CSC 210 - Software Development
Programming Assignment 1

Due: Wednesday, September 7th at 11:59pm
Submit: ConnectFour.java to D2L

Connect Four

Connect Four is a two-player board game in which players take turns dropping tokens into a vertical grid of six rows and seven columns. The tokens fall straight down to occupy the lowest available space in the column. The first player to form a horizontal, vertical, or diagonal line of four of their tokens wins the game. If the board fills up before either player achieves this, then the game is a draw.

Requirements

A program is needed to allow two people to play Connect Four on a computer. The game should be played on the command line. It should begin by prompting each player for their name and their choice of yellow or red tokens. It should then display an empty grid of six rows and seven columns and then prompt the red player to select a column by typing the column number (1-7). The grid should be redisplayed with the token in the correct place. Players will be alternately prompted to drop tokens until someone has won or the game is a draw. The winning player is congratulated by the program and it asks if they want to play again.

Here is a sample run:

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Red to play. Pick a column (1-7): 4
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| | | | | | | |
| | | | | | | |
| | | |R| | | |
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Yellow to play. Pick a column (1-7): 4
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| | | | | | | |
| | | |Y| | | |
| | | |R| | | |
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Red to play. Pick a column (1-7):
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The program should notify a player if they select a column that is already full. Additionally, the game should initially ask the players which version they would like to play by asking how many tokens are needed to win: 3, 4, or 5. This allows for children to play an easier game of ‘Connect Three’ for example.

Design

Based on the requirements it looks like we can take a simple procedural approach and break down the task into a sequence of subtasks or procedures, along with whatever data structures are needed. To find the subtasks it can help to write down the steps in ‘pseudocode’ and repeat this process, refining each step into greater detail. When working on the details of a subtask, such as searching the grid from left to right, it helps to sketch diagrams of what your program will need to do so that you can get some insight into how to solve the tricky parts.

Implementation

The program will be written in Java. Java strongly supports object-oriented programming but also allows procedural programming. We can put all of our code in the class that contains the main() function, adding any functions and data structures that we need. Try to write your program incrementally by first creating the overall structure with empty functions (stubs) and testing often to see that your program is always working as expected. The entire program will be in a single file, called ConnectFour.java, and that is what you will submit.

Testing

When testing, you are checking to see that the program satisfies the requirements. Test to see that wins are correctly detected for horizontal, vertical and diagonal lines. Also test that a draw is correctly detected.

Remember that when moving through the stages of requirements, design, implementation and testing, it is often necessary to go back to a previous stage and revisit decisions and make changes. It is always better to make design changes early in a project rather than later.