21/11/2021

CSC207 Assignment 3

Sprint 0

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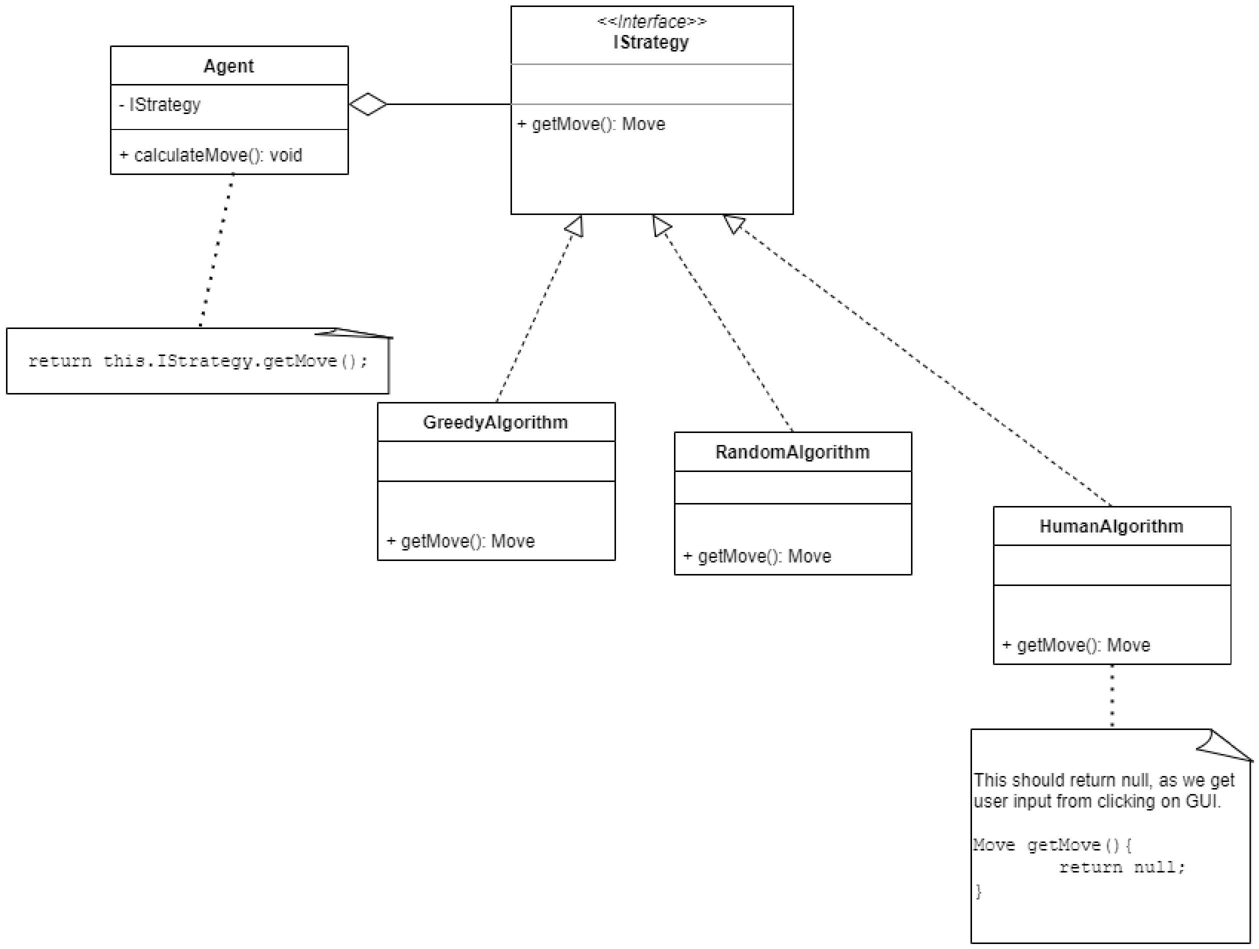
Strategy pattern

We think that the greedy and random agent is an example of strategy, because greedy and strategy agents differ only in their behaviour. In this case, I think that we could define an *interface* **<IBehaviour>** with a *method* **getMove()**, and three concrete classes **<RandomBehaviour>** and **<GreedyBehaviour>** (which have to make use of old code from RandomAgent and GreedyAgent classes respectively to get a move), and **<HumanBehaviour>**. We could then discard the RandomAgent, GreedyAgent and HumanAgent classes, and we could rewrite the Agent class to a concrete class and contain a **<IBehaviour>** field, and have our **getMove()** method in Agent would just return **getMove()** from some instance of a concrete behaviour **<RandomBehaviour>, <GreedyBehaviour>, or <HumanBehaviour>.**

Inspiration took from https://www.oodesign.com/strategy-pattern.html.



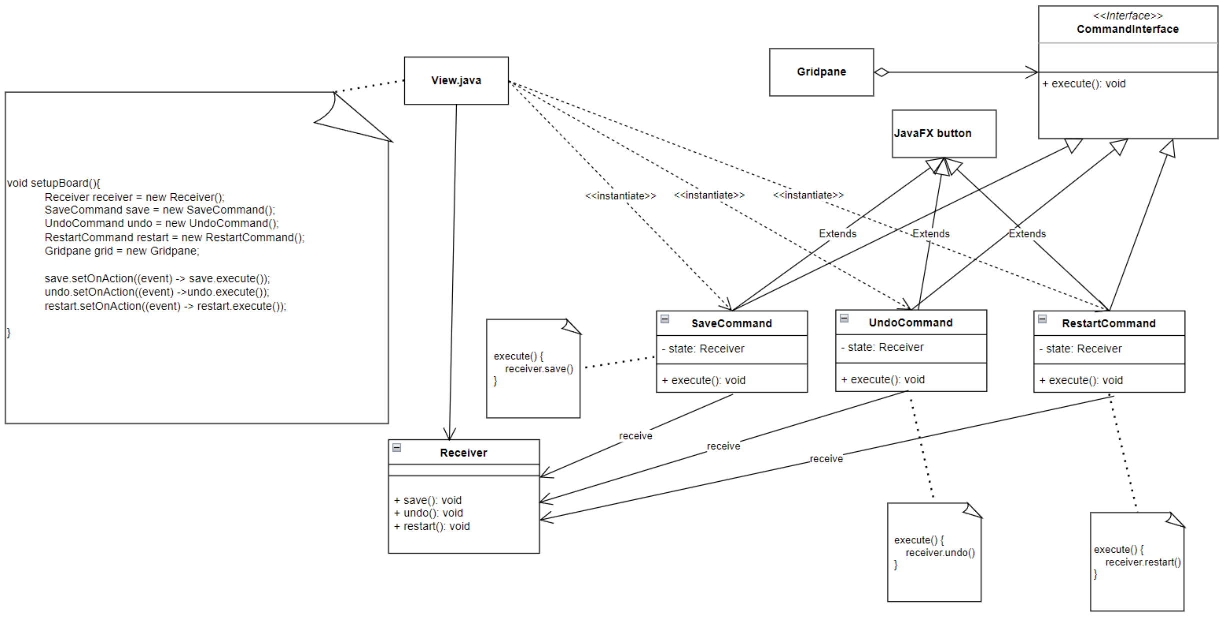
```
return this.IStrategy.getMove();
```

This should return null, as we get user input from clicking on GUI.

```
Move getMove(){
        return null;
}
```

Command pattern

Inspiration took from https://www.oodesign.com/command-pattern.html
We think that the save function, undo function, and restart function is an example of the command pattern. We can define a **<Command>** *interface* with the method **execute()**, and three concrete classes **<SaveCommand>, <UndoCommand>, <RestartCommand>**. The three concrete diagrams should extend JavaFX button class and implement the **<Command>** *interface*. Each of the concrete classes **execute()** method should call the receiver's corresponding method. We also need to define a **<Receiver>** *class*. This *class* should have **undo(), save(), and restart()** as methods that are implemented in the class. The client (which is the **View**.java *class*) will create a **<ConcreteCommand>** object and set its corresponding **receiver.** The JavaFX button is the invoker which asks the command to carry out the request.



```
void setupBoard(){
        Receiver receiver = new Receiver();
        SaveCommand save = new SaveCommand();
        UndoCommand undo = new UndoCommand();
        RestartCommand restart = new RestartCommand();
        Gridpane grid = new Gridpane;

        save.setOnAction((event) -> save.execute());
        undo.setOnAction((event) ->undo.execute());
        restart.setOnAction((event) -> restart.execute());

}
```

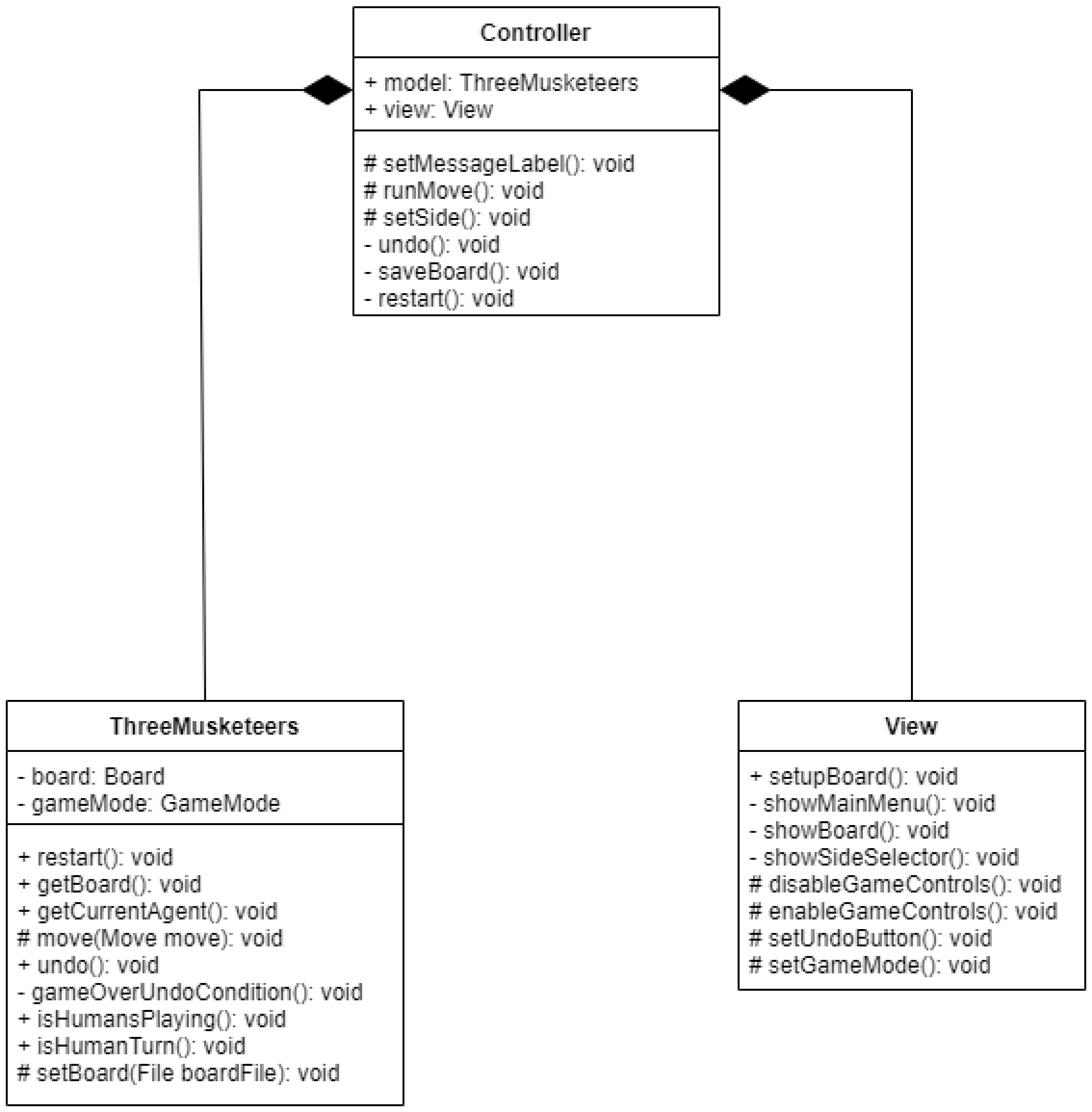
```
execute() {
    receiver.save()
}
```

```
execute() {
    receiver.undo()
}
```

```
execute() {
    receiver.restart()
}
```

Model, View, Controller

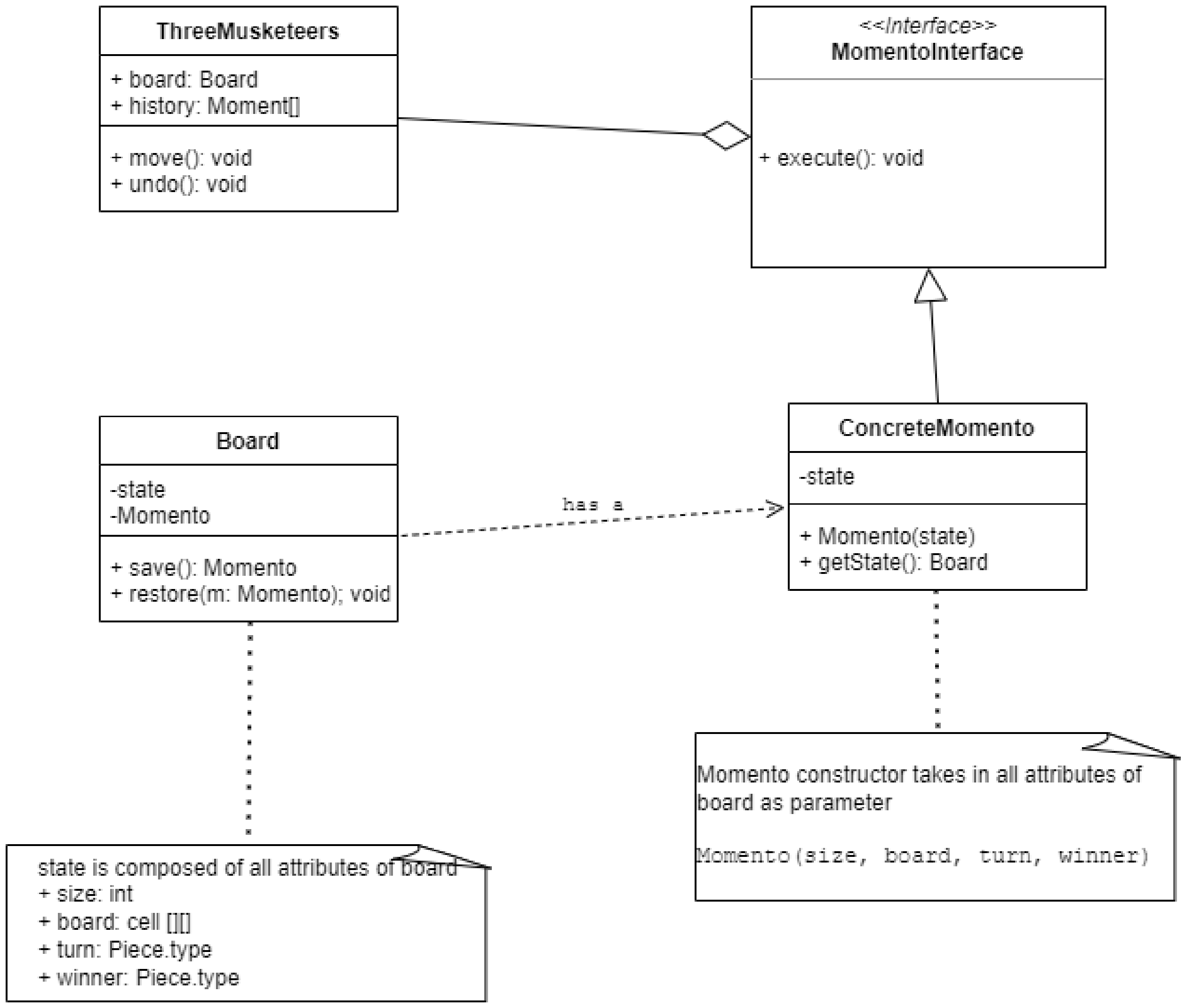
(Lecture)
The MVC design pattern is used within the GUI. In the case of our code, we have the **controller** in the "**View.java" class**, and the **model** is the **"ThreeMusketeers.java" class**. As a result, the **View + Controller** updates and moves the cells on the model. The **view** part of the MVC is the **GUI** and the **buttons** shown on the screen when playing the game. This, as earlier explained is in the **view class**. The **controller** part of the MVC the actions made on the move, when the buttons are **pressed**, which is again in the **view class**. Finally, the **model** of the MVC is the **ThreeMusketeers** file, which ultimately **controls the backend of the game** (how the cells on the board are moves and how the game is won/lost).



Memento

https://refactoring.guru/design-patterns/memento

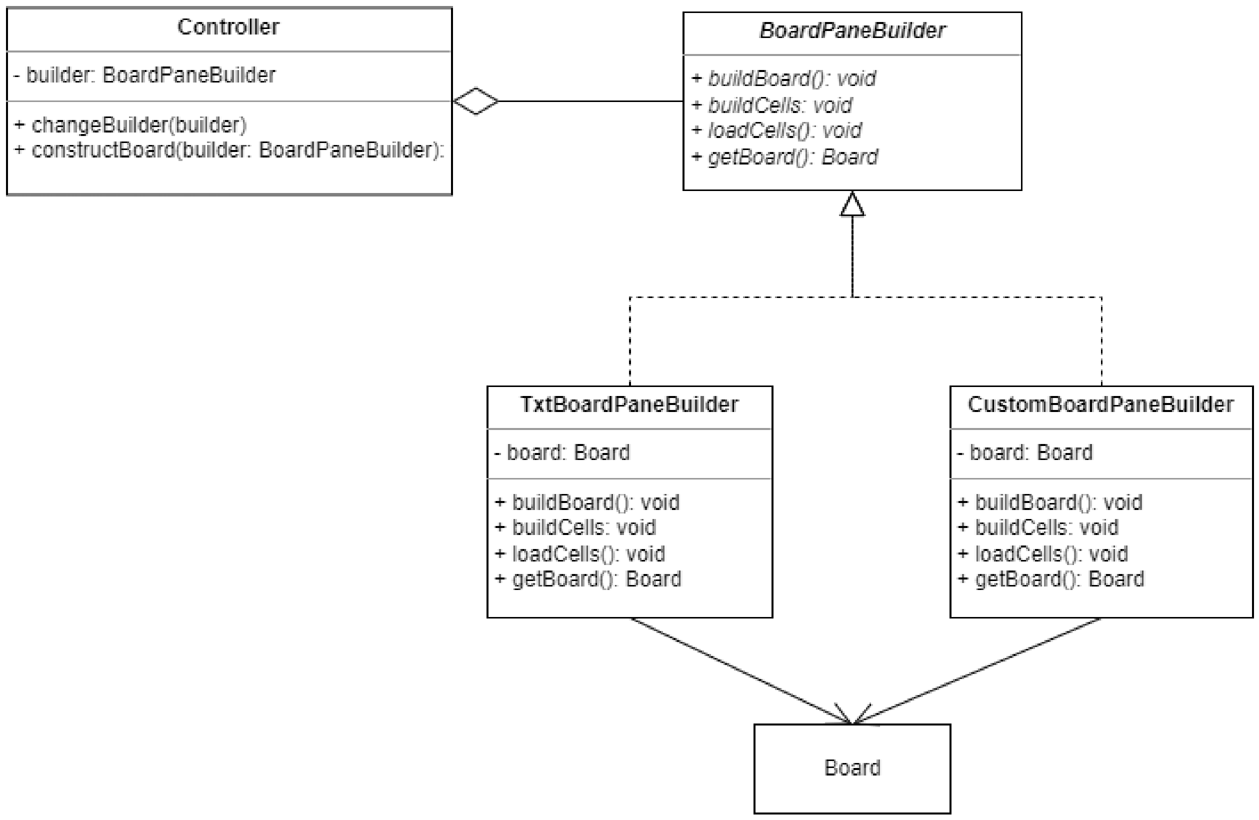
The **Caretaker** *class* is our **<ThreeMusketeers>** *class* which has the **Originator(Board)** as a field, and a **Momento** array history (basically our stack). **move()** and **undo()** are two methods that need to be implemented by the **Caretaker** *class*. The **Originator** is our **<Board>** *class* which must implement **save(): Momento** and **restore(m: Momento)**, we also need to create a **<Momento>** *class* which can hold the board state (deep copy all fields of board state and create new objects). The **<Momento>** *class* is an object with the same fields as the **<Board>** class, also has constructor **Momento(State), getState(): Momento.**



Builder

https://www.oodesign.com/builder-pattern.html

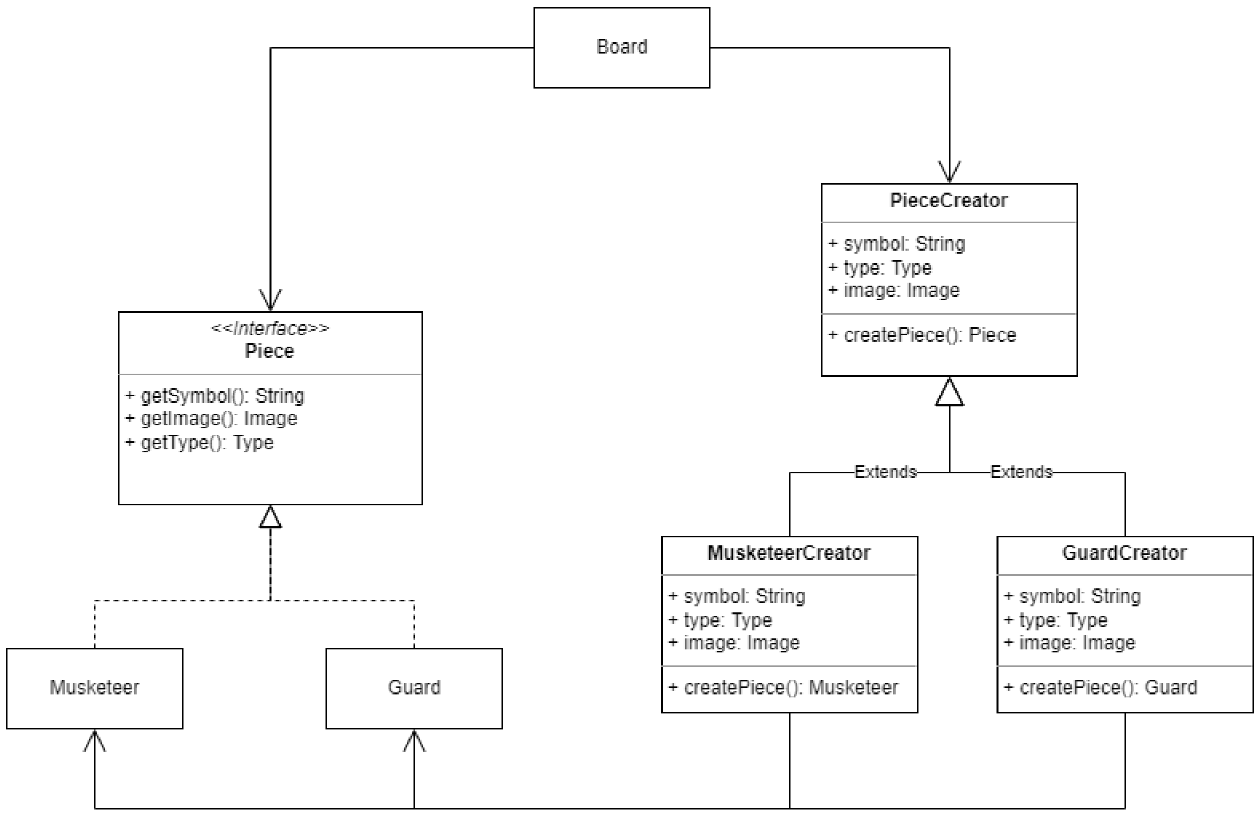
The **<Controller>** will act as our director and has a BoardPaneBuilder attribute with methods that decide on when and how the user's board will be created. The **<Controller>** has a **<BoardPaneBuilder>** which is an interface that has 4 methods; **<buildBoard>**, **<buildCells>**, **<loadCells>**, and **<getBoard>**. **<TxtBoardPaneBuilder>** and **<CustomBoardPaneBuilder>** are two concrete classes that implement the **<BoardPaneBuilder>** interface. **<TxtBoardPaneBuilder>** will be called when the user wants to load the game through a txt file that's already created. **<CustomBoardPaneBuilder>** will be called when the user wants to create their own custom board. However, the board will still follow the properties of a normal game such as the max pieces of each type. Both will implement the methods in **<BoardPaneBuilder>** in their own respective rights in order to create and load the necessary components for the board to operate.



Factory

https://www.oodesign.com/factory-pattern.html

The factory pattern will be used when implementing how the pieces will be created in the board editor. An interface **<Product>** will be created with concrete classes **<Musketeer>** and **<Guard>** while a class **<PieceCreator>** will be made with concrete classes **<MusketeerCreator>** and **<GuardCreator>**. It will return the required pieces that need to be created on the board editor.


Board
<<Interface>>
Piece
+ getSymbol(): String
+ getImage(): Image
+ getType(): Type
PieceCreator
+ symbol: String
+ type: Type
+ image: Image
+ createPiece(): Piece
Extends
Extends
MusketeerCreator
+ symbol: String
+ type: Type
+ image: Image
+ createPiece(): Musketeer
GuardCreator
+ symbol: String
+ type: Type
+ image: Image
+ createPiece(): Guard
Musketeer
Guard