Lab 8 – C++ Classes
CPSC 1021- Fall 19

Due Date: 3 November, 2019 @ Midnight

Introduction

In today’s lab, we will be implementing a board class to play a game of tic tac toe. We will also continue to practice with I/O manipulation and stringstreams.

Lab Objectives

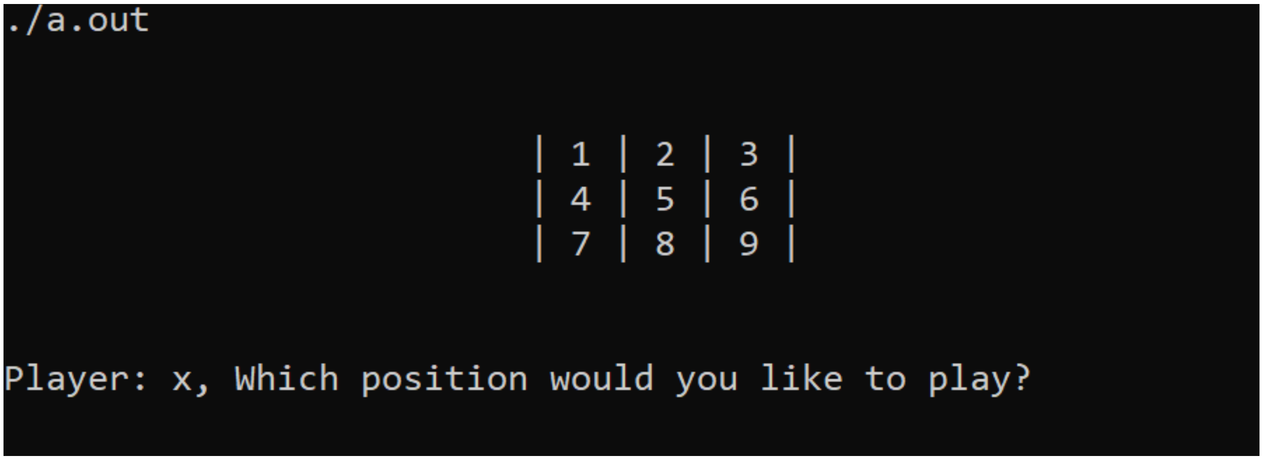
- C++ File I/O + Manipulators
- Writing a Board class
- Object oriented programming
- Using stringstreams to quickly build formatted strings

Lab Instructions

Create 3 files, main.cpp, makefile, and board.cpp. Your program **does not need command line arguments**, but will take in user input via std::cin. **You may not use printf or scanf in your program**.

Sample Output

Before we go any further, here is the expected output for a default gameboard:



```
./a.out


                        | 1 | 2 | 3 |
                        | 4 | 5 | 6 |
                        | 7 | 8 | 9 |


Player: x, Which position would you like to play?
```

Board Class

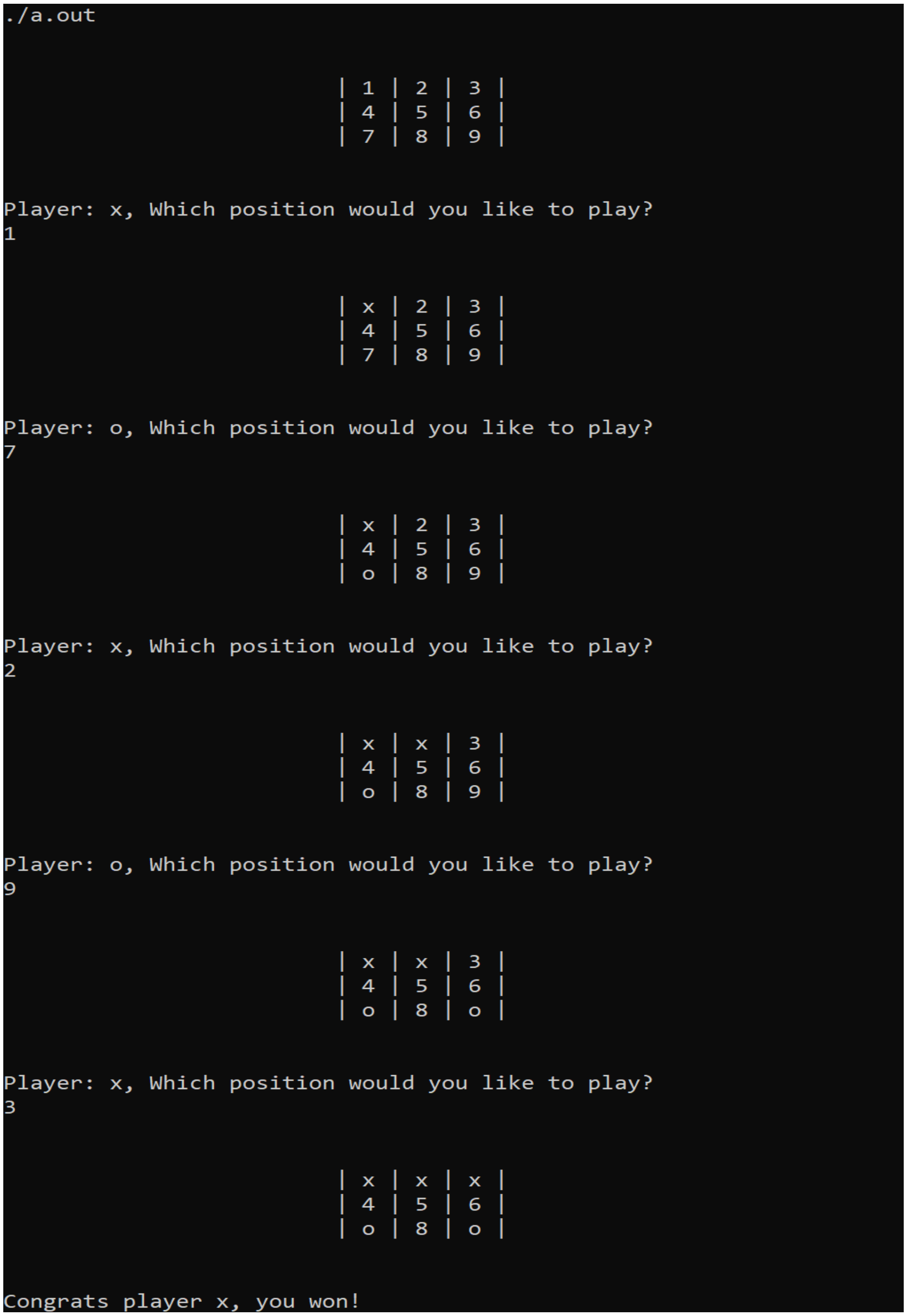
You will be provided with the **board.hpp** file. In C++ your header files can be .h or .hpp. Using the .hpp allows a way to distinguish between C++ and C header files. You must create a board.cpp file and implement all the functions defined in board.hpp. You may create more functions; however, you shouldn't need to.

The **print** function should use a **stringstream** to build and return a string that you'll print to the terminal in the main(). See sample output above.

Assumptions you can make:

- Your program does not need to check if there is already a game piece in a given position. Assume we will not test this.
- Your program **does** need to check if we are entering a number between 1 and 9.
- Your program **does need to match my formatting.**

Sample input and output:



```
./a.out


                         | 1 | 2 | 3 |
                         | 4 | 5 | 6 |
                         | 7 | 8 | 9 |


Player: x, Which position would you like to play?
1


                         | x | 2 | 3 |
                         | 4 | 5 | 6 |
                         | 7 | 8 | 9 |


Player: o, Which position would you like to play?
7


                         | x | 2 | 3 |
                         | 4 | 5 | 6 |
                         | o | 8 | 9 |


Player: x, Which position would you like to play?
2


                         | x | x | 3 |
                         | 4 | 5 | 6 |
                         | o | 8 | 9 |


Player: o, Which position would you like to play?
9


                         | x | x | 3 |
                         | 4 | 5 | 6 |
                         | o | 8 | o |


Player: x, Which position would you like to play?
3


                         | x | x | x |
                         | 4 | 5 | 6 |
                         | o | 8 | o |


Congrats player x, you won!
```

What to turn in

- **main.cpp, board.cpp, board.hpp, makefile**

SOME HINTS!

- You can populate the 2D string array using an iterator and the std::to_string() function.

- Tackle this one function at a time. I recommend starting with the constructor and print() functions.
- You should not need to allocate any memory.
- Draw out every way you can win in tic tac toe and think about how can I program this without brute force checking each win.
- You need to iterate through the vector to get the player. I’d recommend checking if the iterator you use is greater than 1. If it is, reset it to 0.
- When you place a token into the gameboard, do not forget to increment the total number of turns!
- Make sure you test each way a player may win **and for a draw.**

Compile and Execute

Use g++ to compile your code as follows **and include the C++11 standard!**:

```
g++ -std=c++11 -Wall -g main.cpp board.cpp -o game
```

Execute the program

```
./game
```

FORMATTING:

1. Your program should be well documented
2. Each file should include a header:
3. Your program should consist of proper and consistent indention
4. No lines of code should be more than 80 characters

```
// Sample Header
/*******************
  your name
  username
  Lab 1
  Lab Section:
  Name of TA
*******************/
```

5 – 10 points will be deducted for each of the above formatting infractions.

Submission Instructions

- Test your program on the School of Computing server prior to submitting.
- Use the tar utility to tar.gz all source files. **Do not tar an entire directory! When I untar your archive, I should see all the files you included, not a top-level directory! Failure to correctly tar may result in up to a 25-point penalty!**

  EX. tar –czvf yfeaste-lab8.tar.gz *.cpp *.hpp makefile

- Name your tarred file **<username>-lab<#>.tar.gz** (ex. yfeaste-lab8.tar.gz)
- Use handin (http://handin.cs.clemson.edu) to submit your archive