

Project 3

Released: April 3rd

Wireframes Due: Thursday, April 10th at 5pm on Gradescope

Diagrams Due: Thursday, April 17th at 5pm on Gradescope

Code and Report Due: Thursday, April 24th at 5pm on Blackboard and Gradescope

Use up to three late days on this project. You may work in pairs

1 Introduction

This project will have you implementing the game Connect Four in an application that can be played over the network.

2 Connect Four

Connect Four is a two player boardgame played where alternate dropping tokens into a 2D grid. Players may select which column to place their token, and all tokens will fall to the lowest available spot in the column. A player wins when they are able to get four of their tokens in a row. If all spaces in the 2D grid are filled and no one has been able to get four-in-a-row, the game ends in a draw. The rulebook to the game is attached as an appendix to this document.

3 Your work

Work for this project will be submitted as three components. Wireframes will be due on April 10th to gradescope. Class diagrams will be submitted to gradescope on April 17th. Code will be due to blackboard on April 25th and a final report will be due on April 25th to gradescope. All submission times are at 5pm. You may use up to three late days on this project.

3.1 Code

Your submission should contain two zip files containing maven projects: one for the server and one for the client. At a minimum, your code must support the following behavior

- A Client application that allows you to connect to a server to play against another human opponent. Your code may assume that there is a running server to connect to. Users should be able to play multiple games and the correct game state should be maintained.
- Server code, which may optionally contain a GUI, will match clients against each other for play and keep track of the game state for each pairing. Server code will always be run before a client connects.

Your combined project must meet the minimum requirements below:

- a) The server should be able to support multiple pairs of clients each playing a game of connect four simultaneously.
- b) The app should correctly determine a win, loss or draw for each game and at the end of each game, there should be an option to either play again with the same player or quit.
- c) The client must use a GUI with graphical elements. The GUI should be intuitive and all user actions should be clearly labeled.
- d) The server code should print a log of all activity on the server. A GUI for the server application may be useful here, but is not required.
- e) Users must create a unique username when logging on to the server. Duplicate usernames should give an error message to the user and prompt them to enter a new name
- f) Players in a game should be able to send text messages to each other.
- g) All scenes in the app should be reachable and neither the client nor the server should freeze or crash during gameplay.

3.2 Above and Beyond

Completing the minimum requirements for this project will earn a 80%. To earn above this, you or your team must extend the minimum requirements. Here is a non-exhaustive list of how you might extend the requirements to earn more points, roughly sorted from simplest to most complex:

- Implement a non-trivial AI to allow single-user play.
- Keep track of wins and losses for the usernames that persists even if the server and client are closed and reopened.
- Implement a username and password logon screen for server connections
- Allow users to add friends and see when they are online

If you or your team completed any Above and Beyond components, you should include this in your report explaining your design decisions and how the user experience would be improved by your addition.

3.3 Best in Show

Only the top three projects for this class will receive a 100 on the project. These will be awarded on my judgement alone and there are no regrades. Top three announcements will be made in the last week in class and will be asked to give a short 10 minute presentation on their project on the final day of class May 1st. Additionally, the top three projects will have their code made available to the class.

4 Submitting your work

For the wireframes, create a pdf of your wireframe and submit the file to gradescope by April 10th at 5pm. If you are working in a team, submit as a group on gradescope and submit the team form. Check the blackboard / piazza post on this project for the link. Class diagrams for your client and server should be submitted as a pdf to gradescope by April 17th at 5pm. These must be digitally generated. Be sure to add your teammate if you have one when submitting. Once you have completed your app and your report (if applicable) you are ready to submit the zip of your project. Make sure that the submission runs with the maven command and be sure to perform a `mvn clean` before submitting. For late days, late days can be used for either the wireframes, the diagrams or the final submission, e.g. if

you use two late days on the wireframes, you can use two days on the final submission and only use two days cumulatively. Remember that you and your partner should have late days remaining if you plan to submit late.

4.1 Working in Pairs

If you plan to work in a pair, please fill out the "[Project Partners Form](#)" when you submit. The link is also available on blackboard. **Only one team member needs to submit.** Be sure that the gradescope submissions include both partners as a groups submission.

4.2 Academic Dishonesty / ChatGPT

A reminder from the first week of class that **ChatGPT and other AI tools are are not allowed on this project.** If there is suspicion of ChatGPT use or other forms of academic dishonesty, you will be asked to come and explain your code to me personally. If you cannot explain any line of your code, either in its function or its purpose, you will receive a zero on the assignment and a letter grade drop.

POP 10

SET UP

It's great to play this game when the grid has been stored and all the counters are already in the grid. If the grid is empty, take turns dropping in counters one by one, completing a row at a time.

Make sure the PopOut bar is in the open position, so counters can be popped out.

How to Play

1. Players take turns popping out a counter of their own colour from the bottom row of the grid.
2. If the counter that was popped out was part of a Connect 4 (4-in-a-row), keep the counter next to you and continue your turn. Keep popping out counters of your colour from the bottom row until you have to pop one out that is not part of a 4-in-a-row.
3. If the counter you popped out was not part of a Connect 4, put it back into the top of the grid. The next player then takes their turn.
Note: You cannot put a counter back into the same column it was removed from unless there is no other option (this may happen early in the game).
4. The first player to get 10 counters is the winner.

STORAGE

For easy storage, slide the locking mechanism on the bottom of the grid into place. Drop the counters into the grid then slide the locking mechanism on the top of the grid into place. This will keep the counters secure.

Remove the grid from the base by sliding it out of the horizontal slot. Both pieces may be stored in the box.

Alternatively, hold the grid upside down and slide the tabs on the legs into the vertical slots on the base and you'll have a convenient handle to carry your game anywhere. See Figure 8.

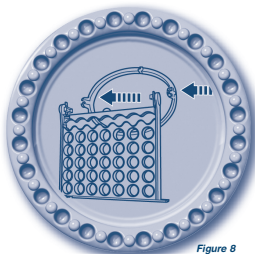


Figure 8



CONTENTS

- 1 grid with PopOut bar
- 1 top locking mechanism
- 1 game base (doubling as a carrying handle)
- 21 yellow counters
- 21 red counters
- 2 scoring slides



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Kids

AGE
6+



2
PLAYERS

MB
GAMES

080801081102 00 Connect 4 Rules (UK)

In Original Connect 4 and PopOut, try to get 4 of your counters in a row before the other player does. Sounds simple, but the vertical strategy will tickle your brain cells. Keep your eyes peeled!

In POP 10, the PopOut feature changes everything! Start with a full grid and pop out a counter of your own colour. If it was part of a 4-in-a-row, keep it! The first player to win 10 counters wins the game.

ASSEMBLY

1. Slide the top locking mechanism into place on the grid as shown in Figure 1.

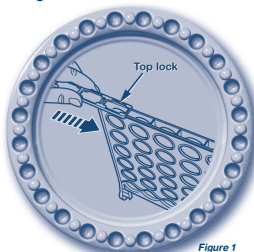


Figure 1

Note: You may need to lift up the end with the arrow to get the tab on the bottom over the edge of the grid. In the locked position, the end of this bar sits flush to the side of the grid.

Attach the scoring slides to game base as shown in Figure 2.

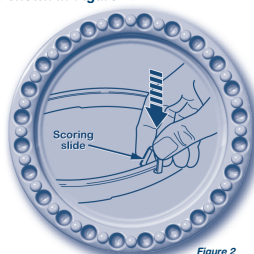


Figure 2

SET UP

1. When you're ready to play, place the game base on a flat surface. Hold the grid vertically and slide the tabs on the legs into the horizontal slots in the game base as shown in Figure 3.

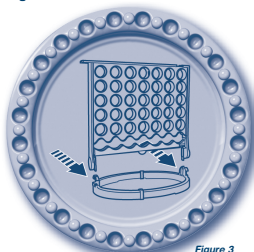


Figure 3

2. Make sure the locking mechanism is down to stop the counters falling out.
3. Sit either side of the grid. One player takes all the yellow counters and the other takes all the red ones.

ORIGINAL CONNECT 4

Be the first player to get 4 of your coloured counters in a row – horizontally, vertically or diagonally.

How to Play

Before You Start

Make sure the locking mechanism and PopOut bar on the bottom of the grid are positioned so that they stop the counters falling or popping out of the grid.

1. Decide who's going first, then take turns after playing 1 counter each.
2. Drop one of your counters down ANY of the slots in the top of the grid. See Figure 4.

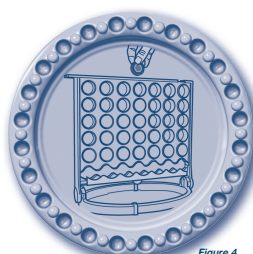


Figure 4

3. Take turns until one player gets 4 of their counters in a row (horizontally, vertically or diagonally). See Figures 5, 6 and 7. This player has won the game.

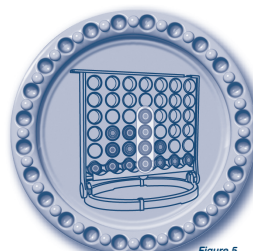


Figure 5

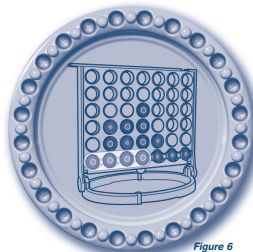


Figure 6

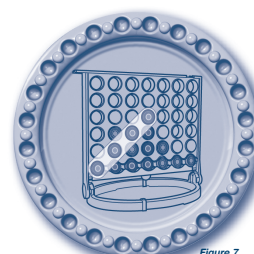


Figure 7

TO START ANOTHER GAME

First, clear the grid of counters by flipping the PopOut bar up. (The bar must be in the PopOut position for this to happen.)

Collect your counters and put the PopOut bar back into the locked position.

You're ready to play again!

SCORING

Every time you win a game, move your scoring slider up 1 space. The first player to reach 5 is the Connect 4 champion!

PopOut

SET UP

Slide the bar at the bottom to the PopOut position.

How to Play

Play PopOut just like the Original Connect 4. However, on your turn, you can choose either to **drop a counter in** OR **pop one out of the bottom row**.

Note: You can only drop in or pop out counters of your own colour.

Be careful. Your move could help you but it could also change things for your opponent.