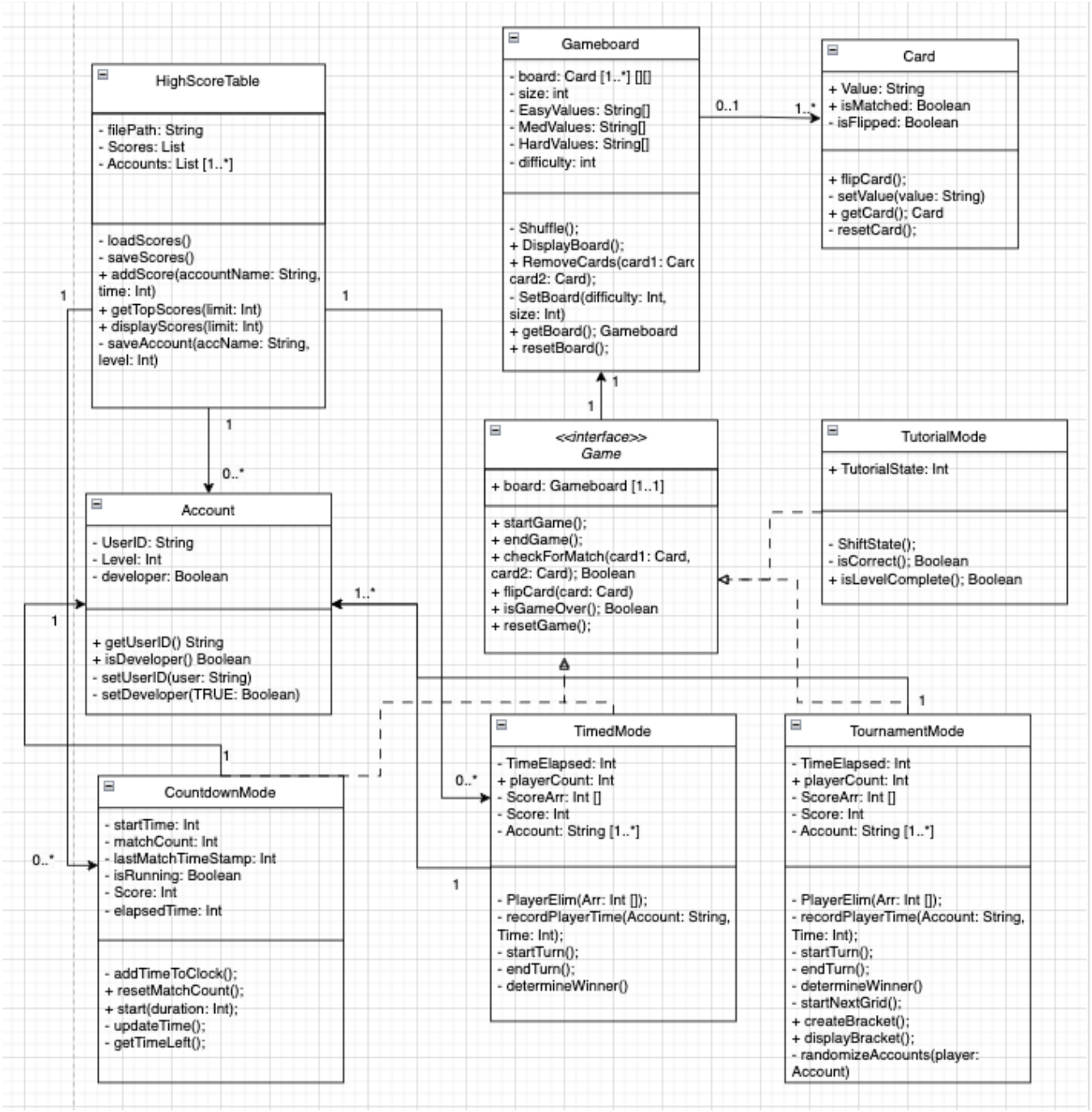
Class Diagram



Textual description

Card

The Card class represents the individual cards used in the game. Each card has attributes such as Value, which stores the card's identifiable content, and boolean flags isMatched and isFlipped to track the card's current state within the game. The Card class provides methods to flip the card, check its value, and reset its state, which are crucial for the gameplay mechanics. This class is used by the Gameboard class, which contains and manages a collection of Card objects to represent the current state of the game board.

Gameboard

The Gameboard class is responsible for assembling the grid of Card objects that make up the playing field. It offers methods to shuffle the grid, remove a pair of matched cards, and set the board according to the difficulty level specified. The board's size and the values represented on the cards are determined by arrays of strings for each difficulty level. The Gameboard is closely associated with the Game interface as it provides the physical layout for various game modes that implement this interface.

Game

The Game interface defines the common structure for different game modes, with methods for starting the game, checking for card matches, flipping cards, and resetting the game. Classes like CountdownMode, TimedMode, TournamentMode, and TutorialMode implement this interface, tailoring these methods to fit their specific game logic. This interface forms the backbone of the gameplay experience and interacts with the Gameboard class to manipulate the game state during play.

HighScoreTable

The HighScoreTable class manages the recording and retrieval of high scores as well as account levels. It is responsible for interfacing with a JSON file (the location specified by filePath) to load and save high-score data. It provides functionality to add new high scores associated with an account name and level, retrieve the top scores, and display these scores, presumably to the user interface. The class maintains a one-to-many relationship with the Account class to tie scores to individual player accounts.

Account

The Account class handles player information, including a unique user ID, their chosen level of play, and a flag to indicate whether the player is a developer. It allows for getting and setting these attributes. This class has a one-to-many relationship with the HighScoreTable, meaning each account can be associated with multiple high scores. This class has a one-to-many relationship with the TimedMode and TournementMode classes since they are multiplayer modes that require one or more players. This class also has a one-to-one relationship with the Countdown mode because it is the main single-player game mode that records the account level progress.

CountdownMode

This class manages the logic for the main single-player mode of Math Match-up. The game mode has a built-in timer that counts down from a specified number depending on the level size. In addition to this timer, the game mode also has an additional feature where multiple correct guesses grant more time on the clock. This mode implements the Game interface and has a one-to-one relationship with the account class since each account has a save state for the highest level they have reached in the mode.

TimedMode

The TimedMode class, another implementation of the Game interface, is similar to CountdownMode but focuses on the overall time taken to complete the game rather than individual turns. It includes attributes to track elapsed time and methods to start the game timer, record player times, and determine the winner based on the fastest completion time. This class caters to players competing against the clock for the best time, using the common Game methods to facilitate its specialized timed challenges.

TournementMode

The TournamentMode class implements the Game interface to provide a competitive tournament structure where players are pitted against each other in 1v1 matches. It includes methods for managing player pairings, recording match times, starting individual games, and determining the overall winner. The class supports a tournament bracket system, advancing players through the stages until a champion is crowned. It interacts with the Account class to record player progress and outcomes.

TutorialMode

The TutorialMode class is designed to guide new players through the game mechanics. As an implementer of the Game interface, it introduces the player to game concepts and provides a controlled environment for learning how to play. This class features methods to advance through tutorial states and check for the completion of tutorial levels. It serves as a bridge between new players and the standard game modes, ensuring players understand the game before they begin competitive play. This class does not require a relationship with Account since no progress is saved and is the same layout despite different account access.