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SUBJECT: Java On-spot Project

Demonstration Video:
https://youtu.be/OG_CzEoG9fw

Q] Design and develop a game application using JavaFX that includes the necessary graphical components, UI controls and event handling mechanism. Incorporate as many (relevant) features of JavaFX as possible.

Source code:

```
import java.util.ArrayList;
import java.util.List;
import javafx.application.Application;
import javafx.event.ActionEvent;
import javafx.event.EventHandler;
import javafx.geometry.Pos;
import javafx.stage.Stage;
import javafx.scene.Parent;
import javafx.scene.Scene;
import javafx.scene.control.Button;
import javafx.scene.layout.Pane;
import javafx.scene.layout.StackPane;
import javafx.scene.paint.Color;
import javafx.scene.shape.Rectangle;
import javafx.scene.text.Text;

public class Project extends Application {
    String currMove;
    String[][] grid = { { "", "", "" }, { "", "", "" }, { "", "", ""
} };
    Text wonState = new Text("Click to start game");
    Text currPlayer = new Text("Chance of: X");
    Boolean playable = true;
    List<Tile> tiles = new ArrayList<>();

    public static void main(String[] args) {
        launch();
    }

    private String checkWin() {
        for (int i = 0; i < grid.length; i++) {
            if ((grid[i][0] == "X") && (grid[i][0] == grid[i][1]) &&
(grid[i][0] == grid[i][2])) {
                return "X";
            }
            if ((grid[0][i] == "X") && (grid[0][i] == grid[1][i]) &&
(grid[0][i] == grid[2][i])) {
                return "X";
            }
            if ((grid[i][0] == "O") && (grid[i][0] == grid[i][1]) &&
(grid[i][0] == grid[i][2])) {
                return "O";
            }
```

```
            if ((grid[0][i] == "O") && (grid[0][i] == grid[1][i]) &&
(grid[0][i] == grid[2][i])) {
                return "O";
            }
        }
        if ((grid[0][0] == "X") && (grid[0][0] == grid[1][1]) &&
(grid[0][0] == grid[2][2])) {
            return "X";
        } else if ((grid[0][0] == "O") && (grid[0][0] == grid[1][1])
&& (grid[0][0] == grid[2][2])) {
            return "O";
        }

        return "";
    }

    void changeMove() {
        if (currMove == "X") {
            currMove = "O";
            currPlayer.setText("Chance of: O");
        } else {
            currMove = "X";
            currPlayer.setText("Chance of: X");
        }
        String winState = checkWin();
        if (winState == "X") {
            wonState.setText("Game Won by X!");
            currPlayer.setText("Reset board to continue playing.");
            playable = false;
        } else if (winState == "O") {
            wonState.setText("Game Won by O!");
            currPlayer.setText("Reset board to continue playing.");
            playable = false;
        } else {
            wonState.setText("Not won!");
        }
    }

    private Parent createContent() {
        wonState.setFill(Color.BLACK);
        wonState.setX(175);
        wonState.setY(50);
        currPlayer.setFill(Color.BLACK);
        currPlayer.setX(325);
        currPlayer.setY(50);
        Button resetButton = new Button("Reset board");
        resetButton.setLayoutX(560);
        resetButton.setLayoutY(35);
```

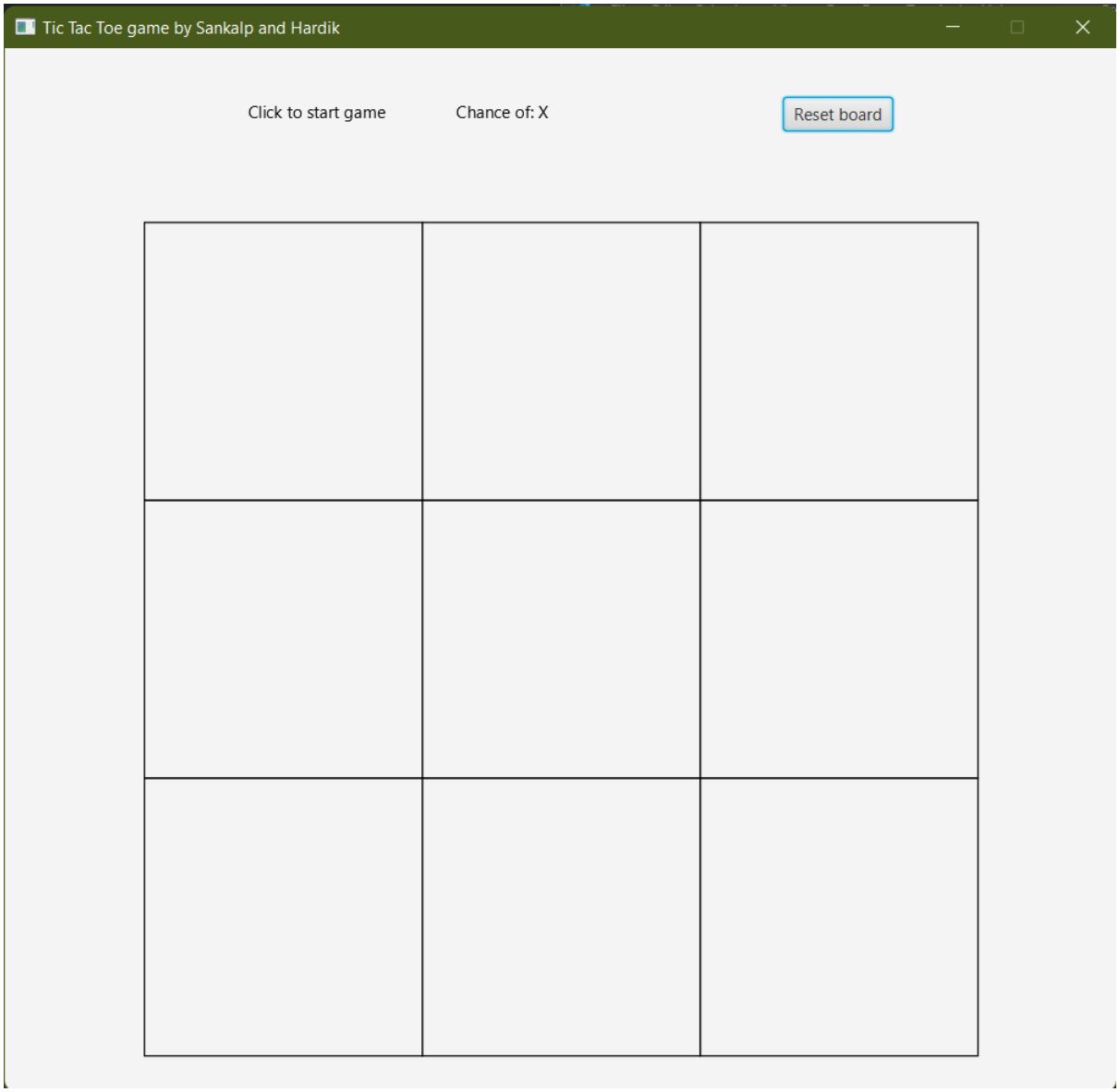
```
        resetButton.setCancelButton(true);
        resetButton.setAlignment(Pos.CENTER);

        currMove = "X";
        Pane root = new Pane();
        root.setPrefSize(800, 750);
        Pane grid = new Pane();
        grid.setPrefSize(600, 600);
        grid.setLayoutX(100);
        grid.setLayoutY(125);

        root.getChildren().addAll(wonState, currPlayer, resetButton,
grid);
        for (int i = 0; i < 3; i++) {
            for (int j = 0; j < 3; j++) {
                Tile tile = new Tile(i, j);
                tile.setTranslateX(j * 200);
                tile.setTranslateY(i * 200);
                tiles.add(tile);

                grid.getChildren().add(tile);
            }
        }
        resetButton.setOnAction(new EventHandler<ActionEvent>() {

            @Override
            public void handle(ActionEvent ev) {
                playable = true;
                makeGridEmpty(grid);
                wonState.setText("Not won!");
                currPlayer.setText("Chance of: " + currMove);
            }

        });
        return root;
    }

    private void makeGridEmpty(Pane grid) {
        for (int i = 0; i < this.grid.length; i++) {
            for (int j = 0; j < this.grid.length; j++) {
                this.grid[i][j] = "";
            }
        }

        for (Tile tile : this.tiles) {
            tile.setEmpty();
        }
    }
```

```java
@Override
public void start(Stage stage) {
    stage.setScene(new Scene(createContent()));
    stage.setTitle("Tic Tac Toe game by Sankalp and Hardik");
    stage.setResizable(false);
    stage.show();
}

private class Tile extends StackPane {
    private Text text = new Text();
    private int i, j;

    public Tile(int I, int J) {
        this.i = I;
        this.j = J;
        Rectangle border = new Rectangle(200, 200);
        border.setFill(null);
        border.setStroke(Color.BLACK);

        setAlignment(Pos.CENTER);
        getChildren().addAll(border, text);

        setOnMouseClicked(event -> {
            if (playable) {
                if (currMove == "X") {
                    drawX();
                } else {
                    drawO();
                }
                changeMove();
            }
        });
    }

    private void drawX() {
        text.setText("X");
        grid[i][j] = "X";
    }

    private void drawO() {
        text.setText("O");
        grid[i][j] = "O";
    }

    private void setEmpty() {
        text.setText("");
    }
```

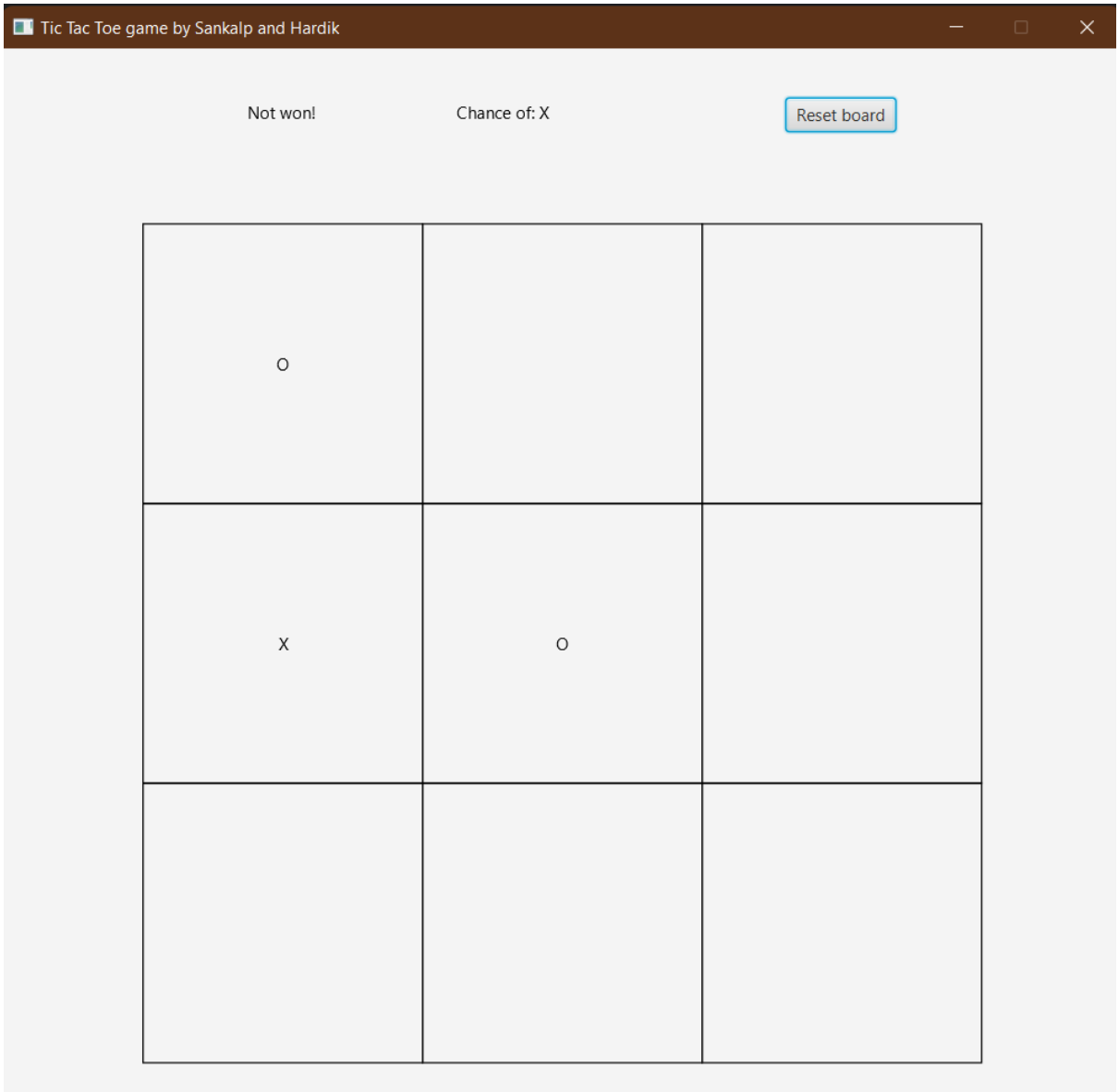
```
    }

}
```

SNAP SHOTS OF THE OUTPUT:

Beginning state: Empty 3x3 grid



Intermediate state: Game dynamically updates and tells which player's turn is it.



Won state: Board freezes until player resets the board.