Atma Ram Sanatan Dharma College
University of Delhi

Android Programming

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1	Create “Hello World” application that will display “Hello World” in the middle of the screen in the emulator. Also display “Hello World” in the middle of the screen in the android phone.	
2	Create an application to display various android activity lifecycle phases.	
3	Create an application with first activity with an editText and send button. On click of send button, make use of explicit intent to send text to second activity and display there in text view.	
4	Create an application with first activity with an editText and send button. On click of send button, make use of implicit intent that uses a SEND ACTION and let user select app from app chooser and navigate to that application.	
5	Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.	
6	Create a menu with 5 options and selected option should appear in text box in upper case.	
7	Create a radio button group with radio button of all courses in your college and on selecting a particular course, teacher-in-charge of that course should appear at the bottom of the screen.	
8	Create a list of all courses in your college and on selecting a particular course parent department and the teacher-in-charge of that department should appear at the bottom of the screen.	

9	(a) Create an application with three buttons (with different colour names) vertically aligned, on selecting a button colour of the screen will change. (b) Create an application with three buttons horizontally aligned, on selecting a button colour of the screen will change.
10	Create a Login application (check username and password). On successful login, pop up the message. ("Welcome username")
11	Create a login application as above, on successful login redirect to another activity with logout button. On click of logout button a dialog appears with OK and CANCEL button. On OK button click go to login activity and on CANCEL stay at same activity.
12	Create an application to Create, Insert, update and Delete operation on the database.

PRACTICAL 1

Objective

Create “Hello World” application that will display “Hello World” in the middle of the screen in the emulator. Also display “Hello World” in the middle of the screen in the android phone.

Code

app/src/main/res/layout/activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:padding="75dp"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/tvHelloWorld"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_centerInParent="true"
        android:text="Hello World!"
        android:textColor="#FF0000"
        android:textSize="36sp"
        android:textStyle="bold" />

</RelativeLayout>
```

app/src/main/java/pro/ghosh/helloworld/MainActivity.java

```
package pro.ghosh.helloworld;

import android.os.Bundle;
import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
    }
}
```

Output

PRACTICAL 2

Objective

Create an application to display various android activity lifecycle phases.

Code

app/src/main/AndroidManifest.xml

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

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.ActivityLifeCyclePhases">
        <activity android:name=".AnotherActivity"></activity>
        <activity android:name=".MainActivity">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

app/src/main/res/layout/activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <Button
        android:id="@+id/btnGoToAnother"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_centerInParent="true"
        android:text="Go to Another Activity" />

</RelativeLayout>
```

app/src/main/java/pro/ghosh/activitylifecyclephases/MainActivity.java

```
package pro.ghosh.activitylifecyclephases;

import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;

import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {
    private Button btnGoToAnother;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        btnGoToAnother = (Button) findViewById(R.id.btnGoToAnother);
        btnGoToAnother.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new Intent(MainActivity.this, AnotherActivity.
class);
                startActivity(intent);
            }
        });
    }
}
```

app/src/main/res/layout/activity_another.xml

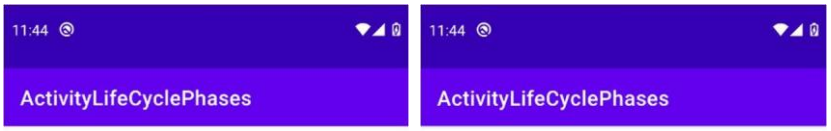
```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".AnotherActivity">

    <Button
        android:id="@+id/btnGoToMain"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_centerInParent="true"
        android:backgroundTint="@color/teal_200"
        android:text="Go Back to Main Activity"
        android:textColor="@color/black" />

</RelativeLayout>
```

app/src/main/java/pro/ghosh/activitylifecyclephases/AnotherActivity.java

```
package pro.ghosh.activitylifecyclephases;

import android.content.Intent;
import android.os.Bundle;
import android.util.Log;
import android.view.View;
import android.widget.Button;

import androidx.appcompat.app.AppCompatActivity;

public class AnotherActivity extends AppCompatActivity {
    private final String LOG_TAG = "AnotherActivity";
    private Button btnGoToMain;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_another);
        Log.d(LOG_TAG, "Activity Created");
        btnGoToMain = (Button) findViewById(R.id.btnGoToMain);
        btnGoToMain.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new Intent(AnotherActivity.this, MainActivity.
class);
                startActivity(intent);
            }
        });
    }
    @Override
    protected void onStart() {
        super.onStart();
        Log.d(LOG_TAG, "Activity Started");
    }
    @Override
    protected void onResume() {
        super.onResume();
        Log.d(LOG_TAG, "Activity Resumed");
    }
    @Override
    protected void onPause() {
        super.onPause();
        Log.d(LOG_TAG, "Activity Paused");
    }
    @Override
    protected void onStop() {
        super.onStop();
```

```
        Log.d(LOG_TAG, "Activity Stopped");
    }
    @Override
    protected void onDestroy() {
        super.onDestroy();
        Log.d(LOG_TAG, "Activity Destroyed");
    }
    @Override
    protected void onRestart() {
        super.onRestart();
        Log.d(LOG_TAG, "Activity Restarted");
    }
}
```

Output



```
2021-03-07 17:15:09.397 17011-17011/pro.ghosh.activitylifecyclephases D/AnotherActivity: Activity Created
2021-03-07 17:15:09.400 17011-17011/pro.ghosh.activitylifecyclephases D/AnotherActivity: Activity Started
2021-03-07 17:15:09.401 17011-17011/pro.ghosh.activitylifecyclephases D/AnotherActivity: Activity Resumed
2021-03-07 17:15:16.542 17011-17011/pro.ghosh.activitylifecyclephases D/AnotherActivity: Activity Paused
2021-03-07 17:15:17.022 17011-17011/pro.ghosh.activitylifecyclephases D/AnotherActivity: Activity Stopped
2021-03-07 17:15:17.023 17011-17011/pro.ghosh.activitylifecyclephases D/AnotherActivity: Activity Destroyed
2021-03-07 17:15:22.025 17011-17011/pro.ghosh.activitylifecyclephases D/AnotherActivity: Activity Created
2021-03-07 17:15:22.028 17011-17011/pro.ghosh.activitylifecyclephases D/AnotherActivity: Activity Started
2021-03-07 17:15:22.030 17011-17011/pro.ghosh.activitylifecyclephases D/AnotherActivity: Activity Resumed
2021-03-07 17:15:24.892 17011-17011/pro.ghosh.activitylifecyclephases D/AnotherActivity: Activity Paused
2021-03-07 17:15:25.451 17011-17011/pro.ghosh.activitylifecyclephases D/AnotherActivity: Activity Stopped
```

PRACTICAL 3

Objective

Create an application with first activity with an editText and send button. On click of send button, make use of explicit intent to send text to second activity and display there in text view.

Code

app/src/main/AndroidManifest.xml

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

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.ExplicitIntentDataPassing">
        <activity android:name=".ReceiveNameActivity"></activity>
        <activity android:name=".MainActivity">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

app/src/main/res/layout/activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.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"
    tools:context=".MainActivity">

    <RelativeLayout
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent">
```

```
        <EditText
            android:id="@+id/etName"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_centerHorizontal="true"
            android:ems="12"
            android:hint="@string/enter_name"
            android:inputType="text"
            android:textAlignment="center" />

        <Button
            android:id="@+id/btnSubmit"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_below="@id/etName"
            android:layout_centerHorizontal="true"
            android:layout_marginTop="10dp"
            android:text="@string/submit" />
    </RelativeLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

app/src/main/java/pro/ghosh/explicitintentdatapassing/MainActivity.java

```
package pro.ghosh.explicitintentdatapassing;

import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;

import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {

    private EditText etName;
    private Button btnSubmit;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        etName = (EditText) findViewById(R.id.etName);
        btnSubmit = (Button) findViewById(R.id.btnSubmit);
        btnSubmit.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
```

```
                String name = etName.getText().toString();
                if (name.length() > 0) {
                    Intent intent = new Intent(MainActivity.this, ReceiveNameA
ctivity.class);
                    intent.putExtra("Name", name);
                    startActivity(intent);
                } else {
                    etName.setError("Please enter your name.");
                }
            }
        });
    }
}
```

app/src/main/res/layout/activity_receive_name.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.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"
    tools:context=".ReceiveNameActivity">

    <RelativeLayout
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent">

        <TextView
            android:id="@+id/tvHello"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_centerHorizontal="true"
            android:text="@string/hello"
            android:textSize="24sp" />

        <Button
            android:id="@+id/btnGoBack"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_below="@id/tvHello"
            android:layout_centerHorizontal="true"
            android:layout_marginTop="10dp"
```

```
            android:text="@string/go_back" />
    </RelativeLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

app/src/main/java/pro/ghosh/explicitintentdatapassing/ReceiveNameActivity.java

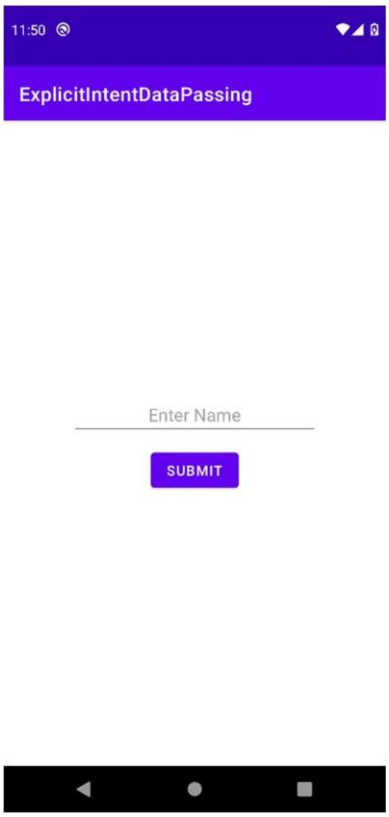
```
package pro.ghosh.explicitintentdatapassing;

import androidx.appcompat.app.AppCompatActivity;

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

public class ReceiveNameActivity extends AppCompatActivity {

    private TextView tvHello;
    private Button btnGoBack;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_receive_name);
        tvHello = (TextView) findViewById(R.id.tvHello);
        tvHello.setText(
                getString(R.string.hello)
                        + " "
                        + getIntent().getStringExtra("Name")
        );
        btnGoBack = (Button) findViewById(R.id.btnGoBack);
        btnGoBack.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                onBackPressed();
            }
        });
    }
}
```

app/src/main/res/values/strings.xml

```
<resources>
    <string name="app_name">ExplicitIntentDataPassing</string>
    <string name="go_back">Go Back</string>
    <string name="hello">Hello</string>
    <string name="submit">Submit</string>
    <string name="enter_name">Enter Name</string>
```

```
</resources>
```

Output



PRACTICAL 4

Objective

Create an application with first activity with an editText and send button. On click of send button, make use of implicit intent that uses a SEND ACTION and let user select app from app chooser and navigate to that application.

Code

app/src/main/AndroidManifest.xml

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

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.ImplicitIntentDataPassing">
        <activity android:name=".ReceiveNameActivity">
            <intent-filter>
                <action android:name="android.intent.action.SEND" />
                <category android:name="android.intent.category.DEFAULT" />
                <data android:mimeType="text/plain" />
            </intent-filter>
        </activity>
        <activity android:name=".MainActivity">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

app/src/main/res/layout/activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.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"
    tools:context=".MainActivity">
```

```
    <RelativeLayout
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent">

        <EditText
            android:id="@+id/etName"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_centerHorizontal="true"
            android:ems="12"
            android:hint="@string/enter_name"
            android:inputType="text"
            android:textAlignment="center" />

        <Button
            android:id="@+id/btnSubmit"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_below="@id/etName"
            android:layout_centerHorizontal="true"
            android:layout_marginTop="10dp"
            android:text="@string/submit" />
    </RelativeLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

app/src/main/java/pro/ghosh/implicitintentdatapassing/MainActivity.java

```
package pro.ghosh.implicitintentdatapassing;

import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;

import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {
    private EditText etName;
    private Button btnSubmit;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
```

```
        etName = (EditText) findViewById(R.id.etName);
        btnSubmit = (Button) findViewById(R.id.btnSubmit);
        btnSubmit.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                String name = etName.getText().toString();
                if (name.length() > 0) {
                    Intent intent = new Intent();
                    intent.setAction(Intent.ACTION_SEND);
                    intent.putExtra(Intent.EXTRA_TEXT, name);
                    intent.setType("text/plain");
                    startActivity(intent);
                } else {
                    etName.setError("Please enter your name.");
                }
            }
        });
    }
}
```

app/src/main/res/layout/activity_receive_name.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.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"
    tools:context=".ReceiveNameActivity">

    <RelativeLayout
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent">

        <TextView
            android:id="@+id/tvHello"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_centerHorizontal="true"
            android:text="@string/hello"
            android:textSize="24sp" />

        <Button
```

```
            android:id="@+id/btnGoBack"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_below="@id/tvHello"
            android:layout_centerHorizontal="true"
            android:layout_marginTop="10dp"
            android:text="@string/go_back" />
    </RelativeLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

app/src/main/java/pro/ghosh/implicitintentdatapassing/ReceiveNameActivity.java

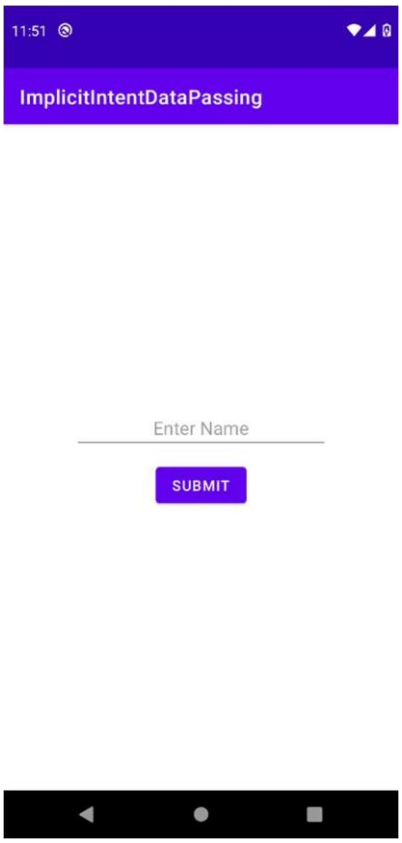
```
package pro.ghosh.implicitintentdatapassing;
import android.content.Intent;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import android.widget.TextView;
import androidx.appcompat.app.AppCompatActivity;
public class ReceiveNameActivity extends AppCompatActivity {
    private TextView tvHello;
    private Button btnGoBack;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_receive_name);
        tvHello = (TextView) findViewById(R.id.tvHello);
        tvHello.setText(
                getString(R.string.hello)
                        + " "
                        + getIntent().getExtras().getString(Intent.EXTRA_TEXT)
        );
        btnGoBack = (Button) findViewById(R.id.btnGoBack);
        btnGoBack.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                onBackPressed();
            }
        });
    }
}
```

app/src/main/res/values/strings.xml

```
<resources>
    <string name="app_name">ImplicitIntentDataPassing</string>
    <string name="go_back">Go Back</string>
    <string name="hello">Hello</string>
    <string name="submit">Submit</string>
    <string name="enter_name">Enter Name</string>
```

```
</resources>
```

Output



PRACTICAL 5

Objective

Create spinner with strings taken from resource folder (res >> value folder) and on changing the spinner value, Image will change.

Code

app/src/main/res/layout/activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.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"
    tools:context=".MainActivity">

    <RelativeLayout
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:layout_margin="100dp"
```

```
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent">

        <Spinner
            android:id="@+id/spIcon"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_centerHorizontal="true"
            android:layout_marginBottom="150dp" />

        <ImageView
            android:id="@+id/ivIcon"
            android:layout_width="150dp"
            android:layout_height="150dp"
            android:layout_below="@id/spIcon"
            android:layout_centerHorizontal="true"
            android:src="@drawable/ic_launcher_background" />
    </RelativeLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

app/src/main/java/pro/ghosh/spinnerfromresarray/MainActivity.java

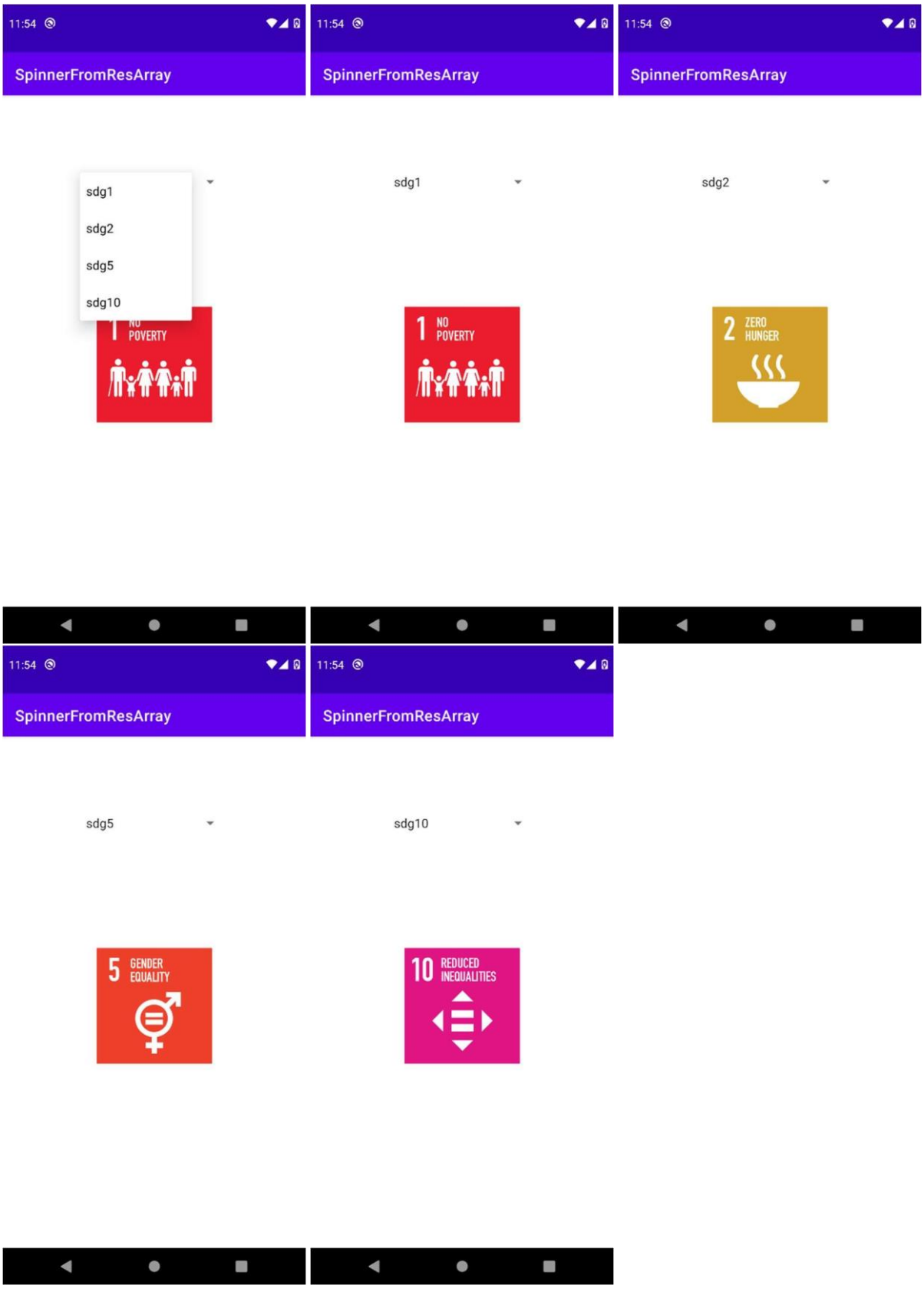
```
package pro.ghosh.spinnerfromresarray;

import android.os.Bundle;
import android.view.View;
import android.widget.AdapterView;
import android.widget.ArrayAdapter;
import android.widget.ImageView;
import android.widget.Spinner;
import android.widget.Toast;

import androidx.appcompat.app.AppCompatActivity;
import androidx.core.content.ContextCompat;

public class MainActivity extends AppCompatActivity implements AdapterView.OnI
temSelectedListener {

    private Spinner spinner;
    private ImageView ivIcon;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
```

```
        ArrayAdapter<CharSequence> adapter = ArrayAdapter.createFromResource(
                this,
                R.array.icons,
                android.R.layout.simple_spinner_item
        );
        adapter.setDropDownViewResource(android.R.layout.simple_spinner_dropdo
wn_item);

        spinner = (Spinner) findViewById(R.id.spIcon);
        spinner.setOnItemSelectedListener(this);
        spinner.setAdapter(adapter);

        ivIcon = (ImageView) findViewById(R.id.ivIcon);
    }


    @Override
    public void onItemSelected(AdapterView<?> parent, View view, int position,
 long id) {
        switch (parent.getItemAtPosition(position).toString()) {
            case "sdg1":
                ivIcon.setImageDrawable(ContextCompat.getDrawable(this, R.draw
able.ic_sdg1));
                break;
            case "sdg2":
                ivIcon.setImageDrawable(ContextCompat.getDrawable(this, R.draw
able.ic_sdg2));
                break;
            case "sdg5":
                ivIcon.setImageDrawable(ContextCompat.getDrawable(this, R.draw
able.ic_sdg5));
                break;
            case "sdg10":
                ivIcon.setImageDrawable(ContextCompat.getDrawable(this, R.draw
able.ic_sdg10));
                break;
            default:
                break;
        }
    }

    @Override
    public void onNothingSelected(AdapterView<?> parent) {
    }
}
```

app/src/main/res/values/strings.xml

```
<resources>
    <string name="app_name">SpinnerFromResArray</string>
    <string-array name="icons">
        <item>sdg1</item>
        <item>sdg2</item>
        <item>sdg5</item>
        <item>sdg10</item>
    </string-array>
</resources>
```

Output


11:54
SpinnerFromResArray
sdg1
sdg2
sdg5
sdg10
1 NO POVERTY
sdg1
1 NO POVERTY
sdg2
2 ZERO HUNGER
11:54
SpinnerFromResArray
sdg5
5 GENDER EQUALITY
11:54
SpinnerFromResArray
sdg10
10 REDUCED INEQUALITIES

PRACTICAL 6

Objective

Create a menu with 5 options and selected option should appear in text box in upper case.

Code

app/src/main/res/layout/activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.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"
    tools:context=".MainActivity">

    <RelativeLayout
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:layout_margin="80dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent">

        <EditText
            android:id="@+id/etMenuItem"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_centerInParent="true"
            android:hint="@string/select_a_menu_item"
            android:textAlignment="center" />
    </RelativeLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

app/src/main/java/pro/ghosh/menutotextbox/MainActivity.java

```
package pro.ghosh.menutotextbox;

import android.os.Bundle;
import android.view.Menu;
import android.view.MenuInflater;
import android.view.MenuItem;
import android.widget.EditText;

import androidx.appcompat.app.AppCompatActivity;

public class MainActivity extends AppCompatActivity {
```

```
    private EditText etMenuItem;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        etMenuItem = (EditText) findViewById(R.id.etMenuItem);
    }

    @Override
    public boolean onCreateOptionsMenu(Menu menu) {
        MenuInflater inflater = getMenuInflater();
        inflater.inflate(R.menu.main_menu, menu);
        return true;
    }

    @Override
    public boolean onOptionsItemSelected(MenuItem item) {
        etMenuItem.setText(item.getTitle().toString().toUpperCase());
        return super.onOptionsItemSelected(item);
    }
}
```

app/src/main/res/menu/main_menu.xml

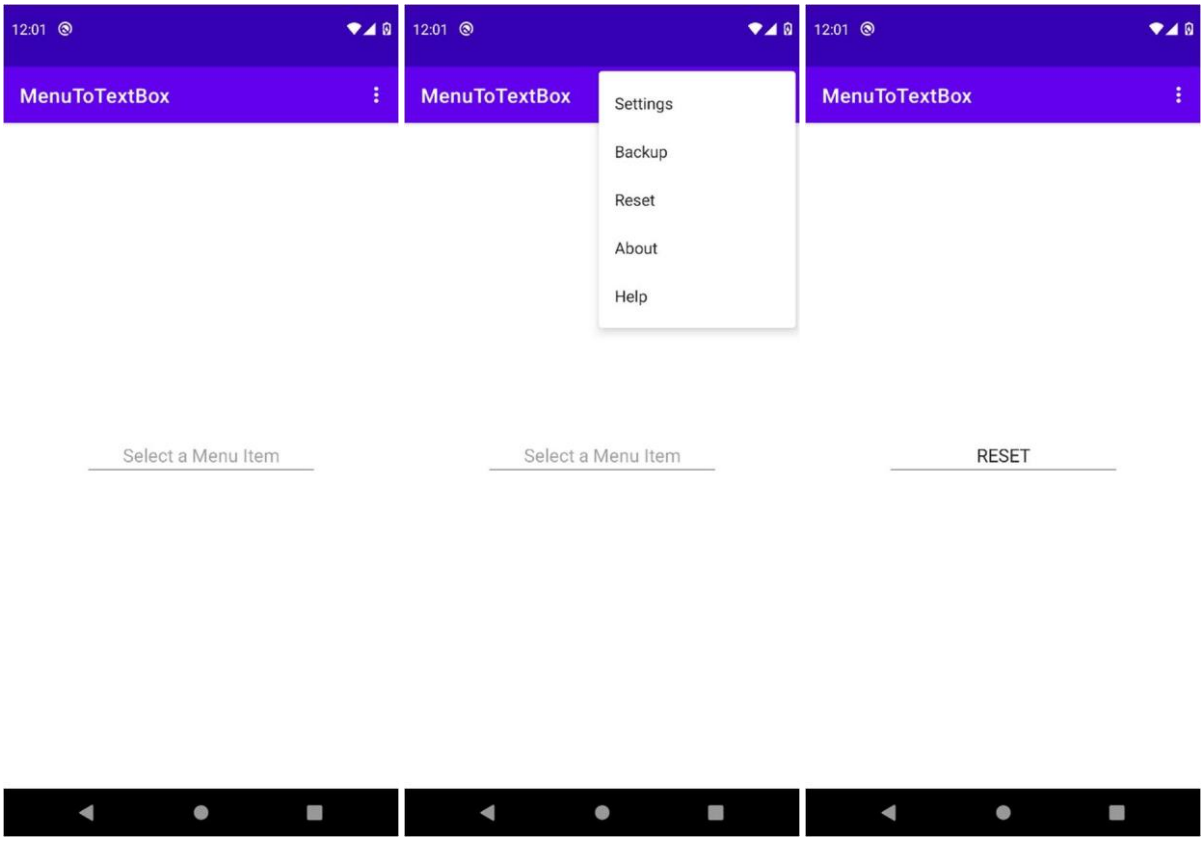
```
<?xml version="1.0" encoding="utf-8"?>
<menu xmlns:android="http://schemas.android.com/apk/res/android">
    <item
        android:id="@+id/miSettings"
        android:title="@string/settings" />
    <item
        android:id="@+id/miBackup"
        android:title="@string/backup" />
    <item
        android:id="@+id/miReset"
        android:title="@string/reset" />
    <item
        android:id="@+id/miAbout"
        android:title="@string/about" />
    <item
        android:id="@+id/miHelp"
        android:title="@string/help" />
</menu>
```

app/src/main/res/values/strings.xml

```
<resources>
    <string name="app_name">MenuToTextBox</string>
```

```
    <string name="settings">Settings</string>
    <string name="backup">Backup</string>
    <string name="reset">Reset</string>
    <string name="about">About</string>
    <string name="help">Help</string>
    <string name="select_a_menu_item">Select a Menu Item</string>
</resources>
```

Output



PRACTICAL 7

Objective

Create a radio button group with radio button of all courses in your college and on selecting a particular course, teacher-in- charge of that course should appear at the bottom of the screen.

Code

app/src/main/res/layout/activity_main.xml

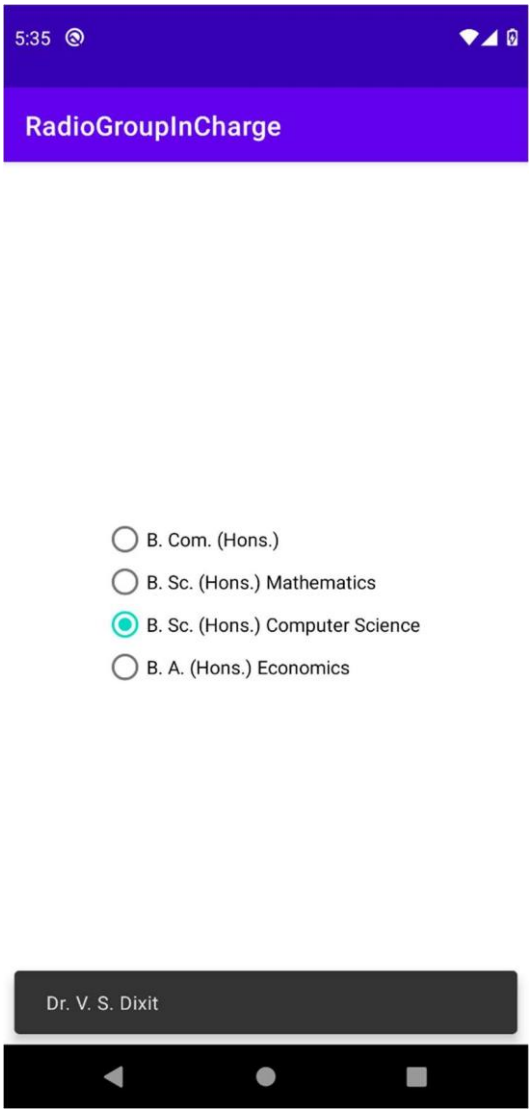
```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <RelativeLayout
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:layout_margin="75dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent">

        <RadioGroup
            android:id="@+id/rgCourses"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_centerInParent="true">
        </RadioGroup>
    </RelativeLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

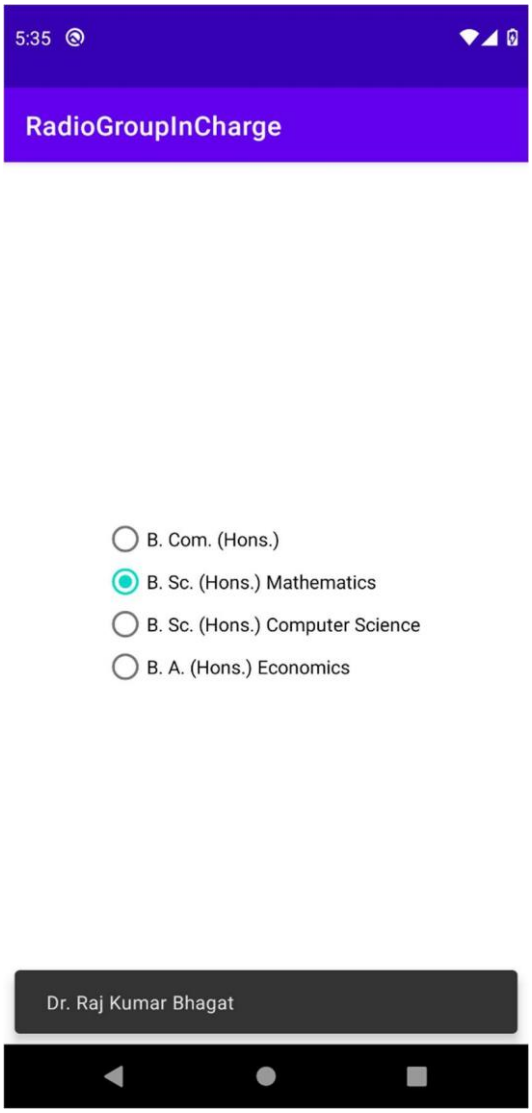
app/src/main/java/pro/ghosh/radiogroupincharge/MainActivity.java

```
package pro.ghosh.radiogroupincharge;

import android.os.Bundle;
import android.widget.RadioButton;
import android.widget.RadioGroup;

import androidx.appcompat.app.AppCompatActivity;

import com.google.android.material.snackbar.Snackbar;

import java.util.HashMap;
```

```
public class MainActivity extends AppCompatActivity {

    private RadioGroup rgCourses;
    private HashMap<String, String> coursesMap;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        initCourses();
    }

    private void initCourses() {
        rgCourses = (RadioGroup) findViewById(R.id.rgCourses);

        if (coursesMap == null) {
            coursesMap = new HashMap<>();
            coursesMap.put("B. Sc. (Hons.) Computer Science", "Dr. V. S. Dixit
");
            coursesMap.put("B. Com. (Hons.)", "Dr. Manika Jain");
            coursesMap.put("B. A. (Hons.) Economics", "Dr. Apra Sinha");
            coursesMap.put("B. Sc. (Hons.) Mathematics", "Dr. Raj Kumar Bhagat
");

            for (String course : coursesMap.keySet()) {
                RadioButton rButton = new RadioButton(MainActivity.this);
                rButton.setText(course);
                rgCourses.addView(rButton);
            }

            rgCourses.setOnCheckedChangeListener(new RadioGroup.OnCheckedChang
eListener() {
                @Override
                public void onCheckedChanged(RadioGroup group, int checkedId)
{
                    int checkedRadioButtonId = rgCourses.getCheckedRadioButton
Id();
                    RadioButton rButton = (RadioButton) findViewById(checkedRa
dioButtonId);
                    Snackbar.make(rgCourses, coursesMap.get(rButton.getText())
, Snackbar.LENGTH_SHORT)
                            .show();
                }
            });
        }
    }
}
```

Output


5:35
RadioGroupInCharge
B. Com. (Hons.)
B. Sc. (Hons.) Mathematics
B. Sc. (Hons.) Computer Science
B. A. (Hons.) Economics
Dr. V. S. Dixit


5:35
RadioGroupInCharge
B. Com. (Hons.)
B. Sc. (Hons.) Mathematics
B. Sc. (Hons.) Computer Science
B. A. (Hons.) Economics
Dr. Raj Kumar Bhagat

PRACTICAL 8

Objective

Create a list of all courses in your college and on selecting a particular course parent department and the teacher-in-charge of that department should appear at the bottom of the screen.

Code

app/src/main/res/layout/activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.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"
    tools:context=".MainActivity">

    <RelativeLayout
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:layout_margin="75dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent">

        <ListView
            android:id="@+id/lvCourses"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_centerInParent="true" />
    </RelativeLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

app/src/main/res/layout/list_item.xml

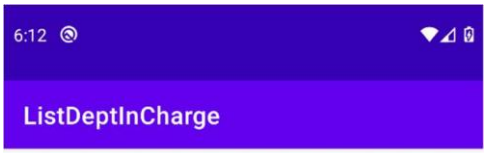
```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent">

    <TextView
        android:id="@+id/tvListItem"
        android:paddingVertical="10dp"
        android:layout_width="fill_parent"
        android:layout_height="fill_parent" />

</LinearLayout>
```

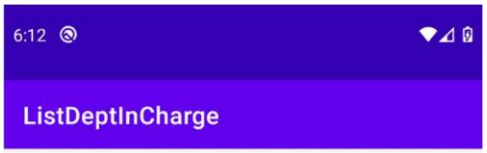
app/src/main/java/pro/ghosh/listdeptincharge/MainActivity.java

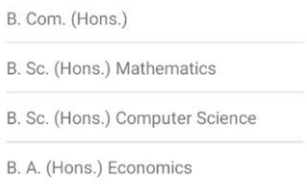
```
package pro.ghosh.listdeptincharge;

import android.os.Bundle;
import android.view.View;
import android.widget.AdapterView;
import android.widget.ArrayAdapter;
import android.widget.ListView;
import android.widget.RadioButton;
import android.widget.RadioGroup;

import androidx.appcompat.app.AppCompatActivity;

import com.google.android.material.snackbar.Snackbar;

import java.util.ArrayList;
import java.util.HashMap;
import java.util.HashSet;

public class MainActivity extends AppCompatActivity {

    private ListView lvCourses;
    private HashMap<String, String> coursesMap;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        initCourses();
    }

    private void initCourses() {
        lvCourses = (ListView) findViewById(R.id.lvCourses);

        if (coursesMap == null) {
            coursesMap = new HashMap<>();
            coursesMap.put("B. Sc. (Hons.) Computer Science", "Deptt. of CS -
Dr. V. S. Dixit");
            coursesMap.put("B. Com. (Hons.)", "Deptt. of Commerce - Dr. Manika
 Jain");
            coursesMap.put("B. A. (Hons.) Economics", "Deptt. of Economics - D
r. Apra Sinha");
            coursesMap.put("B. Sc. (Hons.) Mathematics", "Deptt. of Mathematic
s - Dr. Raj Kumar Bhagat");

            String[] keys = coursesMap.keySet().toArray(new String[0]);
```

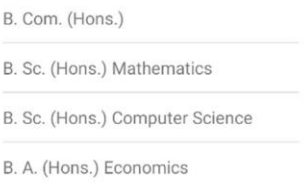
```
            lvCourses.setAdapter(new ArrayAdapter<String>(
                    this, R.layout.list_item, R.id.tvListItem, keys
            ));

            lvCourses.setOnItemClickListener(new AdapterView.OnItemClickListen
er() {
                @Override
                public void onItemClick(AdapterView<?> parent, View view, int
position, long id) {
                    Snackbar.make(lvCourses, coursesMap.get(keys[position]), S
nackbar.LENGTH_SHORT)
                            .show();
                }
            });
        }
    }
}
```

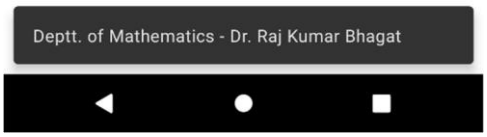
Output

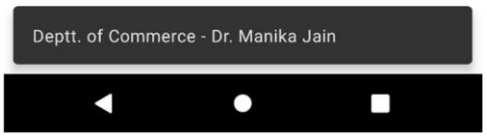












PRACTICAL 9(A)

Objective

Create an application with three buttons (with different colour names) vertically aligned, on selecting a button colour of the screen will change.

Code

app/src/main/res/layout/activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/layoutSuperParent"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">
    <LinearLayout
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:orientation="vertical"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent">
        <Button
            android:id="@+id/btnRed"
            android:layout_width="150dp"
            android:layout_height="wrap_content"
            android:layout_gravity="center"
            android:backgroundTint="@android:color/holo_red_dark"
            android:text="Red" />
        <Button
            android:id="@+id/btnGreen"
            android:layout_width="150dp"
            android:layout_height="wrap_content"
            android:layout_gravity="center"
            android:backgroundTint="@android:color/holo_green_dark"
            android:text="Green" />
        <Button
            android:id="@+id/btnBlue"
            android:layout_width="150dp"
            android:layout_height="wrap_content"
            android:layout_gravity="center"
            android:backgroundTint="@android:color/holo_blue_dark"
            android:text="Blue" />
        <Button
            android:id="@+id/btnReset"
```

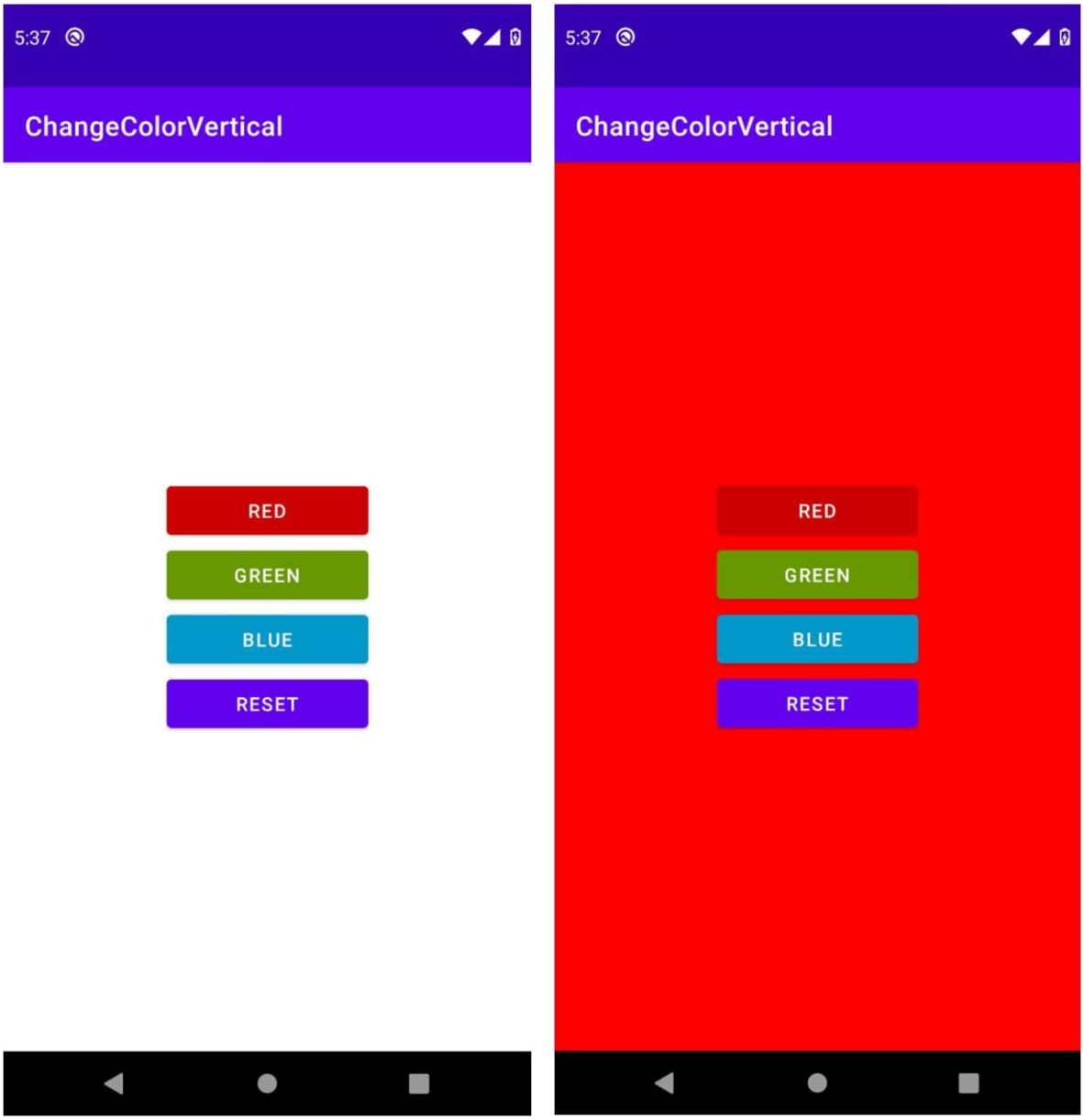
```
            android:layout_width="150dp"
            android:layout_height="wrap_content"
            android:layout_gravity="center"
            android:text="Reset" />
    </LinearLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

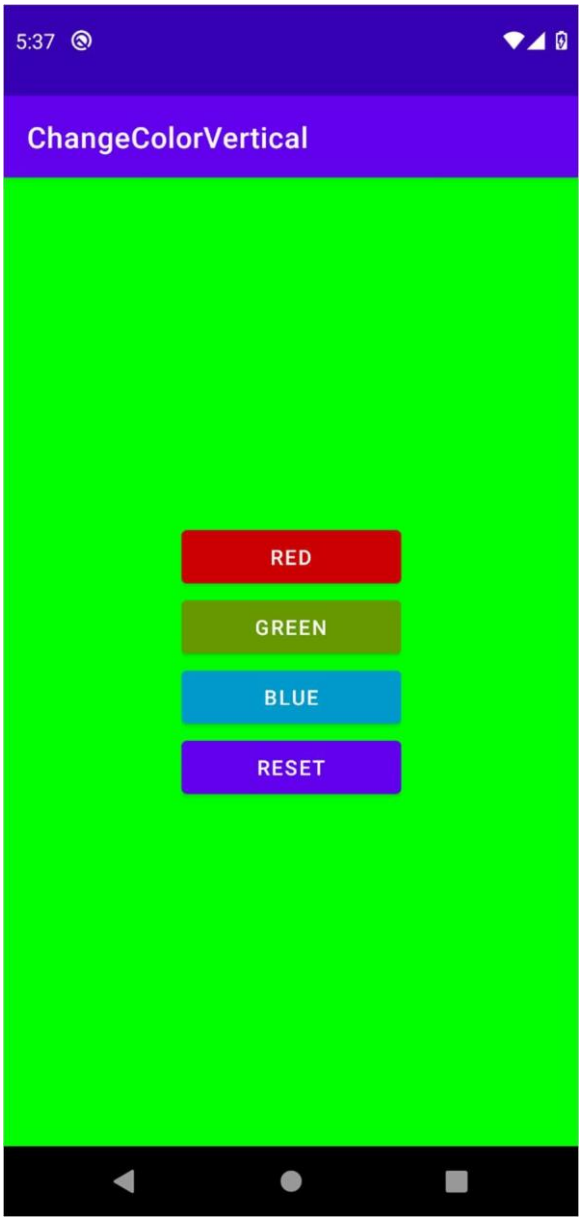
app/src/main/java/pro/ghosh/changecolorvertical/MainActivity.java

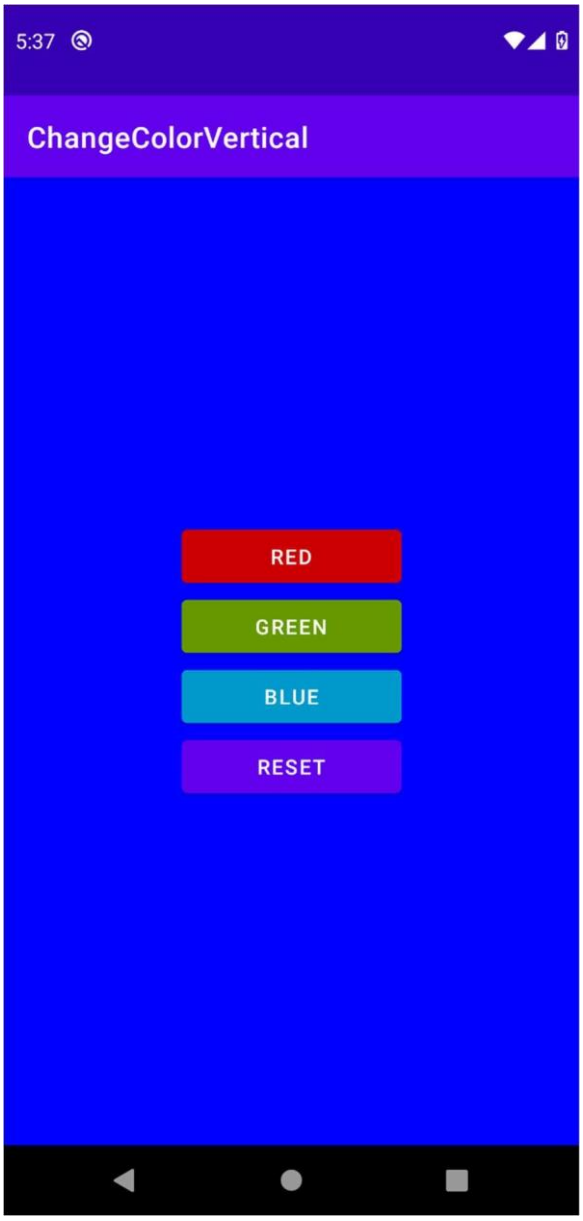
```
package pro.ghosh.changecolorvertical;
import android.graphics.Color;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;
import androidx.appcompat.app.AppCompatActivity;
import androidx.constraintlayout.widget.ConstraintLayout;

public class MainActivity extends AppCompatActivity implements View.OnClickLis
tener {
    private Button btnRed;
    private Button btnGreen;
    private Button btnBlue;
    private Button btnReset;
    private ConstraintLayout layoutSuperParent;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        layoutSuperParent = (ConstraintLayout) findViewById(R.id.layoutSuperPa
rent);
        btnRed = (Button) findViewById(R.id.btnRed);
        btnGreen = (Button) findViewById(R.id.btnGreen);
        btnBlue = (Button) findViewById(R.id.btnBlue);
        btnReset = (Button) findViewById(R.id.btnReset);
        btnRed.setOnClickListener(this);
        btnGreen.setOnClickListener(this);
        btnBlue.setOnClickListener(this);
        btnReset.setOnClickListener(this);
    }
    @Override
    public void onClick(View v) {
        switch (v.getId()) {
            case R.id.btnRed:
                layoutSuperParent.setBackgroundColor(Color.RED);
                break;
            case R.id.btnGreen:
                layoutSuperParent.setBackgroundColor(Color.GREEN);
                break;
```

```
            case R.id.btnBlue:
                layoutSuperParent.setBackgroundColor(Color.BLUE);
                break;
            case R.id.btnReset:
                layoutSuperParent.setBackgroundColor(Color.TRANSPARENT);
                break;
            default:
                break;
        }
    }
}
```

Output




5:37
ChangeColorVertical
RED
GREEN
BLUE
RESET


5:37
ChangeColorVertical
RED
GREEN
BLUE
RESET

PRACTICAL 9(B)

Objective

Create an application with three buttons horizontally aligned, on selecting a button colour of the screen will change.

Code

app/src/main/res/layout/activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/layoutSuperParent"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <LinearLayout
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:orientation="horizontal"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent">

        <Button
            android:id="@+id/btnRed"
            android:layout_width="90dp"
            android:layout_height="wrap_content"
            android:layout_gravity="center"
            android:backgroundTint="@android:color/holo_red_dark"
            android:text="Red" />

        <Button
            android:id="@+id/btnGreen"
            android:layout_width="90dp"
            android:layout_height="wrap_content"
            android:layout_gravity="center"
            android:backgroundTint="@android:color/holo_green_dark"
            android:text="Green" />

        <Button
            android:id="@+id/btnBlue"
            android:layout_width="90dp"
            android:layout_height="wrap_content"
            android:layout_gravity="center"
```

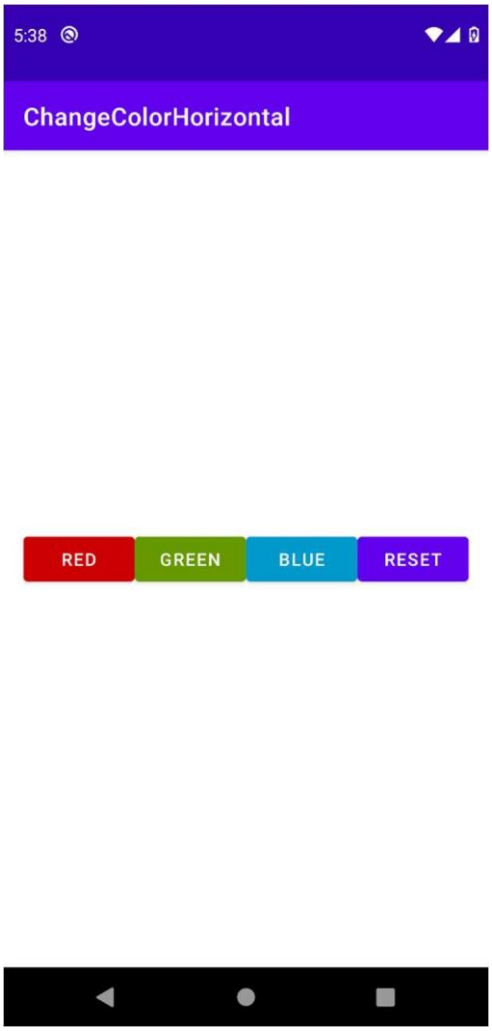
```
            android:backgroundTint="@android:color/holo_blue_dark"
            android:text="Blue" />

        <Button
            android:id="@+id/btnReset"
            android:layout_width="90dp"
            android:layout_height="wrap_content"
            android:layout_gravity="center"
            android:text="Reset" />
    </LinearLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

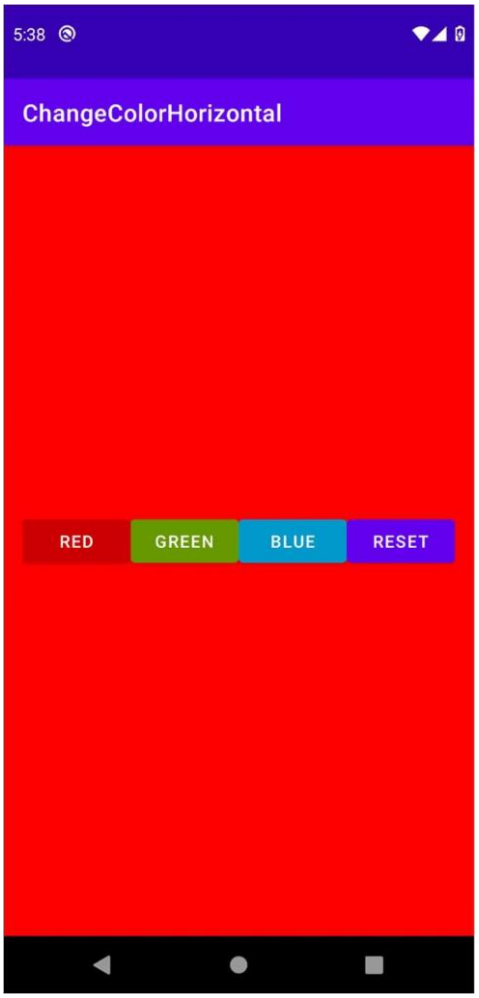
app/src/main/java/pro/ghosh/changecolorhorizontal/MainActivity.java

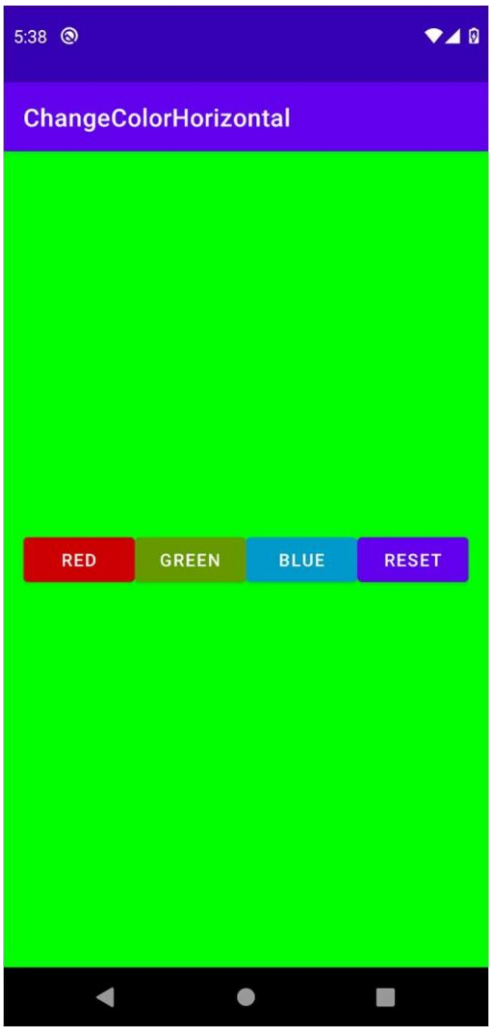
```
package pro.ghosh.changecolorhorizontal;

import androidx.appcompat.app.AppCompatActivity;

import android.os.Bundle;

import android.graphics.Color;
import android.os.Bundle;
import android.view.View;
import android.widget.Button;

import androidx.appcompat.app.AppCompatActivity;
import androidx.constraintlayout.widget.ConstraintLayout;

public class MainActivity extends AppCompatActivity implements View.OnClickLis
tener {

    private Button btnRed;
    private Button btnGreen;
    private Button btnBlue;
    private Button btnReset;
    private ConstraintLayout layoutSuperParent;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        layoutSuperParent = (ConstraintLayout) findViewById(R.id.layoutSuperPa
rent);

        btnRed = (Button) findViewById(R.id.btnRed);
        btnGreen = (Button) findViewById(R.id.btnGreen);
        btnBlue = (Button) findViewById(R.id.btnBlue);
```

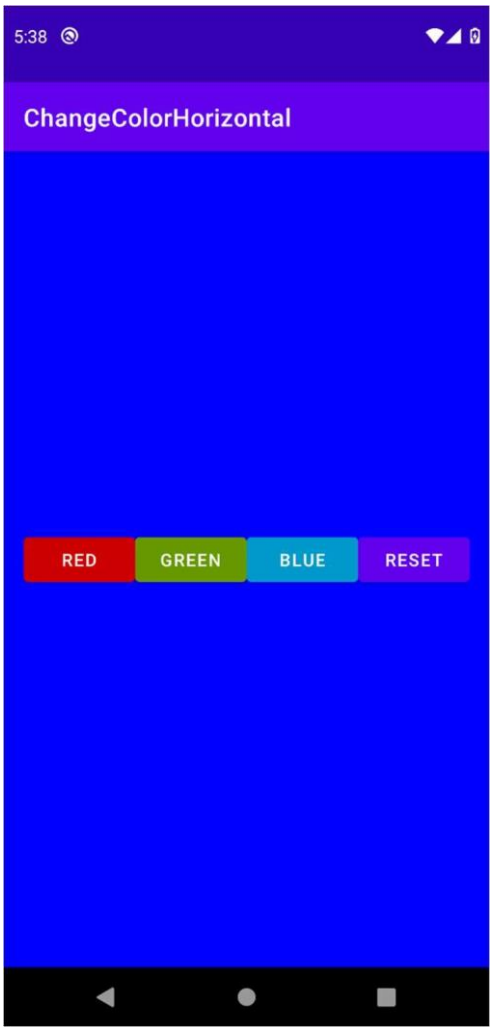
```
        btnReset = (Button) findViewById(R.id.btnReset);

        btnRed.setOnClickListener(this);
        btnGreen.setOnClickListener(this);
        btnBlue.setOnClickListener(this);
        btnReset.setOnClickListener(this);
    }

    @Override
    public void onClick(View v) {
        switch (v.getId()) {
            case R.id.btnRed:
                layoutSuperParent.setBackgroundColor(Color.RED);
                break;
            case R.id.btnGreen:
                layoutSuperParent.setBackgroundColor(Color.GREEN);
                break;
            case R.id.btnBlue:
                layoutSuperParent.setBackgroundColor(Color.BLUE);
                break;
            case R.id.btnReset:
                layoutSuperParent.setBackgroundColor(Color.TRANSPARENT);
                break;
            default:
                break;
        }
    }
}
```

Output


5:38
ChangeColorHorizontal
RED
GREEN
BLUE
RESET


5:38
ChangeColorHorizontal
RED
GREEN
BLUE
RESET


5:38
ChangeColorHorizontal
RED
GREEN
BLUE
RESET


5:38
ChangeColorHorizontal
RED
GREEN
BLUE
RESET

PRACTICAL 10

Objective

Create a Login application (check username and password). On successful login, pop up the message. ("Welcome username").

Code

app/src/main/res/layout/activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.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"
    tools:context=".MainActivity">

    <EditText
        android:id="@+id/etEmail"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="240dp"
        android:autofillHints="false"
        android:ems="10"
        android:hint="@string/e_mail_id"
        android:inputType="textEmailAddress"
        app:layout_constraintBottom_toTopOf="@id/etPassword"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <EditText
        android:id="@+id/etPassword"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="10dp"
        android:autofillHints="false"
        android:ems="10"
        android:hint="@string/password"
        android:inputType="textPassword"
        app:layout_constraintBottom_toTopOf="@id/btnLogin"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@id/etEmail" />

    <Button
        android:id="@+id/btnLogin"
        android:layout_width="wrap_content"
```

```
        android:layout_height="wrap_content"
        android:layout_marginTop="30dp"
        android:text="@string/login"
        app:layout_constraintBottom_toTopOf="@id/btnRegister"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@id/etPassword" />

    <Button
        android:id="@+id/btnRegister"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginBottom="250dp"
        android:text="@string/register"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@id/btnLogin" />

</androidx.constraintlayout.widget.ConstraintLayout>
```

app/src/main/res/values/strings.xml

```
<resources>
    <string name="app_name">LoginValidation</string>
    <string name="welcome">Welcome</string>
    <string name="log_out">Log Out</string>
    <string name="password">Password</string>
    <string name="e_mail_id">E-mail ID</string>
    <string name="login">Login</string>
    <string name="register">Register</string>
    <string name="cancel">Cancel</string>
    <string name="ok">Ok</string>
</resources>
```

app/src/main/java/pro/ghosh/loginvalidation/MainActivity.java

```
package pro.ghosh.loginvalidation;

import android.database.sqlite.SQLiteConstraintException;
import android.os.Bundle;
import  android.util.Log;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;

import androidx.appcompat.app.AppCompatActivity;

import pro.ghosh.loginvalidation.models.User;
```

```
import pro.ghosh.loginvalidation.services.UserService;

public class MainActivity extends AppCompatActivity {
    private EditText etEmail;
    private EditText etPassword;
    private Button btnLogin;
    private Button btnRegister;
    private UserService userService;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        userService = UserService.getInstance();
        UserService.initDatabase(this);

        etEmail = (EditText) findViewById(R.id.etEmail);
        etPassword = (EditText) findViewById(R.id.etPassword);
        btnLogin = (Button) findViewById(R.id.btnLogin);
        btnRegister = (Button) findViewById(R.id.btnRegister);

        btnLogin.setOnClickListener(v -> {
            User user = validateCredentials();
            if (user != null) {
                try {
                    userService.login(user);
                    Toast.makeText(this, "Welcome " + userService.getUser().em
ail, Toast.LENGTH_SHORT).show();
                } catch (IllegalStateException illegalStateException) {
                    Toast.makeText(this, "Invalid E-
mail/Password", Toast.LENGTH_SHORT).show();
                } catch (Exception e) {
                    Log.d("TAG", e.getMessage());
                    Toast.makeText(this, "Error", Toast.LENGTH_SHORT).show();
                }
            }
        });

        btnRegister.setOnClickListener(v -> {
            User user = validateCredentials();
            if (user != null) {
                try {
                    userService.register(user);
                    Toast.makeText(this, "Registered", Toast.LENGTH_SHORT).sho
w();
                } catch (SQLiteConstraintException sqLiteConstraintException)
{
```

```
                    Toast.makeText(this, "E-
mail Already Used", Toast.LENGTH_SHORT).show();
                } catch (Exception e) {
                    Toast.makeText(this, "Error", Toast.LENGTH_SHORT).show();
                }
            }
        });
    }

    private User validateCredentials() {
        String email = etEmail.getText().toString().trim();
        String password = etPassword.getText().toString().trim();

        if (email.length() == 0) {
            etEmail.setError("Enter your e-mail address");
            return null;
        }

        if (password.length() == 0) {
            etPassword.setError("Enter your password");
            return null;
        }

        return new User(email, password);
    }
}
```

app/src/main/java/pro/ghosh/loginvalidation/models/User.java

```
package pro.ghosh.loginvalidation.models;

import androidx.annotation.NonNull;
import androidx.room.ColumnInfo;
import androidx.room.Entity;
import androidx.room.PrimaryKey;

@Entity
public class User {
    @PrimaryKey
    @NonNull
    @ColumnInfo(name = "email")
    public String email;

    @NonNull
    @ColumnInfo(name = "password")
    public String password;

    public User(@NonNull String email, @NonNull String password) {
```

```
        this.email = email;
        this.password = password;
    }
}
```

app/src/main/java/pro/ghosh/loginvalidation/data/UserDao.java

```
package pro.ghosh.loginvalidation.data;

import androidx.room.Dao;
import androidx.room.Delete;
import androidx.room.Insert;
import androidx.room.Query;

import java.util.List;

import pro.ghosh.loginvalidation.models.User;

@Dao
public interface UserDao {
    @Query("SELECT * FROM user")
    List<User> getAll();

    @Query("SELECT * FROM user WHERE email LIKE :email LIMIT 1")
    User findByEmail(String email);

    @Insert
    void insert(User user);

    @Delete
    void delete(User user);
}
```

app/src/main/java/pro/ghosh/loginvalidation/data/UserDatabase.java

```
package pro.ghosh.loginvalidation.data;

import androidx.room.RoomDatabase;
import androidx.room.Database;

import pro.ghosh.loginvalidation.models.User;

@Database(entities = {User.class}, version = 1)
public abstract class UserDatabase extends RoomDatabase {
    public abstract UserDao userDao();
}
```

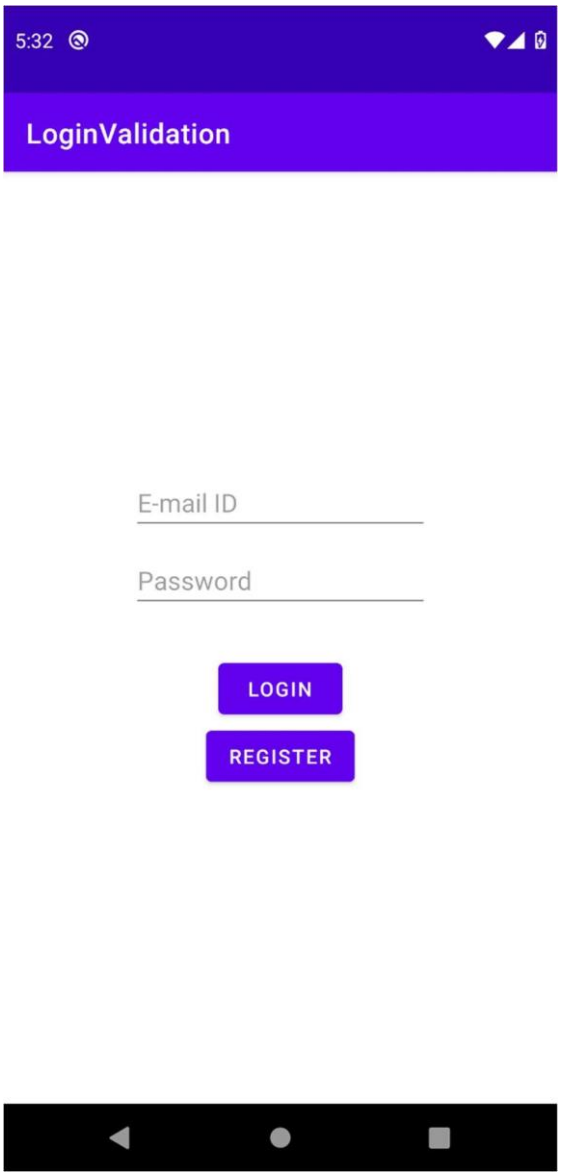
app/src/main/java/pro/ghosh/loginvalidation/services/UserService.java

```
package pro.ghosh.loginvalidation.services;
```

```
import android.content.Context;

import androidx.room.Room;

import pro.ghosh.loginvalidation.data.UserDatabase;
import pro.ghosh.loginvalidation.models.User;

public class UserService {
    private User user = null;
    private static UserService instance = null;
    private static UserDatabase database = null;

    public void login(User user) throws IllegalStateException {
        User u  =  database.userDao().findByEmail(user.email);
        if (!u.password.equals(user.password))
            throw new IllegalStateException("Password Mismatch");
        this.user = user;
    }

    public void register(User user) {
        database.userDao().insert(user);
        this.user = user;
    }

    public void logout() {
        this.user = null;
    }

    public User getUser() {
        return user;
    }

    public static UserService getInstance() {
        if (instance == null) {
            instance = new UserService();
        }
        return instance;
    }

    public static void initDatabase(Context ctx) {
        if (database == null) {
            database = Room
                    .databaseBuilder(ctx, UserDatabase.class, "login_module")
                    .allowMainThreadQueries()
                    .build();
        }
    }
```

```
}
```

Output



PRACTICAL 11

Objective

Create a login application as above, on successful login redirect to another activity with logout button. On click of logout button a dialog appears with OK and CANCEL button. On OK button click go to login activity and on CANCEL stay at same activity.

Code

app/src/main/AndroidManifest.xml

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="pro.ghosh.loginmodule">
    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.LoginModule">
        <activity android:name=".MemberModule"></activity>
        <activity android:name=".MainActivity">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>
</manifest>
```

app/src/main/res/layout/activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.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"
    tools:context=".MainActivity">

    <EditText
        android:id="@+id/etEmail"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="240dp"
        android:autofillHints="false"
        android:ems="10"
        android:hint="@string/e_mail_id"
```

```
        android:inputType="textEmailAddress"
        app:layout_constraintBottom_toTopOf="@id/etPassword"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <EditText
        android:id="@+id/etPassword"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="10dp"
        android:autofillHints="false"
        android:ems="10"
        android:hint="@string/password"
        android:inputType="textPassword"
        app:layout_constraintBottom_toTopOf="@id/btnLogin"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@id/etEmail" />

    <Button
        android:id="@+id/btnLogin"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="30dp"
        android:text="@string/login"
        app:layout_constraintBottom_toTopOf="@id/btnRegister"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@id/etPassword" />

    <Button
        android:id="@+id/btnRegister"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginBottom="250dp"
        android:text="@string/register"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@id/btnLogin" />

</androidx.constraintlayout.widget.ConstraintLayout>
```

app/src/main/res/layout/activity_member_module.xml

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

```
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.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"
    tools:context=".MemberModule">

    <TextView
        android:id="@+id/tvWelcome"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/welcome"
        android:textAppearance="@style/TextAppearance.AppCompat.Display1"
        app:layout_constraintBottom_toTopOf="@id/tvEmail"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <TextView
        android:id="@+id/tvEmail"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text=""
        app:layout_constraintBottom_toTopOf="@id/btnLogout"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@id/tvWelcome" />

    <Button
        android:id="@+id/btnLogout"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="@string/log_out"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/tvEmail" />

</androidx.constraintlayout.widget.ConstraintLayout>
```

app/src/main/res/values/strings.xml

```
<resources>
    <string name="app_name">LoginModule</string>
    <string name="welcome">Welcome</string>
    <string name="log_out">Log Out</string>
    <string name="password">Password</string>
```

```
    <string name="e_mail_id">E-mail ID</string>
    <string name="login">Login</string>
    <string name="register">Register</string>
    <string name="cancel">Cancel</string>
    <string name="ok">Ok</string>
</resources>
```

app/src/main/java/pro/ghosh/loginmodule/MainActivity.java

```
package pro.ghosh.loginmodule;

import android.content.Intent;
import android.database.sqlite.SQLiteConstraintException;
import android.os.Bundle;
import  android.util.Log;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;

import androidx.appcompat.app.AppCompatActivity;

import pro.ghosh.loginmodule.models.User;
import pro.ghosh.loginmodule.services.UserService;

public class MainActivity extends AppCompatActivity {
    private EditText etEmail;
    private EditText etPassword;
    private Button btnLogin;
    private Button btnRegister;
    private UserService userService;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        userService = UserService.getInstance();
        UserService.initDatabase(this);

        etEmail = (EditText) findViewById(R.id.etEmail);
        etPassword = (EditText) findViewById(R.id.etPassword);
        btnLogin = (Button) findViewById(R.id.btnLogin);
        btnRegister = (Button) findViewById(R.id.btnRegister);

        btnLogin.setOnClickListener(v -> {
            User user = validateCredentials();
            if (user != null) {
                try {
```

```
                    userService.login(user);
                    Toast.makeText(this, "Logged In", Toast.LENGTH_SHORT).show
();
                    startActivity(new Intent(this, MemberModule.class));
                } catch (IllegalStateException illegalStateException) {
                    Toast.makeText(this, "Invalid E-
mail/Password", Toast.LENGTH_SHORT).show();
                } catch (Exception e) {
                    Log.d("TAG", e.getMessage());
                    Toast.makeText(this, "Error", Toast.LENGTH_SHORT).show();
                }
            }
        });

        btnRegister.setOnClickListener(v -> {
            User user = validateCredentials();
            if (user != null) {
                try {
                    userService.register(user);
                    Toast.makeText(this, "Registered", Toast.LENGTH_SHORT).sho
w();
                    startActivity(new Intent(this, MemberModule.class));
                } catch (SQLiteConstraintException sqLiteConstraintException)
{
                    Toast.makeText(this, "E-
mail Already Used", Toast.LENGTH_SHORT).show();
                } catch (Exception e) {
                    Toast.makeText(this, "Error", Toast.LENGTH_SHORT).show();
                }
            }
        });
    }

    private User validateCredentials() {
        String email = etEmail.getText().toString().trim();
        String password = etPassword.getText().toString().trim();

        if (email.length() == 0) {
            etEmail.setError("Enter your e-mail address");
            return null;
        }

        if (password.length() == 0) {
            etPassword.setError("Enter your password");
            return null;
        }

        return new User(email, password);
```

```
    }
}
```

app/src/main/java/pro/ghosh/loginmodule/MemberModule.java

```
package pro.ghosh.loginmodule;

import android.app.AlertDialog;
import android.os.Bundle;
import android.widget.TextView;
import android.widget.Toast;

import androidx.appcompat.app.AppCompatActivity;

import pro.ghosh.loginmodule.models.User;
import pro.ghosh.loginmodule.services.UserService;

public class MemberModule extends AppCompatActivity {
    private User user;
    private UserService userService;
    private TextView tvEmail;
    private TextView btnLogout;

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_member_module);

        userService = UserService.getInstance();
        user = userService.getUser();

        tvEmail = (TextView) findViewById(R.id.tvEmail);
        btnLogout = (TextView) findViewById(R.id.btnLogout);

        if (user == null) {
            super.finish();
        } else {
            tvEmail.setText(user.email);
        }

        btnLogout.setOnClickListener(v -> {
            new AlertDialog.Builder(this)
                    .setTitle("Logout")
                    .setMessage("Are you sure you want to log out?")
                    .setPositiveButton(android.R.string.ok, (dialog, which) -
> logoutUser())
                    .setNegativeButton(android.R.string.cancel, null)
                    .setIcon(android.R.drawable.ic_dialog_alert)
```

```
                    .show();
        });
    }

    private void logoutUser() {
        userService.logout();
        Toast.makeText(this, "Logged Out", Toast.LENGTH_SHORT).show();
        super.finish();
    }
}
```

app/src/main/java/pro/ghosh/loginmodule/models/User.java

```
package pro.ghosh.loginmodule.models;

import androidx.annotation.NonNull;
import androidx.room.ColumnInfo;
import androidx.room.Entity;
import androidx.room.PrimaryKey;

@Entity
public class User {
    @PrimaryKey
    @NonNull
    @ColumnInfo(name = "email")
    public String email;

    @NonNull
    @ColumnInfo(name = "password")
    public String password;

    public User(@NonNull String email, @NonNull String password) {
        this.email = email;
        this.password = password;
    }
}
```

app/src/main/java/pro/ghosh/loginmodule/data/UserDao.java

```
package pro.ghosh.loginmodule.data;

import androidx.room.Dao;
import androidx.room.Delete;
import androidx.room.Insert;
import androidx.room.Query;

import java.util.List;

import pro.ghosh.loginmodule.models.User;
```

```
@Dao
public interface UserDao {
    @Query("SELECT * FROM user")
    List<User> getAll();

    @Query("SELECT * FROM user WHERE email LIKE :email LIMIT 1")
    User findByEmail(String email);

    @Insert
    void insert(User user);

    @Delete
    void delete(User user);
}
```

app/src/main/java/pro/ghosh/loginmodule/data/UserDatabase.java

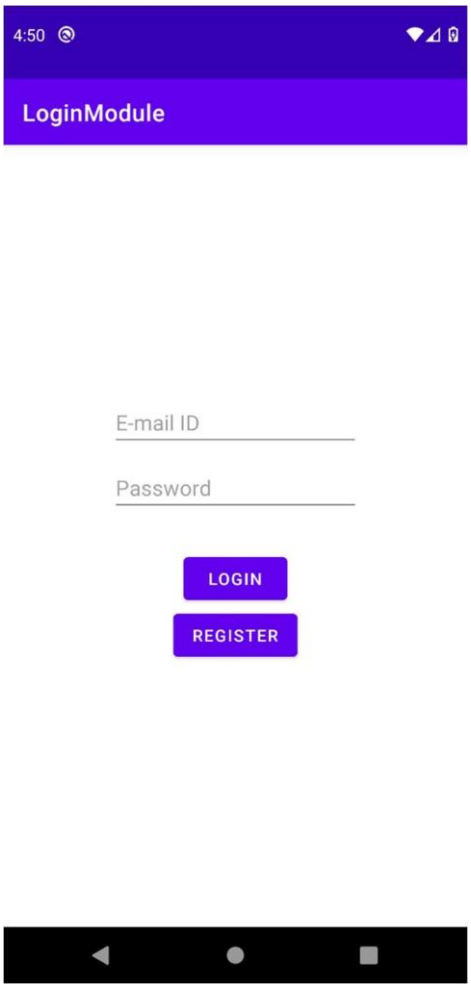
```
package pro.ghosh.loginmodule.data;

import androidx.room.RoomDatabase;
import androidx.room.Database;

import pro.ghosh.loginmodule.models.User;

@Database(entities = {User.class}, version = 1)
public abstract class UserDatabase extends RoomDatabase {
    public abstract UserDao userDao();
}
```

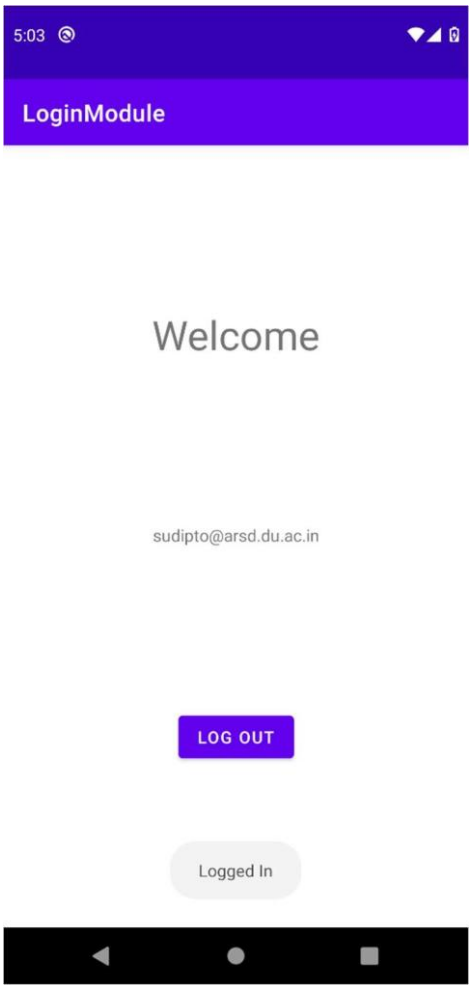
app/src/main/java/pro/ghosh/loginmodule/services/UserService.java

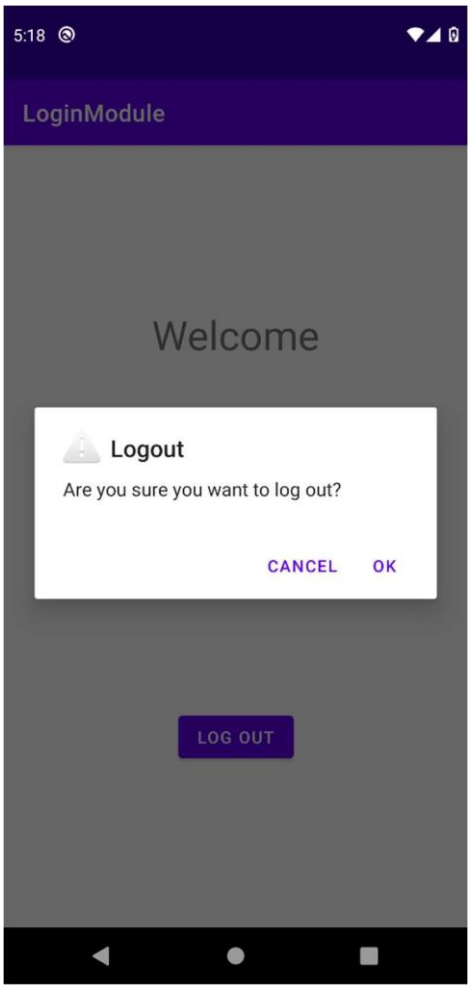
```
package pro.ghosh.loginmodule.services;

import android.content.Context;

import androidx.room.Room;

import pro.ghosh.loginmodule.data.UserDatabase;
import pro.ghosh.loginmodule.models.User;

public class UserService {
    private User user = null;
    private static UserService instance = null;
    private static UserDatabase database = null;

    public void login(User user) throws IllegalStateException {
        User u  =  database.userDao().findByEmail(user.email);
        if (!u.password.equals(user.password))
```

```
            throw new IllegalStateException("Password Mismatch");
        this.user = user;
    }

    public void register(User user) {
        database.userDao().insert(user);
        this.user = user;
    }

    public void logout() {
        this.user = null;
    }

    public User getUser() {
        return user;
    }

    public static UserService getInstance() {
        if (instance == null) {
            instance = new UserService();
        }
        return instance;
    }

    public static void initDatabase(Context ctx) {
        if (database == null) {
            database = Room
                    .databaseBuilder(ctx, UserDatabase.class, "login_module")
                    .allowMainThreadQueries()
                    .build();
        }
    }
}
```

Output




5:03
LoginModule
Welcome
sudipto@arsd.du.ac.in
LOG OUT
Logged In


5:18
LoginModule
Welcome
Logout
Are you sure you want to log out?
CANCEL
OK
LOG OUT

PRACTICAL 12

Objective

Create an application to Create, Insert, update and Delete operation on the database.

Code

app/src/main/res/layout/activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://schem
as.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/clRoot"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <androidx.swiperefreshlayout.widget.SwipeRefreshLayout
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:id="@+id/swipeLayout"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintLeft_toLeftOf="parent"
        app:layout_constraintRight_toRightOf="parent"
        app:layout_constraintTop_toTopOf="parent">

        <androidx.recyclerview.widget.RecyclerView
            android:id="@+id/rvTodos"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content" />
    </androidx.swiperefreshlayout.widget.SwipeRefreshLayout>

    <com.google.android.material.floatingactionbutton.FloatingActionButton
        android:id="@+id/fabAdd"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_gravity="end|bottom"
        android:layout_margin="16dp"
        android:src="@drawable/ic_add"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent" />

</androidx.constraintlayout.widget.ConstraintLayout>
```

app/src/main/res/layout/todo_item.xml

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

```
<com.google.android.material.card.MaterialCardView xmlns:android="http://schem
as.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    android:id="@+id/cvParent"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_marginHorizontal="@dimen/card_margin"
    android:layout_marginTop="@dimen/card_margin"
    app:cardCornerRadius="@dimen/cardview_default_radius"
    app:cardElevation="@dimen/cardview_default_elevation">

    <RelativeLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_margin="@dimen/default_card_content_margin">

        <TextView
            android:id="@+id/tvTodoId"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:visibility="invisible" />

        <TextView
            android:id="@+id/tvTodoContent"
            style="@style/TextAppearance.MaterialComponents.Headline6"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="@string/default_todo_content" />

        <TextView
            android:id="@+id/tvTodoAddedAt"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:layout_below="@id/tvTodoContent"
            android:layout_marginVertical="5dp"
            android:text="@string/default_todo_added_at" />

        <LinearLayout
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_below="@id/tvTodoAddedAt"
            android:orientation="horizontal">

            <Button
                android:id="@+id/btnTodoAction"
                style="@style/Widget.MaterialComponents.Button.OutlinedButton"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
```

```
                android:text="@string/default_todo_action" />

            <Button
                android:id="@+id/btnTodoDelete"
                style="@style/Widget.MaterialComponents.Button.OutlinedButton"
                android:textColor="@android:color/holo_red_dark"
                android:layout_marginStart="10dp"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:text="@string/default_todo_delete" />
        </LinearLayout>
    </RelativeLayout>
</com.google.android.material.card.MaterialCardView>
```

app/src/main/res/layout/dialog_layout.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:orientation="vertical"
    android:paddingHorizontal="20dp"
    android:layout_width="match_parent"
    android:layout_height="match_parent">

    <EditText
        android:id="@+id/etNewContent"
        android:inputType="text"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:hint="Content" />
</LinearLayout>
```

app/src/main/res/values/strings.xml

```
<resources>
    <string name="app_name">DatabaseCRUD</string>
    <string name="default_todo_added_at">YYYY-MM-DD HH:MM:SS</string>
    <string name="default_todo_content">Todo</string>
    <string name="default_todo_action">Mark as Done</string>
    <string name="default_todo_delete">Delete</string>
</resources>
```

app/src/main/res/values/dimens.xml

```
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <dimen name="default_card_image_height">150dp</dimen>
    <dimen name="default_card_content_margin">10dp</dimen>
    <dimen name="card_margin">25dp</dimen>
    <dimen name="logo_dim">200dp</dimen>
</resources>
```

app/src/main/java/pro/ghosh/databasecrud/MainActivity.java

```
package pro.ghosh.databasecrud;

import android.app.AlertDialog;
import android.os.Bundle;
import android.view.LayoutInflater;
import android.view.View;
import android.widget.EditText;
import android.widget.Toast;

import androidx.appcompat.app.AppCompatActivity;
import androidx.recyclerview.widget.LinearLayoutManager;
import androidx.recyclerview.widget.RecyclerView;
import androidx.swiperefreshlayout.widget.SwipeRefreshLayout;

import com.google.android.material.floatingactionbutton.FloatingActionButton;

import pro.ghosh.databasecrud.adapters.RVAdapter;
import pro.ghosh.databasecrud.repos.TodoRepository;

public class MainActivity extends AppCompatActivity implements SwipeRefreshLay
out.OnRefreshListener {
    private TodoRepository todoRepository;
    private RecyclerView rvTodos;
    private RVAdapter todosAdapter;
    private SwipeRefreshLayout swipeLayout;


    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        todoRepository = new TodoRepository(this);

        todosAdapter = new RVAdapter(this, todoRepository);

        swipeLayout = (SwipeRefreshLayout) findViewById(R.id.swipeLayout);
        swipeLayout.setOnRefreshListener(this);

        rvTodos = (RecyclerView) findViewById(R.id.rvTodos);
        rvTodos.setAdapter(todosAdapter);
        rvTodos.setLayoutManager(new LinearLayoutManager(this));

        FloatingActionButton fabAdd = (FloatingActionButton) findViewById(R.id
.fabAdd);
        fabAdd.setOnClickListener(v -> {
```

```
            View layout = getLayoutInflater().inflate(R.layout.dialog_layout,
null);
            EditText etNewContent = (EditText) layout.findViewById(R.id.etNewC
ontent);
            AlertDialog dialog = new AlertDialog.Builder(this)
                    .setView(layout)
                    .setTitle("Add New Todo")
                    .setPositiveButton("Save", (_dialog, which) -> {
                        String content = etNewContent.getText().toString().tri
m();
                        if (content.length() == 0) {
                            Toast.makeText(this, "No Text Entered", Toast.LENG
TH_SHORT).show();
                        } else {
                            todoRepository.create(content);
                            loadTodos();
                        }
                    })
                    .setNegativeButton("Cancel", (_dialog, which) -
> _dialog.dismiss())
                    .create();
            dialog.show();
        });

        loadTodos();
    }

    @Override
    public void onRefresh() {
        loadTodos();
    }

    private void loadTodos() {
        swipeLayout.setRefreshing(true);
        todosAdapter.setTodos(todoRepository.getAll());
        swipeLayout.setRefreshing(false);
    }
}
```

app/src/main/java/pro/ghosh/databasecrud/adapter/RVAdapter.java

```
package pro.ghosh.databasecrud.adapters;

import android.content.Context;
import android.util.Log;
import android.view.LayoutInflater;
import android.view.View;
import android.view.ViewGroup;
```

```
import android.widget.Button;
import android.widget.TextView;
import android.widget.Toast;

import androidx.annotation.NonNull;
import androidx.recyclerview.widget.RecyclerView;

import com.google.android.material.card.MaterialCardView;

import java.util.ArrayList;

import pro.ghosh.databasecrud.R;
import pro.ghosh.databasecrud.models.Todo;
import pro.ghosh.databasecrud.repos.TodoRepository;

public class RVAdapter extends RecyclerView.Adapter<RVAdapter.ViewHolder> {
    private final Context ctx;
    private final TodoRepository repository;
    private ArrayList<Todo> todos = new ArrayList<>();

    public RVAdapter(Context context, TodoRepository repository) {
        this.ctx = context;
        this.repository = repository;
    }

    @NonNull
    @Override
    public ViewHolder onCreateViewHolder(@NonNull ViewGroup parent, int viewTy
pe) {
        View view = LayoutInflater
                .from(parent.getContext())
                .inflate(R.layout.todo_item, parent, false);
        return new ViewHolder(view);
    }

    @Override
    public void onBindViewHolder(@NonNull ViewHolder holder, int position) {
        holder.cvParent.setOnClickListener(v ->
                Log.d("DEBUG", todos.get(position).getId() + " Clicked")
        );
        holder.tvTodoContent.setText(todos.get(position).getContent());
        holder.tvTodoAddedAt.setText(todos.get(position).getAddedAt().toString
());
        if (todos.get(position).isDone()) {
            holder.btnTodoAction.setText("Mark as Not Done");
        } else {
            holder.btnTodoAction.setText("Mark as Done");
        }
```

```
        holder.btnTodoAction.setOnClickListener(v -> {
            repository.update(todos.get(position).getId());
            Toast.makeText(ctx, "Todo State Toggled", Toast.LENGTH_SHORT).show
();
        });
        holder.btnTodoDelete.setOnClickListener(v -> {
            repository.delete(todos.get(position).getId());
            Toast.makeText(ctx, "Todo Deleted", Toast.LENGTH_SHORT).show();
        });
    }

    @Override
    public int getItemCount() {
        return todos.size();
    }

    public void setTodos(ArrayList<Todo> todos) {
        this.todos = todos;
        notifyDataSetChanged();
    }

    public static class ViewHolder extends RecyclerView.ViewHolder {
        private final TextView tvTodoId;
        private final TextView tvTodoContent;
        private final TextView tvTodoAddedAt;
        private final Button btnTodoAction;
        private final Button btnTodoDelete;
        private final MaterialCardView cvParent;

        public ViewHolder(@NonNull View itemView) {
            super(itemView);
            tvTodoId = itemView.findViewById(R.id.tvTodoId);
            tvTodoContent = itemView.findViewById(R.id.tvTodoContent);
            tvTodoAddedAt = itemView.findViewById(R.id.tvTodoAddedAt);
            btnTodoAction = itemView.findViewById(R.id.btnTodoAction);
            btnTodoDelete = itemView.findViewById(R.id.btnTodoDelete);
            cvParent = itemView.findViewById(R.id.cvParent);
        }
    }
}
```

app/src/main/java/pro/ghosh/databasecrud/models/Todo.java

```
package pro.ghosh.databasecrud.models;

import java.time.LocalDateTime;
import java.util.Date;
```

```
public class Todo {
    private String id;
    private String content;
    private LocalDateTime addedAt;
    private boolean isDone;

    public Todo(String id, String content, LocalDateTime addedAt, boolean isDo
ne) {
        this.id = id;
        this.content = content;
        this.addedAt = addedAt;
        this.isDone = isDone;
    }

    public String getId() {
        return id;
    }

    public void setId(String id) {
        this.id = id;
    }

    public String getContent() {
        return content;
    }

    public void setContent(String content) {
        this.content = content;
    }

    public LocalDateTime getAddedAt() {
        return addedAt;
    }

    public void setAddedAt(LocalDateTime addedAt) {
        this.addedAt = addedAt;
    }

    public boolean isDone() {
        return isDone;
    }

    public void setDone(boolean done) {
        isDone = done;
    }

    @Override
    public String toString() {
```

```
        return "Todo{" +
                "id='" + id + '\'' +
                ", content='" + content + '\'' +
                ", addedAt=" + addedAt +
                ", isDone=" + isDone +
                '}';
    }
}
```

app/src/main/java/pro/ghosh/databasecrud/repos/TodoRepository.java

```
package pro.ghosh.databasecrud.repos;

import android.content.ContentValues;
import android.content.Context;
import android.database.Cursor;
import android.database.sqlite.SQLiteDatabase;
import android.util.Log;

import java.time.LocalDateTime;
import java.util.ArrayList;
import java.util.UUID;

import pro.ghosh.databasecrud.models.Todo;
import pro.ghosh.databasecrud.services.DBService;

public class TodoRepository {
    private SQLiteDatabase db;
    private DBService dbService;

    public TodoRepository(Context context) {
        this.dbService = DBService.getInstance(context, "todos", 1);
        this.db = this.dbService.getWritableDatabase();
    }

    public boolean create(String content) {
        try {
            ContentValues contentValues = new ContentValues();
            contentValues.put("Id", UUID.randomUUID().toString());
            contentValues.put("Content", content);
            contentValues.put("AddedAt", LocalDateTime.now().toString());
            contentValues.put("IsDone", false);
            db.insert("todos", null, contentValues);
            return true;
        } catch (Exception e) {
            return false;
        }
    }
```

```
    public ArrayList<Todo> getAll() {
        ArrayList<Todo> todos = new ArrayList<>();
        Cursor res = db.rawQuery("SELECT * FROM TODOS", null);
        res.moveToFirst();
        while (!res.isAfterLast()) {
            todos.add(
                    new Todo(
                            res.getString(res.getColumnIndex("Id")),
                            res.getString(res.getColumnIndex("Content")),
                            LocalDateTime.parse(res.getString(res.getColumnInd
ex("AddedAt"))),
                            res.getInt(res.getColumnIndex("IsDone")) > 0
                    )
            );
            res.moveToNext();
        }
        res.close();
        for (Todo todo: todos) {
            Log.d("TODO", todo.toString());
        }
        return todos;
    }

    public Todo get(String id) {
        Cursor res = db.rawQuery("SELECT * FROM TODOS WHERE Id = " + id, null)
;
        Todo todo = new Todo(
                res.getString(res.getColumnIndex("Id")),
                res.getString(res.getColumnIndex("Content")),
                LocalDateTime.parse(res.getString(res.getColumnIndex("AddedAt"
))),
                res.getInt(res.getColumnIndex("IsDone")) > 0
        );
        res.close();
        return todo;
    }

    public void update(String id) {
        db.execSQL("UPDATE TODOS SET IsDone = NOT IsDone WHERE Id = '" + id +
"'");
    }

    public void delete(String id) {
        db.execSQL("DELETE FROM TODOS WHERE Id = '" + id + "'");
    }
}
```

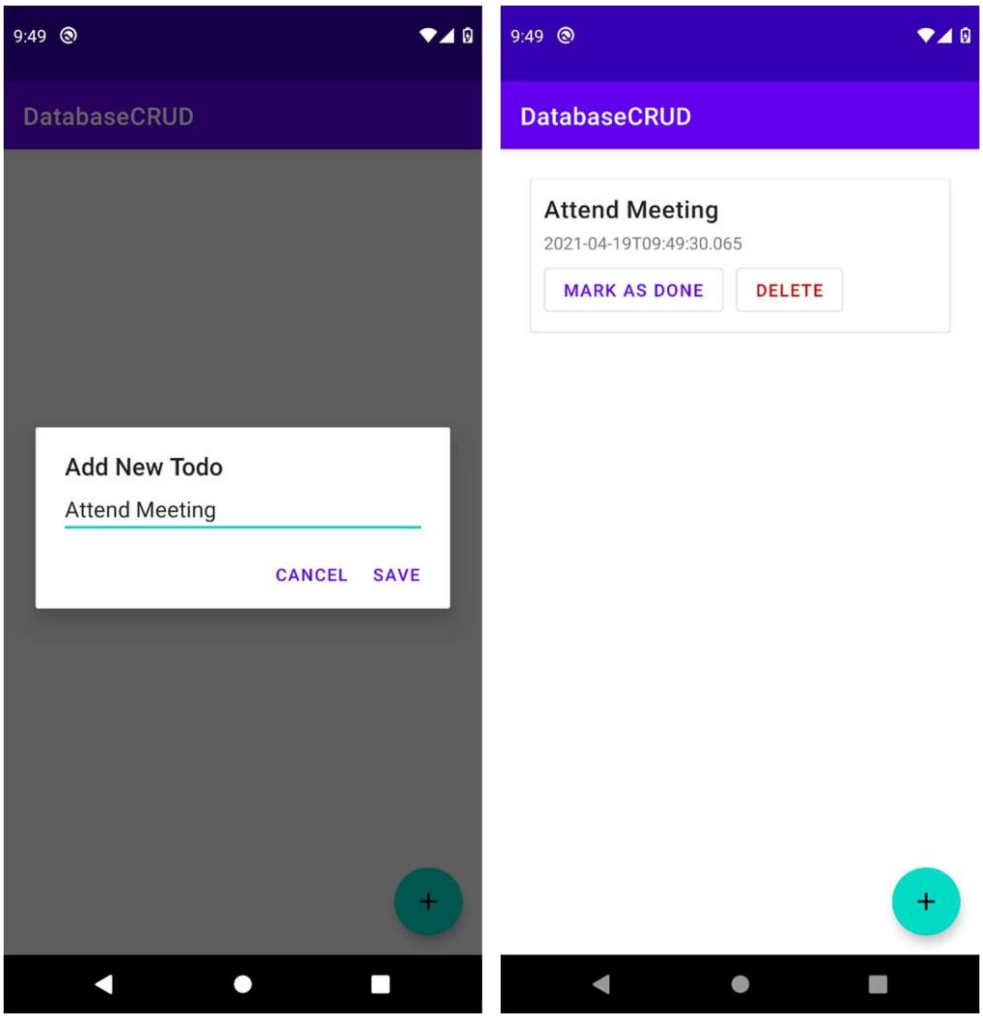
app/src/main/java/pro/ghosh/databasecrud/services/DBService.java

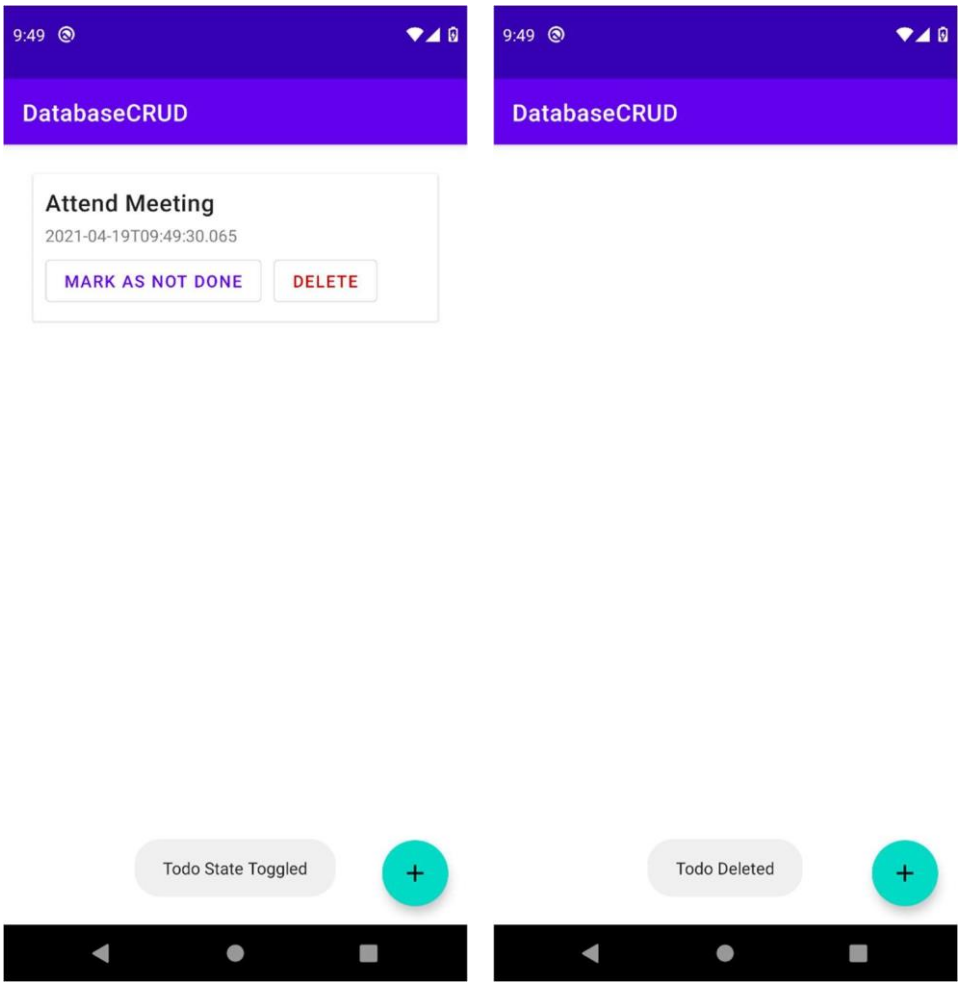
```
package pro.ghosh.databasecrud.services;

import android.content.Context;
import android.database.sqlite.SQLiteDatabase;
import android.database.sqlite.SQLiteOpenHelper;

import androidx.annotation.Nullable;

public class DBService extends SQLiteOpenHelper {
    private static DBService instance = null;

    public DBService(@Nullable Context context, @Nullable String name, @Nullab
le SQLiteDatabase.CursorFactory factory, int version) {
        super(context, name, factory, version);
    }

    @Override
    public void onCreate(SQLiteDatabase db) {
        db.execSQL(
                "CREATE TABLE TODOS ("
                        + "Id INT,"
                        + "Content VARCHAR(255),"
                        + "AddedAt DATETIME,"
                        + "IsDone BOOL"
                + ");"
        );
    }

    @Override
    public void onUpgrade(SQLiteDatabase db, int oldVersion, int newVersion) {
        db.execSQL("DROP TABLE IF EXISTS TODOS;");
        onCreate(db);
    }

    public static DBService getInstance(Context context, String name, int vers
ion) {
        if (instance == null) {
            instance = new DBService(context, name, null, version);
        }
        return instance;
    }
}
```

app/build.gradle

```
plugins {
    id 'com.android.application'
}

android {
    compileSdkVersion 30
    buildToolsVersion "30.0.3"

    defaultConfig {
        applicationId "pro.ghosh.databasecrud"
        minSdkVersion 29
        targetSdkVersion 30
        versionCode 1
        versionName "1.0"

        testInstrumentationRunner "androidx.test.runner.AndroidJUnitRunner"
    }

    buildTypes {
        release {
            minifyEnabled false
            proguardFiles getDefaultProguardFile('proguard-android-
optimize.txt'), 'proguard-rules.pro'
        }
    }
    compileOptions {
        sourceCompatibility JavaVersion.VERSION_1_8
        targetCompatibility JavaVersion.VERSION_1_8
    }
}

dependencies {
    implementation "androidx.swiperefreshlayout:swiperefreshlayout:1.1.0"
    implementation 'androidx.appcompat:appcompat:1.2.0'
    implementation 'com.google.android.material:material:1.3.0'
    implementation 'androidx.constraintlayout:constraintlayout:2.0.4'
    testImplementation 'junit:junit:4.+'
    androidTestImplementation 'androidx.test.ext:junit:1.1.2'
    androidTestImplementation 'androidx.test.espresso:espresso-core:3.3.0'
}
```

Output


9:49
DatabaseCRUD
Add New Todo
Attend Meeting
CANCEL
SAVE
9:49
DatabaseCRUD
Attend Meeting
2021-04-19T09:49:30.065
MARK AS DONE
DELETE


9:49
DatabaseCRUD
Attend Meeting
2021-04-19T09:49:30.065
MARK AS NOT DONE
DELETE
9:49
DatabaseCRUD
Todo State Toggled
Todo Deleted