Assignment 4 – Tic-Tac-Toe

Date assigned: Friday, March 6, 2009
Part 1 due: Friday, March 13, 2009
Part 2 due: Wednesday, March 18, 2009
Points: 40

For this assignment you are to use the principles of object oriented programming to program the game of Tic-Tac-Toe. You should set up the program so that a human can play against another human. You do not need to program any computer game play.

You are to create two classes for this program, and design a driver (main) that will use the classes to allow two humans to play against each other. Your program should perform any necessary error checking, and all the input and output should be handled from the driver.

GameBoard Class

This class represents the current state of the game board. You can represent the board however you like, but the values of the board items should be integers (0 for empty, 1 for player one, 2 for player two). Your class can contain any other private functions that you need, but you must provide the following public functions:

Function	Description
`GameBoard()`	A constructor that initializes the board to an empty game.
`void printBoard()`	Displays the game board onto the screen. You should use X and O for the output, not 1 and 2. Make sure that you display the indices of the board.
`int getVal(int r, int c)`	Returns the value of the board at a given row and column. The row and column values range from 1 - 3, and if either the row or column is invalid, the function should return -1.
`bool setVal(int r, int c, int v)`	Sets the value of the board at a given row and column to the given value. If the row or column is invalid the function should return false. It should return true otherwise.

Player Class

The player class is used to store player information. For each player you will need to store their name and their id (1 for player one, 2 for player two). Again, the player class can contain any private functions but it must provide the following public functions:

Function	Description
`Player(char * n, int id)`	A constructor that initializes the value of the name and the id.
`void displayName()`	Displays the name of the player onto the screen.
`void makeMove(GameBoard &b)`	This function accepts a GameBoard object and uses it to select the player ’s next move.
`bool hasWon(GameBoard b)`	Returns true if the player has won the game, false otherwise.

Driver

The main program should create objects from the above classes to simulate game play. You should ask for the name of two human players, then display an empty board. You are then to alternate game play displaying the state of the game board after each move, asking the human players for their move whenever it's their turn. You should indicate a tie or win at the end of the game.

Goals for Assignment 4:

1. Use the new C++ coding standards Version 5 with your object-oriented code.
2. Use the .h/.cpp separate file design for defining and implementing classes.
3. Get used to the new compiler errors that you will encounter when you implement the constructors and methods of classes.
4. Implement at most one constructor or function at a time and make sure to extensively test the constructor or function before going on. I promise you that on this assignment if you write to much code you will have extreme difficulties getting the code to compile and run.

Notes:

- You must implement each function exactly as described including the names of the functions.
- If you have any questions, please see me early.
- You are to follow version 5 of the coding standards.

What to Submit for Part 1

- For part 1 you must implement all of the functions except for hasWon and hasLost. In other words, your program should ask the players for their name, display an empty board, ask player 1 for their move, then display the board again, ask player 2 for their move, then display the board again.
- Save your project as 04A-PUNet. So as an example, mine would be 04A-khoj0332.
- Your code is to be written using Visual Studio and placed in the CS250 Drop Box by 9:15am on the day in which the assignment is due. A stapled hard copy must be placed on the instructor's desk before 9:15am on the day the assignment is due.

What to Submit for Part 2

- For part 2 you must complete the entire game of tic-tac-toe.
- Save your project as 04B-PUNet. So as an example, mine would be 04B-khoj0332.
- Your code is to be written using Visual Studio and placed in the CS250 Drop Box by 9:15am on the day in which the assignment is due. A stapled hard copy must be placed on the instructor's desk before 9:15am on the day the assignment is due.

Sample output for part 1:

```
.................................................
.                TIC-TAC-TOE                    .
.................................................

Welcome to the game of tic-tac-toe!

Player1, what is your name? Shereen
Player2, what is your name? Chadd

    0   1   2
   --- --- ---
0 |   |   |   |
   --- --- ---
1 |   |   |   |
   --- --- ---
2 |   |   |   |
   --- --- ---

Shereen, please make your move:
Enter row: 0
Enter column: 0

    0   1   2
   --- --- ---
0 | X |   |   |
   --- --- ---
1 |   |   |   |
   --- --- ---
2 |   |   |   |
   --- --- ---

Chadd, please make your move:
Enter row: 1
Enter column: 1

    0   1   2
   --- --- ---
0 | X |   |   |
   --- --- ---
1 |   | O |   |
   --- --- ---
2 |   |   |   |
   --- --- ---
```