COP-3337 Programming II

Programming Assignment 2:
Backgammon - Polymorphism

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In this assignment, you will write a program that makes the rules of a modified version of backgammon.

1 Introduction

Backgammon is a classic board game for two players that combines strategy and luck. The game is played on a board consisting of 24 narrow triangles called points. The points are grouped into four quadrants of six points each. The quadrants are known as the player's home board and outer board, and the opponent's home board and outer board. The points are numbered for each player with point 1 being the innermost point in the player's home board. The objective of the game is to move all your checkers into your home board and then bear them off (remove them from the board) before your opponent does. Here are the basic rules of Backgammon:

1.1 Setup

The board consists of 24 triangles (points) and is divided into four quadrants. Each player starts with 15 checkers/pieces. According to the traditional setup, the checkers are placed as displayed in Figure 1.

1.2 Objective

The main goal is to move all your checkers into your home board and then bear them off before your opponent does.

1.3 Gameplay

Players take turns rolling two six-sided dice to determine their move. The roll of the dice indicates how many points, or pips, the player is to move his checkers.

A checker may be moved only to an open point, one that is not occupied by two or more opposing checkers.

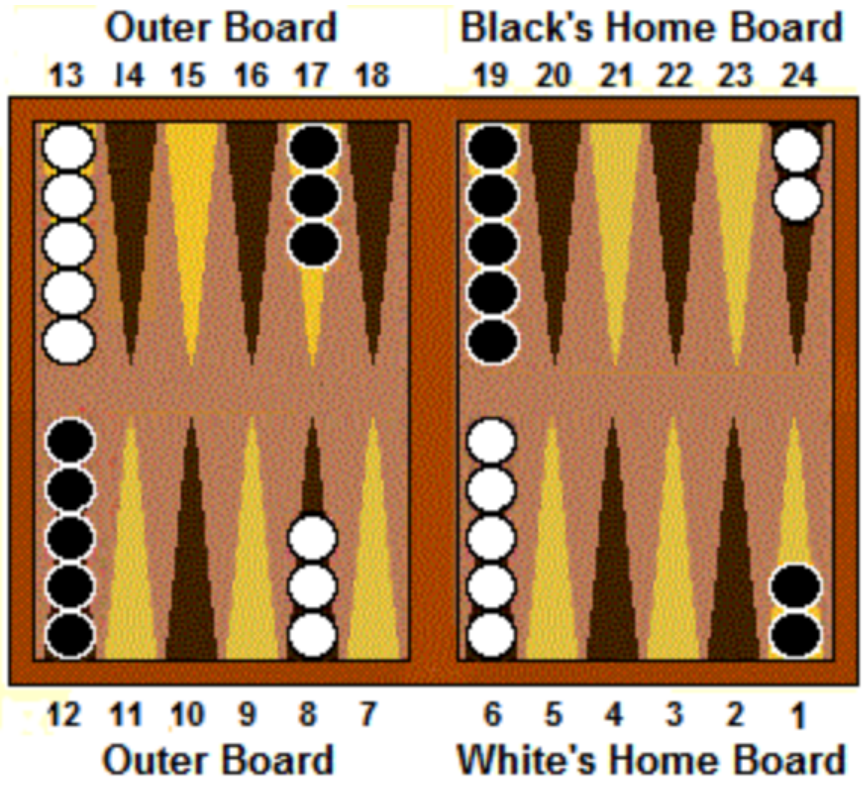

Figure 1: Initial setup of checkers/pieces on the board.

The numbers on the two dice constitute separate moves. For example, if a player rolls a 5 and a 3, they can move one checker five spaces to an open point and another checker three spaces to an open point, or they may move one checker a total of eight spaces to an open point, but only if the intermediate point (either three or five spaces from the starting point) is also open.

A point occupied by a single checker of either color is called a "blot." If an opposing checker lands on a blot, the blot is hit and placed on the bar (the divider between the home and outer boards). Any time a player has one or more checkers on the bar, their first obligation is to enter those checker(s) into the opposing home board. A checker is entered by moving it to an open point corresponding to one of the numbers on the rolled dice.

1.4 Bearing Off

Once all of a player's checkers are in that player's home board, they may start bearing off. A player bears off a checker by rolling a number that corresponds to the point on which the checker resides, and then removing that checker from the board. If a player has not yet borne off any checkers by the time the opponent has borne off all fifteen, then they are gammoned and lose twice.

1.5 Miscellaneous Rules

The direction of movement of the checkers is determined by the setup of the board. Each player moves their checkers from their opponent's home board through their opponent's outer board, then to their own outer board, and finally into their own home board. It is required to use both numbers of a roll if possible. If only one number can be played because only one move is possible, the player must play that number. If either number can be played but not both, the player must play the larger one. If neither number can be played, the player loses their turn. Backgammon combines elements of strategy and probability, and while the basic rules are not overly complicated, the game is enriched by a wealth of strategic possibilities and subtleties.

2 The Modified Game

The game that you implement has one key difference with the original game: There are three types of pieces/checkers for each color:

- **Class A Pieces**: The two black pieces starting at point 1 and the two white pieces starting at point 24 are class A pieces. They can move once, twice, or three times for each rolled dice.
- **Class B Pieces**: The five black pieces starting at point 12 and the five white pieces starting at point 13 are class B pieces. They can move once or twice for each rolled dice.
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- **Class C Pieces**: The rest of pieces can only move once for each rolled dice (normal behavior).

3 What you Implement...

You need to implement a class called "BackgammonGame" that implements the rules of the game. Also, you need to implement a class called "Piece" that represent a piece. Three classes "APiece", "BPiece", and "CPiece", inherited from "Piece", represent the three classes of pieces.

Finally, you implement a program (main method) responsible for running the flow of program (see the starter code).

Submissions

You need to submit a *.zip* file compressing the followings:

- all the packages containing all the .java files of the program