SRI SIVASUBRAMANIYA NADAR COLLEGE OF ENGINEERING

(AN AUTONOMOUS INSTITUTION,
AFFILIATED TO ANNA UNIVERSITY)

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Dept. : CSE Sem. : XII Sec. : B

SSN

SRI SIVASUBRAMANIYA NADAR COLLEGE OF ENGINEERING, CHENNAI

(AN AUTONOMOUS INSTITUTION, AFFILIATED TO ANNA UNIVERSITY)

BONAFIDE CERTIFICATE

Certified that this is the bonafide record of the practical work done in the

UCS1711 Mobile Application Development Laboratory by

Name Sabarivasan Velayutham

Register Number 205001085

Semester VII

Branch CSE

Sri Sivasubramaniya Nadar College of Engineering, Kalavakkam.

During the Academic year 2023-2024

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Faculty

Head of the Department

Submitted for the.....Practical Examination held at SSNCE on.....

Internal Examiner

External Examiner

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Sem : VII Sec : B

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Exercise 1 - Designing Health Insurance Form using GUI Components

Sabarivasan V
205001085
CSE-B

Aim

Generate a Health Insurance registration form to register the patient details under each group.

Patient Details - Title, Patient Name, Patient Phone Number (Mobile or Landline use Checkbox), Address, Age, DOB, Gender, Marital Status
Employer Details - Patient Employer, Employment Status (full time, parttime, unemployed, retired, student, other Checkbox)
Emergency contact Details - Name, Relationship, Address, Phone Number

Use Submit (Button) to submit the details and display the contents. Use the Reset button to clear the form. Display using Table layout.

Code

activity_main.xml

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

```
android:layout_height="match_parent">

<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:layout_marginLeft="16dp"
    android:layout_marginRight="16dp"
    android:layout_marginBottom="8dp"
    android:orientation="vertical"
    tools:context=".MainActivity">

    <TextView
        android:id="@+id/titleTextView"
        android:layout_width="match_parent"
        android:layout_height="128dp"
        android:gravity="center"
        android:text="Health Insurance
        Registration" android:textSize="32sp"
        android:textStyle="bold"
        android:typeface="serif" >

    <TextView
        android:id="@+id/title"
        android:layout_width="match_parent"
        android:layout_height="32dp"
        android:gravity="left"
        android:text="Patient Details"
        android:textSize="22sp"
        android:textStyle="bold"
        android:typeface="serif" >

    <TextView
        android:id="@+id/name"
        android:layout_width="match_parent"
        android:layout_height="26dp"
        android:layout_marginTop="16dp"
```

```
    android:gravity="left"
    android:text="Name"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<EditText
    android:id="@+id/editName"
    android:layout_width="match_parent"
    android:layout_height="54dp"
    android:hint="Name:"
    android:inputType="text"
    android:textColor="#0000FF"
    android:typeface="sans" >

<TextView
    android:id="@+id/number"
    android:layout_width="match_parent"
    android:layout_height="26dp"
    android:layout_marginTop="16dp"
    android:gravity="left"
    android:text="Number"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<RadioGroup
    android:id="@+id/radio_group_id"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="4dp">

    <RadioButton
        android:id="@+id/phone_radio_button
        _id"
        android:layout_width="wrap_content"
```

```
        android:layout_height="wrap_content"
        android:text="Phone" >

    <RadioButton
        android:id="@+id/landline_radio_button
        _id"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Landline" >
/RadioGroup>

<EditText
    android:id="@+id/editNumber"
    android:layout_width="match_parent"
    android:layout_height="54dp"
    android:hint="Number:"
    android:inputType="phone" >

<TextView
    android:id="@+id/address"
    android:layout_width="match_pare
    nt" android:layout_height="26dp"
    android:layout_marginTop="16
    dp" android:gravity="left"
    android:text="Address"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<EditText
    android:id="@+id/editAddress"
    android:layout_width="match_pare
    nt" android:layout_height="54dp"
    android:hint="Address:"
    android:inputType="text"
    android:textColor="#0000FF"
```

```
    android:typeface="sans" >

<TextView
    android:id="@+id/age"
    android:layout_width="match_pare
    nt" android:layout_height="26dp"
    android:layout_marginTop="16
    dp" android:gravity="left"
    android:text="Age"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<EditText
    android:id="@+id/editAge"
    android:layout_width="match_pare
    nt" android:layout_height="54dp"
    android:hint="Age:"
    android:inputType="number"
    android:textColor="#0000FF"
    android:typeface="sans" >

<TextView
    android:id="@+id/dob"
    android:layout_width="match_pare
    nt" android:layout_height="26dp"
    android:layout_marginTop="16dp"
    android:gravity="left"
    android:text="DOB"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<DatePicker
    android:id="@+id/dobPicker"
```

```
    android:layout_width="match_pare
    nt"
    android:layout_height="wrap_cont
    ent" android:gravity="center" >

<TextView
    android:id="@+id/gender"
    android:layout_width="match_pare
    nt" android:layout_height="26dp"
    android:layout_marginTop="16dp"
    android:gravity="left"
    android:text="Gender"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<RadioGroup
    android:id="@+id/gender_group"
    android:layout_width="wrap_conte
    nt"
    android:layout_height="wrap_cont
    ent"
    android:layout_marginTop="4dp">

    <RadioButton
        android:id="@+id/male"
        android:layout_width="wrap_conte
        nt"
        android:layout_height="wrap_cont
        ent" android:text="Male" >

    <RadioButton
        android:id="@+id/female"
        android:layout_width="wrap_conte
        nt"
```

```
        android:layout_height="wrap_cont
        ent" android:text="Female" >
/RadioGroup>
<TextView
    android:id="@+id/marital_status"
    android:layout_width="match_parent"
    android:layout_height="26dp"
    android:layout_marginTop="16dp"
    android:gravity="left"
    android:text="Marital Status"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<Spinner
    android:id="@+id/marital_status_spinner"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:entries="@array/marital_status_options" >

<TextView
    android:id="@+id/employer"
    android:layout_width="match_parent"
    android:layout_height="32dp"
    android:layout_marginTop="48dp"
    android:gravity="left"
    android:text="Employer Details"
    android:textSize="22sp"
    android:textStyle="bold"
    android:typeface="serif" >

<TextView
    android:id="@+id/employer_name"
    android:layout_width="match_parent"
    android:layout_height="26dp"
    android:layout_marginTop="16dp"
```

```
    android:gravity="left"
    android:text="Employer Name"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<EditText
    android:id="@+id/editEmployerName"
    android:layout_width="match_parent"
    android:layout_height="54dp"
    android:hint="Employer Name:"
    android:inputType="text"
    android:textColor="#0000FF"
    android:typeface="sans" >

<TextView
    android:id="@+id/employment_status"
    android:layout_width="match_parent"
    android:layout_height="26dp"
    android:layout_marginTop="16dp"
    android:gravity="left"
    android:text="Employment Status"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<Spinner
    android:id="@+id/employment_status_spin
    ner"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:entries="@array/employment_status_options" >

<TextView
    android:id="@+id/emergency"
    android:layout_width="match_parent"
```

```
    android:layout_height="32dp"
    android:layout_marginTop="48dp"
    android:gravity="left"
    android:text="Emergency Details"
    android:textSize="22sp"
    android:textStyle="bold"
    android:typeface="serif" >

<TextView
    android:id="@+id/emergency_name"
    android:layout_width="match_parent"
    android:layout_height="26dp"
    android:layout_marginTop="16dp"
    android:gravity="left"
    android:text="Emergency Contact Name"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<EditText
    android:id="@+id/edit_emergency_n
    ame"
    android:layout_width="match_paren
    t"
    android:layout_height="54dp"
    android:hint="Employer Contact
    Name:" android:inputType="text"
    android:textColor="#0000FF"
    android:typeface="sans" >

<TextView
    android:id="@+id/emergency_relations
    hip"
    android:layout_width="match_parent"
    android:layout_height="26dp"
```

```
    android:layout_marginTop="16dp"
    android:gravity="left"
    android:text="Relationship"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<EditText
    android:id="@+id/edit_emergency_relations
    hip" android:layout_width="match_parent"
    android:layout_height="54dp"
    android:hint="Relationship:"
    android:inputType="text"
    android:textColor="#0000FF"
    android:typeface="sans" >

<TextView
    android:id="@+id/emergency_address"
    android:layout_width="match_parent"
    android:layout_height="26dp"
    android:layout_marginTop="16dp"
    android:gravity="left"
    android:text="Address"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<EditText
    android:id="@+id/edit_emergency_addr
    ess"
    android:layout_width="match_parent"
    android:layout_height="54dp"
    android:hint="Address:"
    android:inputType="text"
    android:textColor="#0000FF"
    android:typeface="sans" >
```

```
<TextView
    android:id="@+id/emergency_phone
    "
    android:layout_width="match_pare
    nt" android:layout_height="26dp"
    android:layout_marginTop="16dp"
    android:gravity="left"
    android:text="Phone"
    android:textSize="18sp"
    android:textStyle="bold"
    android:typeface="normal" >

<EditText
    android:id="@+id/edit_emergency_ph
    one"
    android:layout_width="match_parent
    " android:layout_height="54dp"
    android:hint="Phone Number:"
    android:inputType="phone"
    android:textColor="#0000FF"
    android:typeface="sans" >

<Button
    android:id="@+id/submit"
    android:layout_width="match_pare
    nt" android:layout_height="64dp"
    android:layout_marginTop="32dp"
    android:backgroundTint="#4CAF50"
    android:gravity="center"
    android:hint="Register"
    android:onClick="openTableActivity

" > <Button

    android:id="@+id/reset"
```

```
          android:layout_width="match_parent"
          android:layout_height="64dp"
          android:layout_marginTop="16dp"
          android:backgroundTint="#F44336"
          android:gravity="center"
          android:hint="Reset"
          android:onClick="resetFormFields" >
   /LinearLayout>
/ScrollView>
```

MainActivity.java

```
package com.example.a1;

import android.content.Intent;
import
android.support.v7.app.AppCompatActivity;
import android.os.Bundle;
import android.view.View;
import android.widget.DatePicker;
import android.widget.EditText;
import android.widget.RadioButton;
import android.widget.Spinner;

import java.util.Calendar;

public class MainActivity extends AppCompatActivity {

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

```
   public void openTableActivity(View view) {
       Intent intent = new Intent(this, TableActivity.class);

       intent.putExtra("name", ((EditText)
findViewById(R.id.editName)).getText().toStrin
       g()); if (((RadioButton)
findViewById(R.id.phone_radio_button_id)).isChecked())
           intent.putExtra("number_type", "Phone");
       else if (((RadioButton)
findViewById(R.id.phone_radio_button_id)).isChecked())
           intent.putExtra("number_type", "Landline");
       intent.putExtra("number", ((EditText)
findViewById(R.id.editNumber)).getText().toString());
       intent.putExtra("address", ((EditText)
findViewById(R.id.editAddress)).getText().toString());
       intent.putExtra("age", ((EditText)
findViewById(R.id.editAge)).getText().toString());

       DatePicker datePicker = findViewById(R.id.dobPicker);
       int day = datePicker.getDayOfMonth();
       int month = datePicker.getMonth();
       int year = datePicker.getYear();
       Calendar calendar = Calendar.getInstance();
       calendar.set(year, month, day);
       intent.putExtra("dob", calendar.getTime().toString());

       if (((RadioButton) findViewById(R.id.male)).isChecked())
intent.putExtra("gender", "Male");
       else if (((RadioButton)
           findViewById(R.id.female)).isChecked())
           intent.putExtra("gender", "Female");
       intent.putExtra("marital_status", ((Spinner)
findViewById(R.id.marital_status_spinner)).getSelectedItem().toString()
);

       intent.putExtra("employer_name", ((EditText)
```

```
findViewById(R.id.editEmployerName)).getText().toStrin
 g()); intent.putExtra("employment_status", ((Spinner)
findViewById(R.id.employment_status_spinner)).getSelectedItem().toStrin
g());

       intent.putExtra("emergency_name", ((EditText)
findViewById(R.id.edit_emergency_name)).getText().toStri
       ng()); intent.putExtra("emergency_relationship",
       ((EditText)
findViewById(R.id.edit_emergency_relationship)).getText().toStri
     ng()); intent.putExtra("emergency_address", ((EditText)
findViewById(R.id.edit_emergency_address)).getText().toStri
   ng()); intent.putExtra("emergency_phone", ((EditText)
findViewById(R.id.edit_emergency_phone)).getText().toString());

       startActivity(intent);
   }
   public void resetFormFields(View view) {
       ((EditText) findViewById(R.id.editName)).setText("");
       ((RadioButton)
findViewById(R.id.phone_radio_button_id)).setChecked(f
       alse); ((RadioButton)
findViewById(R.id.landline_radio_button_id)).setChecked(f
       alse); ((EditText)
       findViewById(R.id.editNumber)).setText("");
       ((EditText) findViewById(R.id.editAddress)).setText("");
       ((EditText) findViewById(R.id.editAge)).setText("");
       ((DatePicker) findViewById(R.id.dobPicker)).updateDate(1970,
       0, 1); ((RadioButton)
       findViewById(R.id.male)).setChecked(false);
       ((RadioButton) findViewById(R.id.female)).setChecked(false);
       ((Spinner)
       findViewById(R.id.marital_status_spinner)).setSelection(0);

       ((EditText)
```

```
        findViewById(R.id.editEmployerName)).setText("");
        ((Spinner)
findViewById(R.id.employment_status_spinner)).setSelection(0);

        ((EditText)
        findViewById(R.id.edit_emergency_name)).setText("");
        ((EditText)
findViewById(R.id.edit_emergency_relationship)).setText("");
    ((EditText)
    findViewById(R.id.edit_emergency_address)).setText("");
    ((EditText)
    findViewById(R.id.edit_emergency_phone)).setText(""); }
}
```

activity_table.xml

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

   <TableRow>

       <TextView
           android:id="@+id/textView_title1"
           android:layout_width="100dp"
           android:layout_height="wrap_content"
           android:text="Patient details"
           android:textAlignment="center"
           android:textSize="48px"
           android:textStyle="bold" >
   /TableRow>

   <TableRow>
```

```
    <TextView
        android:id="@+id/textView_name"
        android:layout_width="100dp"
        android:layout_height="wrap_cont
        ent" android:text="Name" >

    <TextView
        android:id="@+id/textView_name_va
        lue"
        android:layout_width="match_paren
        t"
        android:layout_height="wrap_content
" > /TableRow>

<TableRow>

    <TextView
        android:id="@+id/textView_number"
        android:layout_width="100dp"
        android:layout_height="wrap_cont
        ent" android:text="Number" >

    <TextView
        android:id="@+id/textView_number_va
        lue"
        android:layout_width="match_parent"
        android:layout_height="wrap_content
" > /TableRow>

<TableRow>

    <TextView
        android:id="@+id/textView_address"
        android:layout_width="100dp"
        android:layout_height="wrap_cont
```

```
        ent" android:text="Address" >

    <TextView
        android:id="@+id/textView_address_va
        lue"
        android:layout_width="match_parent"
        android:layout_height="wrap_content
" > /TableRow>

<TableRow>

    <TextView
        android:id="@+id/textView_age"
        android:layout_width="100dp"
        android:layout_height="wrap_cont
        ent" android:text="Age" >

    <TextView
        android:id="@+id/textView_age_va
        lue"
        android:layout_width="match_pare
        nt"
        android:layout_height="wrap_content
" > /TableRow>

<TableRow>

    <TextView
        android:id="@+id/textView_dob"
        android:layout_width="100dp"
        android:layout_height="wrap_cont
        ent" android:text="DOB" >

    <TextView
        android:id="@+id/textView_dob_va
        lue"
```

```
        android:layout_width="match_pare
        nt"
        android:layout_height="wrap_content
" > /TableRow>

<TableRow>

    <TextView
        android:id="@+id/textView_gender"
        android:layout_width="100dp"
        android:layout_height="wrap_cont
        ent" android:text="Gender" >

    <TextView
        android:id="@+id/textView_gender_value"
        android:layout_width="match_parent"
        android:layout_height="wrap_content" >
/TableRow>

<TableRow>

    <TextView
        android:id="@+id/textView_marital_status"
        android:layout_width="100dp"
        android:layout_height="wrap_content"
        android:text="Marital Status" >

    <TextView
        android:id="@+id/textView_marital_status_v
        alue" android:layout_width="match_parent"
        android:layout_height="wrap_content" >
/TableRow>

<TableRow>

    <TextView
```

```
        android:id="@+id/textView_title2"
        android:layout_width="100dp"
        android:layout_height="wrap_content"
        android:layout_marginTop="32px"
        android:text="Employer details"
        android:textAlignment="center"
        android:textSize="48px"
        android:textStyle="bold" >
/TableRow>

<TableRow>

    <TextView
        android:id="@+id/textView_employer_name"
        android:layout_width="100dp"
        android:layout_height="wrap_content"
        android:text="Employer Name" >

    <TextView
        android:id="@+id/textView_employer_name_value"
        android:layout_width="match_parent"
        android:layout_height="wrap_content" >
/TableRow>

<TableRow>

    <TextView
        android:id="@+id/textView_employment_sta
        tus" android:layout_width="100dp"
        android:layout_height="wrap_content"
        android:text="Employement Status" >

    <TextView
        android:id="@+id/textView_employment_status_v
        alue" android:layout_width="match_parent"
        android:layout_height="wrap_content" >
```

```
/TableRow>

<TableRow>

    <TextView
        android:id="@+id/textView_title3"
        android:layout_width="100dp"
        android:layout_height="wrap_content"
        android:layout_marginTop="32px"
        android:text="Emergency details"
        android:textAlignment="center"
        android:textSize="48px"
        android:textStyle="bold" >
/TableRow>

<TableRow>

    <TextView
        android:id="@+id/textView_emergency_name"
        android:layout_width="100dp"
        android:layout_height="wrap_content"
        android:text="Emergency name" >

    <TextView
        android:id="@+id/textView_emergency_name_v
        alue" android:layout_width="match_parent"
        android:layout_height="wrap_content" >
/TableRow>

<TableRow>

    <TextView
        android:id="@+id/textView_emergency_relation
        ship" android:layout_width="100dp"
        android:layout_height="wrap_content"
        android:text="Emergency relationship" >
```

```
        <TextView
            android:id="@+id/textView_emergency_relationship_v
            alue" android:layout_width="match_parent"
            android:layout_height="wrap_content" >
    /TableRow>

    <TableRow>

        <TextView
            android:id="@+id/textView_emergency_address"
            android:layout_width="100dp"
            android:layout_height="wrap_content"
            android:text="Emergency address" >

        <TextView
            android:id="@+id/textView_emergency_address_v
            alue" android:layout_width="match_parent"
            android:layout_height="wrap_content" >
    /TableRow>

    <TableRow>

        <TextView
            android:id="@+id/textView_emergency_phone"
            android:layout_width="100dp"
            android:layout_height="wrap_content"
            android:text="Emergency phone" >

        <TextView
            android:id="@+id/textView_emergency_phone_v
            alue" android:layout_width="match_parent"
            android:layout_height="wrap_content" >
    /TableRow>

/TableLayout>
```

TableActivity.java

```
package com.example.a1;

import android.content.Intent;
import android.support.v7.app.AppCompatActivity;
import android.os.Bundle;
import android.widget.TextView;

public class TableActivity extends AppCompatActivity {
   @Override
   protected void onCreate(Bundle savedInstanceState) {
       super.onCreate(savedInstanceState);
       setContentView(R.layout.activity_table);

       Intent intent = getIntent();
       Bundle extras = intent.getExtras();
       if (extras = null) return;

       ((TextView)
findViewById(R.id.textView_name_value)).setText(extras.getString("n
       ame")); ((TextView)
findViewById(R.id.textView_number_value)).setText(extras.getString("num
       ber")); ((TextView)
findViewById(R.id.textView_address_value)).setText(extras.getString("ad
dress") );
       ((TextView)
findViewById(R.id.textView_age_value)).setText(extras.getString("
       age")); ((TextView)
findViewById(R.id.textView_dob_value)).setText(extras.getString("
       dob")); ((TextView)
findViewById(R.id.textView_gender_value)).setText(extras.getString("gen
       der")); ((TextView)
findViewById(R.id.textView_marital_status_value)).setText(extras.getStr
ing("ma rital_status"));
       ((TextView)
```

```
findViewById(R.id.textView_employer_name_value)).setText(extras.getStri
ng("emp loyer_name"));
       ((TextView)
findViewById(R.id.textView_employment_status_value)).setText(extras.get
String( "employment_status"));

       ((TextView)
findViewById(R.id.textView_emergency_name_value)).setText(extras.getStr
ing("em ergency_name"));
       ((TextView)
findViewById(R.id.textView_emergency_relationship_value)).setText(extra
s.getSt ring("emergency_relationship"));
       ((TextView)
findViewById(R.id.textView_emergency_address_value)).setText(extras.get
String( "emergency_address"));
       ((TextView)
findViewById(R.id.textView_emergency_phone_value)).setText(extras.getSt
ring("e mergency_phone"));

   }
}
```

strings.xml

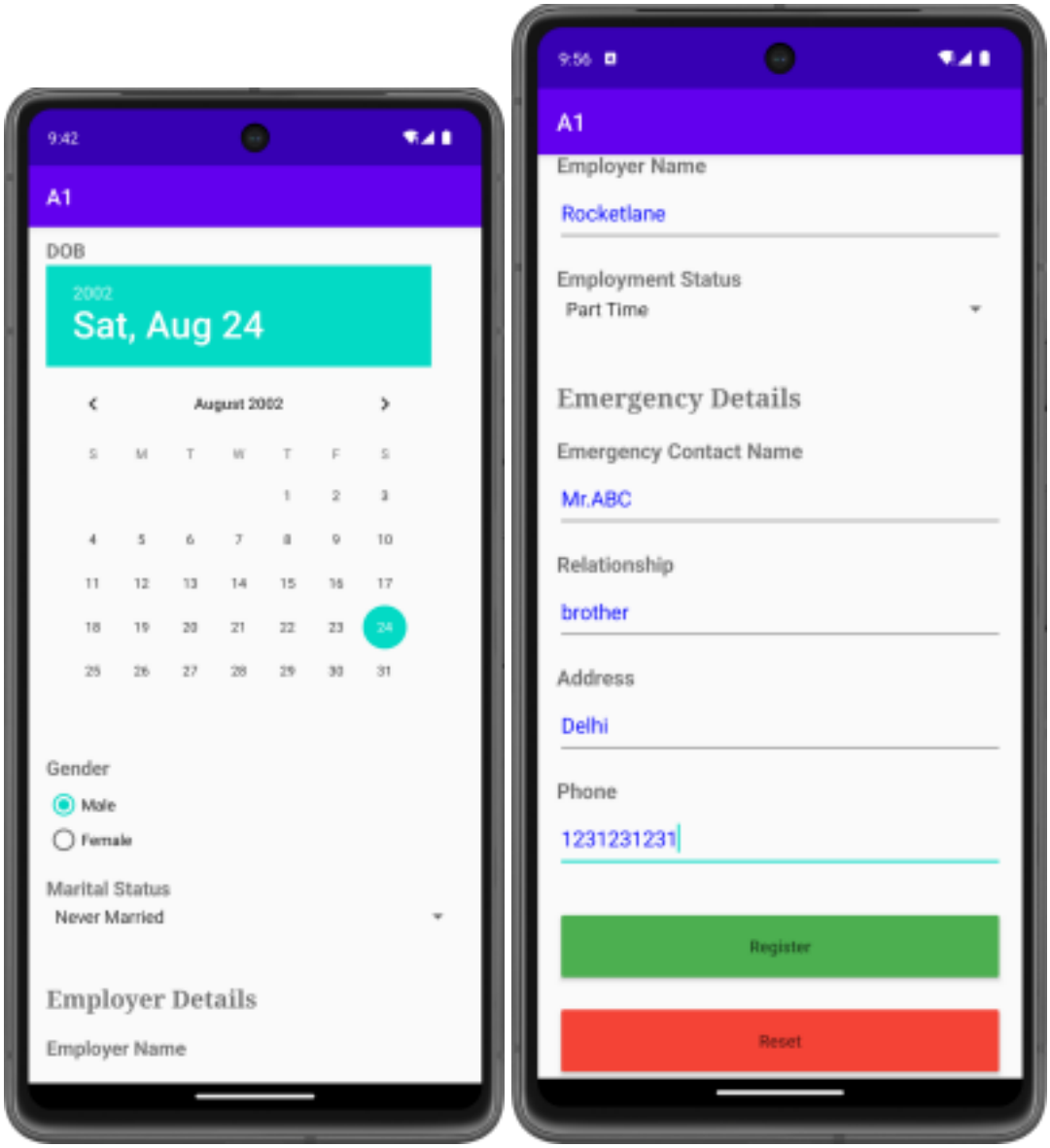
```
<resources>
   <string name="app_name">A1 /string>
   <string-array name="marital_status_options">
       <item>Never Married /item>
       <item>Married /item>
       <item>Widowed /item>
       <item>Divorced /item>
       <item>Separated /item>
   /string-array>

   <string-array name="employment_status_options">
       <item>Full Time /item>
```

```
        <item>Part Time /item>
        <item>Unemployed /item>
        <item>Retired /item>
        <item>Student /item>
        <item>Other /item>
    /string-array>
    <string name="title_activity_table">All Details

/string> /resources>
```

Output



Learning outcomes

Basic GUI components and layouts that are available

Passing data between activities

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CSE - B

Ex. No. 2 Simulation of a Keyboard

Aim: Create an Android mobile application which simulates a virtual keyboard that uses intents to navigate between multiple activities.

Layout and Activities Used: Grid Layout

MainActivity - Activity with alphabets
Numbers- Activity with numbers and special characters

activity_main.xml:

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

    <androidx.gridlayout.widget.GridLayout
        android:layout_width="407dp"
        android:layout_height="343dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        tools:ignore="MissingConstraints"
        android:visibility="visible"
        android:id="@+id/grid1">

        <Button
            android:id="@+id/q"
            android:layout_width="41dp"
```

```
            android:layout_height="wrap_content"
            android:text="q"
            app:layout_column="0"
            app:layout_row="0" />

        <Button
            android:id="@+id/w"
            android:layout_width="43dp"
            android:layout_height="wrap_content"
            android:text="w"
            app:layout_column="1"
            app:layout_row="0" />

        <Button
            android:id="@+id/e"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="e"n="2"
            app:layout_row="0" />

        <Button
            android:id="@+id/r"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="r"
            app:layout_column="3"
            app:layout_row="0" />

        <Button
            android:id="@+id/t"
            android:layout_width="36dp"
            android:layout_height="wrap_content"
            android:text="t"
            app:layout_column="4"
            app:layout_row="0" />

        <Button
            android:id="@+id/y"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="y"
            app:layout_column="5"

            app:layout_row="0" />
            android:id="@+id/u"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
```

```
            android:text="u"
            app:layout_column="6"
            app:layout_row="0" />

        <Button
            android:id="@+id/i"
            android:layout_width="42dp"
            android:layout_height="wrap_content"
            android:text="i"
            app:layout_column="7"
            app:layout_row="0" />

        <Button
            android:id="@+id/o"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="o"
            app:layout_column="8"
            app:layout_row="0" />

        <Button
            android:id="@+id/p"
            android:layout_width="39dp"
            android:layout_height="wrap_content"
            android:text="p"
            app:layout_column="10"
            app:layout_row="0" />

        <Button
            android:id="@+id/a"
            android:layout_width="42dp"
            android:layout_height="wrap_content"
            android:text="a"
            app:layout_column="0"
            app:layout_row="1" />

        <Button
            android:id="@+id/s"
            android:layout_width="44dp"
            android:layout_height="wrap_content"
            android:text="s"
            app:layout_column="1"
            app:layout_row="1" />

        <Button
            android:id="@+id/d"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="d"
```

```
            app:layout_column="2"
            app:layout_row="1" />

        <Button
            android:id="@+id/f"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="f"
            app:layout_column="3"
            app:layout_row="1" />

        <Button
            android:id="@+id/g"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="g"
            app:layout_column="4"
            app:layout_row="1" />

        <Button
            android:id="@+id/h"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="h"
            app:layout_column="5"
            app:layout_row="1" />

        <Button
            android:id="@+id/j"
            android:layout_width="36dp"
            android:layout_height="wrap_content"
            android:text="j"
            app:layout_column="6"
            app:layout_row="1" />

        <Button
            android:id="@+id/k"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="k"
            app:layout_column="7"
            app:layout_row="1" />

        <Button
            android:id="@+id/l"
            android:layout_width="37dp"
            android:layout_height="wrap_content"

            app:layout_column="8"
            android:text="l"
```

```
            app:layout_row="1" />

        <Button
            android:id="@+id/z"
            android:layout_width="43dp"
            android:layout_height="wrap_content"
            android:text="z"
            app:layout_column="0"
            app:layout_row="2" />

        <Button
            android:id="@+id/x"
            android:layout_width="48dp"
            android:layout_height="wrap_content"
            android:text="x"
            app:layout_column="1"
            app:layout_row="2" />

        <Button
            android:id="@+id/c"
            android:layout_width="42dp"
            android:layout_height="wrap_content"
            android:text="c"
            app:layout_column="3"
            app:layout_row="2" />

        <Button
            android:id="@+id/v"
            android:layout_width="42dp"
            android:layout_height="wrap_content"
            android:text="v"
            app:layout_column="4"
            app:layout_row="2" />

        <Button
            android:id="@+id/b"
            android:layout_width="41dp"
            android:layout_height="wrap_content"
            android:text="b"
            app:layout_column="5"
            app:layout_row="2" />

        <Button
            android:id="@+id/n"
            android:layout_width="41dp"
            android:layout_height="wrap_content"
            app:layout_column="6"
            android:text="n"2" />
```

```
        <Button
            android:id="@+id/m"
            android:layout_width="44dp"
            android:layout_height="wrap_content"
            android:text="m"
            app:layout_column="7"
            app:layout_row="2" />

        <Button
            android:id="@+id/num"
            android:layout_width="45dp"
            android:layout_height="wrap_content"
            android:text="\?123"
            app:layout_column="0"
            app:layout_row="3" />

        <Button
            android:id="@+id/back"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="-"
            app:layout_column="8"
            app:layout_row="2" />

        <Button
            android:id="@+id/enter"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="-|"
            app:layout_column="8"
            app:layout_row="3" />

        <Button
            android:id="@+id/button34"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text=","
            app:layout_column="2"
            app:layout_row="3" />

        <Button
            android:id="@+id/sp"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="sp"
            app:layout_column="4"
            app:layout_row="3" />
```

```
        <Button
            android:id="@+id/button36"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="."
            app:layout_column="6"
            app:layout_row="3" />
    </androidx.gridlayout.widget.GridLayout>

    <androidx.gridlayout.widget.GridLayout
        android:layout_width="410dp"
        android:layout_height="298dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        android:visibility="gone"
        android:id="@+id/grid2">

        <Button
            android:id="@+id/one"
            android:layout_width="34dp"
            android:layout_height="wrap_content"
            android:text="1"
            app:layout_column="0"
            app:layout_row="0" />

        <Button
            android:id="@+id/two"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="2"
            app:layout_column="1"
            app:layout_row="0" />

        <Button
            android:id="@+id/three"
            android:layout_width="48dp"
            android:layout_height="wrap_content"
            android:text="3"
            app:layout_column="2"
            app:layout_row="0" />

        <Button
            android:id="@+id/four"
            android:layout_width="41dp"
            android:layout_height="wrap_content"
            android:text="4"
            app:layout_column="3"
            app:layout_row="0" />
```

```
        <Button
            android:id="@+id/five"
            android:layout_width="42dp"
            android:layout_height="wrap_content"
            android:text="5"
            app:layout_column="4"
            app:layout_row="0" />

        <Button
            android:id="@+id/six"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="6"
            app:layout_column="5"
            app:layout_row="0" />

        <Button
            android:id="@+id/seven"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="7"
            app:layout_column="6"
            app:layout_row="0" />

        <Button
            android:id="@+id/eight"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="8"
            app:layout_column="7"
            app:layout_row="0" />

        <Button
            android:id="@+id/nine"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="9"
            app:layout_column="8"
            app:layout_row="0" />

        <Button
            android:id="@+id/zero"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="0"
            app:layout_column="9"
            app:layout_row="0" />
```

```
        <Button
            android:id="@+id/at"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="@"
            app:layout_column="0"
            app:layout_row="1" />

        <Button
            android:id="@+id/hash"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="#"
            app:layout_column="1"
            app:layout_row="1" />

        <Button
            android:id="@+id/rup"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="r"
            app:layout_column="2"
            app:layout_row="1" />

        <Button
            android:id="@+id/under"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="_"
            app:layout_column="3"
            app:layout_row="1" />

        <Button
            android:id="@+id/amp"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="a"
            app:layout_column="4"
            app:layout_row="1" />

        <Button
            android:id="@+id/hyp"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="-"
            app:layout_column="5"
            app:layout_row="1" />

        <Button
```

```
            android:id="@+id/plus"
            android:layout_width="46dp"
            android:layout_height="wrap_content"
            android:text="+"
            app:layout_column="6"
            app:layout_row="1" />

        <Button
            android:id="@+id/ob"
            android:layout_width="35dp"
            android:layout_height="wrap_content"
            android:text="("
            app:layout_column="7"
            app:layout_row="1" />

        <Button
            android:id="@+id/cb"
            android:layout_width="36dp"
            android:layout_height="wrap_content"
            android:text=")"
            app:layout_column="8"
            app:layout_row="1" />

        <Button
            android:id="@+id/fs"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="/"
            app:layout_column="9"
            app:layout_row="1" />

        <Button
            android:id="@+id/star"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="*"
            app:layout_column="0"
            app:layout_row="2" />

        <Button
            android:id="@+id/dq"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="\'"
            app:layout_column="1"
            app:layout_row="2" />

        <Button
            android:id="@+id/sq"
```

```
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="\'"
            app:layout_column="2"
            app:layout_row="2" />

        <Button
            android:id="@+id/col"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text=":"
            app:layout_column="3"
            app:layout_row="2" />

        <Button
            android:id="@+id/scol"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text=";"
            app:layout_column="4"
            app:layout_row="2" />

        <Button
            android:id="@+id/excl"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="!"
            app:layout_column="6"
            app:layout_row="2" />

        <Button
            android:id="@+id/ques"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="\?"
            app:layout_column="7"
            app:layout_row="2" />

        <Button
            android:id="@+id/back2"
            android:layout_width="36dp"
            android:layout_height="wrap_content"
            android:text="-"
            app:layout_column="8"
            app:layout_row="2" />

        <Button
            android:id="@+id/abc"
            android:layout_width="42dp"
```

```
            android:layout_height="wrap_content"
            android:text="ABC"
            app:layout_column="0"
            app:layout_row="3" />

        <Button
            android:id="@+id/com"
            android:layout_width="35dp"
            android:layout_height="wrap_content"
            android:text=","
            app:layout_column="1"
            app:layout_row="3" />

        <Button
            android:id="@+id/dot"
            android:layout_width="43dp"
            android:layout_height="wrap_content"
            android:text="."
            app:layout_column="7"
            app:layout_row="3" />

        <Button
            android:id="@+id/sp2"
            android:layout_width="39dp"
            android:layout_height="wrap_content"
            android:text="sp"
            app:layout_column="3"
            app:layout_row="3" />

        <Button
            android:id="@+id/enter2"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="-|"
            app:layout_column="8"
            app:layout_row="3" />
    </androidx.gridlayout.widget.GridLayout>

    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text=""
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.497"
        app:layout_constraintStart_toStartOf="parent"
        tools:ignore="MissingConstraints"
        tools:layout_editor_absoluteY="85dp"
        android:textSize="36sp"/>
```

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

numbers.xml:

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
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"
    xmlns:app="http://schemas.android.com/apk/res-auto">


    <androidx.gridlayout.widget.GridLayout
        android:layout_width="410dp"
        android:layout_height="298dp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        tools:ignore="MissingConstraints">

        <Button
            android:id="@+id/one"
            android:layout_width="34dp"
            android:layout_height="wrap_content"
            android:text="1"
            app:layout_column="0"
            app:layout_row="0" />

        <Button
            android:id="@+id/two"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="2"
            app:layout_column="1"
            app:layout_row="0" />

        <Button
            android:id="@+id/three"
            android:layout_width="48dp"
            android:layout_height="wrap_content"
            android:text="3"
            app:layout_column="2"
            app:layout_row="0" />

        <Button
```

```
            android:id="@+id/four"
            android:layout_width="41dp"
            android:layout_height="wrap_content"
            android:text="4"
            app:layout_column="3"
            app:layout_row="0" />

        <Button
            android:id="@+id/five"
            android:layout_width="42dp"
            android:layout_height="wrap_content"
            android:text="5"
            app:layout_column="4"
            app:layout_row="0" />

        <Button
            android:id="@+id/six"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="6"
            app:layout_column="5"
            app:layout_row="0" />

        <Button
            android:id="@+id/seven"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="7"
            app:layout_column="6"
            app:layout_row="0" />

        <Button
            android:id="@+id/eight"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="8"
            app:layout_column="7"
            app:layout_row="0" />

        <Button
            android:id="@+id/nine"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="9"
            app:layout_column="8"
            app:layout_row="0" />

        <Button
            android:id="@+id/zero"
```

```
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="0"
            app:layout_column="9"
            app:layout_row="0" />

        <Button
            android:id="@+id/at"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="@"
            app:layout_column="0"
            app:layout_row="1" />

        <Button
            android:id="@+id/hash"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="#"
            app:layout_column="1"
            app:layout_row="1" />

        <Button
            android:id="@+id/rup"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="r"
            app:layout_column="2"
            app:layout_row="1" />

        <Button
            android:id="@+id/under"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="_"
            app:layout_column="3"
            app:layout_row="1" />

        <Button
            android:id="@+id/amp"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="a"
            app:layout_column="4"
            app:layout_row="1" />

        <Button
            android:id="@+id/hyp"
            android:layout_width="38dp"
```

```
            android:layout_height="wrap_content"
            android:text="-"
            app:layout_column="5"
            app:layout_row="1" />

        <Button
            android:id="@+id/plus"
            android:layout_width="46dp"
            android:layout_height="wrap_content"
            android:text="+"
            app:layout_column="6"
            app:layout_row="1" />

        <Button
            android:id="@+id/ob"
            android:layout_width="35dp"
            android:layout_height="wrap_content"
            android:text="("
            app:layout_column="7"
            app:layout_row="1" />

        <Button
            android:id="@+id/cb"
            android:layout_width="36dp"
            android:layout_height="wrap_content"
            android:text=")"
            app:layout_column="8"
            app:layout_row="1" />

        <Button
            android:id="@+id/fs"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="/"
            app:layout_column="9"
            app:layout_row="1" />

        <Button
            android:id="@+id/star"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="*"
            app:layout_column="0"
            app:layout_row="2" />

        <Button
            android:id="@+id/dq"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
```

```
            android:text="\'"
            app:layout_column="1"
            app:layout_row="2" />

        <Button
            android:id="@+id/sq"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="\'"
            app:layout_column="2"
            app:layout_row="2" />

        <Button
            android:id="@+id/col"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text=":"
            app:layout_column="3"
            app:layout_row="2" />

        <Button
            android:id="@+id/scol"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text=";"
            app:layout_column="4"
            app:layout_row="2" />

        <Button
            android:id="@+id/excl"
            android:layout_width="37dp"
            android:layout_height="wrap_content"
            android:text="!"
            app:layout_column="6"
            app:layout_row="2" />

        <Button
            android:id="@+id/ques"
            android:layout_width="38dp"
            android:layout_height="wrap_content"
            android:text="\?"
            app:layout_column="7"
            app:layout_row="2" />

        <Button
            android:id="@+id/back2"
            android:layout_width="36dp"
            android:layout_height="wrap_content"
            android:text="-"
```

```
            app:layout_column="8"
            app:layout_row="2" />

        <Button
            android:id="@+id/abc"
            android:layout_width="42dp"
            android:layout_height="wrap_content"
            android:text="ABC"
            app:layout_column="0"
            app:layout_row="3" />

        <Button
            android:id="@+id/com"
            android:layout_width="35dp"
            android:layout_height="wrap_content"
            android:text=","
            app:layout_column="1"
            app:layout_row="3" />

        <Button
            android:id="@+id/dot"
            android:layout_width="43dp"
            android:layout_height="wrap_content"
            android:text="."
            app:layout_column="7"
            app:layout_row="3" />

        <Button
            android:id="@+id/sp2"
            android:layout_width="39dp"
            android:layout_height="wrap_content"
            android:text="sp"
            app:layout_column="3"
            app:layout_row="3" />

        <Button
            android:id="@+id/enter2"
            android:layout_width="40dp"
            android:layout_height="wrap_content"
            android:text="-|"
            app:layout_column="8"
            app:layout_row="3" />

    </androidx.gridlayout.widget.GridLayout>

    <TextView
        android:id="@+id/textView2"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
```

```
        android:text=""
        android:textSize="36sp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        tools:ignore="MissingConstraints"
        tools:layout_editor_absoluteY="109dp" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

MainActivity.java:

```
package com.example.ex2;

import androidx.appcompat.app.AppCompatActivity;

import android.content.Intent;
import android.os.Bundle;
import android.view.KeyEvent;
import android.view.View;
import android.widget.Button;
import androidx.gridlayout.widget.GridLayout;
import android.widget.TextView;

import org.w3c.dom.Text;

public class MainActivity extends AppCompatActivity implements
View.OnClickListener {


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

        Bundle extras = getIntent().getExtras();
        if (extras != null) {
            String data = extras.getString("text");
            final TextView textView = findViewById(R.id.textView);
            textView.setText(data);
        }

        Button q = (Button)findViewById(R.id.q);
        q.setOnClickListener(this);
        Button w = (Button)findViewById(R.id.w);
        w.setOnClickListener(this);
        Button e = (Button)findViewById(R.id.e);
        e.setOnClickListener(this);
        Button r = (Button)findViewById(R.id.r);
```

```
        r.setOnClickListener(this);
        Button t = (Button)findViewById(R.id.t);
        t.setOnClickListener(this);
        Button y = (Button)findViewById(R.id.y);
        y.setOnClickListener(this);
        Button u = (Button)findViewById(R.id.u);
        u.setOnClickListener(this);
        Button i = (Button)findViewById(R.id.i);
        i.setOnClickListener(this);
        Button o = (Button)findViewById(R.id.o);
        o.setOnClickListener(this);
        Button p = (Button)findViewById(R.id.p);
        p.setOnClickListener(this);
        Button a = (Button)findViewById(R.id.a);
        a.setOnClickListener(this);
        Button s = (Button)findViewById(R.id.s);
        s.setOnClickListener(this);
        Button d = (Button)findViewById(R.id.d);
        d.setOnClickListener(this);
        Button f = (Button)findViewById(R.id.f);
        f.setOnClickListener(this);
        Button g = (Button)findViewById(R.id.g);
        g.setOnClickListener(this);
        Button h = (Button)findViewById(R.id.h);
        h.setOnClickListener(this);
        Button j = (Button)findViewById(R.id.j);
        j.setOnClickListener(this);
        Button k = (Button)findViewById(R.id.k);
        k.setOnClickListener(this);
        Button l = (Button)findViewById(R.id.l);
        l.setOnClickListener(this);
        Button z = (Button)findViewById(R.id.z);
        z.setOnClickListener(this);
        Button x = (Button)findViewById(R.id.x);
        x.setOnClickListener(this);
        Button c = (Button)findViewById(R.id.c);
        c.setOnClickListener(this);
        Button v = (Button)findViewById(R.id.v);
        v.setOnClickListener(this);
        Button b = (Button)findViewById(R.id.b);
        b.setOnClickListener(this);
        Button n = (Button)findViewById(R.id.n);
        n.setOnClickListener(this);
        Button m = (Button)findViewById(R.id.m);
        m.setOnClickListener(this);
        Button sp = (Button)findViewById(R.id.sp);
        sp.setOnClickListener(this);
        Button enter = (Button)findViewById(R.id.enter);
        enter.setOnClickListener(this);
```

```
        Button back = findViewById(R.id.back);
        back.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                final TextView textView = (TextView)findViewById(R.id.textView);
                String s=textView.getText().toString();
                s=s.substring(0,s.length()-1);
                textView.setText(s);
            }
        });

        Button num = (Button)findViewById(R.id.num);
        num.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new Intent(MainActivity.this,Numbers.class);
                Bundle bundle = new Bundle();
                final TextView textView = findViewById(R.id.textView);
                String data = textView.getText().toString();
                bundle.putString("text",data);
                intent.putExtras(bundle);
                startActivity(intent);
            }
        });
    }
    @Override
    public void onClick(View v){
        final TextView textView = (TextView)findViewById(R.id.textView);
        switch (v.getId()){
            case R.id.q:
                textView.append("q");
                break;
            case R.id.w:
                textView.append("w");
                break;
            case R.id.e:
                textView.append("e");
                break;
            case R.id.r:
                textView.append("r");
                break;
            case R.id.t:
                textView.append("t");
                break;
            case R.id.y:
                textView.append("y");
                break;
```

```
            case R.id.u:
                textView.append("u");
                break;
            case R.id.i:
                textView.append("i");
                break;
            case R.id.o:
                textView.append("o");
                break;
            case R.id.p:
                textView.append("p");
                break;
            case R.id.a:
                textView.append("a");
                break;
            case R.id.s:
                textView.append("s");
                break;
            case R.id.d:
                textView.append("d");
                break;
            case R.id.f:
                textView.append("f");
                break;
            case R.id.g:
                textView.append("g");
                break;
            case R.id.h:
                textView.append("h");
                break;
            case R.id.j:
                textView.append("j");
                break;
            case R.id.k:
                textView.append("k");
                break;
            case R.id.l:
                textView.append("l");
                break;
            case R.id.z:
                textView.append("z");
                break;
            case R.id.x:
                textView.append("x");
                break;
            case R.id.c:
                textView.append("c");
                break;
            case R.id.v:
```

```
                textView.append("v");
                break;
            case R.id.b:
                textView.append("b");
                break;
            case R.id.n:
                textView.append("n");
                break;
            case R.id.m:
                textView.append("m");
                break;
            case R.id.one:
                textView.append("1");
                break;
            case R.id.two:
                textView.append("2");
                break;
            case R.id.three:
                textView.append("3");
                break;
            case R.id.four:
                textView.append("4");
                break;
            case R.id.five:
                textView.append("5");
                break;
            case R.id.six:
                textView.append("6");
                break;
            case R.id.seven:
                textView.append("7");
                break;
            case R.id.eight:
                textView.append("8");
                break;
            case R.id.nine:
                textView.append("9");
                break;
            case R.id.zero:
                textView.append("0");
                break;
            case R.id.sp:
                textView.append(" ");
                break;
            case R.id.sp2:
                textView.append(" ");
                break;
            case R.id.at:
                textView.append("@");
```

```
                break;
            case R.id.fs:
                textView.append("/");
                break;
            case R.id.enter:
                textView.append("\n");
                break;
            case R.id.enter2:
                textView.append("\n");
                break;
        }
    }

}
```

Numbers.java:

```
package com.example.ex2;

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 Numbers extends AppCompatActivity implements View.OnClickListener
{
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.numbers);

        Bundle extras = getIntent().getExtras();
        if (extras != null) {
            String data = extras.getString("text");
            final TextView textView = findViewById(R.id.textView2);
            textView.setText(data);
        }

        Button one = (Button)findViewById(R.id.one);
        one.setOnClickListener(this);
        Button two = (Button)findViewById(R.id.two);
        two.setOnClickListener(this);
        Button three = (Button)findViewById(R.id.three);
        three.setOnClickListener(this);
```

```
        Button four = (Button)findViewById(R.id.four);
        four.setOnClickListener(this);
        Button five = (Button)findViewById(R.id.five);
        five.setOnClickListener(this);
        Button six = (Button)findViewById(R.id.six);
        six.setOnClickListener(this);
        Button seven = (Button)findViewById(R.id.seven);
        seven.setOnClickListener(this);
        Button eight = (Button)findViewById(R.id.eight);
        eight.setOnClickListener(this);
        Button nine = (Button)findViewById(R.id.nine);
        nine.setOnClickListener(this);
        Button zero = (Button)findViewById(R.id.zero);
        zero.setOnClickListener(this);
        Button sp2 = (Button)findViewById(R.id.sp2);
        sp2.setOnClickListener(this);
        Button at = (Button)findViewById(R.id.at);
        at.setOnClickListener(this);
        Button fs = (Button)findViewById(R.id.fs);
        fs.setOnClickListener(this);

        Button enter2 = (Button)findViewById(R.id.enter2);
        enter2.setOnClickListener(this);

        Button back2 = findViewById(R.id.back2);
        back2.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                final TextView textView =
(TextView)findViewById(R.id.textView2);
                String s=textView.getText().toString();
                s=s.substring(0,s.length()-1);
                textView.setText(s);
            }
        });

        Button abc=findViewById(R.id.abc);
        abc.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new Intent(Numbers.this,MainActivity.class);
                Bundle bundle = new Bundle();
                final TextView textView = findViewById(R.id.textView2);
                String data = textView.getText().toString();
                bundle.putString("text",data);
                intent.putExtras(bundle);
                startActivity(intent);
            }
        });
```

```
    }

    @Override
    public void onClick(View v){
        final TextView textView = (TextView)findViewById(R.id.textView2);
        switch (v.getId()){
            case R.id.one:
                textView.append("1");
                break;
            case R.id.two:
                textView.append("2");
                break;
            case R.id.three:
                textView.append("3");
                break;
            case R.id.four:
                textView.append("4");
                break;
            case R.id.five:
                textView.append("5");
                break;
            case R.id.six:
                textView.append("6");
                break;
            case R.id.seven:
                textView.append("7");
                break;
            case R.id.eight:
                textView.append("8");
                break;
            case R.id.nine:
                textView.append("9");
                break;
            case R.id.zero:
                textView.append("0");
                break;
            case R.id.sp2:
                textView.append(" ");
                break;
            case R.id.at:
                textView.append("@");
                break;
            case R.id.fs:
                textView.append("/");
                break;
            case R.id.enter2:
                textView.append("\n");
                break;
        }
```

```
    }
}
```

Output:


Ex2
qwrc yh24@
34dfg/
1 2 3 4 5 6 7 8 9 0
@ # R _ A - + ( ) /
* ' " : ; ! ? -
ABC , SP . -

Best Practices:

- Names for buttons variables are based on the buttons
- TextSize of TextView is set to 36sp

Learning Outcomes:

- Learnt to use more than one activity in a single app
- Learnt to switch between activities on press of buttons
- Learnt to pass data via intents

Exercise 3 - Application Development using basic graphical primitives

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Objective :

Design a CAR using Shape drawables with the help of relevant shapes such as Line, Circle, Rectangle and Arc. a. Move the car forward by pressing the forward button so that the car moves from a predefined starting point to the predefined endpoint. b. On pressing the backward button, rotate the car to 180 degrees from the current point to the starting point. c. Implement a Tap-to-zoom animation on any image. d. Implement the Card flipping animation.

Android widgets used :

1. TextView - to display the text typed in the keyboard
2. Buttons - to create keys in the keyboard
3. GridLayout - to achieve layout of the keyboard

car.xml

```
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">
    <!-- Car Body (Rectangle) -->
    <item android:drawable="@drawable/car_body" />

<!--    &lt;!&ndash; Car Roof (Rectangle) &ndash;&gt;-->
    <item
        android:drawable="@drawable/car_
        roof" android:gravity="top"
        />

    <!-- Car Windows (Rectangles) -->
    <item
        android:drawable="@drawable/car_wi
        ndow" android:top="10dp"
        android:left="20
        dp"
        android:right="4
        5dp"
        android:bottom="
```

```
    20dp"
    />
<item
    android:drawable="@drawable/car_wi
    ndow" android:top="10dp"
    android:left="75
    dp"
    android:right="5
    dp"
    android:bottom="
    20dp"
    />

<!-- Car Wheels (Circles) -->
<item
    android:drawable="@drawable/car_w
    heel"
    android:gravity="left|bottom"
    android:left="10dp"
```

```
        android:bottom="0dp"
        />
    <item
        android:drawable="@drawable/car_wheel"
        android:gravity="right|bottom"
        android:right="10dp"
        android:bottom="0dp"
        />
</layer-list>
```

car_roof.xml

```
<shape xmlns:android="http://schemas.android.com/apk/res/android">
    <solid android:color="#000000" /> <!-- White color -->
    <corners android:radius="16dp" />
    <size android:width="20dp" android:height="15dp" />
</shape>
```

road.xml

```
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">
    <!-- Road Background (Gray) -->
    <item>
        <shape android:shape="rectangle">
            <solid android:color="#808080" /> <!-- Gray color -->
        </shape>
    </item>

     Lane Markings (White Lines)
    <item android:drawable="@drawable/lane_marking"
        android:top="10dp"
        android:right="80dp"
        android:left="10dp"
        android:bottom="10dp"/>
    <item android:drawable="@drawable/lane_marking"
        android:top="10dp"
        android:right="45dp"
        android:left="45dp"
        android:bottom="10dp"/>
    <item android:drawable="@drawable/lane_marking"
    android:top="10dp"
    android:right="10dp"
    android:left="80dp"
    android:bottom="10dp"/>
</layer-list>
```

Lane_marking.xml

```
<shape xmlns:android="http://schemas.android.com/apk/res/android">
    <solid android:color="#FFFFFF" /> <!-- White color -->
```

```
    <size android:width="10dp" android:height="2dp" />
</shape>
```

Car_window.xml

```
<?xml version="1.0" encoding="utf-8"?>
<shape xmlns:android="http://schemas.android.com/apk/res/android">
    <solid android:color="#FFFFFF" /> <!-- White color -->
    <corners android:radius="4dp" />
    <size android:width="20dp" android:height="20dp" />
</shape>
```

Car_body.xml

```
<shape xmlns:android="http://schemas.android.com/apk/res/android">
    <solid android:color="#FFA500" /> <!-- Orange color -->
    <corners android:radius="16dp" />
    <size android:width="100dp" android:height="40dp"/>
</shape>
```

Car_wheel.xml

```
<shape xmlns:android="http://schemas.android.com/apk/res/android">
    <solid android:color="#000000" /> <!-- Black color -->
    <size android:width="20dp" android:height="20dp" />
    <corners android:radius="10dp" />
</shape>
```

Main_activity.xml

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

    <ImageView
        android:id="@+id/carImageView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="206dp"
        android:src="@drawable/car"
        app:layout_constraintTop_toTopOf="parent"
        tools:layout_editor_absoluteX="0dp" />

    <ImageView
        android:id="@+id/roadImageView"
        android:layout_width="410dp"
```

```
        android:layout_height="111dp"
        android:layout_marginTop="246dp"
        android:layout_marginEnd="1dp"
        android:src="@drawable/road"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="1.0"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <Button
        android:id="@+id/forwardButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginStart="57dp"
        android:layout_marginTop="91dp"
        android:text="Forward"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/roadImageView" />

    <Button
        android:id="@+id/sunFlipId"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginStart="140dp"
        android:layout_marginEnd="170dp"
        android:layout_marginBottom="45dp"
        android:text="Flip Image"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="1.0"
        app:layout_constraintStart_toStartOf="parent" />

    <Button
        android:id="@+id/backwardButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="91dp"
        android:layout_marginEnd="54dp"
        android:text="Backward"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/roadImageView" />

    <ImageView
        android:id="@+id/sunId"
        android:layout_width="79dp"
        android:layout_height="55dp"
        android:layout_marginStart="278dp"
```

```
        android:layout_marginTop="43dp"
        android:layout_marginEnd="54dp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:srcCompat="?attr/actionModeCloseDrawable" />

    <!-- Add other UI elements here if needed -->
</androidx.constraintlayout.widget.ConstraintLayout>
```

MainActivity.java

```
package com.example.car;
import androidx.appcompat.app.AppCompatActivity;
import android.animation.ObjectAnimator;
import android.os.Bundle;
import android.os.Handler;
import android.view.View;
import android.view.animation.AccelerateDecelerateInterpolator;
import android.widget.Button;
import android.widget.ImageView;

public class MainActivity extends AppCompatActivity {


    private ImageView carImageView;
    private ImageView sunImageView;
    private Button forwardButton;
    private Button backwardButton;
    private Button sunFlipButton;

    private int carXPosition = 0; // Initial X position of the car
    private final int endpoint = 800;// Predefined endpoint
    private final int startpoint = 0;
    boolean isClicked=false;

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

        carImageView = findViewById(R.id.carImageView);
        sunImageView = findViewById(R.id.sunId);
        forwardButton = findViewById(R.id.forwardButton);
        backwardButton =
        findViewById(R.id.backwardButton);
```

```
        sunFlipButton = findViewById(R.id.sunFlipId);

        forwardButton.setOnClickListener(new View.OnClickListener() {
            boolean isOperationInProgress = false;
            @Override
            public void onClick(View v) {
                if (!isOperationInProgress) {
                    isOperationInProgress = true;
                    backwardButton.setEnabled(false);
                    forwardButton.setEnabled(false);
                    final Handler handler = new Handler();
                    final Runnable carMovement = new Runnable() {
                        @Override
                        public void run() {
                            carXPosition +=
                            10;
                            if (carXPosition <= endpoint) {
                                carImageView.setX(carXPosition);
                                handler.postDelayed(this, 100); // 100
milliseconds delay                              } else {
                                    isOperationInPr
                                    ogress = false;
                                    backwardButton.
                                    setEnabled(true
                                    );
                                    forwardButton.s
                                    etEnabled(true)
                                    ;
                            }
                        }
                    };
                                        handler.post(carMovement);
                                    }
            }
        });


        backwardButton.setOnClickListener(new View.OnClickListener() {
            boolean isOperationInProgress = false;
            private boolean isCarFlipped = false;
            @Override
            public void onClick(View v) {
                if (!isOperationInProgress) {
                    isOperationInProgress = true;
                    backwardButton.setEnabled(false);
                    forwardButton.setEnabled(false);
                    flipCar();
                    final Handler handler = new Handler();
                    final Runnable carMovement = new Runnable() {
                        @Override
                        public void run() {
```

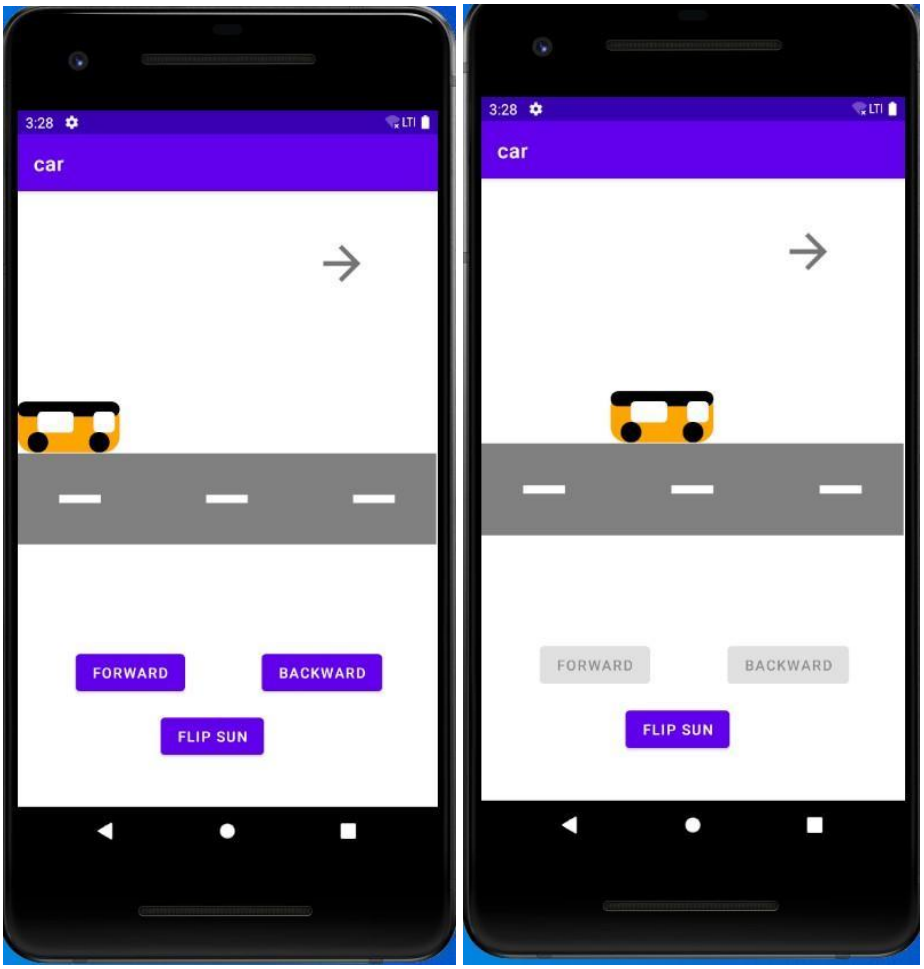
```
carXPosition -=
10;
if (carXPosition >= startpoint) {
```

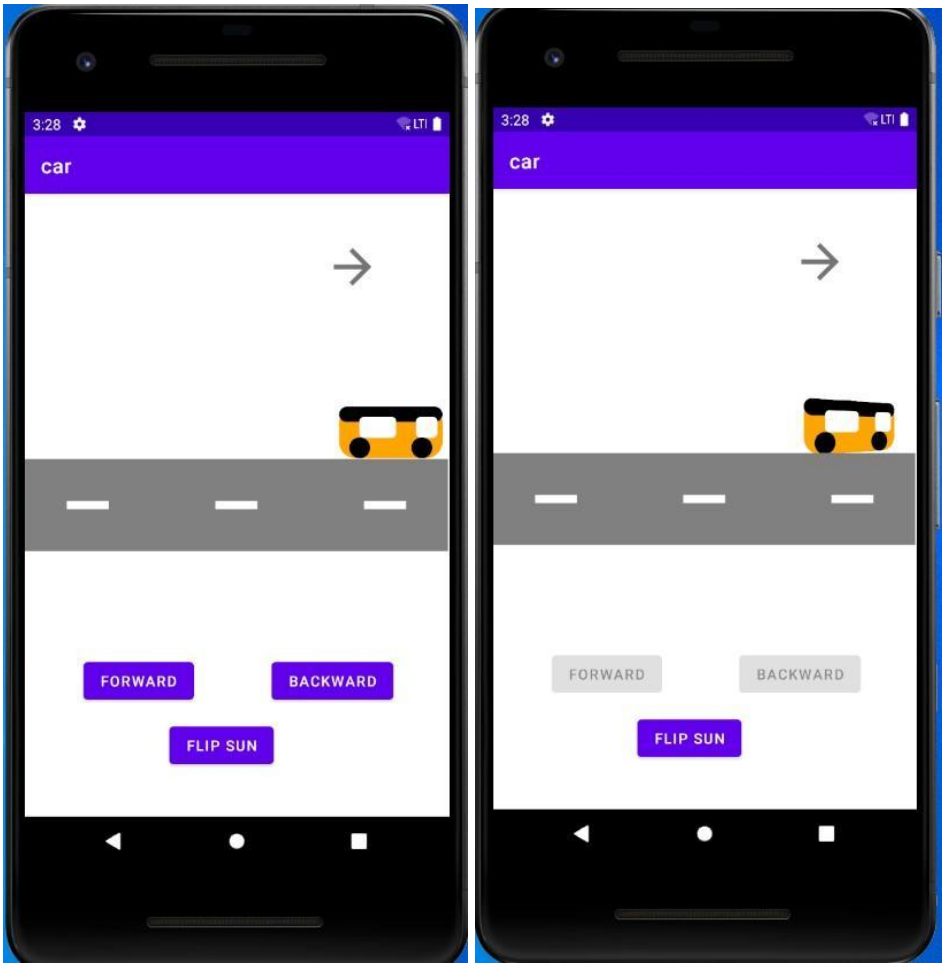
```
                                                    carImageView.setX(car
                                                    XPosition);
                                                    handler.postDelayed(t
milliseconds delay                                  his, 100); // 100

                                                } else {
                                                    isOperationInPr
                                                    ogress = false;
                                                    backwardButton.
                                                    setEnabled(true
                                                    );
                                                    forwardButton.s
                                                    etEnabled(true)
                                                    ; flipCar();
                                }
                            }
                        };
                        handler.post(carMovement);
                    }
                }
                private void flipCar() {
                    ObjectAnimator flipAnimator;

                    if (isCarFlipped) {
                        flipAnimator = ObjectAnimator.ofFloat(carImageView,
"rotationY", 180f, 0f);
                        isCarFlipped = false;
                    } else {
                        flipAnimator = ObjectAnimator.ofFloat(carImageView,
"rotationY", 0f, 180f);
                        isCarFlipped = true;
                    }

                    flipAnimator.setDuration(500);
                    flipAnimator.setInterpolator(new
AccelerateDecelerateInterpolator());
                    flipAnimator.start();
                }
            });
            sunImageView.setOnClickListener(new
                View.OnClickListener(){ @Override
                public void onClick(View v) {
                    if(!isClicked){
                        sunImageView.setScaleX(2)
                        ;
                        sunImageView.setScaleY(2)
                        ; isClicked=true;
                    }
                    else{
                        sunImageView.setScaleX(1)
                        ;
                        sunImageView.setScaleY(1)
```

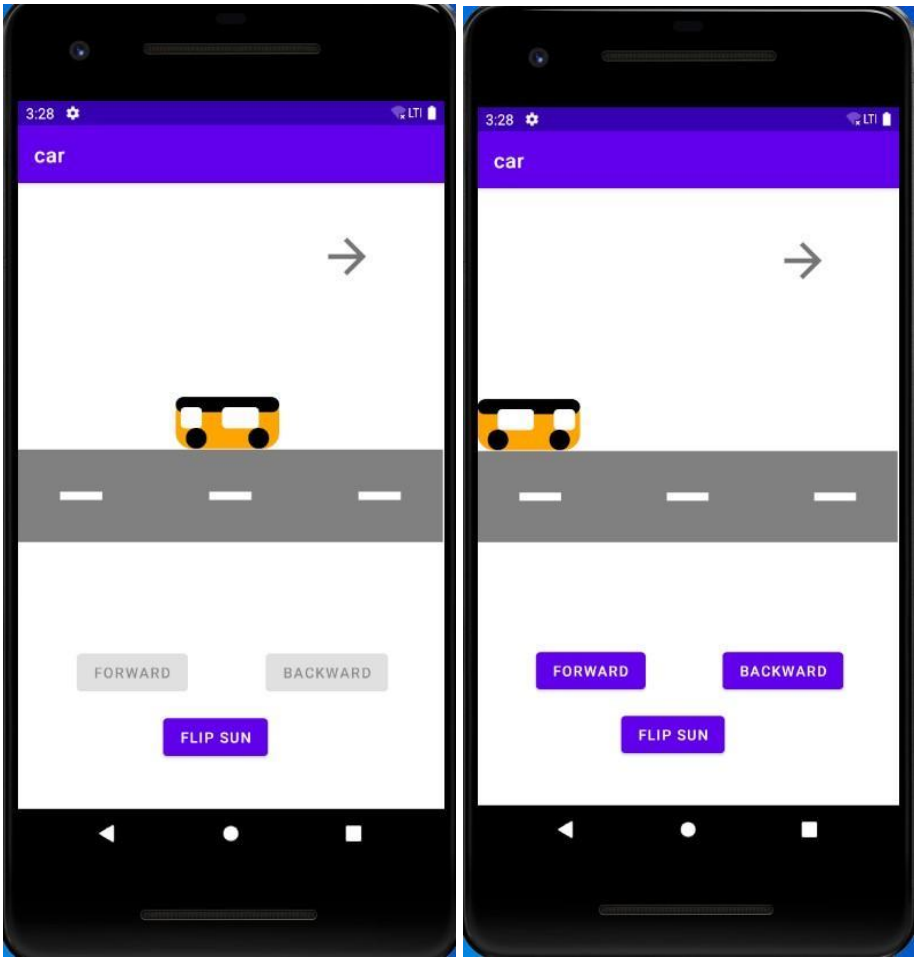
```
            ; isClicked=false;
        }
    }
```

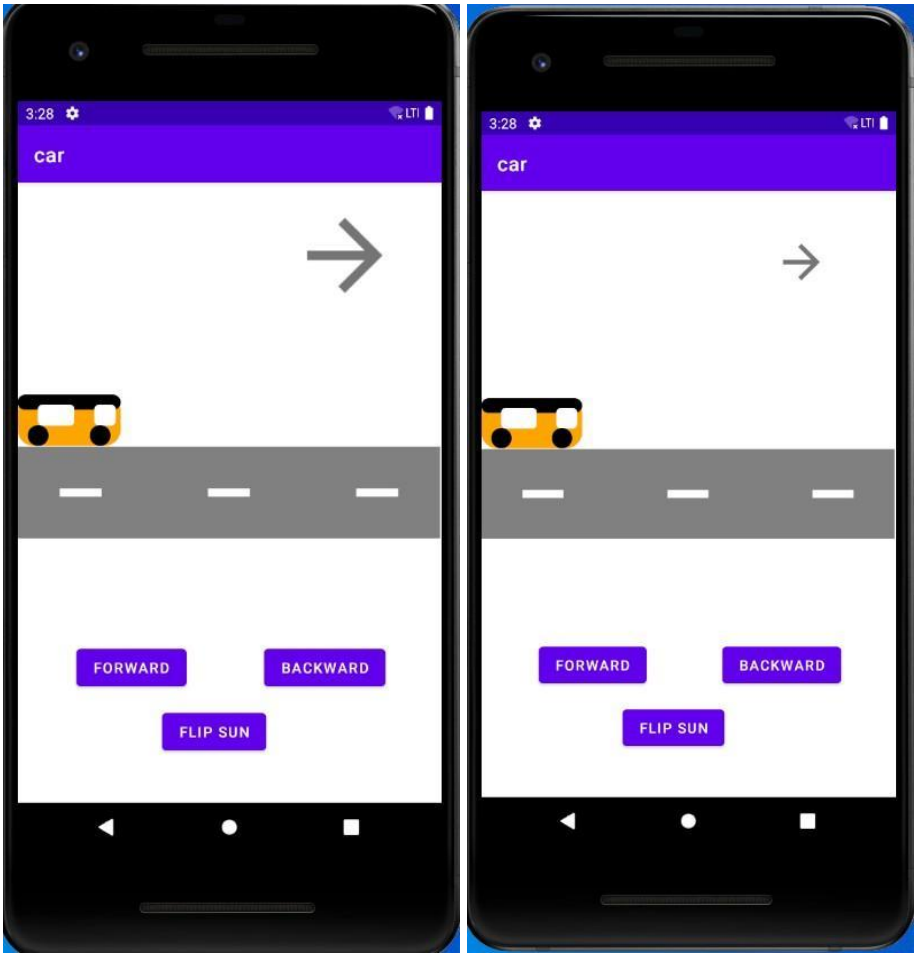
```
        });
        sunFlipButton.setOnClickListener(new View.OnClickListener() {
            private boolean isArrowFlipped = false;
            @Override
            public void onClick(View v) {
                ObjectAnimator flipAnimator;

                if (isArrowFlipped) {
                    flipAnimator = ObjectAnimator.ofFloat(sunImageView,
"rotationY", 180f, 0f);
                    isArrowFlipped = false;
                } else {
                    flipAnimator = ObjectAnimator.ofFloat(sunImageView,
"rotationY", 0f, 180f);
                    isArrowFlipped = true;
                }

                flipAnimator.setDuration(500);
                flipAnimator.setInterpolator(new
AccelerateDecelerateInterpolator());
                flipAnimator.start();
            }
        });
    }
}
```

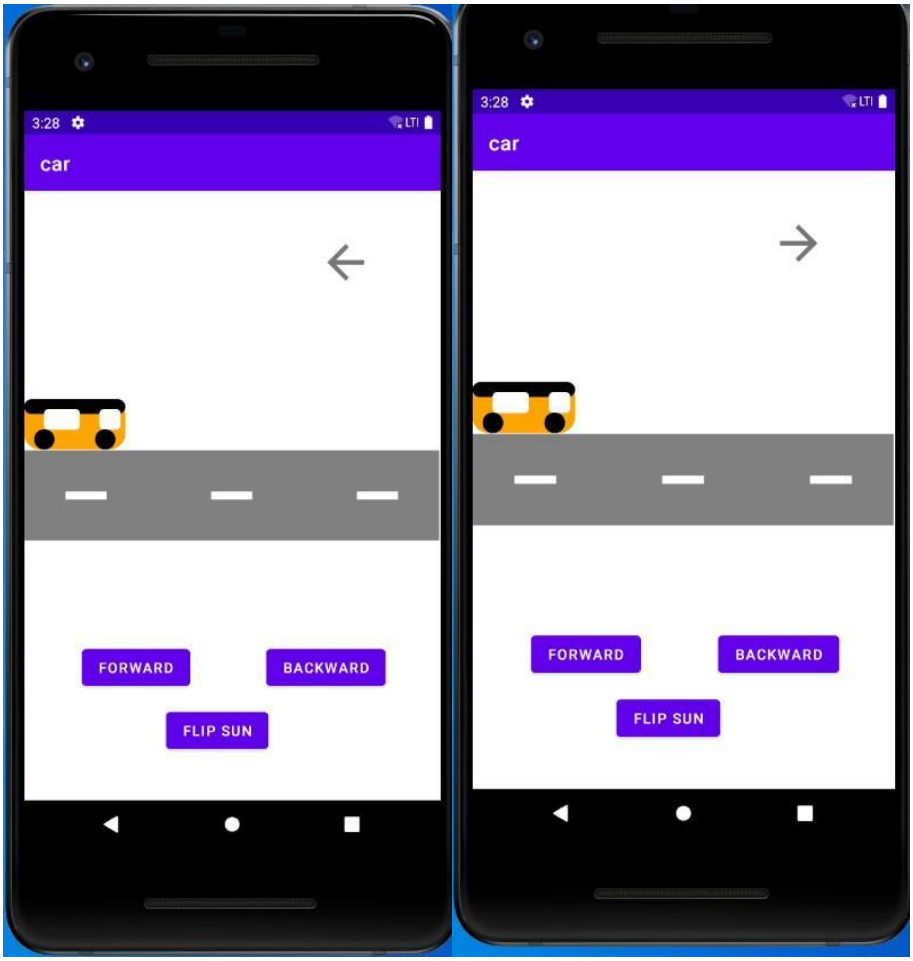
Output


3:28
car
FORWARD
BACKWARD
FLIP SUN
3:28
car
FORWARD
BACKWARD
FLIP SUN


3:28
car
FORWARD
BACKWARD
FLIP SUN
3:28
car
FORWARD
BACKWARD
FLIP SUN


3:28
car
FORWARD
BACKWARD
FLIP SUN
3:28
car
FORWARD
BACKWARD
FLIP SUN


3:28
car
FORWARD
BACKWARD
FLIP SUN
3:28
car
FORWARD
BACKWARD
FLIP SUN



Best Practices followed :

1. The naming convention has been followed to name all the variables used in the code
2. Appropriate versions of the java builds are used to run the mobile application
3. Comments explaining the code written have been included.

Learning Outcomes :

1. Develop mobile applications using GUI, Layouts and Event Listener
2. Develop a mobile app for simple needs
3. Learnt to build custom images by defining .xml file
4. Learnt to rotate,scale images.
5. Learnt to combine images and functions to create a moving effect

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CSE-B

Ex. No. 4 Android Application Development using Database

Aim: Develop a Product information application in Android that enables to perform CRUD operations on data stored in SQLite Database.

Layout Used: Linear Layout, Table Layout
Intents: Insert, Retrieve, Retrieve All, Update, Delete and Main

Code:

MainActivity.java:

```
package com.example.ex4;

import androidx.appcompat.app.AppCompatActivity;

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

public class MainActivity extends AppCompatActivity {

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

        final Database[] db = new Database[1];

        Button create = findViewById(R.id.create);
        create.setOnClickListener(new View.OnClickListener() {
```

```
    @Override
    public void onClick(View v) {
        db[0] = new Database(MainActivity.this);
    }
});


Button insert = findViewById(R.id.insert);
insert.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        Intent intent = new Intent(MainActivity.this,
        Insert.class); startActivity(intent);
    }
});

Button delete = findViewById(R.id.delete);
delete.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        Intent intent = new
        Intent(MainActivity.this,Delete.class);
        startActivity(intent);
    }
});

Button retrieve = findViewById(R.id.read);
retrieve.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        Intent intent = new Intent(MainActivity.this,Retrieve.class);
        startActivity(intent);
    }
});
Button retrieveAll = findViewById(R.id.read_all);
retrieveAll.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
```

```
            Intent intent = new
            Intent(MainActivity.this,RetrieveAll.class);
            startActivity(intent);
        }
    });

    Button update = findViewById(R.id.update);
    update.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            Intent intent = new
            Intent(MainActivity.this,Update.class);
            startActivity(intent);
        }
    });


  }
}
```

Database.java:

```
package com.example.ex4;

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

public class Database extends SQLiteOpenHelper {

    private static final String DB_NAME = "product";
    private static final int DB_VERSION = 3;

    private static final String TABLE_NAME =
```

```
"prod"; private static final String ID_COL = "id";

    private static final String NAME_COL = "name";

    private static final String BRAND_COL = "brand";

    private static final String DESC_COL = "desc";

    private static final String PRICE_COL = "price";

    public Database(Context context) {
        super(context, DB_NAME, null, DB_VERSION);
    }

    @Override
    public void onCreate(SQLiteDatabase db) {

        String query = "CREATE TABLE " + TABLE_NAME + " ("
                + ID_COL + " INTEGER PRIMARY KEY, "
                + NAME_COL + " TEXT,"
                + BRAND_COL + " TEXT,"
                + DESC_COL + " TEXT,"
                + PRICE_COL + " TEXT)";

        // at last we are calling a exec sql
        // method to execute above sql query
        db.execSQL(query);
    }

    // this method is use to add new course to our sqlite database.
    public void addProduct(String id,String name,String brand, String desc,
String price) {

        // on below line we are creating a variable for
        // our sqlite database and calling writable method
        // as we are writing data in our database.
        SQLiteDatabase db = this.getWritableDatabase();
```

```
        // on below line we are creating a
        // variable for content values.
        ContentValues values = new ContentValues();

        // on below line we are passing all values
        // along with its key and value pair.
        values.put(ID_COL,id);
        values.put(NAME_COL, name);
        values.put(BRAND_COL,brand);
        values.put(DESC_COL, desc);
        values.put(PRICE_COL, price);

        // after adding all values we are passing
        // content values to our table.
        db.insert(TABLE_NAME, null, values);

        // at last we are closing our
        // database after adding database.
        db.close();
    }

    public void deleteProduct(String id){
        SQLiteDatabase db = this.getWritableDatabase();
        db.delete(TABLE_NAME,ID_COL+"= ?",new String[]{id});
    }

    public void updateProduct(String id,String price){
        SQLiteDatabase db = this.getWritableDatabase();
        ContentValues values = new ContentValues();
        values.put(PRICE_COL, price);
        db.update(TABLE_NAME, values, ID_COL + "=?", new
String[]{String.valueOf(id)});
    }

    public Cursor retrieveAll(){
        SQLiteDatabase db = this.getReadableDatabase(); return
    db.query(TABLE_NAME, null, null, null, null, null, null); }
```

```
    public Cursor retrieve(String id){
        SQLiteDatabase db = this.getReadableDatabase();
        String[] projection = {
                NAME_COL,
                BRAND_COL,
                DESC_COL,
                PRICE_COL
        };

        // Define the condition for retrieval (e.g., where id = ?)
        String selection = ID_COL + " = ?";
        String[] selectionArgs = { id };

        // Execute the query
        Cursor cursor = db.query(
                TABLE_NAME, // Table name
                projection, // Columns to return
                        selection, // Selection (WHERE clause)
                selectionArgs, // Selection arguments
                null, // Group by
                null, // Having
                null // Order by
        );
        // The cursor now contains the retrieved row(s)
        return cursor;
    }

    @Override
    public void onUpgrade(SQLiteDatabase db, int oldVersion, int
newVersion) {
        // this method is called to check if the table exists already.
        db.execSQL("DROP TABLE IF EXISTS " + TABLE_NAME);
        onCreate(db);
    }
}
```

Insert.java:

```
package com.example.ex4;

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

import androidx.appcompat.app.AppCompatActivity;

public class Insert extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState){
        super.onCreate(savedInstanceState);
        setContentView(R.layout.insert);
        Button backi = findViewById(R.id.backi);
        backi.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new
                Intent(Insert.this,MainActivity.class);
                startActivity(intent);
            }
        });

        Button submiti = findViewById(R.id.submiti);
        submiti.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Database db = new Database(Insert.this);

                TextView textView = findViewById(R.id.idi);
                String id = textView.getText().toString();
                textView = findViewById(R.id.namei);
```

```
            String name = textView.getText().toString();

            RadioGroup radioGroup = findViewById(R.id.radioGroup);
            int selectedRadioButtonId =
radioGroup.getCheckedRadioButtonId();
            RadioButton selectedRadioButton =
findViewById(selectedRadioButtonId);
            String brand = selectedRadioButton.getText().toString();

            Log.d("Debug",brand);

            textView = findViewById(R.id.desci);
            String desc = textView.getText().toString();
            Log.d("Debug",desc);

            textView = findViewById(R.id.pricei);
            String price = textView.getText().toString();
            db.addProduct(id,name,brand,desc,price);
        }
    });
  }
}
```

Retrieve:

```
package com.example.ex4;

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

import androidx.appcompat.app.AppCompatActivity;

public class Retrieve extends AppCompatActivity {
  @Override
```

```
protected void onCreate(Bundle savedInstanceState){
    super.onCreate(savedInstanceState);
    setContentView(R.layout.retrieve);

    Button backr = findViewById(R.id.backr);
    backr.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            Intent intent = new Intent(Retrieve.this,MainActivity.class);
            startActivity(intent);
        }
    });
    Button retrieve = findViewById(R.id.retrieve);
    retrieve.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            TextView textView = findViewById(R.id.idr);
            String id = textView.getText().toString();

            Database db = new Database(Retrieve.this);
            Cursor cursor = db.retrieve(id);

            String name="",brand="",desc="",price="";

            if (cursor.moveToFirst()) {
                do {
                    // Retrieve values from 'column1' and 'column2' as strings
                    int columnIndex = cursor.getColumnIndex("name"); if
                    (columnIndex != -1) {
                        name = cursor.getString(columnIndex);
                    }

                    columnIndex = cursor.getColumnIndex("brand");
                    if(columnIndex!=-1){
                        brand=cursor.getString(columnIndex);
                    }

                    columnIndex = cursor.getColumnIndex("desc");
```

```
                if(columnIndex!=-1){
                    desc=cursor.getString(columnIndex);
                }

                columnIndex = cursor.getColumnIndex("price");
                if(columnIndex!=-1){
                    price=cursor.getString(columnIndex);
                }
            } while (cursor.moveToNext());
        }

        textView = findViewById(R.id.namer);
        textView.setText(name);

        textView = findViewById(R.id.brandr);
        textView.setText(brand);

        textView = findViewById(R.id.descr);
        textView.setText(desc);

        textView = findViewById(R.id.pricer);
        textView.setText(price);

    }
});
}
}
```

Retrieve All:

```
package com.example.ex4;

import android.content.Context;
import android.content.Intent;
import android.database.Cursor;
import android.graphics.Color;
import android.os.Bundle;
import android.util.Log;
```

```
import android.view.View;
import android.view.ViewGroup;
import android.widget.Button;
import android.widget.TableLayout;
import android.widget.TableRow;
import android.widget.TextView;

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

import org.w3c.dom.Text;

public class RetrieveAll extends AppCompatActivity {

    private TextView newTextView(String text){
        TextView tv = new TextView(RetrieveAll.this);

        tv.setText(text);
        tv.setPadding(4,4,4,4);
        tv.setTextSize(24);
        TableRow.LayoutParams layoutParams = new
TableRow.LayoutParams(
                TableRow.LayoutParams.WRAP_CONTENT, // Adjust width as
needed
                TableRow.LayoutParams.WRAP_CONTENT // Adjust height as
needed
        );
        layoutParams.rightMargin = 20;
        tv.setLayoutParams(layoutParams);

        return tv;
    }

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

```
        Database db = new Database(RetrieveAll.this);
        Cursor cursor = db.retrieveAll();

        ConstraintLayout parent = findViewById(R.id.parent);

// Create layout params for the TableLayout
// ConstraintLayout.LayoutParams tableLayoutParams = new
ConstraintLayout.LayoutParams(
//       ConstraintLayout.LayoutParams.MATCH_PARENT,       //
ConstraintLayout.LayoutParams.MATCH_PARENT // );
// tableLayoutParams.startToStart =
ConstraintLayout.LayoutParams.PARENT_ID;
// tableLayoutParams.endToEnd =
ConstraintLayout.LayoutParams.PARENT_ID;
// tableLayoutParams.topToTop =
ConstraintLayout.LayoutParams.PARENT_ID;
// tableLayoutParams.bottomToBottom =
ConstraintLayout.LayoutParams.PARENT_ID;

        TableLayout tl = new TableLayout(RetrieveAll.this);

        TableRow trh = new TableRow(RetrieveAll.this);
        TextView tv0 = newTextView("Id");
        trh.addView(tv0);

        tv0 = newTextView("Name");
        trh.addView(tv0);

        tv0 = newTextView("Brand");
        trh.addView(tv0);

        tv0 = newTextView("Description");
        trh.addView(tv0);

        tv0 = newTextView("Price");
        trh.addView(tv0);
```

```
tl.addView(trh);

String id="",name="",brand="",desc="",price="";
if (cursor.moveToFirst()) {
    do {
        // Retrieve values from 'column1' and 'column2' as strings
        int columnIndex = cursor.getColumnIndex("id");
        if (columnIndex != -1) {
            id = cursor.getString(columnIndex);
        }

        columnIndex = cursor.getColumnIndex("name");
        if(columnIndex!=-1){
            name=cursor.getString(columnIndex);
        }

        columnIndex = cursor.getColumnIndex("brand");
        if(columnIndex!=-1){
            brand=cursor.getString(columnIndex);
        }

        columnIndex = cursor.getColumnIndex("desc");
        if(columnIndex!=-1){
            desc=cursor.getString(columnIndex);
        }

        columnIndex = cursor.getColumnIndex("price");
        if(columnIndex!=-1){
            price=cursor.getString(columnIndex);
        }

        Log.d("Debug",id+" "+name+" "+brand+" "+desc+" "+price);
        TableRow tr = new TableRow(RetrieveAll.this);


        TextView tv1 = newTextView(id);
        TextView tv2 = newTextView(name);
```

```
            TextView tv3 = newTextView(brand);
            TextView tv4 = newTextView(desc);
            TextView tv5 = newTextView(price);

            tr.addView(tv1);
            tr.addView(tv2);
            tr.addView(tv3);
            tr.addView(tv4);
            tr.addView(tv5);

            tl.addView(tr);

        } while (cursor.moveToNext());
    }

    parent.addView(tl);

// app:layout_constraintEnd_toEndOf="parent"
// app:layout_constraintStart_toStartOf="parent"
// app:layout_constraintTop_toTopOf="parent"

    Button retrieveAll = findViewById(R.id.backra);
    retrieveAll.setOnClickListener(new View.OnClickListener() {
        @Override
        public void onClick(View v) {
            Intent intent = new
            Intent(RetrieveAll.this,MainActivity.class);
            startActivity(intent);
        }
    });
  }
}
```

Update:

```
package com.example.ex4;

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 Update extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState){
        super.onCreate(savedInstanceState);
        setContentView(R.layout.update);

        Button backu = findViewById(R.id.backu);
        backu.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new
                Intent(Update.this,MainActivity.class);
                startActivity(intent);
            }
        });

        Button update = findViewById(R.id.update);
        update.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Database db = new Database(Update.this);
                TextView textView = findViewById(R.id.idu);
                String id = textView.getText().toString();
                textView = findViewById(R.id.priceu);
                String price = textView.getText().toString();

                db.updateProduct(id,price);
            }
        });
    }
}
```

Delete.java:

```
package com.example.ex4;

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 Delete extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState){
        super.onCreate(savedInstanceState);
        setContentView(R.layout.delete);

        Button backd = findViewById(R.id.backd);
        backd.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new
                Intent(Delete.this,MainActivity.class);
                startActivity(intent);
            }
        });

        Button delete = findViewById(R.id.delete);
        delete.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                Database db = new Database(Delete.this);

                TextView textView = findViewById(R.id.idd);
                String id = textView.getText().toString();
```

```
            db.deleteProduct(id);
        }
    });
  }
}
```

Activity_main.xml:

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

   <RelativeLayout
      android:layout_width="match_parent"
      android:layout_height="match_parent">
      <!-- Center the LinearLayout vertically -->
      <LinearLayout
         android:id="@+id/verticalLayout"
         android:layout_width="wrap_content"
         android:layout_height="wrap_content"
         android:layout_centerInParent="true"
         android:orientation="vertical">

         <!-- Add your UI elements within this LinearLayout -->

         <Button
            android:id="@+id/create"
            android:layout_width="177dp"
            android:layout_height="62dp"
            android:text="Create" />

         <Button
```

```
            android:id="@+id/insert"
            android:layout_width="177dp"
            android:layout_height="62dp"
            android:text="Insert" />

        <Button
            android:id="@+id/read"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:text="Retrieve" />

        <Button
            android:id="@+id/read_all"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:text="Retrieve All" />

        <Button
            android:id="@+id/update"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:text="Update" />

        <Button
            android:id="@+id/delete"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:text="Delete" />


        <!-- Add more views here as needed -->

    </LinearLayout>
  </RelativeLayout>

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

Insert.xml:

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

   <LinearLayout
      android:layout_width="409dp"
      android:layout_height="665dp"
      android:layout_marginTop="50dp"
      android:orientation="vertical"
      app:layout_constraintBottom_toBottomOf="parent"
      app:layout_constraintStart_toStartOf="parent"
      app:layout_constraintTop_toTopOf="parent">

      <LinearLayout
         android:layout_width="match_parent"
         android:layout_height="87dp"
         android:orientation="horizontal">

         <TextView
            android:id="@+id/textView3"
            android:layout_width="120dp"
            android:layout_height="55dp"
            android:layout_weight="1"
            android:text="Product Id"
            android:textSize="24sp" />

         <EditText
            android:id="@+id/idi"
            android:layout_width="wrap_content"
            android:layout_height="58dp"
            android:layout_weight="1"
            android:ems="10"
```

```
        android:inputType="textPersonName"
        android:textSize="24sp" />
</LinearLayout>

<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="84dp"
    android:orientation="horizontal">

    <TextView
        android:id="@+id/textView5"
        android:layout_width="131dp"
        android:layout_height="58dp"
        android:layout_weight="1"
        android:text="Product Name"
        android:textSize="24sp" />

    <EditText
        android:id="@+id/namei"
        android:layout_width="wrap_content"
        android:layout_height="59dp"
        android:layout_weight="1"
        android:ems="10"
        android:inputType="textPersonName"
        android:textSize="24sp" />
</LinearLayout>

<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="94dp"
    android:orientation="horizontal">

    <TextView
        android:id="@+id/textView6"
        android:layout_width="198dp"
        android:layout_height="71dp"
        android:layout_weight="1"
        android:text="Brand"
```

```
        android:textSize="24sp" />

    <RadioGroup
        android:id="@+id/radioGroup"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:layout_weight="1" >

        <RadioButton
            android:id="@+id/radio1"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:textSize="24sp"
            android:text="A" />

        <RadioButton
            android:id="@+id/radio2"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:textSize="24sp"
            android:text="B" />
    </RadioGroup>

</LinearLayout>

<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="93dp"
    android:orientation="horizontal">

    <TextView
        android:id="@+id/textView7"
        android:layout_width="146dp"
        android:layout_height="73dp"
        android:layout_weight="1"
        android:text="Description"
        android:textSize="24sp" />
```

```
    <EditText
        android:id="@+id/desci"
        android:layout_width="wrap_content"
        android:layout_height="75dp"
        android:layout_weight="1"
        android:ems="10"
        android:inputType="textPersonName"
        android:textSize="24sp" />
</LinearLayout>

<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="96dp"
    android:orientation="horizontal">

    <TextView
        android:id="@+id/textView8"
        android:layout_width="114dp"
        android:layout_height="79dp"
        android:layout_weight="1"
        android:text="Price"
        android:textSize="24sp" />

    <EditText
        android:id="@+id/pricei"
        android:layout_width="wrap_content"
        android:layout_height="82dp"
        android:layout_weight="1"
        android:ems="10"
        android:inputType="textPersonName"
        android:textSize="24sp" />
</LinearLayout>

<Button
    android:id="@+id/submiti"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
```

```
            android:text="Submit" />

        <Button
            android:id="@+id/backi"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:text="Back" />

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

Retrieve.xml:

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

    <LinearLayout
        android:id="@+id/linearLayout"
        android:layout_width="414dp"
        android:layout_height="203dp"
        android:orientation="vertical"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="1.0"
        app:layout_constraintStart_toStartOf="parent"
        tools:ignore="MissingConstraints"
        tools:layout_editor_absoluteY="-2dp">

        <LinearLayout
            android:layout_width="match_parent"
            android:layout_height="103dp"
            android:orientation="horizontal">

            <TextView
```

```
            android:id="@+id/textView"
            android:layout_width="144dp"
            android:layout_height="64dp"
            android:layout_weight="1"
            android:text="Product Id"
            android:textSize="24sp" />

        <EditText
            android:id="@+id/idr"
            android:layout_width="wrap_content"
            android:layout_height="83dp"
            android:layout_weight="1"
            android:ems="10"
            android:inputType="textPersonName"
            android:textSize="24sp" />
    </LinearLayout>

    <Button
        android:id="@+id/retrieve"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Retrieve" />

    <Button
        android:id="@+id/backr"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Back" />
</LinearLayout>

<LinearLayout
    android:layout_marginTop="50dp"
    android:layout_width="411dp"
    android:layout_height="459dp"
    android:orientation="vertical"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintStart_toStartOf="parent"
     app:layout_constraintTop_toBottomOf="@+id/linearLayout">
```

```
<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="84dp"
    android:orientation="horizontal">

    <TextView
        android:id="@+id/textView5"
        android:layout_width="131dp"
        android:layout_height="58dp"
        android:layout_weight="1"
        android:text="Product Name"
        android:textSize="24sp" />

    <TextView
        android:id="@+id/namer"
        android:layout_width="146dp"
        android:layout_height="73dp"
        android:layout_weight="1"
        android:text=""
        android:textSize="24sp" />
</LinearLayout>

<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="94dp"
    android:orientation="horizontal">

    <TextView
        android:id="@+id/textView6"
        android:layout_width="198dp"
        android:layout_height="71dp"
        android:layout_weight="1"
        android:text="Brand"
        android:textSize="24sp" />

    <TextView
        android:id="@+id/brandr"
```

```
        android:layout_width="146dp"
        android:layout_height="73dp"
        android:layout_weight="1"
        android:text=""
        android:textSize="24sp" />

</LinearLayout>

<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="93dp"
    android:orientation="horizontal">

    <TextView
        android:id="@+id/textView0"
        android:layout_width="146dp"
        android:layout_height="73dp"
        android:layout_weight="1"
        android:text="Description"
        android:textSize="24sp" />

    <TextView
        android:id="@+id/descr"
        android:layout_width="146dp"
        android:layout_height="73dp"
        android:layout_weight="1"
        android:text=""
        android:textSize="24sp" />
</LinearLayout>

<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="96dp"
    android:orientation="horizontal">

    <TextView
        android:id="@+id/textView8"
        android:layout_width="114dp"
```

```
            android:layout_height="79dp"
            android:layout_weight="1"
            android:text="Price"
            android:textSize="24sp" />

        <TextView
            android:id="@+id/pricer"
            android:layout_width="146dp"
            android:layout_height="73dp"
            android:layout_weight="1"
            android:text=""
            android:textSize="24sp" />
    </LinearLayout>


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

Retrieve All:

```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
xmlns:app="http://schemas.android.com/apk/res-auto"
xmlns:tools="http://schemas.android.com/tools"
android:layout_width="match_parent"
  android:layout_height="match_parent"
  android:id="@+id/parent">
  <Button
    android:id="@+id/backra"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:text="Back"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintStart_toStartOf="parent" />
```

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

Update.xml:

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

   <LinearLayout
      android:layout_width="412dp"
      android:layout_height="352dp"
      android:orientation="vertical"
      app:layout_constraintStart_toStartOf="parent"
      tools:layout_editor_absoluteY="186dp"
      tools:ignore="MissingConstraints">

      <LinearLayout
         android:layout_width="match_parent"
         android:layout_height="107dp"
         android:orientation="horizontal">

         <TextView
            android:id="@+id/textView2"
            android:layout_width="105dp"
            android:layout_height="80dp"
            android:layout_weight="1"
            android:textSize="24sp"
            android:text="Product Id" />

         <EditText
            android:id="@+id/idu"
            android:layout_width="wrap_content"
```

```
        android:layout_height="match_parent"
        android:layout_weight="1"
        android:ems="10"
        android:inputType="textPersonName"
        android:textSize="24sp" />
</LinearLayout>

<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="97dp"
    android:orientation="horizontal">

    <TextView
        android:id="@+id/textView4"
        android:layout_width="108dp"
        android:layout_height="79dp"
        android:layout_weight="1"
        android:textSize="24sp"
        android:text="Price" />

    <EditText
        android:id="@+id/priceu"
        android:layout_width="wrap_content"
        android:layout_height="match_parent"
        android:layout_weight="1"
        android:ems="10"
        android:textSize="24sp"
        android:inputType="textPersonName" />
</LinearLayout>

<Button
    android:id="@+id/update"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:text="Update" />

<Button
    android:id="@+id/backu"
```

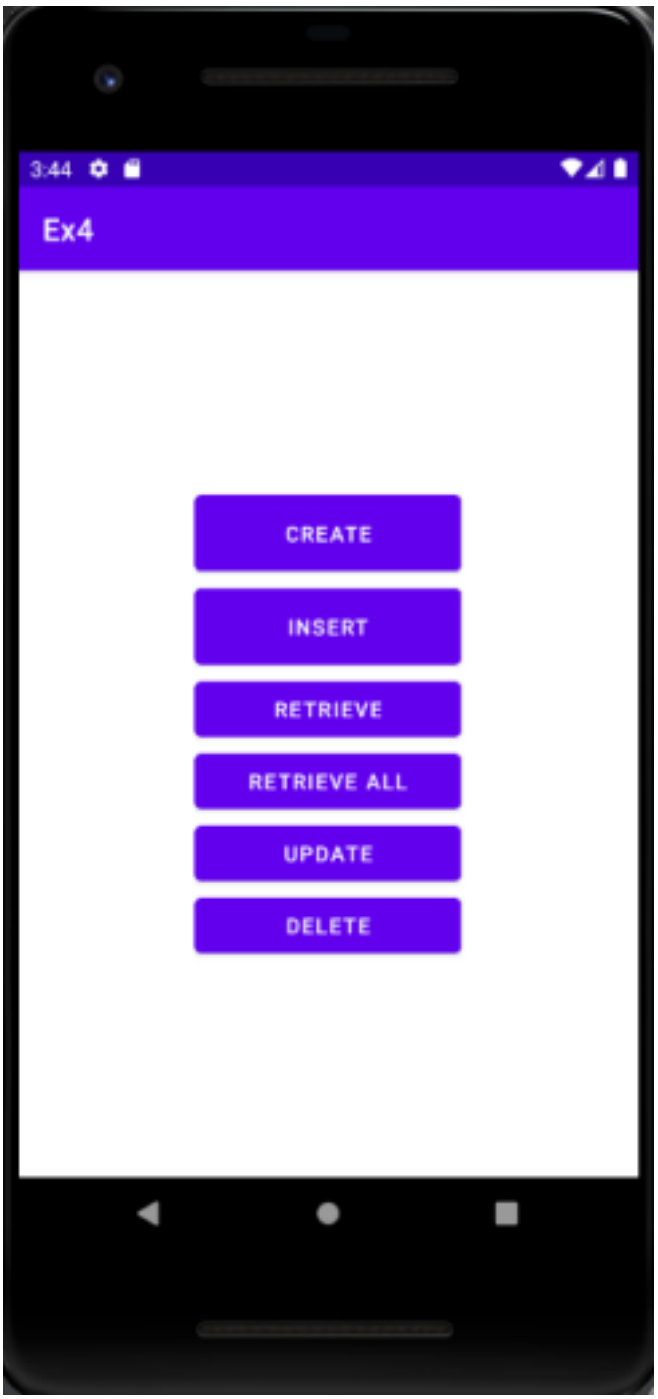
```
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Back" />
    </LinearLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

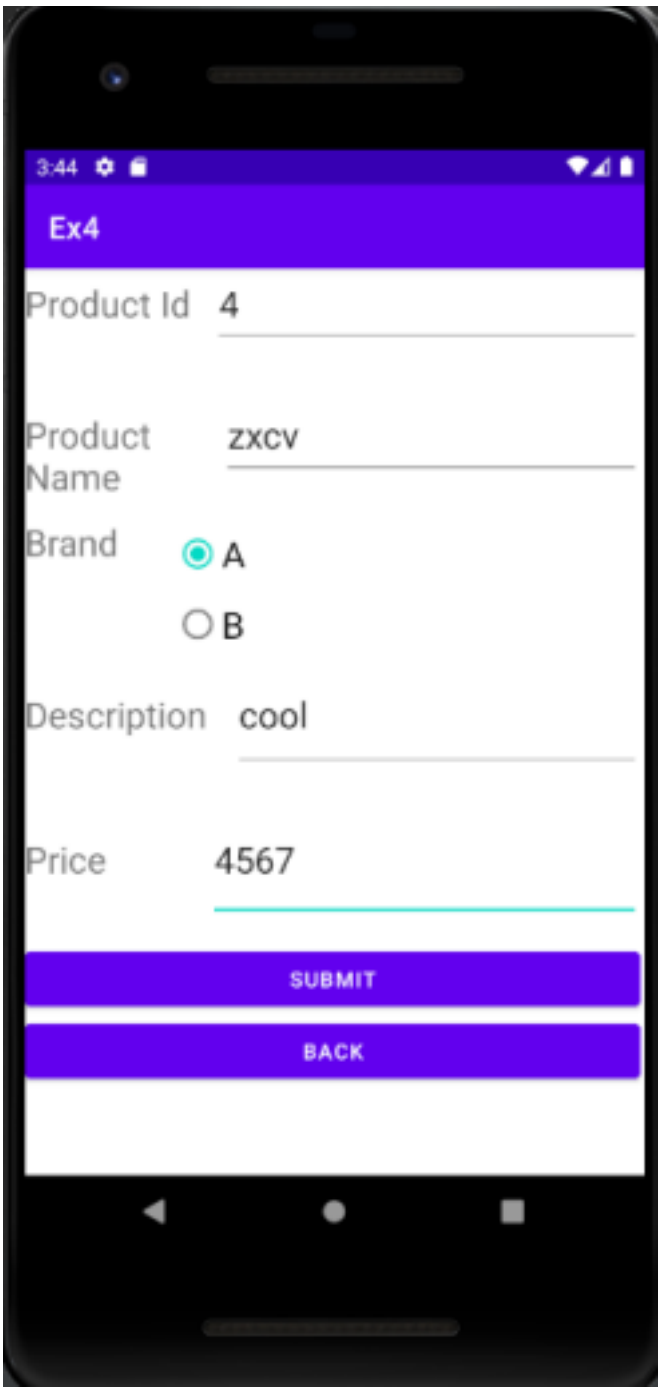
Delete.xml:

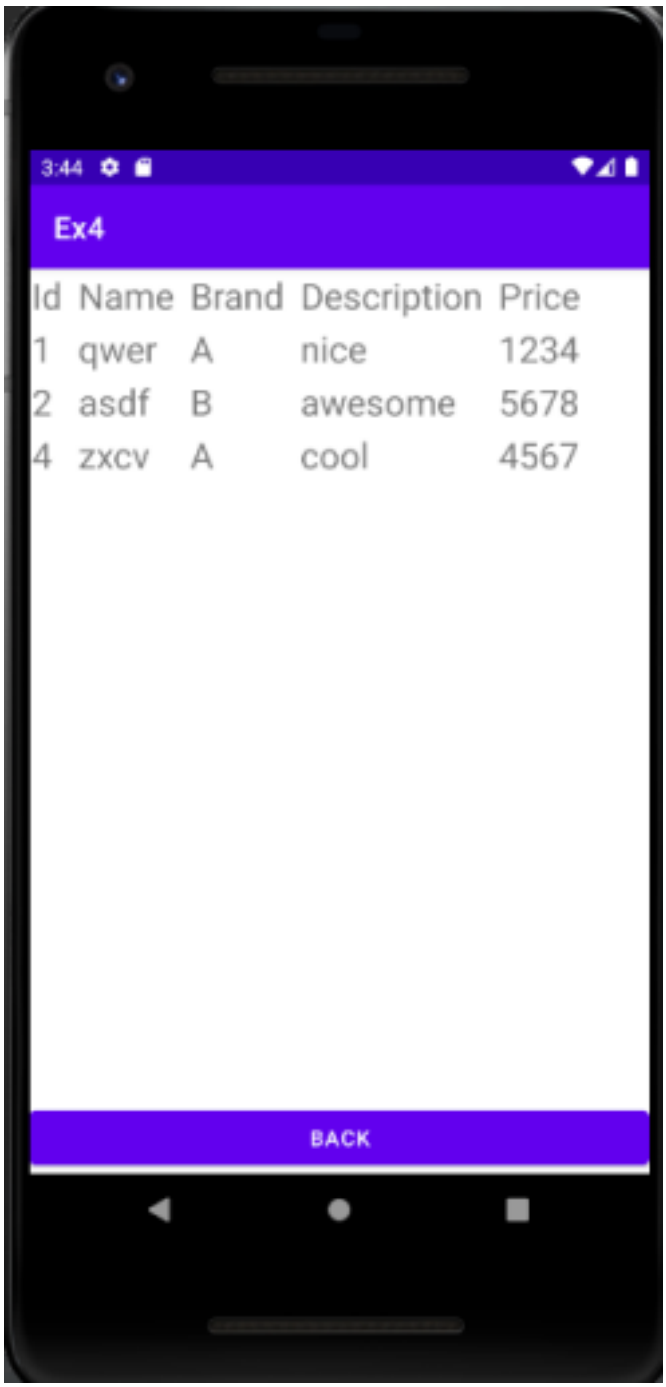
```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
xmlns:app="http://schemas.android.com/apk/res-auto"
xmlns:tools="http://schemas.android.com/tools"
android:layout_width="match_parent"
    android:layout_height="match_parent">

    <LinearLayout
        android:layout_width="414dp"
        android:layout_height="475dp"
        android:orientation="vertical"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        tools:layout_editor_absoluteY="101dp"
        tools:ignore="MissingConstraints">

        <LinearLayout
            android:layout_width="match_parent"
            android:layout_height="152dp"
            android:orientation="horizontal">

            <TextView
                android:id="@+id/textView"
                android:layout_width="144dp"
                android:layout_height="89dp"
                android:layout_weight="1"
                android:textSize="24sp"
                android:text="Product Id" />
```

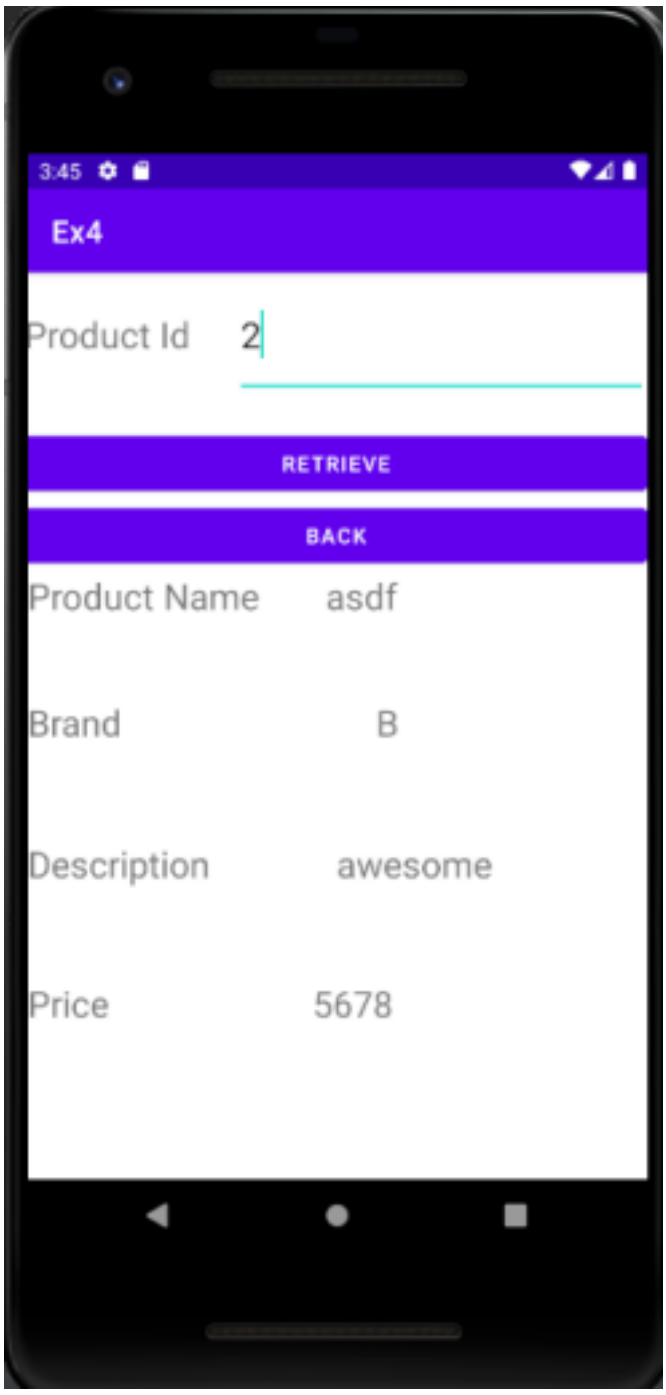
```
        <EditText
            android:id="@+id/idd"
            android:layout_width="wrap_content"
            android:layout_height="match_parent"
            android:layout_weight="1"
            android:ems="10"
            android:inputType="textPersonName"
            android:textSize="24sp" />
    </LinearLayout>

    <Button
        android:id="@+id/delete"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Delete" />
    <Button
        android:id="@+id/backd"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:text="Back" />
  </LinearLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

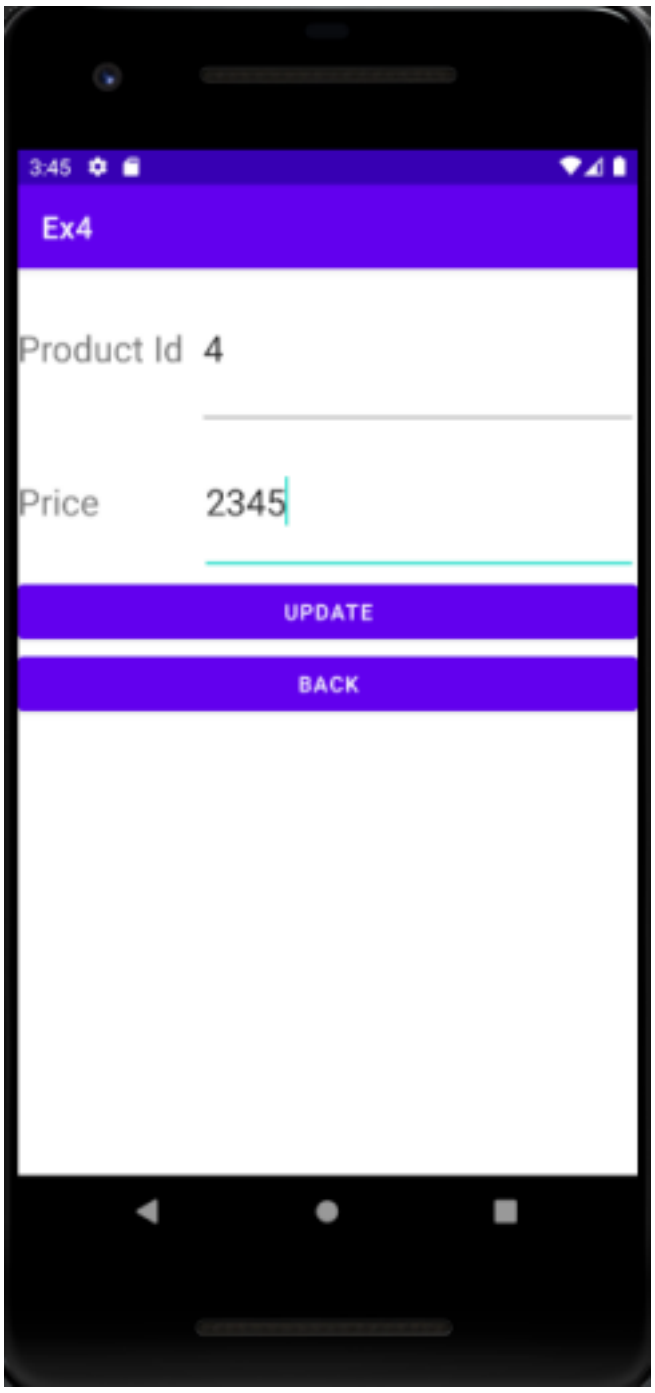
Output:

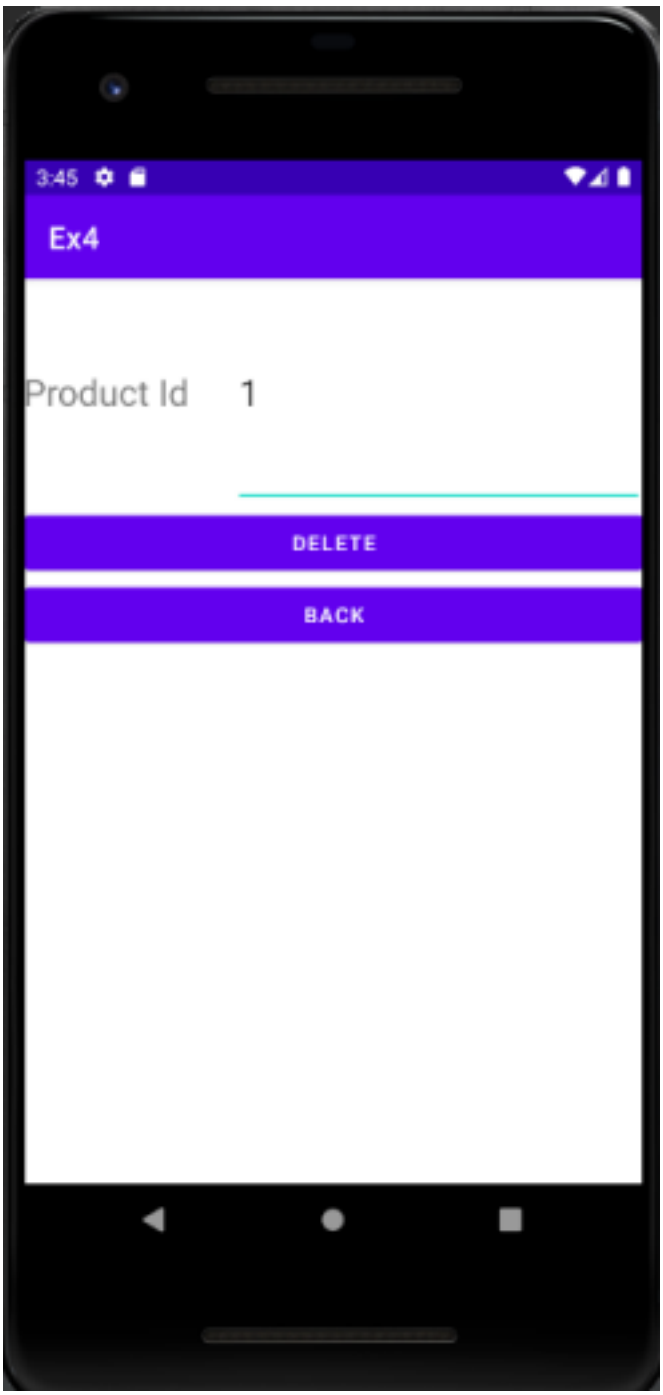

3:44
Ex4
CREATE
INSERT
RETRIEVE
RETRIEVE ALL
UPDATE
DELETE

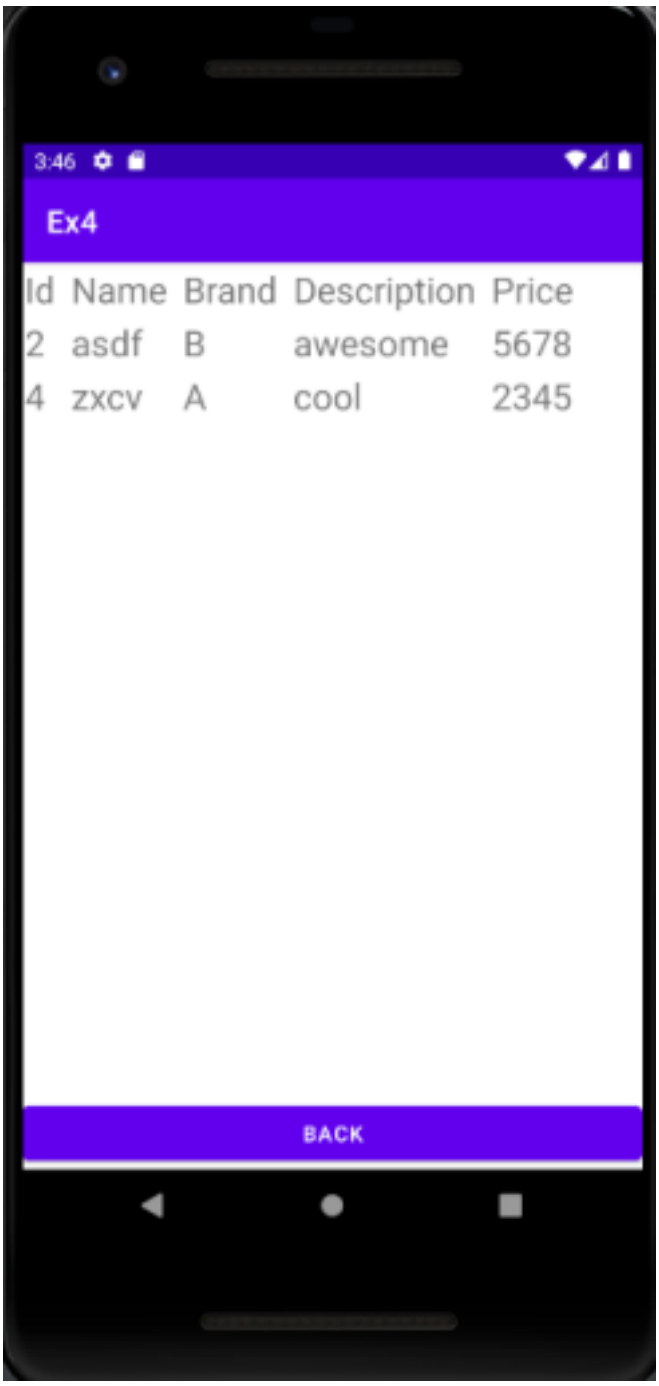

3:44
Ex4
Product Id
4
Product Name
zxcv
Brand
A
B
Description
cool
Price
4567
SUBMIT
BACK


3:44
Ex4
Id Name Brand Description Price
1 qwer A nice 1234
2 asdf B awesome 5678
4 zxcv A cool 4567
BACK


3:45
Ex4
Product Id
2
RETRIEVE
BACK
Product Name
asdf
Brand
B
Description
awesome
Price
5678


3:45
Ex4
Product Id
4
Price
2345
UPDATE
BACK


3:45
Ex4
Product Id
1
DELETE
BACK



Best Practices:

- Used apt names for xml and java files.
- Set padding and margins for dynamically added elements

Learning Outcomes:

- Learnt to integrate sqlite3 in android studio
- Learnt to do CRUD operations

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Ex. No. 5 Android Application using Multithreading

Aim:

Develop an android application to perform multithreading. Define 3 threads to run concurrently when the “start” button is clicked.

The first thread should change the color of the text indefinitely
The second thread should implement a moving banner
The third thread should display a counter starting from 0 to 1000

When the “Stop” button is pressed all the threads should be stopped

Layouts Used: None. Three textViews.

Code:

MainActivity.java:

```
package com.example.ex5;


import androidx.appcompat.app.AppCompatActivity;


import android.graphics.Color;

import android.os.Bundle;
import android.util.Log;

import android.view.View;
```

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

public class MainActivity extends AppCompatActivity {

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

        TextView t1 = findViewById(R.id.t1);
        Thread1 th1 = new Thread1(t1);

        TextView t2 = findViewById(R.id.t2);
        Thread2 th2 = new Thread2(t2);

        TextView t3 = findViewById(R.id.t3);
        Thread3 th3 = new Thread3(t3);
        final boolean[] init = {false};
        Button start = findViewById(R.id.start);
        start.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
```

```
        if(!init[0]){
            th1.start();
            th2.start();
            th3.start();
            init[0] = true;
        }
        else{
            Log.d("debug","hello");
            th1.pause(false);
            th2.pause(false);
            th3.pause(false);
        }



    }
});
Button stop = findViewById(R.id.stop);
stop.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View v) {
        th1.pause(true);
        th2.pause(true);
        th3.pause(true);
```

```
            }
        });


    }
}
```

Thread1.java:

```
package com.example.ex5;


import android.graphics.Color;
import android.util.Log;
import android.widget.TextView;
public class Thread1 extends Thread{
    TextView t;
    int red = 120;
    int green = 120;
    int blue = 120;
    boolean paused = false;
    Object lock = new Object();
    Thread1(TextView t){
        this.t=t;
    }
```

```
public void pause(boolean paused){
    synchronized (lock){
        if(paused)
        this.paused = true;
        else{
            this.paused = false;
            lock.notifyAll();
        }
    }
    Log.d("Debug",""+paused);
}

public void run(){

    while(true) {
        try {
            int color = Color.rgb(red, green, blue);
            t.setTextColor(color);

            red = (red + 20) % 255;
            green = (green + 10) % 255;
            blue = (blue + 5) % 255;
```

```
            Thread.sleep(500);


            synchronized (lock){
                while(paused){
                    try{
                        lock.wait();
                    }catch(InterruptedException e){
                    }
                }
            }
        } catch (InterruptedException e) {
            e.printStackTrace();
        }
    }


}
```

Thread2.java:

```
package com.example.ex5;


import android.util.Log;
```

```
import android.view.animation.TranslateAnimation;

import android.widget.TextView;


public class Thread2 extends Thread{

    TextView t;
    int dir = 1;

    int translationDistance = 300;

    boolean paused=false;

    Object lock = new Object();

    Thread2(TextView t){

        this.t=t;

    }

    public void pause(boolean paused){

        synchronized (lock){

            if(paused)

                this.paused = true;

            else{

                this.paused = false;

                lock.notifyAll();

            }

        }

        Log.d("Debug",""+paused);

    }
```

```
    public void run(){
        while (!paused) {

            try {

                TranslateAnimation animation;

                if (dir == 1) {

                    animation = new TranslateAnimation(-translationDistance,
translationDistance, 0, 0);

                } else {

                    animation = new TranslateAnimation(translationDistance,
-translationDistance, 0, 0);

                }


                animation.setDuration(3000); // Keep the total duration the same

                animation.setFillAfter(true);

                t.startAnimation(animation);


                Thread.sleep(3000);

                dir = 1 - dir;


                synchronized (lock){

                    while(paused){

                        try{

                            lock.wait();
                        }catch(InterruptedException e){
```

```
                }
            }
        }
    } catch (InterruptedException e) {
        e.printStackTrace();

    }

  }
}
```

Thread3.java:

```
package com.example.ex5;

import android.util.Log;
import android.widget.TextView;
public class Thread3 extends Thread{
    TextView t;
    int ctr=0;
    boolean paused = false;
```

```
Object lock = new Object();
Thread3(TextView t){
    this.t=t;
}
public void pause(boolean paused){
    synchronized (lock){
        if(paused)
            this.paused = true;
        else{
            this.paused = false;
            lock.notifyAll();
        }
    }
    Log.d("Debug",""+paused);
}


public void run(){
    while (ctr < 3000 && !paused) {
        try {
            Thread.sleep(1000);
            ctr += 1;


            // Update the TextView on the UI thread
```

```
                t.post(new Runnable() {
                    @Override
                    public void run() {
                        t.setText(Integer.toString(ctr));
                    }
                });

                synchronized (lock){
                    while(paused){
                        try{
                            lock.wait();
                        }catch(InterruptedException e){

                        }
                    }
                }
            } catch (InterruptedException e) {
                    paused = true;
                    e.printStackTrace();
            }
        }
    }
}
```

Activity_main.xml:

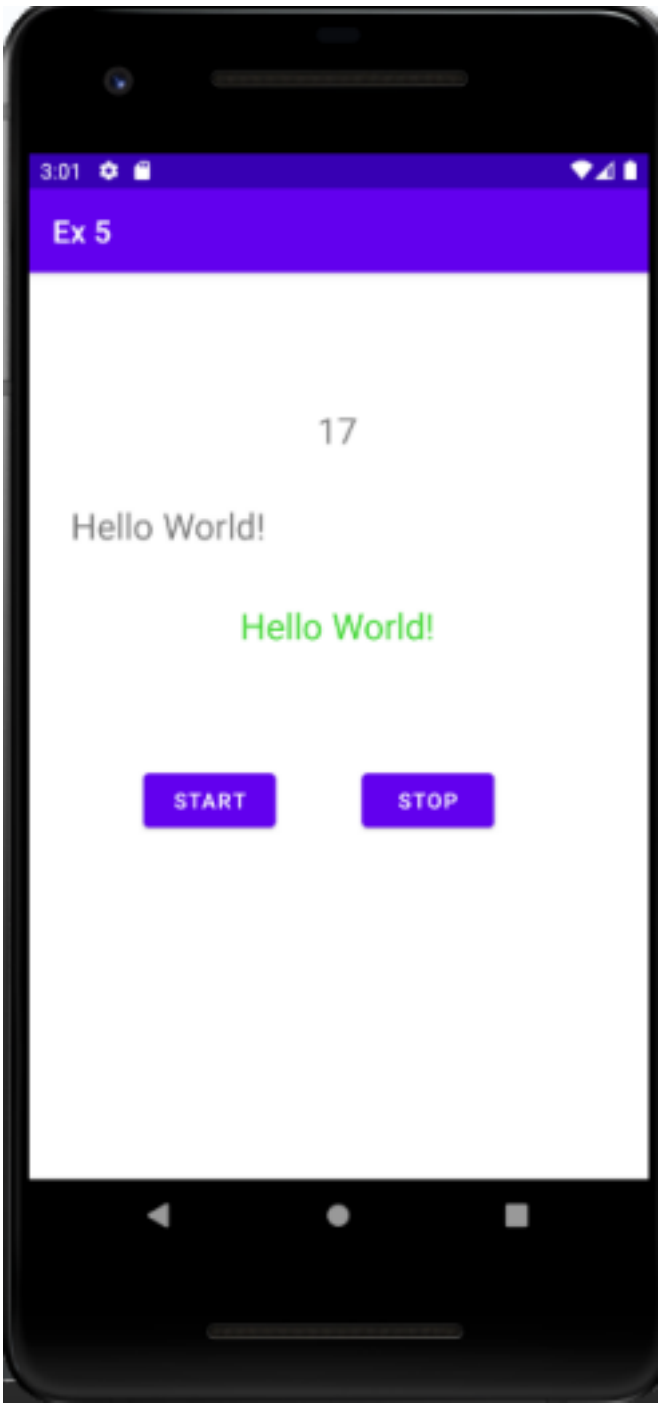
```
<?xml version="1.0" encoding="utf-8"?>

<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"

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

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

    android:layout_width="match_parent"

    android:layout_height="match_parent"

    tools:context=".MainActivity"

    tools:layout_editor_absoluteX="-1dp"

    tools:layout_editor_absoluteY="-83dp">


    <TextView
        android:id="@+id/t1"

        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:text="Hello World!"

        android:textSize="24sp"

        app:layout_constraintBottom_toBottomOf="parent"

        app:layout_constraintHorizontal_bias="0.498"

        app:layout_constraintLeft_toLeftOf="parent"

        app:layout_constraintRight_toRightOf="parent"
```

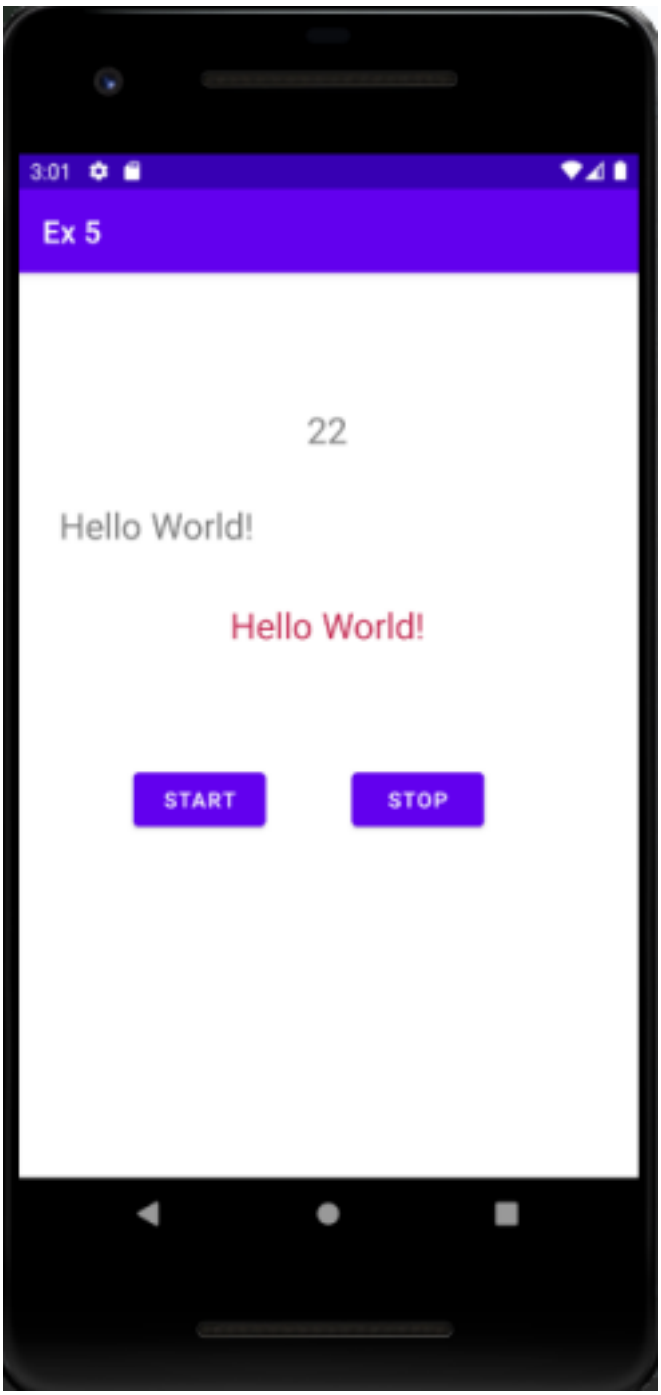
```
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.383" />

<TextView
    android:id="@+id/t2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Hello World!"
    android:textSize="24sp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintHorizontal_bias="0.501"
    app:layout_constraintLeft_toLeftOf="parent"
    app:layout_constraintRight_toRightOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.266" />

<TextView
    android:id="@+id/t3"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="0"
    android:textSize="24sp"
    app:layout_constraintBottom_toBottomOf="parent"
```

```
    app:layout_constraintHorizontal_bias="0.498"

    app:layout_constraintLeft_toLeftOf="parent"

    app:layout_constraintRight_toRightOf="parent"

    app:layout_constraintTop_toTopOf="parent"

    app:layout_constraintVertical_bias="0.155" />


<Button

    android:id="@+id/stop"

    android:layout_width="wrap_content"

    android:layout_height="wrap_content"
    android:layout_marginTop="76dp"

    android:text="Stop"

    app:layout_constraintEnd_toEndOf="parent"

    app:layout_constraintHorizontal_bias="0.684"

    app:layout_constraintStart_toStartOf="parent"

    app:layout_constraintTop_toBottomOf="@+id/t1" />


<Button

    android:id="@+id/start"

    android:layout_width="wrap_content"

    android:layout_height="wrap_content"

    android:layout_marginTop="76dp"

    android:text="Start"
```

```
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.236"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/t1" />



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

Output:


3:01
Ex 5
17
Hello World!
Hello World!
START
STOP


3:01
Ex 5
22
Hello World!
Hello World!
START
STOP

Best Practices:

● Names for ids of buttons were set meaningfully ● Implemented pause and resume in a single function
● Handled exceptions

Learning Outcomes:

● Learnt to implement multithreading ● Learnt to start, stop and resume threads

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Ex. No. 6 Android Application for Location Tracking

Aim: 1.Develop an Android Application that uses Geographical Positioning System (GPS) to display the user's current location in terms of Latitude and Longitude. 2. Develop a mobile app to display the Geo location of a given place.

Layouts Use: None. TextViews.

Code:

MainActivity.java:

```
package com.example.ex6;

import android.Manifest;
import android.annotation.SuppressLint;
import android.content.Context;
import android.content.Intent;
import android.content.pm.PackageManager;
import android.location.Location;
import android.location.LocationManager;
import android.os.Bundle;
import  android.os.Looper;
import android.provider.Settings;
import android.util.Log;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;
```

```
import androidx.annotation.NonNull;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.app.ActivityCompat;

import com.google.android.gms.location.FusedLocationProviderClient;
import com.google.android.gms.location.LocationCallback;
import com.google.android.gms.location.LocationRequest;
import com.google.android.gms.location.LocationResult;
import com.google.android.gms.location.LocationServices;
import com.google.android.gms.tasks.OnCompleteListener;
import com.google.android.gms.tasks.Task;

import android.location.Address;
import android.location.Geocoder;
import android.widget.Toast;
import java.io.IOException;
import java.util.List;


public class MainActivity extends AppCompatActivity {

    // initializing
    // FusedLocationProviderClient
    // object
    FusedLocationProviderClient mFusedLocationClient;

    // Initializing other items
    // from layout file
    TextView latitudeTextView, longitTextView;
    int PERMISSION_ID = 44;

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

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

        latitudeTextView = findViewById(R.id.latTextView);
        longitTextView = findViewById(R.id.lonTextView);

        mFusedLocationClient =
LocationServices.getFusedLocationProviderClient(this);

        // method to get the location
        getLastLocation();



        Button display = findViewById(R.id.dis);
        display.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                String loc = ((EditText)
findViewById(R.id.loc)).getText().toString();
                Log.d("debug",loc);
                getLatLngForPlace(loc);
            }
        });
    }

    @SuppressLint("MissingPermission")
    private void getLastLocation() {
        // check if permissions are given
        if (checkPermissions()) {

            // check if location is enabled
            if (isLocationEnabled()) {

                // getting last
                // location from
                // FusedLocationClient
```

```
            // object

mFusedLocationClient.getLastLocation().addOnCompleteListener(new
OnCompleteListener<Location>() {
                @Override
                public void onComplete(@NonNull Task<Location> task) {
                    Location location = task.getResult();
                    if (location == null) {
                        requestNewLocationData();
                    } else {
                        latitudeTextView.setText(location.getLatitude() + "");
                        longitTextView.setText(location.getLongitude() + "");
                    }
                }
            });
        } else {
            Toast.makeText(this, "Please turn on" + " your location...",
Toast.LENGTH_LONG).show();
            Intent intent = new
Intent(Settings.ACTION_LOCATION_SOURCE_SETTINGS);
            startActivity(intent);
        }
    } else {
        // if permissions aren't available,
        // request for permissions
        requestPermissions();
    }
}

@SuppressLint("MissingPermission")
private void requestNewLocationData() {

    // Initializing LocationRequest
    // object with appropriate methods
    LocationRequest mLocationRequest = new LocationRequest();
```

```
mLocationRequest.setPriority(LocationRequest.PRIORITY_HIGH_ACCUR
ACY);
        mLocationRequest.setInterval(5);
        mLocationRequest.setFastestInterval(0);
        mLocationRequest.setNumUpdates(1);

        // setting LocationRequest
        // on FusedLocationClient
        mFusedLocationClient =
LocationServices.getFusedLocationProviderClient(this);
        mFusedLocationClient.requestLocationUpdates(mLocationRequest,
mLocationCallback, Looper.myLooper());
    }

    private LocationCallback mLocationCallback = new LocationCallback() {

        @Override
        public void onLocationResult(LocationResult locationResult) {
            Location mLastLocation = locationResult.getLastLocation();
            latitudeTextView.setText("Latitude: " + mLastLocation.getLatitude()
+ "");
            longitTextView.setText("Longitude: " +
mLastLocation.getLongitude() + "");
        }
    };

    // method to check for permissions
    private boolean checkPermissions() {
        return ActivityCompat.checkSelfPermission(this,
Manifest.permission.ACCESS_COARSE_LOCATION) ==
PackageManager.PERMISSION_GRANTED &&
ActivityCompat.checkSelfPermission(this,
Manifest.permission.ACCESS_FINE_LOCATION) ==
PackageManager.PERMISSION_GRANTED;
```

```
        // If we want background location
        // on Android 10.0 and higher,
        // use:
        // ActivityCompat.checkSelfPermission(this,
Manifest.permission.ACCESS_BACKGROUND_LOCATION) ==
PackageManager.PERMISSION_GRANTED
    }

    // method to request for permissions
    private void requestPermissions() {
        ActivityCompat.requestPermissions(this, new String[]{
                Manifest.permission.ACCESS_COARSE_LOCATION,
                Manifest.permission.ACCESS_FINE_LOCATION},
PERMISSION_ID);
    }

    // method to check
    // if location is enabled
    private boolean isLocationEnabled() {
        LocationManager locationManager = (LocationManager)
getSystemService(Context.LOCATION_SERVICE);
        return
locationManager.isProviderEnabled(LocationManager.GPS_PROVIDER) ||
locationManager.isProviderEnabled(LocationManager.NETWORK_PROVI
DER);
    }

    // If everything is alright then
    @Override
    public void
    onRequestPermissionsResult(int requestCode, @NonNull String[]
permissions, @NonNull int[] grantResults) {
        super.onRequestPermissionsResult(requestCode, permissions,
grantResults);
```

```
        if (requestCode == PERMISSION_ID) {
            if (grantResults.length > 0 && grantResults[0] ==
PackageManager.PERMISSION_GRANTED) {
                getLastLocation();
            }
        }
    }

    @Override
    public void onResume() {
        super.onResume();
        if (checkPermissions()) {
            getLastLocation();
        }
    }

    private void getLatLngForPlace(String placeName) {
        Geocoder geocoder = new Geocoder(this);

        try {
            List<Address> addresses =
geocoder.getFromLocationName(placeName, 1);
            if (addresses != null && !addresses.isEmpty()) {
                Address address = addresses.get(0);
                double latitude = address.getLatitude();
                double longitude = address.getLongitude();
                latitudeTextView.setText("" + latitude);
                longitTextView.setText("" + longitude);
            } else {
                // Handle the case where the place name couldn't be geocoded
                Toast.makeText(this, "Place not found",
Toast.LENGTH_SHORT).show();
            }
        } catch (IOException e) {
```

```
            e.printStackTrace();
        }
    }

}
```

Activity_main.xml:

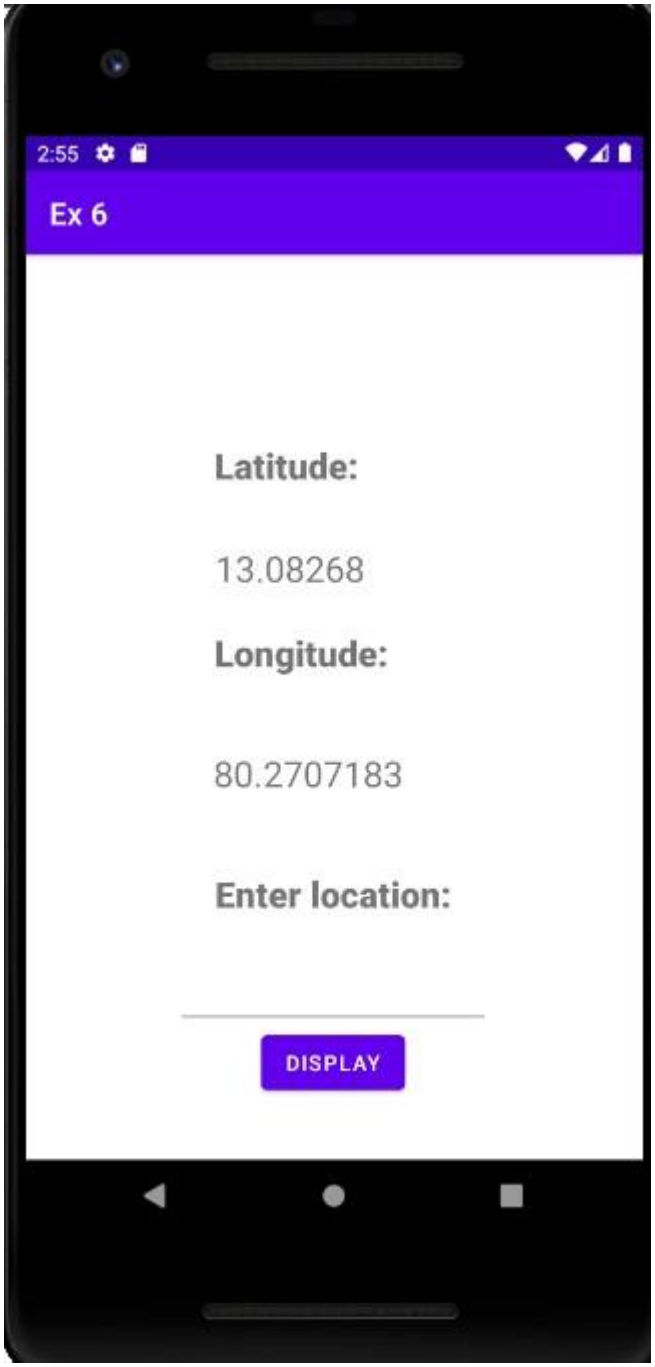
```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
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

    <TextView
        android:id="@+id/textView4"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="48dp"
        android:fontFamily="sans-serif-black"
        android:text="Enter location:"
        android:textSize="24sp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.498"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/lonTextView"
        tools:ignore="MissingConstraints" />

    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
```

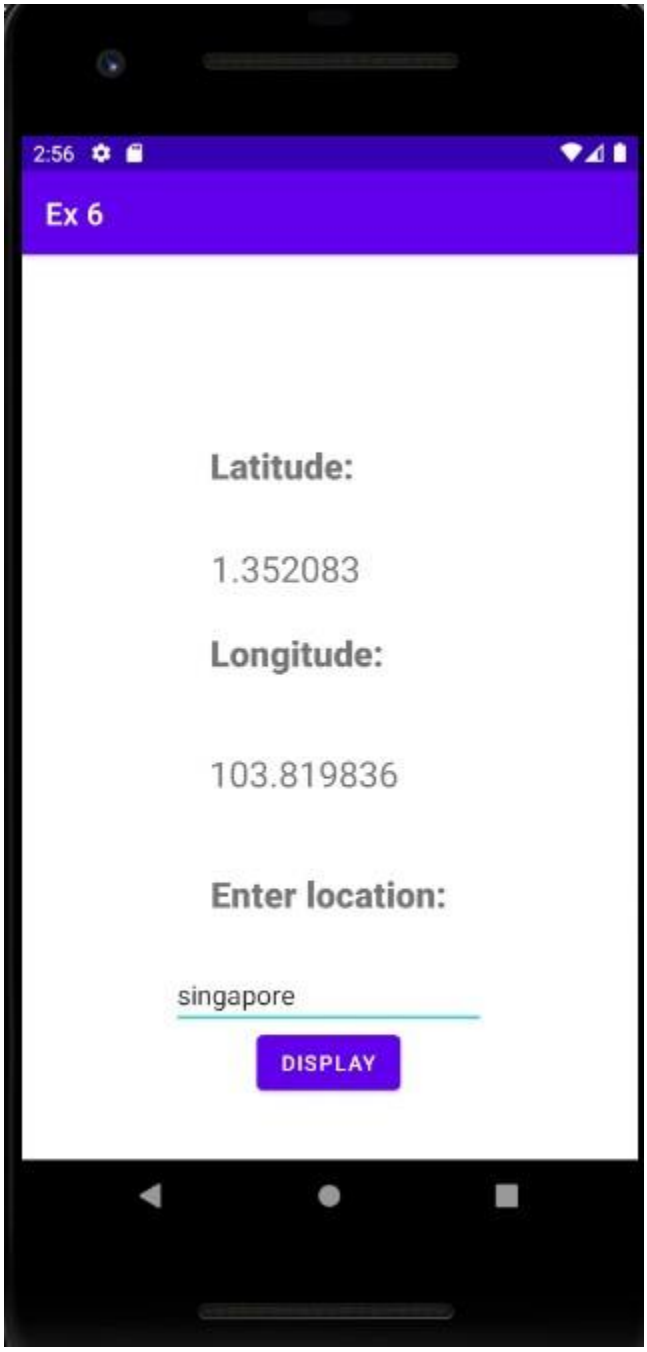
```
    android:layout_height="wrap_content"
    android:layout_marginTop="124dp"
    android:fontFamily="sans-serif-black"
    android:text="Latitude:"
    android:textSize="24sp"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.4"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    tools:ignore="MissingConstraints" />

<TextView
    android:id="@+id/latTextView"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="36dp"
    android:text=""
    android:textSize="24sp"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.406"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/textView"
    tools:ignore="MissingConstraints" />

<TextView
    android:id="@+id/textView2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="24dp"
    android:fontFamily="sans-serif-black"
    android:text="Longitude:"
    android:textSize="24sp"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.427"
    app:layout_constraintStart_toStartOf="parent"
```

```
    app:layout_constraintTop_toBottomOf="@+id/latTextView"
    tools:ignore="MissingConstraints" />

<TextView
    android:id="@+id/lonTextView"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="48dp"
    android:text=""
    android:textSize="24sp"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.44"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/textView2"
    tools:ignore="MissingConstraints" />

<Button
    android:id="@+id/dis"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Display"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.498"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/textView4"
    app:layout_constraintVertical_bias="0.639" />

<EditText
    android:id="@+id/loc"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:inputType="textPersonName"
    app:layout_constraintBottom_toBottomOf="parent"
```

```
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.497"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/textView4"
        app:layout_constraintVertical_bias="0.25" />


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

Output:


2:55
Ex 6
Latitude:
13.08268
Longitude:
80.2707183
Enter location:
DISPLAY



Best Practices:

- Used meaningful ids
- Aligned the textviews

Learning Outcomes:

- Learnt to retrieve coordinates of current locations
- Learnt to retrieve coordinates of a different location using geocoder

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CSE - B

Ex 7: Android Application to write/read a file to/from the SD Card

Aim:

Develop an Android Application to write/read some contents to/from the SD Card.

1. In a TextView write the contents of the file.
2. Use another TextView to read the file name from the user.
3. On clicking 'Write' Button,

   Create a file mentioned in 2nd TextView.

   Write the contents (using 1st TextView) in the file.

   Store the file in the SD card.

4. On clicking 'Read' Button,

   Move to a new activity.
   Read the file name(TextView)
   Read the contents of the file from SD card and display in a new TextView.

Layouts Used: Main Activity and Read Intents. Edit and Text Views.

Code:

MainActivity.java:

```
package com.example.ex7;



import android.Manifest;
import android.content.Intent;

import android.content.pm.PackageManager;
```

```
import android.os.Bundle;
import android.os.Environment;

import android.util.Log;

import android.view.View;

import android.widget.Button;

import android.widget.EditText;

import android.widget.Toast;


import androidx.annotation.NonNull;

import androidx.appcompat.app.AppCompatActivity;

import androidx.core.app.ActivityCompat;

import androidx.core.content.ContextCompat;


import java.io.File;

import java.io.FileOutputStream;

import java.io.IOException;


public class MainActivity extends AppCompatActivity {


   private static final int REQUEST_WRITE_EXTERNAL_STORAGE = 1;
    @Override

    protected void onCreate(Bundle savedInstanceState) {

        super.onCreate(savedInstanceState);

        setContentView(R.layout.activity_main);


        // Request the WRITE_EXTERNAL_STORAGE permission if not granted
```

```
            if (ContextCompat.checkSelfPermission(this,
Manifest.permission.WRITE_EXTERNAL_STORAGE) !=

                    PackageManager.PERMISSION_GRANTED) {

                ActivityCompat.requestPermissions(this, new
String[]{Manifest.permission.WRITE_EXTERNAL_STORAGE},
REQUEST_WRITE_EXTERNAL_STORAGE);

            } else {

                // Permission already granted, perform file operations

                Button button = findViewById(R.id.write);

                button.setOnClickListener(new View.OnClickListener() {

                    @Override

                    public void onClick(View v) {

                        EditText et1 = findViewById(R.id.et1);

                        String file = et1.getText().toString();


                        EditText et2 = findViewById(R.id.et2);

                        String content = et2.getText().toString();

                        createAndWriteFileToSDCard(file,content);

                    }
                });

            }


            Button read = findViewById(R.id.read1);

            read.setOnClickListener(new View.OnClickListener() {

                @Override

                public void onClick(View v) {

                    Intent intent = new Intent(MainActivity.this,Read.class);
```

```
                startActivity(intent);

            }

        });

    }


    // Handle permission request results

    @Override

    public void onRequestPermissionsResult(int requestCode,
@NonNull String[] permissions, @NonNull int[] grantResults) {

        super.onRequestPermissionsResult(requestCode, permissions,
grantResults);

        if (requestCode == REQUEST_WRITE_EXTERNAL_STORAGE) {

            if (grantResults.length > 0 && grantResults[0] ==
PackageManager.PERMISSION_GRANTED) {

                Toast.makeText(this, "Permission granted. Can write to SD card.",
Toast.LENGTH_SHORT).show();

                Button button = findViewById(R.id.write);
                button.setOnClickListener(new View.OnClickListener() {

                    @Override

                    public void onClick(View v) {

                        EditText et1 = findViewById(R.id.et1);

                        String file = et1.getText().toString();



                        EditText et2 = findViewById(R.id.et2);

                        String content = et2.getText().toString();

                        createAndWriteFileToSDCard(file,content);

                    }
                });
```

```
                } else {
                    Toast.makeText(this, "Permission denied. Cannot write to SD card.", Toast.LENGTH_SHORT).show();
                }
            }
        }

        private void createAndWriteFileToSDCard(String fileName,String fileContent) {
            // Check if external storage is available
            if (isExternalStorageWritable()) {
                File sdCard = Environment.getExternalStorageDirectory();
                File directory = new File(sdCard.getAbsolutePath() + "/ex7"); // Change to your desired directory
                directory.mkdirs();

                File file = new File(directory, fileName+".txt"); // Change the file name as needed

                try {
                    FileOutputStream fos = new FileOutputStream(file);
                    fos.write(fileContent.getBytes());
                    fos.close();
                    Toast.makeText(this, "File created and written to SD card", Toast.LENGTH_SHORT).show();
                } catch (IOException e) {
                    Log.e("FileWriteError", "Error writing to file on SD card: " + e.getMessage());
```

```
            }
        } else {
            Toast.makeText(this, "SD card is not available for writing.",
Toast.LENGTH_SHORT).show();
        }
    }

    private boolean isExternalStorageWritable() {
        String state = Environment.getExternalStorageState();
        return Environment.MEDIA_MOUNTED.equals(state);
    }
}
```

Read.java:

```
package com.example.ex7;

import android.Manifest;
import android.content.pm.PackageManager;
import android.os.Bundle;
import android.os.Environment;
import android.util.Log;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.TextView;
import android.widget.Toast;
```

```
import androidx.annotation.NonNull;

import androidx.appcompat.app.AppCompatActivity;

import androidx.core.app.ActivityCompat; import

androidx.core.content.ContextCompat;


import java.io.BufferedReader;

import java.io.File;
import java.io.FileReader;

import java.io.IOException;


public class Read extends AppCompatActivity {


    private static final int REQUEST_READ_EXTERNAL_STORAGE = 2;


    private TextView fileContentsTextView;



    @Override

    protected void onCreate(Bundle savedInstanceState) {

        super.onCreate(savedInstanceState);

        setContentView(R.layout.read);



         fileContentsTextView = findViewById(R.id.content);
          // Request the READ_EXTERNAL_STORAGE permission if not granted

         if (ContextCompat.checkSelfPermission(this,
Manifest.permission.READ_EXTERNAL_STORAGE)
```

```
                != PackageManager.PERMISSION_GRANTED) {

            ActivityCompat.requestPermissions(this, new
String[]{Manifest.permission.READ_EXTERNAL_STORAGE},
REQUEST_READ_EXTERNAL_STORAGE);

        } else {

            // Permission already granted, perform file reading
            Button readButton = findViewById(R.id.read2);

            readButton.setOnClickListener(new View.OnClickListener() {

                @Override

                public void onClick(View v) {

                    EditText fileNameEditText = findViewById(R.id.name);

                    String fileName = fileNameEditText.getText().toString();

                    readFileFromSDCard(fileName);

                }

            });

        }

    }


    // Handle permission request results

    @Override

    public void onRequestPermissionsResult(int requestCode,
@NonNull String[] permissions, @NonNull int[] grantResults) {

        super.onRequestPermissionsResult(requestCode, permissions,
grantResults);

        if (requestCode == REQUEST_READ_EXTERNAL_STORAGE) {

            if (grantResults.length > 0 && grantResults[0] ==
PackageManager.PERMISSION_GRANTED) {
```

```
                    Toast.makeText(this, "Permission granted. Can read from SD card.",
Toast.LENGTH_SHORT).show();

                    Button readButton = findViewById(R.id.read2);

                    readButton.setOnClickListener(new View.OnClickListener() {
                        @Override

                        public void onClick(View v) {

                            EditText fileNameEditText = findViewById(R.id.name);

                            String fileName = fileNameEditText.getText().toString();

                            readFileFromSDCard(fileName);

                        }

                    });

                } else {

                    Toast.makeText(this, "Permission denied. Cannot read from SD card.",
Toast.LENGTH_SHORT).show();

                }

            }

        }


        private void readFileFromSDCard(String fileName) {

            if (isExternalStorageReadable()) {

                File sdCard = Environment.getExternalStorageDirectory();

                File directory = new File(sdCard.getAbsolutePath() + "/ex7"); // Change to
your directory
                File file = new File(directory, fileName + ".txt");



                if (file.exists()) {

                    try {
```

```
                    BufferedReader br = new BufferedReader(new FileReader(file));
                    StringBuilder text = new StringBuilder();

                    String line;


                    while ((line = br.readLine()) != null) {

                        text.append(line);

                        text.append('\n');

                    }


                    br.close();

                    fileContentsTextView.setText(text.toString());

                } catch (IOException e) {

                    Log.e("FileReadError", "Error reading file on SD card: " +
e.getMessage());

                    fileContentsTextView.setText("Error reading file.");

                }

            } else {

                fileContentsTextView.setText("File not found.");

            }

        } else {

            fileContentsTextView.setText("SD card is not available for reading.");
        }

    }


    private boolean isExternalStorageReadable() {
        String state = Environment.getExternalStorageState();
```

```
            return Environment.MEDIA_MOUNTED.equals(state)
|| Environment.MEDIA_MOUNTED_READ_ONLY.equals(state);

        }

    }
```

Activity_main.xml:

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

<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"

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

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

    android:layout_width="match_parent"

    android:layout_height="match_parent"

    tools:context=".MainActivity">


    <TextView

        android:id="@+id/tv2"

        android:layout_width="wrap_content"

        android:layout_height="wrap_content"

        android:text="Enter text"

        android:textSize="24sp"
        app:layout_constraintBottom_toBottomOf="parent"

        app:layout_constraintEnd_toEndOf="parent"

        app:layout_constraintHorizontal_bias="0.498"

        app:layout_constraintStart_toStartOf="parent"
```

```
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.387" />

<EditText
    android:id="@+id/et1"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="184dp"
    android:ems="10"
    android:inputType="textPersonName"
    android:text=""
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.497"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<EditText
    android:id="@+id/et2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:inputType="textPersonName"
    android:text=""
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
```

```
    app:layout_constraintHorizontal_bias="0.497"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<TextView
    android:id="@+id/tv1"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="128dp"
    android:text="Enter file name"
    android:textSize="24sp"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<Button
    android:id="@+id/write"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Write"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.498"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.65" />
```

```
        <Button
            android:id="@+id/read1"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:layout_marginBottom="156dp"
            android:text="Read"
            app:layout_constraintBottom_toBottomOf="parent"
            app:layout_constraintEnd_toEndOf="parent"
            app:layout_constraintHorizontal_bias="0.498"
            app:layout_constraintStart_toStartOf="parent" />


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

Read.xml:

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


        <TextView
            android:id="@+id/textView3"
            android:layout_width="207dp"
```

```
    android:layout_height="47dp"

    android:text="File Content:"

    android:textSize="24sp"

    app:layout_constraintBottom_toBottomOf="parent"

    app:layout_constraintEnd_toEndOf="parent"

    app:layout_constraintStart_toStartOf="parent"

    app:layout_constraintTop_toTopOf="parent"

    app:layout_constraintVertical_bias="0.602" />


<TextView

    android:id="@+id/textView"

    android:layout_width="125dp"

    android:layout_height="50dp"

    android:text="File Name"
    android:textSize="24sp"

    app:layout_constraintBottom_toBottomOf="parent"

    app:layout_constraintEnd_toEndOf="parent"

    app:layout_constraintHorizontal_bias="0.461"

    app:layout_constraintStart_toStartOf="parent"

    app:layout_constraintTop_toTopOf="parent"

    app:layout_constraintVertical_bias="0.19" />


<EditText

    android:id="@+id/name"

    android:layout_width="wrap_content"
```

```
    android:layout_height="wrap_content"
    android:ems="10"
    android:inputType="textPersonName"
    android:text=""
    android:textSize="24sp"
    app:layout_constraintBottom_toBottomOf="parent"
app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintHorizontal_bias="0.496"
app:layout_constraintStart_toStartOf="parent"
app:layout_constraintTop_toTopOf="parent"
app:layout_constraintVertical_bias="0.29" />
<EditText
    android:id="@+id/content"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:ems="10"
    android:inputType="textPersonName"
    android:text=""
    android:textSize="24sp"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.496"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    app:layout_constraintVertical_bias="0.724" />
```

```
        <Button
            android:id="@+id/read2"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="Read"
            app:layout_constraintBottom_toBottomOf="parent"
            app:layout_constraintEnd_toEndOf="parent"
            app:layout_constraintHorizontal_bias="0.498"
            app:layout_constraintStart_toStartOf="parent"
            app:layout_constraintTop_toTopOf="parent"
            app:layout_constraintVertical_bias="0.407" />

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

AndroidManifest.xml:

```
    <?xml version="1.0" encoding="utf-8"?>
    <manifest xmlns:android="http://schemas.android.com/apk/res/android"
        package="com.example.ex7">
<application
android:allowBackup="true"
android:icon="@mipmap/ic_launcher"
android:label="@string/app_name"
android:roundIcon="@mipmap/ic_launcher_round"
android:supportsRtl="true"
```

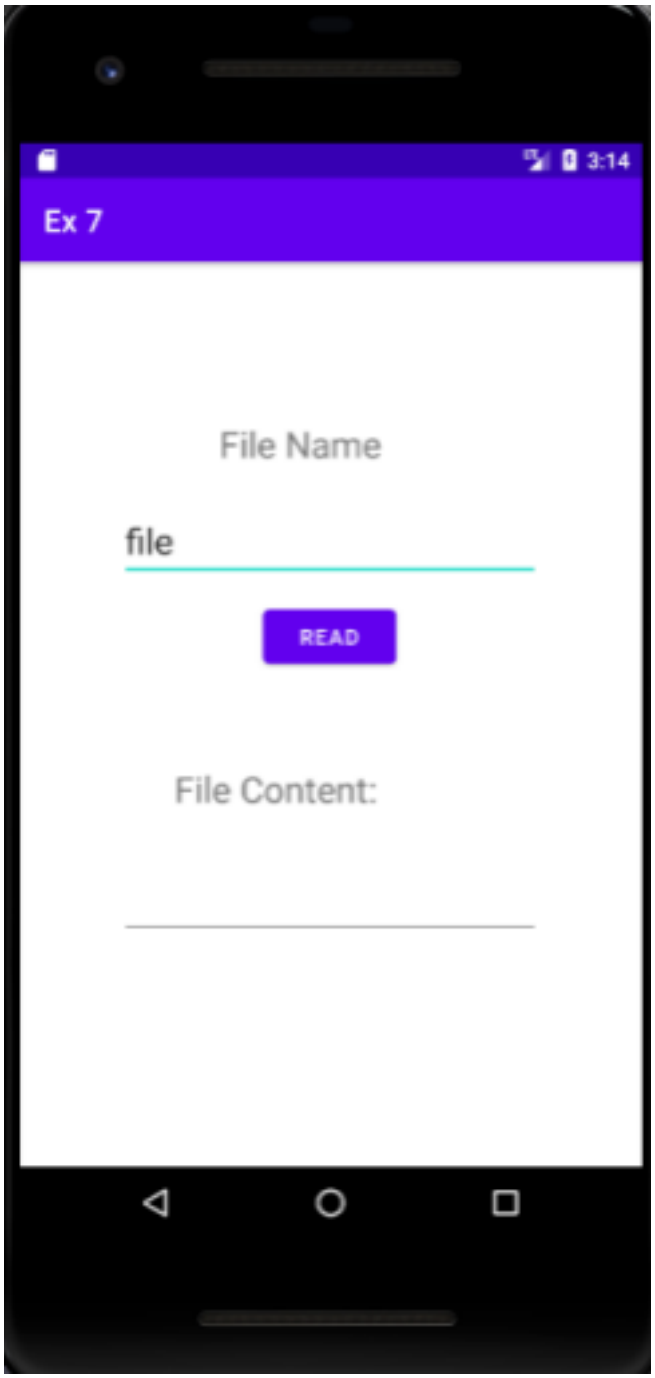
```
android:theme="@style/Theme.Ex7">

<activity

android:name=".MainActivity"

android:exported="true">

<intent-filter>

<action android:name="android.intent.action.MAIN" />
<category android:name="android.intent.category.LAUNCHER" /> </intent-filter>

</activity>

<activity android:name=".Read"></activity>

</application>

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

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

<uses-permission
android:name="android.permission.MANAGE_EXTERNAL_STORAGE" /> </manifest>
```

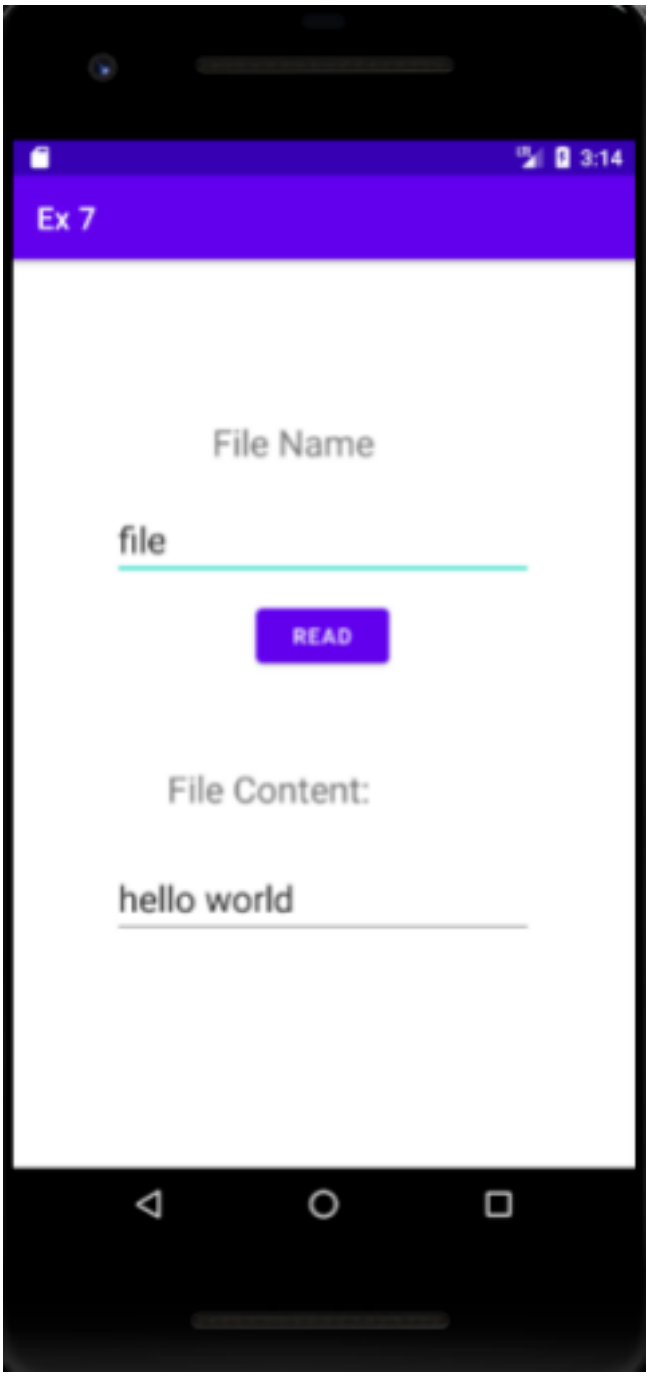
Output:

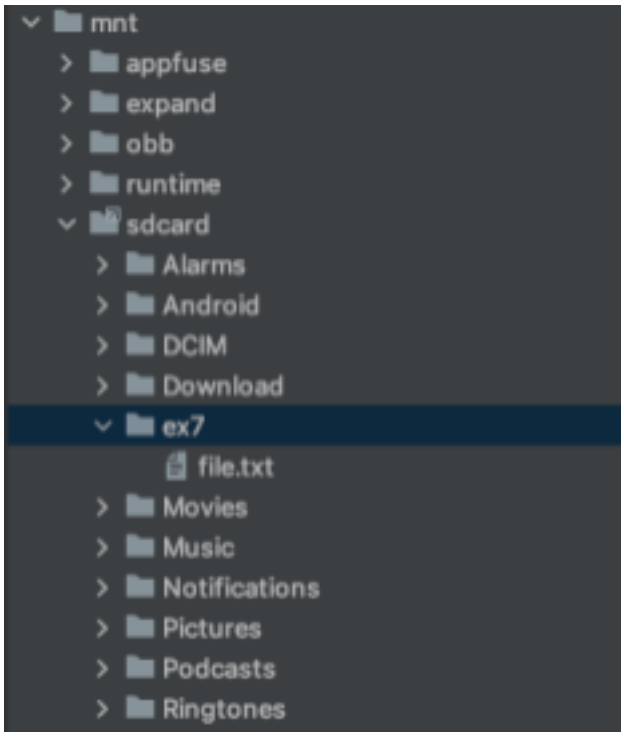

3:13
Ex 7
Enter file name
Enter text
WRITE
READ


3:13
Ex 7
Enter file name
file
Enter text
hello world
WRITE
READ


3:13
Ex 7
File Name
READ
File Content:


3:14
Ex 7
File Name
file
READ
File Content:


3:14
Ex 7
File Name
file
READ
File Content:
hello world



Best Practices:

- Used appropriate ids for buttons, views and intents
- Aligned views.

Learning Outcomes:

- Learnt to create a file
- Learnt to write to a file and store the file in SD card
- Learnt to read from a file that is in SD card

13th Nov,2023

Sabarivasan V
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CSE - B

Ex. No. 8 Android Application to send SMS and Notification

Aim:

Develop an Android Application to send SMS and Notification for the SMS. Send SMS to a specific Mobile Number. a. Use TextViews to read the message content and Mobile Number. b. Use Button to 'SEND'. c. On pressing Send button, send the SMS to the specified mobile number and Notification. Receive SMS a. Display the notification in status bar of the receiver. b. On clicking the notification, enter into receivers Message box.

Layouts Used: Intents for sending and receiving sms.

Code:

MainActivity.java:

```
package com.example.ex8;

import android.Manifest;
import android.app.NotificationChannel;
import android.app.NotificationManager;
import android.app.PendingIntent;
import android.content.Intent;
import android.content.pm.PackageManager;
import android.os.Build;
import android.os.Bundle;
import android.telephony.SmsManager;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;
```

```
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.app.ActivityCompat;
import androidx.core.content.ContextCompat;
import androidx.core.app.NotificationCompat;
import androidx.core.app.NotificationManagerCompat;

public class MainActivity extends AppCompatActivity {

    private static final String CHANNEL_ID = "sms_channel";
    private static final int SEND_SMS_PERMISSION_REQUEST_CODE =
1;
    private static final int RECEIVE_SMS_PERMISSION_REQUEST_CODE
= 2;

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

        if (Build.VERSION.SDK_INT >= Build.VERSION_CODES.O) {
            createNotificationChannel();
        }

        Button sendButton = findViewById(R.id.sendButton);
        sendButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                checkAndRequestSendSmsPermission();
            }
        });
    }

    private void checkAndRequestSendSmsPermission() {
        if (ContextCompat.checkSelfPermission(this,
Manifest.permission.SEND_SMS)
```

```
            != PackageManager.PERMISSION_GRANTED) {
        // Permission is not granted, request the permission
        ActivityCompat.requestPermissions(this,
                new String[]{Manifest.permission.SEND_SMS},
                SEND_SMS_PERMISSION_REQUEST_CODE);
    } else {
        // Permission has already been granted
        // Check and request RECEIVE_SMS permission
        checkAndRequestReceiveSmsPermission();
    }
}

private void checkAndRequestReceiveSmsPermission() {
    if (ContextCompat.checkSelfPermission(this,
Manifest.permission.RECEIVE_SMS)
            != PackageManager.PERMISSION_GRANTED) {
        // Permission is not granted, request the permission
        ActivityCompat.requestPermissions(this,
                new String[]{Manifest.permission.RECEIVE_SMS},
                RECEIVE_SMS_PERMISSION_REQUEST_CODE);
    } else {
        // Permission has already been granted
        // You can proceed with sending SMS
        sendMessage();
    }
}

private void createNotificationChannel() {
    if (Build.VERSION.SDK_INT >= Build.VERSION_CODES.O) {
        CharSequence name = "SMS Channel";
        String description = "Channel for SMS notifications";
        int importance = NotificationManager.IMPORTANCE_DEFAULT;
        NotificationChannel channel = new
NotificationChannel(CHANNEL_ID, name, importance);
        channel.setDescription(description);
```

```
            NotificationManager notificationManager =
getSystemService(NotificationManager.class);
            notificationManager.createNotificationChannel(channel);
        }
    }

    private void sendMessage() {
        String mobileNumber = ((EditText)
findViewById(R.id.mobileNumberEditText)).getText().toString();
        String message = ((EditText)
findViewById(R.id.messageEditText)).getText().toString();

        try {
            SmsManager smsManager = SmsManager.getDefault();
            smsManager.sendTextMessage(mobileNumber, null, message,
null, null);
            Toast.makeText(this, "SMS sent", Toast.LENGTH_SHORT).show();
        } catch (Exception e) {
            Toast.makeText(this, "SMS sending failed",
Toast.LENGTH_SHORT).show();
            e.printStackTrace();
        }
    }
}
```

SMSReceiver.java:

```
package com.example.ex8;

import android.app.NotificationChannel;
import android.app.NotificationManager;
import android.app.PendingIntent;
import android.content.BroadcastReceiver;
import android.content.Context;
```

```
import android.content.Intent;
import android.os.Build;
import android.provider.Telephony;
import android.telephony.SmsMessage;

import androidx.core.app.NotificationCompat;
import androidx.core.app.NotificationManagerCompat;

public class SMSReceiver extends BroadcastReceiver {
    private static final String CHANNEL_ID = "sms_channel";

    @Override
    public void onReceive(Context context, Intent intent) {
        // Handle incoming SMS and display a notification.
        if (intent.getAction() != null &&
intent.getAction().equals("android.provider.Telephony.SMS_RECEIVED")) {
            SmsMessage[] messages =
Telephony.Sms.Intents.getMessagesFromIntent(intent);

            if (messages != null && messages.length > 0) {
                String sender = messages[0].getOriginatingAddress();
                String messageBody = messages[0].getMessageBody();

                createNotification(context, sender, messageBody);
            }
        }
    }

    private void createNotification(Context context, String sender, String
messageBody) {
        if (Build.VERSION.SDK_INT >= Build.VERSION_CODES.O) {
            NotificationChannel channel = new
NotificationChannel(CHANNEL_ID, "SMS Channel",
NotificationManager.IMPORTANCE_DEFAULT);
```

```
            NotificationManager notificationManager =
context.getSystemService(NotificationManager.class);
            notificationManager.createNotificationChannel(channel);
        }

        Intent messageBoxIntent = new Intent(context,
MessageBoxActivity.class);
        messageBoxIntent.putExtra("sender", sender);
        messageBoxIntent.putExtra("message", messageBody);

        PendingIntent pendingIntent = PendingIntent.getActivity(context, 0,
messageBoxIntent, PendingIntent.FLAG_UPDATE_CURRENT);

        NotificationCompat.Builder builder = new
NotificationCompat.Builder(context, CHANNEL_ID)
                .setSmallIcon(R.drawable.noti)
                .setContentTitle("New SMS")
                .setContentText("From: " + sender)
                .setPriority(NotificationCompat.PRIORITY_DEFAULT)
                .setContentIntent(pendingIntent)
                .setAutoCancel(true);

        NotificationManagerCompat notificationManager =
NotificationManagerCompat.from(context);
        notificationManager.notify(1, builder.build());
    }
}
```

MessageBoxActivity.java:

```
         // MessageBoxActivity.java
package com.example.ex8;

import android.os.Bundle;
```

```
import androidx.appcompat.app.AppCompatActivity;
import android.widget.TextView;

public class MessageBoxActivity extends AppCompatActivity {

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

        TextView senderTextView = findViewById(R.id.senderTextView);
        TextView messageTextView = findViewById(R.id.messageTextView);

        // Get data from the intent
        String sender = getIntent().getStringExtra("sender");
        String message = getIntent().getStringExtra("message");

        // Display sender and message in TextViews
        senderTextView.setText("Sender: " + sender);
        messageTextView.setText("Message: " + message);
    }
}
```

Activity_main.xml:

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

    <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="16dp"
    tools:context=".MainActivity">

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

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

    <Button
        android:id="@+id/sendButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_below="@+id/messageEditText"
        android:text="Send" />

  </RelativeLayout>

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

Activity_message_box.xml:

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

```
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent">


    <TextView
        android:id="@+id/senderTextView"
        android:layout_width="166dp"
        android:layout_height="48dp"
        android:layout_marginTop="248dp"
        android:text=""
        android:textSize="24sp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.497"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <TextView
        android:id="@+id/messageTextView"
        android:layout_width="178dp"
        android:layout_height="64dp"
        android:layout_marginTop="372dp"
        android:text=""
        android:textSize="24sp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.48"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

    <TextView
        android:id="@+id/textView3"
        android:layout_width="186dp"
```

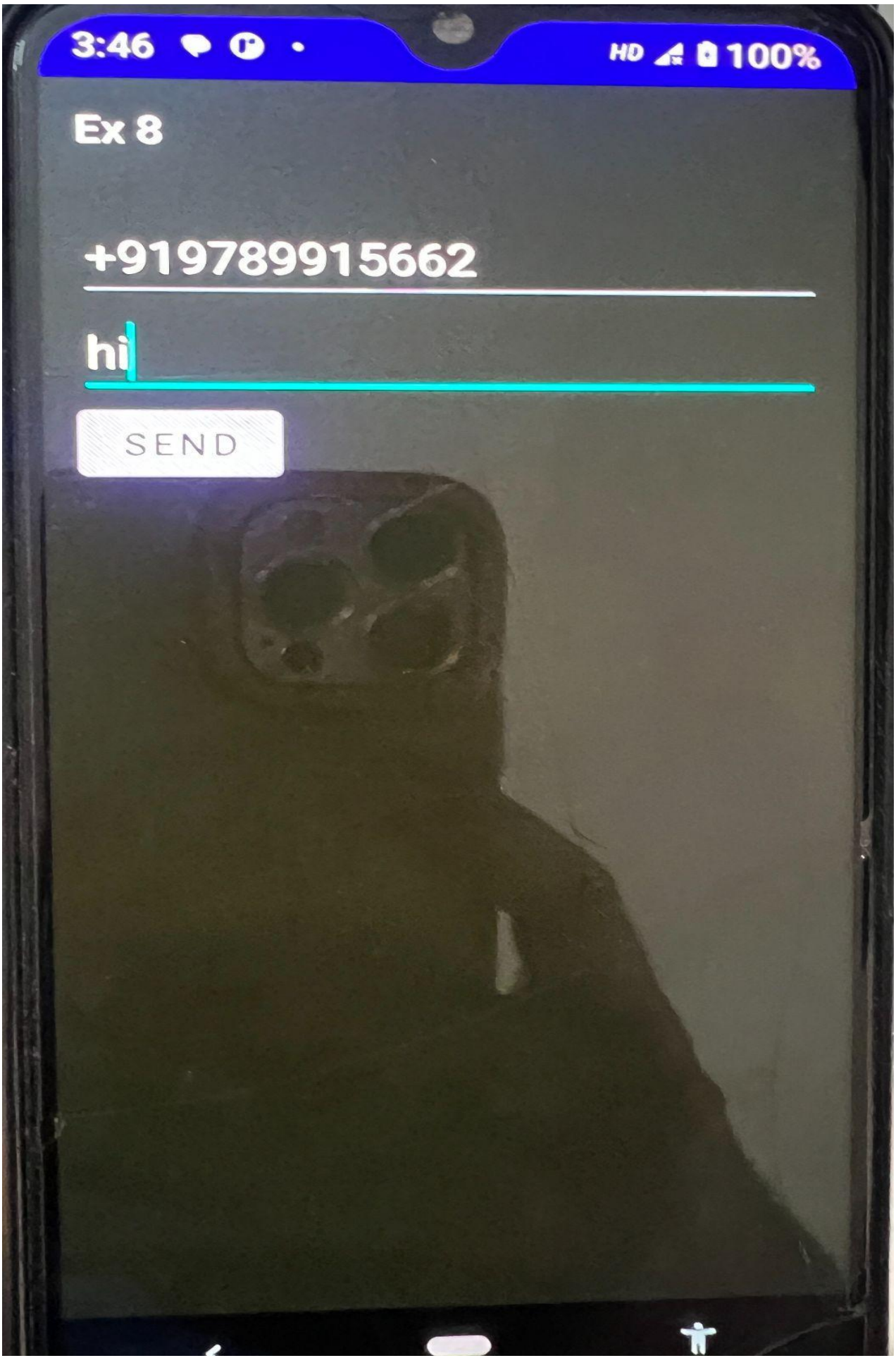
```
        android:layout_height="49dp"
        android:layout_marginTop="40dp"
        android:textSize="24sp"
        android:text="Message Box"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.497"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

AndroidManifest.xml:

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.ex8">

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


    <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.Ex8">
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />
```

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

        <receiver android:name=".SMSReceiver"
            android:exported="true">
            <intent-filter>
                <action
android:name="android.provider.Telephony.SMS_RECEIVED" />
            </intent-filter>
        </receiver>


        <activity android:name=".MessageBoxActivity"></activity>


    </application>



</manifest>
```

Output:


3:46
HD
100%
Ex 8
+919789915662
hi
SEND


3:46
25
+91 866-7816034
SMS
Today, 3:44 PM
hello
hi
SMS

Best Practices:

- Used appropriate names for textviews

Learning Outcomes:

- Learnt to send and receive SMS
- Learnt to receive notification

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Menu Driven App
Exercise No. : 9

Aim : Develop a Menu driven App that displays the option menu that contains names of different countires and when each of the country is clicked, the description about the country should be displayed.

Code :

MainActivity.java:

```
package com.example.menucountry;

import androidx.appcompat.app.AppCompatActivity;

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

public class MainActivity extends AppCompatActivity {

   TextView country, desc;


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

      country = findViewById(R.id.country);
      desc = findViewById(R.id.desc);
   }
   public boolean onCreateOptionsMenu(Menu menu) {
      MenuInflater inflater = getMenuInflater();
      inflater.inflate(R.menu.country, menu);
      return true;
   }

   @Override
   public boolean onOptionsItemSelected(MenuItem item) {
```

```
        int id = item.getItemId();
        switch (id){
            case R.id.ind:
//                Toast.makeText(getApplicationContext(),"Item 1 Selected",Toast.LENGTH_LONG).show();
                country.setText("India");
                desc.setText(R.string.india);
                return true;
            case R.id.bah:
//                Toast.makeText(getApplicationContext(),"Item 2 Selected",Toast.LENGTH_LONG).show();
                country.setText("Bahrain");
                desc.setText(R.string.bahrain);
                return true;

            case R.id.pak:
//                Toast.makeText(getApplicationContext(),"Item 3 Selected",Toast.LENGTH_LONG).show();
                country.setText("Pak");
                desc.setText(R.string.pakistan);
                return true;
            case R.id.is:
//                Toast.makeText(getApplicationContext(),"Item 3 Selected",Toast.LENGTH_LONG).show();
                country.setText("Israel");
                desc.setText(R.string.israel);
                return true;
            case R.id.chn:
//                Toast.makeText(getApplicationContext(),"Item 3 Selected",Toast.LENGTH_LONG).show();
                country.setText("China");
                desc.setText(R.string.china);
                return true;
            case R.id.can:
//                Toast.makeText(getApplicationContext(),"Item 3 Selected",Toast.LENGTH_LONG).show();
                country.setText("Canada");
                desc.setText(R.string.canada);
                return true;
            case R.id.uk:
//                Toast.makeText(getApplicationContext(),"Item 3 Selected",Toast.LENGTH_LONG).show();
                country.setText("UK");
                desc.setText(R.string.uk);
                return true;
            default:
                return super.onOptionsItemSelected(item);
        }
    }
}
```

activity_main.xml

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


    <TextView
        android:id="@+id/country"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text=""
        android:textColor="@color/black"
        android:layout_margin="48dp"
        android:padding="24dp"
        android:textSize="24dp"
        android:textStyle="bold"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"  />

    <TextView
        android:padding="24dp"
        android:layout_margin="24dp"
        android:id="@+id/desc"
        android:layout_width="320dp"
        android:layout_height="wrap_content"
        app:layout_constraintTop_toBottomOf="@+id/country"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent" />

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

Country.xml:

```
<?xml version="1.0" encoding="utf-8"?>
<menu xmlns:android="http://schemas.android.com/apk/res/android">
    <item android:id="@+id/ind"
        android:title="India" />
    <item android:id="@+id/bah"
        android:title="Bahrain" />
    <item android:id="@+id/pak"
```

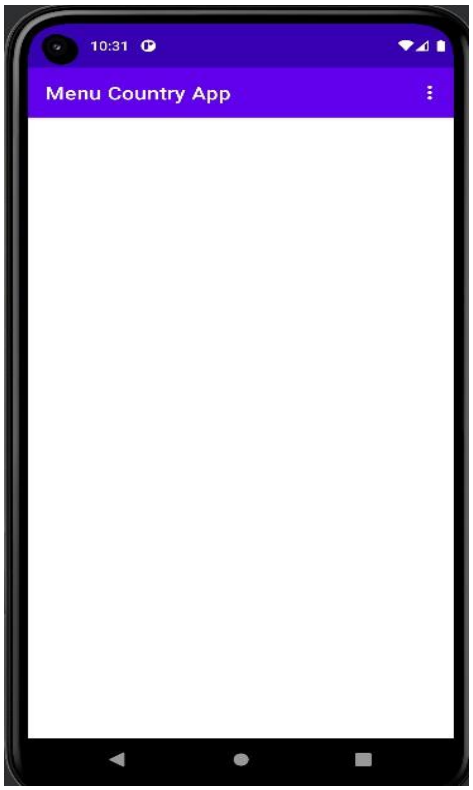
```
        android:title="Pakistan" />
    <item android:id="@+id/is"
        android:title="Israel" />
    <item android:id="@+id/can"
        android:title="Canada" />
    <item android:id="@+id/uk"
        android:title="UK" />
    <item android:id="@+id/chn"
        android:title="China" />
</menu>
```

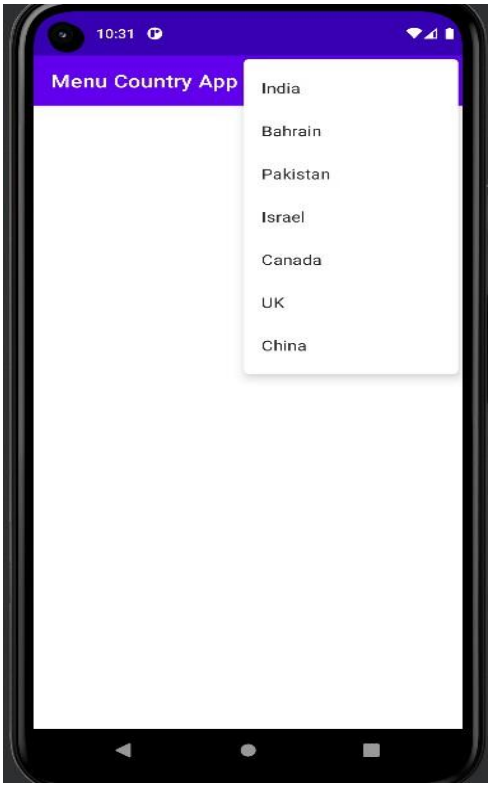
Strings.xml:

```
<resources>
    <string name="app_name">Menu Country App</string>
    <string name="india">India, officially the Republic of India (ISO: Bhārat Gaṇarājya), is a country in South Asia. It is the seventh-largest country by area; the most populous country as of June 2023; and from the time of its independence in 1947, the world\'s most populous democracy</string>
    <string name="pakistan">
        Pakistan (Urdu: پاکستان [ˈpaːkɪstaːn]),[d] officially the Islamic Republic of Pakistan (ISO: اسلامی جمہوریہ پاکستان, islāmi jamhūriyāh pākistān), is a country in South Asia.
    </string>
    <string name="bahrain">
        Bahrain (/bɑːˈreɪn/bah-RAYN, /ˈreɪn/; Arabic: البحرين, romanized: al-Baḥrayn, locally [æl bəħˈreːn]), officially the Kingdom of Bahrain,[a] is an island country in West Asia.
    </string>
    <string name="israel">
        Israel is a country in West Asia. It is bordered by Lebanon to the north, by Syria to the northeast, by Jordan to the east, by the Red Sea to the south, by Egypt to the southwest, by the Mediterranean Sea to the west, and by the Palestinian territories – the West Bank along the east and the Gaza Strip along the southwest. In war please try later
    </string>
    <string name="china">
        China , officially the People\'s Republic of China (PRC),[k] is a country in East Asia.
    </string>
    <string name="canada">
        Canada is a country in North America. Its ten provinces and three territories extend from the Atlantic Ocean to the Pacific Ocean and northward into the Arctic Ocean, making it the world\'s second-largest country by total area,
    </string>
    <string name="uk">
The United Kingdom of Great Britain and Northern Ireland, commonly known as the United Kingdom (UK) or Britain,[k][14] is an island country in Northwestern Europe, off the north-western coast of the continental mainland.
    </string>
```

</resources>

Output :





Learning Outcome :

1. Learnt to edit the menu on android studio
2. Learnt the steps to deploy a new resource file

Ex. No. 10 Alarm Clock - Android Application

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CSE – B

Develop an Alarm Clock Android Application.

1. Use permission for WAKE_LOCK.
2. Have a TimePicker component followed by a ToggleButton to select time and Alarm On / Off.
3. Use the AlarmManager to set the alarm and send notification on alarm trigger.
4. Perform 3 different notifications
    a. Show a message to user in the activity UI
    b. Play the alarm ringtone
    c. Send an Android notification message

activity_main.xml

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

   <TimePicker
       android:layout_width="wrap_content"
       android:layout_height="wrap_content"
       android:id="@+id/time"
       />

   <ToggleButton
       android:id="@+id/set"
       android:layout_width="150dp"
       android:layout_height="50dp"
       android:layout_below="@+id/time"
       android:layout_marginLeft="130dp"
       />

</RelativeLayout>
```

display.xml

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

```
    <TextView
        android:id="@+id/textView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Close App to turn off alarm!"
        android:padding="50dp"
        android:textSize="20dp"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

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

MainActivity.java

```
package com.example.alarm;

import androidx.appcompat.app.AppCompatActivity;

import android.app.AlarmManager;
import android.app.NotificationChannel;
import android.app.NotificationManager;
import android.app.PendingIntent;
import android.content.Intent;
import android.os.Build;
import android.os.Bundle;
import android.text.format.Time;
import android.view.View;
import android.widget.Button;
import android.widget.TimePicker;
import android.widget.Toast;
import android.widget.ToggleButton;

import com.example.alarm.databinding.ActivityMainBinding;

import java.util.Calendar;

public class MainActivity extends AppCompatActivity {

    private ActivityMainBinding binding;

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

        binding = ActivityMainBinding.inflate(getLayoutInflater());
        setContentView(binding.getRoot());
```

```
        createNotificationChannel();

        ToggleButton b1 = findViewById(R.id.set);
        TimePicker t1 = findViewById(R.id.time);
        t1.setIs24HourView(true);


        b1.setOnCheckedChangeListener((buttonView, isChecked) -> {
            if (isChecked) {
                setAlarm();
            } else {
                cancelAlarm();
            }
        });
    }

    private void createNotificationChannel() {
        if(Build.VERSION.SDK_INT >= Build.VERSION_CODES.O) {
            CharSequence name = "alarm";
            String desc = "Channel for alarm";
            int importance = NotificationManager.IMPORTANCE_HIGH;
            NotificationChannel channel = new NotificationChannel("alarm", name,
importance);
            channel.setDescription(desc);

            NotificationManager notifs =
getSystemService(NotificationManager.class);
            notifs.createNotificationChannel(channel);
        }
    }

    public void  setAlarm() {

        TimePicker timePicker = findViewById(R.id.time);
        AlarmManager alarm = (AlarmManager) getSystemService(ALARM_SERVICE);

        Intent intent = new Intent(this, AlarmReceiver.class);
        PendingIntent pendingIntent =
PendingIntent.getBroadcast(this.getApplicationContext(), 234, intent,
PendingIntent.FLAG_IMMUTABLE);

        int hour = timePicker.getHour();
        int minute = timePicker.getMinute();
        Calendar calendar = Calendar.getInstance();
        calendar.set(Calendar.HOUR_OF_DAY, hour);
        calendar.set(Calendar.MINUTE, minute);
        calendar.set(Calendar.SECOND, 0);

        long triggerTime = calendar.getTimeInMillis();
```

```
        int timeInSec = 1;

        alarm.set(AlarmManager.RTC_WAKEUP, triggerTime, pendingIntent);
        Toast.makeText(this, "Alarm set for " + hour + ":" + minute,
Toast.LENGTH_SHORT).show();
    }

    public void cancelAlarm() {
        AlarmManager alarm = (AlarmManager) getSystemService(ALARM_SERVICE);

        Intent intent = new Intent(this, AlarmReceiver.class);
        PendingIntent pendingIntent =
PendingIntent.getBroadcast(this.getApplicationContext(), 234, intent,
PendingIntent.FLAG_IMMUTABLE);

        if(alarm != null) {
            alarm.cancel(pendingIntent);
        }

        Toast.makeText(this, "Alarm unset!", Toast.LENGTH_SHORT).show();
    }

}
```

AlarmReceiver.java

```
package com.example.alarm;

import static androidx.core.content.ContextCompat.startActivity;

import android.app.AlarmManager;
import  android.app.Notification;
import android.app.NotificationChannel;
import android.app.NotificationManager;
import android.app.PendingIntent;
import android.content.BroadcastReceiver;
import android.content.Context;
import android.content.Intent;
import android.content.pm.PackageManager;
import android.media.Ringtone;
import android.media.RingtoneManager;
import android.net.Uri;
import android.os.Build;
import android.widget.Toast;

import androidx.appcompat.app.AppCompatActivity;
import androidx.core.app.ActivityCompat;
import androidx.core.app.NotificationCompat;
import androidx.core.app.NotificationManagerCompat;
```

```
public class AlarmReceiver extends BroadcastReceiver {

   static Uri alarmrt1 =
RingtoneManager.getDefaultUri(RingtoneManager.TYPE_ALARM);

   @Override
   public void onReceive(Context context, Intent intent) {
       Toast.makeText(context, "INSIDE WOHOOO", Toast.LENGTH_LONG).show();

       Intent i = new Intent(context, In.class);
       intent.setFlags(Intent.FLAG_ACTIVITY_NEW_TASK |
Intent.FLAG_ACTIVITY_CLEAR_TASK);
       PendingIntent p = PendingIntent.getActivity(context, 0, i,
PendingIntent.FLAG_IMMUTABLE);

       NotificationCompat.Builder builder = new
NotificationCompat.Builder(context, "alarm")
               .setSmallIcon(R.drawable.ic_launcher_foreground)
               .setContentTitle("Your Alarm is going off!!!")
               .setContentInfo("You set this alarm!")
               .setAutoCancel(true)
               .setDefaults(NotificationCompat.DEFAULT_ALL)
               .setPriority(NotificationCompat.PRIORITY_HIGH)
               .setContentIntent(p);

       NotificationManagerCompat notifications =
NotificationManagerCompat.from(context);
       if (ActivityCompat.checkSelfPermission(context,
android.Manifest.permission.POST_NOTIFICATIONS) !=
PackageManager.PERMISSION_GRANTED) {
           return;
       }
       else {
           notifications.notify(123, builder.build());
       }

       Ringtone ringtone =
RingtoneManager.getRingtone(context.getApplicationContext(), alarmrt1);
       //Toast.makeText(context, ringtone.toString(),
Toast.LENGTH_SHORT).show();
       intent.putExtra("RINGTONE_URI", alarmrt1);
       ringtone.play();
   }

   public static Uri getInstant() {
       return alarmrt1;

   }
```

```
}
```

In.java

```
package com.example.alarm;

import android.content.Intent;
import android.media.Ringtone;
import android.media.RingtoneManager;
import android.net.Uri;
import android.os.Bundle;
import android.widget.Toast;
//ce3c069
import androidx.appcompat.app.AppCompatActivity;

public class In extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.display);

        Intent intent = getIntent();

        Uri ringtoneUri = intent.getParcelableExtra("RINGTONE_URI");
        Ringtone ringtone = RingtoneManager.getRingtone(In.this, ringtoneUri);

        //Toast.makeText(In.this, ringtone.toString(),
Toast.LENGTH_SHORT).show();

        if (ringtone.isPlaying()) {
            //Toast.makeText(In.this, "yes", Toast.LENGTH_SHORT).show();
            ringtone.stop();
        }
        else {
            //Toast.makeText(In.this, "no", Toast.LENGTH_SHORT).show();
        }
    }
}
```

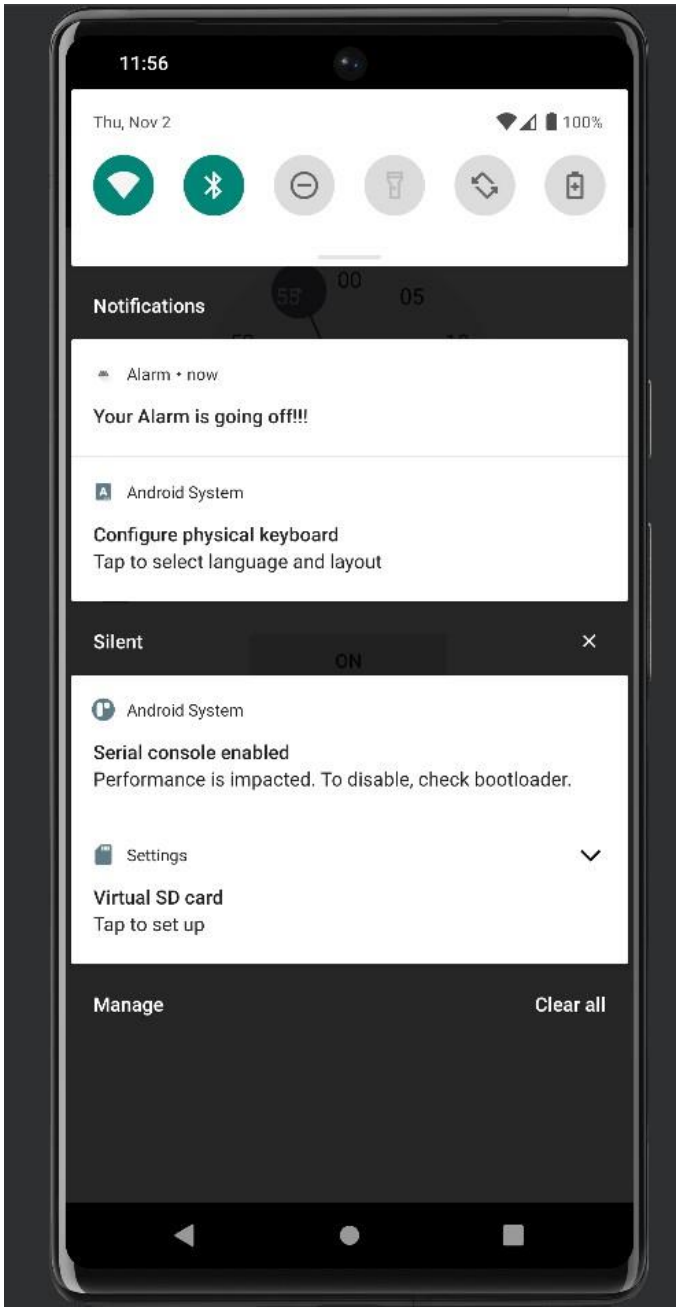
AndroidManifest.java

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

    <uses-permission android:name="android.permission.POST_NOTIFICATIONS" />
    <uses-permission android:name="android.permission.WAKE_LOCK" />
    <uses-permission android:name="android.permission.VIBRATE" />

    <application
```

```
        android:allowBackup="true"
        android:dataExtractionRules="@xml/data_extraction_rules"
        android:fullBackupContent="@xml/backup_rules"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/Theme.Alarm"
        tools:targetApi="31">
        <activity
            android:name=".MainActivity"
            android:exported="true">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
        <activity android:name=".In"
            android:exported="false"
            />
        <receiver android:name=".AlarmReceiver"
            />
    </application>

</manifest>
```


11:55
23:56
00
05
10
15
20
25
30
35
40
45
50
55
ON
Alarm set for 23:56
11:55
23:56
00
05
10
15
20
25
30
35
40
45
50
55
OFF
Alarm unset!


Alarm
Your Alarm is going off!!!
00
05
10
15
20
25
30
35
40
45
50
55
ON
You alarm is going off with this ringtone!
android.media.Ringtone@20699c0



Best Practices

1. Keep the index form clean and uncluttered.
2. Use default ringtone as it is known by everyone.
3. Ensure the form works on various mobile devices.

Learning Outcomes

1. Learnt how to use UI Elements for Android App development.
2. Learnt how to use Phone shared storage.

Web page Display

Ex. No: 11 **Name:** Sabarivasan V
Date: 12.10.2023 **Reg. no:** 205001085

Objective:

- Develop an android application to display a static web page with contents that uses all formatting HTML tags.
- Also should load the web page from the specified URL.
-

Android widgets and layouts used:

- Linear layout (linear and horizontal)
- Space
- Button
- TextView
- EditText
- WebView

Code:

activity_main.xml

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
   xmlns:app="http://schemas.android.com/apk/res-auto"
   xmlns:tools="http://schemas.android.com/tools"
   android:layout_width="match_parent"
   android:layout_height="match_parent"
   android:padding="10dp"
   tools:context=".MainActivity">

   <LinearLayout
       android:layout_width="match_parent"
       android:layout_height="match_parent"
       android:orientation="vertical">

       <LinearLayout
           android:layout_width="match_parent"
           android:layout_height="wrap_content"
           android:orientation="horizontal">

           <TextView
               android:id="@+id/textView"
               android:layout_width="60dp"
               android:layout_height="wrap_content"
```

```
                android:paddingBottom="10dp"
                android:paddingLeft="15dp"
                android:textStyle="bold"
                android:text="URL:" />

            <EditText
                android:id="@+id/url"
                android:layout_width="237dp"
                android:layout_height="wrap_content"
                android:layout_weight="1"
                android:ems="10"
                android:inputType="text" />

            <Button
                android:id="@+id/load"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_weight="1"
                android:text="GET" />
        </LinearLayout>

        <WebView
            android:id="@+id/webView"
            android:layout_width="match_parent"
            android:layout_height="match_parent">

        </WebView>
    </LinearLayout>

</LinearLayout>
```

MainActivity.java:

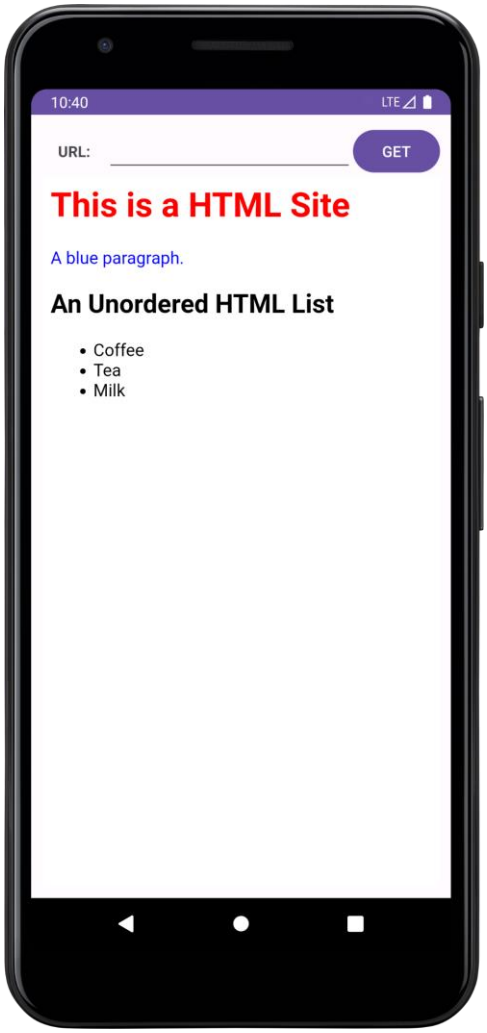
```
package com.example.hybridapp;

import androidx.appcompat.app.AppCompatActivity;

import android.annotation.TargetApi;
import android.app.Activity;
import android.os.Bundle;
import android.view.View;
import android.webkit.WebResourceError;
import android.webkit.WebResourceRequest;
import android.webkit.WebSettings;
import android.webkit.WebView;
import android.webkit.WebViewClient;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;
```

```
public class MainActivity extends AppCompatActivity {

   private WebView webView;
   private EditText url;
   private Button getButton;

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

        webView = findViewById(R.id.webView);
        url = findViewById(R.id.url);
        getButton = findViewById(R.id.load);

        webView.getSettings().setJavaScriptEnabled(true);

        // Load static HTML content
        String staticHtml = "<html>\n" +
                "<body>\n" +
                "\n" +
                "<h1 style=\"color:red; font-family:sans-serif\">This is a HTML
Site</h1>\n" +
                "\n" +
                "<p style=\"color:blue;\">A blue paragraph.</p>\n" +
                "\n" +
                "<h2>An Unordered HTML List</h2>\n" +
                "\n" +
                "<ul>\n" +
                "  <li>Coffee</li>\n" +
                "  <li>Tea</li>\n" +
                "  <li>Milk</li>\n" +
                "</ul>\n" +
                "\n" +
                "</body>\n" +
                "</html>";
        webView.loadData(staticHtml, "text/html", "UTF-8");

        webView.setWebViewClient(new WebViewClient()
        {
             @Override
            public boolean shouldOverrideUrlLoading(WebView view, String url)
            {
                //view.loadUrl(url);
                System.out.println("hello");
                return false;
            }
        });
```

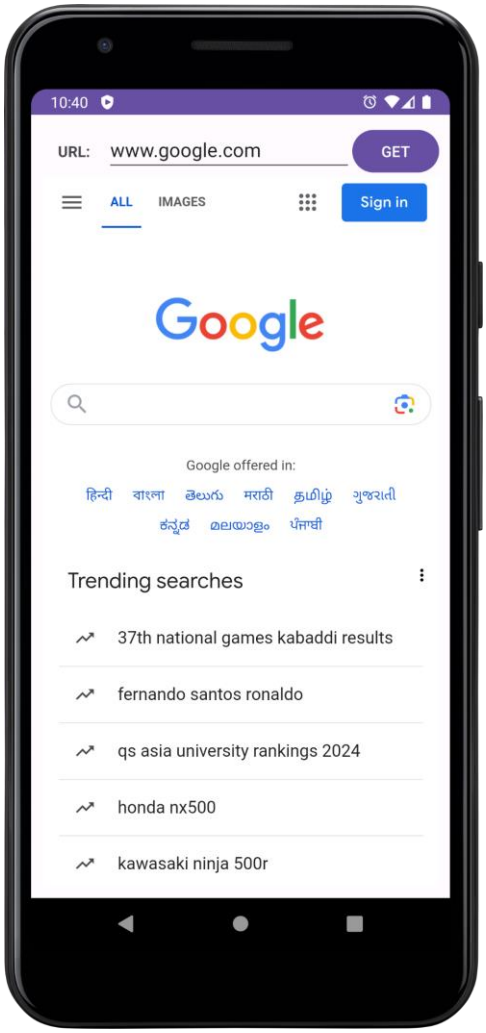
```
        getButton.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View v) {
                webView.loadUrl("https://" + url.getText().toString());
            }
        });
    }
}
```

Output:

Default site:



Specified URL:



Best Practices:

1. Followed proper naming convention and used camel case for variable names.
2. Meaningful comments are included
3. User-friendly navigation
4. Providing different fonts to show separation and emphasis for titles.

5. Colors are used with valid contrast for readability
6. Usage of Data Binding.

Learning Outcomes:

1. I learned how to insert WebView into android app.
2. I learned how to include a webpage using static HTML code.
3. I learned how to display a webpage in android app.
4. Implemented application for loading website using specified URL.

MOBILE APPLICATION DEVELOPMENT LAB
MINI PROJECT REPORT

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Expense Tracker Application

Problem Statement:

Develop a comprehensive Android application that serves as a user-friendly and efficient expense tracker. The primary goal is to help users manage their expenses, visualise spending patterns, and make informed financial decisions. The app should include features such as currency conversion and detailed expense reports for different time periods.

Functional Requirements:

Functional requirements include the features that the system provides to the user.

- **Today's Expense page**
  Contains reports of the current day and displays a list of expenses with the categories. Also displays the total expense.

- **Expense Reports page:**
  It is a summary page for all the expenses by the user.It can be filtered by week, month etc.

- Expense Categories:
  Shows all expense categories and allows the user to edit and add new categories.
- Settings:
  Choose the currency type.

Non-Functional Requirements:

These are requirements that are not functional in nature. Specifically, these are the constraints that the system must work within.

- **UI/UX:**
  The application must provide a clear user experience to enable seamless use.

- **Performance:**
  The system dynamically reflects any changes - addition, deletion or updation.

Functionalities:

- **Today's Page Module:**
  The application features a daily report showcasing a list of categorized expenses incurred on the current day, along with the total expenditure for quick reference.

- **Expense Report Module:**

  The application includes a consolidated summary page displaying all user expenses, with the flexibility to apply filters based on different time frames such as weeks or months.

- **Categories:**
  Displays a comprehensive list of expense categories and provides users with the ability to both edit existing categories and add new ones.
- **Settings:**
  Select the type of currency.

System Design for Expense Tracker App

Architecture:
The Expense Tracker app follows a client-server architecture.

Client Side (Android App):

Frontend: Developed using Android SDK and Kotlin/Java.
User Interface: Activities and Fragments for different screens (Expense logging, Reports, Settings).

Backend :
SQLite Database on the application with local storage.

Database Schema:

Expense Table:
ExpenseID (Primary Key)
CategoryID (Foreign Key referencing Category table)
Amount
Date

Category Table:
CategoryID (Primary Key)
CategoryName

Data Flow:

Expense Logging:
User inputs expense details in the app.
The app validates and sends the data to the SQLite database for insertion.

Reports:
The app queries the SQLite database to fetch expenses based on selected time periods (weeks, months).

Settings (Currency Selection):
User selects the currency type. The app updates the currency preference in the local SQLite database.

Code :

```
<manifest
xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.github.ematiyuk.expensetracer">

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:supportsRtl="true"
        android:theme="@style/AppTheme">

        <activity android:name=".activities.MainActivity"
            android:label="@string/app_name"
```

```
            android:launchMode="singleTop"
            android:screenOrientation="portrait">
            <intent-filter>
                <action android:name="android.intent.action.MAIN"/>

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

        <activity android:name=".activities.SettingsActivity"
            android:screenOrientation="portrait"
            android:parentActivityName=".activities.MainActivity">
            <!-- Parent activity meta-data to support Android 4.0 and
lower -->
            <meta-data
android:name="android.support.PARENT_ACTIVITY"
                android:value=".activities.MainActivity"/>
        </activity>

        <activity android:name=".activities.CategoryEditActivity"
            android:screenOrientation="portrait"
            android:windowSoftInputMode="stateVisible"
            android:parentActivityName=".activities.MainActivity">
            <!-- Parent activity meta-data to support Android 4.0 and
lower -->
            <meta-data
android:name="android.support.PARENT_ACTIVITY"
                android:value=".activities.MainActivity"/>
        </activity>
```

```
        <activity android:name=".activities.ExpenseEditActivity"
            android:screenOrientation="portrait"
            android:windowSoftInputMode="stateVisible"
            android:parentActivityName=".activities.MainActivity">
            <!-- Parent activity meta-data to support Android 4.0 and
lower -->
            <meta-data
android:name="android.support.PARENT_ACTIVITY"
                android:value=".activities.MainActivity"/>
        </activity>

        <provider

android:authorities="com.github.ematiyuk.expensetracer.provider"
            android:name=".providers.ExpensesProvider" />

    </application>

</manifest>



package com.github.ematiyuk.expensetracer.activities;

import android.os.Bundle;
import android.support.annotation.LayoutRes;
import android.support.annotation.Nullable;
import android.support.v4.app.Fragment;
import android.support.v4.app.FragmentManager;
```

```
import android.support.v7.app.AppCompatActivity;
import android.support.v7.widget.Toolbar;

import com.github.ematiyuk.expensetracer.R;

public abstract class BaseFragmentActivity extends
AppCompatActivity {
    protected Toolbar mToolbar;

    @LayoutRes
    protected int getLayoutResId() {
        return R.layout.activity_base;
    }

    @Override
    protected void onCreate(@Nullable Bundle
savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(getLayoutResId());

        // Set a Toolbar to replace the ActionBar
        mToolbar = (Toolbar) findViewById(R.id.toolbar);
        setSupportActionBar(mToolbar);
    }

    protected void insertFragment(Fragment fragment) {
        // Insert the fragment by replacing any existing fragment
        FragmentManager fragmentManager =
getSupportFragmentManager();
        fragmentManager.beginTransaction()
```

```
                .replace(R.id.content_frame, fragment)
                .commit();
    }
}
```

```
package com.github.ematiyuk.expensetracer.activities;

import android.os.Bundle;
import android.support.annotation.Nullable;
import android.support.v7.app.ActionBar;

import
com.github.ematiyuk.expensetracer.fragments.CategoryEditFrag
ment;

public class CategoryEditActivity extends BaseFragmentActivity {

    /* Important: use onCreate(Bundle savedInstanceState)
     * instead of onCreate(Bundle savedInstanceState,
PersistableBundle persistentState) */
    @Override
    protected void onCreate(@Nullable Bundle
savedInstanceState) {
        super.onCreate(savedInstanceState);

        insertFragment(new CategoryEditFragment());
        setupActionBar();
```

```
    }

    private void setupActionBar() {
        ActionBar actionBar = getSupportActionBar();
        if (actionBar != null) {
            // Show the Up button in the action bar (toolbar).
            actionBar.setDisplayHomeAsUpEnabled(true);
        }
    }
}
```

```
package com.github.ematiyuk.expensetracer.activities;

import android.content.Intent;
import android.content.res.Configuration;
import android.os.Bundle;
import android.support.annotation.IdRes;
import android.support.annotation.LayoutRes;
import android.support.annotation.Nullable;
import android.support.design.widget.NavigationView;
import android.support.v4.app.Fragment;
import android.support.v4.view.GravityCompat;
import android.support.v4.widget.DrawerLayout;
import android.support.v7.app.ActionBarDrawerToggle;
import android.view.MenuItem;
```

```
import
com.github.ematiyuk.expensetracer.fragments.CategoryFragment
;
import com.github.ematiyuk.expensetracer.R;
import
com.github.ematiyuk.expensetracer.fragments.ReportFragment;
import
com.github.ematiyuk.expensetracer.fragments.TodayFragment;

public class MainActivity extends BaseFragmentActivity {
    private DrawerLayout mDrawerLayout;
    private NavigationView mNavDrawer;
    private ActionBarDrawerToggle mDrawerToggle;

    @Override
    @LayoutRes
    protected int getLayoutResId() {
        return R.layout.activity_main;
    }

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

        mDrawerLayout = (DrawerLayout)
findViewById(R.id.drawer_layout);
        mNavDrawer = (NavigationView)
findViewById(R.id.nav_drawer);
        mDrawerToggle = setupDrawerToggle();
```

```
        // Tie DrawerLayout events to the ActionBarToggle
        mDrawerLayout.addDrawerListener(mDrawerToggle);

        // Setup drawer view
        setupDrawerContent(mNavDrawer);

        // Select TodayFragment on app start by default
        loadTodayFragment();
    }

    @Override
    protected void onPause() {
        super.onPause();
        closeNavigationDrawer();
    }

    @Override
    public boolean onOptionsItemSelected(MenuItem item) {
        // Pass the event to ActionBarDrawerToggle, if it returns
        // true, then it has handled the app icon touch event
        if (mDrawerToggle.onOptionsItemSelected(item)) {
            return true;
        }

        return super.onOptionsItemSelected(item);
    }

    @Override
    protected void onPostCreate(@Nullable Bundle
savedInstanceState) {
```

```
        super.onPostCreate(savedInstanceState);
        // Sync the toggle state after onRestoreInstanceState has
occurred.
        mDrawerToggle.syncState();
    }

    @Override
    public void onConfigurationChanged(Configuration newConfig)
{
        super.onConfigurationChanged(newConfig);
        // Pass any configuration change to the drawer toggle
        mDrawerToggle.onConfigurationChanged(newConfig);
    }

    @Override
    public void onBackPressed() {
        if (!closeNavigationDrawer()) {
            Fragment currentFragment =
getSupportFragmentManager()
                    .findFragmentById(R.id.content_frame);
            if (!(currentFragment instanceof TodayFragment)) {
                loadTodayFragment();
            } else {
                // If current fragment is TodayFragment then exit
                super.onBackPressed();
            }
        }
    }

    private ActionBarDrawerToggle setupDrawerToggle() {
```

```
        return new ActionBarDrawerToggle(this, mDrawerLayout,
mToolbar,
                R.string.drawer_open,  R.string.drawer_close);
    }

    private void setupDrawerContent(NavigationView
navigationView) {
        navigationView.setNavigationItemSelectedListener(
                new
NavigationView.OnNavigationItemSelectedListener() {
                    @Override
                    public boolean onNavigationItemSelected(MenuItem
menuItem) {
                        selectDrawerItem(menuItem);
                        return true;
                    }
                });
    }

    private void selectDrawerItem(MenuItem menuItem) {
        closeNavigationDrawer();
        switch(menuItem.getItemId()) {
            case R.id.nav_today:
                loadFragment(TodayFragment.class,
menuItem.getItemId(), menuItem.getTitle());
                break;
            case R.id.nav_report:
                loadFragment(ReportFragment.class,
menuItem.getItemId(), menuItem.getTitle());
                break;
```

```
            case R.id.nav_categories:
                loadFragment(CategoryFragment.class,
menuItem.getItemId(), menuItem.getTitle());
                break;
            case R.id.nav_settings:
                startActivity(new Intent(MainActivity.this,
SettingsActivity.class));
                break;
            default:
                loadFragment(TodayFragment.class,
menuItem.getItemId(), menuItem.getTitle());
        }
    }

    private boolean closeNavigationDrawer() {
        boolean drawerIsOpen =
mDrawerLayout.isDrawerOpen(GravityCompat.START);
        if (drawerIsOpen) {
            mDrawerLayout.closeDrawer(GravityCompat.START);
        }
        return drawerIsOpen;
    }

    public void hideNavigationBar() {
        closeNavigationDrawer();
    }

    private void loadFragment(Class fragmentClass, @IdRes int
navDrawerCheckedItemId,
                              CharSequence toolbarTitle) {
```

```
        Fragment fragment = null;
        try {
            fragment = (Fragment) fragmentClass.newInstance();
        } catch (Exception e) {
            e.printStackTrace();
        }

        insertFragment(fragment);

        // Highlight the selected item
        mNavDrawer.setCheckedItem(navDrawerCheckedItemId);
        // Set action bar title
        setTitle(toolbarTitle);
    }

    private void loadTodayFragment() {
        loadFragment(TodayFragment.class, R.id.nav_today,
                getResources().getString(R.string.nav_today));
    }
}


package com.github.ematiyuk.expensetracer.adapters;

import android.content.Context;
import android.database.Cursor;
import android.view.View;
import android.view.ViewGroup;
import android.widget.TextView;
```

```
import com.github.ematiyuk.expensetracer.R;
import
com.github.ematiyuk.expensetracer.providers.ExpensesContract;
import com.github.ematiyuk.expensetracer.utils.Utils;
import
com.twotoasters.sectioncursoradapter.SectionCursorAdapter;

public class SectionExpenseAdapter extends
SectionCursorAdapter {
    private String mCurrency;

    public SectionExpenseAdapter(Context context) {
        super(context, null, 0);
    }

    public void setCurrency(String currency) {
        mCurrency = currency;
        notifyDataSetChanged();
    }

    @Override
    protected Object getSectionFromCursor(Cursor cursor) {
        String dateStr =
cursor.getString(cursor.getColumnIndexOrThrow(ExpensesContra
ct.Expenses.DATE));
        return Utils.getSystemFormatDateString(mContext, dateStr);
    }

    @Override
```

```
    protected View newSectionView(Context context, Object item,
ViewGroup parent) {
        return
getLayoutInflater().inflate(R.layout.expense_report_section_head
er, parent, false);
    }

    @Override
    protected void bindSectionView(View convertView, Context
context, int position, Object item) {
        ((TextView) convertView).setText((String) item);
    }

    @Override
    protected View newItemView(Context context, Cursor cursor,
ViewGroup parent) {
        return getLayoutInflater().inflate(R.layout.expense_list_item,
parent, false);
    }

    @Override
    protected void bindItemView(View convertView, Context
context, Cursor cursor) {
        // Find fields to populate in inflated template
        TextView tvExpenseValue = (TextView)
convertView.findViewById(R.id.expense_value_text_view);
        TextView tvExpenseCurrency = (TextView)
convertView.findViewById(R.id.expense_currency_text_view);
```

```
        TextView tvExpenseCatName = (TextView)
convertView.findViewById(R.id.expense_category_name_text_vie
w);

        // Extract values from cursor
        float expValue =
cursor.getFloat(cursor.getColumnIndexOrThrow(ExpensesContra
ct.Expenses.VALUE));
        String categoryName =
cursor.getString(cursor.getColumnIndexOrThrow(ExpensesContra
ct.Categories.NAME));

        // Populate views with extracted values
        tvExpenseValue.setText(Utils.formatToCurrency(expValue));
        tvExpenseCatName.setText(categoryName);
        tvExpenseCurrency.setText(mCurrency);
    }
}



package com.github.ematiyuk.expensetracer.db;

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

import com.github.ematiyuk.expensetracer.R;
```

```
import
com.github.ematiyuk.expensetracer.providers.ExpensesContract.
Categories;
import
com.github.ematiyuk.expensetracer.providers.ExpensesContract.
Expenses;

public class ExpenseDbHelper extends SQLiteOpenHelper {
    private static final int DATABASE_VERSION = 1;
    private static final String DATABASE_NAME =
"expense_tracer.db";

    public static final String CATEGORIES_TABLE_NAME =
"categories";
    public static final String EXPENSES_TABLE_NAME =
"expenses";

    private Context mContext;

    public ExpenseDbHelper(Context ctx) {
        super(ctx, DATABASE_NAME, null, DATABASE_VERSION);
        mContext = ctx;
    }

    @Override
    public void onCreate(SQLiteDatabase db) {
        db.execSQL(CategoriesTable.CREATE_TABLE_QUERY);
        // Fill the table with predefined values
        CategoriesTable.fillTable(db, mContext);
```

```
        db.execSQL(ExpensesTable.CREATE_TABLE_QUERY);
    }

    @Override
    public void onUpgrade(SQLiteDatabase db, int oldVersion, int
newVersion) {
        /* Temporary (dummy) upgrade policy */
        db.execSQL(ExpensesTable.DELETE_TABLE_QUERY);
        db.execSQL(CategoriesTable.DELETE_TABLE_QUERY);
        onCreate(db);
    }

    private static final class CategoriesTable {
        public static final String CREATE_TABLE_QUERY =
                "CREATE TABLE " + CATEGORIES_TABLE_NAME + "
(" +
                Categories._ID + " INTEGER PRIMARY KEY
AUTOINCREMENT, " +
                Categories.NAME + " TEXT NOT NULL);";

        public static final String DELETE_TABLE_QUERY =
                "DROP TABLE IF EXISTS " +
CATEGORIES_TABLE_NAME + ";";

        public static void fillTable(SQLiteDatabase db, Context ctx) {
            String[] predefinedNames =
ctx.getResources().getStringArray(R.array.predefined_categories)
;
            ContentValues values = new ContentValues();
            for (String name : predefinedNames) {
```

```
            values.put(Categories.NAME, name);
            db.insert(CATEGORIES_TABLE_NAME, null, values);
        }
    }
}

private static final class ExpensesTable {
    public static final String CREATE_TABLE_QUERY =
            "CREATE TABLE " + EXPENSES_TABLE_NAME + " ("
+
            Expenses._ID + " INTEGER PRIMARY KEY
AUTOINCREMENT, " +
            Expenses.VALUE + " FLOAT NOT NULL, " +
            Expenses.DATE + " DATE NOT NULL, " +
            Expenses.CATEGORY_ID + " INTEGER NOT NULL);";

    public static final String DELETE_TABLE_QUERY =
            "DROP TABLE IF EXISTS " +
EXPENSES_TABLE_NAME + ";";
}
}
```

```
package com.github.ematiyuk.expensetracer.fragments;

import android.content.ContentUris;
import android.content.ContentValues;
import android.database.Cursor;
import android.net.Uri;
```

```
import android.os.Bundle;
import android.support.annotation.Nullable;
import android.support.v4.app.Fragment;
import android.support.v4.app.LoaderManager;
import android.support.v4.content.CursorLoader;
import android.support.v4.content.Loader;
import android.view.KeyEvent;
import android.view.LayoutInflater;
import android.view.Menu;
import android.view.MenuInflater;
import android.view.MenuItem;
import android.view.View;
import android.view.ViewGroup;
import android.widget.EditText;
import android.widget.Toast;

import
com.github.ematiyuk.expensetracer.providers.ExpensesContract.
Categories;
import com.github.ematiyuk.expensetracer.R;

public class CategoryEditFragment extends Fragment implements
LoaderManager.LoaderCallbacks<Cursor> {
    public static final String EXTRA_EDIT_CATEGORY =
"com.github.ematiyuk.expensetracer.edit_category";

    private EditText mCatNameEditText;
    private long mExtraValue;

    @Override
```

```
    public void onCreate(@Nullable Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);

        setHasOptionsMenu(true);
    }

    @Override
    public View onCreateView(LayoutInflater inflater, ViewGroup
container, Bundle savedInstanceState) {
        // Inflate layout for this fragment
        View rootView =
inflater.inflate(R.layout.fragment_category_edit, container, false);

        mCatNameEditText = (EditText)
rootView.findViewById(R.id.category_name_edit_text);

        // Set listener on Done (submit) button on keyboard clicked
        mCatNameEditText.setOnKeyListener(new
View.OnKeyListener() {
            @Override
            public boolean onKey(View view, int keyCode, KeyEvent
event) {
                if ((event.getAction() == KeyEvent.ACTION_DOWN) &&
(keyCode == KeyEvent.KEYCODE_ENTER)) {
                    checkEditTextForEmptyField(mCatNameEditText);
                    return true;
                }
                return false;
            }
        });
```

```
        return rootView;
    }

    @Override
    public void onActivityCreated(@Nullable Bundle
savedInstanceState) {
        super.onActivityCreated(savedInstanceState);

        mExtraValue =
getActivity().getIntent().getLongExtra(EXTRA_EDIT_CATEGORY,
-1);
        // Create a new category
        if (mExtraValue < 1) {
            getActivity().setTitle(R.string.add_category);

        // Edit existing category
        } else {
            getActivity().setTitle(R.string.edit_category);
            setCategoryData();
        }
    }

    @Override
    public void onCreateOptionsMenu(Menu menu, MenuInflater
inflater) {
        super.onCreateOptionsMenu(menu, inflater);
        inflater.inflate(R.menu.fragment_category_edit, menu);
    }
```

```
    @Override
    public boolean onOptionsItemSelected(MenuItem item) {
        switch (item.getItemId()) {
            case R.id.done_category_edit_menu_item:
                if (checkEditTextForEmptyField(mCatNameEditText)) {
                    // Create a new category
                    if (mExtraValue < 1) {
                        insertNewCategory();

                    // Edit existing category
                    } else {
                        updateCategory(mExtraValue);
                    }
                    getActivity().finish();
                }
                return true;
            default:
                return super.onOptionsItemSelected(item);
        }
    }

    private boolean checkEditTextForEmptyField(EditText editText)
{
        String inputText = editText.getText().toString().trim();
        if (inputText.length() == 0) {

editText.setError(getResources().getString(R.string.error_empty_fi
eld));
            mCatNameEditText.selectAll();
            return false;
```

```
        } else {
            return true;
        }
    }

    private void setCategoryData() {
        getLoaderManager().initLoader(0, null, this);
    }

    @Override
    public CursorLoader onCreateLoader(int id, Bundle args) {
        String[] projectionFields = new String[] {
                Categories._ID,
                Categories.NAME
        };

        Uri singleCategoryUri =
ContentUris.withAppendedId(Categories.CONTENT_URI,
mExtraValue);

        return new CursorLoader(getActivity(),
                singleCategoryUri,
                projectionFields,
                null,
                null,
                null
        );
    }

    @Override
```

```
    public void onLoadFinished(Loader<Cursor> loader, Cursor
data) {
        int categoryNameIndex =
data.getColumnIndex(Categories.NAME);
        data.moveToFirst();
        String categoryName = data.getString(categoryNameIndex);
        mCatNameEditText.setText(categoryName);
    }

    @Override
    public void onLoaderReset(Loader loader) {
        mCatNameEditText.setText("");
    }

    private void insertNewCategory() {
        ContentValues insertValues = new ContentValues();
        insertValues.put(Categories.NAME,
mCatNameEditText.getText().toString());

        getActivity().getContentResolver().insert(
                Categories.CONTENT_URI,
                insertValues
        );

        Toast.makeText(getActivity(),
                getResources().getString(R.string.category_added),
                Toast.LENGTH_SHORT).show();
    }

    private void updateCategory(long id) {
```

```
        ContentValues updateValues = new ContentValues();
        updateValues.put(Categories.NAME,
mCatNameEditText.getText().toString());

        Uri categoryUri =
ContentUris.withAppendedId(Categories.CONTENT_URI, id);

        getActivity().getContentResolver().update(
                categoryUri,
                updateValues,
                null,
                null
        );

        Toast.makeText(getActivity(),
                getResources().getString(R.string.category_updated),
                Toast.LENGTH_SHORT).show();
    }
}


package com.github.ematiyuk.expensetracer.fragments;

import android.app.DatePickerDialog;
import android.app.Dialog;
import android.os.Bundle;
import android.support.v4.app.DialogFragment;

import java.util.Calendar;
```

```
public class DatePickerFragment extends DialogFragment {
    private static DatePickerDialog.OnDateSetListener mListener;

    @Override
    public Dialog onCreateDialog(Bundle savedInstanceState) {
        // Use the current date as the default date in the picker
        final Calendar c = Calendar.getInstance();
        int year = c.get(Calendar.YEAR);
        int month = c.get(Calendar.MONTH);
        int day = c.get(Calendar.DAY_OF_MONTH);

        // Create a new instance of DatePickerDialog and return it
        return new DatePickerDialog(getActivity(), mListener, year,
month, day);
    }

    public static DatePickerFragment
newInstance(DatePickerDialog.OnDateSetListener listener) {
        mListener = listener;
        return new DatePickerFragment();
    }
}

package com.github.ematiyuk.expensetracer.fragments;

import android.content.ContentUris;
import android.content.ContentValues;
import android.database.Cursor;
import android.net.Uri;
import android.os.Bundle;
```

```
import android.support.annotation.Nullable;
import android.support.v4.app.Fragment;
import android.support.v4.app.LoaderManager;
import android.support.v4.content.CursorLoader;
import android.support.v4.content.Loader;
import android.support.v4.widget.SimpleCursorAdapter;
import android.support.v7.widget.AppCompatSpinner;
import android.view.KeyEvent;
import android.view.LayoutInflater;
import android.view.Menu;
import android.view.MenuInflater;
import android.view.MenuItem;
import android.view.View;
import android.view.ViewGroup;
import android.widget.AdapterView;
import android.widget.ArrayAdapter;
import android.widget.EditText;
import android.widget.Toast;

import
com.github.ematiyuk.expensetracer.providers.ExpensesContract.
Categories;
import
com.github.ematiyuk.expensetracer.providers.ExpensesContract.
Expenses;
import com.github.ematiyuk.expensetracer.R;
import com.github.ematiyuk.expensetracer.utils.Utils;

import java.util.ArrayList;
import java.util.Date;
```

```
public class ExpenseEditFragment extends Fragment implements
LoaderManager.LoaderCallbacks<Cursor> {
    public static final String EXTRA_EDIT_EXPENSE =
"com.github.ematiyuk.expensetracer.edit_expense";

    private static final int EXPENSE_LOADER_ID = 1;
    private static final int CATEGORIES_LOADER_ID = 0;

    private EditText mExpValueEditText;
    private AppCompatSpinner mCategorySpinner;
    private SimpleCursorAdapter mAdapter;
    private View mCatProgressBar;
    private long mExtraValue;
    private long mExpenseCategoryId = -1;

    @Override
    public void onCreate(@Nullable Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);

        setHasOptionsMenu(true);
    }

    @Override
    public View onCreateView(LayoutInflater inflater, ViewGroup
container, Bundle savedInstanceState) {
        // Inflate layout for this fragment
        View rootView =
inflater.inflate(R.layout.fragment_expense_edit, container, false);
```

```
        mExpValueEditText = (EditText)
rootView.findViewById(R.id.expense_value_edit_text);
        mCatProgressBar =
rootView.findViewById(R.id.cat_select_progress_bar);
        mCategorySpinner = (AppCompatSpinner)
rootView.findViewById(R.id.category_choose_spinner);

        setEditTextDefaultValue();

        // Set listener on Done (submit) button on keyboard clicked
        mExpValueEditText.setOnKeyListener(new
View.OnKeyListener() {
            @Override
            public boolean onKey(View view, int keyCode, KeyEvent
event) {
                if ((event.getAction() == KeyEvent.ACTION_DOWN) &&
(keyCode == KeyEvent.KEYCODE_ENTER)) {
                    checkValueFieldForIncorrectInput();
                    return true;
                }
                return false;
            }
        });

        mCategorySpinner.setOnItemSelectedListener(new
AdapterView.OnItemSelectedListener() {
            @Override
            public void onItemSelected(AdapterView<?> parent, View
view, int pos, long id) {
                mExpenseCategoryId = id;
```

```
            }

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

        return rootView;
    }

    @Override
    public void onActivityCreated(@Nullable Bundle
savedInstanceState) {
        super.onActivityCreated(savedInstanceState);

        mAdapter = new SimpleCursorAdapter(getActivity(),
                android.R.layout.simple_spinner_item,
                null,
                new String[] { Categories.NAME },
                new int[] { android.R.id.text1 },
                0);
        // Specify the layout to use when the list of choices appears

mAdapter.setDropDownViewResource(android.R.layout.simple_s
pinner_dropdown_item);
        // Apply the adapter to the spinner
        mCategorySpinner.setAdapter(mAdapter);
```

```
        mExtraValue =
getActivity().getIntent().getLongExtra(EXTRA_EDIT_EXPENSE,
-1);
        // Create a new expense
        if (mExtraValue < 1) {
            getActivity().setTitle(R.string.add_expense);
            loadCategories();

            // Edit existing expense
        } else {
            getActivity().setTitle(R.string.edit_expense);
            loadExpenseData();
        }
    }

    @Override
    public void onCreateOptionsMenu(Menu menu, MenuInflater
inflater) {
        super.onCreateOptionsMenu(menu, inflater);
        inflater.inflate(R.menu.fragment_expense_edit, menu);
    }

    @Override
    public boolean onOptionsItemSelected(MenuItem item) {
        switch (item.getItemId()) {
            case R.id.done_expense_edit_menu_item:
                if (checkForIncorrectInput()) {
                    // Create a new expense
                    if (mExtraValue < 1) {
                        insertNewExpense();
```

```
                // Edit existing expense
                } else {
                    updateExpense(mExtraValue);
                }
                getActivity().finish();
            }
            return true;
        default:
            return super.onOptionsItemSelected(item);
    }
}

private boolean checkForIncorrectInput() {
    if (!checkValueFieldForIncorrectInput()) {
        mExpValueEditText.selectAll();
        return false;
    }
    // Future check of other fields

    return true;
}

private boolean checkValueFieldForIncorrectInput() {
    String etValue = mExpValueEditText.getText().toString();
    try {
        if (etValue.length() == 0) {

mExpValueEditText.setError(getResources().getString(R.string.err
or_empty_field));
```

```
                return false;
            } else if (Float.parseFloat(etValue) == 0.00f) {

mExpValueEditText.setError(getResources().getString(R.string.err
or_zero_value));
                return false;
            }
        } catch (Exception e) {

mExpValueEditText.setError(getResources().getString(R.string.err
or_incorrect_input));
            return false;
        }
        return true;
    }

    private void loadCategories() {
        // Show the progress bar next to category spinner
        mCatProgressBar.setVisibility(View.VISIBLE);


getLoaderManager().initLoader(CATEGORIES_LOADER_ID, null,
this);
    }

    private void loadExpenseData() {
        getLoaderManager().initLoader(EXPENSE_LOADER_ID,
null, this);
        loadCategories();
    }
```

```
    private void setEditTextDefaultValue() {
        mExpValueEditText.setText(String.valueOf(0));
        mExpValueEditText.selectAll();
    }

    @Override
    public CursorLoader onCreateLoader(int id, Bundle args) {
        String[] projectionFields = null;
        Uri uri = null;
        switch (id) {
            case EXPENSE_LOADER_ID:
                projectionFields = new String[] {
                        Expenses._ID,
                        Expenses.VALUE,
                        Expenses.CATEGORY_ID
                };

                uri =
ContentUris.withAppendedId(Expenses.CONTENT_URI,
mExtraValue);
                break;
            case CATEGORIES_LOADER_ID:
                projectionFields = new String[] {
                        Categories._ID,
                        Categories.NAME
                };

                uri = Categories.CONTENT_URI;
                break;
```

```
        }

        return new CursorLoader(getActivity(),
                uri,
                projectionFields,
                null,
                null,
                null
        );
    }

    @Override
    public void onLoadFinished(Loader<Cursor> loader, Cursor
data) {
        switch (loader.getId()) {
            case EXPENSE_LOADER_ID:
                int expenseValueIndex =
data.getColumnIndex(Expenses.VALUE);
                int expenseCategoryIdIndex =
data.getColumnIndex(Expenses.CATEGORY_ID);

                data.moveToFirst();
                mExpenseCategoryId =
data.getLong(expenseCategoryIdIndex);
                updateSpinnerSelection();


mExpValueEditText.setText(String.valueOf(data.getFloat(expense
ValueIndex)));
                mExpValueEditText.selectAll();
```

```
            break;
        case CATEGORIES_LOADER_ID:
            // Hide the progress bar next to category spinner
            mCatProgressBar.setVisibility(View.GONE);

            if (null == data || data.getCount() < 1) {
                mExpenseCategoryId = -1;
                // Fill the spinner with default values
                ArrayList<String> defaultItems = new ArrayList<>();

defaultItems.add(getResources().getString(R.string.no_categories
_string));

                ArrayAdapter<String> tempAdapter = new
ArrayAdapter<String>(getActivity(),
                        android.R.layout.simple_spinner_item,
                        defaultItems);
                mCategorySpinner.setAdapter(tempAdapter);
                // Disable the spinner
                mCategorySpinner.setEnabled(false);
            } else {
                // Set the original adapter
                mCategorySpinner.setAdapter(mAdapter);
                // Update spinner data
                mAdapter.swapCursor(data);
                // Enable the spinner
                mCategorySpinner.setEnabled(true);
                updateSpinnerSelection();
            }
            break;
```

```
        }
    }

    @Override
    public void onLoaderReset(Loader<Cursor> loader) {
        switch (loader.getId()) {
            case EXPENSE_LOADER_ID:
                mExpenseCategoryId = -1;
                setEditTextDefaultValue();
                break;
            case CATEGORIES_LOADER_ID:
                mAdapter.swapCursor(null);
                break;
        }
    }

    private void updateSpinnerSelection() {
        mCategorySpinner.setSelection(0);
        for (int pos = 0; pos < mAdapter.getCount(); ++pos) {
            if (mAdapter.getItemId(pos) == mExpenseCategoryId) {
                // Set spinner item selected according to the value from
db
                mCategorySpinner.setSelection(pos);
                break;
            }
        }
    }

    private void insertNewExpense() {
        ContentValues insertValues = new ContentValues();
```

```
        insertValues.put(Expenses.VALUE,
Float.parseFloat(mExpValueEditText.getText().toString()));
        insertValues.put(Expenses.DATE, Utils.getDateString(new
Date())); // Put current date (today)
        insertValues.put(Expenses.CATEGORY_ID,
mExpenseCategoryId);

        getActivity().getContentResolver().insert(
                Expenses.CONTENT_URI,
                insertValues
        );

        Toast.makeText(getActivity(),
                getResources().getString(R.string.expense_added),
                Toast.LENGTH_SHORT).show();
    }

    private void updateExpense(long id) {
        ContentValues updateValues = new ContentValues();
        updateValues.put(Expenses.VALUE,
Float.parseFloat(mExpValueEditText.getText().toString()));
        updateValues.put(Expenses.CATEGORY_ID,
mExpenseCategoryId);

        Uri expenseUri =
ContentUris.withAppendedId(Expenses.CONTENT_URI, id);

        getActivity().getContentResolver().update(
                expenseUri,
                updateValues,
```

```
                null,
                null
        );

        Toast.makeText(getActivity(),
                getResources().getString(R.string.expense_updated),
                Toast.LENGTH_SHORT).show();
    }
}
```

```
package com.github.ematiyuk.expensetracer.utils;

import android.content.Context;

import java.text.NumberFormat;
import java.text.ParseException;
import java.text.SimpleDateFormat;
import java.util.Date;
import java.util.Locale;

public class Utils {
    public static String getSystemFormatDateString(Context
context, Date date) {
        java.text.DateFormat dateFormat =
android.text.format.DateFormat.getDateFormat(context);
        return  dateFormat.format(date);
    }
```

```
    public static String getSystemFormatDateString(Context
context, String dateString) {
        java.text.DateFormat dateFormat =
android.text.format.DateFormat.getDateFormat(context);
        return  dateFormat.format(stringToDate(dateString));
    }

    public static String getDateString(Date date) {
        SimpleDateFormat dateFormat = new
SimpleDateFormat("MM/dd/yy", Locale.US);
        try {
            return dateFormat.format(date);
        } catch (Exception pe) {
            pe.printStackTrace();
            return "no_date";
        }
    }

    private static Date stringToDate(String dateString) {
        SimpleDateFormat dateFormat = new
SimpleDateFormat("MM/dd/yy", Locale.US);
        try {
            return dateFormat.parse(dateString);
        } catch (ParseException pe) {
            pe.printStackTrace();
            return null;
        }
    }

    public static String formatToCurrency(float value) {
```

```
        final NumberFormat numberFormat =
NumberFormat.getNumberInstance();
        numberFormat.setMaximumFractionDigits(2);
        numberFormat.setMinimumFractionDigits(2);
        return numberFormat.format(value);
    }
}
```

```
<?xml version="1.0" encoding="utf-8"?>
<RelativeLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    android:id="@+id/top_parent"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:fitsSystemWindows="true">

    <!-- The ActionBar (Toolbar) displayed at the top -->
    <include
        android:id="@+id/toolbar"
        layout="@layout/toolbar" />

    <android.support.v4.widget.DrawerLayout
        android:id="@+id/drawer_layout"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:layout_below="@id/toolbar">

        <!-- The main content view where fragments are loaded -->
```

```
        <FrameLayout
            android:id="@+id/content_frame"
            android:layout_width="match_parent"
            android:layout_height="match_parent" />

        <android.support.design.widget.NavigationView
            android:id="@+id/nav_drawer"
            android:layout_width="wrap_content"
            android:layout_height="match_parent"
            android:layout_gravity="start"
            android:background="@android:color/white"
            app:menu="@menu/drawer_view"/>
    </android.support.v4.widget.DrawerLayout>

</RelativeLayout>



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

    <TextView
        android:id="@+id/category_name_list_item"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_alignParentLeft="true"
        android:layout_alignParentStart="true"
```

```
        android:padding="10dp"
        android:textSize="19sp" />

</RelativeLayout>


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

    <TextView
        android:id="@+id/expense_value_text_view"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentLeft="true"
        android:layout_alignParentStart="true"
        android:paddingLeft="6dp"
        android:paddingRight="6dp"
        android:paddingTop="6dp"
        android:textSize="22sp" />

    <TextView
        android:id="@+id/expense_currency_text_view"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:paddingLeft="6dp"
        android:paddingRight="6dp"
        android:paddingTop="6dp"
```

```
        android:paddingBottom="0dp"
        android:layout_toRightOf="@id/expense_value_text_view"
        android:layout_toEndOf="@id/expense_value_text_view"
        android:layout_alignParentTop="true"
        android:layout_alignParentEnd="true"
        android:layout_alignParentRight="true"
        android:gravity="end"
        android:textSize="20sp" />

    <TextView
        android:id="@+id/expense_category_name_text_view"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_alignParentLeft="true"
        android:layout_alignParentStart="true"
        android:layout_below="@id/expense_value_text_view"
        android:paddingLeft="6dp"
        android:paddingRight="6dp"
        android:paddingBottom="4dp"
        android:textSize="14sp" />

</RelativeLayout>


<LinearLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical">
```

```
<LinearLayout
    android:id="@+id/categories_progress_bar"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:layout_gravity="center"
    android:gravity="center">

    <ProgressBar
        style="@style/Base.Widget.AppCompat.ProgressBar"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:indeterminate="true"/>

</LinearLayout>

<ListView
    android:id="@+id/categories_list_view"
    android:layout_width="match_parent"
    android:layout_height="match_parent" />

<LinearLayout
    android:id="@+id/categories_empty_list_view"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical"
    android:gravity="center">

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

```
            android:layout_height="wrap_content"
            android:text="@string/add_category"/>

    </LinearLayout>

</LinearLayout>


<LinearLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:orientation="vertical">

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="vertical"
        android:layout_weight="0">

        <LinearLayout
            android:layout_width="match_parent"
            android:layout_height="wrap_content"
            android:orientation="vertical"
            android:layout_marginTop="10dp"
            android:layout_marginLeft="10dp"
            android:layout_marginRight="10dp"
            android:layout_marginBottom="0dp">

            <TextView
```

```
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginBottom="2dp"
        android:textSize="18sp"
        android:text="@string/total_string" />

    <View
        android:layout_width="match_parent"
        android:layout_height="1dip"
        android:background="#000000" />

</LinearLayout>

<RelativeLayout
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:layout_marginTop="0dp"
    android:layout_marginBottom="0dp"
    android:layout_marginLeft="10dp"
    android:layout_marginRight="10dp">

    <TextView
        android:id="@+id/expenses_report_total_text_view"
        android:layout_width="wrap_content"
        android:layout_height="55dp"
        android:gravity="start|center_vertical"
        android:paddingRight="4dp"
        android:paddingEnd="4dp"
        android:paddingLeft="2dp"
        android:paddingStart="2dp"
```

```
            android:textSize="30sp"
            android:singleLine="true"/>

        <TextView

android:id="@+id/expenses_report_total_currency_text_view"
            android:layout_width="wrap_content"
            android:layout_height="55dp"

android:layout_toEndOf="@id/expenses_report_total_text_view"

android:layout_toRightOf="@id/expenses_report_total_text_view"
            android:gravity="end|center_vertical"
            android:paddingRight="4dp"
            android:paddingEnd="4dp"
            android:paddingLeft="0dp"
            android:paddingStart="0dp"
            android:textSize="22sp"
            android:singleLine="true"
            android:layout_alignParentEnd="true"
            android:layout_alignParentRight="true"/>

    </RelativeLayout>

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:orientation="vertical"
        android:layout_marginTop="0dp"
        android:layout_marginLeft="10dp"
```

```
        android:layout_marginRight="10dp"
        android:layout_marginBottom="2dp">

        <View
            android:layout_width="match_parent"
            android:layout_height="1dip"
            android:background="#000000" />

    </LinearLayout>

</LinearLayout>

<LinearLayout
    android:layout_width="match_parent"
    android:layout_height="0dp"
    android:orientation="vertical"
    android:layout_marginLeft="10dp"
    android:layout_marginRight="10dp"
    android:layout_weight="1">

    <LinearLayout
        android:id="@+id/expenses_report_progress_bar"
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:layout_gravity="center"
        android:gravity="center">

        <ProgressBar
            style="@style/Base.Widget.AppCompat.ProgressBar"
            android:layout_width="wrap_content"
```

```
            android:layout_height="wrap_content"
            android:indeterminate="true"/>

        </LinearLayout>

        <ListView
            android:id="@+id/expenses_report_list_view"
            android:layout_width="match_parent"
            android:layout_height="match_parent"/>

        <LinearLayout
            android:id="@+id/expenses_report_empty_list_view"
            android:layout_width="match_parent"
            android:layout_height="match_parent"
            android:orientation="vertical"
            android:gravity="center">

            <TextView

android:id="@+id/expenses_report_empty_list_text_view"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:textSize="20sp"
                android:text="@string/no_expenses"/>

        </LinearLayout>

    </LinearLayout>

</LinearLayout>
```

```
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <string-array name="predefined_categories">
        <item>@string/cat_general</item>
        <item>@string/cat_clothes</item>
        <item>@string/cat_entertainment</item>
        <item>@string/cat_food</item>
        <item>@string/cat_health</item>
        <item>@string/cat_household</item>
        <item>@string/cat_hygiene</item>
        <item>@string/cat_pets</item>
        <item>@string/cat_presents</item>
        <item>@string/cat_sports</item>
        <item>@string/cat_transportation</item>
    </string-array>
</resources>
```

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

    <string name="nav_today">Today</string>
    <string name="nav_report">Expense reports</string>
    <string name="nav_categories">Expense categories</string>
    <string name="nav_settings">Settings</string>

    <string name="drawer_open">Open navigation drawer</string>
    <string name="drawer_close">Close navigation
drawer</string>
```

```
    <string name="add_category">Add a category</string>
    <string name="edit_category">Edit category</string>
    <string name="delete_category">Delete category</string>
    <string name="delete_cat_dialog_msg">All associated
expenses will be deleted as well. Are you sure you want to delete
the category?</string>
    <string name="category_deleted">Category deleted</string>
    <string name="category_added">Category added</string>
    <string name="category_updated">Category updated</string>
    <string name="category_name_string">Category
name</string>

    <string name="today_total">Today\'s total</string>
    <string name="today_expenses">Today\'s expenses</string>

    <string name="add_expense">New expense</string>
    <string name="edit_expense">Edit expense</string>
    <string name="delete_expense">Delete expense</string>
    <string name="delete_exp_dialog_msg">Are you sure you
want to delete the expense?</string>
    <string name="expense_deleted">Expense deleted</string>
    <string name="expense_added">Expense added</string>
    <string name="expense_updated">Expense updated</string>
    <string
name="expense_category_name_string">Category</string>
    <plurals name="expenses_deleted_plurals_msg">
        <item quantity="one">%d expense deleted</item>
        <item quantity="other">%d expenses deleted</item>
    </plurals>
```

```
    <string name="delete_string">Delete</string>
    <string name="done_string">Done</string>
    <string name="error_empty_field">Empty field</string>
    <string name="error_zero_value">Zero value is invalid</string>
    <string name="error_incorrect_input">Incorrect input</string>

    <string name="filter_expenses">Filter</string>
    <string name="filter_option_today">By Today</string>
    <string name="filter_option_week">By Week</string>
    <string name="filter_option_month">By Month</string>
    <string name="filter_option_date">By Date</string>
    <string name="filter_option_range">By Date range</string>
    <string name="filter_todays_expenses">Today\'s
expenses</string>
    <string name="filter_weeks_expenses">Week\'s
expenses</string>
    <string name="filter_months_expenses">Month\'s
expenses</string>
    <string name="filter_date_expenses">For %s</string>
    <string name="filter_date_range_expenses">%1$s -
%2$s</string>

    <string name="default_string">Default</string>
    <string name="no_categories_string">&amp;#60;No
categories&amp;#62;</string>
    <string name="no_expenses">There are no expenses.</string>
    <string name="total_string">Total</string>

    <string name="pref_currency_title">Currency</string>
```

```
<string name="pref_currency_default">USD</string>
<string-array name="pref_currency_list_titles">
    <item>Indian Rupee</item>
    <item>US Dollar</item>
    <item>Euro</item>
    <item>British Pound</item>
    <item>Canadian Dollar</item>
    <item>Australian Dollar</item>
    <item>Ukrainian Hryvnia</item>
    <item>Russian Rouble</item>
</string-array>
<string-array name="pref_currency_list_values">
    <item>INR</item>
    <item>USD</item>
    <item>EUR</item>
    <item>GBP</item>
    <item>CAD</item>
    <item>AUD</item>
    <item>UAH</item>
    <item>RUB</item>
</string-array>

<!-- Predefined expense categories -->
<string name="cat_general">General</string>
<string name="cat_clothes">Clothes</string>
<string name="cat_entertainment">Entertainment</string>
<string name="cat_food">Food</string>
<string name="cat_health">Health</string>
<string name="cat_household">Household</string>
<string name="cat_hygiene">Hygiene</string>
```

```
    <string name="cat_pets">Pets</string>
    <string name="cat_presents">Presents</string>
    <string name="cat_sports">Sports</string>
    <string name="cat_transportation">Transportation</string>

</resources>
```

Output Screenshots:

Today's total

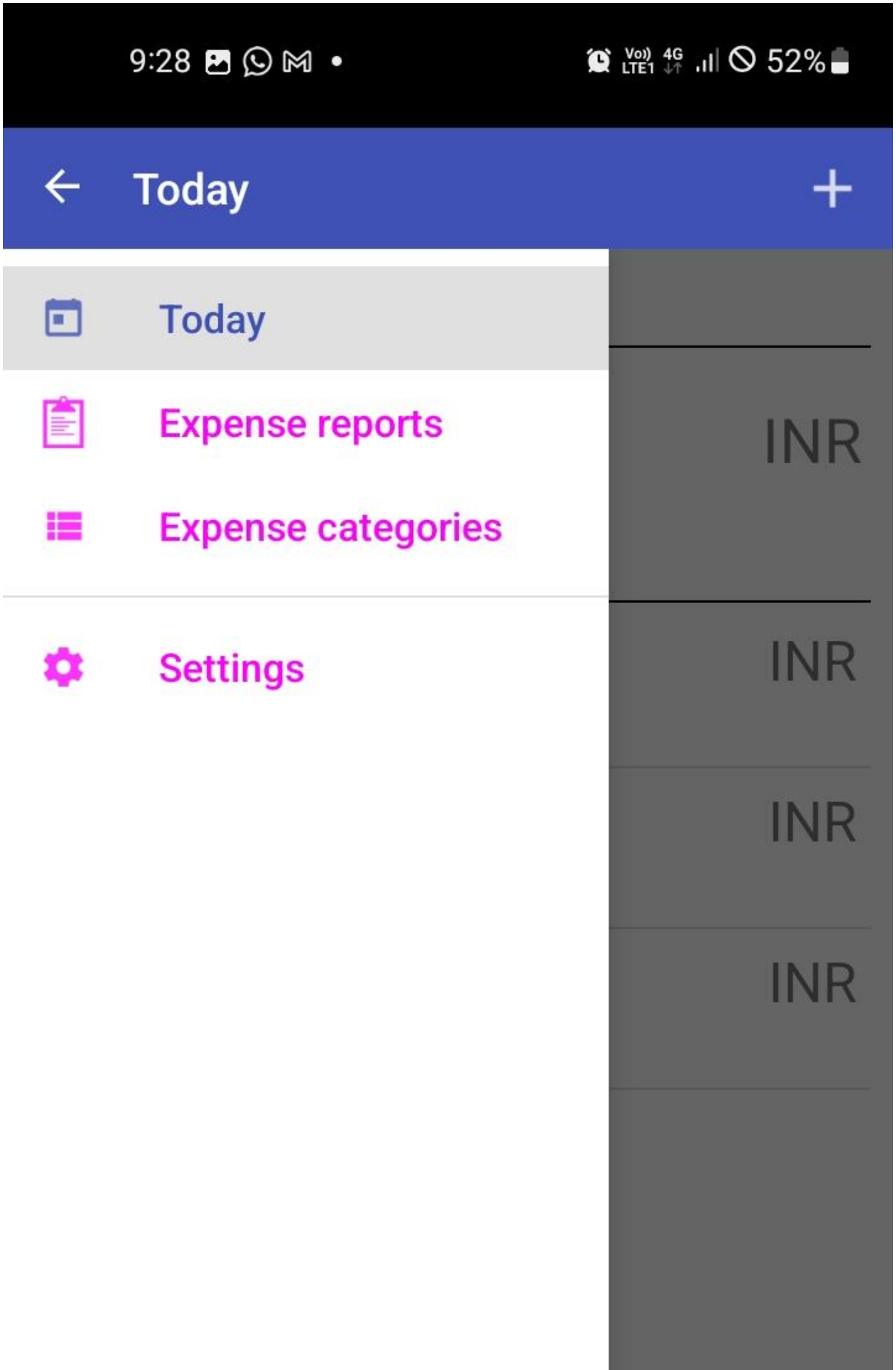
5,032.00 INR

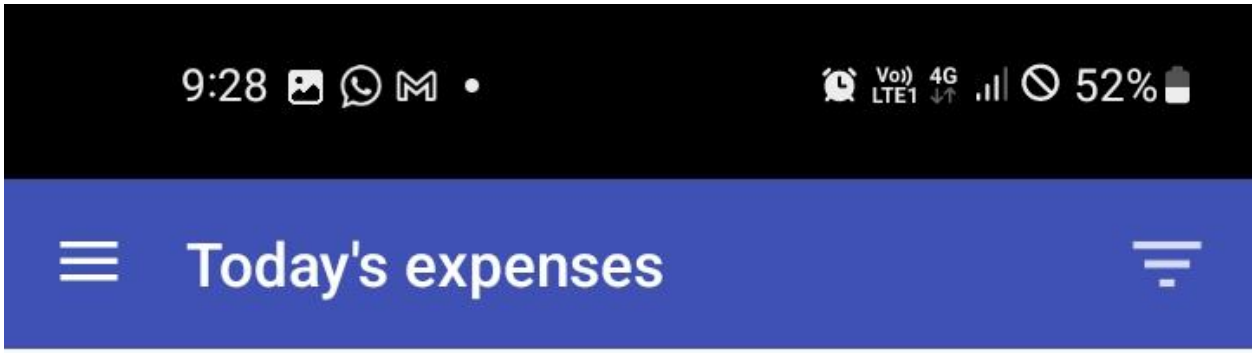
Today's expenses

123.00 INR
General

4,789.00 INR
Hygiene

120.00 INR
Hygiene


9:28
52%
Today
Today
Expense reports
Expense categories
Settings
INR
INR
INR
INR



Total

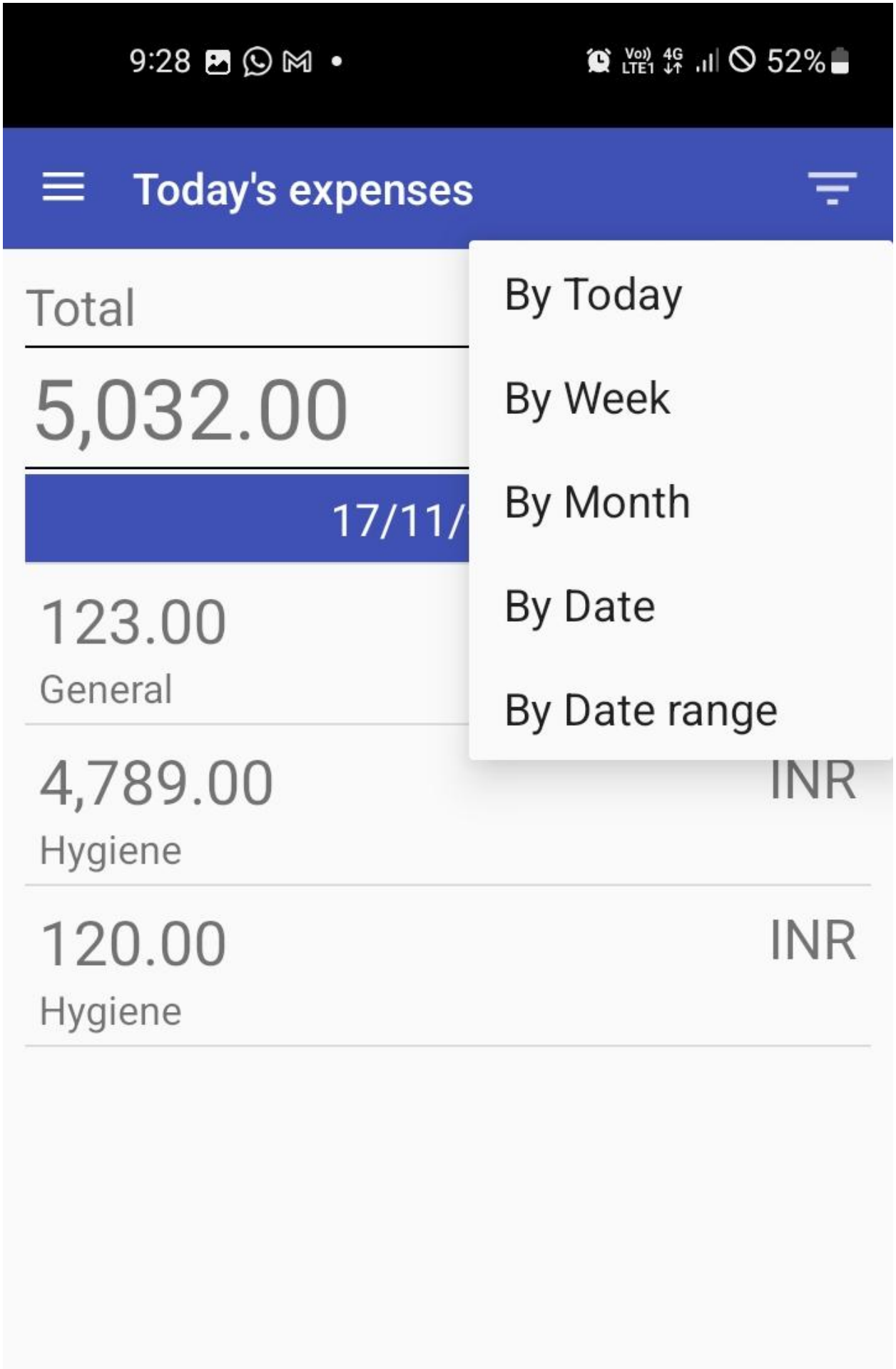
5,032.00 INR

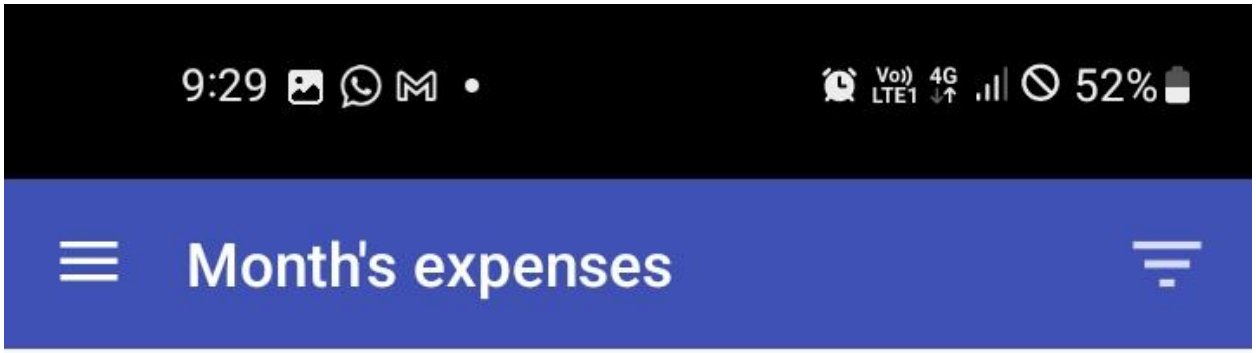
17/11/2023

123.00 INR
General

4,789.00 INR
Hygiene

120.00 INR
Hygiene


9:28
52%
Today's expenses
Total
5,032.00
17/11/
By Today
By Week
By Month
By Date
By Date range
123.00
General
4,789.00
INR
Hygiene
120.00
INR
Hygiene



Month's expenses

Total

7,262.00 INR

16/11/2023

230.00 INR
General

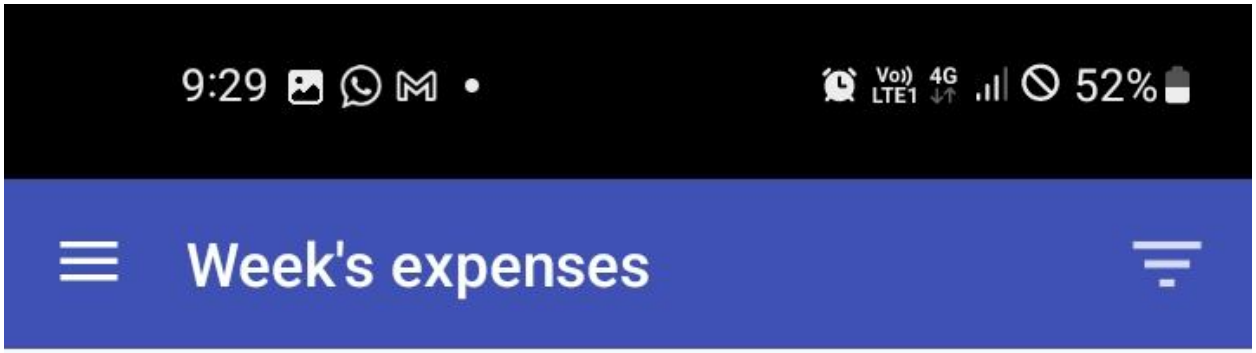
1,000.00 INR
Pets

1,000.00 INR
Sabari

17/11/2023

123.00 INR
General

4,789.00 INR



Week's expenses

Total

7,262.00 INR

16/11/2023

230.00 INR
General

1,000.00 INR
Pets

1,000.00 INR
Sabari

17/11/2023

123.00 INR
General

4,789.00 INR

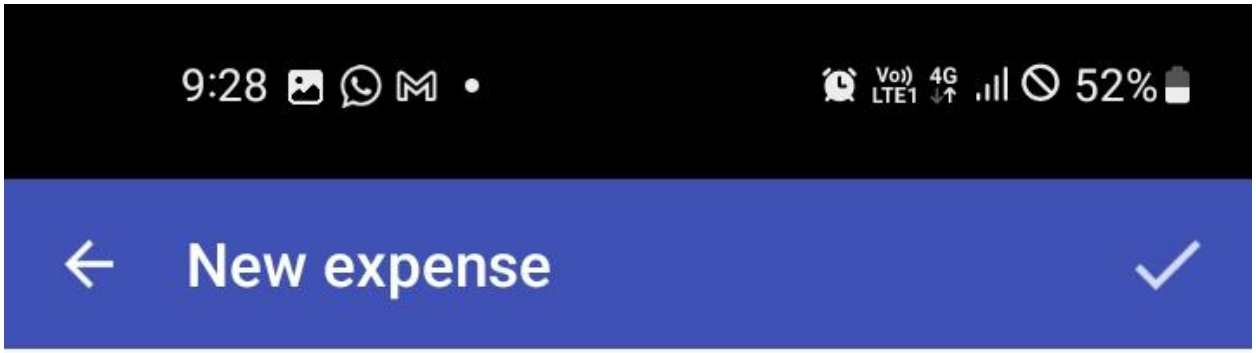
Today's total

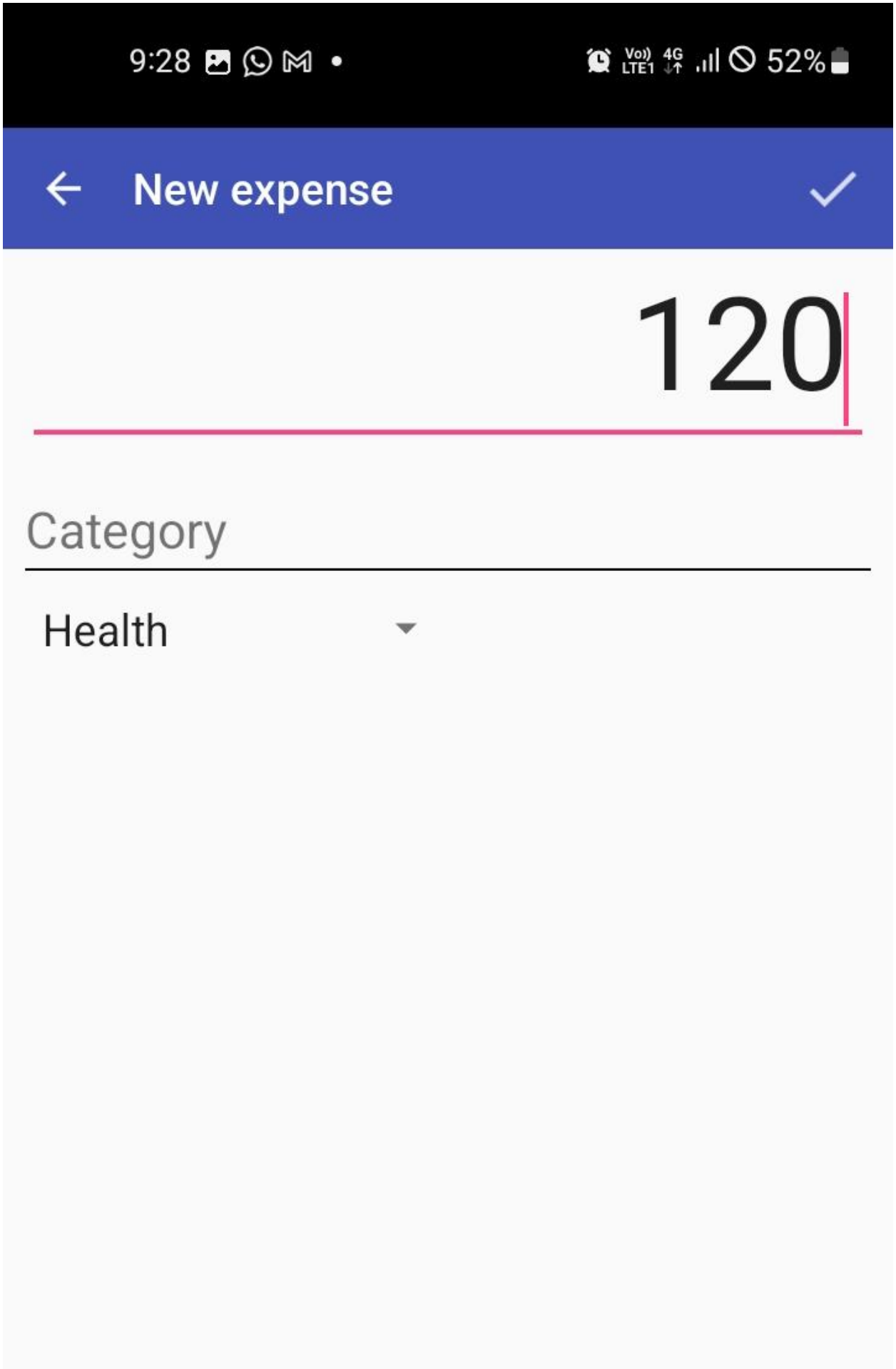
4,912.00 INR

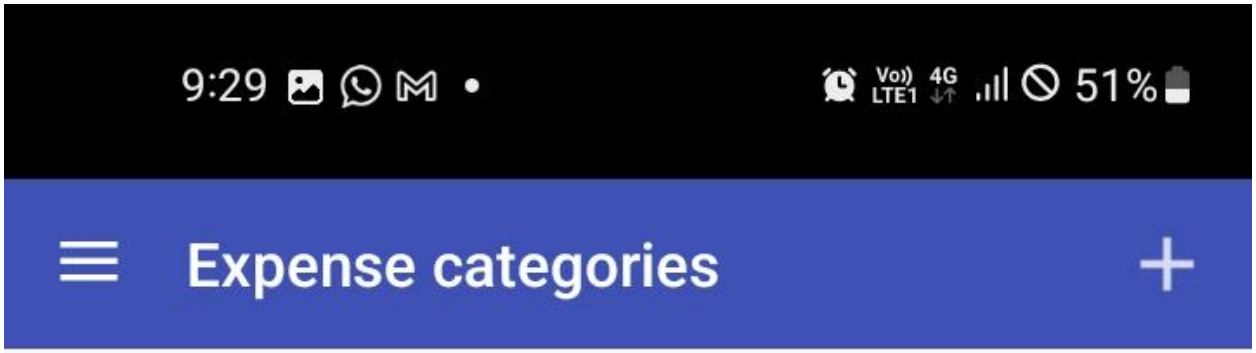
Today's expenses

123.00 INR
General

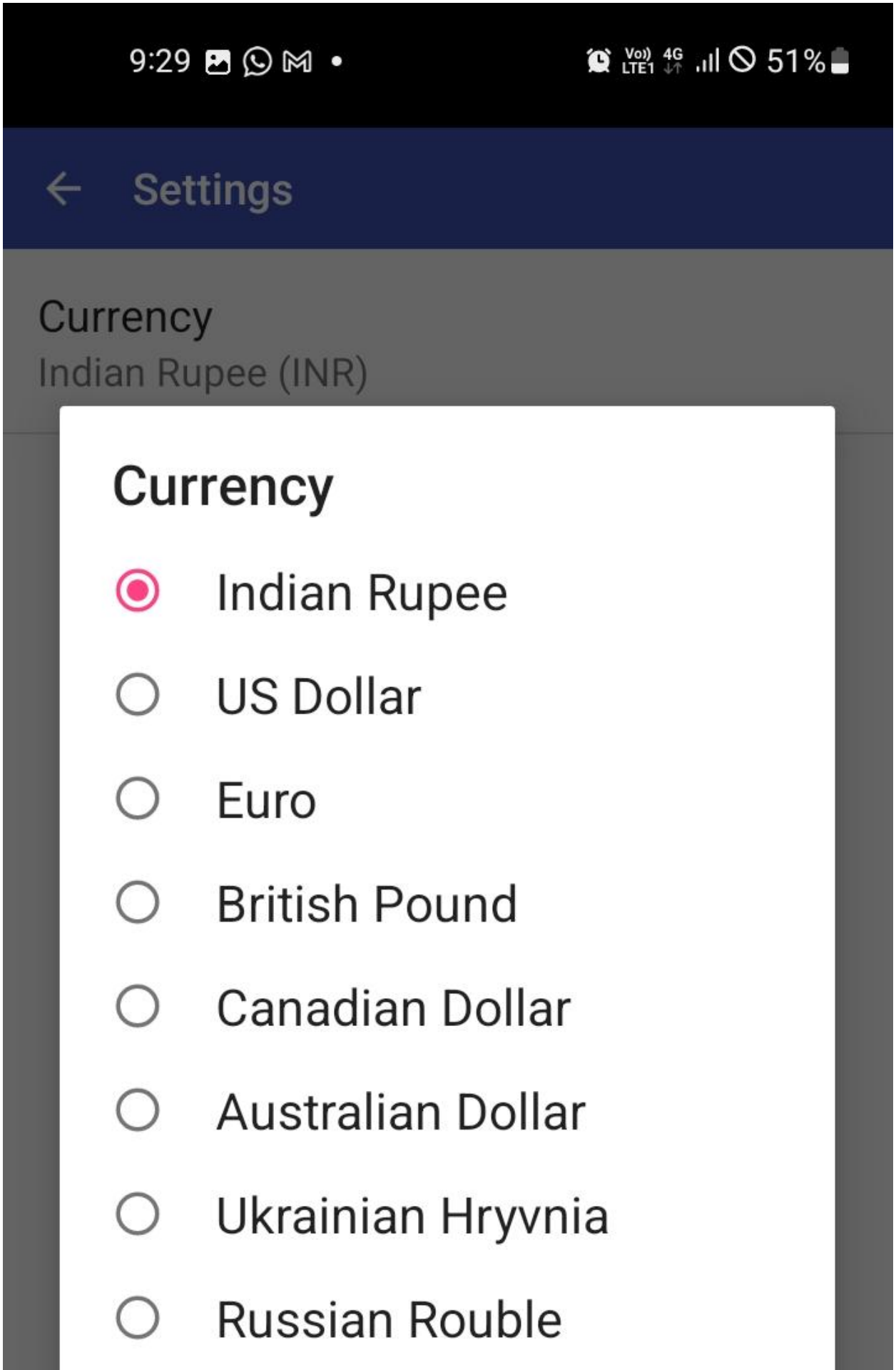
4,789.00 INR
Hygiene

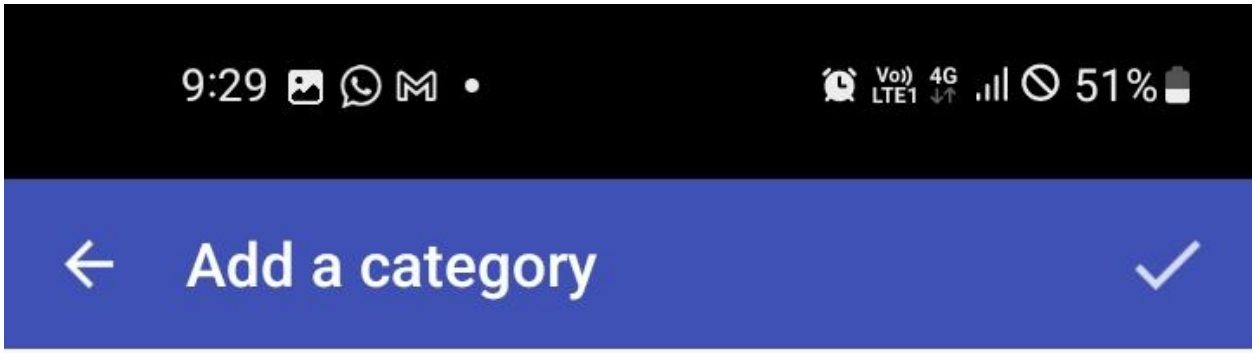

9:28
52%
New expense
0
Category
General

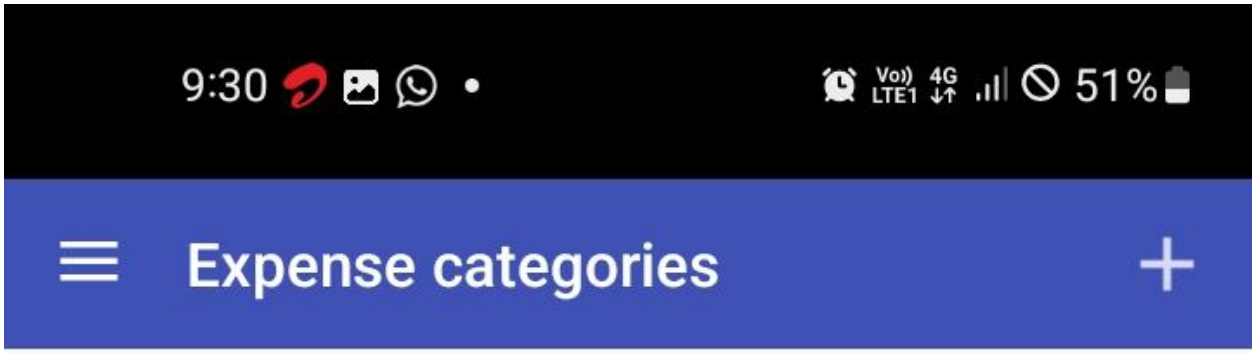

9:28
52%
New expense
120
Category
Health



- General
- Clothes
- Entertainment
- works
- Health
- Household
- Hygiene
- Pets
- Presents


9:29
51%
Settings
Currency
Indian Rupee (INR)
Currency
Indian Rupee
US Dollar
Euro
British Pound
Canadian Dollar
Australian Dollar
Ukrainian Hryvnia
Russian Rouble


9:29
51%
Add a category
Category name
sample category



- General
- Clothes
- Entertainment
- works
- Health
- Household
- Hygiene
- Pets
- Presents

Best Practices:

- The code written to develop the application is concise and easily understandable.
- Each intent layout is provided with its own java file.
- The attributes of the database are clearly defined.
- The colour template used is in such a way that it becomes easier to use the application.
- Proper naming convention is used to define variables and functions.

Learning Outcomes:

- We learnt how to use android studio to create applications.
- We learnt how to create a database to store and display the information accordingly.
- We learnt how to use different concepts involved in android development to build the application.
- We learnt how to handle different layouts to provide a seamless experience.
- We learnt how to design the different pages using the underlying xml file.