# 20CYS404 Android Application Development

# END SEM LAB EXAM

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Aim:

To develop an Android application to play TicTacToe and print result after 5 games Code:

# Activity\_main.xml

```
<?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:id="@+id/main"
  android:layout_width="match_parent"
  android:layout height="match parent"
  android:background="#E0F7FA"
  tools:context=".MainActivity">
  <ImageView
    android:id="@+id/logoImageView"
    android:layout_width="70dp"
    android:layout_height="70dp"
    android:src="@drawable/amrita"
    android:layout_marginTop="20dp"/>
  <TextView
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Fiyan Mehfil Ayoob - 21018"
    android:textSize="24sp"
    tools:layout_editor_absoluteX="56dp"
    tools:layout_editor_absoluteY="16dp"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    android:textColor="#004D40"
    android:layout marginTop="20dp"
    android:layout_marginLeft="70dp"/>
  <TextView
    android:id="@+id/statusText"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="100dp"
    android:text="Player Java's Turn"
    android:textColor="#004D40"
    android:textSize="24sp"
```

```
app:layout_constraintEnd_toEndOf="parent"
  app:layout constraintHorizontal bias="0.497"
  app:layout_constraintStart_toStartOf="parent"
  app:layout_constraintTop_toTopOf="parent" />
<Button
  android:id="@+id/btn_java"
  android:layout_width="100dp"
  android:layout height="100dp"
  android:text="Java"
  android:textSize="19sp"
  android:textColor="#000"
  android:background="#FFFFFF"
  app:layout_constraintTop_toBottomOf="@+id/statusText"
  app:layout_constraintStart_toStartOf="parent"
  app:layout_constraintEnd_toStartOf="@+id/btn_kotlin"
  android:layout_marginTop="20dp" />
<Button
  android:id="@+id/btn_kotlin"
  android:layout width="100dp"
  android:layout_height="100dp"
  android:text="Kotlin"
  android:textSize="19sp"
  android:textColor="#000"
  android:background="#FFFFFF"
  app:layout_constraintTop_toBottomOf="@+id/statusText"
  app:layout_constraintStart_toEndOf="@+id/btn_java"
  app:layout_constraintEnd_toEndOf="parent"
  android:layout marginTop="20dp" />
<!-- GridLayout for Tic-Tac-Toe Buttons -->
<GridLayout
  android:id="@+id/gridLayout"
  android:layout_width="wrap_content"
  android:layout height="wrap content"
  android:rowCount="3"
  android:columnCount="3"
  app:layout constraintTop toBottomOf="@+id/btn java"
  app:layout_constraintStart_toStartOf="parent"
  app:layout_constraintEnd_toEndOf="parent"
  android:textColor="#004D40"
  android:layout_marginTop="32dp">
  <Button
    android:id="@+id/button00"
    android:layout_width="100dp"
    android:layout height="100dp"
```

```
android:textColor="#000000"
android:textSize="30sp" />
```

#### <Button

android:id="@+id/button01" android:layout\_width="100dp" android:layout\_height="100dp" android:textColor="#000000" android:textSize="30sp"/>

#### <Button

android:id="@+id/button02" android:layout\_width="100dp" android:layout\_height="100dp" android:textColor="#000000" android:textSize="30sp"/>

#### <Button

android:id="@+id/button10" android:layout\_width="100dp" android:layout\_height="100dp" android:textColor="#000000" android:textSize="30sp"/>

#### <Button

android:id="@+id/button11" android:layout\_width="100dp" android:layout\_height="100dp" android:textColor="#000000" android:textSize="30sp"/>

#### <Button

android:id="@+id/button12" android:layout\_width="100dp" android:layout\_height="100dp" android:textColor="#000000" android:textSize="30sp"/>

#### <Button

android:id="@+id/button20" android:layout\_width="100dp" android:layout\_height="100dp" android:textColor="#000000" android:textSize="30sp"/>

#### <Button

android:id="@+id/button21" android:layout\_width="100dp"

```
android:layout_height="100dp"
      android:textColor="#000000"
      android:textSize="30sp"/>
    <Button
      android:id="@+id/button22"
      android:layout_width="100dp"
      android:layout_height="100dp"
      android:textColor="#000000"
      android:textSize="30sp"/>
  </GridLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
MainActivity.java
package com.example.tictactoe;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.TextView;
import androidx.appcompat.app.AppCompatActivity;
public class MainActivity extends AppCompatActivity {
  private boolean playerX = true; // Player X starts
  private int turnCount = 0;
  private int[][] board = new int[3][3]; // 0 for empty, 1 for X, 2 for O
  private int xWins = 0, oWins = 0, draws = 0;
  private int gamesPlayed = 0;
  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    final TextView statusText = findViewById(R.id.statusText);
    statusText.setText("Player Java's Turn");
    final Button[][] buttons = new Button[3][3];
    buttons[0][0] = findViewById(R.id.button00);
    buttons[0][1] = findViewById(R.id.button01);
    buttons[0][2] = findViewById(R.id.button02);
    buttons[1][0] = findViewById(R.id.button10);
```

```
buttons[1][1] = findViewById(R.id.button11);
buttons[1][2] = findViewById(R.id.button12);
buttons[2][0] = findViewById(R.id.button20);
buttons[2][1] = findViewById(R.id.button21);
buttons[2][2] = findViewById(R.id.button22);
// Click listener for the grid buttons
View.OnClickListener listener = new View.OnClickListener() {
  @Override
  public void onClick(View v) {
    Button button = (Button) v;
    String tag = button.getTag().toString();
    int row = Character.getNumericValue(tag.charAt(0));
    int col = Character.getNumericValue(tag.charAt(1));
    if (board[row][col] == 0) {
      board[row][col] = playerX ? 1 : 2;
      button.setText(playerX ? "X" : "O");
      button.setEnabled(false);
      turnCount++;
      if (checkWinner()) {
         if (playerX) {
           xWins++;
           statusText.setText("Player Java Wins!");
         } else {
           oWins++;
           statusText.setText("Player Kotlin Wins!");
        }
         resetBoard(buttons);
      } else if (turnCount == 9) {
         draws++;
         statusText.setText("It's a Draw!");
         resetBoard(buttons);
      } else {
         playerX = !playerX;
         statusText.setText(playerX ? "Player Java's Turn" : "Player Kotlin's Turn");
      }
      // If 5 games are played, move to ResultActivity
      if (gamesPlayed == 5) {
         Intent intent = new Intent(MainActivity.this, ResultsActivity.class);
         intent.putExtra("xWins", xWins);
         intent.putExtra("oWins", oWins);
         intent.putExtra("draws", draws);
         startActivity(intent);
    }
```

```
}
  };
  // Attach listeners to each button
  for (int i = 0; i < 3; i++) {
    for (int j = 0; j < 3; j++) {
       buttons[i][j].setOnClickListener(listener);
       buttons[i][j].setTag("" + i + j);
  }
}
private boolean checkWinner() {
  // Check rows, columns, and diagonals
  for (int i = 0; i < 3; i++) {
    if (board[i][0] == board[i][1] && board[i][1] == board[i][2] && board[i][0] != 0) {
       return true;
    if (board[0][i] == board[1][i] && board[1][i] == board[2][i] && board[0][i] != 0) {
       return true;
    }
  if (board[0][0] == board[1][1] && board[1][1] == board[2][2] && board[0][0] != 0) {
    return true;
  if (board[0][2] == board[1][1] && board[1][1] == board[2][0] && board[0][2] != 0) {
    return true;
  return false;
private void resetBoard(Button[][] buttons) {
  board = new int[3][3];
  turnCount = 0;
  playerX = true;
  gamesPlayed++;
  // Reset all buttons
  for (int i = 0; i < 3; i++) {
    for (int j = 0; j < 3; j++) {
       buttons[i][j].setEnabled(true);
       buttons[i][j].setText("");
  }
}
```

### Activity\_results.xml

```
package com.example.tictactoe;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.TextView;
import androidx.appcompat.app.AppCompatActivity;
public class MainActivity extends AppCompatActivity {
  private boolean playerX = true; // Player X starts
  private int turnCount = 0;
  private int[][] board = new int[3][3]; // 0 for empty, 1 for X, 2 for O
  private int xWins = 0, oWins = 0, draws = 0;
  private int gamesPlayed = 0;
  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    final TextView statusText = findViewById(R.id.statusText);
    statusText.setText("Player Java's Turn");
    final Button[][] buttons = new Button[3][3];
    buttons[0][0] = findViewById(R.id.button00);
    buttons[0][1] = findViewById(R.id.button01);
    buttons[0][2] = findViewById(R.id.button02);
    buttons[1][0] = findViewById(R.id.button10);
    buttons[1][1] = findViewById(R.id.button11);
    buttons[1][2] = findViewById(R.id.button12);
    buttons[2][0] = findViewById(R.id.button20);
    buttons[2][1] = findViewById(R.id.button21);
    buttons[2][2] = findViewById(R.id.button22);
    // Click listener for the grid buttons
    View.OnClickListener listener = new View.OnClickListener() {
      @Override
      public void onClick(View v) {
        Button button = (Button) v;
        String tag = button.getTag().toString();
        int row = Character.getNumericValue(tag.charAt(0));
        int col = Character.getNumericValue(tag.charAt(1));
```

```
if (board[row][col] == 0) {
         board[row][col] = playerX ? 1 : 2;
         button.setText(playerX ? "X" : "O");
         button.setEnabled(false);
         turnCount++;
         if (checkWinner()) {
           if (playerX) {
             xWins++;
              statusText.setText("Player Java Wins!");
           } else {
              oWins++;
              statusText.setText("Player Kotlin Wins!");
           }
           resetBoard(buttons);
         } else if (turnCount == 9) {
           draws++;
           statusText.setText("It's a Draw!");
           resetBoard(buttons);
         } else {
           playerX = !playerX;
           statusText.setText(playerX ? "Player Java's Turn" : "Player Kotlin's Turn");
         }
         // If 5 games are played, move to ResultActivity
         if (gamesPlayed == 5) {
           Intent intent = new Intent(MainActivity.this, ResultsActivity.class);
           intent.putExtra("xWins", xWins);
           intent.putExtra("oWins", oWins);
           intent.putExtra("draws", draws);
           startActivity(intent);
         }
      }
    }
  };
  // Attach listeners to each button
  for (int i = 0; i < 3; i++) {
    for (int j = 0; j < 3; j++) {
       buttons[i][j].setOnClickListener(listener);
       buttons[i][j].setTag(""+i+j);\\
    }
  }
private boolean checkWinner() {
  // Check rows, columns, and diagonals
  for (int i = 0; i < 3; i++) {
```

}

```
if (board[i][0] == board[i][1] && board[i][1] == board[i][2] && board[i][0] != 0) {
         return true;
       if (board[0][i] == board[1][i] && board[1][i] == board[2][i] && board[0][i] != 0) {
         return true;
    }
    if (board[0][0] == board[1][1] && board[1][1] == board[2][2] && board[0][0] != 0) {
       return true;
    }
    if (board[0][2] == board[1][1] && board[1][1] == board[2][0] && board[0][2] != 0) {
       return true;
    }
    return false;
  }
  private void resetBoard(Button[][] buttons) {
    board = new int[3][3];
    turnCount = 0;
    playerX = true;
    gamesPlayed++;
    // Reset all buttons
    for (int i = 0; i < 3; i++) {
       for (int j = 0; j < 3; j++) {
         buttons[i][j].setEnabled(true);
         buttons[i][j].setText("");
       }
    }
}
```

## ResultsActivity.java

```
package com.example.tictactoe;

import android.content.Intent;
import android.os.Bundle;
import android.widget.Button;
import android.widget.TextView;

import androidx.appcompat.app.AppCompatActivity;

public class ResultsActivity extends AppCompatActivity {

@Override
protected void onCreate(Bundle savedInstanceState) {
```

```
super.onCreate(savedInstanceState);
    setContentView(R.layout.activity results);
    TextView resultText = findViewById(R.id.resultText);
    Button resetButton = findViewById(R.id.btn reset results);
    // Retrieve Intent data
    int xWins = getIntent().getIntExtra("xWins", -1);
    int oWins = getIntent().getIntExtra("oWins", -1);
    int draws = getIntent().getIntExtra("draws", -1);
    // Check if data was received properly
    if (xWins == -1 || oWins == -1 || draws == -1) {
       // If there's a problem with the data, display an error
       resultText.setText("Error: Could not retrieve game results.");
    } else {
       // Display the results properly
       String results = "Results after 5 games:\n" +
           "Player Java Wins: " + xWins + "\n" +
           "Player Kotlin Wins: " + oWins + "\n" +
           "Draws: " + draws;
       resultText.setText(results);
    // Reset button functionality
    resetButton.setOnClickListener(v -> {
       // Optionally, start a new game or navigate back to the main activity
       Intent intent = new Intent(ResultsActivity.this, MainActivity.class); // Navigate back to
MainActivity
       startActivity(intent);
       finish(); // Optional: to close the ResultsActivity and clear it from the back stack
    });
  }
}
```

#### AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
   xmlns:tools="http://schemas.android.com/tools">

<application
   android:allowBackup="true"
   android:dataExtractionRules="@xml/data_extraction_rules"
   android:fullBackupContent="@xml/backup_rules"
   android:icon="@mipmap/ic_launcher"
   android:label="@string/app_name"</pre>
```

```
android:roundlcon="@mipmap/ic_launcher_round"
    android:supportsRtl="true"
    android:theme="@style/Theme.TicTacToe"
    tools:targetApi="31">
    <!-- MainActivity requires android:exported="true" because it has an intent filter -->
    <activity
      android:name=".MainActivity"
      android:exported="true"> <!-- Explicitly set android:exported to true -->
      <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
      </intent-filter>
    </activity>
    <!-- You can add other activities like ResultActivity without intent filters -->
    <activity
      android:name=".ResultsActivity"
      android:exported="false" /> <!-- Set exported to false, since it doesn't need to be launched
externally -->
  </application>
</manifest>
Style.xml
<?xml version="1.0" encoding="utf-8"?>
<resources>
  <!-- Base application theme. -->
  <style name="AppTheme" parent="Theme.AppCompat.Light.DarkActionBar">
    <!-- Customize your theme here. -->
    <item name="colorPrimary">#008080</item>
    <item name="android:statusBarColor">#008080</item>
    <item name="colorPrimaryDark">#008080</item>
    <item name="colorAccent">#008080</item>
  </style>
  <style name="ButtonStyle">
    <item name="android:layout_width">100dp</item>
    <item name="android:layout height">100dp</item>
    <item name="android:textSize">30sp</item>
    <item name="android:background">?attr/selectableItemBackground</item>
  </style>
  <style name="TextStyle">
    <item name="android:textSize">24sp</item>
```

```
<item name="android:layout_marginTop">16dp</item>
  <item name="android:textColor">#000000</item>
  </style>
</resources>
```

# Output







