**Project: Connect 4**

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**Preliminary Specification: Connect 4**

Our project is a computer version of the board game called Connect Four. This game involves a 6x7 two-player game where the goal of the game is to get 4 pieces in a row. Since Connect 4 is a 2-player game, we will be making two or three AIs, easy, medium, and hard. The easy AI picks its moves randomly from a list of allowed moves. The Medium AI uses an algorithm to make a list of moves rated from best to worst, and it picks the middle move. The Hard AI does the same thing has Medium AI, but chooses the best moves.

1. Structural Design

|  |  |
| --- | --- |
| Data | Interface => class |
| Hard AI | Map => TreeMap<Integer, Location> |
| Medium AI | Map => TreeMap<Integer,Location> |

Both these AIs use TreeMaps to order the ratings of the moves. Easy AI does not use a ordered data structure because it just picks a random move

1. Object-Oriented design

ConnectRunner

ConnectWorld

Piece

ConnectGame

Easy AI

Medium AI

Hard AI

HumanConnectPlayer

ConnectPlayer

9 classes: HumanConnectPlayer, ConnectPlayer, EasyAI, MediumAI, HardAI, Piece, ConnectGame, ConnectWorld, ConnectRunner

HumanConnectPlayer uses the inputs from the person at the computer to put in pieces onto the board. ConnectPlayer is the abstract class which all the other types of players extend. EasyAI, MediumAI, HardAI, all are different types of AIs that also extend the ConnectPlayer. The Piece is what represents each token in the game. ConnectGame contains the game and the players, its decides how to proceed throughout the game. ConnectWorld contains all the pieces, and acts as the “board” of the game. ConnectRunner starts a new ConnectGame and runs the game until the game is over.

1. Detailed Design

The detailed specifications can be seen in the javadoc comments in the code which will be seen in the final files

1. Testing

The testing for this game will mostly focus on the AIs and the ConnectGame. It will make sure that the AIs make the best moves for many situations. It will focus on the ConnectGame too to check the allowed moves are correctly checked and that the game knows when to correctly check the win and lose states.