



Assignment

Submitted By:

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BS (SE) Section: A

Submitted To:

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Dated: 5/27/2020

**Department of Computer Science,
IQRA National University, Peshawar Pakistan**

Department of Computer Science
Semester Assignment Spring 2020

Subject: Object Oriented Programming

Time: (Last date of submission 30th May 2020)

BS (CS,SE)

Instructor: M.Ayub Khan

Note:

At the top of the answer sheet there must be the ID, Name and semester of the concerned Student.

Students must have to provide the output of their respective programs. Students have same answers or programs will be considered fail. Programs in Java or codes should be explained clearly.

As this assignment is online so incase of any ambiguity my Whatsapp no. is 034499121116.

Q1. Create a Tic Tac Toe game in java (use any java tool for coding) and explain it in detail including screen shots.

```

import java.util.*;
import java.util.List;

import javax.swing.*;
import java.awt.*;
import java.awt.event.*;

//javax.swing.* is used to create JFrames. java.awt.* is used to create labels and buttons.
java.awt.event.* is used to create functions for buttons.

//In this class, a Tic-Tac-Toe game is created.
public class TicTacToe extends JPanel{
    static String[] board;
    static String turn;

    //A list of buttons is created and, when clicked, can change array values in board[]. This will be used to
    see if someone won or if a draw occurred.

    static List<JButton> buttons=new ArrayList<JButton>();
    static JFrame frame=new JFrame();
    static int value=0;
    static String winner = null;

    static JLabel information=new JLabel("<html>Welcome to 2 Player Tic Tac Toe.<br/>X will play
    first.<br/> Click near the center of a slot to place X in:");

    //In the main function, a JFrame window is being created and the lines from the paintComponent
    function are drawn. Then, populateEmptyBoard is called.

    public static void main(String[] args) {
        frame.setDefaultCloseOperation(JFrame.EXIT_ON_CLOSE);
        TicTacToe ticTacToe=new TicTacToe();
        frame.add(ticTacToe);

```

```
frame.setContentPane(ticTacToe);
```

```
frame.setVisible(true);
```

```
board = new String[9];
```

```
turn = "X";
```

```
populateEmptyBoard();
```

```
}
```

//In winningText, checkWinner is called to see if a player has won. If the player won or a draw occurred, the label on the window is updated to show it.

```
static void winningText() {
```

```
    winner=checkWinner();
```

```
    if(winner!=null) {
```

```
        if (winner.equalsIgnoreCase("draw")) {
```

```
            information.setText("<html>It's a draw!<br/> Thanks for playing.");
```

```
        } else {
```

```
            information.setText("<html>Congratulations!<br/> "+ winner+ " has won!<br/> Thanks for playing.");
```

```
        }
```

```
    }
```

```
}
```

//In this function, the board array is used to see if there is a winner or if a draw occurred. If both of these conditions are false, the game continues.

```
static String checkWinner() {
```

```
    for (int a = 0; a < 8; a++) {
```

```
        String line = null;
```

```
        switch (a) {
```

```
            case 0:
```

```
                line = board[0] + board[1] + board[2];
```

```
        break;
    case 1:
        line = board[3] + board[4] + board[5];
        break;
    case 2:
        line = board[6] + board[7] + board[8];
        break;
    case 3:
        line = board[0] + board[3] + board[6];
        break;
    case 4:
        line = board[1] + board[4] + board[7];
        break;
    case 5:
        line = board[2] + board[5] + board[8];
        break;
    case 6:
        line = board[0] + board[4] + board[8];
        break;
    case 7:
        line = board[2] + board[4] + board[6];
        break;
    }
    if (line.equals("XXX")) {
        return "X";
    } else if (line.equals("OOO")) {
        return "O";
    }
}
```

```

for (int a = 0; a < 9; a++) {
    if (Arrays.asList(board).contains("Empty")){
        break;
    }
    else if (a == 8) return "draw";
}
information.setText("<html>"+turn+"'s turn.<br/> Click near the center of a slot to place "+turn+"
in.");
return null;
}

```

//In this function, buttons are created for the player to put his/her/their turns in. Every time a player clicks on an applicable button, the board array is updated.

```

static void populateEmptyBoard() {
    frame.setLayout(null);
    information.setBounds(10,160, 400, 400);
    frame.add(information);
    int xIncrease=0;
    int yIncrease=-100;

    for(int i=0; i<9; i++) board[i]="Empty";

    for(int y=0; y<3; y++){

        xIncrease=0;
        yIncrease+=100;
        for (int x = 0; x < 3; x++) {

```

```

buttons.add(new JButton(""));
buttons.get(value).setBounds(xIncrease, yIncrease, 100, 100);
buttons.get(value).setOpaque(false);
buttons.get(value).setContentAreaFilled(false);
buttons.get(value).setBorderPainted(false);
frame.add(buttons.get(value));
buttons.get(value).addActionListener(new ActionListener() {
    int val=value;
    public void actionPerformed(ActionEvent e) {
        if(winner==null && board[val]=="Empty") {
            board[val]=turn;
            buttons.get(val).setText(turn);

            if (turn.equals("X")) {
                turn = "O";
            } else {
                turn = "X";
            }
            winningText();
        }
        else if(winner!=null) information.setText("The game has already been finished!");
        else information.setText("<html>The slot is already taken!<br/> Pick another slot!");
    }
});
value++;
xIncrease+=100;
}
frame.setSize(300,450);
frame.setResizable(false);

```

```
}
```

```
}
```

//In this in-built function, three black vertical lines and two black horizontal lines are created to separate the buttons in a Tic-Tac-Toe fashion.

```
public void paintComponent(Graphics g) {
```

```
    super.paintComponent(g);
```

```
    int x=100;
```

```
    g.setColor(Color.BLACK);
```

```
    for(int i=0; i<2; i++) {
```

```
        g.drawLine(0, 0+x, 300,0+x);
```

```
        if(i==2) break;
```

```
        g.drawLine(0+x,0,0+x, 300);
```

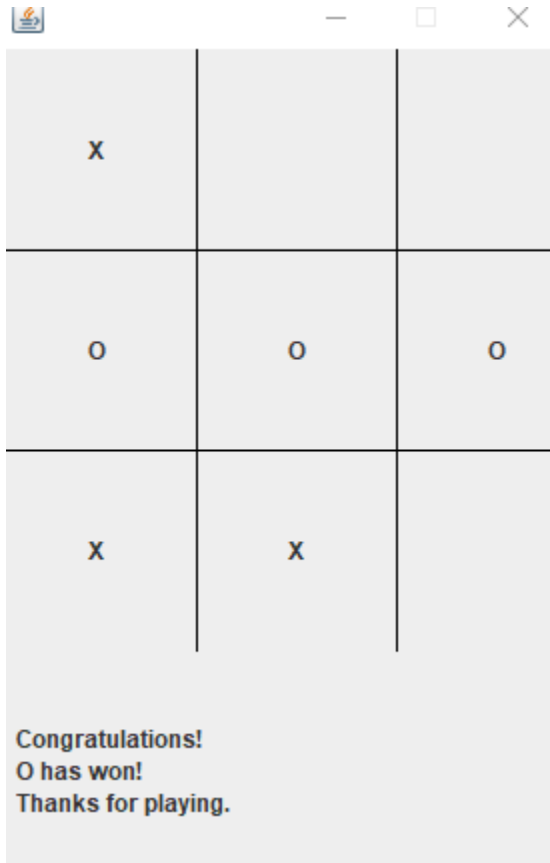
```
        x+=100;
```

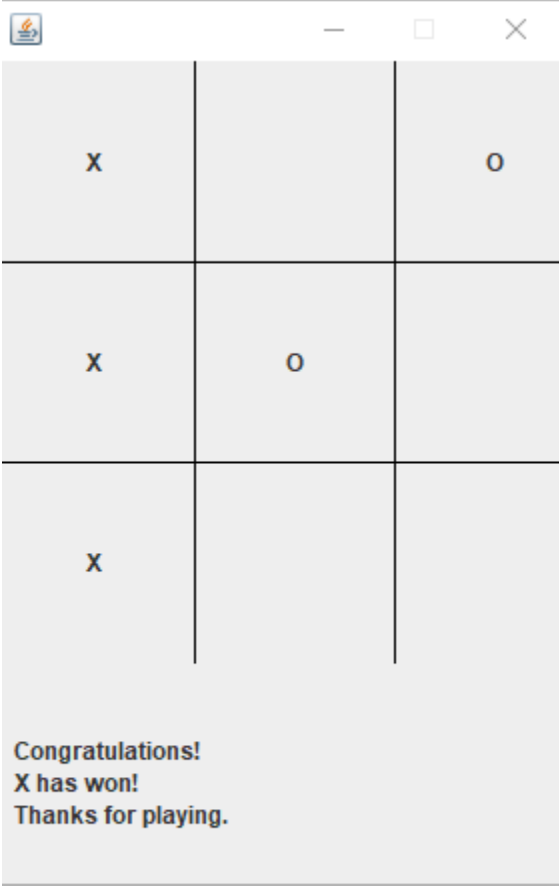
```
    }
```

```
}
```

```
}
```


OUTPUT:







X	O	X
O	O	X
X	X	O

It's a draw!
Thanks for playing.