Bowling game scoring - Solution Approach

Zeynal Zeynalov

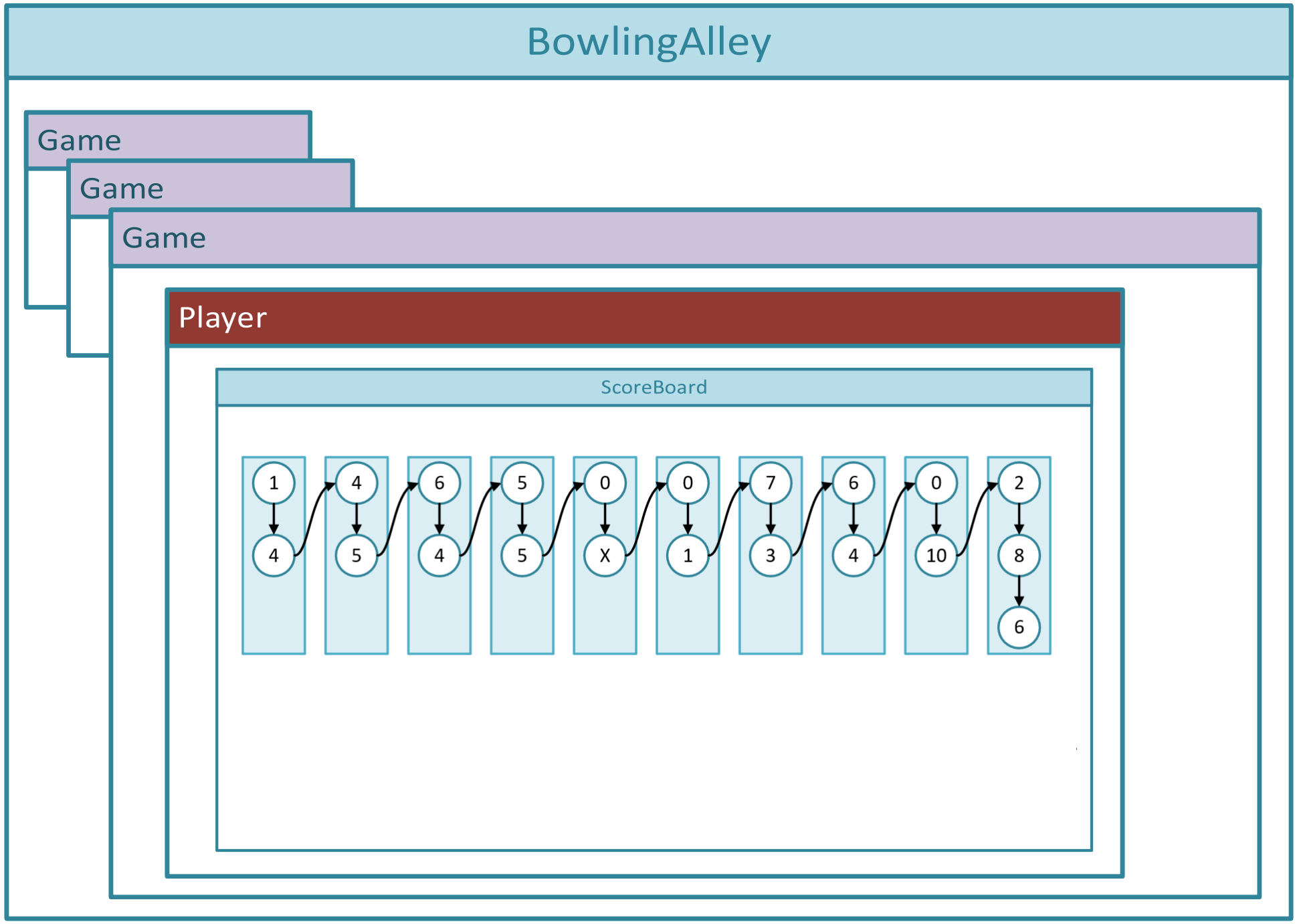
General solution approach is to encapsulate Frame related data and score calculation details from Bowling Game layer. Moreover, to facilitates Strike/Spare score calculations Next first and Next second ball result links are created for each ball result object.

As each Frame can have different number of Balls, each frame will have dynamic size List of Balls. And also all these Balls will have link to the next Ball in order to help calculating Strike/Spare scores.

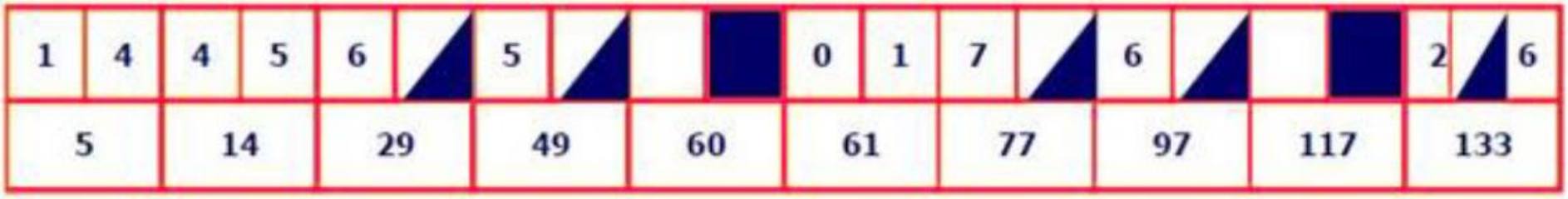
Score board calculate final game score by summing scores of each Frames and it is not interested in how score of each Frame is calculated in detail level.

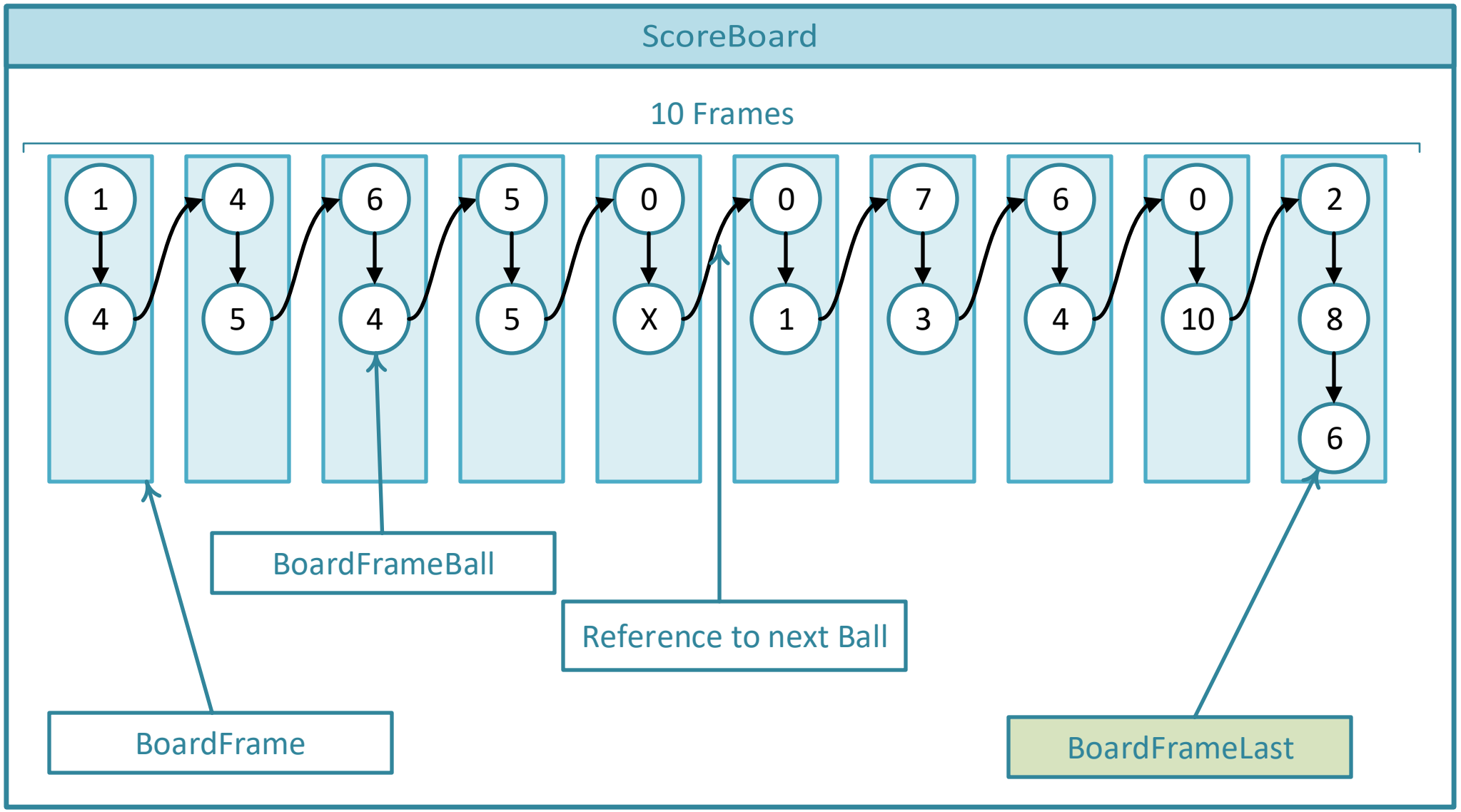
As Last Frame differs from normal frames, it is derived from Frame class to override some methods.

General Class Relationship



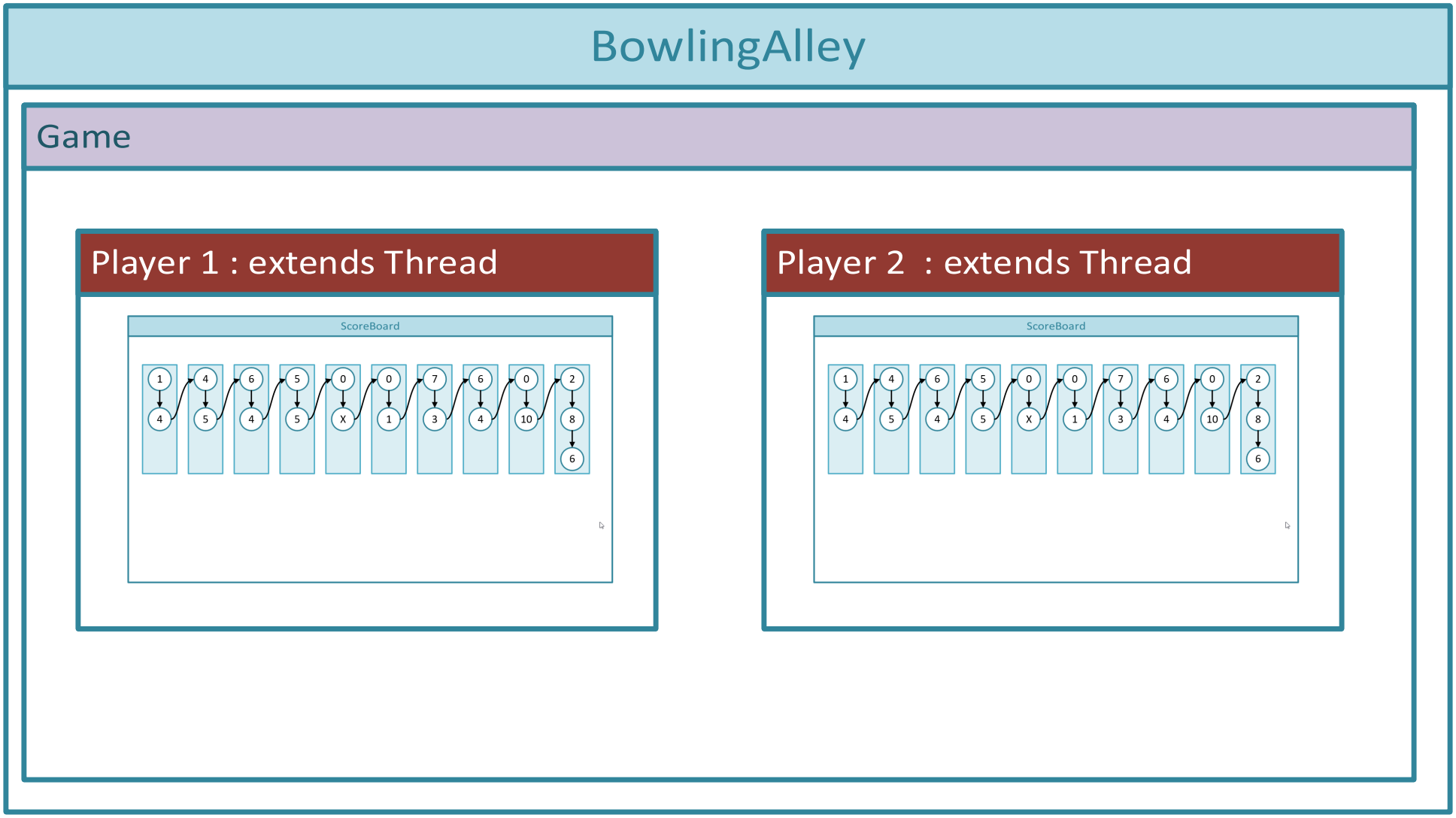
Data Structure of Score Board





Game Simulation

Solution contains a Simulation module to simulate several Games with multiple Players. Each Player extends Thread and throws random balls and wait for each other.



Project Structure

JDK version:

jdk1.8.0_191

IDE:

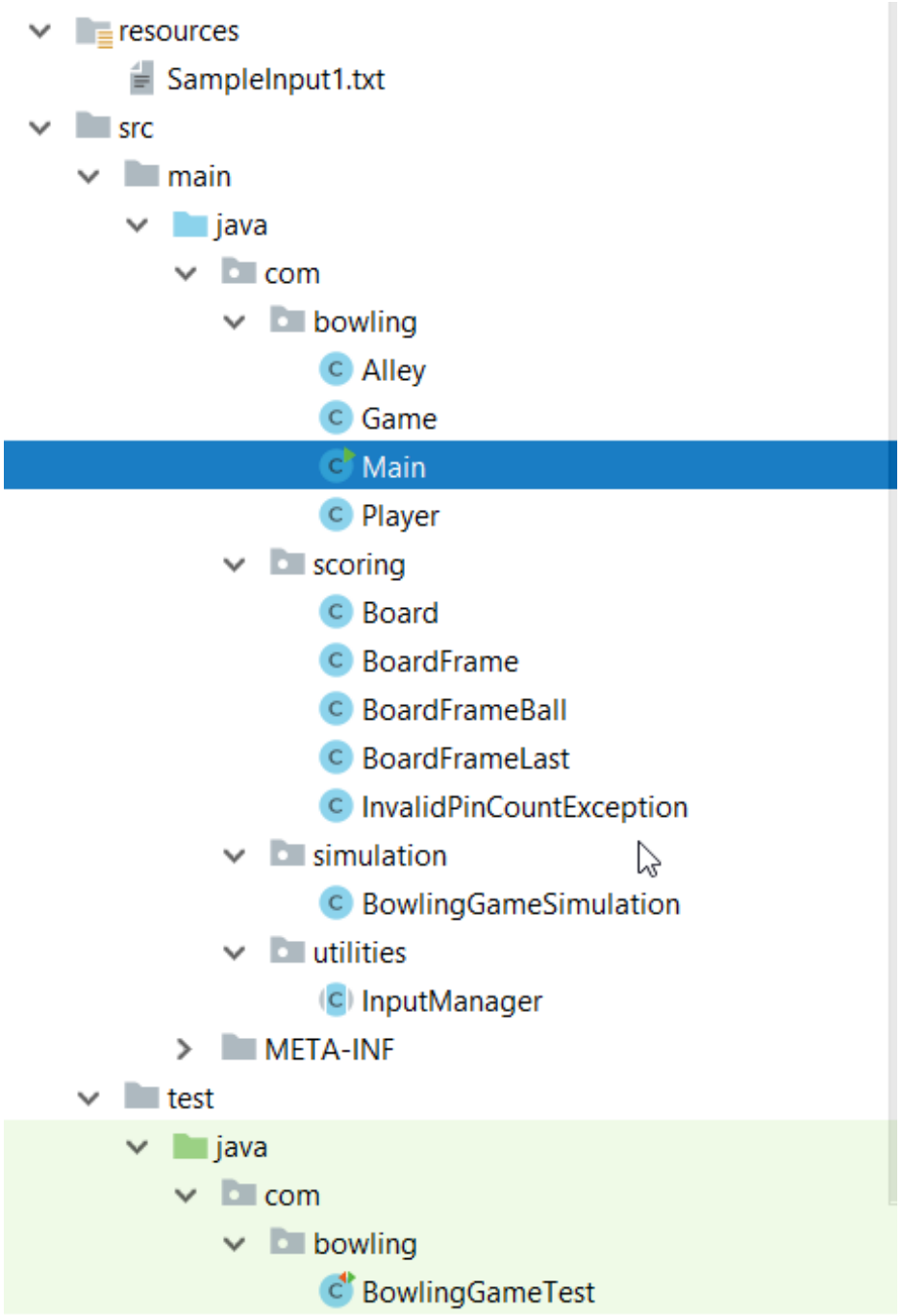
IntelliJ IDEA 2018.2.5

Unit test:

BowlingGameTest.java

Sample input file resource:

resources/SampleInput1.txt



Execution Details

JDK version: jdk1.8.0_191

Application execution options:

1) **Read input from console:** please execute script: *startApp.cmd*. Firstly number of input lines should be entered as number. Then list of pin score number list lines should be entered.

```
Command Prompt - startApp.cmd

C:\Users\z.zeynalov\IdeaProjects\BowlingGame>startApp.cmd

C:\Users\z.zeynalov\IdeaProjects\BowlingGame>cmd /k java -jar out/artifacts/BowlingGame_jar/BowlingGame.jar
[ Welcome to bowling alley: "Munich" ]
[ Bowling game started at lane: "Warming Up" ]
Please enter total input line count: 2
Please enter 2 lines of ball results below:
10 10 10 10 10 10 10 10 10 10 10 10
1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0
[ Bowling game at lane: "Warming Up" ]
[ Player "Junior 1" | Final score: 300 | Board: [  10 = 30 |   10 = 30 |   10 = 30 |   10 = 30 |   10 = 30 |   10 = 30 |   10 = 30 |   10 = 30 |   10 = 30 | 10,10,10 = 30 ] ]
[ Player "Junior 2" | Final score:  10 | Board: [ 1,0 =  1 |  1,0 =  1 |  1,0 =  1 |  1,0 =  1 |  1,0 =  1 |  1,0 =  1 |  1,0 =  1 |  1,0 =  1 |  1,0 =  1 |      1,0 =  1 ] ]
```

2) **Read input from file:** please execute script: *startAppWithInputSampleFile.cmd*

This script will pass sample input file as argument to app.

```
Command Prompt - startApp.cmd - startAppWithInputSampleFile.cmd

C:\Users\z.zeynalov\IdeaProjects\BowlingGame>startAppWithInputSampleFile.cmd

C:\Users\z.zeynalov\IdeaProjects\BowlingGame>cmd /k java -jar out/artifacts/BowlingGame_jar/BowlingGame.jar inputfile SampleInput1.txt
[ Welcome to bowling alley: "Munich" ]
[ Bowling game started at lane: "Warming Up" ]
[ WARNING: Player Junior 8 - com.scoring.InvalidPinCountException: Invalid pin count - Total pins exeeds 10!]
[ Bowling game at lane: "Warming Up" ]
[ Player "Junior 1" | Final score:  22 | Board: [ 1,0 =  1 |  1,0 =  1 |  1,0 =  1 |  1,0 =  1 |  1,0 =  1 |  1,0 =  1 |  1,0 =  1 |  1,0 =  1
[ Player "Junior 2" | Final score:  20 | Board: [ 1,1 =  2 |  1,1 =  2 |  1,1 =  2 |  1,1 =  2 |  1,1 =  2 |  1,1 =  2 |  1,1 =  2 |  1,1 =  2
[ Player "Junior 3" | Final score:  40 | Board: [ 2,2 =  4 |  2,2 =  4 |  2,2 =  4 |  2,2 =  4 |  2,2 =  4 |  2,2 =  4 |  2,2 =  4 |  2,2 =  4
[ Player "Junior 4" | Final score:  60 | Board: [ 3,3 =  6 |  3,3 =  6 |  3,3 =  6 |  3,3 =  6 |  3,3 =  6 |  3,3 =  6 |  3,3 =  6 |  3,3 =  6
[ Player "Junior 5" | Final score:   0 | Board: [ 0,0 =  0 |  0,0 =  0 |  0,0 =  0 |  0,0 =  0 |  0,0 =  0 |  0,0 =  0 |  0,0 =  0 |  0,0 =  0
```

3) **Simulation:** please execute script: *startAppWithSimulation.cmd*

This script will simulate game with players those throw balls with random pin scores.

```
Command Prompt - startApp.cmd - startAppWithInputSampleFile.cmd - startAppWithSimulation.cmd

C:\Users\z.zeynalov\IdeaProjects\BowlingGame>startAppWithSimulation.cmd

C:\Users\z.zeynalov\IdeaProjects\BowlingGame>cmd /k java -jar out/artifacts/BowlingGame_jar/BowlingGame.jar simulation
[ Welcome to bowling alley: "Simulation" ]
[ Bowling game started at lane: "Simulation" ]
[ Player "0" finished game ]
[ Player "1" finished game ]
[ Player "2" finished game ]
[ Player "3" finished game ]
[ Player "4" finished game ]
[ Bowling game at lane: "Simulation" ]
[ Player "0" | Final score:  72 | Board: [ 2,3 =  5 |  6,3 =  9 |  3,0 =  3 |  1,1 =  2 |  0,5 =  5 |  4,5 =  9 |  3,0 =  3 |
[ Player "1" | Final score:  80 | Board: [ 3,6 =  9 |  0,3 =  3 |  0,1 =  1 |  2,4 =  6 |  2,8 = 14 |  4,6 = 13 |  3,7 = 15 |
```