Design Snakes and Ladders

Snakes and ladders is an ancient Indian board game that's regarded today as a worldwide classic. It requires two or more players and takes place on a board with numbered, gridded squares. Throughout the board, there are snakes and ladders which connect different squares. Players roll a die and navigate the board. Landing on a ladder advances a player to a square further up the board, while landing on a snake means they have to go back to a previous square.

The aim of the game is to reach the final square.

Problem requirements

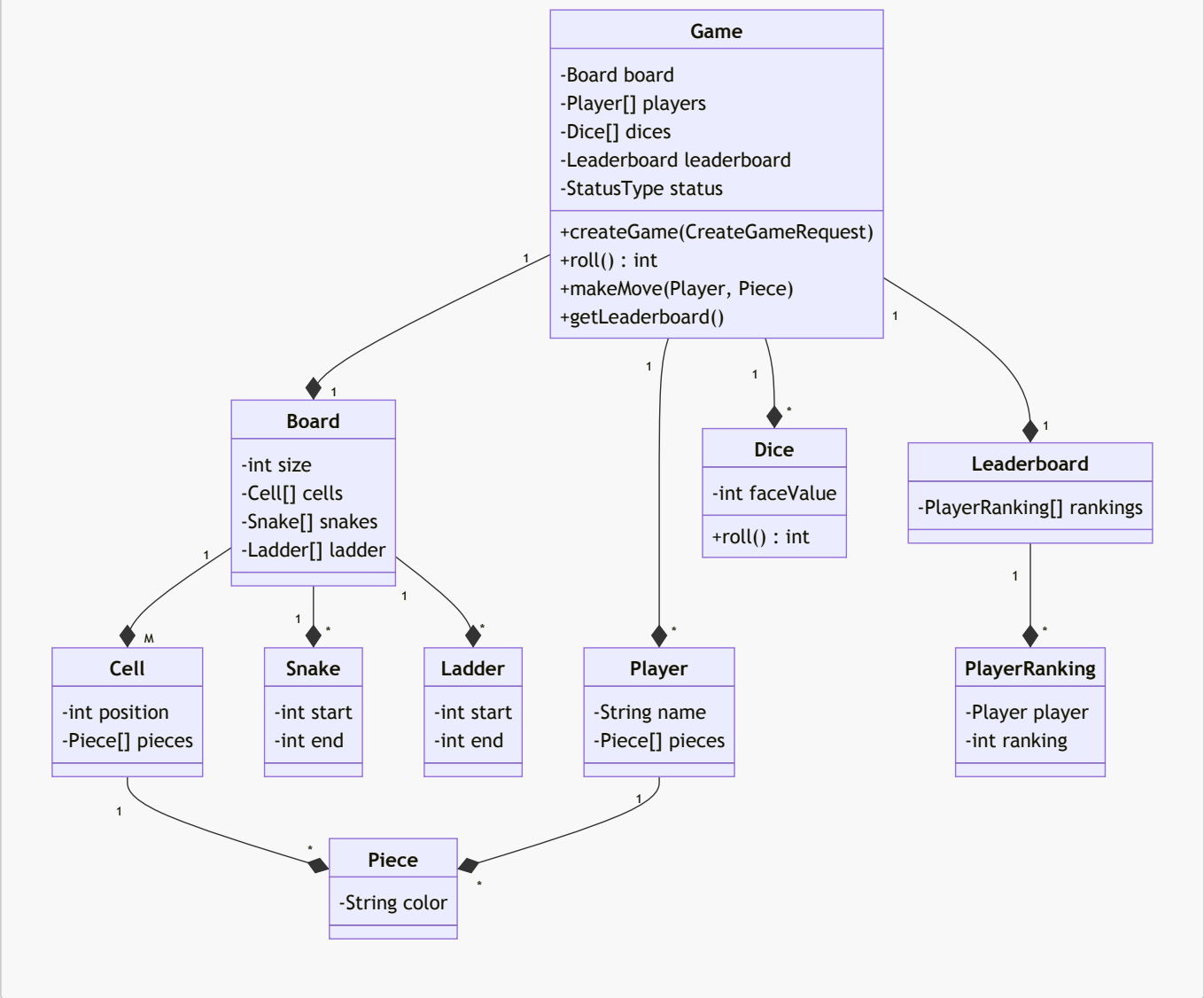
- A game can be between multiple players.
- A game will only have human players
- Each player can have multiple pieces
- A board can be of any varying size decided by the client
- A board will different types of cells
- There can be a normal cell and cells with snakes and ladders
- Position of snakes and ladders is random and decided at the start of the game
- The number of snakes and ladders is random and also decided at the start of the game
- The size of snakes and ladders is also random and decided at the start of the game
- A player will move on the basis of a dice
- A player will enter the game only if they get a 1 or maximum face value of the dice

- A player will win if they reach the last cell
- The game will end when all players expect one reach the last cell
- For each game maintain a leaderboard which has the rankings of each player

Entities and their attributes

- Game
  - Board
  - Players
  - Dices
  - Leaderboard
  - Status
- Board
  - Dimensions
  - Cells
  - Snakes
  - Ladders
- Cell
  - Position
  - Pieces
  - Type?
- Snakes/Ladders
  - Start
  - End
- Player
  - Name
  - Pieces
- Leaderboard
  - Players
  - Rankings

Initial Design



Problems with initial design

- OCP violation in Board class.
- No parent class for special cells to reduce duplication.

Adding a new parent class for Snake and Ladder

Snake 1- 10 nextLocation() - 1 Ladder 2 - 12 nextLocation() 12

1. Common behaviour - Interface or Abstract
2. Common attributes - Abstract class

1 2 3

Snake 3 - 1 Ladder 2 - 5

Optimising our design - Move obstacle in cell

Problems

- Might have to add a lot of null checks - Not all cells have obstacles

Optimising our design - Adding an empty cell to obstacle hierarchy

- Requirements
- Clarifications
- Data Flow diagram
    - Context
    - Functionalities
- Clarifications
- Class Diagram
    - API contracts
- Feedback on contract
- [Optional] Schema diagram
- Feedback on schema
- Implementation