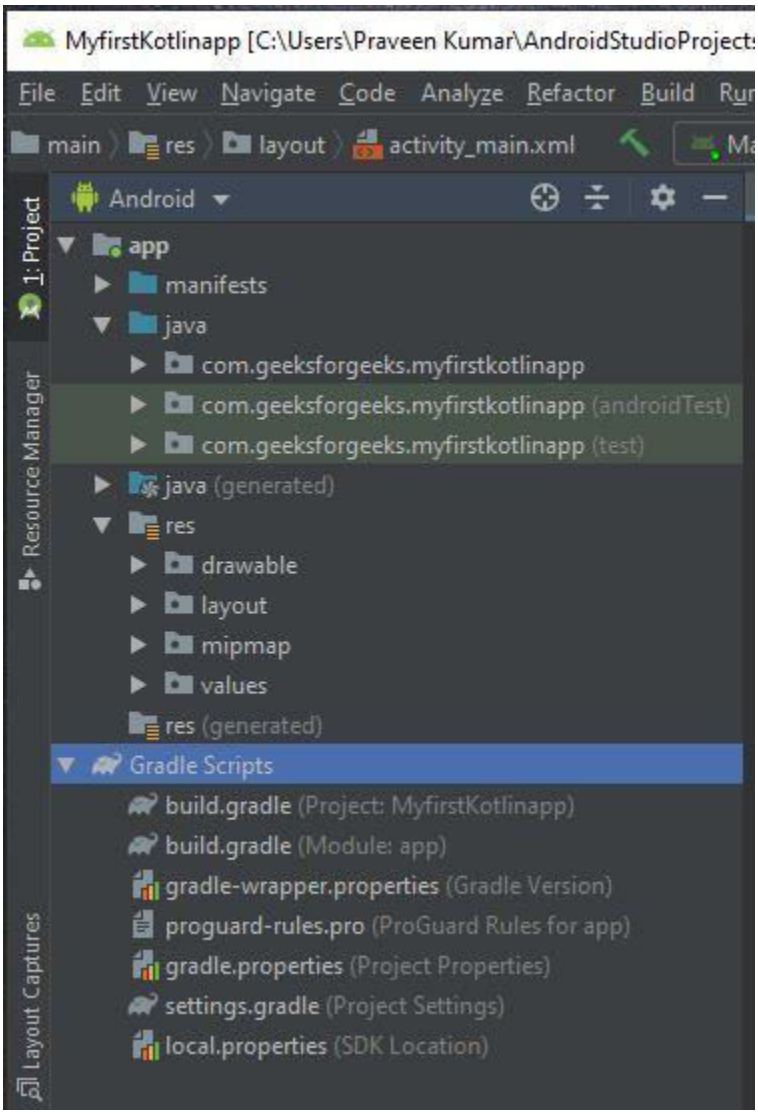
Lab Exercise-9: SMS Banking

Project Structure (Example)



Open app > res > layout > activity_main.xml. This file defines the layout for the user interface (UI). A UI in Android is defined in XML files.

activity_main.xml

Root folder of the application

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical">

    <EditText
        android:id="@+id/phone_number_edittext"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Phone Number"/>

    <EditText
        android:id="@+id/message_edittext"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Message"/>

    <Button
        android:id="@+id/send_encrypted_button"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Send Encrypted"/>
```

```
    <Button
        android:id="@+id/send_plain_text_button"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Send Plain Text"/>

</LinearLayout>
```

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">
    <uses-permission android:name="android.permission.SEND_SMS"/>


    <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"
        android:supportsRtl="true"
```

```
        android:theme="@style/Theme.SMSEncrptAndPt"
        tools:targetApi="31">
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category  android:name="android.intent.category.LAUNCHER"
/>
            </intent-filter>
        </activity>
    </application>

</manifest>
```

Application root folder → java →

MainActivity.java

```
// Importing necessary tools and libraries for the app.
package com.example.smsencrptandpt;

import android.Manifest;
import android.content.pm.PackageManager;
import android.os.Bundle;
import android.telephony.SmsManager;
```

```
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Switch;
import android.widget.Toast;

import androidx.annotation.NonNull;
import androidx.appcompat.app.AppCompatActivity;

import java.nio.charset.StandardCharsets;
import java.security.MessageDigest;
import java.security.NoSuchAlgorithmException;
import java.util.ArrayList;

// Main part of the app begins.
public class MainActivity extends AppCompatActivity {

    // Constants and variables for managing permissions and UI elements.
    private static final int PERMISSION_REQUEST_SEND_SMS = 1;
    private EditText mMessageEditText;
    private EditText mPhoneNumberEditText;
    //private Switch mEncryptionSwitch;
    private Button mSendEncryptedButton;
    private Button mSendPlainTextButton;
    private boolean mIsEncrypted = false;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
```

```
        setContentView(R.layout.activity_main);

        // Initializing UI elements.
        mMessageEditText = findViewById(R.id.message_edittext);
        mPhoneNumberEditText = findViewById(R.id.phone_number_edittext);
        mSendEncryptedButton = findViewById(R.id.send_encrypted_button);
        mSendPlainTextButton = findViewById(R.id.send_plain_text_button);

        // Setting click listeners for send buttons.
        mSendEncryptedButton.setOnClickListener(view -> {
            mIsEncrypted = true;
            sendSMS();
        });

        mSendPlainTextButton.setOnClickListener(view -> {
            mIsEncrypted = false;
            sendSMS();
        });
    }

    // Function to send SMS.
    private void sendSMS() {
        String message = mMessageEditText.getText().toString();
        String phoneNumber = mPhoneNumberEditText.getText().toString();
        if (!message.isEmpty() && !phoneNumber.isEmpty()) {
            if (checkSelfPermission(Manifest.permission.SEND_SMS) ==
PackageManager.PERMISSION_GRANTED) {
                SmsManager smsManager = SmsManager.getDefault();
                String encryptedMessage = mIsEncrypted ? encryptMessage(message) : message;
```

```
            ArrayList<String> messageParts = smsManager.divideMessage(encryptedMessage);
            smsManager.sendMultipartTextMessage(phoneNumber, null, messageParts, null, null);
            Toast.makeText(this, "SMS sent", Toast.LENGTH_SHORT).show();
        } else {
            requestPermissions(new String[]{Manifest.permission.SEND_SMS},
PERMISSION_REQUEST_SEND_SMS);
        }
    }
}

// Function to encrypt the message.
private String encryptMessage(String message) {
    try {
        MessageDigest md = MessageDigest.getInstance("SHA-256");
        byte[] hash = md.digest(message.getBytes(StandardCharsets.UTF_8));
        return bytesToHex(hash);
    } catch (NoSuchAlgorithmException e) {
        e.printStackTrace();
    }
    return null;
}

// Function to convert bytes to hexadecimal representation.
private String bytesToHex(byte[] hash) {
    StringBuilder hexString = new StringBuilder();
    for (byte b : hash) {
        String hex = Integer.toHexString(0xff & b);
        if (hex.length() == 1) hexString.append('0');
        hexString.append(hex);
```

```
        }
        return hexString.toString();
    }

    // Handling permission results after user interaction.
    @Override
    public void onRequestPermissionsResult(int requestCode, @NonNull String[] permissions, @NonNull
int[] grantResults) {
        super.onRequestPermissionsResult(requestCode, permissions, grantResults);
        if (requestCode == PERMISSION_REQUEST_SEND_SMS) {
            if (grantResults.length > 0 && grantResults[0] == PackageManager.PERMISSION_GRANTED) {
                sendSMS();
            }
        }
    }
}
```