



Cairo University, Faculty of Computers and Artificial Intelligence

**FACULTY OF COMPUTERS
AND AI, CAIRO
UNIVERSITY**

CS213: Object Oriented Programming Fall 2023

Year 2022-2023

First Semester

Name: Yousef Waleed Sayed

ID: 20221206

Email: yws246246@gmail.com

Name: Sherif Mahmoud

ID: 20221080

Email: sherifma799@gmail.com

Name: Mohamed Taha

ID: 20221123

Email: mhmdth276@gmail.com

Course Instructors:

Eng. Rana Abdelkader

Description of the classes we did and its methods: -

`X_O_Board5x5` Class:

1. bool makeMove(int row, int col, char playerSymbol);
 - Allows a player to make a move on the 5x5 board.
 - Verifies the move's validity and updates the board if valid.
2. bool checkWin(char playerSymbol);
 - Checks if the specified player has won on the 5x5 board.
 - Examines rows, columns, and diagonals for winning patterns.
3. bool isBoardFull();
 - Checks if the 5x5 board is completely filled with moves.
 - Returns `true` if no empty spaces remain, indicating a tie.
4. void displayBoard();
 - Displays the current state of the 5x5 board.
 - Renders the board layout with player moves.

`Pyramic_X_O` Class:

1. bool makeMove(int row, int col, char playerSymbol);
 - Allows a player to make a move on the pyramidal board.
 - Verifies the move's validity and updates the board if valid.

2. `bool checkWin(char playerSymbol);`

- Checks if the specified player has won on the pyramidal board.
- Examines rows, columns, and diagonals for winning patterns in the pyramid.

3. `bool isBoardFull();`

- Checks if the pyramidal board is completely filled with moves.
- Returns `true` if no empty spaces remain, indicating a tie.

4. `void displayBoard();`

- Displays the current state of the pyramidal board.
- Renders the board layout with player moves in a pyramid structure.

`Connect_four_board` Class:

1. `bool makeMove(int column, char playerSymbol);`

- Allows a player to make a move in a specific column of the Connect Four board.
- Verifies the move's validity and updates the board if valid.

2. `bool checkWin(char playerSymbol);`

- Checks if the specified player has won in the Connect Four game.
- Searches horizontally, vertically, and diagonally for four-in-a-row.

3. `bool isBoardFull();`

- Checks if the Connect Four board is completely filled with moves.
- Returns `true` if no empty spaces remain, indicating a tie.

4. void displayBoard();

- Displays the current state of the Connect Four board.
- Renders the board layout with player moves in a grid structure.

These methods facilitate gameplay by managing moves, checking for wins, determining full boards, and displaying the current state of each game board.

Name	Id	Solved parts
Mohamed Taha	20221123	- Connect four - Game interface - GitHub Repository
Yousef Waleed	20221206	- 5*5X_O Board - Code Review
Sherif Mahmoud	20221080	- Pyramic X_O - Pdf report

Code quality report:

Firstly, we checked each other's code, and we found no mistakes or uncleared variables, so we used (PVS Studio) to review our codes, we got some issues and we fixed them and we attached screen shots of it down below.

This is the issue as described in the PVS menu:

☆ V501	There are identical sub-expressions to the left and to the right of the '=' operator: board[x][y] == board[x][y]	X_O_Board.cpp(179)
☆ V501	Non-void function should return a value.	X_O_Board.cpp(185)
☆ V501	There are identical sub-expressions to the left and to the right of the '=' operator: board[x][y] == board[x][y]	X_O_Board.cpp(189)
☆ V501	Non-void function should return a value.	X_O_Board.cpp(194)
☆ V501	There are identical sub-expressions to the left and to the right of the '=' operator: board[x][y] == board[x][y]	X_O_Board.cpp(198)
☆ V501	Non-void function should return a value.	X_O_Board.cpp(203)
☆ V501	There are identical sub-expressions to the left and to the right of the '=' operator: board[x][y] == board[x][y]	X_O_Board.cpp(206)
☆ V501	Non-void function should return a value.	X_O_Board.cpp(211)

The issue here is the unnecessary condition:

```
bool X_O_Board5x5::check_diagonal2(int x, int y) {
    if(is_valid(x+1,y-1) && is_valid(x+2,y-2)){
        if((board[x][y] == board[x][y] && board[x+1][y-1] == board[x][y] && board[x+2][y-2] == board[x][y])){
            return true;
        }
    }
    return false;
}
```

We simply solve it by removing the extra condition:























```
bool X_O_Board5x5::check_diagonal2(int x, int y) {
    if(is_valid(x+1,y-1) && is_valid(x+2,y-2)){
        if((board[x+1][y-1] == board[x][y] && board[x+2][y-2] == board[x][y])){
            return true;
        }
    }
    return false;
}
```












Here we have the same issue, so we solved it the same way with the repeated issues:

```
bool X_0_Board5x5::check_diagonal2(int x, int y) {  
    if(is_valid(x+1,y-1) && is_valid(x+2,y-2)){  
        if((board[x][y] == board[x][y] && board[x+1][y-1] == board[x][y] && board[x+2][y-2] == board[x][y])){  
            return true;  
        }  
    }  
    return false;  
}
```

Also, we used GitHub repository to get the code together and so everyone can commit his edits as shown in the screen shots below, also we attached link of our repository, kindly take a look at it.

<https://github.com/Mohamed-Taha20/OOP-Assignment3>

Delete Seperated games/test	...
 Mohamed-Taha20 pushed 1 commit to <code>main</code> • 34752dd...b3ee8e5 • 2 hours ago	
Add files via upload	...
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Create test2	...
 Mohamed-Taha20 pushed 1 commit to <code>main</code> • 83fdd5d...7d874c0 • 2 hours ago	
Create test file	...
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Delete Integrated program/Test Program	...
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Add files via upload	...
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Welcome to our program	...
 Mohamed-Taha20 pushed 1 commit to <code>main</code> • db4dce9...7138a20 • 2 hours ago	
Update connect_four_app.cpp	...
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X_O5x5 Pull request merge	...
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Pyramic_tic_tac_toe Pull request merge	...
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Delete RandomPlayer.cpp	...
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Delete Player.cpp	...
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Delete GameManagerer.cpp	...
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Delete connect_four_app.cpp	...
 Mohamed-Taha20 pushed 1 commit to <code>main</code> • 4fd4a80...c5847aa • 2 hours ago	
Delete Sherif Mahmoud-20221080/Seperated games/Sherif Mahmoud-2022108...	...
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Update and rename Sherif Mahmoud-20221080/BoardGame_Classes.hpp to Sh...	...
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Update and rename BoardGame_Classes.hpp to Sherif Mahmoud-20221080/Bo...	...
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Delete Seperated games/Yousef Waleed-20221206/X_O5x5.zip	...
 Mohamed-Taha20 pushed 1 commit to <code>main</code> • f3a7d3b...07d497f • 2 hours ago	
Add files via upload	...
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Create test4	...
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Update X_O_Board.cpp	...
 yousef-15 pushed 1 commit to main • 47bbc01...a412634 • 31 minutes ago	
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Update RandomPlayer.cpp	...
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Update Player.cpp	...
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Update Integrated_Game.cpp	...
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Update Integrated_Game.cpp with interface	...
 Mohamed-Taha20 pushed 1 commit to main • 50c88cc...bc1c0e2 • 1 hour ago	
Add files via upload	...
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Update and rename X_O_App.cpp to Integrated_Game.cpp	...
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Delete X_O_Board.cpp	...
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