Dice Roll

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Aim:

To make an android application for a two player dice roll game.

Description of App:

A simple dice roll game with the following specifications:
- Have a button, when clicked - roll the dice and stop at a random number. Visualize the rolling of dice using a set of images with faces of the dice.
- Have two players roll the dice alternatively. The one who scores 25 first will be the winner.
- Display the game results information using toasts.

Device Specifications:

Model: Poco F1
Android Version: 9 (API Level 28)
Resolution: 2160 x 1080 pixels

Technical Concepts Learnt:
- To create and manage Threads using Runnable();
- To insert and programmatically modify ImageViews.
- To programmatically change the visibility of views.
- To create and display toasts.
- To create games in an Object Oriented Manner.

Source Code:

(i) DiceGame.java - The game logic class which is used by the Activity to create and manage the game.

```
package com.example.diceroll;
```

```java
import java.util.Random;

public class DiceGame {

    // Dice Stuff
    final int min = 1;
    final int max = 6;
    int currentNumber = 1;

    // Game Stuff
    int winner; // 1 - P1, 2 - P2, 3 - Draw
    int targetScore = 25;
    int currentPlayer = -1;
    int numPlayers = 2;
    int scores[] = {0, 0};

    // Constructor
    DiceGame() {
        reset();
    }

    // Check if game is over
    public void checkIfGameIsOver () {
        for (int i = 0; i < numPlayers; i++) {
            if (scores[i] > targetScore) {
                winner = i + 1;
                return;
            }
        }
    }

    public void nextRandomNumber() {
        int r = 0;
        do {
            r = new Random().nextInt((max - min) + 1) + min;
        } while (r == currentNumber);
        currentNumber = r;
    }
```

```java
    // Function to make a move
    public void roll() {
        if( winner != -1 ) {
            return;
        }

        scores[currentPlayer] += currentNumber;

        currentPlayer = (currentPlayer + 1) % numPlayers;

        checkIfGameIsOver();
    }

    public void reset() {
        for (int i = 0; i < numPlayers; i++) scores[i] = 0;
        winner = -1;
        currentPlayer = 0;
    }
}
```

(ii) MainActivity.java - Used to render the game and related views.

```java
package com.example.diceroll;

import androidx.appcompat.app.AppCompatActivity;

import android.os.Bundle;
import android.os.Handler;
import android.view.View;
import android.widget.Button;
import android.widget.ImageView;
import android.widget.TextView;
import android.widget.Toast;

public class MainActivity extends AppCompatActivity {
```

```java
    final int STOP = 1;
    final int START = 0;

    Handler handler = new Handler();
    int imageGap = 100;
    int p1ImageArray[] = {R.drawable.p1d1, R.drawable.p1d2,
R.drawable.p1d3, R.drawable.p1d4, R.drawable.p1d5, R.drawable.p1d6};
    int p2ImageArray[] = {R.drawable.p2d1, R.drawable.p2d2,
R.drawable.p2d3, R.drawable.p2d4, R.drawable.p2d5, R.drawable.p2d6};
    int state = STOP;

    ImageView imageView;
    Button button, resetButton;
    TextView p1Score, p2Score;

    DiceGame diceGame;

    Runnable runnable = new Runnable() {
        public void run() {
            diceGame.nextRandomNumber();
            if (diceGame.currentPlayer == 0)

imageView.setImageResource(p1ImageArray[diceGame.currentNumber - 1]);
            else if (diceGame.currentPlayer == 1)

imageView.setImageResource(p2ImageArray[diceGame.currentNumber - 1]);
            handler.postDelayed(this, imageGap);
        }
    };

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        imageView = findViewById(R.id.image_dice);
        button = findViewById(R.id.start_stop);
        resetButton = findViewById(R.id.reset);

        p1Score = findViewById(R.id.player1_score);
```

```java
        p2Score = findViewById(R.id.player2_score);

        diceGame = new DiceGame();

        updateScore();

        button.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                if (state == STOP) {
                    button.setText("STOP");
                    handler.post(runnable);
                    state = START;
                } else {
                    handler.removeCallbacks(runnable);
                    diceGame.roll();
                    updateScore();
                    state = STOP;
                    button.setText("ROLL");
                    if (diceGame.winner == -1){
                        Toast.makeText(getApplicationContext(),
"Player " + (diceGame.currentPlayer + 1) + "'s turn!",
Toast.LENGTH_SHORT).show();
                    }
                }
            }
        });

        resetButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                reset();
            }
        });
    }

    private int getPlayerColor(int id) {
        switch (id) {
            case 0:
```

```java
            return 0xff0099cc;
        case 1:
            return 0xff99cc00;
    }

    return 0;
}

private void updateScore() {
    p1Score.setText("" + diceGame.scores[0]);
    p2Score.setText("" + diceGame.scores[1]);


button.setBackgroundColor(getPlayerColor(diceGame.currentPlayer));

    if (diceGame.winner != -1) {
        Toast.makeText(getApplicationContext(), "Winner is player
" + (diceGame.winner) + "!", Toast.LENGTH_SHORT).show();
        button.setVisibility(View.GONE);
    }
}

private void reset() {
    diceGame.reset();
    updateScore();
    button.setVisibility(View.VISIBLE);
}
}
```

Video Demo:
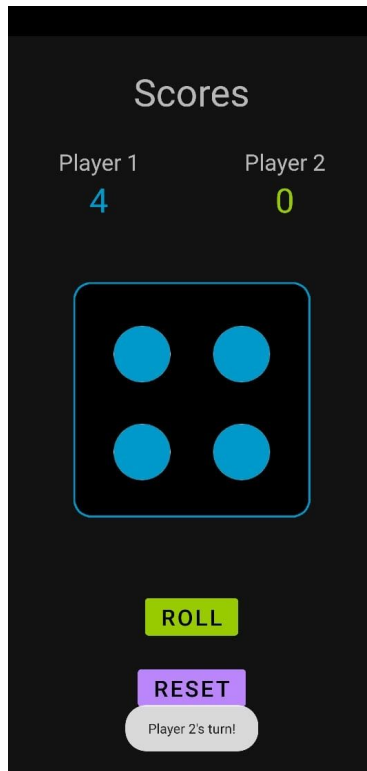https://drive.google.com/file/d/17gXDNGvGIG4Fyf61ocLwWAmDtm2g5gDx/view?usp=sharing

APK:
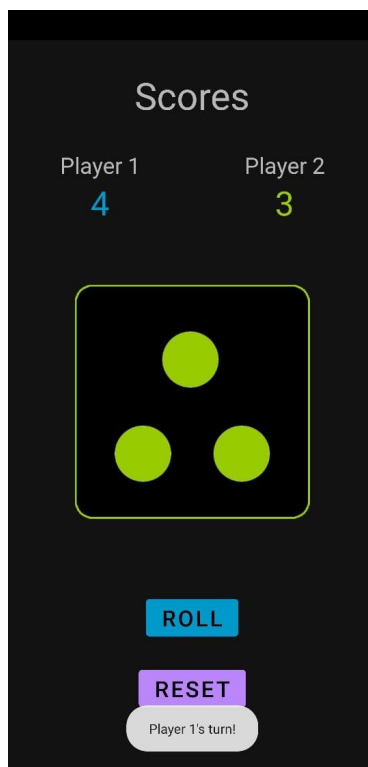https://drive.google.com/file/d/1TsGBKCQNyR9TiYNMNA_M7TzVkv1PZ5SM/view?usp=sharing
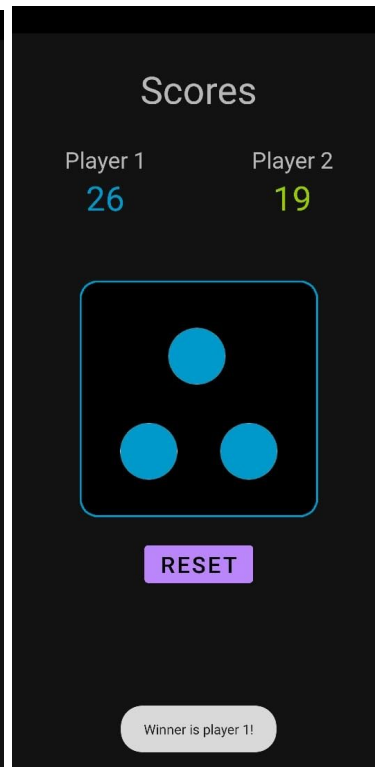
Screenshots:
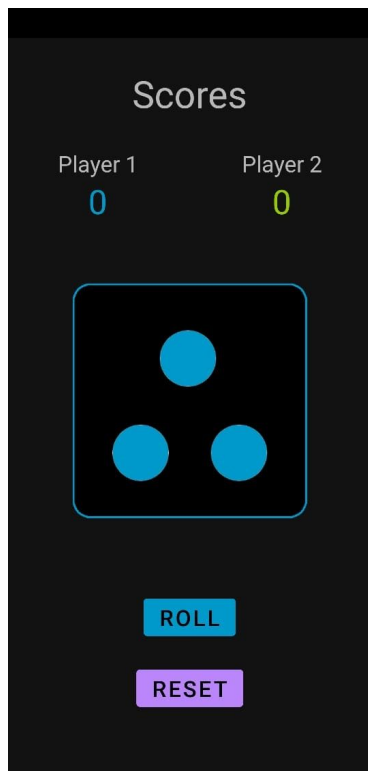
(i) Initial State

(ii) Game in Progress

(iii) Game in Progress

(iv) Game Over

Outcomes:

An android application was developed for a two player Dice Roll game. Various concepts in Android App Development were explored including:

- Creating and managing Threads using Runnable();
- Inserting and programmatically modifying ImageViews.
- Programmatically changing the visibility of views.
- Creating and displaying toasts.
- Creating games in an Object Oriented Manner.