**EXPERIMENT 6**

**Aim :**

Develop a Game Application for Mobile Phone using Android Studio.

**Theory :**

The Tic Tac Toe Game is a two-player game. Each player chooses between X and O. Only one move at a time is allowed simultaneously. In a move, a player can choose any position from a 3×3 grid. The goal here is to get three consecutive X or O in a horizontal, vertical, or diagonal direction. There will be a single activity in this application. This activity will show a 3×3 grid. The status of the game will be displayed at the bottom.

**Requirements :**

* Android Studio
* Knowledge of XML and JAVA
* Android emulator (or) Android Mobile

**Steps for Tic Tac Toe Game Application :**

***Step 1:*** Create a **New Project**

Create a new project in Android Studio and select **Java** as the programming language.

***Step 2:*** Before going to the coding section, first we have to do some pre-task

Save the images of **Grid** **X** and **O** in drawable folder in resources. Go to **app > res > drawable.**

Change the style to **NoActionBar** in **themes.xml** file:

<style name=”AppTheme” parent=”Theme.AppCompat.NoActionBar”>

***Step 3:*** Working with **activity\_main.xml** file

The XML codes are used to build the structure of the activity as well as its styling part. It contains a **TextView** at the very top of the activity to display the title. Then it contains an **ImageView** of the grid and in each box, there is an **ImageView.** At the bottom of the activity, there is a **TextView** to display the status of the game.

***Step 4:*** Working with **MainActivity.java** file

We will create a two-dimensional array that will store all the winning positions. We will create a function that will run when a box inside the grid is clicked. Inside this function, we will first check if the box selected is empty or not. After that, we will set the image of X if the last move was of O or we will set the image of O if the last move was of X. Then we will check if the move has reached the winning position and then reset the game.

**Code :**

**activity\_main.xml** file

<?xml version="1.0" encoding="utf-8"?>

<androidx.constraintlayout.widget.ConstraintLayout

    xmlns:android="http://schemas.android.com/apk/res/android"

    xmlns:app="http://schemas.android.com/apk/res-auto"

    xmlns:tools="http://schemas.android.com/tools"

    android:layout\_width="match\_parent"

    android:layout\_height="match\_parent"

    android:background="@color/green"

    tools:context=".MainActivity">

    <TextView

        android:id="@+id/textView"

        android:layout\_width="wrap\_content"

        android:layout\_height="wrap\_content"

        android:layout\_marginTop="23dp"

        android:text="Tic Tac Toe"

        android:textSize="45sp"

        android:textStyle="bold"

        app:fontFamily="cursive"

        app:layout\_constraintLeft\_toLeftOf="parent"

        app:layout\_constraintRight\_toRightOf="parent"

        app:layout\_constraintTop\_toTopOf="parent" />

    <ImageView

        android:id="@+id/imageView"

        android:layout\_width="0dp"

        android:layout\_height="wrap\_content"

        android:contentDescription="Start"

        app:layout\_constraintEnd\_toEndOf="parent"

        app:layout\_constraintStart\_toStartOf="parent"

        app:layout\_constraintTop\_toBottomOf="@+id/textView"

        app:srcCompat="@drawable/grid" />

    <LinearLayout

        android:id="@+id/linearLayout"

        android:layout\_width="0dp"

        android:layout\_height="420dp"

        android:orientation="vertical"

        app:layout\_constraintBottom\_toBottomOf="@+id/imageView"

        app:layout\_constraintEnd\_toEndOf="@+id/imageView"

        app:layout\_constraintStart\_toStartOf="@+id/imageView"

        app:layout\_constraintTop\_toTopOf="@+id/imageView">

        <LinearLayout

            android:layout\_width="match\_parent"

            android:layout\_height="match\_parent"

            android:layout\_weight="1"

            android:orientation="horizontal">

            <ImageView

                android:id="@+id/imageView0"

                android:layout\_width="match\_parent"

                android:layout\_height="match\_parent"

                android:layout\_weight="1"

                android:onClick="playerTap"

                android:padding="20sp"

                android:tag="0" />

            <ImageView

                android:id="@+id/imageView1"

                android:layout\_width="match\_parent"

                android:layout\_height="match\_parent"

                android:layout\_weight="1"

                android:onClick="playerTap"

                android:padding="20sp"

                android:tag="1" />

            <ImageView

                android:id="@+id/imageView2"

                android:layout\_width="match\_parent"

                android:layout\_height="match\_parent"

                android:layout\_weight="1"

                android:onClick="playerTap"

                android:padding="20sp"

                android:tag="2" />

        </LinearLayout>

        <LinearLayout

            android:layout\_width="match\_parent"

            android:layout\_height="match\_parent"

            android:layout\_weight="1"

            android:orientation="horizontal">

            <ImageView

                android:id="@+id/imageView3"

                android:layout\_width="match\_parent"

                android:layout\_height="match\_parent"

                android:layout\_weight="1"

                android:onClick="playerTap"

                android:padding="20sp"

                android:tag="3" />

            <ImageView

                android:id="@+id/imageView4"

                android:layout\_width="match\_parent"

                android:layout\_height="match\_parent"

                android:layout\_weight="1"

                android:onClick="playerTap"

                android:padding="20sp"

                android:tag="4" />

            <ImageView

                android:id="@+id/imageView5"

                android:layout\_width="match\_parent"

                android:layout\_height="match\_parent"

                android:layout\_weight="1"

                android:onClick="playerTap"

                android:padding="20sp"

                android:tag="5" />

        </LinearLayout> <LinearLayout

            android:layout\_width="match\_parent"

            android:layout\_height="match\_parent"

            android:layout\_weight="1"

            android:orientation="horizontal">

            <ImageView

                android:id="@+id/imageView6"

                android:layout\_width="match\_parent"

                android:layout\_height="match\_parent"

                android:layout\_weight="1"

                android:onClick="playerTap"

                android:padding="20sp"

                android:tag="6" />

            <ImageView

                android:id="@+id/imageView7"

                android:layout\_width="match\_parent"

                android:layout\_height="match\_parent"

                android:layout\_weight="1"

                android:onClick="playerTap"

                android:padding="20sp"

                android:tag="7" />

            <ImageView

                android:id="@+id/imageView8"

                android:layout\_width="match\_parent"

                android:layout\_height="match\_parent"

                android:layout\_weight="1"

                android:onClick="playerTap"

                android:padding="20sp"

                android:tag="8" />

</LinearLayout> </LinearLayout> <TextView

        android:id="@+id/status"

        android:layout\_width="wrap\_content"

        android:layout\_height="wrap\_content"

        android:layout\_marginBottom="15sp"

        android:text="Status"

        android:textSize="28sp"

        android:textStyle="italic"

        app:layout\_constraintBottom\_toBottomOf="parent"

        app:layout\_constraintEnd\_toEndOf="parent"

        app:layout\_constraintStart\_toStartOf="parent"

        app:layout\_constraintTop\_toBottomOf="@+id/linearLayout" />

</androidx.constraintlayout.widget.ConstraintLayout>

**Code :**

**MainActivity.java** file

import android.os.Bundle;

import android.view.View;

import android.widget.ImageView;

import android.widget.TextView;

import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {

    boolean gameActive = true;

    int activePlayer = 0;

    int[] gameState = {2, 2, 2, 2, 2, 2, 2, 2, 2};

    int[][] winPositions = {{0, 1, 2}, {3, 4, 5}, {6, 7, 8},

            {0, 3, 6}, {1, 4, 7}, {2, 5, 8},

            {0, 4, 8}, {2, 4, 6}};

    public static int counter = 0;

    public void playerTap(View view) {

        ImageView img = (ImageView) view;

        int tappedImage = Integer.parseInt(img.getTag().toString());

        if (!gameActive) {

            gameReset(view);

        }

        if (gameState[tappedImage] == 2) {

            counter++;

            if (counter == 9) {

                gameActive = false;

            }

            gameState[tappedImage] = activePlayer;

            img.setTranslationY(-1000f);

            if (activePlayer == 0) {

                img.setImageResource(R.drawable.x);

                activePlayer = 1;

                TextView status = findViewById(R.id.status);

                status.setText("O's Turn - Tap to play");

            } else {

                img.setImageResource(R.drawable.o);

                activePlayer = 0;

                TextView status = findViewById(R.id.status);

                status.setText("X's Turn - Tap to play");

            }

            img.animate().translationYBy(1000f).setDuration(300);

        }

        int flag = 0;

        for (int[] winPosition : winPositions) {

            if (gameState[winPosition[0]] == gameState[winPosition[1]] &&

                    gameState[winPosition[1]] == gameState[winPosition[2]] &&

                    gameState[winPosition[0]] != 2) {

                flag = 1;

                String winnerStr;

                gameActive = false;

                if (gameState[winPosition[0]] == 0) {

                    winnerStr = "X has won";

                } else {

                    winnerStr = "O has won";

                }

                TextView status = findViewById(R.id.status);

                status.setText(winnerStr);

            }

        }

        if (counter == 9 && flag == 0) {

            TextView status = findViewById(R.id.status);

            status.setText("Match Draw");

        }

    }

    public void gameReset(View view) {

        gameActive = true;

        activePlayer = 0;

        for (int i = 0; i < gameState.length; i++) {

            gameState[i] = 2;

        }

        ((ImageView) findViewById(R.id.imageView0)).setImageResource(0);

        ((ImageView) findViewById(R.id.imageView1)).setImageResource(0);

        ((ImageView) findViewById(R.id.imageView2)).setImageResource(0);

        ((ImageView) findViewById(R.id.imageView3)).setImageResource(0);

        ((ImageView) findViewById(R.id.imageView4)).setImageResource(0);

        ((ImageView) findViewById(R.id.imageView5)).setImageResource(0);

        ((ImageView) findViewById(R.id.imageView6)).setImageResource(0);

        ((ImageView) findViewById(R.id.imageView7)).setImageResource(0);

        ((ImageView) findViewById(R.id.imageView8)).setImageResource(0);

        TextView status = findViewById(R.id.status);

        status.setText("X's Turn - Tap to play");

    }

    @Override

    protected void onCreate(Bundle savedInstanceState) {

        super.onCreate(savedInstanceState);

        setContentView(R.layout.activity\_main);

    }

}

**App Screenshots :**

  

  

 