Exercise 1 - Designing Health Insurance Form using GUI Components

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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_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/editAddress"
        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/age"
        android:layout_width="match_parent"
        android:layout_height="26dp"
        android:layout_marginTop="16dp"
        android:gravity="left"
        android:text="Age"
        android:textSize="18sp"
        android:textStyle="bold"
        android:typeface="normal" >
    <EditText
        android:id="@+id/editAge"
        android:layout_width="match_parent"
        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_parent"
        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_parent"
        android:layout_height="wrap_content"
        android:gravity="center" >
```

```
<TextView
    android:id="@+id/gender"
    android:layout_width="match_parent"
    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_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="4dp">
    <RadioButton
        android:id="@+id/male"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Male" >
    <RadioButton
        android:id="@+id/female"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        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_spinner"
        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_name"
        android:layout_width="match_parent"
        android:layout_height="54dp"
        android:hint="Employer Contact Name:"
        android:inputType="text"
        android:textColor="#0000FF"
        android:typeface="sans" >
    <TextView
        android:id="@+id/emergency_relationship"
        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_relationship"
        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_address"
        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_parent"
            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_phone"
            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_parent"
            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().toString()); 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().toString());
              intent.putExtra("employment_status", ((Spinner)
findViewById(R.id.employment_status_spinner)).getSelectedItem().toString());
        intent.putExtra("emergency_name", ((EditText)
findViewById(R.id.edit_emergency_name)).getText().toString());
        intent.putExtra("emergency_relationship", ((EditText)
            findViewById(R.id.edit_emergency_relationship)).getText().toString());
                    intent.putExtra("emergency_address", ((EditText)
          findViewById(R.id.edit_emergency_address)).getText().toString());
                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(false); ((RadioButton)
findViewById(R.id.landline_radio_button_id)).setChecked(false); ((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_content"
            android:text="Name" >
        <TextView
            android:id="@+id/textView_name_value"
            android:layout_width="match_parent"
            android:layout_height="wrap_content" > /TableRow>
    <TableRow>
        <TextView
            android:id="@+id/textView_number"
```

```
            android:layout_width="100dp"
            android:layout_height="wrap_content"
            android:text="Number" >
        <TextView
            android:id="@+id/textView_number_value"
            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_content"
            android:text="Address" >
        <TextView
            android:id="@+id/textView_address_value"
            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_content"
            android:text="Age" >
        <TextView
            android:id="@+id/textView_age_value"
            android:layout_width="match_parent"
            android:layout_height="wrap_content" > /TableRow>
    <TableRow>
        <TextView
            android:id="@+id/textView_dob"
            android:layout_width="100dp"
            android:layout_height="wrap_content"
            android:text="DOB" >
        <TextView
            android:id="@+id/textView_dob_value"
            android:layout_width="match_parent"
            android:layout_height="wrap_content" > /TableRow>
    <TableRow>
        <TextView
            android:id="@+id/textView_gender"
            android:layout_width="100dp"
            android:layout_height="wrap_content"
            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_value"
            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_status"
            android:layout_width="100dp"
            android:layout_height="wrap_content"
            android:text="Employement Status" >
      <TextView
            android:id="@+id/textView_employment_status_value"
            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_value"
            android:layout_width="match_parent"
            android:layout_height="wrap_content" >
/TableRow>
<TableRow>
    <TextView
            android:id="@+id/textView_emergency_relationship"
            android:layout_width="100dp"
            android:layout_height="wrap_content"
            android:text="Emergency relationship" >
    <TextView
            android:id="@+id/textView_emergency_relationship_value"
            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_value"
            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_value"
            android:layout_width="match_parent"
```

```
                android:layout_height="wrap_content" >
    /TableRow>
/TableLayout>
```

TableActivity.java

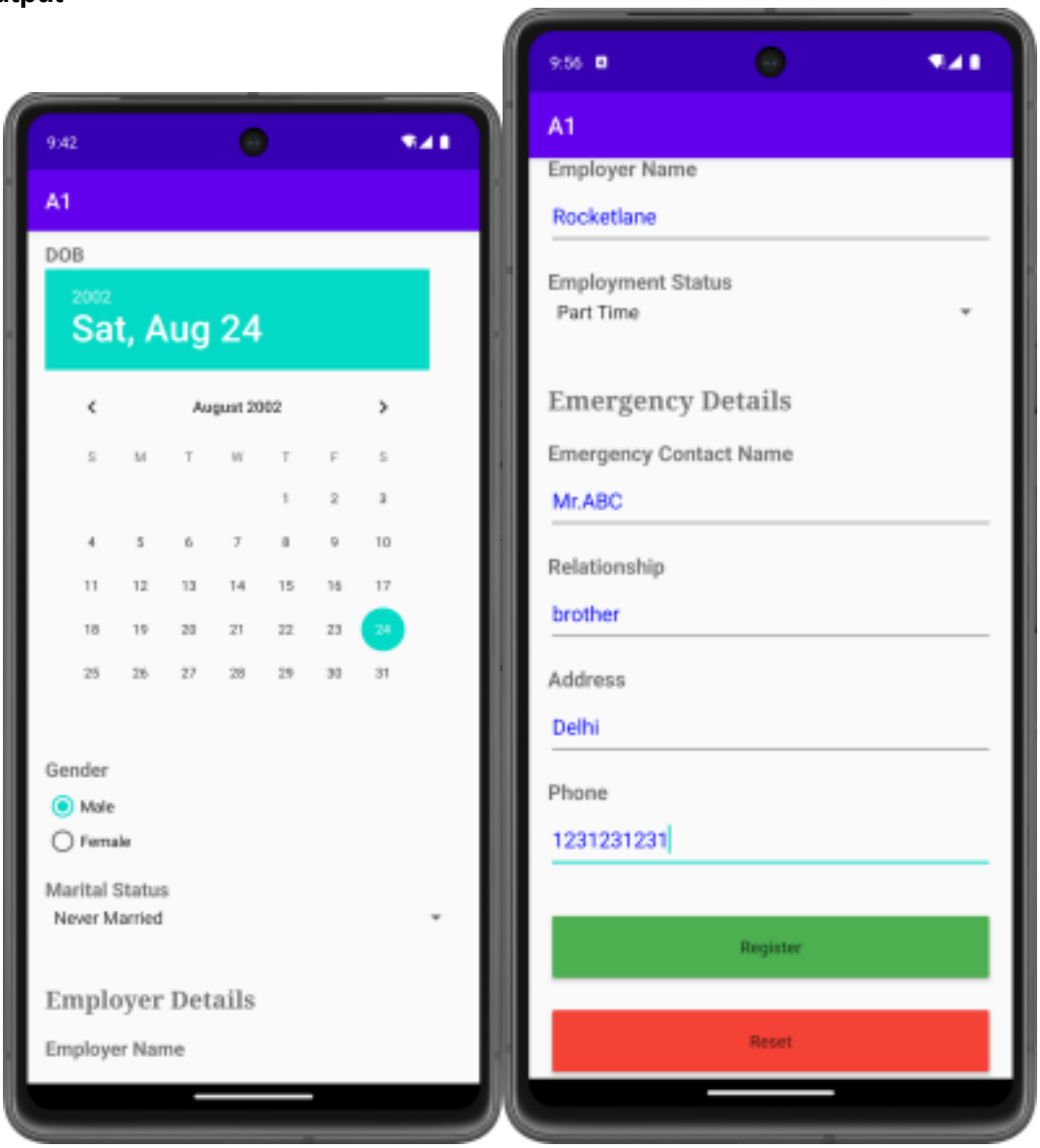
```
package com.example.a1;
import android.content.Intent;
import android.support.v7.app.AppCompatActivity;
import android.os.Bundle;
import android.widget.TextView;
public class TableActivity extends AppCompatActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        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("name")); ((TextView)
findViewById(R.id.textView_number_value)).setText(extras.getString("number")); ((TextView)
findViewById(R.id.textView_address_value)).setText(extras.getString("address") );
        ((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("gender")); ((TextView)
findViewById(R.id.textView_marital_status_value)).setText(extras.getString("ma rital_status"));
        ((TextView)
findViewById(R.id.textView_employer_name_value)).setText(extras.getString("emp loyer_name"));
        ((TextView)
findViewById(R.id.textView_employment_status_value)).setText(extras.getString( "employment_status"));
        ((TextView)
findViewById(R.id.textView_emergency_name_value)).setText(extras.getString("em ergency_name"));
        ((TextView)
findViewById(R.id.textView_emergency_relationship_value)).setText(extras.getSt
ring("emergency_relationship"));
        ((TextView)
findViewById(R.id.textView_emergency_address_value)).setText(extras.getString( "emergency_address"));
        ((TextView)
findViewById(R.id.textView_emergency_phone_value)).setText(extras.getString("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

Exercise 2 - Keyboard application

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CSE-A

Aim

To implement a keyboard application using Android Studio

Code

activity_main.xml

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

  <TextView
     android:id="@+id/text_bar"
     android:layout_width="match_parent"
     android:layout_height="wrap_content"
     android:layout_marginLeft="6dp"
     android:layout_marginTop="24dp"
     android:layout_marginRight="6dp"
     android:hint="Enter text..."
     android:text=""
     android:textSize="24sp" />

  <GridLayout
     android:id="@+id/keyboard"
     android:layout_width="match_parent"
     android:layout_height="200dp"
     android:layout_alignParentBottom="true"
     android:background="#202020"
     android:padding="1dp" />
</RelativeLayout>
```

MainActivity.java

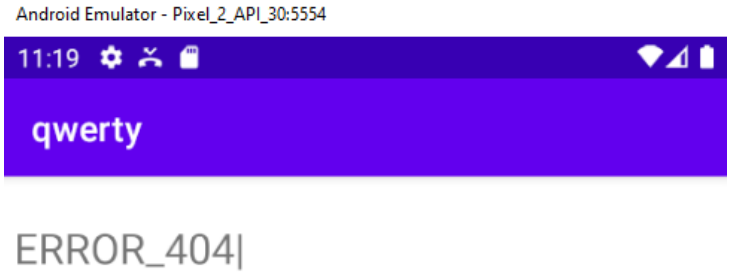
```
package com.example.qwerty;

import androidx.appcompat.app.AppCompatActivity;
import androidx.core.content.res.ResourcesCompat;
import android.os.Bundle;
import android.util.DisplayMetrics;
import android.view.Gravity;
import android.widget.Button;
import android.widget.GridLayout;
import android.widget.TextView;
import android.graphics.Typeface;
```

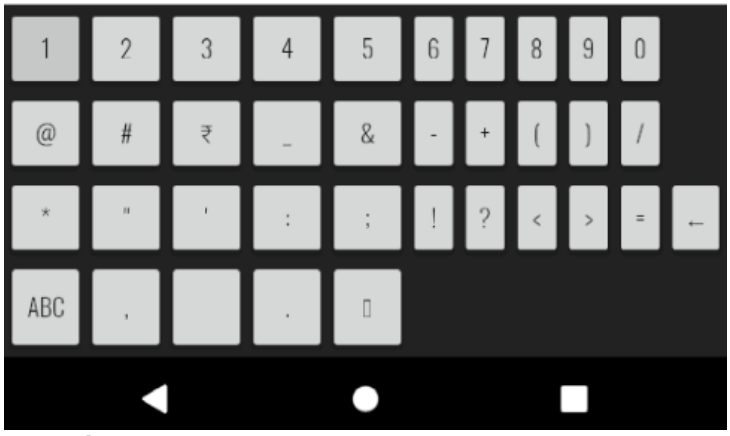
```
public class MainActivity extends AppCompatActivity {
    private final String[][] letterKeys = {
            {"Q", "W", "E", "R", "T", "Y", "U", "I", "O", "P"},
            {"A", "S", "D", "F", "G", "H", "J", "K", "L"},
            {"↑", "Z", "X", "C", "V", "B", "N", "M", "←"},
                    {"?123", ",", "  ", ".", "↵"}
    };
    private final String[][] numberKeys = {
            {"1", "2", "3", "4", "5", "6", "7", "8", "9", "0"},
            {"@", "#", "₹", "_", "&", "-", "+", "(", ")", "/"},
            {"*", "\"", "'", ":", ";", "!", "?", "<", ">", "=", "←"},
                    {"ABC", ",", "  ", ".", "↵"}
    };
    private TextView textBar;

    private GridLayout keyboard;
    private DisplayMetrics displayMetrics;
    private Boolean isCaps = false;
    private Typeface customFont;

    private void init() {
        textBar = findViewById(R.id.text_bar);
        textBar.setText("|");
        keyboard = findViewById(R.id.keyboard);

        displayMetrics = new DisplayMetrics();
        getWindowManager().getDefaultDisplay().getMetrics(displayMetrics);

        customFont = ResourcesCompat.getFont(this, R.font.oswald);
    }
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);

        init();
        initKeyboard(letterKeys);
    }

    private void initKeyboard(String[][] keys) {
        keyboard.removeAllViews();

        int rowIndex = 0;
        for (String[] row : keys) {
            int colIndex = 0;
            int width = displayMetrics.widthPixels / (row.length + 4);

            for (String letter : row) {
```

```
            addButtonToKeyboard(letter, width, rowIndex, colIndex);
            colIndex++;
        }
        rowIndex++;
    }
}

private boolean isChar(String key) {
    return key.length() == 1 && Character.isLetter(key.charAt(0));
}

private void addButtonToKeyboard(String key, int width, int row, int col) {
    Button button = new Button(this);
    if (isChar(key)) button.setText(key.toLowerCase());
    else {
        button.setText(key);
        button.setTypeface(customFont);
        button.setWidth(0);
        button.setPadding(0, 0, 0, 0);
    }

    GridLayout.LayoutParams params = new GridLayout.LayoutParams();
    params.width = width;
    params.height = GridLayout.LayoutParams.WRAP_CONTENT;
    params.rowSpec = GridLayout.spec(row);
    params.columnSpec = GridLayout.spec(col);
    params.setGravity(Gravity.FILL);

    button.setLayoutParams(params);
    button.setClickable(true);
    setHandler(button, key);

    keyboard.addView(button);
}

private void setHandler(Button button, String key) {
    if (key.length() == 1 && Character.isLetter(key.charAt(0))) {
        button.setOnClickListener(view -> {
            if (isCaps) textBar.append(key.toUpperCase());
            else textBar.append(key.toLowerCase());
        });
        return;
    }

    switch (key) {
        case "↑":
            button.setOnClickListener(view -> isCaps = !isCaps);
            break;
```

```
            case "←":
                button.setOnClickListener(view -> {
                    CharSequence currentText = textBar.getText();
                    if(currentText.length()!=0) {
                        CharSequence newText = currentText.subSequence(0, currentText.length() - 1);
                        textBar.setText(newText);
                    }
                });
                break;
            case "?123":
                button.setOnClickListener(view -> initKeyboard(numberKeys));
                break;
            case "ABC":
                button.setOnClickListener(view -> initKeyboard(letterKeys));
                break;
                    case "↵":
                button.setOnClickListener(view -> textBar.append("\n"));
                break;
            default:
                button.setOnClickListener(view -> {
                        CharSequence currentText = textBar.getText();
                        CharSequence newText = currentText.subSequence(0, currentText.length() - 1);
                        textBar.setText(newText);
                        textBar.append(String.valueOf(key.charAt(0)));
                        textBar.append("|");
                    }
                );
                break;
        }

    }
}
```

Output





Learning outcomes

Thus a keyboard was implemented using Android Studio

Exercise 3 - Application Development using basic graphicalPrimitives

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CSE-B

Aim

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 forward button so that car moves from a predefined

starting point to the predefined endpoint.
b. On pressing 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.

Code

Drawables:

car.xml

```
<layer-list xmlns:android="http://schemas.android.com/apk/res/android">

    <item android:drawable="@drawable/car_body" />

    <item
        android:drawable="@drawable/car_roof"
        android:gravity="top"
        />

    <item
        android:drawable="@drawable/car_window"
        android:top="10dp"
        android:left="20dp"
        android:right="50dp"
        android:bottom="20dp"
        />
    <item
        android:drawable="@drawable/car_window"
        android:top="10dp"
        android:left="75dp"
        android:right="20dp"
        android:bottom="20dp"
        />
    <item
        android:drawable="@drawable/car_wheel"
        android:gravity="left|bottom"
        android:left="5dp"
        android:bottom="0dp"
        />
    <item
        android:drawable="@drawable/car_wheel"
        android:gravity="right|bottom"
        android:right="5dp"
        android:bottom="0dp"
        />
</layer-list>
```

car_body.xml

```
<shape xmlns:android="http://schemas.android.com/apk/res/android">
    <solid android:color="#123" />
```

```
    <corners android:radius="8dp" />
    <size android:width="100dp" android:height="40dp"/>
</shape>
```

car_roof.xml

```
<shape xmlns:android="http://schemas.android.com/apk/res/android">
    <solid android:color="#000000" />
    <corners android:radius="2dp" />
    <size android:width="20dp" android:height="15dp" />
</shape>
```

car_wheel.xml

```
<shape android:shape="oval"
    xmlns:android="http://schemas.android.com/apk/res/android">
    <solid android:color="#000000" />
    <size android:width="20dp" android:height="20dp" />
    <corners android:radius="3dp" />
</shape>
```

car_window.xml

```
<?xml version="1.0" encoding="utf-8"?>
<shape xmlns:android="http://schemas.android.com/apk/res/android">
    <solid android:color="#333" />
    <corners android:radius="4dp" />
    <size android:width="20dp" android:height="20dp" />
</shape>
```

lane_marking.xml

```
<shape xmlns:android="http://schemas.android.com/apk/res/android">
    <solid android:color="#FFFFFF" />
    <size android:width="10dp" android:height="2dp" />
</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="#333" />
        </shape>
    </item>
    <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>
```

Layout :

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">

    <ImageView
        android:id="@+id/carImageView"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:src="@drawable/car"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        app:layout_constraintVertical_bias="0.302"
        tools:layout_editor_absoluteX="0dp" />

    <ImageView
        android:id="@+id/roadImageView"
        android:layout_width="410dp"
        android:layout_height="111dp"
        android:layout_marginTop="256dp"
        android:layout_marginEnd="1dp"
        android:layout_marginBottom="364dp"
        android:src="@drawable/road"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.0"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />
    <Button
```

```
        android:id="@+id/forwardButton"
        android:layout_width="117dp"
        android:layout_height="45dp"
        android:layout_marginTop="60dp"
        android:text="Forward"
        app:layout_constraintEnd_toEndOf="parent"
        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_marginBottom="108dp"
        android:text="Flip Image"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.496"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/backwardButton"
        app:layout_constraintVertical_bias="0.384" />
    <Button
        android:id="@+id/backwardButton"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:layout_marginTop="16dp"
        android:text="Backward"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/forwardButton" />
    <ImageView
        android:id="@+id/sunId"
        android:layout_width="79dp"

        android:layout_height="55dp"
        android:layout_marginTop="84dp"
        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

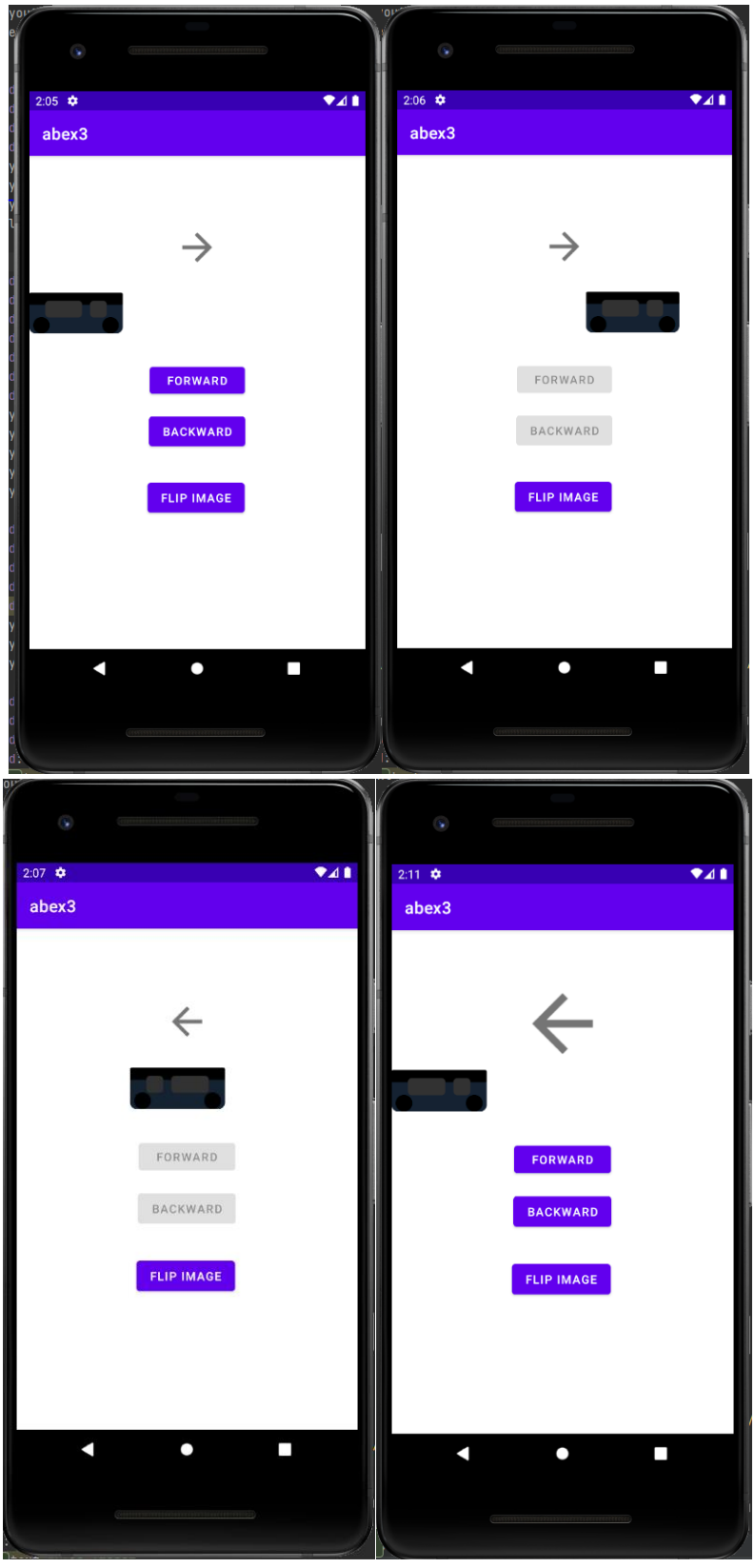
```
package com.example.abex3;
import androidx.appcompat.app.AppCompatActivity;
import android.animation.ObjectAnimator;
import android.os.Bundle;
import android.os.Handler;
```

```
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;
    private final int endpoint = 800;
    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 {
                                isOperationInProgress = false;
                                backwardButton.setEnabled(true);
                                forwardButton.setEnabled(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(carXPosition);
                                handler.postDelayed(this, 100); // 100
milliseconds delay
                            } else {
                                isOperationInProgress = false;
                                backwardButton.setEnabled(true);
                                forwardButton.setEnabled(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



Learning outcomes

- Proficient in creating user interfaces using shape drawables and relevant shapes.
- Implemented event listeners for user interaction and learned to navigate between activities.

- Successfully added animations, improving user engagement with tap-to-zoom and card flipping features.

Ex. No. 4 Android Application Development using Database

Aim: Develop a Product information application in Android that enables toperform 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 querydb.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 bynull,      // Having
                null                    // Order by
        );
```

```
        // The cursor now contains the retrieved row(s)return cursor;
    }

    @Override
    public void onUpgrade(SQLiteDatabase db, int oldVersion, intnewVersion) {
        // 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 stringsint 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 stringsint 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>
```

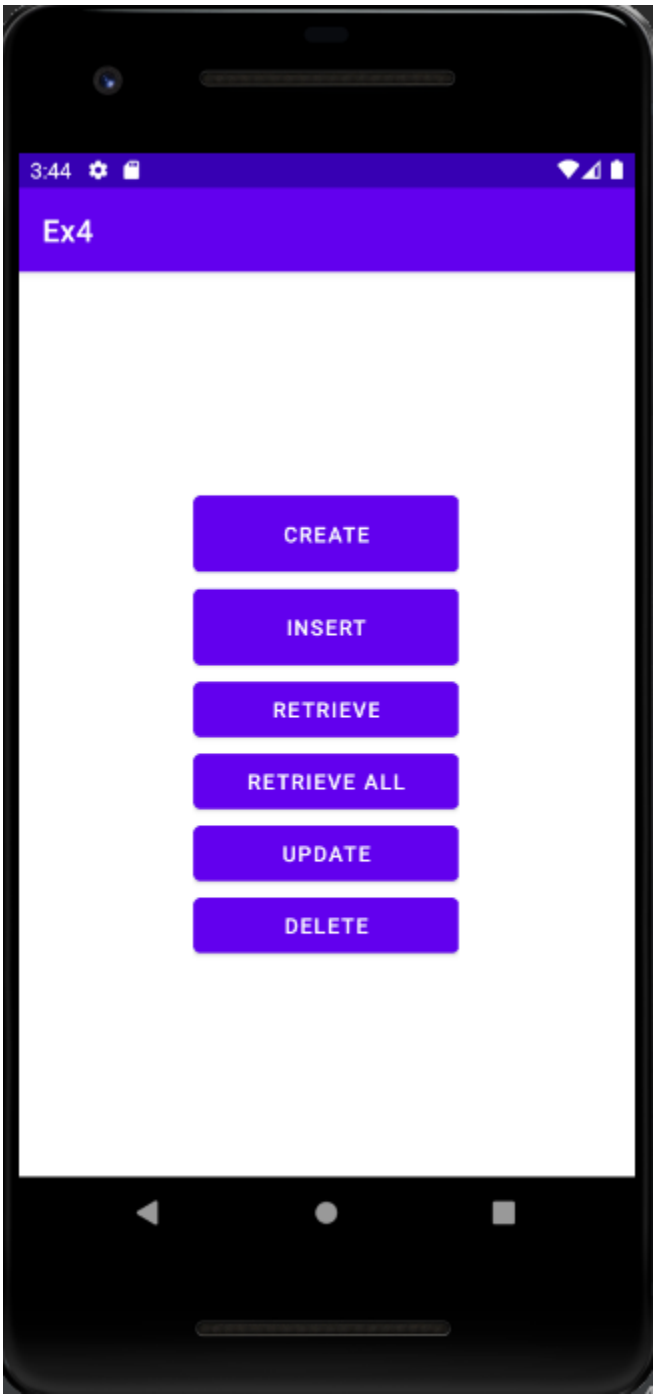
Delete.xml:

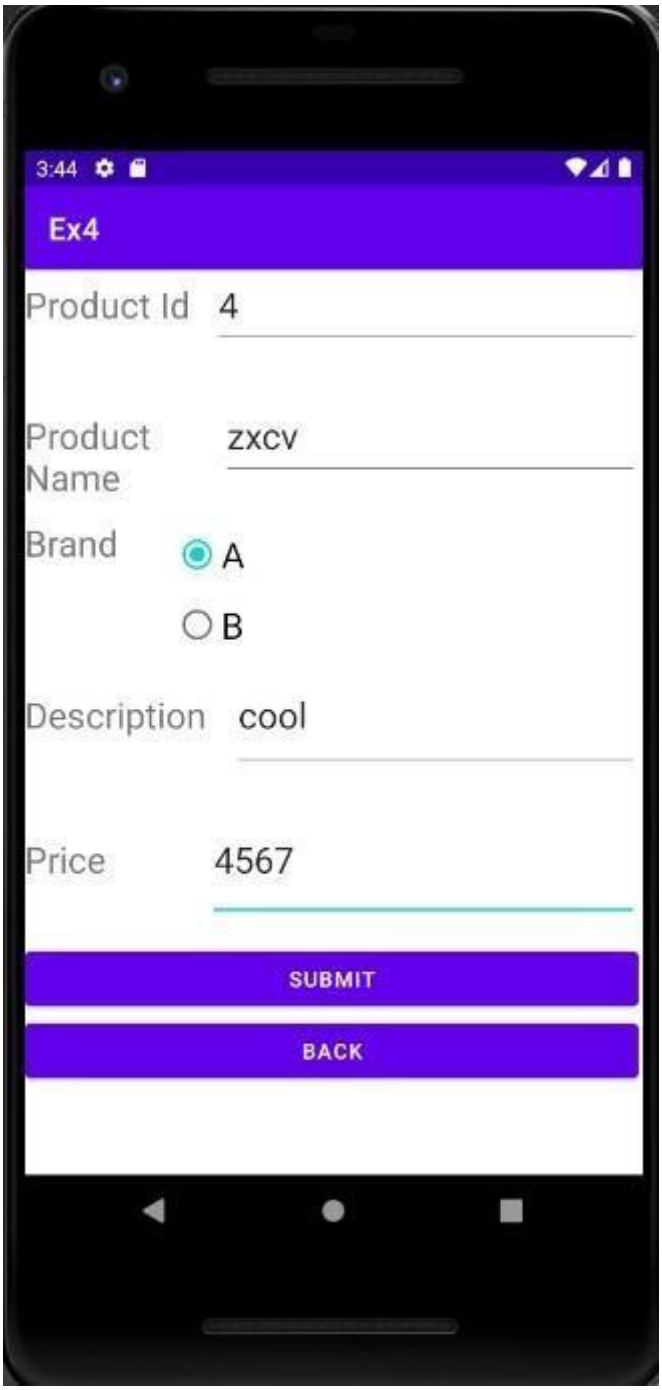
```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools" android:layout_width="match_parent"
    android:layout_height="match_parent">

    <LinearLayout android:layout_width="414dp"
        android:layout_height="475dp"
```

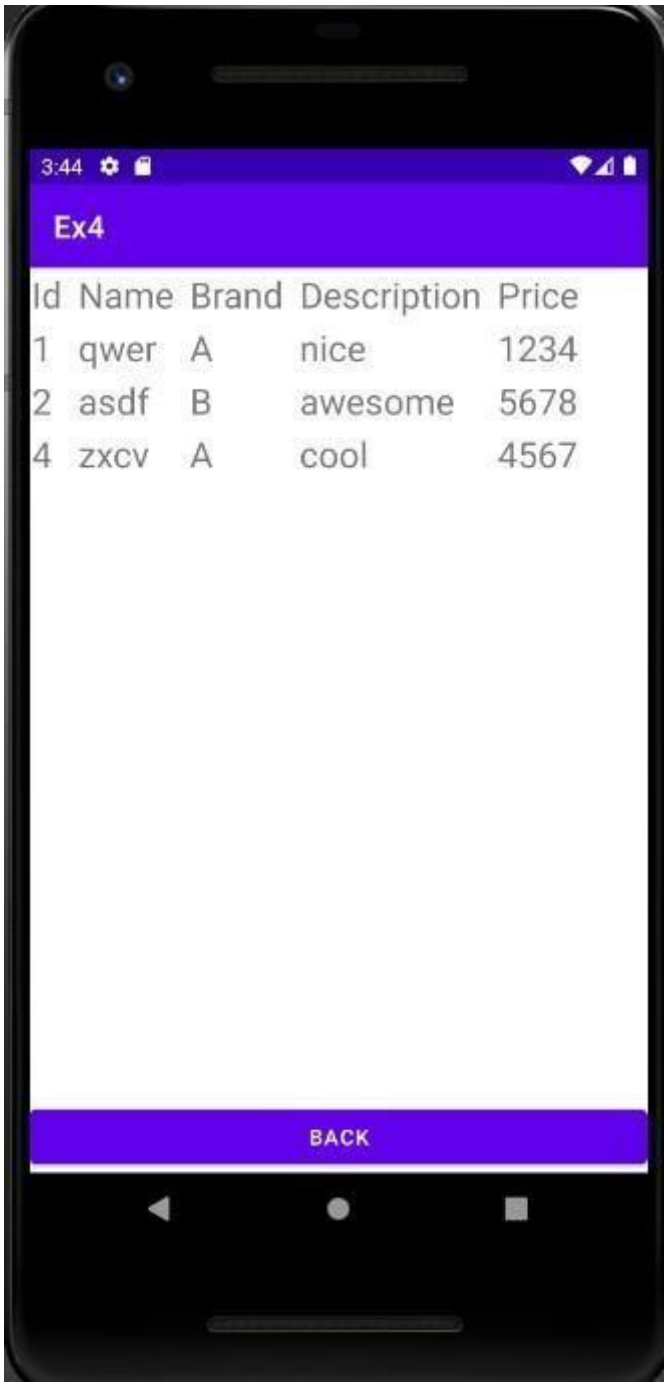
```
android:orientation="vertical" app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintStart_toStartOf="parent"tools:layout_editor_absoluteY="101dp"
tools:ignore="MissingConstraints">

<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" />
```

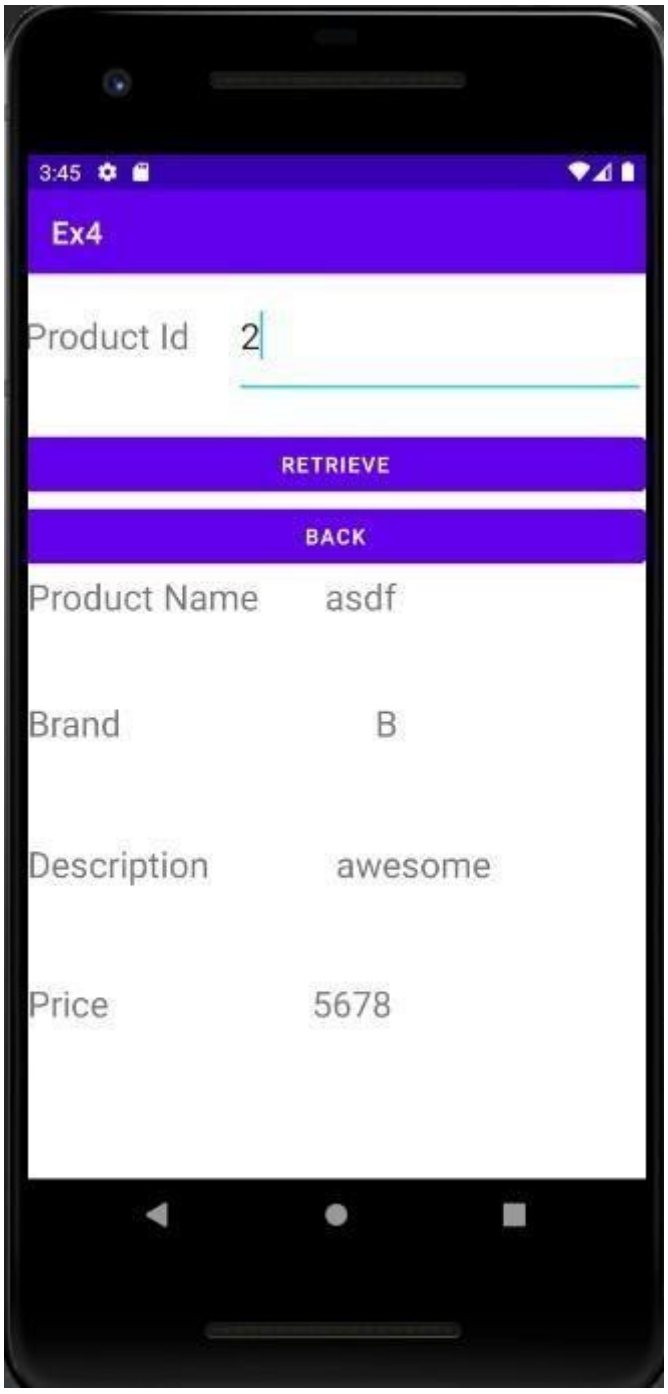
```
        <Button
            android:id="@+id/backd"
            android:layout_width="match_parent"
            android:layout_height="wrap_content"android:text="Back"
            />
    </LinearLayout>
</androidx.constraintlayout.widget.ConstraintLayout>
```

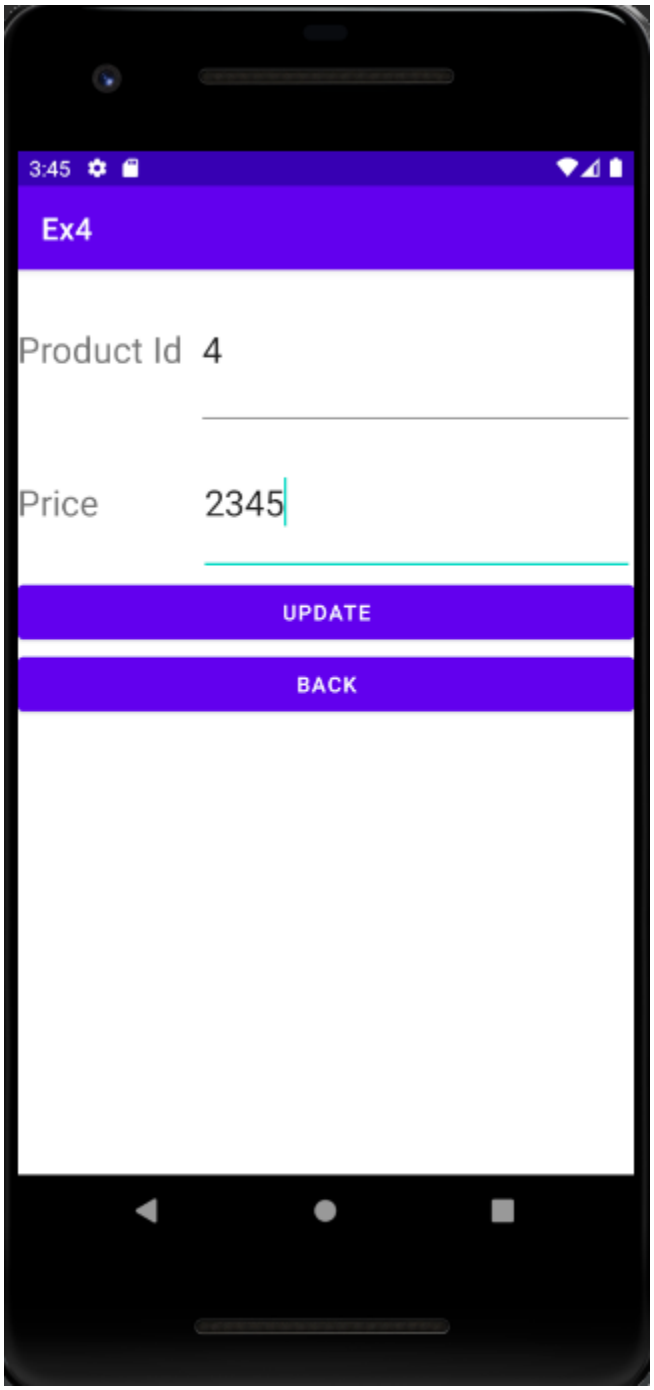
Output:

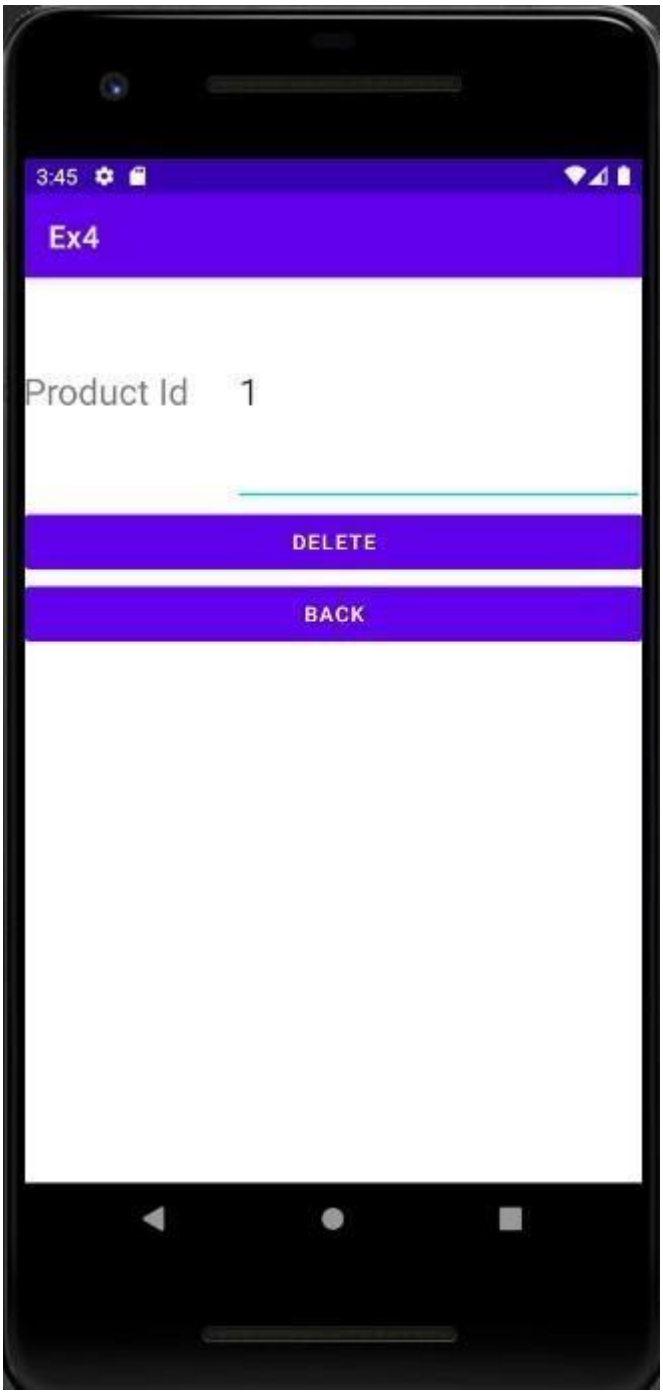

3:44
Ex4
CREATE
INSERT
RETRIEVE
RETRIEVE ALL
UPDATE
DELETE

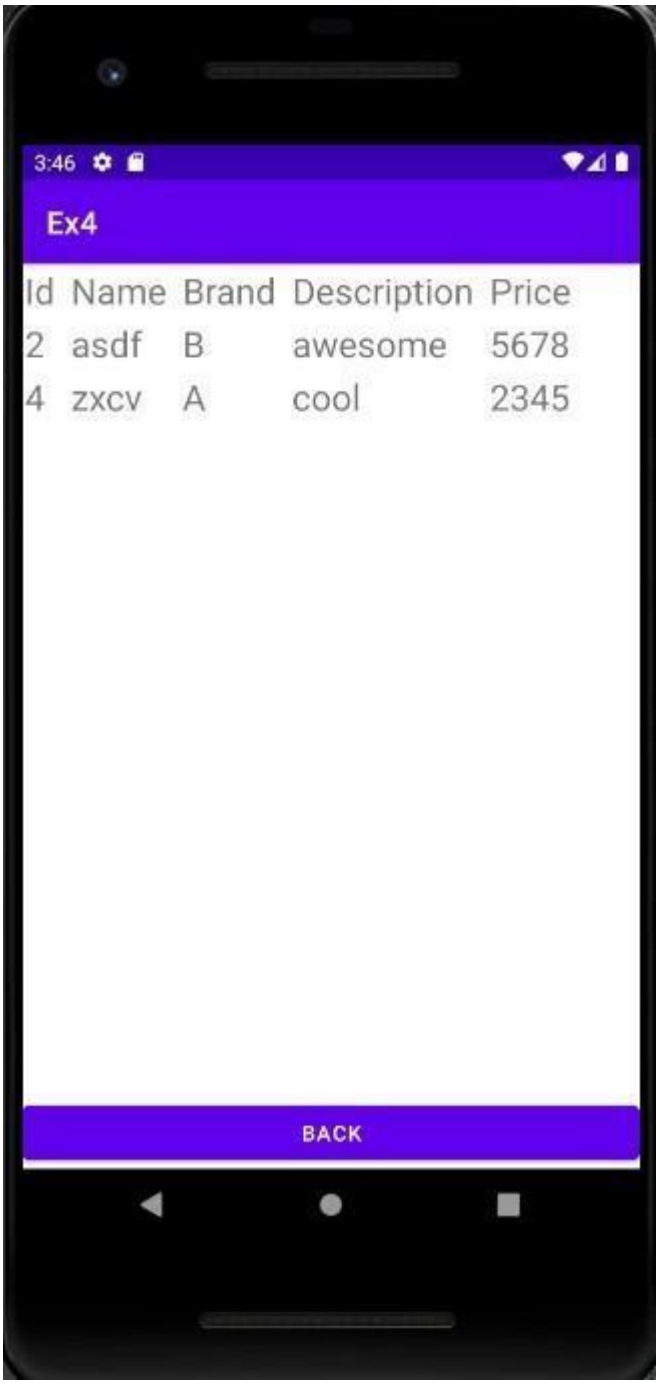

3:44
Ex4
Product Id
4
Product Name
zxcv
Brand
A
B
Description
cool
Price
4567
SUBMIT
BACK


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

Ex. No. 5 Android Application using Multithreading

Aim:

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

The first thread should change the color of the text indefinitelyThe 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 threadt.post(new
        Runnable() {
            @Override publicvoid
            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
6
Hello World!
Hello World!
START
STOP


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

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 andLongitude. 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 givenif
        (checkPermissions()) {

            // check if location is enabledif
            (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_ACCURACY);
        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 permissionsprivate
    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_PROVIDER);
    }

    // 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:

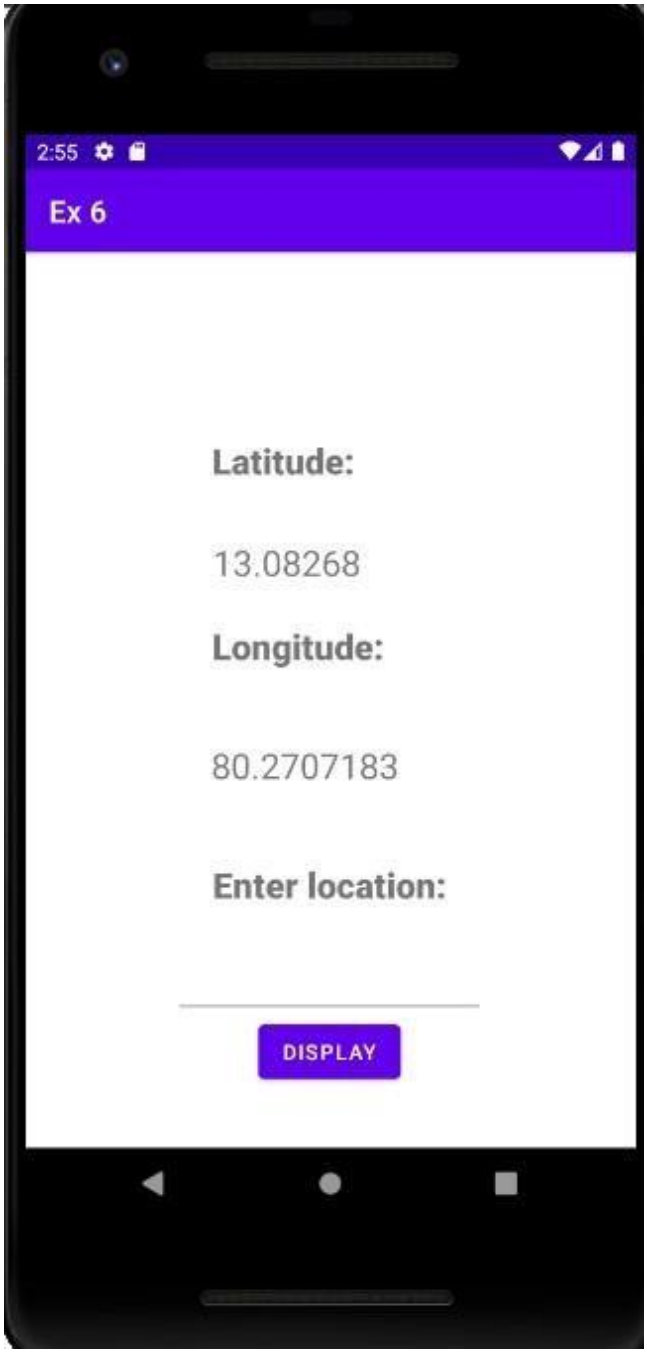
```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
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

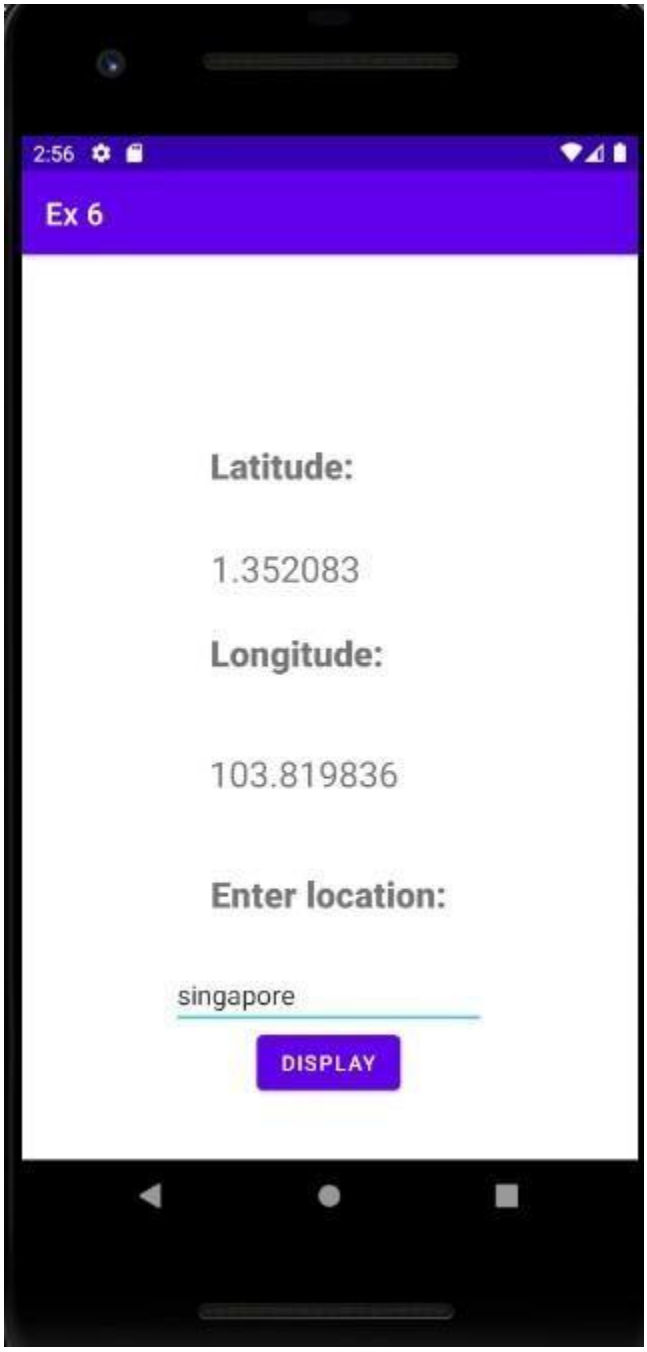
```
    android:layout_height="wrap_content"
    android:layout_marginTop="124dp"
    android:fontFamily="sans-serif-black"
    android:text="Latitude:" android:textSize="24sp"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.4"
    app:layout_constraintStart_toStartOf="parent"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





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

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 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"
```

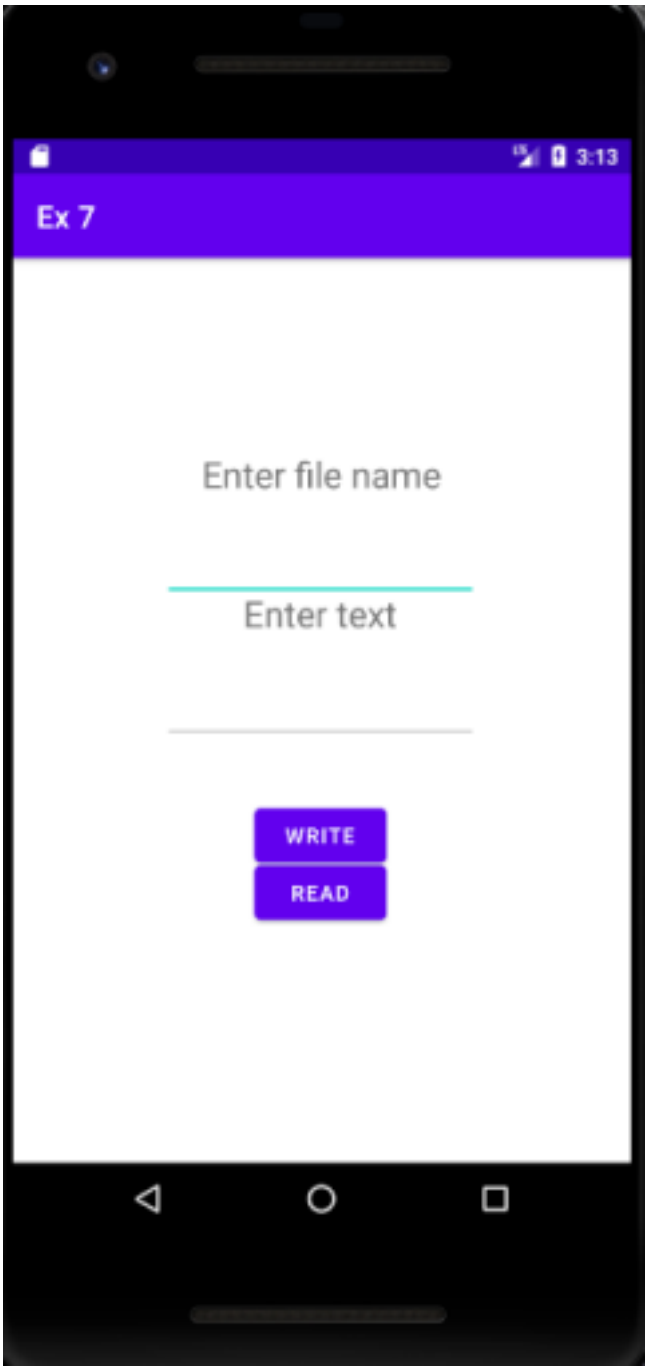
```
        android:inputType="textPersonName"
        android:text=""
        android:textSize="24sp"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.496"
        app:layout_constraintStart_toStartOf="parent"
        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:

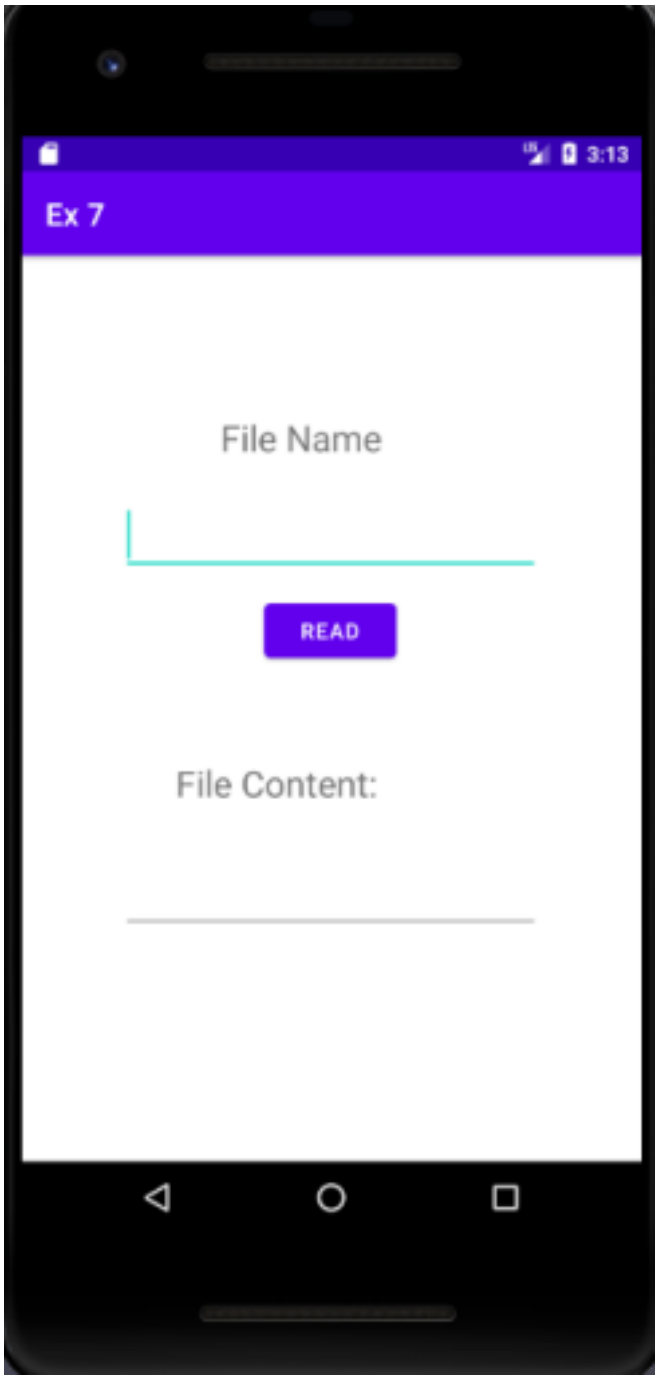
```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.ex7">

    <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" />
```

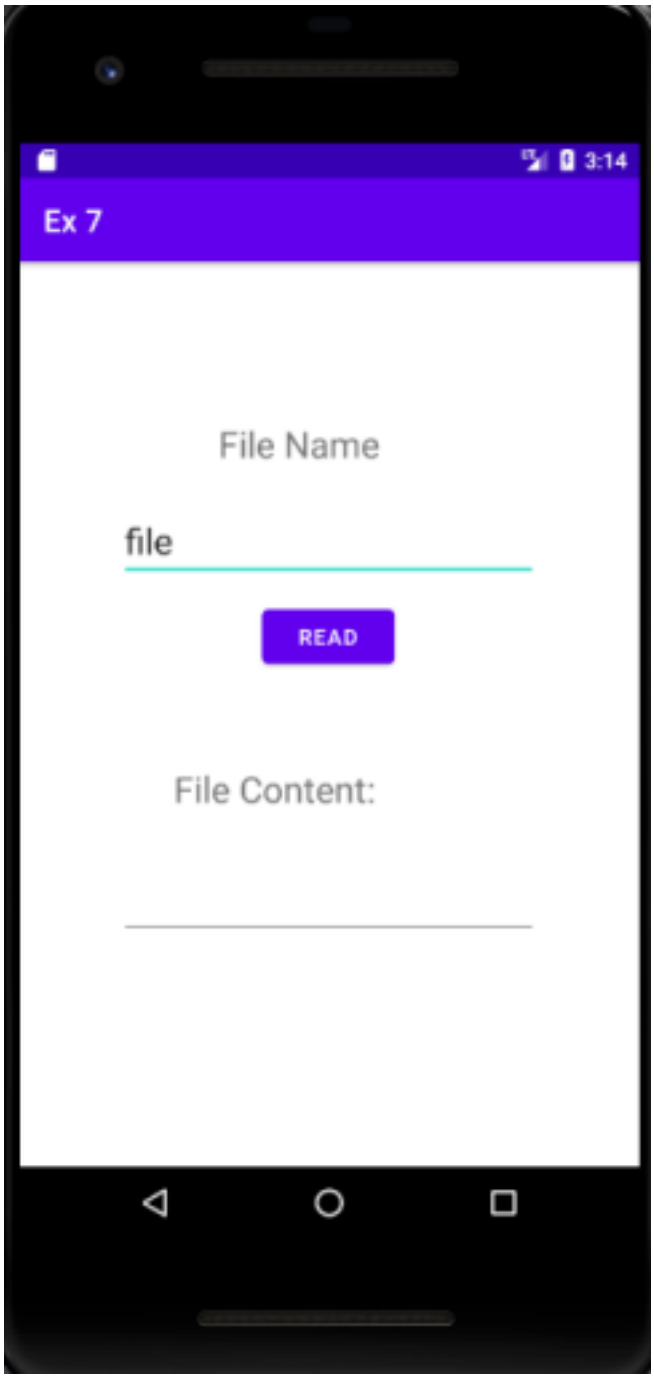
```
    <uses-permission
android:name="android.permission.READ_EXTERNAL_STORAGE" />

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




    </manifest>
```

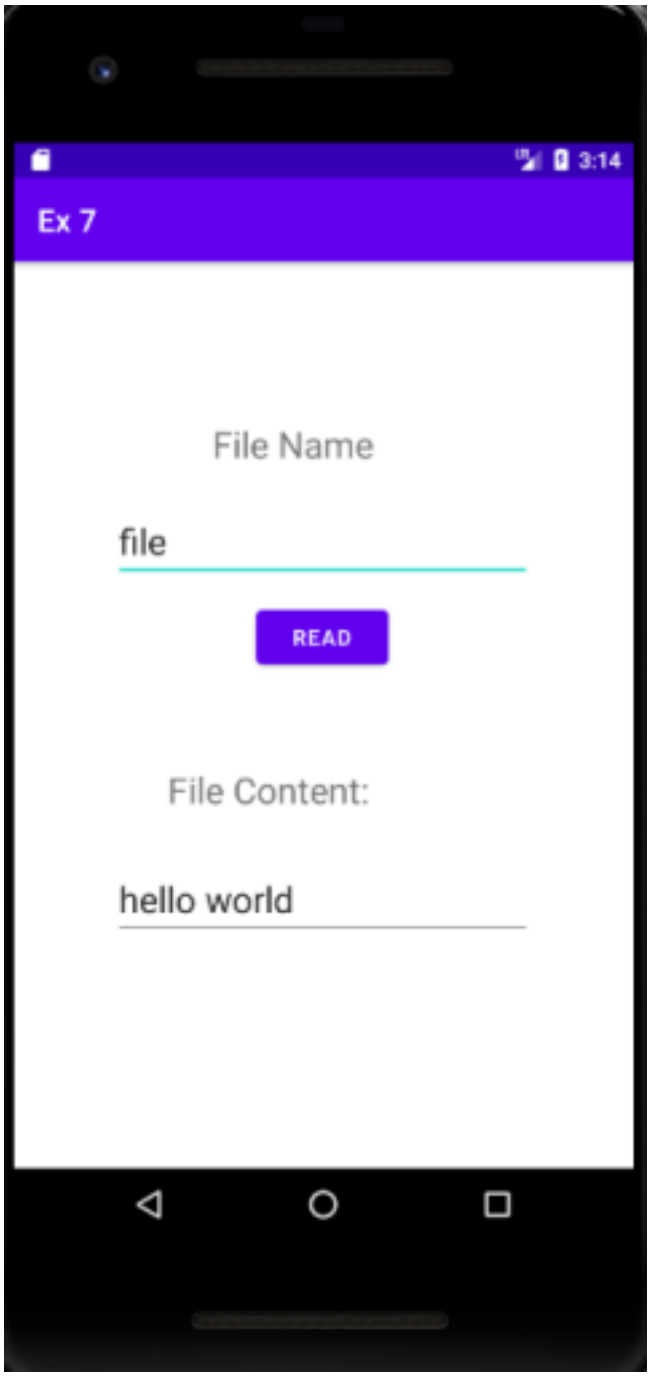
Output:

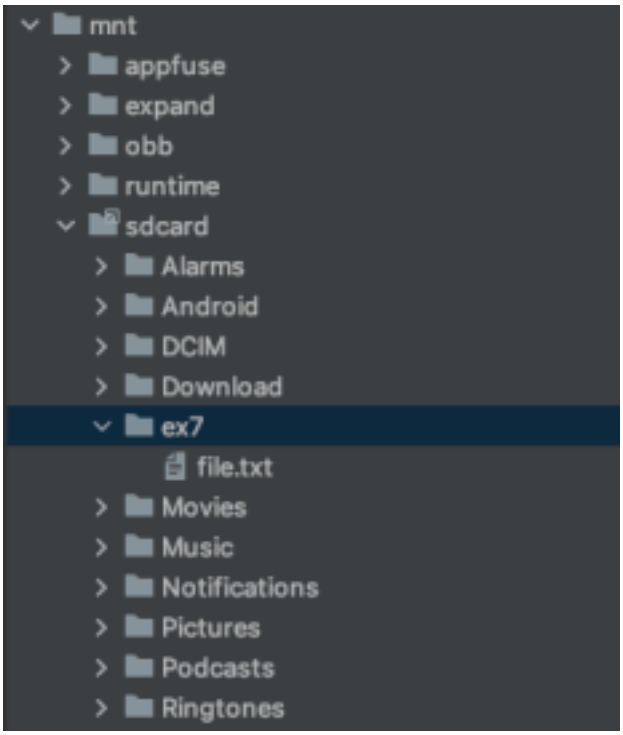

3:13
Ex 7
Enter file name
Enter text
WRITE
READ


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

Assignment 8 SMS Sending and Notification

Objective:

To develop an android app that sends SMS and creates an alert upon receiving the SMS with text in the notification.

Source Code:

MainActivity.java:

```
package com.example.ex8;
import android.Manifest;
import android.content.pm.PackageManager;
import android.os.Bundle;
import android.telephony.SmsManager;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Toast;
import androidx.appcompat.app.AppCompatActivity;
import androidx.core.app.ActivityCompat;
import androidx.core.content.ContextCompat;


public class MainActivity extends AppCompatActivity {
  private static final int MY_PERMISSIONS_REQUEST_SEND_SMS = 0;
  Button sendBtn;
  EditText txtphoneNo;
  EditText txtMessage;
  String phoneNo;
  String message;
  @Override
  protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    sendBtn = (Button) findViewById(R.id.sendbtn);
    txtphoneNo = (EditText) findViewById(R.id.etPhone);
    txtMessage = (EditText) findViewById(R.id.content);
    sendBtn.setOnClickListener(new View.OnClickListener() {
```

```
    public void onClick(View view) {
      sendSMSMessage();
    }
  });
 }
 protected void sendSMSMessage() {
  phoneNo = txtphoneNo.getText().toString();
  message = txtMessage.getText().toString();
  if (ContextCompat.checkSelfPermission(this, Manifest.permission.SEND_SMS)
      != PackageManager.PERMISSION_GRANTED) {
    if (ActivityCompat.shouldShowRequestPermissionRationale(
          this, Manifest.permission.SEND_SMS)) {
    } else {
      ActivityCompat.requestPermissions(this,
          new String[] {Manifest.permission.SEND_SMS},
          MY_PERMISSIONS_REQUEST_SEND_SMS);
    }
  }
 }
 @Override
 public void{onRequestPermissionsResult(int requestCode, String permissions[],   int[] grantResults)
switch (requestCode) {
    case MY_PERMISSIONS_REQUEST_SEND_SMS: {
      if (grantResults.length > 0
          && grantResults[0] == PackageManager.PERMISSION_GRANTED) {
        SmsManager smsManager = SmsManager.getDefault();
        smsManager.sendTextMessage(phoneNo, null, message, null, null);
        Toast.makeText(getApplicationContext(), "SMS sent.", Toast.LENGTH_LONG).show();
      }
 else {
        Toast.makeText(getApplicationContext(), "SMS failed, please try
again.",Toast.LENGTH_LONG).show();
        return;
      }
    }
}
 }
```

```
}
```

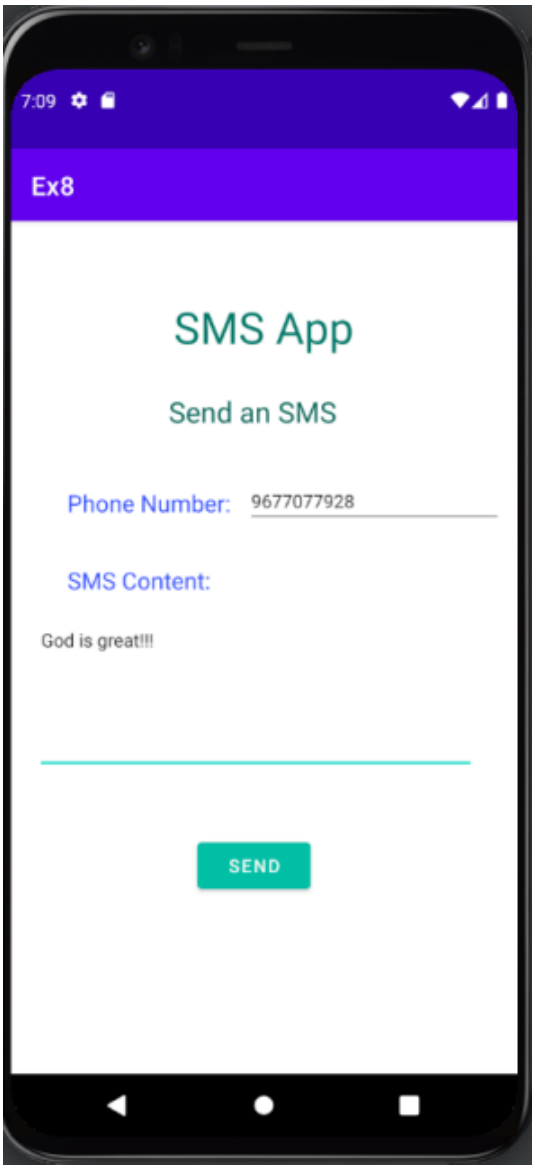
activity_main.xml

```
<?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/textView2"
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:text="SMS App"
android:textAppearance="@style/TextAppearance.AppCompat.Display1" android:textColor="#067A6A"
app:layout_constraintBottom_toBottomOf="parent"
app:layout_constraintLeft_toLeftOf="parent"
app:layout_constraintRight_toRightOf="parent"
app:layout_constraintTop_toTopOf="parent"
app:layout_constraintVertical_bias="0.096" />
<TextView
android:id="@+id/textView"
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:layout_marginTop="28dp"
android:layout_marginEnd="140dp"
android:text="Send an SMS"
android:textAppearance="@style/TextAppearance.AppCompat.Large"
android:textColor="#0C675A"
app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintTop_toBottomOf="@+id/textView2" />
<TextView
android:id="@+id/phno"
android:layout_width="wrap_content"
android:layout_height="wrap_content"
```

```
android:layout_marginStart="44dp"
android:layout_marginTop="44dp"
android:text="Phone Number:"
android:textAppearance="@style/TextAppearance.AppCompat.Medium"
android:textColor="#304FFE"
app:layout_constraintStart_toStartOf="parent"
app:layout_constraintTop_toBottomOf="@+id/textView" />
<TextView
android:id="@+id/smstv"
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:layout_marginStart="44dp"
android:layout_marginTop="104dp"
android:text="SMS Content:"
android:textAppearance="@style/TextAppearance.AppCompat.Medium" android:textColor="#304FFE"
app:layout_constraintStart_toStartOf="parent"
app:layout_constraintTop_toBottomOf="@+id/textView" />
<EditText
android:id="@+id/etPhone"
android:layout_width="199dp"
android:layout_height="39dp"
android:layout_marginStart="12dp"
android:layout_marginTop="36dp"
android:ems="10"
android:inputType="phone"
android:textAppearance="@style/TextAppearance.AppCompat.Body1"
app:layout_constraintStart_toEndOf="@+id/phno"
app:layout_constraintTop_toBottomOf="@+id/textView" />
<EditText
android:id="@+id/content"
android:layout_width="341dp"
android:layout_height="123dp"
android:layout_marginTop="68dp"
android:layout_marginEnd="32dp"
android:ems="10"
android:gravity="start|top"
android:hint="Type here"
```

```
android:inputType="textMultiLine"
android:textAppearance="@style/TextAppearance.AppCompat.Body1"
app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintTop_toBottomOf="@+id/etPhone" />
<Button
android:id="@+id/sendbtn"
android:layout_width="wrap_content"
android:layout_height="wrap_content"
android:layout_marginTop="48dp"
android:layout_marginEnd="160dp"
android:backgroundTint="#00BFA5"
android:text="SEND"
app:layout_constraintEnd_toEndOf="parent"
app:layout_constraintTop_toBottomOf="@+id/content" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

Output:



Result:

The required program was built and executed successfully.

Assignment 9
Alarm Clock - Android Application

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 the 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

Code:
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:

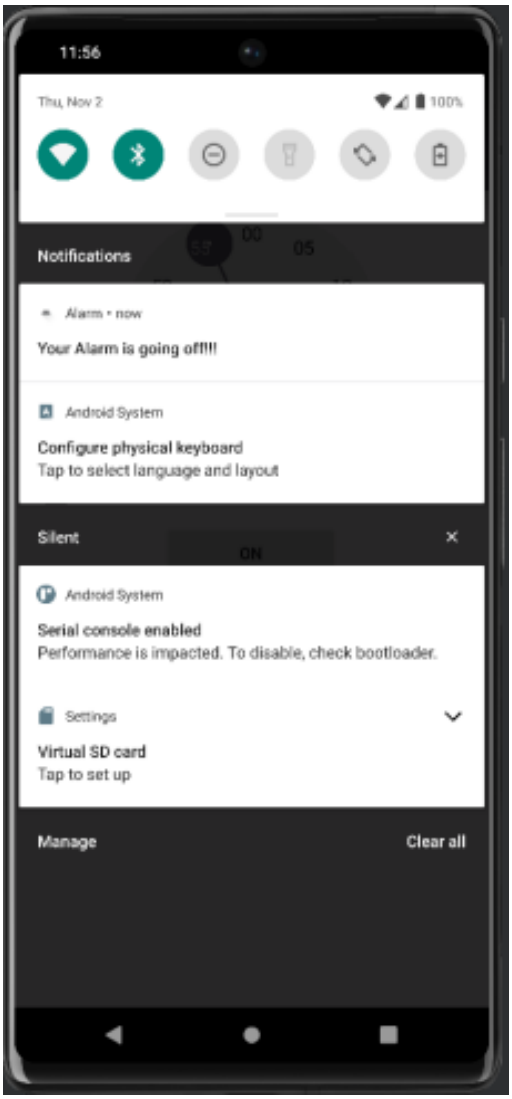
```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
xmlns:tools="http://schemas.android.com/tools">
<uses-permission android:name="android.permission.POST_NOTIFICATIONS" /> <uses-permission
android:name="android.permission.WAKE_LOCK" /> <uses-permission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

Output:


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


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



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.