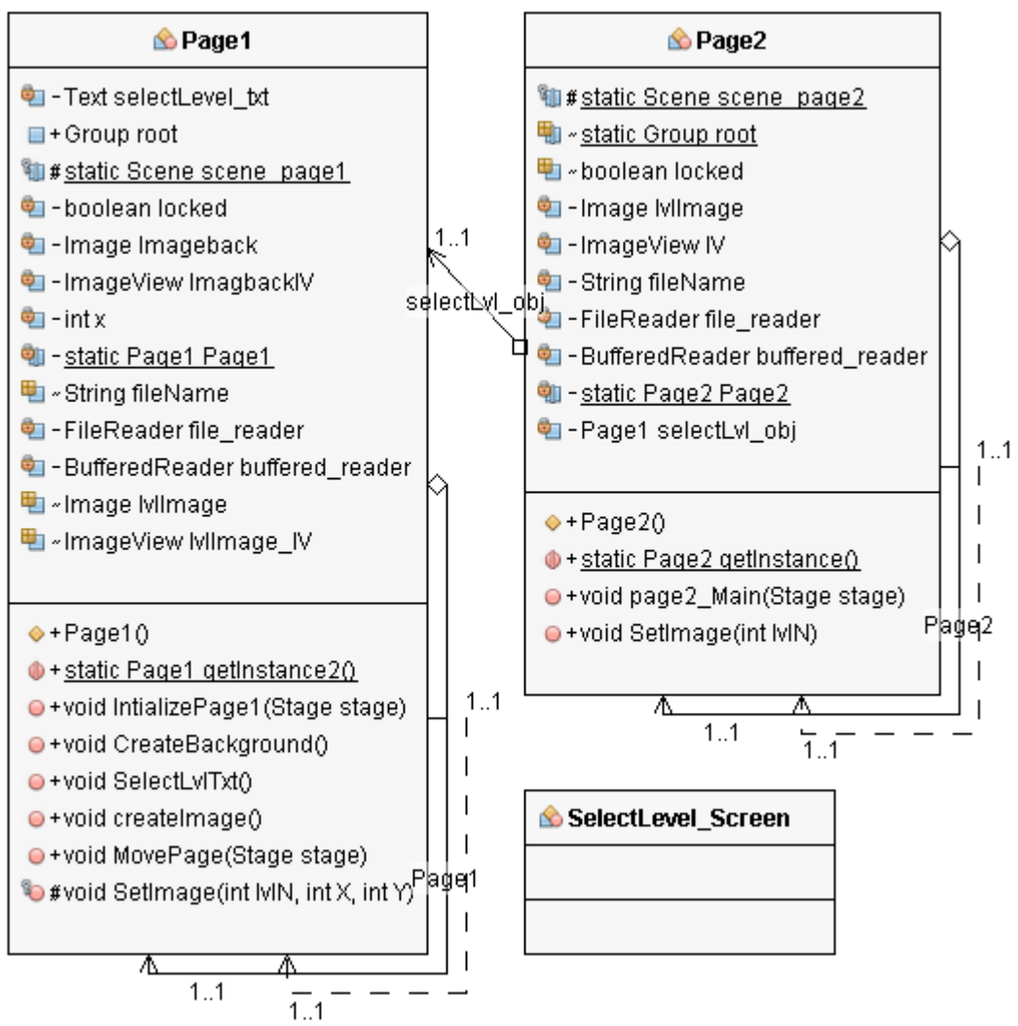
- Using AI “Artificial Intelligence”
  - that plays a perfect game. This AI will consider all possible scenarios and makes the most optimal move.
  - Min Max Algorithm that depends totally on
    - Recursion
    - Back Tracking.
- Design Patterns
  - In the implementation of Arkanoid we used:
    - Singleton Pattern.

3.1 The Game Loop Package ” UML”:

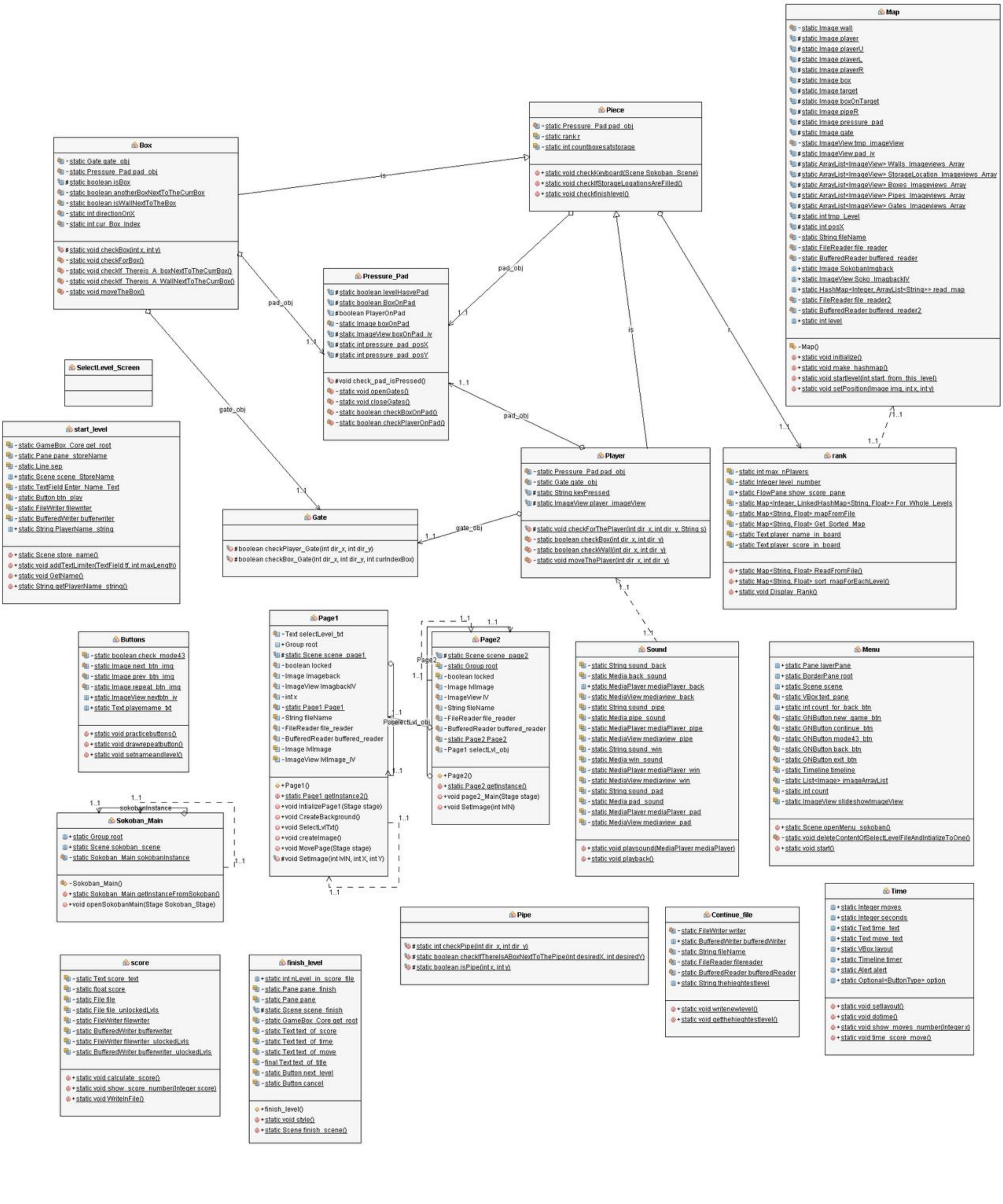
When you start with our Game Box, You’ll find the main ”The start point” in GameBox_Core Class .



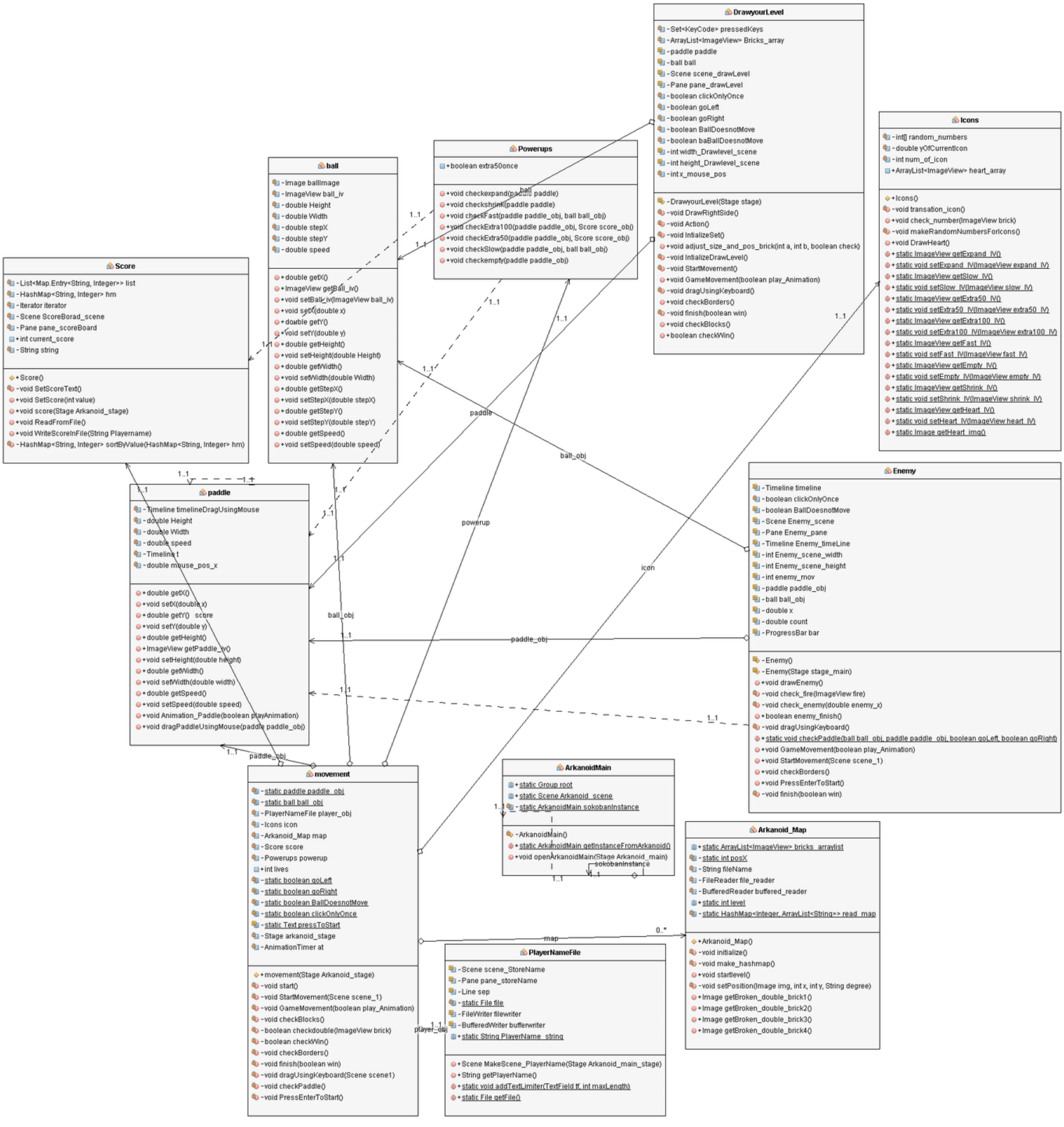
3.2.1 Sokoban.SelectLevel Package “ UML “:



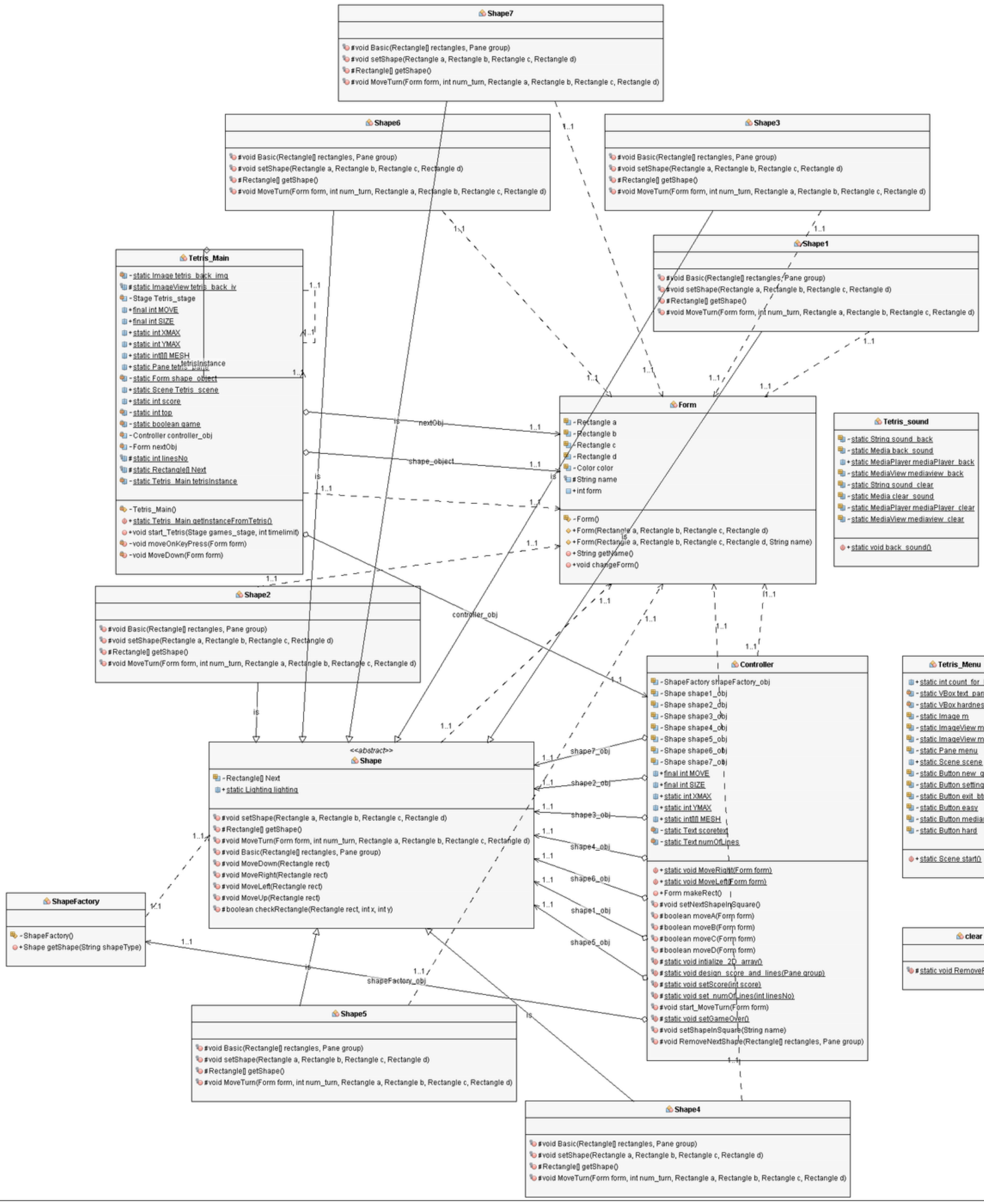
3.2.2 Sokoban Package “ UML “:



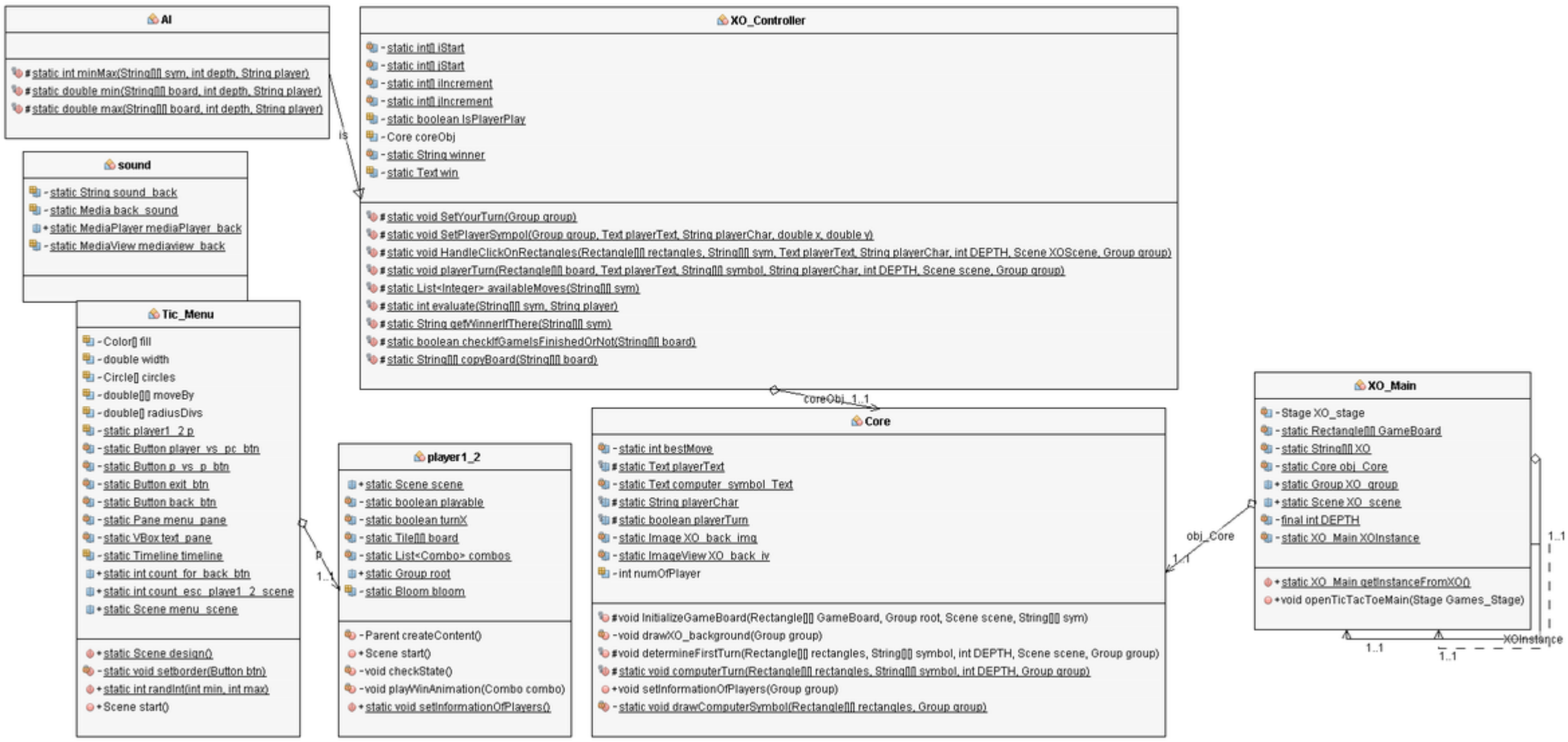
3.3 Arkanoid Package " UML ":



3.4 Tetris Package “ UML “:



3.5 AI-XO Package “ UML “:



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4. Contact

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