**Functional Specification of Connect4**

**Classes:**

ConnectPlayer

ConnectGame

ConnectRunner

ConnectWorld

EasyAI

HardAI

MediumAI

HumanPlayer

Piece

PieceDisplay

Prioritize

**ConnectPlayer Abstract Class**

What it does: This class is an abstract class that the classes EasyAI, MediumAI, HardAI, and Human player extend. It stores data like its color and name. It also decides how to proceed after a location has been selected.

Functions:

1.When a location has been selected, it changes the color of the white piece (empty space) into the color of the player.

2. It also finds the empty locations, allowed plays, and checks if a location is allowed to play.

**ConnectGame Class**

What it does: This class is the center of the program as it handles all the events in the game. It chooses which player is going next and it controls this. It also holds the players, and all the other classes for the program to run.

Functions:

1. Creates a ConnectWorld, and puts on a AI opponent based on the difficulty level chosen
2. This keeps track of whose turn it is, and makes sure only one person can play at the same time.
3. This also determines which of the players has won the game by calling its hasWon() method.
4. This also decides what is sent to the textbox in the top of the gridworld, which gives helpful messages to the user.

**ConnectRunner Class**

What it does: All this class does is start and run the game. It asks the user for a difficulty level, (easy, medium, or hard) or if they want to quit. After that, its starts a game with an AI corresponding to the requested difficulty.

Function:

1. Creates a new game with the appropriate AI
2. Run the game

**ConnectWorld Class**

What it does:

The board class keeps track of all of the chips that are placed on the board and handles the mouse click. It also sets up the GUI for gridworld and shows when a move has been made by changing the color of the chip where the move was made.

Function:

1. Checks where the user clicked and translate that point into a move.
2. Changes the color of a chip to a respective color show that a move was made.
3. Stores the information on all of the Pieces located on the game board.

**EasyAI**

What it does: This made moves for the computer using randomness to pick from a list of allowed moves. It extends the ConnectPlayer class.

Function:

1. Gets all the allowed moves that it can place on the board.
2. Randomly picks from this list of moves.
3. Changes the color of the piece to red.

**Medium AI**

What it does: This is also another AI, but it picks the moves more intelligently.

Functions:

1. Gets all the allowed moves.
2. Rates all of them by checking for chains of pieces of the same color, and adds these ratings for each location onto a tree map.
3. Chooses the best move every other turn, and every other turn it picks the second best move.

**Hard AI**

What it does: Always picks the best move from the list of moves in the treemap.

Function:

This functions the same as the medium class except it picks the best move every time.

**Human Player**

What it does: It uses the mouse click from the user to pick a move to play.

Function:

1. Gets the location picked by the mouse click.
2. Shows the move by changing the location yellow.

**Piece**

What it does: Holds information about the tile on each space

Function:

1. Holds the color and can return it
2. Can change the color to show a change of move.

**PieceDisplay**

What it does: Uses the color of the chip to display the chip on the board and the background blue to make it look like a connect four board.

Function: Gets passed a color and makes and displays a piece appropriately on the board.

**Prioritize**

What it does: basically pairs up a location with a rating

Functions:

1. Holds a rating and a location.
2. Returns these two data.