

XO GAmes

A2-Task3-S5-20231116-20231134-20231209



December 12, 2024

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| Name | ID | What he made |
| Amr Khaled Ahmed Abd El-Hamid   20231116@stud.fci-cu.edu.eg | 20231116 | 1. Pyramid Tic Tac Toe    1. Pyramid\_board:       1. is\_within\_bounds: bool       2. check\_line: bool       3. update\_board: bool       4. display\_board: void       5. is\_win: bool       6. is\_draw: bool       7. game\_is\_over: bool    2. PyramidPlayer:       1. Getmove: void    3. PyramidRandomPlayer:       1. Getmove: void    4. PyramidGamemenu: void 2. Word Tic Tac Toe    1. Word\_Tic\_Tac\_Toe\_Board:       1. is\_within\_bounds: bool       2. check\_line: bool       3. update\_board: bool       4. display\_board: void       5. is\_win: bool       6. is\_draw: bool       7. game\_is\_over: bool    2. Word\_Tic\_Tac\_Toe\_Player:       1. Getmove: void    3. Word\_Tic\_Tac\_Toe\_Random\_Player:       1. Getmove: void    4. PyramidGamemenu: void 3. GUI:    1. Building shape of boards    2. Accessing symbols on boards |

Illustrative table

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| --- | --- | --- |
| Name | ID | What he made |
| Mohamed Ahmed Mohamed Abd El Wahab   20231134@stud.fci-cu.edu.eg | 20231134 | 1. Four-in-a-row    1. Four\_in\_a\_row\_Board:       1. update\_board: bool       2. display\_board: void       3. is\_win: bool       4. is\_draw: bool       5. game\_is\_over: bool    2. Four\_in\_a\_row\_player:       1. Getmove: void    3. Random\_Four\_in\_a\_row:       1. Getmove: void    4. Four\_in\_a\_row\_menu: *int* 2. Numerical Tic Tac Toe    1. Numerical\_Tic\_Tac\_Toe\_Board:       1. update\_board: bool       2. display\_board: void       3. is\_win: bool       4. is\_draw: bool       5. game\_is\_over: bool    2. Numerical\_Tic\_Tac\_Toe\_player:       1. Getmove: void    3. Random\_Numerical\_Tic\_Tac\_Toe:       1. Getmove: void    4. Numerical\_menu: int 3. Ultimate Tic Tac Toe:    1. Ultimate\_Tic\_Tac\_Toe\_Board:       1. update\_board: bool       2. display\_board: void       3. is\_win: bool       4. is\_draw: bool       5. game\_is\_over: bool    2. Ultimate\_Tic\_Tac\_Toe\_player:       1. Getmove: void    3. Random\_Ultimate\_Tic\_Tac\_Toe:       1. Getmove: void    4. Ultimate\_Tic\_Tac\_Toe\_menu: int |

Illustrative table

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| Name | ID | What he made |
| Youssef Hassan Abd El Gawad   yousefhassan8902@gmail.com | 20231209 | 1. 5 x 5 Tic Tac Toe    1. X\_O\_5x5\_Board:       1. update\_board: bool       2. display\_board: void       3. is\_win: bool       4. is\_draw: bool       5. game\_is\_over: bool    2. X\_O\_5x5\_Player:       1. Getmove: void    3. X\_O\_5x5\_Random\_Player:       1. Getmove: void 2. Misere\_X\_O    1. Misere\_X\_O\_Board:       1. update\_board: bool       2. display\_board: void       3. is\_win: bool       4. is\_draw: bool       5. game\_is\_over: bool    2. Misere\_X\_O\_Player :       1. Getmove: void    3. Misere\_X\_O\_Random\_Player:       1. Getmove: void 3. X\_O\_4x4:    1. X\_O\_4x4\_Board:       1. update\_board: bool       2. display\_board: void       3. is\_win: bool       4. is\_draw: bool       5. game\_is\_over: bool    2. X\_O\_4x4\_Player:       1. Getmove: void    3. X\_O\_4x4\_Random\_Player:       1. Getmove: void |

Team Works Together on:

1. Integrating Games on One Menu.
2. Making GUI for 2 Grouped Games.
3. Making Report for All games.

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XO Games

# UML Diagram:

A diagram of a diagram

Description automatically generated with medium confidence

# GitHub repository:

GitHub link: <https://github.com/mohamedahmed2005/Assignment2_OOP_Board_Games.git>

# Games:

1. **Pyramid Tic Tac Toe:**
   1. The game board is shaped like a pyramid. Five squares make the base, then three, then one. Players
   2. take turns marking Xs and Os as in traditional tic-tac-toe.
   3. Winning: The first player to get three-in-a-row vertically, horizontally, or diagonally wins.
2. **Four-in-a-row:**
   1. The game board consists of a 7 x 6 grid. Seven columns of six squares each. Instead of dropping counters as in Connect Four, players mark the grid with Xs and Os as in tic-tac-toe.
   2. Rules: The first player places an X in the bottom square of any column. Taking turns, players make their mark in any column, as long as it is in the lowest square possible.
   3. Winning: The first player to get four-in-a-row vertically, horizontally, or diagonally wins.
3. **5 x 5 Tic Tac Toe:**
   1. This tic-tac-toe variation is played on a 5 x 5 grid. As in the traditional game, players are Xs or Os.
   2. Rules: Players take turns placing an X or an O in one of the squares until all the squares except one are filled. (Each player has 12 turns for a total of 24 squares.)
   3. Winning: Count the number of three-in-a-rows each player has. Sequences can be vertically, horizontally, or diagonally. Whoever has the most, wins.
4. **Word Tic Tac Toe:**
   1. Word Tic-tac-toe is an innovative twist on the classic Tic-tac-toe game. Instead of using "X" or "O", players place letters on a 3x3 grid to form valid words.
   2. Players aim to form a valid word with the letters they place on the board. Words can be formed horizontally, vertically, or diagonally.
   3. Rules: Each player takes turns placing one letter on the board. A player must try to form a valid word with each move. Players can build upon existing letters to form words, provided that the resulting sequence is a valid word.
   4. Winning: The game is won by forming a valid word horizontally, vertically, or diagonally. If the board fills up without a valid word being formed, the game ends in a draw.
5. **Numerical Tic Tac Toe:**
   1. Numerical Tic-Tac-Toe offers a mathematical twist to the classic Tic-Tac-Toe game. Instead of the traditional "X" and "O", players use numbers to add an element of strategic calculation.
   2. The objective is to achieve a sum of 15 with three numbers in a row, column, or diagonal.
   3. Rules: Player 1 typically starts and uses odd numbers (1, 3, 5, 7, 9), while Player 2 uses even numbers (2, 4, 6, 8). Players alternate turns, placing one number in an empty cell on the board. Each number can only be used once.
   4. Winning: A player wins by placing three numbers in a row, column, or diagonal that add up to 15.
6. **Misere Tic Tac Toe:**
   1. Misere Tic Tac Toe, also known as Inverse Tic Tac Toe or Toe Tac Tic, is a unique twist on the classic game. In this version, the objective is to avoid getting three marks in a row. The game flips the traditional win condition on its head, making every move a strategic decision to prevent losing.
   2. Rules: The game is played on a standard 3x3 Tic-Tac-Toe grid. The goal is to avoid placing three of your marks in a row, column, or diagonal. The player who ends up with three marks in a row loses the game. If all cells are filled without either player aligning three marks in a row, the game ends in a draw.
7. **4x4 XO:**
   1. 4 x 4 Tic-Tac-Toe is an extended version of the classic game, played on a larger board with more strategies. Each player has four tokens and aims to align three tokens in a row to win.
   2. This game introduces new movement rules and strategic depth to the traditional Tic-Tac- Toe.
   3. The game is played on a 4x4 grid. Each player has four tokens. Tokens are placed in specific starting positions: two tokens on opposite sides of the board for each player.
   4. Rules: Players alternate turns, moving one of their tokens to an immediately adjacent open square. Tokens can be moved horizontally or vertically but not diagonally. Tokens may not jump over other tokens.
   5. The goal is to align three of your tokens in a row. This can be achieved horizontally, vertically, or diagonally.
   6. Winning: The first player to get three tokens in a row wins the game. The alignment can be in any direction: horizontal, vertical, or diagonal.
8. **Ultimate Tic Tac Toe:**
   1. Ultimate Tic Tac Toe is an expansion of the classic game, where players engage in a meta- game of Tic Tac Toe within a 3x3 grid of smaller Tic Tac Toe boards. The goal is to win three smaller games in a row to claim victory on the main board, adding layers of complexity to the traditional game. The game is played on a large 3x3 grid, where each cell contains a smaller 3x3 Tic Tac Toe board.
   2. Rules: Player 1 starts by choosing any of the nine smaller Tic Tac Toe boards to play on. Players alternate turns, playing Tic Tac Toe on the smaller boards. The winner of each smaller board claims that space on the main board. The winner of the smaller board replaces that board with their symbol (X or O) on the main board.
   3. Winning: The first player to win three smaller boards in a row on the main 3x3 grid wins the Ultimate Tic Tac Toe game. The winning row on the main board can be horizontal, vertical, or diagonal.

# Classes:

1. **Base Classes:**
   1. **BoardGame\_Classes:**
      1. # rows: int
      2. # columns: int
      3. # T\*\* board
      4. # n\_moves: int
      5. + Update Board: bool
      6. + display board: void
      7. + Is win: bool
      8. + Is draw: bool
      9. game\_is\_over: bool
   2. **Player:**
      1. # name: string
      2. # symbol: T” template”
      3. + Get move: void
      4. + Get symbol: T” template”
      5. + Get name: string
      6. + set board: void
   3. RandomPlayer:
      1. # dimension: int
      2. + getmove: void
   4. GameManager:
      1. - BoardGame\_Classes<*T*>\* boardPtr
      2. - Player<*T*>\* players[2]
      3. + GameManager(BoardGame\_Classes<*T*>\*, Player<*T*>\* playerPtr[2])
      4. + run: void
2. **Child Classes:**
   1. **Pyramid Game:**
      1. PyramidBoard:
         1. - is\_within\_bounds: bool
         2. - check\_line: bool
         3. + Update Board: bool
         4. + display board: void
         5. + Is win: bool
         6. + Is draw: bool
         7. game\_is\_over: bool
      2. PyramidPlayer:
         1. - *T*\*\* boardPTR2D: T” template”
         2. + Getmove: void
      3. PyramidRandomPlayer:
         1. + Getmove: void
   2. **Four In a Row Game**:
      1. Four\_in\_a\_row\_Board:
         1. + Update Board: bool
         2. + display board: void
         3. + Is win: bool
         4. + Is draw: bool
         5. game\_is\_over: bool
      2. Four\_in\_a\_row\_player:
         1. + Getmove: void
      3. Random\_Four\_in\_a\_row:
         1. + Getmove: void
   3. **5 x 5 Tic Tac Toe:**
      1. X\_O\_5x5\_Board:
         1. + Update Board: bool
         2. + display board: void
         3. + Is win: bool
         4. + Is draw: bool
         5. + game\_is\_over: bool
      2. X\_O\_5x5\_Player:
         1. + Getmove: void
      3. X\_O\_5x5\_Random\_Player:
         1. + Getmove: void
   4. **Word Tic Tac Toe Game:**
      1. Word\_Tic\_Tac\_Toe\_Board:
         1. - Set “words”: string
         2. - is\_within\_bounds: bool
         3. - check\_line: bool
         4. + Update Board: bool
         5. + display board: void
         6. + Is win: bool
         7. + Is draw: bool
         8. + game\_is\_over: bool
      2. Word\_Tic\_Tac\_Toe\_Player:
         1. + Getmove: void
      3. Word\_Tic\_Tac\_Toe\_Random\_Player:
         1. + Getmove: void
   5. **Numerical Tic Tac Toe Game:**
      1. Numerical\_Tic\_Tac\_Toe\_Board:
         1. + Update Board: bool
         2. + display board: void
         3. + Is win: bool
         4. + Is draw: bool
         5. + game\_is\_over: bool
      2. Numerical\_Tic\_Tac\_Toe\_player:
         1. + Getmove: void
      3. Random\_Numerical\_Tic\_Tac\_Toe:
         1. - Vector “ available\_numbers”: T” template”
   6. **Misere Tic Tac Toe Game:**
      1. Misere\_X\_O\_Board:
         1. + Update Board: bool
         2. + display board: void
         3. + Is win: bool
         4. + Is draw: bool
         5. + game\_is\_over: bool
      2. Misere\_X\_O\_Player:
         1. + Getmove: void
      3. Misere\_X\_O\_Random\_Player:
         1. + Getmove: void
   7. **4X4 Tic Tac Toe Game:**
      1. X\_O\_4x4\_Board:
         1. + Update Board: bool
         2. + display board: void
         3. + Is win: bool
         4. + Is draw: bool
         5. + game\_is\_over: bool
         6. + valid\_move: bool
      2. X\_O\_4x4\_Player:
         1. + Getmove: void
      3. X\_O\_4x4\_Random\_Player:
         1. + Getmove: void
   8. **Ultimate Tic Tac Toe Game:**
      1. Ultimate\_Tic\_Tac\_Toe\_Board;
         1. + Update Board: bool
         2. + display board: void
         3. + Is win: bool
         4. + Is draw: bool
         5. + game\_is\_over: bool
      2. Ultimate\_Tic\_Tac\_Toe\_player:
         1. + Getmove: void
      3. Random\_Ultimate\_Tic\_Tac\_Toe:
         1. + Getmove: void

# Code Quality:

Help