

# Department of CSE

## SSN College of Engineering

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### UCS 1711 - Mobile Application Development Lab

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#### Exercise 1: Application Using GUI Components, Font and Colours

##### **Aim:**

Generate a registration form for a hospital to register new patient details as below:

- Assign a title for the registration form (TextView- textSize, textStyle, typeface)
- Name. Specify some font and colour. (use TextView, EditText-standard)
- Address (use TextView, EditText-standard)
- Age (TextView, EditText)
- Date of Birth (DatePicker)
- Gender (RadioButton)
- Marital Status (Spinner)
- Contact Number (EditText- inputType, phoneNumber)
- Registration time (TimePicker)
- Addiction (Smoking, Alcohol) (CheckBox)
- Submit (Button)
- Reset (Button)

## Code: Main Activity:

```
1 package com.example.patientregistration;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.app.DatePickerDialog;
6 import android.app.TimePickerDialog;
7 import android.content.Intent;
8 import android.os.Bundle;
9 import android.view.MotionEvent;
10 import android.view.View;
11 import android.widget.Button;
12 import android.widget.CheckBox;
13 import android.widget.DatePicker;
14 import android.widget.EditText;
15 import android.widget.RadioButton;
16 import android.widget.RadioGroup;
17 import android.widget.Spinner;
18 import android.widget.TimePicker;
19
20 import java.util.Calendar;
21
22 public class MainActivity extends AppCompatActivity {
23
24     @Override
25     protected void onCreate(Bundle savedInstanceState) {
26         super.onCreate(savedInstanceState);
27         setContentView(R.layout.activity_main);
28
29         final EditText nameField = findViewById(R.id.nameField);
30         final EditText dateField = findViewById(R.id.dateField);
31         final RadioGroup genderGroup = findViewById(R.id.genderRadioGroup)
32     ;
33         final Spinner maritalList = findViewById(R.id.maritalList);
34         final EditText timeField = findViewById(R.id.timeField);
35         final CheckBox smokingCheck = findViewById(R.id.smokingCheckBox);
36         final CheckBox drinkingCheck = findViewById(R.id.drinkingCheckBox)
37     ;
38         final EditText ageField = findViewById(R.id.ageField);
39         final EditText phoneField = findViewById(R.id.phoneField);
40         final EditText addressField = findViewById(R.id.addrField);
41         final Button clearButton = findViewById(R.id.resetButton);
42         final Button submitButton = findViewById(R.id.submitButton);
43
44         //Calendar instance for the DatePicker & TimePicker
45         final Calendar calendar = Calendar.getInstance();
```

```

46         dateField.setOnFocusChangeListener(new View.OnFocusChangeListener
47         () {
48             @Override
49             public void onFocusChange(View v, boolean hasFocus) {
50                 if(hasFocus){
51                     int day = calendar.get(Calendar.DAY_OF_MONTH);
52                     int month = calendar.get(Calendar.MONTH);
53                     int year = calendar.get(Calendar.YEAR);
54
55                     //Date Picker Dialog
56                     DatePickerDialog datePicker = new DatePickerDialog(
57                     MainActivity.this, new DatePickerDialog.OnDateSetListener() {
58                         @Override
59                         public void onDateSet(DatePicker view, int year,
60                         int month, int dayOfMonth) {
61                             dateField.setText(dayOfMonth + "/" + (month +
62                             1) + "/" + year);
63                         }
64                     }, year, month, day);
65                     datePicker.show();
66                 }
67             });
68
69         timeField.setOnFocusChangeListener(new View.OnFocusChangeListener
70         () {
71             @Override
72             public void onFocusChange(View v, boolean hasFocus) {
73                 if(hasFocus){
74                     int hour = calendar.get(Calendar.HOUR_OF_DAY);
75                     int minutes = calendar.get(Calendar.MINUTE);
76
77                     //Time Picker Dialog
78                     TimePickerDialog timePicker = new TimePickerDialog(
79                     MainActivity.this, new TimePickerDialog.OnTimeSetListener() {
80                         @Override
81                         public void onTimeSet(TimePicker view, int
82                         hourOfDay, int minute) {
83                             timeField.setText(hourOfDay + ":" + minute);
84                         }
85                     }, hour, minutes, false);
86                     timePicker.show();
87                 }
88             });
89
90         submitButton.setOnClickListener(new View.OnClickListener() {
91             //define event for onClick of Submit Button
92             @Override
93             public void onClick(View v) {

```

```

90         String patientName = nameField.getText().toString();
91         String patientDate = dateField.getText().toString();
92         String patientGender = "Not Selected";
93
94         int selectedId = genderGroup.getCheckedRadioButtonId();
95
96         if(selectedId > 0){
97             RadioButton selectedRadioBtn = (RadioButton)
findViewById(selectedId);
98             patientGender = selectedRadioBtn.getText().toString();
99         }
100
101         String patientMarital = maritalList.getSelectedItem().
toString();
102
103         String patientTime = timeField.getText().toString();
104         String patientAddictions = "";
105
106         if(smokingCheck.isChecked() && drinkingCheck.isChecked()){
107             patientAddictions += "Smoking, Drinking";
108         }
109
110         else if(drinkingCheck.isChecked()){
111             patientAddictions += "Drinking";
112         }
113
114         else if(smokingCheck.isChecked()){
115             patientAddictions += "Smoking";
116         }
117
118         else{
119             patientAddictions += "-NIL-";
120         }
121
122         String patientPhone = phoneField.getText().toString();
123         String patientAddress = addressField.getText().toString();
124         int patientAge = Integer.parseInt(ageField.getText().
toString());
125
126         //Transfer the contents to the SubmitActivity class using
an Intent
127         Intent submitIntent = new Intent(getApplicationContext(),
SubmitActivity.class);
128         submitIntent.putExtra("patientName", patientName);
129         submitIntent.putExtra("patientDate", patientDate);
130         submitIntent.putExtra("patientGender", patientGender);
131         submitIntent.putExtra("patientMarital", patientMarital);
132         submitIntent.putExtra("patientTime", patientTime);
133         submitIntent.putExtra("patientAddictions",
patientAddictions);
134         submitIntent.putExtra("patientAge", patientAge);
135         submitIntent.putExtra("patientPhone", patientPhone);

```

```

135         submitIntent.putExtra("patientAddress", patientAddress);
136
137         startActivity(submitIntent);
138     }
139 });
140
141 clearButton.setOnClickListener(new View.OnClickListener() {
142     //define event for onClick of Clear All Button
143     @Override
144     public void onClick(View v) {
145         nameField.setText("");
146         dateField.setText("");
147         genderGroup.clearCheck();
148         maritalList.setSelection(0);
149         timeField.setText("");
150         smokingCheck.setChecked(false);
151         drinkingCheck.setChecked(false);
152         ageField.setText("");
153         addressField.setText("");
154         phoneField.setText("");
155     }
156 });
157
158 }
159 }

```

## Code: Submit Activity

```
1 package com.example.patientregistration;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.content.Intent;
6 import android.os.Bundle;
7 import android.view.View;
8 import android.widget.TextView;
9
10 public class SubmitActivity extends AppCompatActivity {
11
12     @Override
13     protected void onCreate(Bundle savedInstanceState) {
14         super.onCreate(savedInstanceState);
15         setContentView(R.layout.activity_submit);
16
17         final TextView nameView = findViewById(R.id.nameText);
18         final TextView dateView = findViewById(R.id.dateText);
19         final TextView genderView = findViewById(R.id.genderText);
20         final TextView maritalView = findViewById(R.id.maritalText);
21         final TextView timeView = findViewById(R.id.timeText);
22         final TextView additionsView = findViewById(R.id.additionsText);
23         final TextView addressView = findViewById(R.id.addressText);
24         final TextView phoneView = findViewById(R.id.phoneText);
25         final TextView ageView = findViewById(R.id.ageText);
26
27         //Get the current class' intent and obtain the stored key-value
        pairs from MainActivity
28         Intent submitIntent = getIntent();
29
30         String patientName = submitIntent.getStringExtra("patientName");
31         String patientDate = submitIntent.getStringExtra("patientDate");
32         String patientGender = submitIntent.getStringExtra("patientGender");
33     };
34     String patientMarital = submitIntent.getStringExtra("
        patientMarital");
35     String patientTime = submitIntent.getStringExtra("patientTime");
36     String patientAdditions = submitIntent.getStringExtra("
        patientAdditions");
37     String patientAddresss = submitIntent.getStringExtra("
        patientAddress");
38     String patientPhone = submitIntent.getStringExtra("patientPhone");
39     int patientAge = submitIntent.getIntExtra("patientAge", 0);
40
41
42     nameView.setText(patientName);
```

```
43     dateView.setText(patientDate);
44     genderView.setText(patientGender);
45     maritalView.setText(patientMarital);
46     timeView.setText(patientTime);
47     addictionsView.setText(patientAddictions);
48     addressView.setText(patientAddresss);
49     phoneView.setText(patientPhone);
50     ageView.setText(Integer.toString(patientAge));
51
52 }
53 }
```

## Code: Main Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".MainActivity">
8
9   <Button
10      android:id="@+id/submitButton"
11      android:layout_width="0dp"
12      android:layout_height="wrap_content"
13      android:layout_marginStart="96dp"
14      android:layout_marginEnd="96dp"
15      android:layout_marginBottom="4dp"
16      android:text="Submit"
17      app:layout_constraintBottom_toBottomOf="parent"
18      app:layout_constraintEnd_toEndOf="parent"
19      app:layout_constraintHorizontal_bias="0.0"
20      app:layout_constraintStart_toStartOf="parent" />
21
22   <Button
23      android:id="@+id/resetButton"
24      android:layout_width="0dp"
25      android:layout_height="wrap_content"
26      android:layout_marginStart="96dp"
27      android:layout_marginEnd="96dp"
28      android:text="Clear All"
29      app:layout_constraintBottom_toTopOf="@+id/submitButton"
30      app:layout_constraintEnd_toEndOf="parent"
31      app:layout_constraintHorizontal_bias="0.0"
32      app:layout_constraintStart_toStartOf="parent"
33      app:layout_constraintTop_toBottomOf="@+id/phoneField"
34      app:layout_constraintVertical_bias="1.0" />
35
36   <TextView
37      android:id="@+id/textView"
38      android:layout_width="wrap_content"
39      android:layout_height="wrap_content"
40      android:layout_marginTop="48dp"
41      android:text="Patient Registration"
42      android:textSize="28sp"
43      android:textStyle="bold"
44      android:typeface="monospace"
45      app:layout_constraintEnd_toEndOf="parent"
46      app:layout_constraintStart_toStartOf="parent"
```



```

47         app:layout_constraintTop_toTopOf="parent" />
48
49     <TextView
50         android:id="@+id/textView2"
51         android:layout_width="wrap_content"
52         android:layout_height="wrap_content"
53         android:layout_marginStart="8dp"
54         android:layout_marginTop="32dp"
55         android:text="Name"
56         android:textSize="18sp"
57         app:layout_constraintStart_toStartOf="parent"
58         app:layout_constraintTop_toBottomOf="@+id/textView" />
59
60     <TextView
61         android:id="@+id/textView3"
62         android:layout_width="wrap_content"
63         android:layout_height="wrap_content"
64         android:layout_marginStart="8dp"
65         android:layout_marginTop="24dp"
66         android:text="Date of Birth"
67         android:textSize="18sp"
68         app:layout_constraintStart_toStartOf="parent"
69         app:layout_constraintTop_toBottomOf="@+id/textView2" />
70
71     <TextView
72         android:id="@+id/textView4"
73         android:layout_width="wrap_content"
74         android:layout_height="wrap_content"
75         android:layout_marginStart="8dp"
76         android:layout_marginTop="28dp"
77         android:text="Gender"
78         android:textSize="18sp"
79         app:layout_constraintStart_toStartOf="parent"
80         app:layout_constraintTop_toBottomOf="@+id/textView15" />
81
82     <TextView
83         android:id="@+id/textView5"
84         android:layout_width="wrap_content"
85         android:layout_height="wrap_content"
86         android:layout_marginStart="8dp"
87         android:layout_marginTop="24dp"
88         android:text="Marital Status"
89         android:textSize="18sp"
90         app:layout_constraintStart_toStartOf="parent"
91         app:layout_constraintTop_toBottomOf="@+id/textView4" />
92
93     <TextView
94         android:id="@+id/textView7"
95         android:layout_width="wrap_content"
96         android:layout_height="wrap_content"
97         android:layout_marginStart="8dp"

```

```

98         android:layout_marginTop="36dp"
99         android:text="Registration Time"
100        android:textSize="18sp"
101        app:layout_constraintStart_toStartOf="parent"
102        app:layout_constraintTop_toBottomOf="@+id/textView5" />
103
104    <TextView
105        android:id="@+id/textView8"
106        android:layout_width="wrap_content"
107        android:layout_height="wrap_content"
108        android:layout_marginStart="8dp"
109        android:layout_marginTop="36dp"
110        android:text="Addictions"
111        android:textSize="18sp"
112        app:layout_constraintStart_toStartOf="parent"
113        app:layout_constraintTop_toBottomOf="@+id/textView7" />
114
115    <EditText
116        android:id="@+id/nameField"
117        android:layout_width="180dp"
118        android:layout_height="wrap_content"
119        android:layout_marginTop="24dp"
120        android:ems="10"
121        android:inputType="textPersonName"
122        android:textSize="14sp"
123        app:layout_constraintEnd_toEndOf="parent"
124        app:layout_constraintHorizontal_bias="0.542"
125        app:layout_constraintStart_toEndOf="@+id/textView7"
126        app:layout_constraintTop_toBottomOf="@+id/textView" />
127
128    <EditText
129        android:id="@+id/dateField"
130        android:layout_width="180dp"
131        android:layout_height="wrap_content"
132        android:layout_marginTop="8dp"
133        android:ems="10"
134        android:inputType="date"
135        android:textSize="14sp"
136        app:layout_constraintEnd_toEndOf="parent"
137        app:layout_constraintHorizontal_bias="0.542"
138        app:layout_constraintStart_toEndOf="@+id/textView7"
139        app:layout_constraintTop_toBottomOf="@+id/nameField" />
140
141    <RadioGroup
142        android:id="@+id/genderRadioGroup"
143        android:layout_width="180dp"
144        android:layout_height="26dp"
145        android:layout_marginTop="24dp"
146        android:orientation="horizontal"
147        app:layout_constraintEnd_toEndOf="parent"
148        app:layout_constraintHorizontal_bias="0.481"

```

```

149     app:layout_constraintStart_toEndOf="@+id/textView7"
150     app:layout_constraintTop_toBottomOf="@+id/addrField">
151
152     <RadioButton
153         android:id="@+id/maleRadioButton"
154         android:layout_width="90dp"
155         android:layout_height="wrap_content"
156         android:text="Male" />
157
158     <RadioButton
159         android:id="@+id/femaleRadioButton"
160         android:layout_width="90dp"
161         android:layout_height="wrap_content"
162         android:text="Female" />
163 </RadioGroup>
164
165 <Spinner
166     android:id="@+id/maritalList"
167     android:layout_width="180dp"
168     android:layout_height="wrap_content"
169     android:layout_marginTop="24dp"
170     android:entries="@array/marital_items"
171     app:layout_constraintEnd_toEndOf="parent"
172     app:layout_constraintStart_toEndOf="@+id/textView7"
173     app:layout_constraintTop_toBottomOf="@+id/genderRadioGroup" />
174
175 <EditText
176     android:id="@+id/timeField"
177     android:layout_width="180dp"
178     android:layout_height="wrap_content"
179     android:layout_marginTop="24dp"
180     android:ems="10"
181     android:inputType="time"
182     android:textSize="14sp"
183     app:layout_constraintEnd_toEndOf="parent"
184     app:layout_constraintStart_toEndOf="@+id/textView7"
185     app:layout_constraintTop_toBottomOf="@+id/maritalList" />
186
187 <CheckBox
188     android:id="@+id/smokingCheckBox"
189     android:layout_width="wrap_content"
190     android:layout_height="wrap_content"
191     android:layout_marginStart="40dp"
192     android:layout_marginTop="16dp"
193     android:text="Smoking"
194     app:layout_constraintStart_toEndOf="@+id/textView7"
195     app:layout_constraintTop_toBottomOf="@+id/timeField" />
196
197 <CheckBox
198     android:id="@+id/drinkingCheckBox"
199     android:layout_width="wrap_content"

```

```

200     android:layout_height="wrap_content"
201     android:layout_marginTop="16dp"
202     android:text="Drinking"
203     app:layout_constraintEnd_toEndOf="parent"
204     app:layout_constraintHorizontal_bias="0.188"
205     app:layout_constraintStart_toEndOf="@+id/smokingCheckBox"
206     app:layout_constraintTop_toBottomOf="@+id/timeField" />
207
208 <TextView
209     android:id="@+id/textView15"
210     android:layout_width="wrap_content"
211     android:layout_height="wrap_content"
212     android:layout_marginStart="8dp"
213     android:layout_marginTop="36dp"
214     android:text="Address"
215     android:textSize="18sp"
216     app:layout_constraintStart_toStartOf="parent"
217     app:layout_constraintTop_toBottomOf="@+id/textView17" />
218
219 <EditText
220     android:id="@+id/addrField"
221     android:layout_width="180dp"
222     android:layout_height="wrap_content"
223     android:layout_marginTop="12dp"
224     android:ems="10"
225     android:inputType="textPostalAddress"
226     android:textSize="14sp"
227     app:layout_constraintEnd_toEndOf="parent"
228     app:layout_constraintHorizontal_bias="0.542"
229     app:layout_constraintStart_toEndOf="@+id/textView7"
230     app:layout_constraintTop_toBottomOf="@+id/ageField" />
231
232 <TextView
233     android:id="@+id/textView16"
234     android:layout_width="wrap_content"
235     android:layout_height="wrap_content"
236     android:layout_marginStart="8dp"
237     android:layout_marginTop="36dp"
238     android:text="Contact Number"
239     android:textSize="18sp"
240     app:layout_constraintStart_toStartOf="parent"
241     app:layout_constraintTop_toBottomOf="@+id/textView8" />
242
243 <EditText
244     android:id="@+id/phoneField"
245     android:layout_width="180dp"
246     android:layout_height="wrap_content"
247     android:layout_marginTop="16dp"
248     android:ems="10"
249     android:inputType="phone"
250     android:textSize="14sp"

```

```

251     app:layout_constraintEnd_toEndOf="parent"
252     app:layout_constraintStart_toEndOf="@+id/textView7"
253     app:layout_constraintTop_toBottomOf="@+id/smokingCheckBox" />
254
255     <TextView
256         android:id="@+id/textView17"
257         android:layout_width="wrap_content"
258         android:layout_height="wrap_content"
259         android:layout_marginStart="8dp"
260         android:layout_marginTop="28dp"
261         android:text="Age"
262         android:textSize="18sp"
263         app:layout_constraintStart_toStartOf="parent"
264         app:layout_constraintTop_toBottomOf="@+id/textView3" />
265
266     <EditText
267         android:id="@+id/ageField"
268         android:layout_width="180dp"
269         android:layout_height="wrap_content"
270         android:layout_marginTop="12dp"
271         android:ems="10"
272         android:inputType="number"
273         android:textSize="14sp"
274         app:layout_constraintEnd_toEndOf="parent"
275         app:layout_constraintHorizontal_bias="0.542"
276         app:layout_constraintStart_toEndOf="@+id/textView7"
277         app:layout_constraintTop_toBottomOf="@+id/dateField" />
278
279     <ImageView
280         android:id="@+id/imageView"
281         android:layout_width="62dp"
282         android:layout_height="89dp"
283         app:layout_constraintBottom_toBottomOf="parent"
284         app:layout_constraintEnd_toStartOf="@+id/resetButton"
285         app:layout_constraintHorizontal_bias="0.47"
286         app:layout_constraintStart_toStartOf="parent"
287         app:layout_constraintTop_toBottomOf="@+id/phoneField"
288         app:layout_constraintVertical_bias="0.788"
289         app:srcCompat="@drawable/ic_medication_black_24dp" />
290
291     <ImageView
292         android:id="@+id/imageView3"
293         android:layout_width="62dp"
294         android:layout_height="89dp"
295         app:layout_constraintBottom_toBottomOf="parent"
296         app:layout_constraintEnd_toEndOf="parent"
297         app:layout_constraintHorizontal_bias="0.529"
298         app:layout_constraintStart_toEndOf="@+id/resetButton"
299         app:layout_constraintTop_toBottomOf="@+id/phoneField"
300         app:layout_constraintVertical_bias="0.788"
301         app:srcCompat="@drawable/ic_medication_black_24dp" />

```

```
302  
303 </androidx.constraintlayout.widget.ConstraintLayout>
```

## Code: Submit Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent">
7
8   <TextView
9       android:id="@+id/textView6"
10      android:layout_width="wrap_content"
11      android:layout_height="wrap_content"
12      android:layout_marginTop="48dp"
13      android:text="Patient Details"
14      android:textSize="28sp"
15      android:textStyle="bold"
16      android:typeface="monospace"
17      app:layout_constraintEnd_toEndOf="parent"
18      app:layout_constraintStart_toStartOf="parent"
19      app:layout_constraintTop_toTopOf="parent" />
20
21   <TextView
22       android:id="@+id/textView9"
23       android:layout_width="wrap_content"
24       android:layout_height="wrap_content"
25       android:layout_marginStart="8dp"
26       android:layout_marginTop="32dp"
27       android:text="Name"
28       android:textSize="18sp"
29       app:layout_constraintStart_toStartOf="parent"
30       app:layout_constraintTop_toBottomOf="@+id/textView6" />
31
32   <TextView
33       android:id="@+id/textView10"
34       android:layout_width="wrap_content"
35       android:layout_height="wrap_content"
36       android:layout_marginStart="8dp"
37       android:layout_marginTop="24dp"
38       android:text="Date of Birth"
39       android:textSize="18sp"
40       app:layout_constraintStart_toStartOf="parent"
41       app:layout_constraintTop_toBottomOf="@+id/textView9" />
42
43   <TextView
44       android:id="@+id/textView11"
45       android:layout_width="wrap_content"
46       android:layout_height="wrap_content"
```

```

47     android:layout_marginStart="8dp"
48     android:layout_marginTop="24dp"
49     android:text="Gender"
50     android:textSize="18sp"
51     app:layout_constraintStart_toStartOf="parent"
52     app:layout_constraintTop_toBottomOf="@+id/addressText" />
53
54 <TextView
55     android:id="@+id/textView12"
56     android:layout_width="wrap_content"
57     android:layout_height="wrap_content"
58     android:layout_marginStart="8dp"
59     android:layout_marginTop="24dp"
60     android:text="Marital Status"
61     android:textSize="18sp"
62     app:layout_constraintStart_toStartOf="parent"
63     app:layout_constraintTop_toBottomOf="@+id/textView11" />
64
65 <TextView
66     android:id="@+id/textView13"
67     android:layout_width="wrap_content"
68     android:layout_height="wrap_content"
69     android:layout_marginStart="8dp"
70     android:layout_marginTop="24dp"
71     android:text="Registration Time"
72     android:textSize="18sp"
73     app:layout_constraintStart_toStartOf="parent"
74     app:layout_constraintTop_toBottomOf="@+id/textView12" />
75
76 <TextView
77     android:id="@+id/textView14"
78     android:layout_width="wrap_content"
79     android:layout_height="wrap_content"
80     android:layout_marginStart="8dp"
81     android:layout_marginTop="24dp"
82     android:text="Addictions"
83     android:textSize="18sp"
84     app:layout_constraintStart_toStartOf="parent"
85     app:layout_constraintTop_toBottomOf="@+id/textView13" />
86
87 <TextView
88     android:id="@+id/nameText"
89     android:layout_width="wrap_content"
90     android:layout_height="wrap_content"
91     android:layout_marginTop="32dp"
92     android:width="180dp"
93     android:textSize="18sp"
94     app:layout_constraintEnd_toEndOf="parent"
95     app:layout_constraintStart_toEndOf="@+id/textView13"
96     app:layout_constraintTop_toBottomOf="@+id/textView6" />
97

```



```

98 <TextView
99     android:id="@+id/dateText"
100     android:layout_width="wrap_content"
101     android:layout_height="wrap_content"
102     android:layout_marginTop="24dp"
103     android:width="180dp"
104     android:textSize="18sp"
105     app:layout_constraintEnd_toEndOf="parent"
106     app:layout_constraintStart_toEndOf="@+id/textView13"
107     app:layout_constraintTop_toBottomOf="@+id/nameText" />
108
109 <TextView
110     android:id="@+id/genderText"
111     android:layout_width="wrap_content"
112     android:layout_height="wrap_content"
113     android:layout_marginTop="24dp"
114     android:width="180dp"
115     android:textSize="18sp"
116     app:layout_constraintEnd_toEndOf="parent"
117     app:layout_constraintHorizontal_bias="0.501"
118     app:layout_constraintStart_toEndOf="@+id/textView13"
119     app:layout_constraintTop_toBottomOf="@+id/addressText" />
120
121 <TextView
122     android:id="@+id/maritalText"
123     android:layout_width="wrap_content"
124     android:layout_height="wrap_content"
125     android:layout_marginTop="24dp"
126     android:width="180dp"
127     android:textSize="18sp"
128     app:layout_constraintEnd_toEndOf="parent"
129     app:layout_constraintStart_toEndOf="@+id/textView13"
130     app:layout_constraintTop_toBottomOf="@+id/genderText" />
131
132 <TextView
133     android:id="@+id/timeText"
134     android:layout_width="wrap_content"
135     android:layout_height="wrap_content"
136     android:layout_marginTop="24dp"
137     android:width="180dp"
138     android:textSize="18sp"
139     app:layout_constraintEnd_toEndOf="parent"
140     app:layout_constraintStart_toEndOf="@+id/textView13"
141     app:layout_constraintTop_toBottomOf="@+id/maritalText" />
142
143 <TextView
144     android:id="@+id/addictionsText"
145     android:layout_width="wrap_content"
146     android:layout_height="wrap_content"
147     android:layout_marginTop="24dp"
148     android:width="180dp"

```

```

149         android:textSize="18sp"
150         app:layout_constraintEnd_toEndOf="parent"
151         app:layout_constraintStart_toEndOf="@+id/textView13"
152         app:layout_constraintTop_toBottomOf="@+id/timeText" />
153
154     <ImageView
155         android:id="@+id/imageView4"
156         android:layout_width="62dp"
157         android:layout_height="89dp"
158         app:layout_constraintBottom_toBottomOf="parent"
159         app:layout_constraintEnd_toEndOf="parent"
160         app:layout_constraintHorizontal_bias="0.025"
161         app:layout_constraintStart_toStartOf="parent"
162         app:layout_constraintTop_toBottomOf="@+id/additionsText"
163         app:layout_constraintVertical_bias="0.935"
164         app:srcCompat="@drawable/ic_masks_black_24dp" />
165
166     <ImageView
167         android:id="@+id/imageView2"
168         android:layout_width="62dp"
169         android:layout_height="89dp"
170         app:layout_constraintBottom_toBottomOf="parent"
171         app:layout_constraintEnd_toEndOf="parent"
172         app:layout_constraintHorizontal_bias="0.948"
173         app:layout_constraintStart_toStartOf="parent"
174         app:layout_constraintTop_toBottomOf="@+id/additionsText"
175         app:layout_constraintVertical_bias="0.934"
176         app:srcCompat="@drawable/ic_masks_black_24dp" />
177
178     <TextView
179         android:id="@+id/textView19"
180         android:layout_width="wrap_content"
181         android:layout_height="wrap_content"
182         android:layout_marginStart="8dp"
183         android:layout_marginTop="24dp"
184         android:text="Age"
185         android:textSize="18sp"
186         app:layout_constraintStart_toStartOf="parent"
187         app:layout_constraintTop_toBottomOf="@+id/textView10" />
188
189     <TextView
190         android:id="@+id/ageText"
191         android:layout_width="wrap_content"
192         android:layout_height="wrap_content"
193         android:layout_marginTop="24dp"
194         android:width="180dp"
195         android:textSize="18sp"
196         app:layout_constraintEnd_toEndOf="parent"
197         app:layout_constraintHorizontal_bias="0.501"
198         app:layout_constraintStart_toEndOf="@+id/textView13"
199         app:layout_constraintTop_toBottomOf="@+id/dateText" />

```

```

200
201 <TextView
202     android:id="@+id/textView21"
203     android:layout_width="wrap_content"
204     android:layout_height="wrap_content"
205     android:layout_marginStart="8dp"
206     android:layout_marginTop="24dp"
207     android:text="Address"
208     android:textSize="18sp"
209     app:layout_constraintStart_toStartOf="parent"
210     app:layout_constraintTop_toBottomOf="@+id/textView19" />
211
212 <TextView
213     android:id="@+id/addressText"
214     android:layout_width="wrap_content"
215     android:layout_height="wrap_content"
216     android:layout_marginTop="24dp"
217     android:width="180dp"
218     android:ellipsize="none"
219     android:maxLines="5"
220     android:scrollHorizontally="false"
221     android:textSize="18sp"
222     app:layout_constraintEnd_toEndOf="parent"
223     app:layout_constraintStart_toEndOf="@+id/textView13"
224     app:layout_constraintTop_toBottomOf="@+id/ageText" />
225
226 <TextView
227     android:id="@+id/textView23"
228     android:layout_width="wrap_content"
229     android:layout_height="wrap_content"
230     android:layout_marginStart="8dp"
231     android:layout_marginTop="24dp"
232     android:text="Contact Number"
233     android:textSize="18sp"
234     app:layout_constraintStart_toStartOf="parent"
235     app:layout_constraintTop_toBottomOf="@+id/textView14" />
236
237 <TextView
238     android:id="@+id/phoneText"
239     android:layout_width="wrap_content"
240     android:layout_height="wrap_content"
241     android:layout_marginTop="24dp"
242     android:width="180dp"
243     android:textSize="18sp"
244     app:layout_constraintEnd_toEndOf="parent"
245     app:layout_constraintStart_toEndOf="@+id/textView13"
246     app:layout_constraintTop_toBottomOf="@+id/additionsText" />
247
248 <ImageView
249     android:id="@+id/imageView5"
250     android:layout_width="122dp"

```

```
251     android:layout_height="124dp"
252     app:layout_constraintBottom_toBottomOf="parent"
253     app:layout_constraintEnd_toStartOf="@+id/imageView2"
254     app:layout_constraintHorizontal_bias="0.492"
255     app:layout_constraintStart_toEndOf="@+id/imageView4"
256     app:layout_constraintTop_toBottomOf="@+id/phoneText"
257     app:layout_constraintVertical_bias="0.802"
258     app:srcCompat="@drawable/ic_info_black_24dp" />
259
260 </androidx.constraintlayout.widget.ConstraintLayout>
```

## Output: Empty Form:

Figure 1: Output: Empty Form.

**Patient Registration**

### Patient Registration

Name

Date of Birth

Age

Address


Gender ☐ Male ☐ Female

Marital Status  ▼

Registration Time


Addictions ☐ Smoking ☐ Drinking

Contact Number



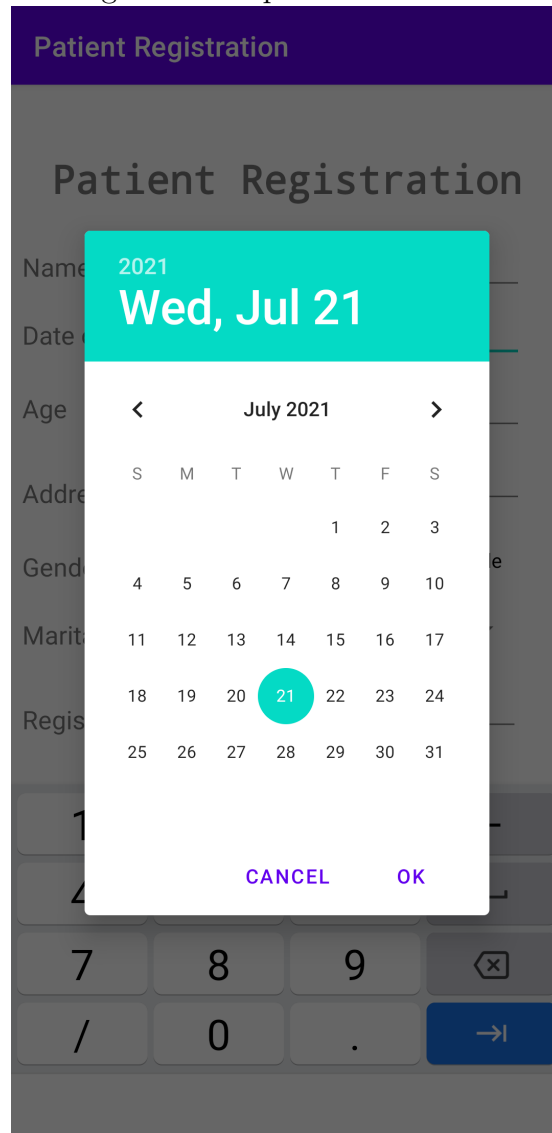
CLEAR ALL

SUBMIT



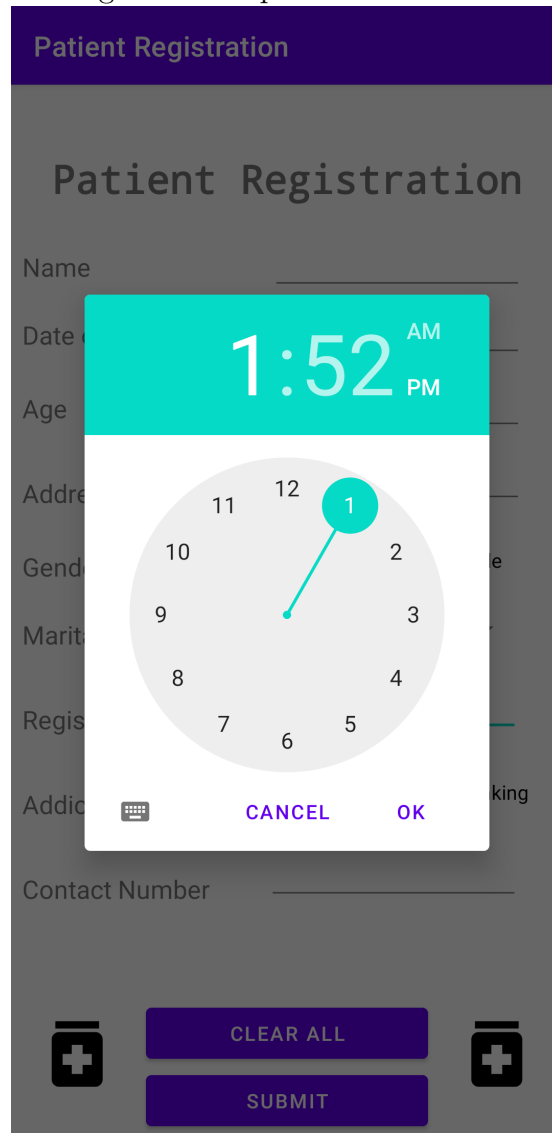
## Output: Date Picker:

Figure 2: Output: Date Picker.



## Output: Time Picker:

Figure 3: Output: Time Picker.




## Output: Filled Form:

Figure 4: Output: Filled Form.

Patient Registration


### Patient Registration

Name	Jarvis Johnson
Date of Birth	05/05/1992
Age	29
Address	University Campus, Atlanta
Gender	<input checked="" type="radio"/> Male <input type="radio"/> Female
Marital Status	Single ▼
Registration Time	18:14:32
Addictions	<input checked="" type="checkbox"/> Smoking <input checked="" type="checkbox"/> Drinking
Contact Number	9903695423



CLEAR ALL

SUBMIT





## Output: Submitted Form:

Figure 5: Output: Submitted Form.

### Patient Registration

#### Patient Details

Name	Jarvis Johnson
Date of Birth	05/05/1992
Age	29
Address	Georgia Tech University Campus, Atlanta
Gender	Male
Marital Status	Single
Registration Time	18:14:32
Addictions	Smoking, Drinking
Contact Number	9903695423



## Learning Outcome:

- I was able to install **Android Studio IDE** and create a new project.
- I understood how to code a simple form with **GUI components** using Java and XML.
- I understood how to use the design window to design the front-end GUI layout without requiring to write XML code to do the same.
- I used multiple GUI components like **TextView, ImageView, Button, PlainText, Phone, PostalAddress, Number, RadioButton, CheckBox, RadioGroup, Date & Time.**
- I understood how to use **Constraint Layout** for basic front-end development.
- I understood how the usage of **Spinner** to create a drop-down list and I was able to populate it with a custom-defined list with the help of **strings.xml**
- I implemented **onClickListener** events to the buttons to perform required form actions.
- I understood the usage of **Intent** to transfer data from one Activity to another.
- I understood how to call a new Activity from existing Activity using the help of Intent.
- I was able to store and extract form data using Intent and display it on a new Activity.
- I was able to display a **Date Picker** and **Time Picker** component to easily enter the date and time fields in the registration form respectively.
- I configured different **font styles, font sizes and colors** for different UI elements with the element's design attributes.
- I was able to develop and run a basic **Android application** on my computer and also export it to my phone as an **APK file** and use it from my mobile device.

# Department of CSE

## SSN College of Engineering

Vishakan Subramanian - 18 5001 196 - Semester VII

02 August 2021

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### UCS 1711 - Mobile Application Development Lab

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#### Exercise 2: Application For Calculator and Keyboard Simulation

##### **Aim:**

To develop an Android application that performs the functions of a basic calculator and also to develop a custom keyboard to accept numeric input from the user.

## Code: Main Activity:

```
1 package com.example.calculator;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.os.Bundle;
6 import android.view.View;
7 import android.widget.Button;
8 import android.widget.EditText;
9 import android.widget.TextView;
10
11 public class MainActivity extends AppCompatActivity {
12
13     Double input1 = 0.0, input2 = 0.0, result = 0.0;
14     Boolean addFlag = false, subFlag = false, mulFlag = false, divFlag =
false, powFlag = false;
15
16     @Override
17     protected void onCreate(Bundle savedInstanceState) {
18         super.onCreate(savedInstanceState);
19         setContentView(R.layout.activity_main);
20
21         final EditText displayArea = findViewById(R.id.displayArea);
22         final Button num0 = findViewById(R.id.num0);
23         final Button num1 = findViewById(R.id.num1);
24         final Button num2 = findViewById(R.id.num2);
25         final Button num3 = findViewById(R.id.num3);
26         final Button num4 = findViewById(R.id.num4);
27         final Button num5 = findViewById(R.id.num5);
28         final Button num6 = findViewById(R.id.num6);
29         final Button num7 = findViewById(R.id.num7);
30         final Button num8 = findViewById(R.id.num8);
31         final Button num9 = findViewById(R.id.num9);
32         final Button decimal = findViewById(R.id.decimal);
33         final Button clear = findViewById(R.id.clear);
34         final Button power = findViewById(R.id.power);
35         final Button divide = findViewById(R.id.divide);
36         final Button multiply = findViewById(R.id.multiply);
37         final Button subtract = findViewById(R.id.subtract);
38         final Button add = findViewById(R.id.add);
39         final Button equal = findViewById(R.id.equal);
40
41         num0.setOnClickListener(new View.OnClickListener() {
42             @Override
43             public void onClick(View v) {
44                 displayArea.setText(displayArea.getText() + "0");
45             }
46         });
```

```

47
48 num1.setOnClickListener(new View.OnClickListener() {
49     @Override
50     public void onClick(View v) {
51         displayArea.setText(displayArea.getText() + "1");
52     }
53 });
54
55 num2.setOnClickListener(new View.OnClickListener() {
56     @Override
57     public void onClick(View v) {
58         displayArea.setText(displayArea.getText() + "2");
59     }
60 });
61
62 num3.setOnClickListener(new View.OnClickListener() {
63     @Override
64     public void onClick(View v) {
65         displayArea.setText(displayArea.getText() + "3");
66     }
67 });
68
69 num4.setOnClickListener(new View.OnClickListener() {
70     @Override
71     public void onClick(View v) {
72         displayArea.setText(displayArea.getText() + "4");
73     }
74 });
75
76 num5.setOnClickListener(new View.OnClickListener() {
77     @Override
78     public void onClick(View v) {
79         displayArea.setText(displayArea.getText() + "5");
80     }
81 });
82
83 num6.setOnClickListener(new View.OnClickListener() {
84     @Override
85     public void onClick(View v) {
86         displayArea.setText(displayArea.getText() + "6");
87     }
88 });
89
90 num7.setOnClickListener(new View.OnClickListener() {
91     @Override
92     public void onClick(View v) {
93         displayArea.setText(displayArea.getText() + "7");
94     }
95 });
96
97 num8.setOnClickListener(new View.OnClickListener() {

```

```

98         @Override
99         public void onClick(View v) {
100             displayArea.setText(displayArea.getText() + "8");
101         }
102     });
103
104     num9.setOnClickListener(new View.OnClickListener() {
105         @Override
106         public void onClick(View v) {
107             displayArea.setText(displayArea.getText() + "9");
108         }
109     });
110
111     decimal.setOnClickListener(new View.OnClickListener() {
112         @Override
113         public void onClick(View v) {
114             if(!displayArea.getText().toString().contains(".")) {
115                 displayArea.setText(displayArea.getText() + ".");
116             }
117         }
118     });
119
120     clear.setOnClickListener(new View.OnClickListener() {
121         @Override
122         public void onClick(View v) {
123             displayArea.setText("");
124         }
125     });
126
127     add.setOnClickListener(new View.OnClickListener() {
128         @Override
129         public void onClick(View v) {
130             if(displayArea.getText().length() != 0){
131                 input1 = Double.parseDouble(displayArea.getText().
toString());
132                 displayArea.setText("");
133             }
134
135             //if operator was pressed without any new input
136             addFlag = true;
137             subFlag = mulFlag = divFlag = powFlag = false;
138         }
139     });
140
141     subtract.setOnClickListener(new View.OnClickListener() {
142         @Override
143         public void onClick(View v) {
144             if(displayArea.getText().length() != 0){
145                 input1 = Double.parseDouble(displayArea.getText().
toString());
146                 displayArea.setText("");

```

```

147         }
148
149         //if operator was pressed without any new input
150         subFlag = true;
151         addFlag = mulFlag = divFlag = powFlag = false;
152     }
153 });
154
155 multiply.setOnClickListener(new View.OnClickListener() {
156     @Override
157     public void onClick(View v) {
158         if(displayArea.getText().length() != 0){
159             input1 = Double.parseDouble(displayArea.getText().
toString());
160             displayArea.setText("");
161         }
162
163         //if operator was pressed without any new input
164         mulFlag = true;
165         addFlag = subFlag = divFlag = powFlag = false;
166     }
167 });
168
169 divide.setOnClickListener(new View.OnClickListener() {
170     @Override
171     public void onClick(View v) {
172         if(displayArea.getText().length() != 0){
173             input1 = Double.parseDouble(displayArea.getText().
toString());
174             displayArea.setText("");
175         }
176
177         //if operator was pressed without any new input
178         divFlag = true;
179         addFlag = subFlag = mulFlag = powFlag = false;
180     }
181 });
182
183 power.setOnClickListener(new View.OnClickListener() {
184     @Override
185     public void onClick(View v) {
186         if(displayArea.getText().length() != 0){
187             input1 = Double.parseDouble(displayArea.getText().
toString());
188             displayArea.setText("");
189         }
190
191         //if operator was pressed without any new input
192         powFlag = true;
193         addFlag = subFlag = mulFlag = divFlag = false;
194     }

```

```

195     });
196
197     equal.setOnClickListener(new View.OnClickListener() {
198         @Override
199         public void onClick(View v) {
200             if((addFlag || subFlag || mulFlag || divFlag || powFlag)
201             && displayArea.getText().length() != 0){
202                 input2 = Double.parseDouble(displayArea.getText().
203                 toString());
204             }
205
206             if(addFlag){
207                 result = input1 + input2;
208                 displayArea.setText(result + "");
209                 input1 = input2 = result = 0.0;
210             }
211
212             if(subFlag){
213                 result = input1 - input2;
214                 displayArea.setText(result + "");
215                 input1 = input2 = result = 0.0;
216             }
217
218             if(mulFlag){
219                 result = input1 * input2;
220                 displayArea.setText(result + "");
221                 input1 = input2 = result = 0.0;
222             }
223
224             if(divFlag){
225                 result = input1 / input2;
226                 displayArea.setText(result + "");
227                 input1 = input2 = result = 0.0;
228             }
229
230             if(powFlag){
231                 result = Math.pow(input1, input2);
232                 displayArea.setText(result + "");
233                 input1 = input2 = result = 0.0;
234             }
235
236             //set all operations to false
237             addFlag = subFlag = mulFlag = divFlag = powFlag = false;
238         }
239     });

```



## Code: MyInputMethodService:

```
1 package com.example.calculator;
2
3 import android.inputmethodservice.InputMethodService;
4 import android.inputmethodservice.Keyboard;
5 import android.inputmethodservice.KeyboardView;
6 import android.text.TextUtils;
7 import android.view.View;
8 import android.view.inputmethod.InputConnection;
9
10 public class MyInputMethodService extends InputMethodService implements
    KeyboardView.OnKeyboardActionListener {
11
12     @Override
13     public View onCreateInputView() {
14         // get the KeyboardView and add our Keyboard layout to it
15         KeyboardView keyboardView = (KeyboardView) getLayoutInflater().
            inflate(R.layout.keyboard_view, null);
16         Keyboard keyboard = new Keyboard(this, R.xml.number_pad);
17         keyboardView.setKeyboard(keyboard);
18         keyboardView.setOnKeyboardActionListener(this);
19         return keyboardView;
20     }
21
22     @Override
23     public void onKey(int primaryCode, int[] keyCodes) {
24
25         InputConnection ic = getCurrentInputConnection();
26
27         if (ic == null) return;
28         switch (primaryCode) {
29             case Keyboard.KEYCODE_DELETE:
30                 CharSequence selectedText = ic.getSelectedText(0);
31                 if (TextUtils.isEmpty(selectedText)) {
32                     // no selection, so delete previous character
33                     ic.deleteSurroundingText(1, 0);
34                 } else {
35                     // delete the selection
36                     ic.commitText("", 1);
37                 }
38                 break;
39
40             default:
41                 char code = (char) primaryCode;
42                 ic.commitText(String.valueOf(code), 1);
43         }
44     }
45 }
```

```
46     @Override
47     public void onPress(int primaryCode) { }
48
49     @Override
50     public void onRelease(int primaryCode) { }
51
52     @Override
53     public void onText(CharSequence text) { }
54
55     @Override
56     public void swipeLeft() { }
57
58     @Override
59     public void swipeRight() { }
60
61     @Override
62     public void swipeDown() { }
63
64     @Override
65     public void swipeUp() { }
66 }
```

## Code: Main Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   android:background="#B388FF"
8   tools:context=".MainActivity">
9
10  <Button
11      android:id="@+id/num3"
12      android:layout_width="wrap_content"
13      android:layout_height="wrap_content"
14      android:layout_marginStart="8dp"
15      android:layout_marginTop="32dp"
16      android:backgroundTint="@color/
  design_default_color_secondary_variant"
17      android:text="3"
18      android:textSize="20sp"
19      android:textStyle="bold"
20      app:layout_constraintStart_toStartOf="parent"
21      app:layout_constraintTop_toBottomOf="@+id/num6" />
22
23  <Button
24      android:id="@+id/num2"
25      android:layout_width="wrap_content"
26      android:layout_height="wrap_content"
27      android:layout_marginStart="16dp"
28      android:layout_marginTop="32dp"
29      android:backgroundTint="@color/
  design_default_color_secondary_variant"
30      android:text="2"
31      android:textSize="20sp"
32      android:textStyle="bold"
33      app:layout_constraintStart_toEndOf="@+id/num3"
34      app:layout_constraintTop_toBottomOf="@+id/num5" />
35
36  <Button
37      android:id="@+id/num1"
38      android:layout_width="wrap_content"
39      android:layout_height="wrap_content"
40      android:layout_marginStart="16dp"
41      android:layout_marginTop="32dp"
42      android:backgroundTint="@color/
  design_default_color_secondary_variant"
43      android:text="1"
```

```

44     android:textSize="20sp"
45     android:textStyle="bold"
46     app:layout_constraintStart_toEndOf="@+id/num2"
47     app:layout_constraintTop_toBottomOf="@+id/num4" />
48
49     <Button
50         android:id="@+id/num0"
51         android:layout_width="wrap_content"
52         android:layout_height="wrap_content"
53         android:layout_marginStart="8dp"
54         android:layout_marginTop="32dp"
55         android:backgroundTint="@color/
design_default_color_secondary_variant"
56         android:text="0"
57         android:textSize="20sp"
58         android:textStyle="bold"
59         app:layout_constraintStart_toStartOf="parent"
60         app:layout_constraintTop_toBottomOf="@+id/num3" />
61
62     <Button
63         android:id="@+id/decimal"
64         android:layout_width="wrap_content"
65         android:layout_height="wrap_content"
66         android:layout_marginStart="16dp"
67         android:layout_marginTop="32dp"
68         android:backgroundTint="@color/
design_default_color_secondary_variant"
69         android:text="."
70         android:textSize="20sp"
71         android:textStyle="bold"
72         app:layout_constraintStart_toEndOf="@+id/num0"
73         app:layout_constraintTop_toBottomOf="@+id/num2" />
74
75     <Button
76         android:id="@+id/clear"
77         android:layout_width="wrap_content"
78         android:layout_height="wrap_content"
79         android:layout_marginStart="16dp"
80         android:layout_marginTop="32dp"
81         android:backgroundTint="@color/
design_default_color_secondary_variant"
82         android:text="C"
83         android:textSize="20sp"
84         android:textStyle="bold"
85         app:layout_constraintStart_toEndOf="@+id/decimal"
86         app:layout_constraintTop_toBottomOf="@+id/num2" />
87
88     <Button
89         android:id="@+id/num9"
90         android:layout_width="wrap_content"
91         android:layout_height="wrap_content"

```

```

92         android:layout_marginStart="8dp"
93         android:layout_marginTop="40dp"
94         android:backgroundTint="@color/
design_default_color_secondary_variant"
95         android:text="9"
96         android:textSize="20sp"
97         android:textStyle="bold"
98         app:layout_constraintStart_toStartOf="parent"
99         app:layout_constraintTop_toBottomOf="@+id/displayArea" />
100
101     <Button
102         android:id="@+id/num6"
103         android:layout_width="wrap_content"
104         android:layout_height="wrap_content"
105         android:layout_marginStart="8dp"
106         android:layout_marginTop="32dp"
107         android:backgroundTint="@color/
design_default_color_secondary_variant"
108         android:text="6"
109         android:textSize="20sp"
110         android:textStyle="bold"
111         app:layout_constraintStart_toStartOf="parent"
112         app:layout_constraintTop_toBottomOf="@+id/num9" />
113
114     <Button
115         android:id="@+id/num5"
116         android:layout_width="wrap_content"
117         android:layout_height="wrap_content"
118         android:layout_marginStart="16dp"
119         android:layout_marginTop="32dp"
120         android:backgroundTint="@color/
design_default_color_secondary_variant"
121         android:text="5"
122         android:textSize="20sp"
123         android:textStyle="bold"
124         app:layout_constraintStart_toEndOf="@+id/num6"
125         app:layout_constraintTop_toBottomOf="@+id/num8" />
126
127     <Button
128         android:id="@+id/num4"
129         android:layout_width="wrap_content"
130         android:layout_height="wrap_content"
131         android:layout_marginStart="16dp"
132         android:layout_marginTop="32dp"
133         android:backgroundTint="@color/
design_default_color_secondary_variant"
134         android:text="4"
135         android:textSize="20sp"
136         android:textStyle="bold"
137         app:layout_constraintStart_toEndOf="@+id/num5"
138         app:layout_constraintTop_toBottomOf="@+id/num7" />

```

```

139
140 <Button
141     android:id="@+id/num8"
142     android:layout_width="wrap_content"
143     android:layout_height="wrap_content"
144     android:layout_marginStart="16dp"
145     android:layout_marginTop="40dp"
146     android:backgroundTint="@color/
design_default_color_secondary_variant"
147     android:text="8"
148     android:textSize="20sp"
149     android:textStyle="bold"
150     app:layout_constraintStart_toEndOf="@+id/num9"
151     app:layout_constraintTop_toBottomOf="@+id/displayArea" />
152
153 <Button
154     android:id="@+id/num7"
155     android:layout_width="wrap_content"
156     android:layout_height="wrap_content"
157     android:layout_marginStart="16dp"
158     android:layout_marginTop="40dp"
159     android:backgroundTint="@color/
design_default_color_secondary_variant"
160     android:text="7"
161     android:textSize="20sp"
162     android:textStyle="bold"
163     app:layout_constraintStart_toEndOf="@+id/num8"
164     app:layout_constraintTop_toBottomOf="@+id/displayArea" />
165
166 <Button
167     android:id="@+id/divide"
168     android:layout_width="71dp"
169     android:layout_height="48dp"
170     android:layout_marginStart="16dp"
171     android:layout_marginTop="40dp"
172     android:layout_marginEnd="16dp"
173     android:backgroundTint="@color/
design_default_color_secondary_variant"
174     android:text="/"
175     android:textSize="20sp"
176     android:textStyle="bold"
177     app:layout_constraintEnd_toEndOf="parent"
178     app:layout_constraintStart_toEndOf="@+id/num7"
179     app:layout_constraintTop_toBottomOf="@+id/displayArea" />
180
181 <Button
182     android:id="@+id/multiply"
183     android:layout_width="71dp"
184     android:layout_height="48dp"
185     android:layout_marginStart="16dp"
186     android:layout_marginTop="32dp"

```

```

187         android:layout_marginEnd="16dp"
188         android:backgroundTint="@color/
design_default_color_secondary_variant"
189         android:text="*"
190         android:textSize="20sp"
191         android:textStyle="bold"
192         app:layout_constraintEnd_toEndOf="parent"
193         app:layout_constraintStart_toEndOf="@+id/num4"
194         app:layout_constraintTop_toBottomOf="@+id/divide" />
195
196     <Button
197         android:id="@+id/subtract"
198         android:layout_width="71dp"
199         android:layout_height="48dp"
200         android:layout_marginStart="16dp"
201         android:layout_marginTop="32dp"
202         android:layout_marginEnd="16dp"
203         android:backgroundTint="@color/
design_default_color_secondary_variant"
204         android:text="-"
205         android:textSize="20sp"
206         android:textStyle="bold"
207         app:layout_constraintEnd_toEndOf="parent"
208         app:layout_constraintStart_toEndOf="@+id/num1"
209         app:layout_constraintTop_toBottomOf="@+id/multiply" />
210
211     <Button
212         android:id="@+id/add"
213         android:layout_width="71dp"
214         android:layout_height="48dp"
215         android:layout_marginStart="16dp"
216         android:layout_marginTop="32dp"
217         android:layout_marginEnd="16dp"
218         android:backgroundTint="@color/
design_default_color_secondary_variant"
219         android:text="+"
220         android:textSize="20sp"
221         android:textStyle="bold"
222         app:layout_constraintEnd_toEndOf="parent"
223         app:layout_constraintStart_toEndOf="@+id/clear"
224         app:layout_constraintTop_toBottomOf="@+id/subtract" />
225
226     <Button
227         android:id="@+id/equal"
228         android:layout_width="wrap_content"
229         android:layout_height="wrap_content"
230         android:layout_marginStart="16dp"
231         android:layout_marginTop="32dp"
232         android:backgroundTint="@color/
design_default_color_secondary_variant"
233         android:text="="

```

```

234     android:textSize="20sp"
235     android:textStyle="bold"
236     app:layout_constraintStart_toEndOf="@+id/decimal"
237     app:layout_constraintTop_toBottomOf="@+id/clear" />
238
239     <Button
240         android:id="@+id/power"
241         android:layout_width="71dp"
242         android:layout_height="48dp"
243         android:layout_marginStart="16dp"
244         android:layout_marginTop="32dp"
245         android:layout_marginEnd="16dp"
246         android:backgroundTint="@color/
design_default_color_secondary_variant"
247         android:text="^"
248         android:textSize="20sp"
249         android:textStyle="bold"
250         app:layout_constraintEnd_toEndOf="parent"
251         app:layout_constraintStart_toEndOf="@+id/equal"
252         app:layout_constraintTop_toBottomOf="@+id/add" />
253
254     <ImageView
255         android:id="@+id/imageView"
256         android:layout_width="215dp"
257         android:layout_height="145dp"
258         android:layout_marginTop="16dp"
259         app:layout_constraintEnd_toEndOf="parent"
260         app:layout_constraintStart_toStartOf="parent"
261         app:layout_constraintTop_toTopOf="parent"
262         app:srcCompat="@drawable/ic_calculate_black_24dp" />
263
264     <EditText
265         android:id="@+id/displayArea"
266         android:layout_width="377dp"
267         android:layout_height="62dp"
268         android:layout_marginStart="8dp"
269         android:layout_marginTop="20dp"
270         android:layout_marginEnd="8dp"
271         android:background="@android:drawable/editbox_background"
272         android:backgroundTint="@color/white"
273         android:ems="10"
274         android:inputType="numberDecimal"
275         android:textAlignment="textEnd"
276         android:textSize="20sp"
277         android:textStyle="bold"
278         app:layout_constraintEnd_toEndOf="parent"
279         app:layout_constraintStart_toStartOf="parent"
280         app:layout_constraintTop_toBottomOf="@+id/imageView" />
281
282 </androidx.constraintlayout.widget.ConstraintLayout>

```



## Code: Keyboard View Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <android.inputmethodservice.KeyboardView
3     xmlns:android="http://schemas.android.com/apk/res/android"
4     android:id="@+id/keyboard_view"
5     android:layout_width="match_parent"
6     android:layout_height="wrap_content"
7     android:keyPreviewLayout="@layout/key_preview"
8     android:layout_alignParentBottom="true">
9
10 </android.inputmethodservice.KeyboardView>
```

## Code: Key Preview Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <TextView
3     xmlns:android="http://schemas.android.com/apk/res/android"
4     android:layout_width="match_parent"
5     android:layout_height="match_parent"
6     android:gravity="center"
7     android:background="@android:color/white"
8     android:textColor="@android:color/black"
9     android:textSize="30sp">
10 </TextView>
```

## Code: Method XML

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <input-method
3     xmlns:android="http://schemas.android.com/apk/res/android">
4
5     <subtype
6         android:imeSubtypeMode="keyboard"/>
7
8 </input-method>
```

## Code: Number Pad XML

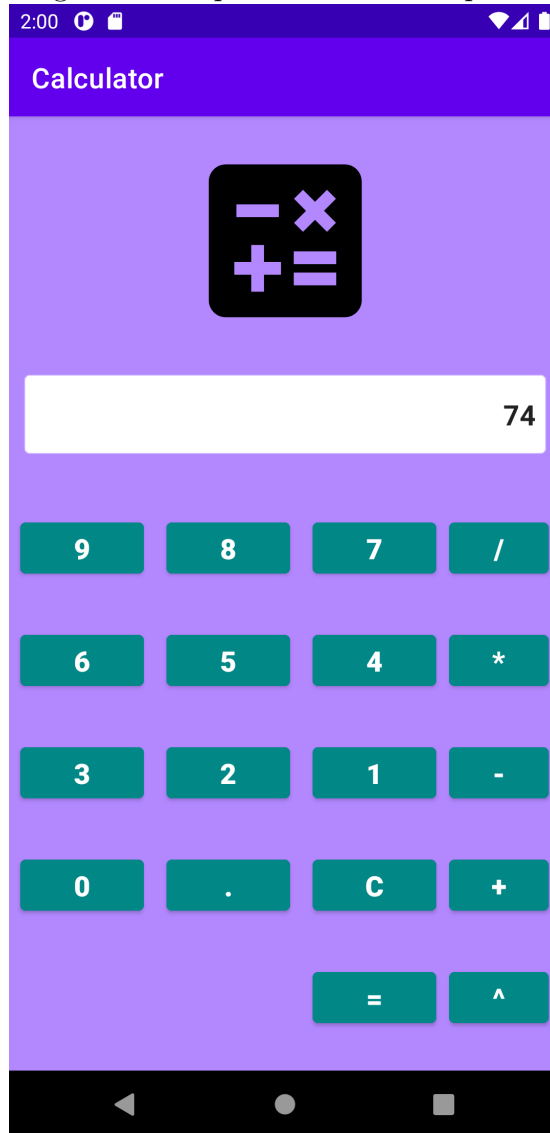
```
1 <?xml version="1.0" encoding="utf-8"?>
2 <Keyboard xmlns:android="http://schemas.android.com/apk/res/android"
3     android:keyWidth="20%p"
4     android:horizontalGap="5dp"
5     android:verticalGap="5dp"
6     android:keyHeight="60dp">
7
8     <Row>
9         <Key android:codes="49" android:keyLabel="1" android:keyEdgeFlags=
10            "left"/>
11         <Key android:codes="50" android:keyLabel="2"/>
12         <Key android:codes="51" android:keyLabel="3"/>
13         <Key android:codes="52" android:keyLabel="4"/>
14         <Key android:codes="53" android:keyLabel="5" android:keyEdgeFlags=
15            "right"/>
16     </Row>
17
18     <Row>
19         <Key android:codes="54" android:keyLabel="6" android:keyEdgeFlags=
20            "left"/>
21         <Key android:codes="55" android:keyLabel="7"/>
22         <Key android:codes="56" android:keyLabel="8"/>
23         <Key android:codes="57" android:keyLabel="9"/>
24         <Key android:codes="48" android:keyLabel="0" android:keyEdgeFlags=
25            "right"/>
26     </Row>
27
28     <Row>
29         <Key android:codes="-5"
30             android:keyLabel="DELETE"
31             android:keyWidth="80%p"
32             android:keyEdgeFlags="left"
33             android:isRepeatable="true"/>
34         <Key android:codes="46"
35             android:keyLabel="."
36             android:keyEdgeFlags="right"/>
37     </Row>
38 </Keyboard>
```

## Code: Android Manifest

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3     package="com.example.calculator">
4
5     <application
6         android:allowBackup="true"
7         android:icon="@mipmap/ic_launcher"
8         android:label="@string/app_name"
9         android:roundIcon="@mipmap/ic_launcher_round"
10        android:supportsRtl="true"
11        android:theme="@style/Theme.Calculator">
12        <activity android:name=".MainActivity">
13            <intent-filter>
14                <action android:name="android.intent.action.MAIN" />
15
16                <category android:name="android.intent.category.LAUNCHER"
17            />
18            </intent-filter>
19        </activity>
20
21        <service
22            android:name=".MyInputMethodService"
23            android:label="Easy Calc Number Pad"
24            android:permission="android.permission.BIND_INPUT_METHOD">
25            <intent-filter>
26                <action android:name="android.view.InputMethod"/>
27            </intent-filter>
28            <meta-data
29                android:name="android.view.im"
30                android:resource="@xml/method"/>
31        </service>
32    </application>
33
34 </manifest>
```

## Output: Calculator Input 1:

Figure 1: Output: Calculator Input 1.



## Output: Calculator Input 2:

Figure 2: Output: Calculator Input 2.



## Output: Calculator Result:

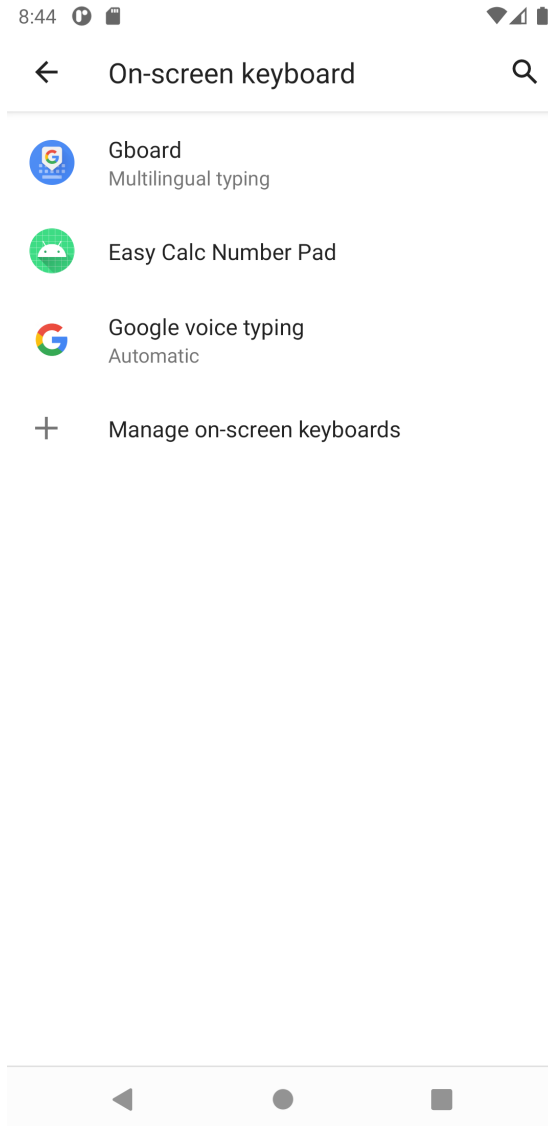
Figure 3: Output: Calculator Result.





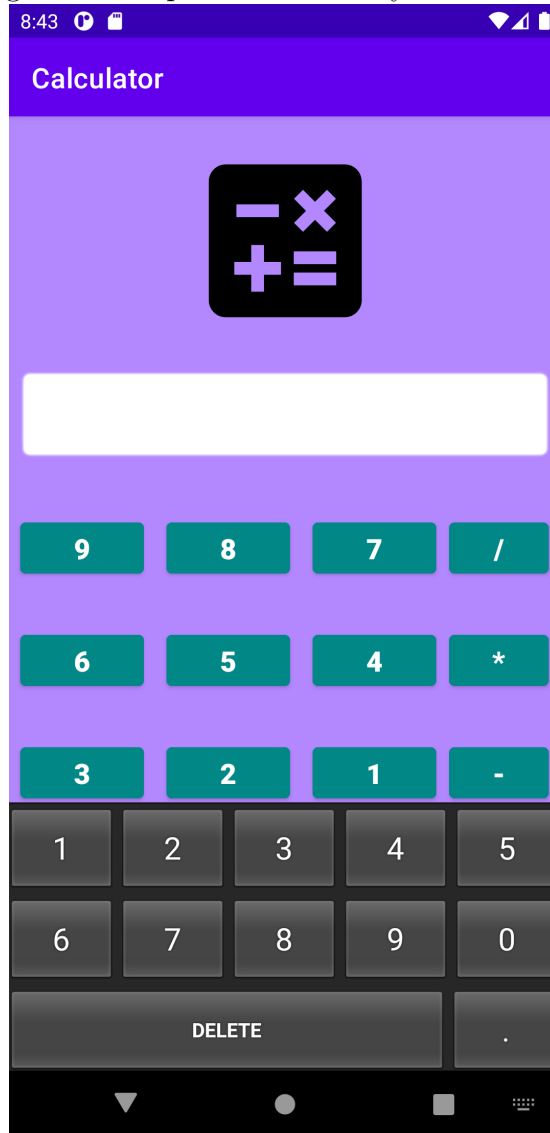
## Output: Custom Keyboard Set-Up:

Figure 4: Output: Custom Keyboard Set-Up.



## Output: Custom Keyboard In Use:

Figure 5: Output: Custom Keyboard In Use.



## Learning Outcome:

- I understood how to set-up a layout for a simple calculator application.
- I implemented the calculator logic with appropriate display functionality.
- I implemented buttons with logic for clearing the display area and include decimal points as well.
- I understood how to design a **custom keyboard** for Android.
- I understood how to map the keyboard keys to appropriate actions using the **Input-MethodService class & OnKeyboardActionListener interface**.
- I implemented functionality to clear the screen using a keypress as well.
- I understood how to style my custom keyboard using XML.
- I understood how to add keys to the custom keyboard using XML definition.
- I learnt that the keyboard service must be exposed to the device through the **Android Manifest** XML file for end-user peruse.
- I understood how to enable the custom keyboard from the front-end layer of the Android device.

# Department of CSE

## SSN College of Engineering

Vishakan Subramanian - 18 5001 196 - Semester VII

18 August 2021

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### UCS 1711 - Mobile Application Development Lab

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#### Exercise 3: Application Using Graphical Primitives

##### **Aim:**

To develop an Android application that generates the following using graphical primitives.

1. Draw shapes such as Line, Circle, Rectangle and Arc.
2. Perform animations on an image.
3. Perform transformations like rotation and zoom.
4. Draw a car and animate the car.

## Code: Main Activity:

```
1 package com.example.graphics;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.content.Intent;
6 import android.os.Bundle;
7 import android.view.View;
8 import android.widget.Button;
9
10 public class MainActivity extends AppCompatActivity {
11
12     @Override
13     protected void onCreate(Bundle savedInstanceState) {
14         super.onCreate(savedInstanceState);
15         setContentView(R.layout.activity_main);
16
17         final Button shapesButton = findViewById(R.id.shapesButton);
18         final Button animateButton = findViewById(R.id.animateButton);
19         final Button transformButton = findViewById(R.id.transformButton);
20
21         shapesButton.setOnClickListener(new View.OnClickListener() {
22             @Override
23             public void onClick(View v) {
24                 Intent shapesIntent = new Intent(MainActivity.this,
25 ShapesActivity.class);
26                 startActivity(shapesIntent);
27             }
28         });
29         animateButton.setOnClickListener(new View.OnClickListener() {
30             @Override
31             public void onClick(View v) {
32                 Intent animateIntent = new Intent(MainActivity.this,
33 AnimateActivity.class);
34                 startActivity(animateIntent);
35             }
36         });
37         transformButton.setOnClickListener(new View.OnClickListener() {
38             @Override
39             public void onClick(View v) {
40                 Intent transformIntent = new Intent(MainActivity.this,
41 TransformActivity.class);
42                 startActivity(transformIntent);
43             }
44         });
45     }
46 }
```

## Code: Shapes Activity:

```
1 package com.example.graphics;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.graphics.Bitmap;
6 import android.graphics.Canvas;
7 import android.graphics.Color;
8 import android.graphics.Paint;
9 import android.graphics.RectF;
10 import android.os.Bundle;
11 import android.widget.ImageView;
12
13 public class ShapesActivity extends AppCompatActivity {
14
15     @Override
16     protected void onCreate(Bundle savedInstanceState) {
17         super.onCreate(savedInstanceState);
18         setContentView(R.layout.activity_shapes);
19
20         final ImageView canvasImage = findViewById(R.id.canvasImage);
21
22         Bitmap bitmap = Bitmap.createBitmap(1080, 1920, Bitmap.Config.
23     ARGB_8888);
24         canvasImage.setImageBitmap(bitmap);
25
26         Canvas canvas = new Canvas(bitmap);
27         Paint paint = new Paint();
28
29         paint.setTextSize(50);
30
31         paint.setColor(Color.MAGENTA);
32         canvas.drawText("Rectangle", 720, 350, paint);
33         canvas.drawRect(700, 400, 950, 900, paint);
34
35         paint.setColor(Color.BLUE);
36         canvas.drawText("Circle", 220, 350, paint);
37         canvas.drawCircle(300, 550, 150, paint);
38
39         paint.setColor(Color.RED);
40         canvas.drawText("Square", 220, 1100, paint);
41         canvas.drawRect(150, 1150, 450, 1450, paint);
42
43         paint.setColor(Color.BLACK);
44         canvas.drawText("Line", 780, 1100, paint);
45         canvas.drawLine(820, 1150, 820, 1450, paint);
46
47         paint.setColor(Color.parseColor("#FFA500")); //orange
```

```
47         RectF oval = new RectF(200, 100, 800, 200);
48         canvas.drawText("Arc", 475, 100, paint);
49         canvas.drawArc(oval, 0, 180, false, paint);
50     }
51 }
```

## Code: Animate Activity:

```
1 package com.example.graphics;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.animation.Animator;
6 import android.animation.AnimatorListenerAdapter;
7 import android.animation.AnimatorSet;
8 import android.animation.ObjectAnimator;
9 import android.graphics.Bitmap;
10 import android.graphics.Canvas;
11 import android.graphics.Color;
12 import android.graphics.Paint;
13 import android.graphics.RectF;
14 import android.os.Bundle;
15 import android.widget.ImageView;
16
17 public class AnimateActivity extends AppCompatActivity {
18
19     @Override
20     protected void onCreate(Bundle savedInstanceState) {
21         super.onCreate(savedInstanceState);
22         setContentView(R.layout.activity_animate);
23
24         ImageView canvasAnimate = findViewById(R.id.canvasAnimate);
25
26         Paint paint = new Paint();
27
28         Bitmap carBitmap = Bitmap.createBitmap(1920, 1080, Bitmap.Config.
19         ARGB_8888);
29         canvasAnimate.setImageBitmap(carBitmap);
30
31         Canvas carCanvas = new Canvas(carBitmap);
32
33         //Car one
34         paint.setColor(Color.GREEN);
35         carCanvas.drawRect(50, 100, 450, 300, paint);
36
37         paint.setColor(Color.YELLOW);
38         RectF roof1 = new RectF(100, 0, 400, 200);
39         carCanvas.drawArc(roof1, 180, 180, false, paint);
40
41         paint.setColor(Color.DKGRAY);
42         carCanvas.drawCircle(150, 300, 50, paint);
43         carCanvas.drawCircle(350, 300, 50, paint);
44
45         //Car two
46         paint.setColor(Color.BLUE);
```



```

47     carCanvas.drawRect(450, 600, 50, 800, paint);
48
49     paint.setColor(Color.RED);
50     RectF roof2 = new RectF(100, 500, 400, 700);
51     carCanvas.drawArc(roof2, 180, 180, false, paint);
52
53     paint.setColor(Color.BLACK);
54     carCanvas.drawCircle(150, 800, 50, paint);
55     carCanvas.drawCircle(350, 800, 50, paint);
56
57     ObjectAnimator animateCar = ObjectAnimator.ofFloat(canvasAnimate,
"x", 800);
58     animateCar.setDuration(2000);
59     AnimatorSet animation = new AnimatorSet();
60
61     //Reverse the direction
62     animation.play(animateCar).before(ObjectAnimator.ofFloat(
canvasAnimate, "x", 0).setDuration(2000));
63
64     //To loop the animation indefinitely
65     animation.addListener(new AnimatorListenerAdapter() {
66         @Override
67         public void onAnimationEnd(Animator animation) {
68             super.onAnimationEnd(animation);
69             animation.start();
70         }
71     });
72
73     //To start the animation
74     animation.start();
75 }
76 }

```

## Code: Transform Activity:

```
1 package com.example.graphics;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.os.Bundle;
6 import android.view.animation.Animation;
7 import android.view.animation.AnimationUtils;
8 import android.widget.ImageView;
9
10 public class TransformActivity extends AppCompatActivity {
11
12     @Override
13     protected void onCreate(Bundle savedInstanceState) {
14         super.onCreate(savedInstanceState);
15         setContentView(R.layout.activity_transform);
16
17         final ImageView syncImage = findViewById(R.id.syncImage);
18         final ImageView starImage = findViewById(R.id.starImage);
19         final ImageView dollarImage = findViewById(R.id.dollarImage);
20
21         Animation rotateAnimation = AnimationUtils.loadAnimation(
22             getApplicationContext(), R.anim.rotate);
23         syncImage.startAnimation(rotateAnimation);
24
25         Animation zoomAnimation = AnimationUtils.loadAnimation(
26             getApplicationContext(), R.anim.zoom);
27         starImage.startAnimation(zoomAnimation);
28
29         Animation fadeAnimation = AnimationUtils.loadAnimation(
30             getApplicationContext(), R.anim.fade);
31         dollarImage.startAnimation(fadeAnimation);
32     }
33 }
```

## Code: Rotate XML:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <set xmlns:android="http://schemas.android.com/apk/res/android"
   android:interpolator="@android:anim/cycle_interpolator">
3   <rotate android:fromDegrees="0"
4     android:toDegrees="360"
5     android:pivotX="50%"
6     android:pivotY="50%"
7     android:duration="4000"
8     android:repeatCount="infinite"
9     android:repeatMode="restart"/>
10 </set>
```

## Code: Fade XML:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <set xmlns:android="http://schemas.android.com/apk/res/android">
3     <alpha
4         android:fromAlpha="0.0"
5         android:toAlpha="1.0"
6         android:duration="2000"
7         android:repeatCount="infinite"
8         android:repeatMode="reverse"/>
9 </set>
```

## Code: Zoom XML:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <set xmlns:android="http://schemas.android.com/apk/res/android">
3     <scale
4         xmlns:android="http://schemas.android.com/apk/res/android"
5         android:duration="2000"
6         android:fromXScale="1"
7         android:fromYScale="1"
8         android:pivotX="50%"
9         android:pivotY="50%"
10        android:toXScale="2"
11        android:toYScale="2"
12        android:repeatCount="infinite"
13        android:repeatMode="reverse">
14    </scale>
15 </set>
```

## Code: Main Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".MainActivity">
8
9   <Button
10      android:id="@+id/shapesButton"
11      android:layout_width="173dp"
12      android:layout_height="70dp"
13      android:layout_marginTop="250dp"
14      android:text="Shapes"
15      android:textSize="18sp"
16      android:textStyle="bold"
17      app:layout_constraintEnd_toEndOf="parent"
18      app:layout_constraintStart_toStartOf="parent"
19      app:layout_constraintTop_toTopOf="parent" />
20
21   <Button
22      android:id="@+id/animateButton"
23      android:layout_width="173dp"
24      android:layout_height="70dp"
25      android:layout_marginTop="20dp"
26      android:text="Animate"
27      android:textSize="18sp"
28      android:textStyle="bold"
29      app:layout_constraintEnd_toEndOf="parent"
30      app:layout_constraintStart_toStartOf="parent"
31      app:layout_constraintTop_toBottomOf="@+id/shapesButton" />
32
33   <Button
34      android:id="@+id/transformButton"
35      android:layout_width="173dp"
36      android:layout_height="70dp"
37      android:layout_marginTop="20dp"
38      android:text="Transform"
39      android:textSize="18sp"
40      android:textStyle="bold"
41      app:layout_constraintEnd_toEndOf="parent"
42      app:layout_constraintStart_toStartOf="parent"
43      app:layout_constraintTop_toBottomOf="@+id/animateButton" />
44 </androidx.constraintlayout.widget.ConstraintLayout>
```

## Code: Shapes Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".ShapesActivity">
8
9   <ImageView
10     android:id="@+id/canvasImage"
11     android:layout_width="wrap_content"
12     android:layout_height="wrap_content"
13     app:layout_constraintBottom_toBottomOf="parent"
14     app:layout_constraintEnd_toEndOf="parent"
15     app:layout_constraintStart_toStartOf="parent"
16     app:layout_constraintTop_toTopOf="parent"
17     app:srcCompat="@color/white" />
18 </androidx.constraintlayout.widget.ConstraintLayout>
```

## Code: Animate Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout
3     xmlns:android="http://schemas.android.com/apk/res/android"
4     xmlns:tools="http://schemas.android.com/tools"
5     xmlns:app="http://schemas.android.com/apk/res-auto"
6     android:layout_width="match_parent"
7     android:layout_height="match_parent"
8     tools:context=".AnimateActivity">
9
10    <ImageView
11        android:id="@+id/canvasAnimate"
12        android:layout_width="wrap_content"
13        android:layout_height="wrap_content"
14        app:layout_constraintBottom_toBottomOf="parent"
15        app:layout_constraintEnd_toEndOf="parent"
16        app:layout_constraintStart_toStartOf="parent"
17        app:layout_constraintTop_toTopOf="parent"
18        app:srcCompat="@color/white" />
19 </androidx.constraintlayout.widget.ConstraintLayout>
```

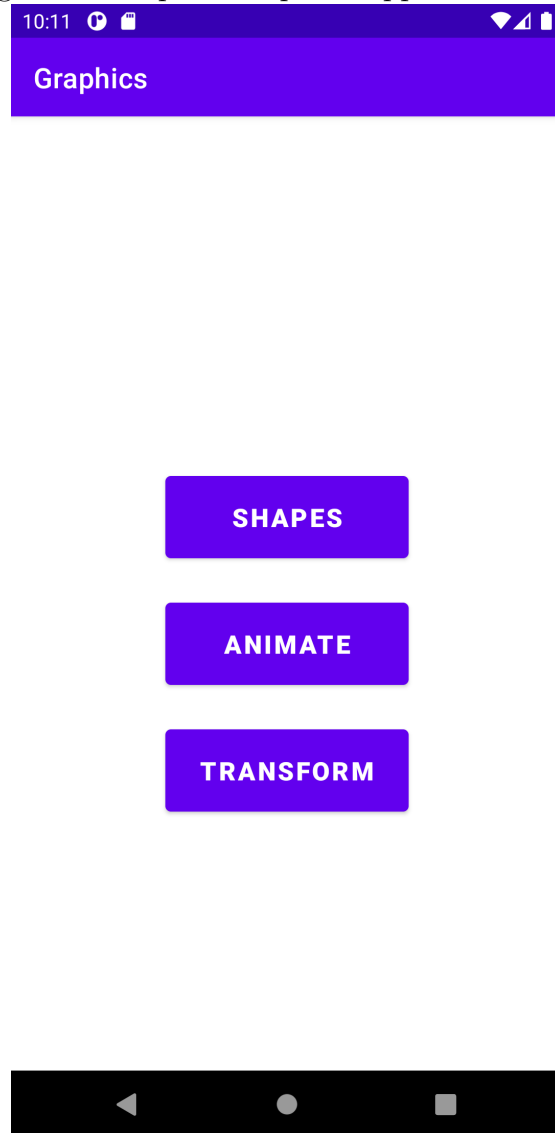


## Code: Transform Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".TransformActivity">
8
9   <ImageView
10      android:id="@+id/syncImage"
11      android:layout_width="150dp"
12      android:layout_height="150dp"
13      android:layout_marginTop="50dp"
14      app:layout_constraintEnd_toEndOf="parent"
15      app:layout_constraintHorizontal_bias="0.497"
16      app:layout_constraintStart_toStartOf="parent"
17      app:layout_constraintTop_toTopOf="parent"
18      app:srcCompat="@drawable/ic_sync_black_24dp" />
19
20   <ImageView
21      android:id="@+id/starImage"
22      android:layout_width="75dp"
23      android:layout_height="75dp"
24      android:layout_marginTop="100dp"
25      app:layout_constraintEnd_toEndOf="parent"
26      app:layout_constraintHorizontal_bias="0.493"
27      app:layout_constraintStart_toStartOf="parent"
28      app:layout_constraintTop_toBottomOf="@+id/dollarImage"
29      app:srcCompat="@drawable/ic_auto_awesome_black_24dp" />
30
31   <ImageView
32      android:id="@+id/dollarImage"
33      android:layout_width="150dp"
34      android:layout_height="150dp"
35      android:layout_marginTop="50dp"
36      app:layout_constraintEnd_toEndOf="parent"
37      app:layout_constraintStart_toStartOf="parent"
38      app:layout_constraintTop_toBottomOf="@+id/syncImage"
39      app:srcCompat="@drawable/ic_monetization_on_black_24dp" />
40 </androidx.constraintlayout.widget.ConstraintLayout>
```

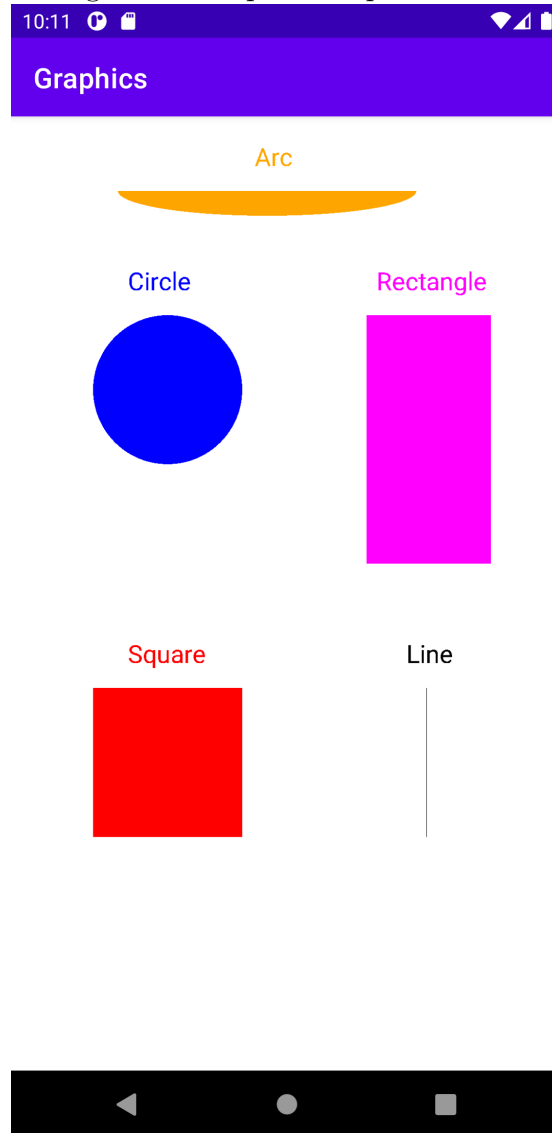
## Output: Graphics App Main Screen:

Figure 1: Output: Graphics App Main Screen.



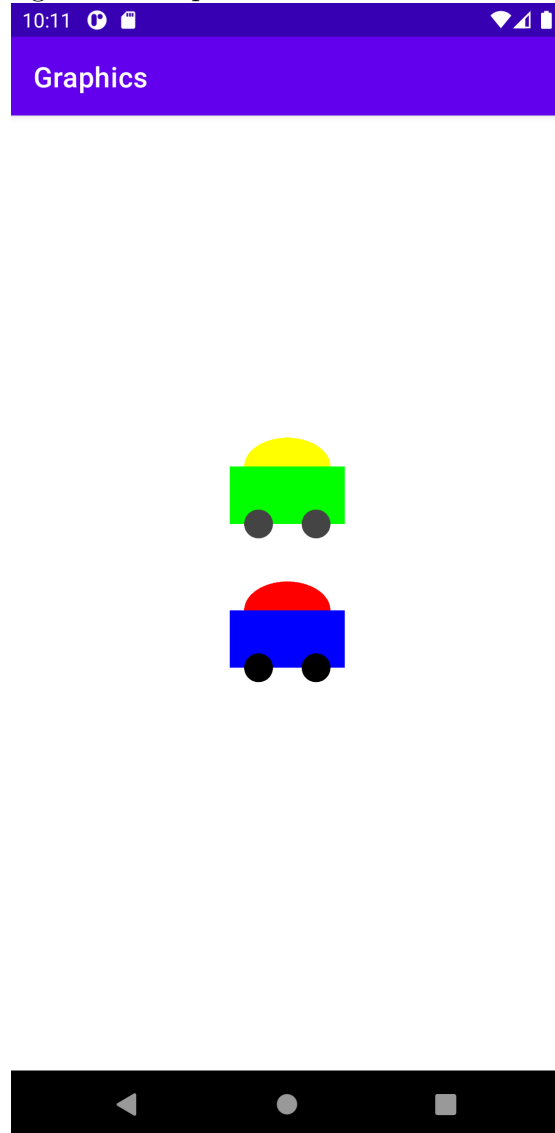
## Output: Shapes Screen:

Figure 2: Output: Shapes Screen.



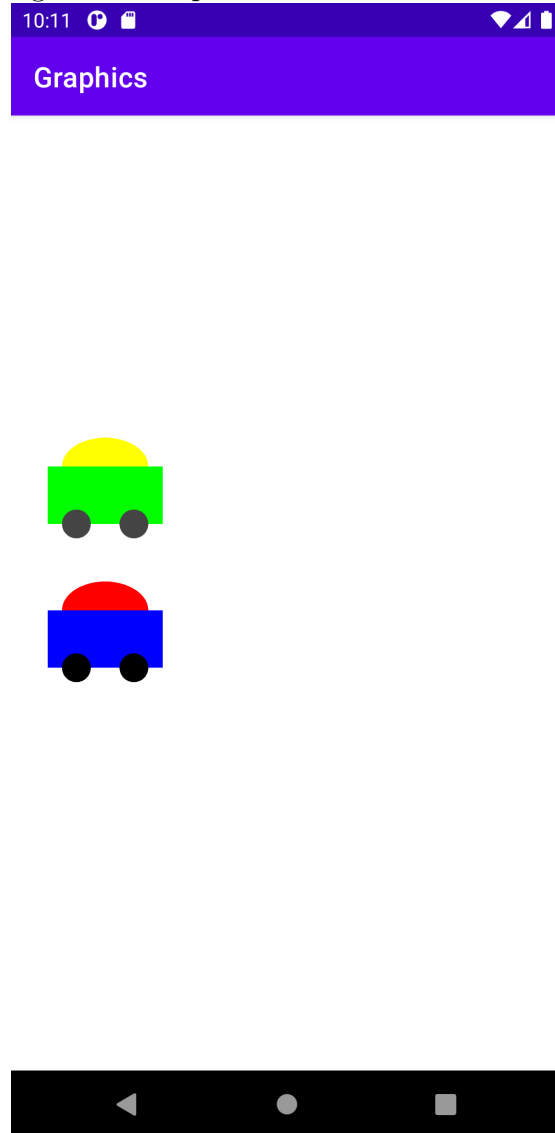
## Output: Animations Screen - 1:

Figure 3: Output: Animations Screen - 1.



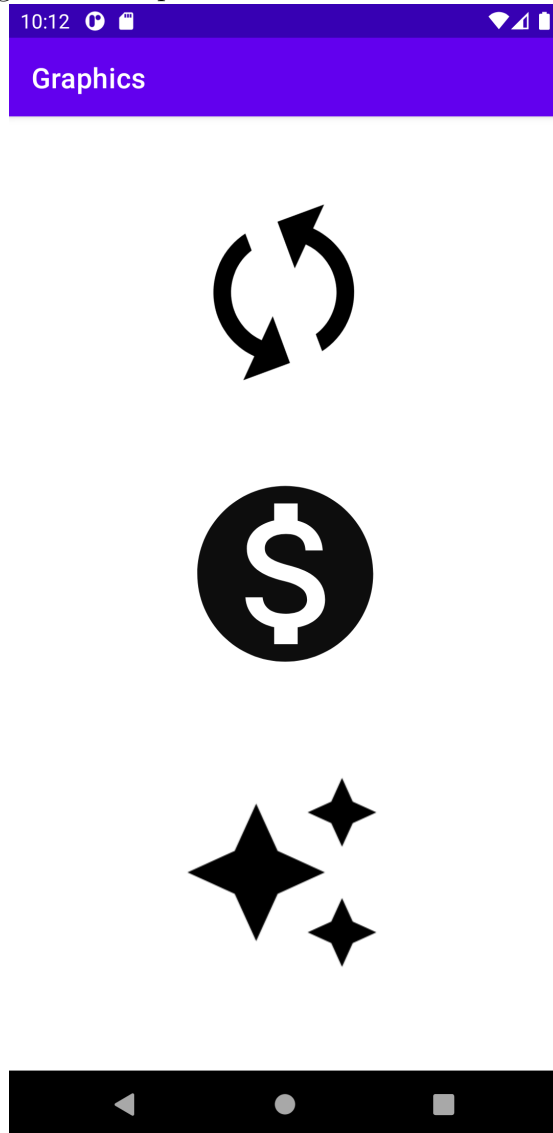
## Output: Animations Screen - 2:

Figure 4: Output: Animations Screen - 2.



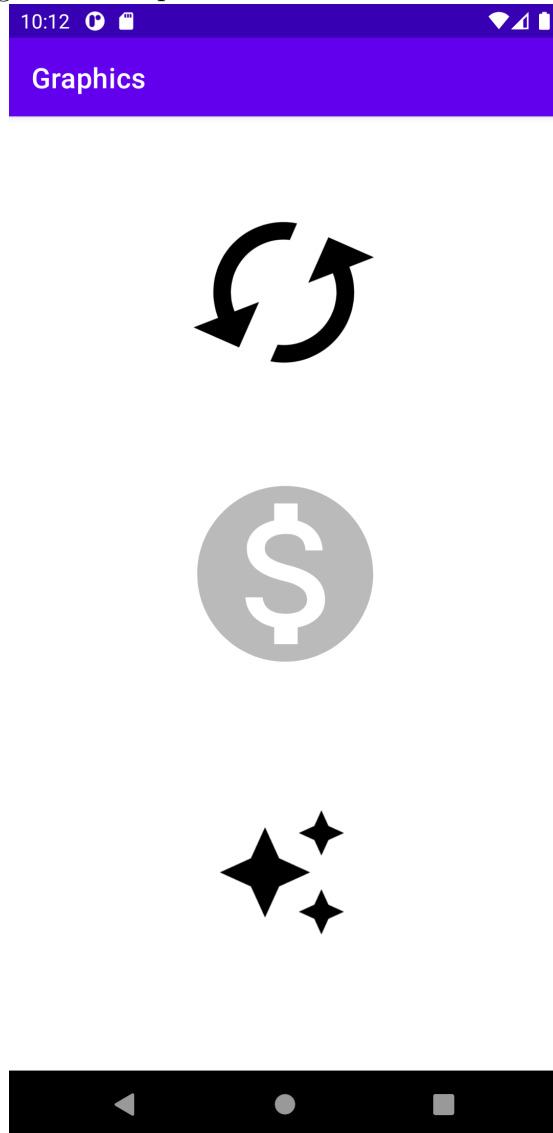
## Output: Transformations Screen - 1:

Figure 5: Output: Transformations Screen - 1.



## Output: Transformations Screen - 2:

Figure 6: Output: Transformations Screen - 2.



## Learning Outcome:

- I understood how to draw graphical primitives like shapes using **Bitmap** and **Canvas** in Android.
- I was able to draw shapes like **Lines, Rectangles, Circles and Arcs** using the **Canvas** object.
- I was able to set **Colors** to the objects drawn using the **Canvas** object.
- I drew a simple **car** using the graphical primitives.
- I was able to animate the car to **move forwards and backwards** infinitely using **AnimatorSet** object.
- I understood how to add custom animation specifications with XML-based syntax for Android applications.
- I was able to add a **rotate** transformation to a static image using **AnimationUtils** object and **XML specification**.
- I was able to add a **fade** transformation to a static image using **AnimationUtils** object and **XML specification**.
- I was able to add a **zoom** transformation to a static image using **AnimationUtils** object and **XML specification**.
- I understood how to use several XML-based parameters like **duration, repeatCount, repeatMode, pivotX, pivotY, fromXScale, fromYScale** etc. to control the transformations as desired.



# Department of CSE

## SSN College of Engineering

Vishakan Subramanian - 18 5001 196 - Semester VII

22 August 2021

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### UCS 1711 - Mobile Application Development Lab

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#### Exercise 4: Android Application Development Using Database

##### **Aim:**

To develop an Android application that generates the following using graphical primitives. In main activity have the following buttons: Create, Insert, Update, Delete, Retrieve

1. On clicking Create Button, create a new database to store the following contents.  
(Use SQLite Database)
  - (a) Name
  - (b) Gender
  - (c) Employee Code
  - (d) Department
  - (e) Salary

2. On Clicking Insert, move to a new view which contains the following details: (Insert new Employee to the database)
  - (a) Name (EditText - Validation checking - Alphabet)
  - (b) Gender (RadioButton)
  - (c) Employee Code (EditText - Validation checking - Alphanumeric)
  - (d) Department (Spinner)
  - (e) Salary (EditText - Validation checking - Numeric)
  - (f) Submit (Button – On press, Insert the data into database)
3. On clicking Update, move to a new view which contains above details and Update by Employee Code.
4. On clicking Delete, Delete the whole row in the table by Employee Code.
5. On clicking Retrieve, Retrieve an employee by Employee Code. Also retrieve the details of all the employees in a particular department.

## Code: Main Activity:

```
1 package com.example.employeemanager;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.content.Intent;
6 import android.database.sqlite.SQLiteDatabase;
7 import android.database.sqlite.SQLiteException;
8 import android.database.sqlite.SQLiteOpenHelper;
9 import android.os.Bundle;
10 import android.view.View;
11 import android.widget.Button;
12 import android.widget.Toast;
13
14 public class MainActivity extends AppCompatActivity {
15
16     @Override
17     protected void onCreate(Bundle savedInstanceState) {
18         super.onCreate(savedInstanceState);
19         setContentView(R.layout.activity_main);
20
21         final Button createButton = findViewById(R.id.createButton);
22         final Button insertButton = findViewById(R.id.insertButton);
23         final Button updateButton = findViewById(R.id.updateButton);
24         final Button deleteButton = findViewById(R.id.deleteButton);
25         final Button retrieveButton = findViewById(R.id.retrieveButton);
26         final Button retrieveByDeptButton = findViewById(R.id.
retrieveByDeptButton);
27
28         final SQLiteOpenHelper employeeDatabaseHelper = new
EmployeeDatabaseHelper(this);
29
30         createButton.setOnClickListener(new View.OnClickListener() {
31             @Override
32             public void onClick(View v) {
33                 try{
34                     SQLiteDatabase db = employeeDatabaseHelper.
getReadableDatabase();
35                     Toast toast = Toast.makeText(MainActivity.this, "
Database created!", Toast.LENGTH_SHORT);
36                     toast.show();
37                 } catch (SQLiteException e){
38                     Toast toast = Toast.makeText(MainActivity.this, "
Database unavailable!", Toast.LENGTH_SHORT);
39                     toast.show();
40                 }
41             }
42         });
```

```

43
44     insertButton.setOnClickListener(new View.OnClickListener() {
45         @Override
46         public void onClick(View v) {
47             Intent insertIntent = new Intent(getApplicationContext(),
InsertActivity.class);
48             startActivity(insertIntent);
49         }
50     });
51
52     updateButton.setOnClickListener(new View.OnClickListener() {
53         @Override
54         public void onClick(View v) {
55             Intent updateIntent = new Intent(getApplicationContext(),
UpdateActivity.class);
56             startActivity(updateIntent);
57         }
58     });
59
60     deleteButton.setOnClickListener(new View.OnClickListener() {
61         @Override
62         public void onClick(View v) {
63             Intent deleteIntent = new Intent(getApplicationContext(),
DeleteActivity.class);
64             startActivity(deleteIntent);
65         }
66     });
67
68     retrieveButton.setOnClickListener(new View.OnClickListener() {
69         @Override
70         public void onClick(View v) {
71             Intent retrieveIntent = new Intent(getApplicationContext()
, RetrieveActivity.class);
72             startActivity(retrieveIntent);
73         }
74     });
75
76     retrieveByDeptButton.setOnClickListener(new View.OnClickListener()
{
77         @Override
78         public void onClick(View v) {
79             Intent retrieveByDeptIntent = new Intent(
getApplicationContext(), RetrieveManyActivity.class);
80             startActivity(retrieveByDeptIntent);
81         }
82     });
83 }
84 }

```

## Code: Insert Activity:

```
1 package com.example.employeemanager;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.database.sqlite.SQLiteException;
6 import android.os.Bundle;
7 import android.text.TextUtils;
8 import android.view.View;
9 import android.widget.Button;
10 import android.widget.EditText;
11 import android.widget.RadioButton;
12 import android.widget.RadioGroup;
13 import android.widget.Spinner;
14 import android.widget.Toast;
15
16 public class InsertActivity extends AppCompatActivity {
17
18     @Override
19     protected void onCreate(Bundle savedInstanceState) {
20         super.onCreate(savedInstanceState);
21         setContentView(R.layout.activity_insert);
22
23         final EditText empCodeText = findViewById(R.id.empCodeText);
24         final EditText nameText = findViewById(R.id.nameText);
25         final RadioButton maleRadioButton = findViewById(R.id.
maleRadioButton3);
26         final RadioButton femaleRadioButton = findViewById(R.id.
femaleRadioButton3);
27         final RadioButton otherRadioButton = findViewById(R.id.
otherRadioButton3);
28         final RadioGroup genderRadioGroup = findViewById(R.id.
genderRadioGroup3);
29         final Spinner deptSpinner = findViewById(R.id.deptSpinner);
30         final EditText salaryText = findViewById(R.id.salaryText);
31         final Button addButton = findViewById(R.id.addButton);
32         final EmployeeDatabaseHelper employeeDatabaseHelper = new
EmployeeDatabaseHelper(this);
33
34         addButton.setOnClickListener(new View.OnClickListener() {
35             @Override
36             public void onClick(View v) {
37                 String eCode = empCodeText.getText().toString();
38                 String eName = nameText.getText().toString();
39                 int selectedRadioButtonID = genderRadioGroup.
getCheckedRadioButtonId();
40                 String department = (String) deptSpinner.getSelectedItem()
;
```

```

41         String salaryValue = salaryText.getText().toString();
42
43         //Validity Checking
44         if(TextUtils.isEmpty(eCode)){
45             //Empty employee code field
46             Toast eCodeToast = Toast.makeText(InsertActivity.this,
47 "Employee Code cannot be empty!", Toast.LENGTH_SHORT);
48             eCodeToast.show();
49         } else if(TextUtils.isEmpty(eName)){
50             //Empty name field
51             Toast nameToast = Toast.makeText(InsertActivity.this,
52 "Name Field cannot be empty!", Toast.LENGTH_SHORT);
53             nameToast.show();
54         } else if(TextUtils.isEmpty(salaryValue)){
55             //Empty salary field
56             Toast salaryToast = Toast.makeText(InsertActivity.this,
57 "Salary must not be empty!", Toast.LENGTH_SHORT);
58             salaryToast.show();
59         } else if(eCode.charAt(0) != 'E'){
60             //Wrong employee code format
61             empCodeText.setText("");
62             Toast eCodeToast = Toast.makeText(InsertActivity.this,
63 "Employee Code must be of the format E1024.", Toast.LENGTH_SHORT);
64             eCodeToast.show();
65         } else if(eName.matches(".*\\d.*")){
66             //Name contains numeric characters
67             nameText.setText("");
68             Toast eNameToast = Toast.makeText(InsertActivity.this,
69 "Employee Name must contain only alphabets.", Toast.LENGTH_SHORT);
70             eNameToast.show();
71         } else if(selectedRadioButtonID < 0){
72             //Gender was not selected
73             Toast genderToast = Toast.makeText(InsertActivity.this,
74 "Please identify your gender.", Toast.LENGTH_SHORT);
75             genderToast.show();
76         }
77         else{
78             //All information valid, proceed to add to database
79
80             RadioButton selectedRadioButton = genderRadioGroup.
81 findViewById(selectedRadioButtonID);
82             String gender = selectedRadioButton.getText().toString
83 ();
84
85             double salary = Double.parseDouble(salaryValue);
86
87             try{
88                 employeeDatabaseHelper.addRecord(eCode, eName,
89 gender, department, salary);
90                 Toast insertSuccessToast = Toast.makeText(
91 InsertActivity.this, eCode + "'s record was added!", Toast.LENGTH_SHORT

```

```

    );
82         insertSuccessToast.show();
83     } catch (SQLException e){
84         Toast insertFailureToast = Toast.makeText(
InsertActivity.this, e.getMessage() , Toast.LENGTH_SHORT);
85         insertFailureToast.show();
86     }
87 }
88 }
89 });
90 }
91 }

```

## Code: Update Activity:

```
1 package com.example.employeemanager;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.database.sqlite.SQLiteException;
6 import android.os.Bundle;
7 import android.text.TextUtils;
8 import android.view.View;
9 import android.widget.Button;
10 import android.widget.EditText;
11 import android.widget.RadioButton;
12 import android.widget.RadioGroup;
13 import android.widget.Spinner;
14 import android.widget.Toast;
15
16 public class UpdateActivity extends AppCompatActivity {
17
18     @Override
19     protected void onCreate(Bundle savedInstanceState) {
20         super.onCreate(savedInstanceState);
21         setContentView(R.layout.activity_update);
22
23         final EditText empCodeText = findViewById(R.id.empCodeText3);
24         final EditText nameText = findViewById(R.id.nameText3);
25         final RadioButton maleRadioButton = findViewById(R.id.
maleRadioButton3);
26         final RadioButton femaleRadioButton = findViewById(R.id.
femaleRadioButton3);
27         final RadioButton otherRadioButton = findViewById(R.id.
otherRadioButton3);
28         final RadioGroup genderRadioGroup = findViewById(R.id.
genderRadioGroup3);
29         final Spinner deptSpinner = findViewById(R.id.deptSpinner3);
30         final EditText salaryText = findViewById(R.id.salaryText3);
31         final Button changeButton = findViewById(R.id.changeButton);
32         final EmployeeDatabaseHelper employeeDatabaseHelper = new
EmployeeDatabaseHelper(this);
33
34         changeButton.setOnClickListener(new View.OnClickListener() {
35             @Override
36             public void onClick(View v) {
37                 String empCode = empCodeText.getText().toString();
38                 String empName = nameText.getText().toString();
39                 int selectedRadioButtonID = genderRadioGroup.
getCheckedRadioButtonId();
40                 String department = (String) deptSpinner.getSelectedItem()
;
```



```

41         String salaryValue = salaryText.getText().toString();
42
43         if(TextUtils.isEmpty(empCode)){
44             //Employee code not entered
45             Toast empCodeToast = Toast.makeText(UpdateActivity.
this, "Please enter an employee code.", Toast.LENGTH_SHORT);
46             empCodeToast.show();
47         } else if(TextUtils.isEmpty(empName)){
48             //Employee name not entered
49             Toast empNameToast = Toast.makeText(UpdateActivity.
this, "Please enter the employee name.", Toast.LENGTH_SHORT);
50             empNameToast.show();
51         } else if(TextUtils.isEmpty(salaryValue)){
52             //Empty salary field
53             Toast salaryToast = Toast.makeText(UpdateActivity.this
, "Salary must not be empty!", Toast.LENGTH_SHORT);
54             salaryToast.show();
55         } else if(empCode.charAt(0) != 'E'){
56             //Wrong employee code format
57             empCodeText.setText("");
58             Toast eCodeToast = Toast.makeText(UpdateActivity.this,
"Employee Code must be of the format E1024.", Toast.LENGTH_SHORT);
59             eCodeToast.show();
60         } else if(empName.matches(".*\\d.*")){
61             //Employee name contains numeric characters
62             nameText.setText("");
63             Toast eNameToast = Toast.makeText(UpdateActivity.this,
"Employee Name must contain only alphabets.", Toast.LENGTH_SHORT);
64             eNameToast.show();
65         } else if(selectedRadioButtonID < 0){
66             //Gender was not selected
67             Toast genderToast = Toast.makeText(UpdateActivity.this
, "Please identify your gender.", Toast.LENGTH_SHORT);
68             genderToast.show();
69         } else{
70             //All information valid, proceed to update table
record
71
72             RadioButton selectedRadioButton = genderRadioGroup.
findViewById(selectedRadioButtonID);
73             String gender = selectedRadioButton.getText().toString
();
74
75             double salary = Double.parseDouble(salaryValue);
76
77             try{
78                 //Check if an employee with the given Employee
Code exists
79                 String results[] = employeeDatabaseHelper.
retrieveRecord(empCode);
80

```

```

81         if(results == null){
82             //Employee doesn't exist under the specified
employee code
83             Toast empNotFoundToast = Toast.makeText(
UpdateActivity.this, "Employee with code: " + empCode + " doesn't exist
!", Toast.LENGTH_SHORT);
84             empNotFoundToast.show();
85         } else{
86             //Employee exists, update the record
87             employeeDatabaseHelper.updateRecord(empCode,
empName, gender, department, salary);
88             Toast updateSuccessToast = Toast.makeText(
UpdateActivity.this, empCode + "'s record was updated!", Toast.
LENGTH_SHORT);
89             updateSuccessToast.show();
90         }
91     } catch (SQLException e){
92         Toast updateFailureToast = Toast.makeText(
UpdateActivity.this, e.getMessage() , Toast.LENGTH_SHORT);
93         updateFailureToast.show();
94     }
95 }
96 }
97 }
98 }
99 });
100 }
101 }

```

## Code: Delete Activity:

```
1 package com.example.employeemanager;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.os.Bundle;
6 import android.text.TextUtils;
7 import android.view.View;
8 import android.widget.Button;
9 import android.widget.EditText;
10 import android.widget.TextView;
11 import android.widget.Toast;
12
13 public class DeleteActivity extends AppCompatActivity {
14
15     @Override
16     protected void onCreate(Bundle savedInstanceState) {
17         super.onCreate(savedInstanceState);
18         setContentView(R.layout.activity_delete);
19
20         final EditText empCodeText = findViewById(R.id.empCodeText4);
21         final TextView nameTextView = findViewById(R.id.empCodeTextView5);
22         final TextView genderTextView = findViewById(R.id.nameTextView5);
23         final TextView departmentTextView = findViewById(R.id.
genderTextView5);
24         final TextView salaryTextView = findViewById(R.id.salaryTextView5)
;
25         final Button removeButton = findViewById(R.id.getButton);
26         final EmployeeDatabaseHelper employeeDatabaseHelper = new
EmployeeDatabaseHelper(this);
27
28         removeButton.setOnClickListener(new View.OnClickListener() {
29             @Override
30             public void onClick(View v) {
31                 String empCode = empCodeText.getText().toString();
32
33                 if(TextUtils.isEmpty(empCode)){
34                     //If the employee code hasn't been entered
35                     Toast empCodeToast = Toast.makeText(DeleteActivity.
this, "Please enter the Employee Code.", Toast.LENGTH_SHORT);
36                     empCodeToast.show();
37                     return;
38                 }
39
40                 String[] results = employeeDatabaseHelper.retrieveRecord(
empCode);
41
42                 if(results == null){
```

```

43         //Record does not exist
44         Toast missingRecordToast = Toast.makeText(
DeleteActivity.this, empCode + "'s record doesn't exist!", Toast.
LENGTH_SHORT);
45         missingRecordToast.show();
46         return;
47     }
48
49     //Record exists, set the TextViews accordingly
50     nameTextView.setText(results[0]);
51     genderTextView.setText(results[1]);
52     departmentTextView.setText(results[2]);
53     salaryTextView.setText("$ " + results[3]);
54
55     //Delete the record from the table
56     int deleteStatus = employeeDatabaseHelper.deleteRecord(
empCode);
57
58     if(deleteStatus > 0){
59         //Record purged successfully
60         Toast deleteSuccessToast = Toast.makeText(
DeleteActivity.this, empCode + "'s record has been deleted successfully
.", Toast.LENGTH_SHORT);
61         deleteSuccessToast.show();
62     } else{
63         //Record purge unsuccessful
64         Toast deleteFailureToast = Toast.makeText(
DeleteActivity.this, empCode + "'s record could not be deleted.", Toast
.LENGTH_SHORT);
65         deleteFailureToast.show();
66     }
67
68     }
69     });
70 }
71 }

```

## Code: Retrieve Activity:

```
1 package com.example.employeemanager;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.os.Bundle;
6 import android.text.TextUtils;
7 import android.view.View;
8 import android.widget.Button;
9 import android.widget.EditText;
10 import android.widget.TextView;
11 import android.widget.Toast;
12
13 public class RetrieveActivity extends AppCompatActivity {
14
15     @Override
16     protected void onCreate(Bundle savedInstanceState) {
17         super.onCreate(savedInstanceState);
18         setContentView(R.layout.activity_retrieve);
19
20         final EditText empCodeText = findViewById(R.id.empCodeText4);
21         final TextView nameTextView = findViewById(R.id.empCodeTextView5);
22         final TextView genderTextView = findViewById(R.id.nameTextView5);
23         final TextView departmentTextView = findViewById(R.id.
genderTextView5);
24         final TextView salaryTextView = findViewById(R.id.salaryTextView5)
;
25         final Button fetchButton = findViewById(R.id.getButton);
26         final EmployeeDatabaseHelper employeeDatabaseHelper = new
EmployeeDatabaseHelper(this);
27
28         fetchButton.setOnClickListener(new View.OnClickListener() {
29             @Override
30             public void onClick(View v) {
31                 String empCode = empCodeText.getText().toString();
32
33                 if(TextUtils.isEmpty(empCode)){
34                     //If the employee code hasn't been entered
35                     Toast empCodeToast = Toast.makeText(RetrieveActivity.
this, "Please enter the Employee Code.", Toast.LENGTH_SHORT);
36                     empCodeToast.show();
37                     return;
38                 }
39
40                 String[] results = employeeDatabaseHelper.retrieveRecord(
empCode);
41
42                 if(results == null){
```

```

43         //Record does not exist
44         Toast missingRecordToast = Toast.makeText(
RetrieveActivity.this, empCode + "'s record doesn't exist!", Toast.
LENGTH_SHORT);
45         missingRecordToast.show();
46         return;
47     }
48
49     //Record exists, set the TextViews accordingly
50     nameTextView.setText(results[0]);
51     genderTextView.setText(results[1]);
52     departmentTextView.setText(results[2]);
53     salaryTextView.setText("$ " + results[3]);
54     }
55     });
56 }
57 }

```

## Code: Retrieve Many Activity:

```
1 package com.example.employeemanager;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.database.Cursor;
6 import android.os.Bundle;
7 import android.text.TextUtils;
8 import android.view.View;
9 import android.widget.Button;
10 import android.widget.EditText;
11 import android.widget.ImageButton;
12 import android.widget.Spinner;
13 import android.widget.TextView;
14 import android.widget.Toast;
15
16 public class RetrieveManyActivity extends AppCompatActivity {
17
18     public void enableButton(ImageButton button, boolean enabled){
19         //To enable and disable the scroll buttons
20         button.setEnabled(enabled);
21
22         //Change background color of the button
23         if(!enabled){
24             //dark gray color
25             button.setBackgroundTintList(this.getResources().
getColorStateList(R.color.darker_gray, this.getTheme()));
26         } else{
27             //holo red light color
28             button.setBackgroundTintList(this.getResources().
getColorStateList(R.color.holo_red_light, this.getTheme()));
29         }
30     }
31
32     Cursor results = null; //To store the retrieved records
33
34     @Override
35     protected void onCreate(Bundle savedInstanceState) {
36         super.onCreate(savedInstanceState);
37         setContentView(R.layout.activity_retrieve_many);
38
39         final Spinner deptSpinner = findViewById(R.id.deptSpinner5);
40         final TextView empCodeTextView = findViewById(R.id.
empCodeTextView5);
41         final TextView nameTextView = findViewById(R.id.nameTextView5);
42         final TextView genderTextView = findViewById(R.id.genderTextView5)
;
43     }
44 }
```

```

43     final TextView salaryTextView = findViewById(R.id.salaryTextView5)
44     ;
45     final Button getButton = findViewById(R.id.getButton);
46     final ImageButton prevButton = findViewById(R.id.prevButton);
47     final ImageButton nextButton = findViewById(R.id.nextButton);
48     final EmployeeDatabaseHelper employeeDatabaseHelper = new
EmployeeDatabaseHelper(this);
49
50     //Disable scroll behavior on initial load
51     enableButton(prevButton, false);
52     enableButton(nextButton, false);
53
54     getButton.setOnClickListener(new View.OnClickListener() {
55         @Override
56         public void onClick(View v) {
57             //Disable scroll behavior by default
58             enableButton(prevButton, false);
59             enableButton(nextButton, false);
60
61             String department = (String) deptSpinner.getSelectedItem()
62             ;
63
64             results = employeeDatabaseHelper.retrieveByDeptRecords(
65             department);
66
67             if(results == null){
68                 //No records were retrieved
69                 Toast noRecordsToast = Toast.makeText(
70             RetrieveManyActivity.this, "There are no employees in the " +
71             department + " department.", Toast.LENGTH_SHORT);
72                 noRecordsToast.show();
73
74                 //Clear the TextViews
75                 empCodeTextView.setText("");
76                 nameTextView.setText("");
77                 genderTextView.setText("");
78                 salaryTextView.setText("");
79
80                 return;
81             }
82
83             //Records were retrieved, display the first one by default
84             results.moveToFirst();
85
86             empCodeTextView.setText(results.getString(0));
87             nameTextView.setText(results.getString(1));
88             genderTextView.setText(results.getString(2));
89             salaryTextView.setText("$ " + results.getString(3));
90
91             if(results.getCount() > 1){
92                 //More than one record was retrieved

```



```

88         enableButton(nextButton, true);
89     }
90 }
91 });
92
93     nextButton.setOnClickListener(new View.OnClickListener() {
94         @Override
95         public void onClick(View v) {
96             enableButton(prevButton, true);    //enable prevButton to
move backwards
97             results.moveToNext();    //move by 1 position forward
98
99             empCodeTextView.setText(results.getString(0));
100             nameTextView.setText(results.getString(1));
101             genderTextView.setText(results.getString(2));
102             salaryTextView.setText("$ " + results.getString(3));
103
104             if(results.isLast()){
105                 enableButton(nextButton, false);
106             }
107         }
108     });
109
110     prevButton.setOnClickListener(new View.OnClickListener() {
111         @Override
112         public void onClick(View v) {
113             enableButton(nextButton, true);    //enable nextButton to
move forwards
114             results.moveToPrevious();    //move by 1 position backward
115
116             empCodeTextView.setText(results.getString(0));
117             nameTextView.setText(results.getString(1));
118             genderTextView.setText(results.getString(2));
119             salaryTextView.setText("$ " + results.getString(3));
120
121             if(results.isFirst()){
122                 enableButton(prevButton, false);
123             }
124         }
125     });
126 }
127 }

```

## Code: Employee Database Helper:

```
1 package com.example.employeemanager;
2
3 import android.content.ContentValues;
4 import android.content.Context;
5 import android.database.Cursor;
6 import android.database.sqlite.SQLiteDatabase;
7 import android.database.sqlite.SQLiteException;
8 import android.database.sqlite.SQLiteOpenHelper;
9
10
11 public class EmployeeDatabaseHelper extends SQLiteOpenHelper {
12     private static final String DB_NAME = "employees";
13     private static final int DB_VERSION = 1;
14
15     public EmployeeDatabaseHelper(Context context){
16         super(context, DB_NAME, null, DB_VERSION);
17     }
18
19     @Override
20     public void onCreate(SQLiteDatabase db) {
21         db.execSQL("CREATE TABLE IF NOT EXISTS EMPLOYEES (" +
22             "ECODE TEXT PRIMARY KEY, " +
23             "NAME TEXT, " +
24             "GENDER TEXT, " +
25             "DEPARTMENT TEXT, " +
26             "SALARY NUMERIC );");
27     }
28
29     @Override
30     public void onUpgrade(SQLiteDatabase db, int oldVersion, int
newVersion) {
31         db.execSQL("DROP TABLE IF EXISTS EMPLOYEES;");
32         onCreate(db);
33     }
34
35     public void addRecord(String eCode, String name, String gender, String
department, double salary){
36         SQLiteDatabase db = this.getWritableDatabase();
37         ContentValues record = new ContentValues();
38
39         record.put("ECODE", eCode);
40         record.put("NAME", name);
41         record.put("GENDER", gender);
42         record.put("DEPARTMENT", department);
43         record.put("SALARY", salary);
44
45
```

```

46         //throws SQLiteException if the insertion was unsuccessful
47         db.insertOrThrow("EMPLOYEES", null, record);
48
49         db.close();
50     }
51
52     public String[] retrieveRecord(String eCode){
53         SQLiteDatabase db = this.getReadableDatabase();
54         Cursor cursor = db.query("EMPLOYEES", new String[] {"NAME", "
GENDER", "DEPARTMENT", "SALARY"}, "ECODE = ?", new String[] {eCode},
null, null, null);
55         String results[] = new String[4];
56
57         if(cursor.moveToNext()){
58             //If record exists, retrieve it into results array and return
59             results[0] = cursor.getString(0);
60             results[1] = cursor.getString(1);
61             results[2] = cursor.getString(2);
62             results[3] = Double.toString(cursor.getDouble(3));
63
64             return results;
65         } else{
66             //Record doesn't exist, return null
67             return null;
68         }
69     }
70
71     public void updateRecord(String eCode, String name, String gender,
String department, double salary){
72         SQLiteDatabase db = this.getWritableDatabase();
73         ContentValues updatedRecord = new ContentValues();
74
75         updatedRecord.put("NAME", name);
76         updatedRecord.put("GENDER", gender);
77         updatedRecord.put("DEPARTMENT", department);
78         updatedRecord.put("SALARY", salary);
79
80         db.update("EMPLOYEES", updatedRecord, "ECODE = ?", new String[] {
eCode});
81     }
82
83     public int deleteRecord(String eCode){
84         SQLiteDatabase db = this.getWritableDatabase();
85
86         //Returns the number of rows affected
87         return db.delete("EMPLOYEES", "ECODE = ?", new String[] {eCode});
88     }
89
90     public Cursor retrieveByDeptRecords(String department){
91         SQLiteDatabase db = this.getReadableDatabase();

```

```
92         Cursor cursor = db.query("EMPLOYEES", new String[] {"ECODE", "NAME", "GENDER", "SALARY"}, "DEPARTMENT = ?", new String[] {department}, null, null, null);
93
94         if(cursor.getCount() == 0){
95             //No records were retrieved
96             return null;
97         }
98
99         return cursor;
100     }
101 }
```

## Code: Main Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".MainActivity">
8
9   <Button
10      android:id="@+id/createButton"
11      android:layout_width="250dp"
12      android:layout_height="50dp"
13      android:layout_marginTop="48dp"
14      android:backgroundTint="@android:color/holo_red_light"
15      android:fontFamily="@font/cagliostro"
16      android:text="CREATE"
17      android:textSize="20sp"
18      android:textStyle="bold"
19      app:layout_constraintEnd_toEndOf="parent"
20      app:layout_constraintStart_toStartOf="parent"
21      app:layout_constraintTop_toBottomOf="@+id/textView" />
22
23   <Button
24      android:id="@+id/updateButton"
25      android:layout_width="250dp"
26      android:layout_height="50dp"
27      android:layout_marginTop="32dp"
28      android:backgroundTint="@android:color/holo_red_light"
29      android:fontFamily="@font/cagliostro"
30      android:text="UPDATE"
31      android:textSize="20sp"
32      android:textStyle="bold"
33      app:layout_constraintEnd_toEndOf="parent"
34      app:layout_constraintHorizontal_bias="0.498"
35      app:layout_constraintStart_toStartOf="parent"
36      app:layout_constraintTop_toBottomOf="@+id/insertButton" />
37
38   <Button
39      android:id="@+id/insertButton"
40      android:layout_width="250dp"
41      android:layout_height="50dp"
42      android:layout_marginTop="32dp"
43      android:backgroundTint="@android:color/holo_red_light"
44      android:fontFamily="@font/cagliostro"
45      android:text="INSERT"
46      android:textSize="20sp"
```

```

47         android:textStyle="bold"
48         app:layout_constraintEnd_toEndOf="parent"
49         app:layout_constraintHorizontal_bias="0.498"
50         app:layout_constraintStart_toStartOf="parent"
51         app:layout_constraintTop_toBottomOf="@+id/createButton" />
52
53     <Button
54         android:id="@+id/deleteButton"
55         android:layout_width="250dp"
56         android:layout_height="50dp"
57         android:layout_marginTop="32dp"
58         android:backgroundTint="@android:color/holo_red_light"
59         android:fontFamily="@font/cagliostro"
60         android:text="DELETE"
61         android:textSize="20sp"
62         android:textStyle="bold"
63         app:layout_constraintEnd_toEndOf="parent"
64         app:layout_constraintHorizontal_bias="0.501"
65         app:layout_constraintStart_toStartOf="parent"
66         app:layout_constraintTop_toBottomOf="@+id/updateButton" />
67
68     <Button
69         android:id="@+id/retrieveButton"
70         android:layout_width="250dp"
71         android:layout_height="50dp"
72         android:layout_marginTop="32dp"
73         android:backgroundTint="@android:color/holo_red_light"
74         android:fontFamily="@font/cagliostro"
75         android:text="RETRIEVE"
76         android:textSize="20sp"
77         android:textStyle="bold"
78         app:layout_constraintEnd_toEndOf="parent"
79         app:layout_constraintHorizontal_bias="0.498"
80         app:layout_constraintStart_toStartOf="parent"
81         app:layout_constraintTop_toBottomOf="@+id/deleteButton" />
82
83     <Button
84         android:id="@+id/retrieveByDeptButton"
85         android:layout_width="250dp"
86         android:layout_height="50dp"
87         android:layout_marginTop="32dp"
88         android:backgroundTint="@android:color/holo_red_light"
89         android:fontFamily="@font/cagliostro"
90         android:text="RETRIEVE BY DEPT"
91         android:textSize="20sp"
92         android:textStyle="bold"
93         app:layout_constraintEnd_toEndOf="parent"
94         app:layout_constraintHorizontal_bias="0.498"
95         app:layout_constraintStart_toStartOf="parent"
96         app:layout_constraintTop_toBottomOf="@+id/retrieveButton" />
97

```

```
98     <TextView
99         android:id="@+id/textView"
100         android:layout_width="wrap_content"
101         android:layout_height="wrap_content"
102         android:layout_marginTop="64dp"
103         android:fontFamily="@font/cagliostro"
104         android:text="Employee Management"
105         android:textColor="?android:attr/textColorPrimary"
106         android:textSize="34sp"
107         android:textStyle="bold"
108         app:layout_constraintEnd_toEndOf="parent"
109         app:layout_constraintStart_toStartOf="parent"
110         app:layout_constraintTop_toTopOf="parent" />
111 </androidx.constraintlayout.widget.ConstraintLayout>
```

## Code: Insert Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".InsertActivity">
8
9   <Button
10      android:id="@+id/addButton"
11      android:layout_width="150dp"
12      android:layout_height="50dp"
13      android:layout_marginTop="50dp"
14      android:backgroundTint="@android:color/holo_red_light"
15      android:fontFamily="@font/cagliostro"
16      android:text="ADD"
17      android:textSize="20sp"
18      android:textStyle="bold"
19      app:layout_constraintEnd_toEndOf="parent"
20      app:layout_constraintStart_toStartOf="parent"
21      app:layout_constraintTop_toBottomOf="@+id/salaryText" />
22
23   <TextView
24      android:id="@+id/textView3"
25      android:layout_width="wrap_content"
26      android:layout_height="wrap_content"
27      android:layout_marginTop="64dp"
28      android:fontFamily="@font/cagliostro"
29      android:text="Insert Record"
30      android:textColor="?android:attr/textColorPrimary"
31      android:textSize="34sp"
32      android:textStyle="bold"
33      app:layout_constraintEnd_toEndOf="parent"
34      app:layout_constraintStart_toStartOf="parent"
35      app:layout_constraintTop_toTopOf="parent" />
36
37   <TextView
38      android:id="@+id/textView4"
39      android:layout_width="wrap_content"
40      android:layout_height="wrap_content"
41      android:layout_marginStart="16dp"
42      android:layout_marginTop="64dp"
43      android:fontFamily="@font/cagliostro"
44      android:text="Emp. Code"
45      android:textColor="?android:attr/textColorPrimary"
46      android:textSize="20sp"
```



```

47         android:textStyle="bold"
48         app:layout_constraintStart_toStartOf="parent"
49         app:layout_constraintTop_toBottomOf="@+id/textView3" />
50
51     <TextView
52         android:id="@+id/textView5"
53         android:layout_width="wrap_content"
54         android:layout_height="wrap_content"
55         android:layout_marginStart="16dp"
56         android:layout_marginTop="56dp"
57         android:fontFamily="@font/cagliostro"
58         android:text="Name"
59         android:textColor="?android:attr/textColorPrimary"
60         android:textSize="20sp"
61         android:textStyle="bold"
62         app:layout_constraintStart_toStartOf="parent"
63         app:layout_constraintTop_toBottomOf="@+id/textView4" />
64
65     <TextView
66         android:id="@+id/textView6"
67         android:layout_width="wrap_content"
68         android:layout_height="wrap_content"
69         android:layout_marginStart="16dp"
70         android:layout_marginTop="44dp"
71         android:fontFamily="@font/cagliostro"
72         android:text="Gender"
73         android:textColor="?android:attr/textColorPrimary"
74         android:textSize="20sp"
75         android:textStyle="bold"
76         app:layout_constraintStart_toStartOf="parent"
77         app:layout_constraintTop_toBottomOf="@+id/textView5" />
78
79     <TextView
80         android:id="@+id/textView7"
81         android:layout_width="wrap_content"
82         android:layout_height="wrap_content"
83         android:layout_marginStart="16dp"
84         android:layout_marginTop="40dp"
85         android:fontFamily="@font/cagliostro"
86         android:text="Department"
87         android:textColor="?android:attr/textColorPrimary"
88         android:textSize="20sp"
89         android:textStyle="bold"
90         app:layout_constraintStart_toStartOf="parent"
91         app:layout_constraintTop_toBottomOf="@+id/textView6" />
92
93     <TextView
94         android:id="@+id/textView8"
95         android:layout_width="wrap_content"
96         android:layout_height="wrap_content"
97         android:layout_marginStart="16dp"

```

```

98         android:layout_marginTop="44dp"
99         android:fontFamily="@font/cagliostro"
100        android:text="Salary"
101        android:textColor="?android:attr/textColorPrimary"
102        android:textSize="20sp"
103        android:textStyle="bold"
104        app:layout_constraintStart_toStartOf="parent"
105        app:layout_constraintTop_toBottomOf="@+id/textView7" />
106
107    <EditText
108        android:id="@+id/empCodeText"
109        android:layout_width="230dp"
110        android:layout_height="wrap_content"
111        android:layout_marginStart="16dp"
112        android:layout_marginTop="48dp"
113        android:ems="10"
114        android:fontFamily="sans-serif"
115        android:hint="E1024"
116        android:inputType="textPersonName"
117        android:textColor="?android:attr/textColorPrimary"
118        android:textSize="20sp"
119        app:layout_constraintStart_toEndOf="@+id/textView7"
120        app:layout_constraintTop_toBottomOf="@+id/textView3" />
121
122    <EditText
123        android:id="@+id/nameText"
124        android:layout_width="230dp"
125        android:layout_height="wrap_content"
126        android:layout_marginStart="16dp"
127        android:layout_marginTop="32dp"
128        android:ems="10"
129        android:fontFamily="sans-serif"
130        android:hint="John Doe"
131        android:inputType="textPersonName"
132        android:textColor="?android:attr/textColorPrimary"
133        android:textSize="20sp"
134        app:layout_constraintStart_toEndOf="@+id/textView7"
135        app:layout_constraintTop_toBottomOf="@+id/empCodeText" />
136
137    <Spinner
138        android:id="@+id/deptSpinner"
139        android:layout_width="230dp"
140        android:layout_height="wrap_content"
141        android:layout_marginStart="16dp"
142        android:layout_marginTop="32dp"
143        android:entries="@array/departments"
144        android:textSize="20sp"
145        app:layout_constraintStart_toEndOf="@+id/textView7"
146        app:layout_constraintTop_toBottomOf="@+id/genderRadioGroup3" />
147
148    <EditText

```

```

149     android:id="@+id/salaryText "
150     android:layout_width="230dp"
151     android:layout_height="wrap_content "
152     android:layout_marginStart="16dp"
153     android:layout_marginTop="32dp"
154     android:ems="10 "
155     android:hint="100000 "
156     android:inputType="numberDecimal "
157     android:textColor="?android:attr/textColorPrimary"
158     app:layout_constraintStart_toEndOf="@+id/textView7"
159     app:layout_constraintTop_toBottomOf="@+id/deptSpinner" />
160
161 <RadioGroup
162     android:id="@+id/genderRadioGroup3"
163     android:layout_width="230sp"
164     android:layout_height="wrap_content "
165     android:layout_marginStart="16dp"
166     android:layout_marginTop="32dp"
167     android:orientation="horizontal "
168     app:layout_constraintStart_toEndOf="@+id/textView7"
169     app:layout_constraintTop_toBottomOf="@+id/nameText" />
170
171 <RadioButton
172     android:id="@+id/maleRadioButton3"
173     android:layout_width="70dp"
174     android:layout_height="wrap_content "
175     android:fontFamily="sans-serif"
176     android:text="Male"
177     android:textColor="?android:attr/textColorPrimary"
178     android:textSize="16sp"
179     android:typeface="normal" />
180
181 <RadioButton
182     android:id="@+id/femaleRadioButton3"
183     android:layout_width="85dp"
184     android:layout_height="wrap_content "
185     android:fontFamily="sans-serif"
186     android:text="Female"
187     android:textColor="?android:attr/textColorPrimary"
188     android:textSize="16sp"
189     android:typeface="normal" />
190
191 <RadioButton
192     android:id="@+id/otherRadioButton3"
193     android:layout_width="75dp"
194     android:layout_height="wrap_content "
195     android:fontFamily="sans-serif"
196     android:text="Other"
197     android:textColor="?android:attr/textColorPrimary"
198     android:textSize="16sp"
199     android:typeface="normal" />

```

```
200         </RadioGroup>
201
202
203 </androidx.constraintlayout.widget.ConstraintLayout>
```

## Code: Update Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".UpdateActivity">
8
9   <Button
10      android:id="@+id/changeButton"
11      android:layout_width="150dp"
12      android:layout_height="50dp"
13      android:layout_marginTop="50dp"
14      android:backgroundTint="@android:color/holo_red_light"
15      android:fontFamily="@font/cagliostro"
16      android:text="CHANGE"
17      android:textSize="20sp"
18      android:textStyle="bold"
19      app:layout_constraintEnd_toEndOf="parent"
20      app:layout_constraintStart_toStartOf="parent"
21      app:layout_constraintTop_toBottomOf="@+id/salaryText3" />
22
23   <EditText
24      android:id="@+id/salaryText3"
25      android:layout_width="230dp"
26      android:layout_height="wrap_content"
27      android:layout_marginStart="16dp"
28      android:layout_marginTop="32dp"
29      android:ems="10"
30      android:hint="100000"
31      android:inputType="numberDecimal"
32      android:textColor="?android:attr/textColorPrimary"
33      app:layout_constraintStart_toEndOf="@+id/textView13"
34      app:layout_constraintTop_toBottomOf="@+id/deptSpinner3" />
35
36   <Spinner
37      android:id="@+id/deptSpinner3"
38      android:layout_width="230dp"
39      android:layout_height="wrap_content"
40      android:layout_marginStart="16dp"
41      android:layout_marginTop="32dp"
42      android:entries="@array/departments"
43      android:textSize="20sp"
44      app:layout_constraintStart_toEndOf="@+id/textView13"
45      app:layout_constraintTop_toBottomOf="@+id/genderRadioGroup3" />
46
```

```

47 <RadioGroup
48     android:id="@+id/genderRadioGroup3"
49     android:layout_width="230sp"
50     android:layout_height="wrap_content"
51     android:layout_marginStart="16dp"
52     android:layout_marginTop="32dp"
53     android:orientation="horizontal"
54     app:layout_constraintStart_toEndOf="@+id/textView13"
55     app:layout_constraintTop_toBottomOf="@+id/nameText3">
56
57     <RadioButton
58         android:id="@+id/maleRadioButton3"
59         android:layout_width="70dp"
60         android:layout_height="wrap_content"
61         android:fontFamily="sans-serif"
62         android:text="Male"
63         android:textColor="?android:attr/textColorPrimary"
64         android:textSize="16sp"
65         android:typeface="normal" />
66
67     <RadioButton
68         android:id="@+id/femaleRadioButton3"
69         android:layout_width="85dp"
70         android:layout_height="wrap_content"
71         android:fontFamily="sans-serif"
72         android:text="Female"
73         android:textColor="?android:attr/textColorPrimary"
74         android:textSize="16sp"
75         android:typeface="normal" />
76
77     <RadioButton
78         android:id="@+id/otherRadioButton3"
79         android:layout_width="75dp"
80         android:layout_height="wrap_content"
81         android:fontFamily="sans-serif"
82         android:text="Other"
83         android:textColor="?android:attr/textColorPrimary"
84         android:textSize="16sp"
85         android:typeface="normal" />
86 </RadioGroup>
87
88 <EditText
89     android:id="@+id/nameText3"
90     android:layout_width="230dp"
91     android:layout_height="wrap_content"
92     android:layout_marginStart="16dp"
93     android:layout_marginTop="32dp"
94     android:ems="10"
95     android:fontFamily="sans-serif"
96     android:hint="John Doe"
97     android:inputType="textPersonName"

```

```

98     android:textColor="?android:attr/textColorPrimary"
99     android:textSize="20sp"
100    app:layout_constraintStart_toEndOf="@+id/textView13"
101    app:layout_constraintTop_toBottomOf="@+id/empCodeText3" />
102
103    <EditText
104        android:id="@+id/empCodeText3"
105        android:layout_width="230dp"
106        android:layout_height="wrap_content"
107        android:layout_marginStart="16dp"
108        android:layout_marginTop="48dp"
109        android:ems="10"
110        android:fontFamily="sans-serif"
111        android:hint="E1024"
112        android:inputType="textPersonName"
113        android:textColor="?android:attr/textColorPrimary"
114        android:textSize="20sp"
115        app:layout_constraintStart_toEndOf="@+id/textView13"
116        app:layout_constraintTop_toBottomOf="@+id/textView9" />
117
118    <TextView
119        android:id="@+id/textView14"
120        android:layout_width="wrap_content"
121        android:layout_height="wrap_content"
122        android:layout_marginStart="16dp"
123        android:layout_marginTop="44dp"
124        android:fontFamily="@font/cagliostro"
125        android:text="Salary"
126        android:textColor="?android:attr/textColorPrimary"
127        android:textSize="20sp"
128        android:textStyle="bold"
129        app:layout_constraintStart_toStartOf="parent"
130        app:layout_constraintTop_toBottomOf="@+id/textView13" />
131
132    <TextView
133        android:id="@+id/textView13"
134        android:layout_width="wrap_content"
135        android:layout_height="wrap_content"
136        android:layout_marginStart="16dp"
137        android:layout_marginTop="40dp"
138        android:fontFamily="@font/cagliostro"
139        android:text="Department"
140        android:textColor="?android:attr/textColorPrimary"
141        android:textSize="20sp"
142        android:textStyle="bold"
143        app:layout_constraintStart_toStartOf="parent"
144        app:layout_constraintTop_toBottomOf="@+id/textView12" />
145
146    <TextView
147        android:id="@+id/textView12"
148        android:layout_width="wrap_content"

```

```

149     android:layout_height="wrap_content"
150     android:layout_marginStart="16dp"
151     android:layout_marginTop="44dp"
152     android:fontFamily="@font/cagliostro"
153     android:text="Gender"
154     android:textColor="?android:attr/textColorPrimary"
155     android:textSize="20sp"
156     android:textStyle="bold"
157     app:layout_constraintStart_toStartOf="parent"
158     app:layout_constraintTop_toBottomOf="@+id/textView11" />
159
160 <TextView
161     android:id="@+id/textView11"
162     android:layout_width="wrap_content"
163     android:layout_height="wrap_content"
164     android:layout_marginStart="16dp"
165     android:layout_marginTop="56dp"
166     android:fontFamily="@font/cagliostro"
167     android:text="Name"
168     android:textColor="?android:attr/textColorPrimary"
169     android:textSize="20sp"
170     android:textStyle="bold"
171     app:layout_constraintStart_toStartOf="parent"
172     app:layout_constraintTop_toBottomOf="@+id/textView10" />
173
174 <TextView
175     android:id="@+id/textView10"
176     android:layout_width="wrap_content"
177     android:layout_height="wrap_content"
178     android:layout_marginStart="16dp"
179     android:layout_marginTop="64dp"
180     android:fontFamily="@font/cagliostro"
181     android:text="Emp. Code"
182     android:textColor="?android:attr/textColorPrimary"
183     android:textSize="20sp"
184     android:textStyle="bold"
185     app:layout_constraintStart_toStartOf="parent"
186     app:layout_constraintTop_toBottomOf="@+id/textView9" />
187
188 <TextView
189     android:id="@+id/textView9"
190     android:layout_width="wrap_content"
191     android:layout_height="wrap_content"
192     android:layout_marginTop="64dp"
193     android:fontFamily="@font/cagliostro"
194     android:text="Update Record"
195     android:textColor="?android:attr/textColorPrimary"
196     android:textSize="34sp"
197     android:textStyle="bold"
198     app:layout_constraintEnd_toEndOf="parent"
199     app:layout_constraintStart_toStartOf="parent"

```



```
200         app:layout_constraintTop_toTopOf="parent" />
201
202 </androidx.constraintlayout.widget.ConstraintLayout>
```

## Code: Delete Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".DeleteActivity">
8
9   <Button
10     android:id="@+id/getButton"
11     android:layout_width="150dp"
12     android:layout_height="50dp"
13     android:layout_marginTop="40dp"
14     android:backgroundTint="@android:color/holo_red_light"
15     android:fontFamily="@font/cagliostro"
16     android:text="REMOVE"
17     android:textSize="20sp"
18     android:textStyle="bold"
19     app:layout_constraintEnd_toEndOf="parent"
20     app:layout_constraintStart_toStartOf="parent"
21     app:layout_constraintTop_toBottomOf="@+id/empCodeText4" />
22
23   <TextView
24     android:id="@+id/textView46"
25     android:layout_width="wrap_content"
26     android:layout_height="wrap_content"
27     android:layout_marginStart="16dp"
28     android:layout_marginTop="36dp"
29     android:fontFamily="@font/cagliostro"
30     android:text="Salary"
31     android:textColor="?android:attr/textColorPrimary"
32     android:textSize="20sp"
33     android:textStyle="bold"
34     app:layout_constraintStart_toStartOf="parent"
35     app:layout_constraintTop_toBottomOf="@+id/textView45" />
36
37   <TextView
38     android:id="@+id/textView45"
39     android:layout_width="wrap_content"
40     android:layout_height="wrap_content"
41     android:layout_marginStart="16dp"
42     android:layout_marginTop="40dp"
43     android:fontFamily="@font/cagliostro"
44     android:text="Department"
45     android:textColor="?android:attr/textColorPrimary"
46     android:textSize="20sp"
```

```

47     android:textStyle="bold"
48     app:layout_constraintStart_toStartOf="parent"
49     app:layout_constraintTop_toBottomOf="@+id/textView44" />
50
51 <TextView
52     android:id="@+id/textView44"
53     android:layout_width="wrap_content"
54     android:layout_height="wrap_content"
55     android:layout_marginStart="16dp"
56     android:layout_marginTop="44dp"
57     android:fontFamily="@font/cagliostro"
58     android:text="Gender"
59     android:textColor="?android:attr/textColorPrimary"
60     android:textSize="20sp"
61     android:textStyle="bold"
62     app:layout_constraintStart_toStartOf="parent"
63     app:layout_constraintTop_toBottomOf="@+id/textView43" />
64
65 <TextView
66     android:id="@+id/textView43"
67     android:layout_width="wrap_content"
68     android:layout_height="wrap_content"
69     android:layout_marginStart="16dp"
70     android:layout_marginTop="40dp"
71     android:fontFamily="@font/cagliostro"
72     android:text="Name"
73     android:textColor="?android:attr/textColorPrimary"
74     android:textSize="20sp"
75     android:textStyle="bold"
76     app:layout_constraintStart_toStartOf="parent"
77     app:layout_constraintTop_toBottomOf="@+id/textView27" />
78
79 <EditText
80     android:id="@+id/empCodeText4"
81     android:layout_width="230dp"
82     android:layout_height="wrap_content"
83     android:layout_marginStart="16dp"
84     android:layout_marginTop="48dp"
85     android:ems="10"
86     android:fontFamily="sans-serif"
87     android:hint="E1024"
88     android:inputType="textPersonName"
89     android:textColor="?android:attr/textColorPrimary"
90     android:textSize="20sp"
91     app:layout_constraintStart_toEndOf="@+id/textView45"
92     app:layout_constraintTop_toBottomOf="@+id/textView47" />
93
94 <TextView
95     android:id="@+id/textView42"
96     android:layout_width="wrap_content"
97     android:layout_height="wrap_content"

```

```

98     android:layout_marginStart="16dp"
99     android:layout_marginTop="64dp"
100    android:fontFamily="@font/cagliostro"
101    android:text="Emp. Code"
102    android:textColor="?android:attr/textColorPrimary"
103    android:textSize="20sp"
104    android:textStyle="bold"
105    app:layout_constraintStart_toStartOf="parent"
106    app:layout_constraintTop_toBottomOf="@+id/textView47" />
107
108    <TextView
109        android:id="@+id/textView47"
110        android:layout_width="wrap_content"
111        android:layout_height="wrap_content"
112        android:layout_marginTop="64dp"
113        android:fontFamily="@font/cagliostro"
114        android:text="Delete Record"
115        android:textColor="?android:attr/textColorPrimary"
116        android:textSize="34sp"
117        android:textStyle="bold"
118        app:layout_constraintEnd_toEndOf="parent"
119        app:layout_constraintStart_toStartOf="parent"
120        app:layout_constraintTop_toTopOf="parent" />
121
122    <TextView
123        android:id="@+id/empCodeTextView5"
124        android:layout_width="230dp"
125        android:layout_height="wrap_content"
126        android:layout_marginStart="16dp"
127        android:layout_marginTop="40dp"
128        android:textColor="?android:attr/textColorPrimary"
129        android:textSize="20sp"
130        app:layout_constraintStart_toEndOf="@+id/textView45"
131        app:layout_constraintTop_toBottomOf="@+id/textView27" />
132
133    <TextView
134        android:id="@+id/nameTextView5"
135        android:layout_width="230dp"
136        android:layout_height="wrap_content"
137        android:layout_marginStart="16dp"
138        android:layout_marginTop="46dp"
139        android:textColor="?android:attr/textColorPrimary"
140        android:textSize="20sp"
141        app:layout_constraintStart_toEndOf="@+id/textView45"
142        app:layout_constraintTop_toBottomOf="@+id/empCodeTextView5" />
143
144    <TextView
145        android:id="@+id/genderTextView5"
146        android:layout_width="230dp"
147        android:layout_height="wrap_content"
148        android:layout_marginStart="16dp"

```

```

149     android:layout_marginTop="40dp"
150     android:textColor="?android:attr/textColorPrimary"
151     android:textSize="20sp"
152     app:layout_constraintStart_toEndOf="@+id/textView45"
153     app:layout_constraintTop_toBottomOf="@+id/nameTextView5" />
154
155     <TextView
156         android:id="@+id/salaryTextView5"
157         android:layout_width="230dp"
158         android:layout_height="wrap_content"
159         android:layout_marginStart="16dp"
160         android:layout_marginTop="36dp"
161         android:textColor="?android:attr/textColorPrimary"
162         android:textSize="20sp"
163         app:layout_constraintStart_toEndOf="@+id/textView45"
164         app:layout_constraintTop_toBottomOf="@+id/genderTextView5" />
165
166     <TextView
167         android:id="@+id/textView27"
168         android:layout_width="wrap_content"
169         android:layout_height="wrap_content"
170         android:layout_marginTop="30dp"
171         android:fontFamily="@font/cagliostro"
172         android:text="Purged Record"
173         android:textColor="?android:attr/textColorPrimary"
174         android:textSize="24sp"
175         android:textStyle="bold"
176         app:layout_constraintEnd_toEndOf="parent"
177         app:layout_constraintStart_toStartOf="parent"
178         app:layout_constraintTop_toBottomOf="@+id/getButton" />
179 </androidx.constraintlayout.widget.ConstraintLayout>

```

## Code: Retrieve Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".RetrieveActivity">
8
9   <Button
10      android:id="@+id/getButton"
11      android:layout_width="150dp"
12      android:layout_height="50dp"
13      android:layout_marginTop="60dp"
14      android:backgroundTint="@android:color/holo_red_light"
15      android:fontFamily="@font/cagliostro"
16      android:text="FETCH"
17      android:textSize="20sp"
18      android:textStyle="bold"
19      app:layout_constraintEnd_toEndOf="parent"
20      app:layout_constraintStart_toStartOf="parent"
21      app:layout_constraintTop_toBottomOf="@+id/salaryTextView5" />
22
23   <TextView
24      android:id="@+id/textView46"
25      android:layout_width="wrap_content"
26      android:layout_height="wrap_content"
27      android:layout_marginStart="16dp"
28      android:layout_marginTop="44dp"
29      android:fontFamily="@font/cagliostro"
30      android:text="Salary"
31      android:textColor="?android:attr/textColorPrimary"
32      android:textSize="20sp"
33      android:textStyle="bold"
34      app:layout_constraintStart_toStartOf="parent"
35      app:layout_constraintTop_toBottomOf="@+id/textView45" />
36
37   <TextView
38      android:id="@+id/textView45"
39      android:layout_width="wrap_content"
40      android:layout_height="wrap_content"
41      android:layout_marginStart="16dp"
42      android:layout_marginTop="40dp"
43      android:fontFamily="@font/cagliostro"
44      android:text="Department"
45      android:textColor="?android:attr/textColorPrimary"
46      android:textSize="20sp"
```

```

47         android:textStyle="bold"
48         app:layout_constraintStart_toStartOf="parent"
49         app:layout_constraintTop_toBottomOf="@+id/textView44" />
50
51     <TextView
52         android:id="@+id/textView44"
53         android:layout_width="wrap_content"
54         android:layout_height="wrap_content"
55         android:layout_marginStart="16dp"
56         android:layout_marginTop="44dp"
57         android:fontFamily="@font/cagliostro"
58         android:text="Gender"
59         android:textColor="?android:attr/textColorPrimary"
60         android:textSize="20sp"
61         android:textStyle="bold"
62         app:layout_constraintStart_toStartOf="parent"
63         app:layout_constraintTop_toBottomOf="@+id/textView43" />
64
65     <TextView
66         android:id="@+id/textView43"
67         android:layout_width="wrap_content"
68         android:layout_height="wrap_content"
69         android:layout_marginStart="16dp"
70         android:layout_marginTop="56dp"
71         android:fontFamily="@font/cagliostro"
72         android:text="Name"
73         android:textColor="?android:attr/textColorPrimary"
74         android:textSize="20sp"
75         android:textStyle="bold"
76         app:layout_constraintStart_toStartOf="parent"
77         app:layout_constraintTop_toBottomOf="@+id/textView42" />
78
79     <EditText
80         android:id="@+id/empCodeText4"
81         android:layout_width="230dp"
82         android:layout_height="wrap_content"
83         android:layout_marginStart="16dp"
84         android:layout_marginTop="48dp"
85         android:ems="10"
86         android:fontFamily="sans-serif"
87         android:hint="E1024"
88         android:inputType="textPersonName"
89         android:textColor="?android:attr/textColorPrimary"
90         android:textSize="20sp"
91         app:layout_constraintStart_toEndOf="@+id/textView45"
92         app:layout_constraintTop_toBottomOf="@+id/textView47" />
93
94     <TextView
95         android:id="@+id/textView42"
96         android:layout_width="wrap_content"
97         android:layout_height="wrap_content"

```

```

98         android:layout_marginStart="16dp"
99         android:layout_marginTop="64dp"
100        android:fontFamily="@font/cagliostro"
101        android:text="Emp. Code"
102        android:textColor="?android:attr/textColorPrimary"
103        android:textSize="20sp"
104        android:textStyle="bold"
105        app:layout_constraintStart_toStartOf="parent"
106        app:layout_constraintTop_toBottomOf="@+id/textView47" />
107
108    <TextView
109        android:id="@+id/textView47"
110        android:layout_width="wrap_content"
111        android:layout_height="wrap_content"
112        android:layout_marginTop="64dp"
113        android:fontFamily="@font/cagliostro"
114        android:text="Retrieve Record"
115        android:textSize="34sp"
116        android:textStyle="bold"
117        app:layout_constraintEnd_toEndOf="parent"
118        app:layout_constraintStart_toStartOf="parent"
119        app:layout_constraintTop_toTopOf="parent"
120        android:textColor="?android:attr/textColorPrimary" />
121
122    <TextView
123        android:id="@+id/empCodeTextView5"
124        android:layout_width="230dp"
125        android:layout_height="wrap_content"
126        android:layout_marginStart="16dp"
127        android:layout_marginTop="50dp"
128        android:textColor="?android:attr/textColorPrimary"
129        android:textSize="20sp"
130        app:layout_constraintStart_toEndOf="@+id/textView45"
131        app:layout_constraintTop_toBottomOf="@+id/empCodeText4" />
132
133    <TextView
134        android:id="@+id/nameTextView5"
135        android:layout_width="230dp"
136        android:layout_height="wrap_content"
137        android:layout_marginStart="16dp"
138        android:layout_marginTop="46dp"
139        android:textColor="?android:attr/textColorPrimary"
140        android:textSize="20sp"
141        app:layout_constraintStart_toEndOf="@+id/textView45"
142        app:layout_constraintTop_toBottomOf="@+id/empCodeTextView5" />
143
144    <TextView
145        android:id="@+id/genderTextView5"
146        android:layout_width="230dp"
147        android:layout_height="wrap_content"
148        android:layout_marginStart="16dp"

```



```

149     android:layout_marginTop="40dp"
150     android:textColor="?android:attr/textColorPrimary"
151     android:textSize="20sp"
152     app:layout_constraintStart_toEndOf="@+id/textView45"
153     app:layout_constraintTop_toBottomOf="@+id/nameTextView5" />
154
155     <TextView
156         android:id="@+id/salaryTextView5"
157         android:layout_width="230dp"
158         android:layout_height="wrap_content"
159         android:layout_marginStart="16dp"
160         android:layout_marginTop="44dp"
161         android:textColor="?android:attr/textColorPrimary"
162         android:textSize="20sp"
163         app:layout_constraintStart_toEndOf="@+id/textView45"
164         app:layout_constraintTop_toBottomOf="@+id/genderTextView5" />
165 </androidx.constraintlayout.widget.ConstraintLayout>

```

## Code: Retrieve Many Activity Layout

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".RetrieveManyActivity">
8
9   <Spinner
10      android:id="@+id/deptSpinner5"
11      android:layout_width="230dp"
12      android:layout_height="wrap_content"
13      android:layout_marginStart="16dp"
14      android:layout_marginTop="64dp"
15      android:entries="@array/departments"
16      android:textSize="20sp"
17      app:layout_constraintStart_toEndOf="@+id/textView42"
18      app:layout_constraintTop_toBottomOf="@+id/textView47" />
19
20   <Button
21      android:id="@+id/getButton"
22      android:layout_width="150dp"
23      android:layout_height="50dp"
24      android:layout_marginTop="40dp"
25      android:backgroundTint="@android:color/holo_red_light"
26      android:fontFamily="@font/cagliostro"
27      android:text="GET"
28      android:textSize="20sp"
29      android:textStyle="bold"
30      app:layout_constraintEnd_toEndOf="parent"
31      app:layout_constraintStart_toStartOf="parent"
32      app:layout_constraintTop_toBottomOf="@+id/salaryTextView5" />
33
34   <TextView
35      android:id="@+id/textView46"
36      android:layout_width="wrap_content"
37      android:layout_height="wrap_content"
38      android:layout_marginStart="16dp"
39      android:layout_marginTop="44dp"
40      android:fontFamily="@font/cagliostro"
41      android:text="Salary"
42      android:textColor="?android:attr/textColorPrimary"
43      android:textSize="20sp"
44      android:textStyle="bold"
45      app:layout_constraintStart_toStartOf="parent"
46      app:layout_constraintTop_toBottomOf="@+id/textView45" />
```

```

47
48 <TextView
49     android:id="@+id/textView45"
50     android:layout_width="wrap_content"
51     android:layout_height="wrap_content"
52     android:layout_marginStart="16dp"
53     android:layout_marginTop="40dp"
54     android:fontFamily="@font/cagliostro"
55     android:text="Gender"
56     android:textColor="?android:attr/textColorPrimary"
57     android:textSize="20sp"
58     android:textStyle="bold"
59     app:layout_constraintStart_toStartOf="parent"
60     app:layout_constraintTop_toBottomOf="@+id/textView44" />
61
62 <TextView
63     android:id="@+id/textView44"
64     android:layout_width="wrap_content"
65     android:layout_height="wrap_content"
66     android:layout_marginStart="16dp"
67     android:layout_marginTop="44dp"
68     android:fontFamily="@font/cagliostro"
69     android:text="Name"
70     android:textColor="?android:attr/textColorPrimary"
71     android:textSize="20sp"
72     android:textStyle="bold"
73     app:layout_constraintStart_toStartOf="parent"
74     app:layout_constraintTop_toBottomOf="@+id/textView43" />
75
76 <TextView
77     android:id="@+id/textView43"
78     android:layout_width="wrap_content"
79     android:layout_height="wrap_content"
80     android:layout_marginStart="16dp"
81     android:layout_marginTop="56dp"
82     android:fontFamily="@font/cagliostro"
83     android:text="Emp. Code"
84     android:textColor="?android:attr/textColorPrimary"
85     android:textSize="20sp"
86     android:textStyle="bold"
87     app:layout_constraintStart_toStartOf="parent"
88     app:layout_constraintTop_toBottomOf="@+id/textView42" />
89
90 <TextView
91     android:id="@+id/textView42"
92     android:layout_width="wrap_content"
93     android:layout_height="wrap_content"
94     android:layout_marginStart="16dp"
95     android:layout_marginTop="64dp"
96     android:fontFamily="@font/cagliostro"
97     android:text="Department"

```

```

98         android:textColor="?android:attr/textColorPrimary"
99         android:textSize="20sp"
100        android:textStyle="bold"
101        app:layout_constraintStart_toStartOf="parent"
102        app:layout_constraintTop_toBottomOf="@+id/textView47" />
103
104    <TextView
105        android:id="@+id/textView47"
106        android:layout_width="250dp"
107        android:layout_height="wrap_content"
108        android:layout_marginTop="64dp"
109        android:fontFamily="@font/cagliostro"
110        android:text="Retrieve Records By Department"
111        android:textAlignment="center"
112        android:textColor="?android:attr/textColorPrimary"
113        android:textSize="34sp"
114        android:textStyle="bold"
115        app:layout_constraintEnd_toEndOf="parent"
116        app:layout_constraintStart_toStartOf="parent"
117        app:layout_constraintTop_toTopOf="parent" />
118
119    <TextView
120        android:id="@+id/empCodeTextView5"
121        android:layout_width="230dp"
122        android:layout_height="wrap_content"
123        android:layout_marginStart="16dp"
124        android:layout_marginTop="58dp"
125        android:textColor="?android:attr/textColorPrimary"
126        android:textSize="20sp"
127        app:layout_constraintStart_toEndOf="@+id/textView42"
128        app:layout_constraintTop_toBottomOf="@+id/deptSpinner5" />
129
130    <TextView
131        android:id="@+id/nameTextView5"
132        android:layout_width="230dp"
133        android:layout_height="wrap_content"
134        android:layout_marginStart="16dp"
135        android:layout_marginTop="46dp"
136        android:textColor="?android:attr/textColorPrimary"
137        android:textSize="20sp"
138        app:layout_constraintStart_toEndOf="@+id/textView42"
139        app:layout_constraintTop_toBottomOf="@+id/empCodeTextView5" />
140
141    <TextView
142        android:id="@+id/genderTextView5"
143        android:layout_width="230dp"
144        android:layout_height="wrap_content"
145        android:layout_marginStart="16dp"
146        android:layout_marginTop="40dp"
147        android:textColor="?android:attr/textColorPrimary"
148        android:textSize="20sp"

```

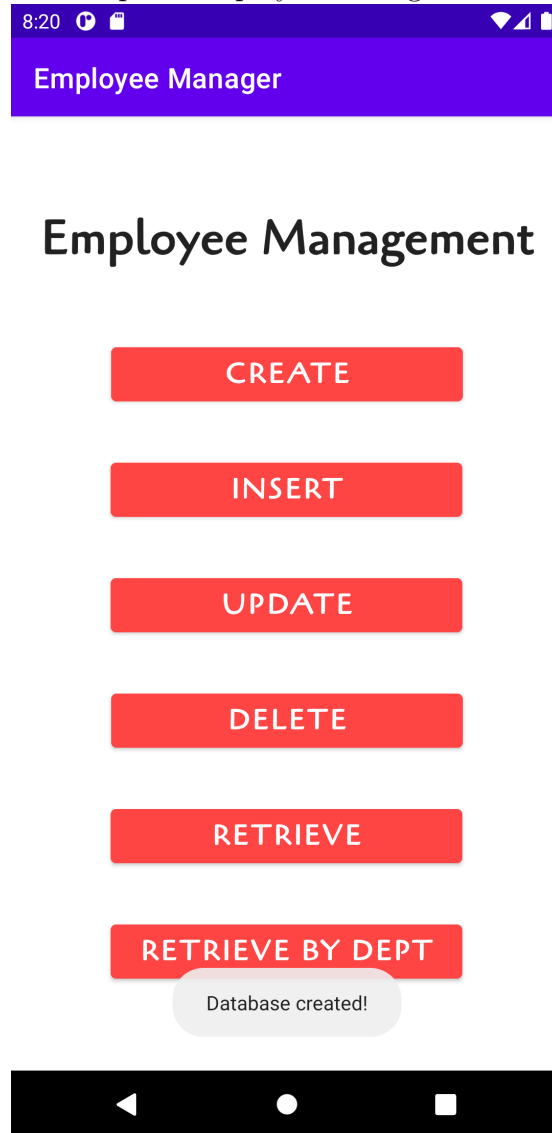
```

149         app:layout_constraintStart_toEndOf="@+id/textView42"
150         app:layout_constraintTop_toBottomOf="@+id/nameTextView5" />
151
152     <TextView
153         android:id="@+id/salaryTextView5"
154         android:layout_width="230dp"
155         android:layout_height="wrap_content"
156         android:layout_marginStart="16dp"
157         android:layout_marginTop="44dp"
158         android:textColor="?android:attr/textColorPrimary"
159         android:textSize="20sp"
160         app:layout_constraintStart_toEndOf="@+id/textView42"
161         app:layout_constraintTop_toBottomOf="@+id/genderTextView5" />
162
163     <ImageButton
164         android:id="@+id/prevButton"
165         android:layout_width="50dp"
166         android:layout_height="50dp"
167         android:layout_marginTop="40dp"
168         android:backgroundTint="@android:color/holo_red_light"
169         app:layout_constraintEnd_toStartOf="@+id/getButton"
170         app:layout_constraintStart_toStartOf="parent"
171         app:layout_constraintTop_toBottomOf="@+id/salaryTextView5"
172         app:srcCompat="@drawable/ic_navigate_before_white_48dp" />
173
174     <ImageButton
175         android:id="@+id/nextButton"
176         android:layout_width="50dp"
177         android:layout_height="50dp"
178         android:layout_marginTop="40dp"
179         android:backgroundTint="@android:color/holo_red_light"
180         app:layout_constraintEnd_toEndOf="parent"
181         app:layout_constraintStart_toEndOf="@+id/getButton"
182         app:layout_constraintTop_toBottomOf="@+id/salaryTextView5"
183         app:srcCompat="@drawable/ic_navigate_next_white_48dp" />
184
185 </androidx.constraintlayout.widget.ConstraintLayout>

```

## Output: Employee Manager Home Screen:

Figure 1: Output: Employee Manager Home Screen.



## Output: Employee Manager - Insert Record:

Figure 2: Output: Employee Manager - Insert Record.

The screenshot shows a mobile application interface with a purple header bar containing the text "Employee Manager". Below the header, the title "Insert Record" is centered. The form consists of several fields: "Emp. Code" with the value "E2048", "Name" with the value "Saul Goodman", "Gender" with radio buttons for "Male" (selected), "Female", and "Other", "Department" with a dropdown menu showing "Legal & Auditing", and "Salary" with the value "170000". A red "ADD" button is positioned below the form fields. A light gray notification bubble at the bottom of the form area contains the text "E2048's record was added!". The bottom of the screen features a black navigation bar with three white icons: a back arrow, a circle, and a square.

8:24

Employee Manager

### Insert Record

Emp. Code

Name

Gender ☒ Male ☐ Female ☐ Other

Department

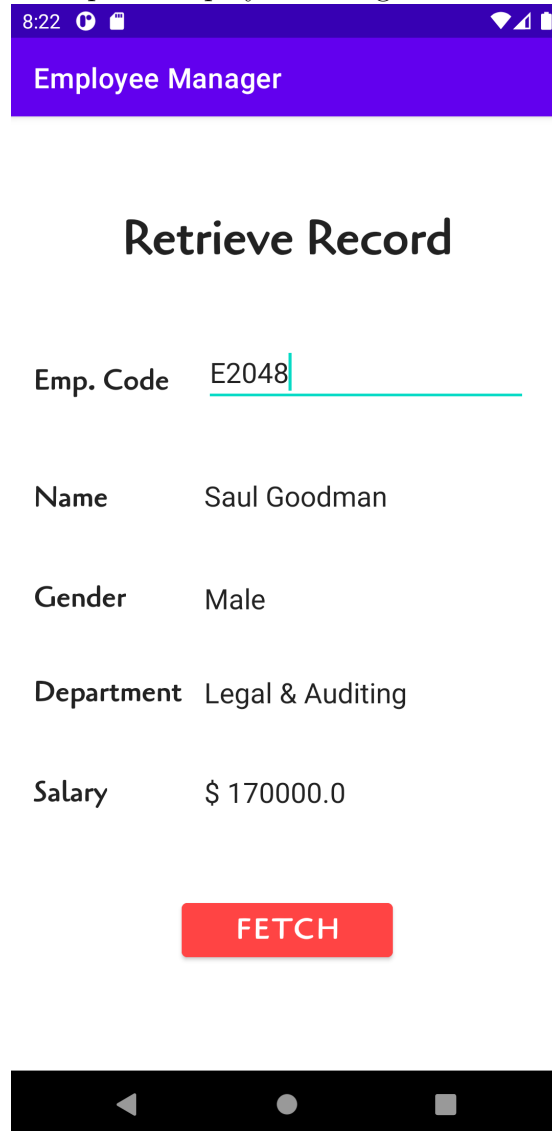
Salary

**ADD**

E2048's record was added!

## Output: Employee Manager - Retrieve Record:

Figure 3: Output: Employee Manager - Retrieve Record.



The screenshot shows an Android application interface. At the top, there is a status bar with the time 8:22 and icons for signal, Wi-Fi, and battery. Below the status bar is a purple header bar with the text "Employee Manager". The main content area has a title "Retrieve Record" in bold. Below the title, there are five rows of data, each with a label and a value: "Emp. Code" with "E2048", "Name" with "Saul Goodman", "Gender" with "Male", "Department" with "Legal & Auditing", and "Salary" with "\$ 170000.0". At the bottom of the data rows is a red button with the text "FETCH". The bottom of the screen shows the Android navigation bar with back, home, and recent apps icons.

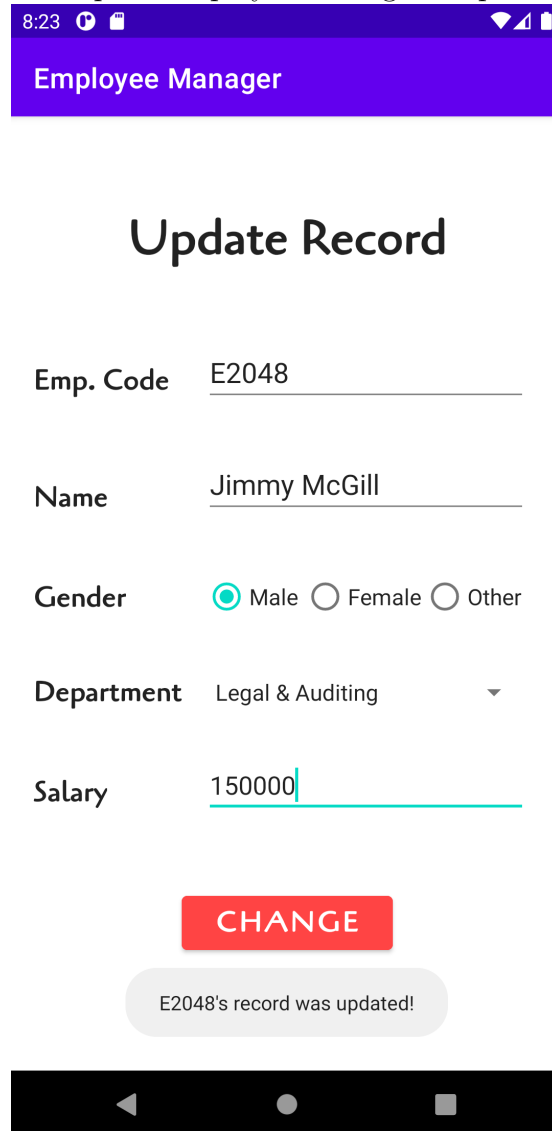
Emp. Code	E2048
Name	Saul Goodman
Gender	Male
Department	Legal & Auditing
Salary	\$ 170000.0

**FETCH**



## Output: Employee Manager - Update Record:

Figure 4: Output: Employee Manager - Update Record.



The screenshot shows a mobile application interface with a purple header bar containing the text "Employee Manager". Below the header, the title "Update Record" is centered. The form contains five input fields: "Emp. Code" with the value "E2048", "Name" with the value "Jimmy McGill", "Gender" with radio buttons for "Male" (selected), "Female", and "Other", "Department" with a dropdown menu showing "Legal & Auditing", and "Salary" with the value "150000". A red "CHANGE" button is positioned below the salary field. A light gray toast message at the bottom states "E2048's record was updated!". The bottom of the screen features a black navigation bar with three icons: a back arrow, a home circle, and a recent apps square.

8:23

Employee Manager

### Update Record

Emp. Code

Name

Gender ☒ Male ☐ Female ☐ Other

Department

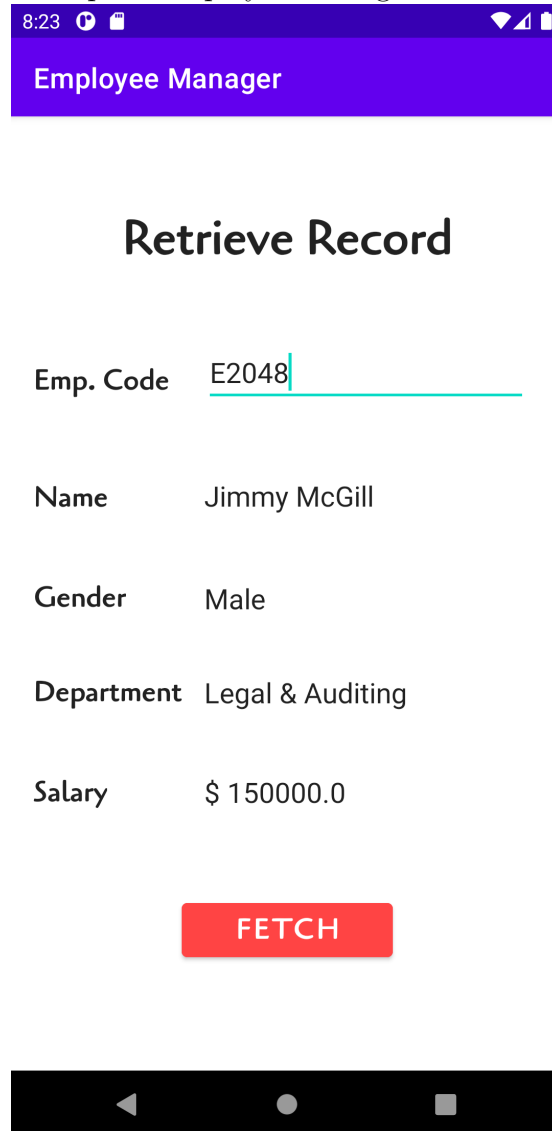
Salary

**CHANGE**

E2048's record was updated!

## Output: Employee Manager - Retrieve Record:

Figure 5: Output: Employee Manager - Retrieve Record.



The screenshot shows an Android application interface. At the top, there is a status bar with the time 8:23 and icons for signal, Wi-Fi, and battery. Below the status bar is a purple header bar with the text "Employee Manager". The main content area has a white background with the title "Retrieve Record" in bold black text. Below the title, there are five rows of data, each with a label and a value: "Emp. Code" with "E2048", "Name" with "Jimmy McGill", "Gender" with "Male", "Department" with "Legal & Auditing", and "Salary" with "\$ 150000.0". At the bottom of the data rows is a red button with the text "FETCH". At the very bottom of the screen is a black navigation bar with three icons: a back arrow, a home circle, and a recent apps square.

Emp. Code	E2048
Name	Jimmy McGill
Gender	Male
Department	Legal & Auditing
Salary	\$ 150000.0

**FETCH**

## Output: Employee Manager - Delete Record:

Figure 6: Output: Employee Manager - Delete Record.

8:23

Employee Manager

### Delete Record

Emp. Code

REMOVE

### Purged Record

Name Jimmy McGill

Gender Male

Department Legal & Auditing

Salary E2048's record has been deleted successfully.

## Output: Employee Manager - Retrieve Records By Department (1):

Figure 7: Output: Employee Manager - Retrieve Records By Department (1).



The screenshot shows a mobile application interface with a purple header bar containing the text 'Employee Manager'. Below the header, the title 'Retrieve Records By Department' is displayed in a large, bold, black font. The form consists of several input fields with labels on the left and values on the right: 'Department' with the value 'Management', 'Emp. Code' with 'E1024', 'Name' with 'John Doe', 'Gender' with 'Male', and 'Salary' with '\$ 120000'. At the bottom of the form, there are three buttons: a grey button with a left arrow, a red button with the text 'GET', and a red button with a right arrow. The entire interface is set against a light grey background.

8:25	🔍	📄	📶	🔋
Employee Manager				
Retrieve Records By Department				
Department	Management ▼			
Emp. Code	E1024			
Name	John Doe			
Gender	Male			
Salary	\$ 120000			
<	GET	>		
◀ ● ▶				

## Output: Employee Manager - Retrieve Records By Department (2):

Figure 8: Output: Employee Manager - Retrieve Records By Department (2).



The screenshot shows an Android application titled "Employee Manager". The main screen displays the title "Retrieve Records By Department" in a large, bold font. Below the title, there are five rows of data, each with a label and a value: "Department" with "Management", "Emp. Code" with "E1026", "Name" with "Michael G. Scott", "Gender" with "Male", and "Salary" with "\$ 125000". At the bottom of the screen, there are three red buttons: a left arrow, a "GET" button, and a right arrow. The top of the screen shows a status bar with the time "8:25" and various icons.

Department	Management
Emp. Code	E1026
Name	Michael G. Scott
Gender	Male
Salary	\$ 125000

< GET >

## Learning Outcome:

- I understood Android makes use of **SQLite** for its database purposes, and why SQLite is preferred over a full-fledged DBMS service.
- I learnt to implement a **Helper Class** extending from the **SQLiteOpenHelper Class** to construct methods for my own database handling.
- I learnt about **SQLite Primitives** like **TEXT, NUMERIC, REAL, INTEGER, BLOB & NULL**.
- I implemented the mandatory **onCreate()** and **onUpdate()** methods in my helper class.
- I was able to execute SQL Queries for **Creating the Table, Inserting a Record, Updating a Record, Deleting a Record, Retrieving Records by Emp. Code & Retrieving by Department** in the helper class and provided a facade to access the query results for the main program.
- I learnt how to traverse **Cursor** objects that are returned by SQLite methods on execution of a **SELECT** query.
- I learnt how to alert users with the help of small **Toast** messages in Android.
- I was able to implement the **CRUD** operations along with the **Retrieve By Department** operation as dictated by the objective of the program.
- I learnt to use **TextUtils** for validating user-input and **Regex** to check for numbers in a given string.
- I was able to design a **navigator** using **< & > buttons** to traverse through multiple records returned from the **Retrieve by Department** query.
- I learnt how to change **BackgroundTint** for buttons programatically, to highlight enabled/disabled behaviour.
- I learnt basics of **SQLite Programming in Android**.

# Department of CSE

## SSN College of Engineering

Vishakan Subramanian - 18 5001 196 - Semester VII

13 September 2021

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### UCS 1711 - Mobile Application Development Lab

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#### Exercise 5: Progress Bar and Alarm Clock using Multithreading

##### **Aim:**

To develop Android applications for:

- Progress Bar Simulation
- Simulation for Suspending the UI
- Alarm Clock

Use **multithreading** concepts to implement the progress bar.

## Code - Progress Bar: Main Activity:

```
1 package com.example.progressbar;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.app.ProgressDialog;
6 import android.os.Bundle;
7 import android.os.Handler;
8 import android.view.View;
9 import android.widget.Button;
10 import android.widget.EditText;
11 import android.widget.ProgressBar;
12
13 public class MainActivity extends AppCompatActivity {
14
15     @Override
16     protected void onCreate(Bundle savedInstanceState) {
17         super.onCreate(savedInstanceState);
18         setContentView(R.layout.activity_main);
19
20         final EditText durationText = findViewById(R.id.durationText);
21         final Button startButton = findViewById(R.id.startButton);
22         final Button sleepButton = findViewById(R.id.sleepButton);
23         final ProgressBar progressBar = findViewById(R.id.progressBar);
24         final Handler handler = new Handler();
25
26         sleepButton.setOnClickListener(new View.OnClickListener() {
27             @Override
28             public void onClick(View v) {
29                 final ProgressDialog progressDialog = new ProgressDialog(
30                     MainActivity.this);
31                 progressDialog.setTitle("\uD83D\uDD15 Sleep in Progress...
32 ");
33                 progressDialog.setMessage("Sleeping \uD83D\uDCA4");
34                 progressDialog.show();
35
36                 int duration = Integer.parseInt(durationText.getText().
37 toString());
38
39                 //Dismiss the progressDialog after waiting for the sleep
40                 duration
41                 new Handler().postDelayed(new Runnable() {
42                     @Override
43                     public void run() {
44                         progressDialog.dismiss();
45                     }
46                 }, duration * 1000);
47             }
48         });
49     }
50 }
```



```

44     });
45
46     startButton.setOnClickListener(new View.OnClickListener() {
47         @Override
48         public void onClick(View v) {
49             startButton.setEnabled(false);
50             startButton.setText("IN PROGRESS...");
51
52             //Runs in a separate thread
53             new Thread(new Runnable() {
54                 @Override
55                 public void run() {
56                     for(int i = 0; i <= 100; i+=5){
57                         if(i == 100){
58                             //Re-enable the button once the loop is
over
59
60                             handler.post(new Runnable() {
61                                 @Override
62                                 public void run() {
63                                     startButton.setEnabled(true);
64                                     startButton.setText("START");
65                                 }
66                             });
67
68                             progressBar.setProgress(i);
69
70                             //Wait for 100ms before the next iteration
71                             try{
72                                 Thread.sleep(100);
73                             } catch (Exception e){
74                                 e.printStackTrace();
75                             }
76                         }
77                     }
78                 }).start();
79             }
80         });
81     }
82 }

```

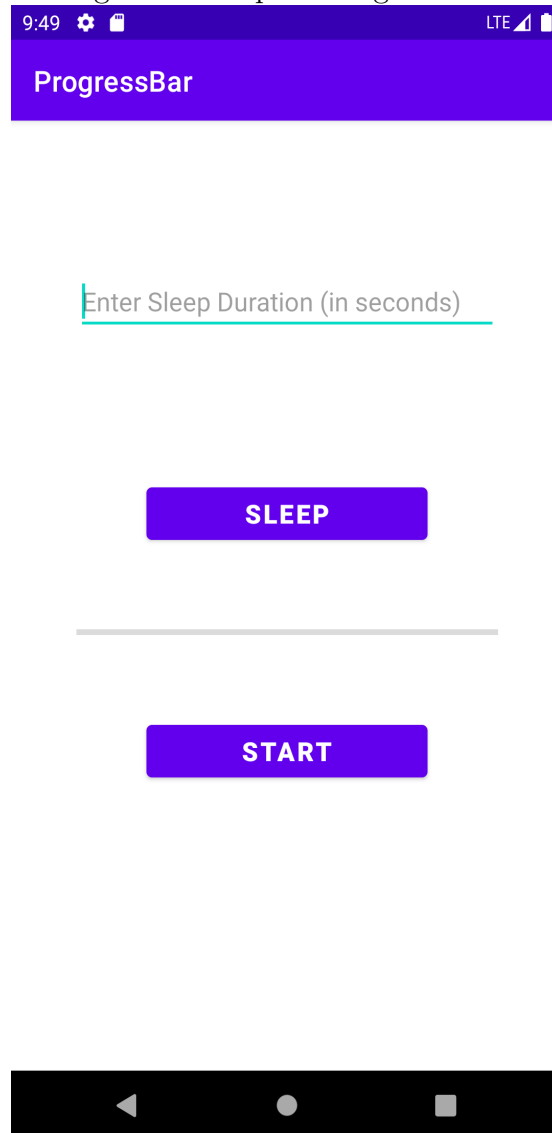
## Code - Progress Bar: Main Activity Layout:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".MainActivity">
8
9   <EditText
10      android:id="@+id/durationText"
11      android:layout_width="300dp"
12      android:layout_height="wrap_content"
13      android:layout_marginTop="100dp"
14      android:ems="10"
15      android:gravity="bottom"
16      android:hint="Enter Sleep Duration (in seconds)"
17      android:inputType="number"
18      android:minHeight="48dp"
19      app:layout_constraintEnd_toEndOf="parent"
20      app:layout_constraintStart_toStartOf="parent"
21      app:layout_constraintTop_toTopOf="parent" />
22
23   <Button
24      android:id="@+id/sleepButton"
25      android:layout_width="200dp"
26      android:layout_height="wrap_content"
27      android:layout_marginTop="100dp"
28      android:text="SLEEP"
29      android:textSize="18sp"
30      android:textStyle="bold"
31      app:layout_constraintEnd_toEndOf="parent"
32      app:layout_constraintStart_toStartOf="parent"
33      app:layout_constraintTop_toBottomOf="@+id/durationText" />
34
35   <ProgressBar
36      android:id="@+id/progressBar"
37      style="?android:attr/progressBarStyleHorizontal"
38      android:layout_width="300dp"
39      android:layout_height="wrap_content"
40      android:layout_marginTop="50dp"
41      app:layout_constraintEnd_toEndOf="parent"
42      app:layout_constraintStart_toStartOf="parent"
43      app:layout_constraintTop_toBottomOf="@+id/sleepButton" />
44
45   <Button
46      android:id="@+id/startButton"
```

```
47     android:layout_width="200dp"
48     android:layout_height="wrap_content"
49     android:layout_marginTop="50dp"
50     android:text="START"
51     android:textSize="18sp"
52     android:textStyle="bold"
53     app:layout_constraintEnd_toEndOf="parent"
54     app:layout_constraintStart_toStartOf="parent"
55     app:layout_constraintTop_toBottomOf="@+id/progressBar" />
56 </androidx.constraintlayout.widget.ConstraintLayout>
```

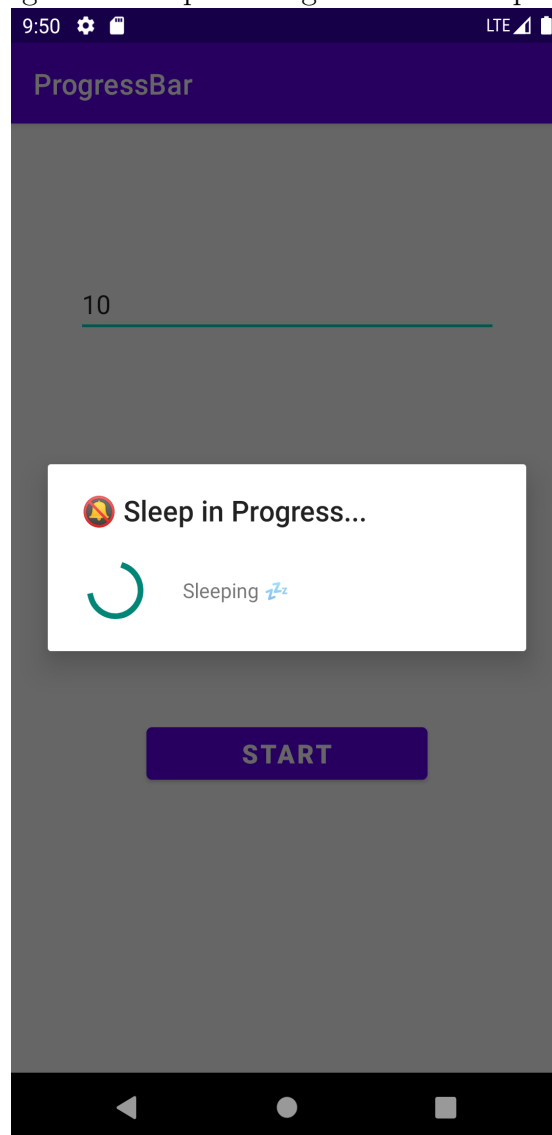
## Output: Progress Bar:

Figure 1: Output: Progress Bar.



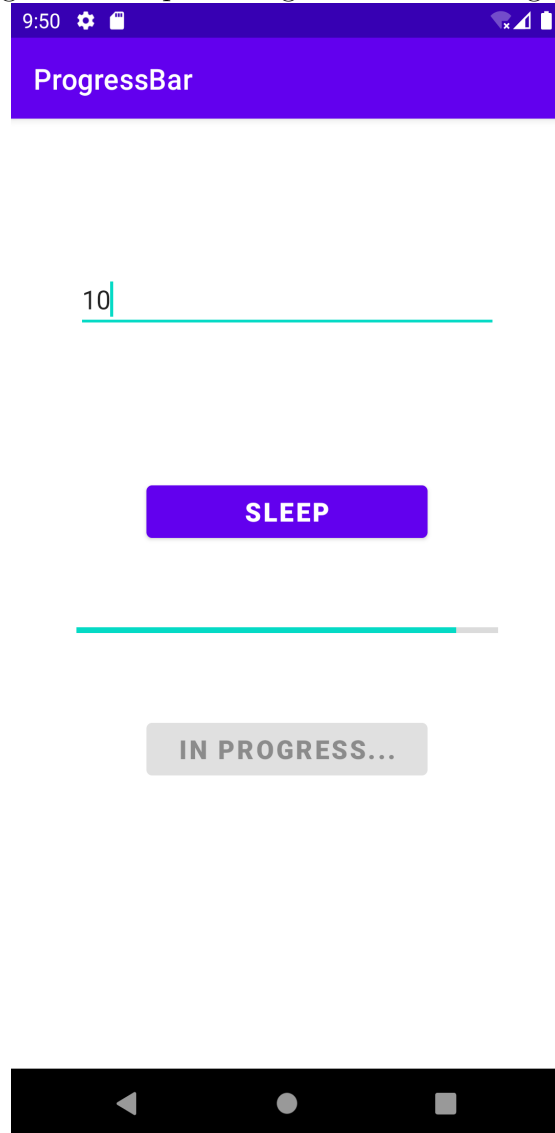
## Output: Progress Bar - Sleeping:

Figure 2: Output: Progress Bar - Sleeping.



## Output: Progress Bar - In Progress:

Figure 3: Output: Progress Bar - In Progress.



## Code - Alarm Clock: Main Activity:

```
1 package com.example.alarmclock;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.app.AlarmManager;
6 import android.app.PendingIntent;
7 import android.content.Context;
8 import android.content.Intent;
9 import android.os.Bundle;
10 import android.util.Log;
11 import android.view.View;
12 import android.widget.TextView;
13 import android.widget.TimePicker;
14 import android.widget.Toast;
15 import android.widget.ToggleButton;
16
17 import java.text.DateFormat;
18 import java.util.Calendar;
19
20
21 public class MainActivity extends AppCompatActivity {
22
23     @Override
24     protected void onCreate(Bundle savedInstanceState) {
25         super.onCreate(savedInstanceState);
26         setContentView(R.layout.activity_main);
27
28         final TextView alarmText = findViewById(R.id.alarmText);
29         final TimePicker timePicker = findViewById(R.id.timePicker);
30         final AlarmManager alarmManager = (AlarmManager) getSystemService(
Context.ALARM_SERVICE);
31         final ToggleButton alarmToggle = findViewById(R.id.alarmToggle);
32         final Intent intent = new Intent(getApplicationContext(),
AlarmReceiver.class);
33         final PendingIntent pendingIntent = PendingIntent.getBroadcast(
MainActivity.this, 1, intent, PendingIntent.FLAG_UPDATE_CURRENT);
34
35         alarmToggle.setOnClickListener(new View.OnClickListener() {
36             @Override
37             public void onClick(View v) {
38                 if(((ToggleButton) v).isChecked()){
39                     //Turn the alarm on
40
41                     Calendar calendar = Calendar.getInstance();
42
43                     calendar.set(Calendar.HOUR_OF_DAY, timePicker.getHour
());
44                 }
45             }
46         });
47     }
48 }
```

```

44         calendar.set(Calendar.MINUTE, timePicker.getMinute());
45         calendar.set(Calendar.SECOND, 0);
46
47         //If time in the past was chosen, move alarm to the
next day
48         if(calendar.before(Calendar.getInstance())) {
49             calendar.add(Calendar.DATE, 1);
50         }
51
52         Log.i("Time ", calendar.getTime().toString());
53         alarmText.setText("Alarm Set For: " + DateFormat.
getTimeInstance(DateFormat.SHORT).format(calendar.getTime()) + " \uD83D
\uDD14");
54
55
56         alarmManager.setRepeating(AlarmManager.RTC_WAKEUP,
calendar.getTimeInMillis(), 10000, pendingIntent);
57         Toast.makeText(MainActivity.this, "ALARM SET!", Toast.
LENGTH_SHORT).show();
58
59         } else{
60             //Turn the alarm off
61
62             alarmManager.cancel(pendingIntent);          //Cancel the
pending alarm intent
63
64             if(AlarmReceiver.ringtone != null && AlarmReceiver.
ringtone.isPlaying()){
65                 //If the ringtone is playing i.e. the alarm is
ringing and the ringtone object has been set
66                 AlarmReceiver.ringtone.stop(); //Stop the
ringtone started from the alarm receiver
67             }
68
69             Toast.makeText(MainActivity.this, "ALARM OFF!", Toast.
LENGTH_SHORT).show();
70             alarmText.setText("Alarm Not Set \uD83D\uDEAB");
71         }
72     }
73     });
74 }
75 }

```



## Code - Alarm Clock: Alarm Receiver Class:

```
1 package com.example.alarmclock;
2
3
4 import android.content.BroadcastReceiver;
5 import android.content.Context;
6 import android.content.Intent;
7 import android.media.Ringtone;
8 import android.media.RingtoneManager;
9 import android.widget.Toast;
10
11
12
13 public class AlarmReceiver extends BroadcastReceiver {
14     public static Ringtone ringtone = null;    //Important - Required to
        stop the ringtone from the main activity
15
16     @Override
17     public void onReceive(Context context, Intent intent) {
18         Toast.makeText(context, "Alarm Time!", Toast.LENGTH_LONG).show();
19
20         ringtone = RingtoneManager.getRingtone(context, RingtoneManager.
            getDefaultUri(RingtoneManager.TYPE_ALARM));
21         ringtone.play();
22     }
23 }
```

## Code - Alarm Clock: Main Activity Layout:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".MainActivity">
8
9   <TextView
10     android:id="@+id/textView"
11     android:layout_width="wrap_content"
12     android:layout_height="wrap_content"
13     android:layout_marginTop="20dp"
14     android:text="ALARM CLOCK"
15     android:textColor="?android:attr/textColorPrimary"
16     android:textSize="24sp"
17     android:textStyle="bold"
18     app:layout_constraintEnd_toEndOf="parent"
19     app:layout_constraintStart_toStartOf="parent"
20     app:layout_constraintTop_toTopOf="parent" />
21
22   <TimePicker
23     android:id="@+id/timePicker"
24     android:layout_width="wrap_content"
25     android:layout_height="wrap_content"
26     android:layout_marginTop="50dp"
27     android:headerBackground="@android:color/holo_purple"
28     android:numbersSelectorColor="@android:color/holo_purple"
29     app:layout_constraintEnd_toEndOf="parent"
30     app:layout_constraintHorizontal_bias="0.0"
31     app:layout_constraintStart_toStartOf="parent"
32     app:layout_constraintTop_toBottomOf="@+id/textView" />
33
34   <ToggleButton
35     android:id="@+id/alarmToggle"
36     android:layout_width="150dp"
37     android:layout_height="wrap_content"
38     android:backgroundTint="@android:color/holo_purple"
39     android:checked="false"
40     android:text="Off"
41     android:textColor="?android:attr/textColorPrimary"
42     android:textOff="On"
43     android:textOn="Off"
44     android:textSize="18sp"
45     android:textStyle="bold"
46     app:layout_constraintBottom_toBottomOf="parent"
```

```

47         app:layout_constraintEnd_toEndOf="parent "
48         app:layout_constraintStart_toStartOf="parent "
49         app:layout_constraintTop_toBottomOf="@+id/timePicker" />
50
51     <TextView
52         android:id="@+id/alarmText "
53         android:layout_width="wrap_content "
54         android:layout_height="wrap_content "
55         android:text="Alarm Not Set"
56         android:textColor="?android:attr/textColorPrimary"
57         android:textSize="18sp"
58         android:textStyle="bold"
59         app:layout_constraintBottom_toTopOf="@+id/alarmToggle "
60         app:layout_constraintEnd_toEndOf="parent "
61         app:layout_constraintStart_toStartOf="parent "
62         app:layout_constraintTop_toBottomOf="@+id/timePicker" />
63
64 </androidx.constraintlayout.widget.ConstraintLayout>

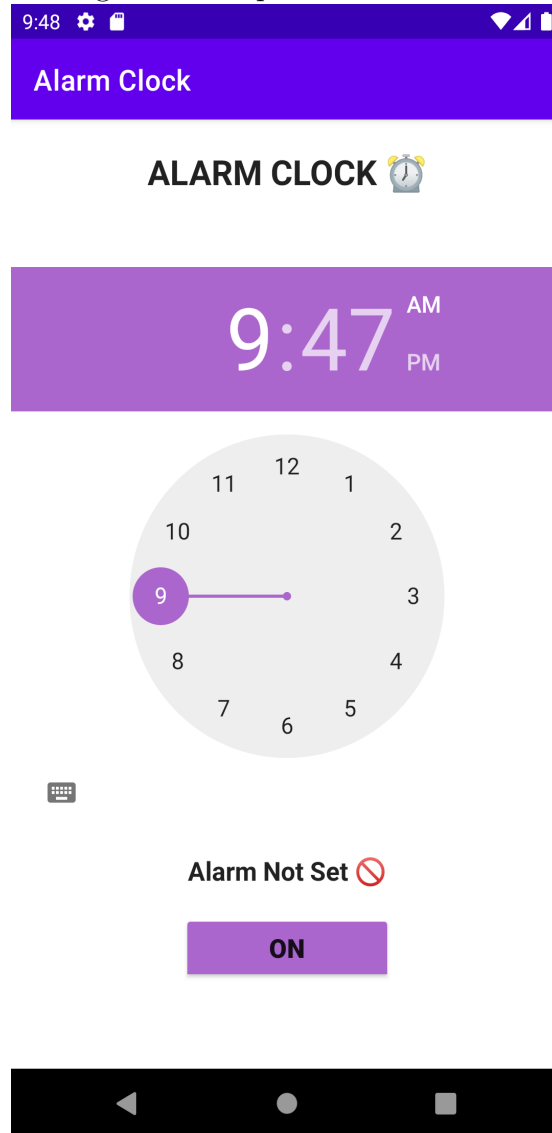
```

## Code - Alarm Clock: Android Manifest XML:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3     package="com.example.alarmclock">
4
5     <application
6         android:allowBackup="true"
7         android:icon="@mipmap/ic_launcher"
8         android:label="@string/app_name"
9         android:roundIcon="@mipmap/ic_launcher_round"
10        android:supportsRtl="true"
11        android:theme="@style/Theme.AlarmClock">
12        <activity
13            android:name=".MainActivity"
14            android:exported="true">
15            <intent-filter>
16                <action android:name="android.intent.action.MAIN" />
17
18                <category android:name="android.intent.category.LAUNCHER"
19            />
20            </intent-filter>
21        </activity>
22
23        <receiver android:name=".AlarmReceiver"/> <!-- added here for
24        alarm -->
25    </application>
26</manifest>
```

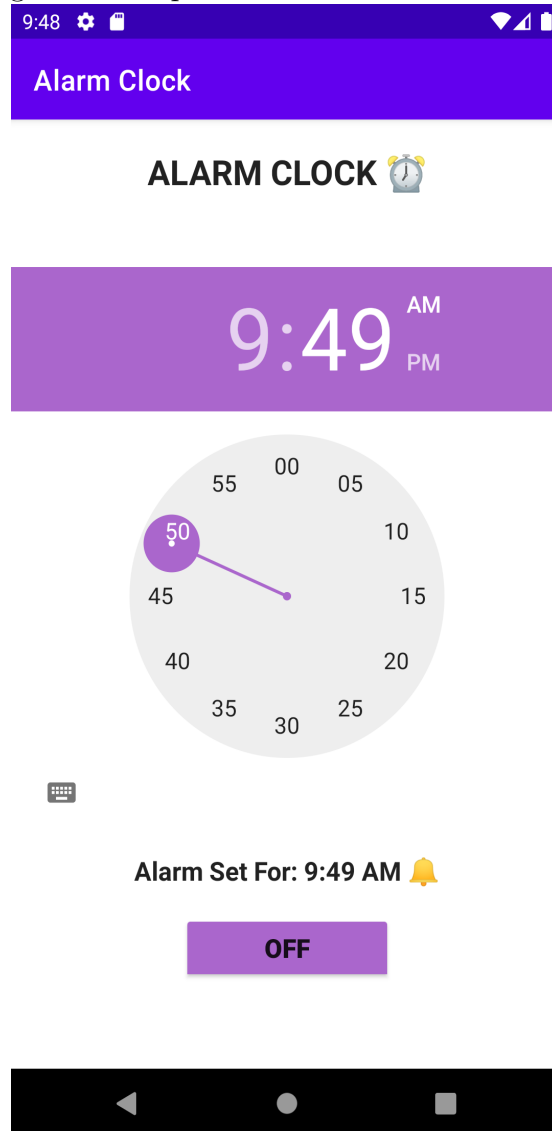
## Output: Alarm Clock:

Figure 4: Output: Alarm Clock.



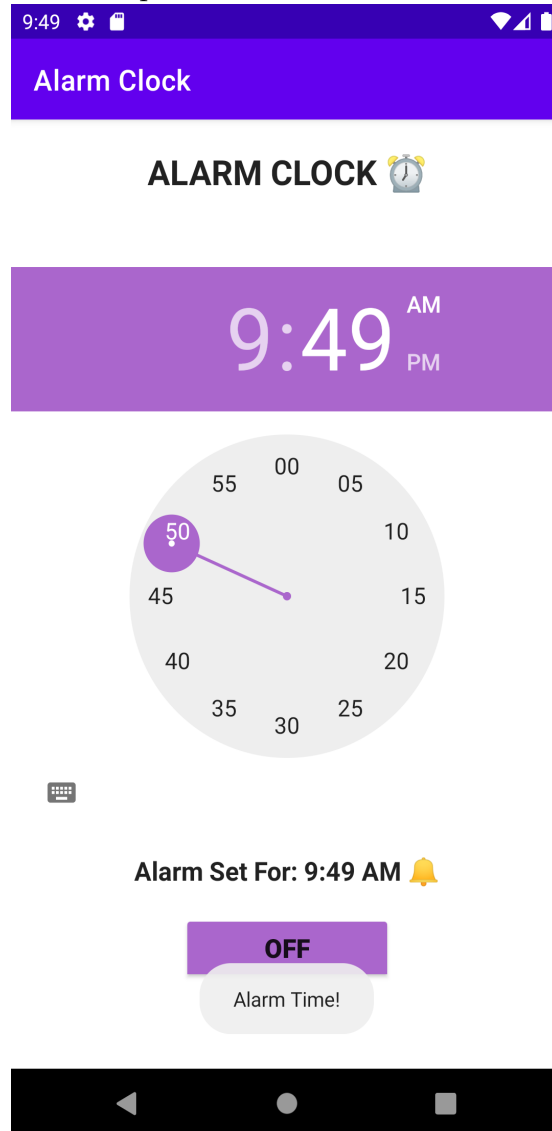
## Output: Alarm Clock - Alarm Set:

Figure 5: Output: Alarm Clock - Alarm Set.



## Output: Alarm Clock - Alarm Ringing:

Figure 6: Output: Alarm Clock - Alarm Ringing.



## Learning Outcome:

- I understood how to design a **Progress Bar** in Android.
- I understood how to use **Thread** in Android to handle and update the progress bar's progress value.
- I understood how Threads work in Android by implementing a **Runnable** Object and how concurrent execution is handled in the UI using threads.
- I learnt how to display a **Progress Dialog** in Android and dismiss it while the main UI was sleeping.
- I learnt to use a **ToggleButton** and **TimePicker** to implement an Alarm Clock in Android.
- I learnt to use the inbuilt **AlarmManager** object to set alarms and play a ringtone using the **Ringtone** object for reminding the user during the time of alarm.
- I learnt to use **PendingIntent** and **Intent** to set the alarm in AlarmManager.
- I understood how to use **Log** object for debugging purposes and printing status messages.



# **Department of CSE SSN College of Engineering**

**Vishakan Subramanian - 18 5001 196 - Semester VII**

**03 October 2021**

---

## **UCS 1711 - Mobile Application Development Lab**

---

### **Exercise 6: GPS Location Application**

#### **Aim:**

To develop a native application that makes use of GPS location information.

## Code - GPS Location: Main Activity:

```
1 package com.example.gps;
2
3 import androidx.appcompat.app.AppCompatActivity;
4 import androidx.core.app.ActivityCompat;
5
6 import android.Manifest;
7 import android.content.Context;
8 import android.content.pm.PackageManager;
9 import android.location.Address;
10 import android.location.Geocoder;
11 import android.location.LocationManager;
12 import android.os.Bundle;
13 import android.view.View;
14 import android.widget.Button;
15 import android.widget.EditText;
16 import android.widget.TextView;
17 import android.widget.Toast;
18
19 import java.util.List;
20
21 public class MainActivity extends AppCompatActivity {
22
23     @Override
24     protected void onCreate(Bundle savedInstanceState) {
25         super.onCreate(savedInstanceState);
26         setContentView(R.layout.activity_main);
27
28         EditText locationText = findViewById(R.id.locationText);
29         TextView latitudeText = findViewById(R.id.latitudeText);
30         TextView longitudeText = findViewById(R.id.longitudeText);
31         TextView addressText = findViewById(R.id.addressText);
32         Button getButton = findViewById(R.id.getButton);
33
34         if (ActivityCompat.checkSelfPermission(this, Manifest.permission.
ACCESS_FINE_LOCATION)
35             != PackageManager.PERMISSION_GRANTED && ActivityCompat.
checkSelfPermission(this, Manifest.permission.ACCESS_COARSE_LOCATION)
36             != PackageManager.PERMISSION_GRANTED){
37             //If permissions are not granted, display message to user and
exit
38             Toast permissionToast = Toast.makeText(MainActivity.this, "
Please enable location permission for the application to work!", Toast.
LENGTH_SHORT);
39             permissionToast.show();
40             return;
41         }
42     }
}
```

```

43     getButton.setOnClickListener(new View.OnClickListener() {
44         @Override
45         public void onClick(View v) {
46             try {
47                 String location = locationText.getText().toString();
48                 Geocoder geocoder = new Geocoder(MainActivity.this);
49                 List<Address> addressList = null;
50                 addressList = geocoder.getFromLocationName(location,
1);
51
52                 if(addressList != null && addressList.size() > 0){
53                     Address address = addressList.get(0);
54                     latitudeText.setText(Double.toString(address.
getLatitude()).substring(0, 7));
55                     longitudeText.setText(Double.toString(address.
getLongitude()).substring(0, 7));
56                     addressText.setText(address.getAddressLine(0));
57                 }
58
59                 else{
60                     Toast errorToast = Toast.makeText(MainActivity.
this, "Location Not Found!", Toast.LENGTH_SHORT);
61                     errorToast.show();
62                     latitudeText.setText("");
63                     longitudeText.setText("");
64                     addressText.setText("");
65                 }
66
67                 } catch (Exception e) {
68                     Toast errorToast = Toast.makeText(MainActivity.this, "
Error: " + e.getMessage(), Toast.LENGTH_SHORT);
69                     errorToast.show();
70                     latitudeText.setText("");
71                     longitudeText.setText("");
72                     addressText.setText("");
73                 }
74             }
75         });
76     }
77 }

```

## Code - GPS Location: Main Activity Layout:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".MainActivity">
8
9   <EditText
10     android:id="@+id/locationText"
11     android:layout_width="180dp"
12     android:layout_height="wrap_content"
13     android:layout_marginStart="40dp"
14     android:layout_marginTop="60dp"
15     android:ems="10"
16     android:fontFamily="@font/quantico"
17     android:hint="White House"
18     android:inputType="textPersonName"
19     app:layout_constraintStart_toEndOf="@+id/textView2"
20     app:layout_constraintTop_toBottomOf="@+id/textView" />
21
22   <TextView
23     android:id="@+id/textView"
24     android:layout_width="wrap_content"
25     android:layout_height="wrap_content"
26     android:layout_marginTop="30dp"
27     android:fontFamily="@font/quantico"
28     android:text="GPS Location Finder"
29     android:textColor="?android:attr/textColorPrimary"
30     android:textSize="28sp"
31     android:textStyle="bold"
32     app:layout_constraintEnd_toEndOf="parent"
33     app:layout_constraintStart_toStartOf="parent"
34     app:layout_constraintTop_toTopOf="parent" />
35
36   <TextView
37     android:id="@+id/textView2"
38     android:layout_width="wrap_content"
39     android:layout_height="wrap_content"
40     android:layout_marginStart="10dp"
41     android:layout_marginTop="80dp"
42     android:fontFamily="@font/quantico"
43     android:text="Enter Location Name:"
44     android:textColor="?android:attr/textColorPrimary"
45     android:textSize="16sp"
46     android:textStyle="bold"
```

```

47         app:layout_constraintStart_toStartOf="parent "
48         app:layout_constraintTop_toBottomOf="@+id/textView" />
49
50     <TextView
51         android:id="@+id/textView3"
52         android:layout_width="wrap_content"
53         android:layout_height="wrap_content"
54         android:layout_marginStart="10dp"
55         android:layout_marginTop="50dp"
56         android:fontFamily="@font/quantico"
57         android:text="Latitude"
58         android:textColor="?android:attr/textColorPrimary"
59         android:textSize="16sp"
60         android:textStyle="bold"
61         app:layout_constraintStart_toStartOf="parent "
62         app:layout_constraintTop_toBottomOf="@+id/textView4" />
63
64     <TextView
65         android:id="@+id/textView4"
66         android:layout_width="wrap_content"
67         android:layout_height="wrap_content"
68         android:layout_marginTop="50dp"
69         android:fontFamily="@font/quantico"
70         android:text="Location Details"
71         android:textColor="?android:attr/textColorPrimary"
72         android:textSize="20sp"
73         android:textStyle="bold"
74         app:layout_constraintEnd_toEndOf="parent "
75         app:layout_constraintStart_toStartOf="parent "
76         app:layout_constraintTop_toBottomOf="@+id/textView2" />
77
78     <TextView
79         android:id="@+id/textView5"
80         android:layout_width="wrap_content"
81         android:layout_height="wrap_content"
82         android:layout_marginStart="10dp"
83         android:layout_marginTop="30dp"
84         android:fontFamily="@font/quantico"
85         android:text="Longitude:"
86         android:textColor="?android:attr/textColorPrimary"
87         android:textSize="16sp"
88         android:textStyle="bold"
89         app:layout_constraintStart_toStartOf="parent "
90         app:layout_constraintTop_toBottomOf="@+id/textView3" />
91
92     <TextView
93         android:id="@+id/latitudeText "
94         android:layout_width="160sp"
95         android:layout_height="wrap_content"
96         android:layout_marginStart="130dp"
97         android:layout_marginTop="50dp"

```

```

98         android:fontFamily="@font/quantico"
99         android:textColor="@color/purple_500"
100        android:textSize="16sp"
101        android:textStyle="bold"
102        app:layout_constraintStart_toEndOf="@+id/textView5"
103        app:layout_constraintTop_toBottomOf="@+id/textView4" />
104
105    <TextView
106        android:id="@+id/longitudeText"
107        android:layout_width="160sp"
108        android:layout_height="wrap_content"
109        android:layout_marginStart="130dp"
110        android:layout_marginTop="30dp"
111        android:fontFamily="@font/quantico"
112        android:textColor="@color/purple_500"
113        android:textSize="16sp"
114        android:textStyle="bold"
115        app:layout_constraintStart_toEndOf="@+id/textView5"
116        app:layout_constraintTop_toBottomOf="@+id/latitudeText" />
117
118    <Button
119        android:id="@+id/getButton"
120        android:layout_width="wrap_content"
121        android:layout_height="wrap_content"
122        android:fontFamily="@font/quantico"
123        android:text="Get Details"
124        android:textSize="16sp"
125        android:textStyle="bold"
126        app:layout_constraintBottom_toBottomOf="parent"
127        app:layout_constraintEnd_toEndOf="parent"
128        app:layout_constraintStart_toStartOf="parent"
129        app:layout_constraintTop_toBottomOf="@+id/addressText" />
130
131    <TextView
132        android:id="@+id/textView6"
133        android:layout_width="wrap_content"
134        android:layout_height="wrap_content"
135        android:layout_marginStart="10dp"
136        android:layout_marginTop="30dp"
137        android:fontFamily="@font/quantico"
138        android:text="Address: "
139        android:textColor="?android:attr/textColorPrimary"
140        android:textSize="16sp"
141        android:textStyle="bold"
142        app:layout_constraintStart_toStartOf="parent"
143        app:layout_constraintTop_toBottomOf="@+id/textView5" />
144
145    <TextView
146        android:id="@+id/addressText"
147        android:layout_width="160sp"
148        android:layout_height="wrap_content"

```

```
149         android:layout_marginStart="130dp"
150         android:layout_marginTop="30dp"
151         android:fontFamily="@font/quantico"
152         android:textColor="@color/purple_500"
153         android:textSize="16sp"
154         android:textStyle="bold"
155         app:layout_constraintStart_toEndOf="@+id/textView5"
156         app:layout_constraintTop_toBottomOf="@+id/longitudeText" />
157
158 </androidx.constraintlayout.widget.ConstraintLayout>
```

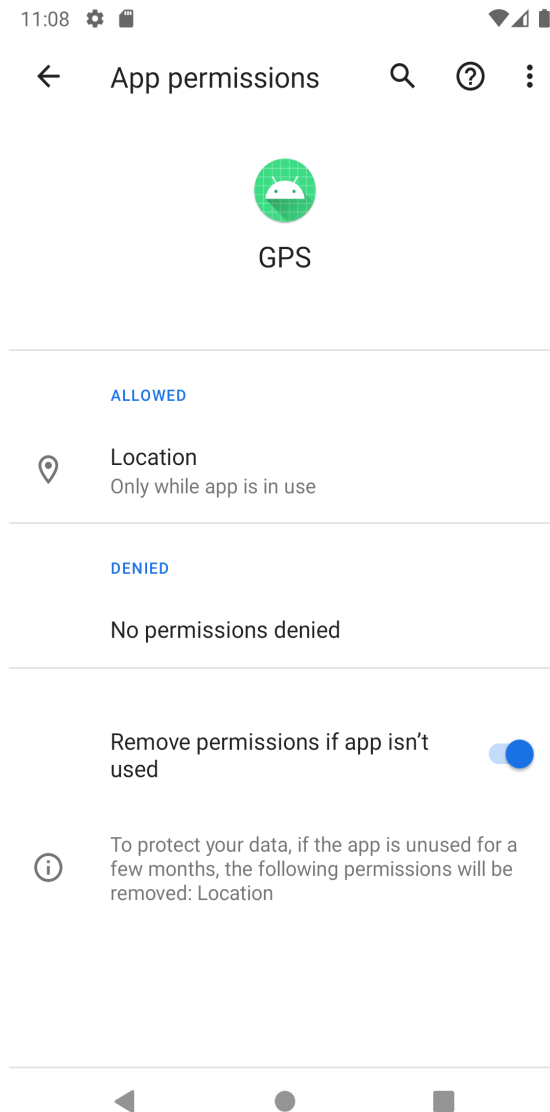
## Code - GPS Location: Android Manifest XML:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3     package="com.example.gps">
4
5     <!--Added Line 6 & 7 to obtain GPS location permission for the
6     application -->
7     <uses-permission android:name="android.permission.ACCESS_FINE_LOCATION"
8     />
9     <uses-permission android:name="android.permission.
10     ACCESS_COARSE_LOCATION" />
11     <uses-permission android:name="android.permission.INTERNET" />
12
13     <application
14         android:allowBackup="true"
15         android:icon="@mipmap/ic_launcher"
16         android:label="@string/app_name"
17         android:roundIcon="@mipmap/ic_launcher_round"
18         android:supportsRtl="true"
19         android:theme="@style/Theme.GPS">
20         <activity
21             android:name=".MainActivity"
22             android:exported="true">
23             <intent-filter>
24                 <action android:name="android.intent.action.MAIN" />
25
26                 <category android:name="android.intent.category.LAUNCHER"
27                 />
28             </intent-filter>
29         </activity>
30         <meta-data
31             android:name="preloaded_fonts"
32             android:resource="@array/preloaded_fonts" />
33     </application>
34 </manifest>
```



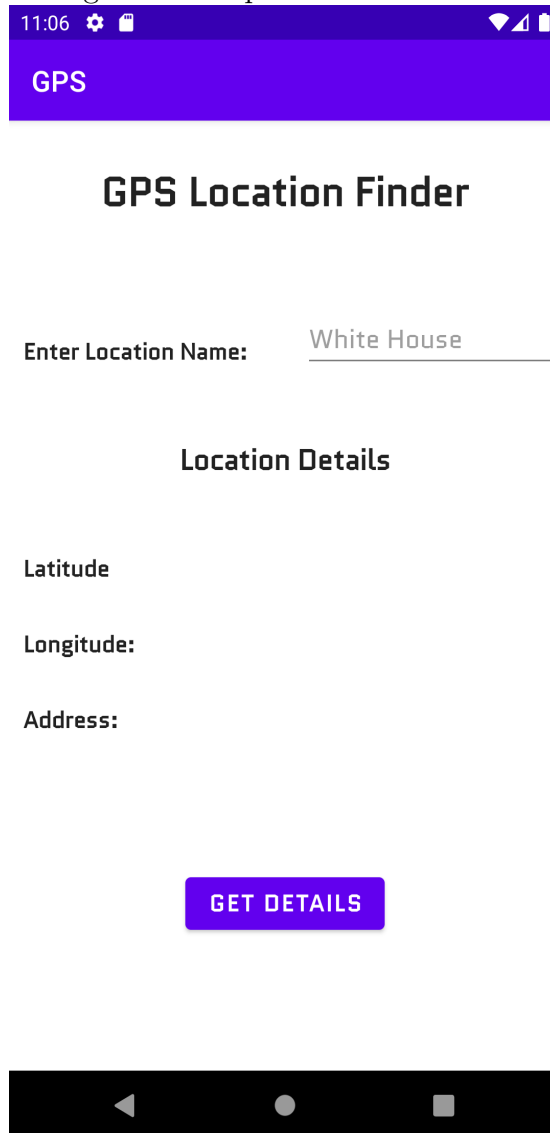
## Output: Location Permission:

Figure 1: Output: Location Permission.



## Output: GPS Location:

Figure 2: Output: GPS Location.



The screenshot shows a mobile application interface with a blue header bar containing the text "GPS". Below the header, the title "GPS Location Finder" is displayed in a large, bold, black font. Underneath the title, there is a label "Enter Location Name:" followed by a text input field containing the text "White House". Below the input field, the text "Location Details" is displayed in a bold, black font. Further down, there are three labels: "Latitude", "Longitude:", and "Address:", each followed by a corresponding input field. At the bottom of the form, there is a blue button with the text "GET DETAILS" in white. The entire interface is set against a light gray background. The top of the screen shows a status bar with the time "11:06", a gear icon, a document icon, and signal and battery indicators. The bottom of the screen shows a black navigation bar with three icons: a back arrow, a home circle, and a recent apps square.

11:06

GPS

### GPS Location Finder

Enter Location Name:

Location Details

Latitude

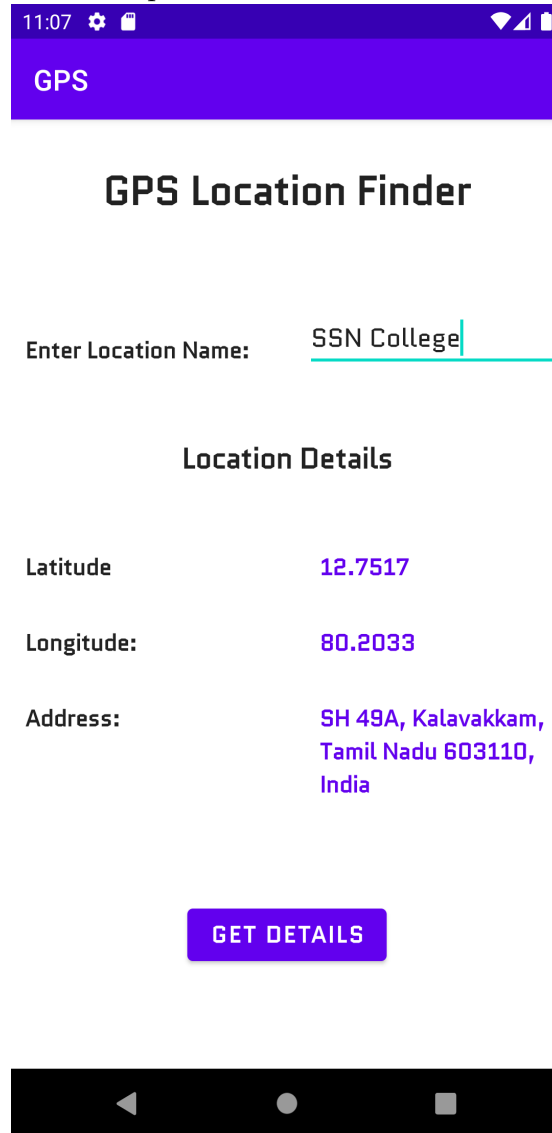
Longitude:

Address:

[GET DETAILS](#)

## Output: GPS Location - SSN College:

Figure 3: Output: GPS Location - SSN College.



The screenshot shows a mobile application interface. At the top, there is a status bar with the time 11:07 and icons for settings, a folder, and signal strength. Below the status bar is a blue header with the text "GPS". The main content area has a title "GPS Location Finder" in bold black text. Below the title is a text input field with the label "Enter Location Name:" and the text "SSN College" entered. Below the input field is a section titled "Location Details" in bold black text. This section contains three rows of data: "Latitude" with the value "12.7517", "Longitude:" with the value "80.2033", and "Address:" with the value "SH 49A, Kalavakkam, Tamil Nadu 603110, India". Below the data is a blue button with the text "GET DETAILS". At the bottom of the screen is a black navigation bar with three icons: a back arrow, a home circle, and a recent apps square.

Latitude	12.7517
Longitude:	80.2033
Address:	SH 49A, Kalavakkam, Tamil Nadu 603110, India

GET DETAILS

## Learning Outcome:

- I learnt how to set application permissions for **COARSE LOCATION, FINE LOCATION & INTERNET** using the AndroidManifest.xml file.
- I implemented conditions to check whether location permissions have been granted for the application.
- I learnt about **Geocoder** and its relevant method **getFromLocationName()** to get **Address** details of a particular place.
- I used the **Address** object to retrieve details like **latitude, longitude & street address**.
- I displayed the appropriate GPS results to the user via the UI.
- I was also able to handle error cases wherein the requested location was not found with the use of the Geocoder methods.

# **Department of CSE**

## **SSN College of Engineering**

**Vishakan Subramanian - 18 5001 196 - Semester VII**

**07 October 2021**

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### **UCS 1711 - Mobile Application Development Lab**

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#### **Exercise 7: External Storage File I/O**

##### **Aim:**

To develop a native application that reads and persistently writes content to a file stored in the external storage media of the device.

## Code - External Storage: Main Activity:

```
1 package com.example.externalstorage;
2
3 import androidx.appcompat.app.AppCompatActivity;
4 import androidx.core.app.ActivityCompat;
5
6 import android.Manifest;
7 import android.os.Bundle;
8 import android.os.Environment;
9 import android.view.View;
10 import android.widget.Button;
11 import android.widget.EditText;
12 import android.widget.TextView;
13 import android.widget.Toast;
14
15 import java.io.BufferedReader;
16 import java.io.File;
17 import java.io.FileOutputStream;
18 import java.io.FileReader;
19
20 public class MainActivity extends AppCompatActivity {
21
22     @Override
23     protected void onCreate(Bundle savedInstanceState) {
24         super.onCreate(savedInstanceState);
25         setContentView(R.layout.activity_main);
26
27         final EditText writeFileText = findViewById(R.id.writeFileText);
28         final EditText readFileText = findViewById(R.id.readFileText);
29         final EditText writeContentsText = findViewById(R.id.
writeContentsText);
30         final TextView readContentsText = findViewById(R.id.
readContentsText);
31         final Button readButton = findViewById(R.id.readButton);
32         final Button writeButton = findViewById(R.id.writeButton);
33         final File sdCard = Environment.getExternalStorageDirectory();
34
35         //Request for the read/write permissions to the external storage
from the user
36         ActivityCompat.requestPermissions(this, new String[]
37             {Manifest.permission.READ_EXTERNAL_STORAGE, Manifest.
permission.WRITE_EXTERNAL_STORAGE
38             }, 1);
39
40         writeButton.setOnClickListener(new View.OnClickListener() {
41             @Override
42             public void onClick(View v) {
43                 String writeFileName = writeFileText.getText().toString();
```

```

44         String writeContents = writeContentsText.getText().
toString();
45
46         //File Write Logic
47         try {
48             File file = new File(getExternalFilesDir(null),
writeFileName);
49             FileOutputStream fileOutputStream = new
FileOutputStream(file);
50             fileOutputStream.write(writeContents.getBytes());
51             fileOutputStream.close();
52
53             Toast successToast = Toast.makeText(MainActivity.this,
"File Written Successfully!", Toast.LENGTH_SHORT);
54             successToast.show();
55         } catch (Exception e) {
56             Toast errorToast = Toast.makeText(MainActivity.this, e
.getMessage(), Toast.LENGTH_SHORT);
57             errorToast.show();
58         }
59     }
60 });
61
62     readButton.setOnClickListener(new View.OnClickListener() {
63         @Override
64         public void onClick(View v) {
65
66             String readFileName = readFileText.getText().toString();
67
68             //File Read Logic
69             try{
70                 String buffer, readContents = "";
71                 File file = new File(getExternalFilesDir(null),
readFileName);
72                 BufferedReader bufferedReader = new BufferedReader(new
FileReader(file));
73
74                 while((buffer = bufferedReader.readLine()) != null){
75                     //Read till the bufferedReader gets characters
76                     readContents += buffer;
77                 }
78
79                 readContentsText.setText(readContents);
80
81                 Toast successToast = Toast.makeText(MainActivity.this,
"File Read Successfully!", Toast.LENGTH_SHORT);
82                 successToast.show();
83
84             } catch (Exception e) {
85                 Toast errorToast = Toast.makeText(MainActivity.this, e
.getMessage(), Toast.LENGTH_SHORT);

```

```
86         errorToast.show();
87     }
88 }
89 });
90 }
91 }
```



## Code - External Storage: Main Activity Layout:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".MainActivity">
8
9   <TextView
10      android:id="@+id/textView"
11      android:layout_width="wrap_content"
12      android:layout_height="wrap_content"
13      android:layout_marginTop="20dp"
14      android:fontFamily="@font/chivo"
15      android:text="SD Card - Write"
16      android:textColor="?android:attr/textColorPrimary"
17      android:textSize="20sp"
18      android:textStyle="bold"
19      app:layout_constraintEnd_toEndOf="parent"
20      app:layout_constraintStart_toStartOf="parent"
21      app:layout_constraintTop_toTopOf="parent" />
22
23   <TextView
24      android:id="@+id/textView2"
25      android:layout_width="wrap_content"
26      android:layout_height="wrap_content"
27      android:layout_marginStart="10dp"
28      android:layout_marginTop="75dp"
29      android:fontFamily="@font/chivo"
30      android:text="Enter File Name:"
31      android:textColor="?android:attr/textColorPrimary"
32      android:textSize="16sp"
33      android:textStyle="bold"
34      app:layout_constraintStart_toStartOf="parent"
35      app:layout_constraintTop_toBottomOf="@+id/textView" />
36
37   <EditText
38      android:id="@+id/writeFileText"
39      android:layout_width="wrap_content"
40      android:layout_height="wrap_content"
41      android:layout_marginTop="55dp"
42      android:ems="10"
43      android:fontFamily="@font/chivo"
44      android:hint="File.txt"
45      android:inputType="textPersonName"
46      android:textColor="?android:attr/textColorPrimary"
```

```

47     app:layout_constraintEnd_toEndOf="parent "
48     app:layout_constraintStart_toEndOf="@+id/textView2 "
49     app:layout_constraintTop_toBottomOf="@+id/textView" />
50
51 <TextView
52     android:id="@+id/textView3 "
53     android:layout_width="wrap_content "
54     android:layout_height="wrap_content "
55     android:layout_marginStart="10dp"
56     android:layout_marginTop="50dp"
57     android:fontFamily="@font/chivo "
58     android:text="Enter Contents: "
59     android:textColor="?android:attr/textColorPrimary "
60     android:textSize="16sp"
61     android:textStyle="bold"
62     app:layout_constraintStart_toStartOf="parent "
63     app:layout_constraintTop_toBottomOf="@+id/textView2 " />
64
65 <EditText
66     android:id="@+id/writeContentsText "
67     android:layout_width="wrap_content "
68     android:layout_height="wrap_content "
69     android:layout_marginTop="30dp"
70     android:ems="10 "
71     android:fontFamily="@font/chivo "
72     android:gravity="start|top"
73     android:hint="Hello World!"
74     android:inputType="textMultiLine"
75     android:textColor="?android:attr/textColorPrimary "
76     app:layout_constraintEnd_toEndOf="parent "
77     app:layout_constraintStart_toEndOf="@+id/textView2 "
78     app:layout_constraintTop_toBottomOf="@+id/writeFileText " />
79
80 <TextView
81     android:id="@+id/textView4 "
82     android:layout_width="wrap_content "
83     android:layout_height="wrap_content "
84     android:layout_marginTop="30dp"
85     android:fontFamily="@font/chivo "
86     android:text="SD Card - Read"
87     android:textColor="?android:attr/textColorPrimary "
88     android:textSize="20sp"
89     android:textStyle="bold"
90     app:layout_constraintEnd_toEndOf="parent "
91     app:layout_constraintStart_toStartOf="parent "
92     app:layout_constraintTop_toBottomOf="@+id/writeButton " />
93
94 <TextView
95     android:id="@+id/textView5 "
96     android:layout_width="wrap_content "
97     android:layout_height="wrap_content "

```

```

98     android:layout_marginStart="10dp"
99     android:layout_marginTop="75dp"
100    android:fontFamily="@font/chivo"
101    android:text="Enter File Name:"
102    android:textColor="?android:attr/textColorPrimary"
103    android:textSize="16sp"
104    android:textStyle="bold"
105    app:layout_constraintStart_toStartOf="parent"
106    app:layout_constraintTop_toBottomOf="@+id/textView4" />
107
108    <EditText
109        android:id="@+id/readFileText"
110        android:layout_width="wrap_content"
111        android:layout_height="wrap_content"
112        android:layout_marginTop="55dp"
113        android:ems="10"
114        android:fontFamily="@font/chivo"
115        android:hint="File.txt"
116        android:inputType="textPersonName"
117        android:textColor="?android:attr/textColorPrimary"
118        app:layout_constraintEnd_toEndOf="parent"
119        app:layout_constraintStart_toEndOf="@+id/textView5"
120        app:layout_constraintTop_toBottomOf="@+id/textView4" />
121
122    <TextView
123        android:id="@+id/textView6"
124        android:layout_width="wrap_content"
125        android:layout_height="wrap_content"
126        android:layout_marginStart="10dp"
127        android:layout_marginTop="50dp"
128        android:fontFamily="@font/chivo"
129        android:text="File Contents:"
130        android:textColor="?android:attr/textColorPrimary"
131        android:textSize="16sp"
132        android:textStyle="bold"
133        app:layout_constraintStart_toStartOf="parent"
134        app:layout_constraintTop_toBottomOf="@+id/textView5" />
135
136    <TextView
137        android:id="@+id/readContentsText"
138        android:layout_width="200dp"
139        android:layout_height="wrap_content"
140        android:layout_marginTop="50dp"
141        android:fontFamily="@font/chivo"
142        android:textColor="?android:attr/textColorPrimary"
143        android:textSize="16sp"
144        app:layout_constraintEnd_toEndOf="parent"
145        app:layout_constraintStart_toEndOf="@+id/textView5"
146        app:layout_constraintTop_toBottomOf="@+id/readFileText" />
147
148    <Button

```

```

149     android:id="@+id/readButton"
150     android:layout_width="wrap_content"
151     android:layout_height="wrap_content"
152     android:fontFamily="@font/chivo"
153     android:text="Read"
154     android:textColor="@color/design_default_color_on_primary"
155     android:textSize="16sp"
156     android:textStyle="bold"
157     app:layout_constraintBottom_toBottomOf="parent"
158     app:layout_constraintEnd_toEndOf="parent"
159     app:layout_constraintStart_toStartOf="parent"
160     app:layout_constraintTop_toBottomOf="@+id/readContentsText" />
161
162 <Button
163     android:id="@+id/writeButton"
164     android:layout_width="wrap_content"
165     android:layout_height="wrap_content"
166     android:layout_marginTop="30dp"
167     android:fontFamily="@font/chivo"
168     android:text="Write"
169     android:textSize="16sp"
170     android:textStyle="bold"
171     app:layout_constraintEnd_toEndOf="parent"
172     app:layout_constraintStart_toStartOf="parent"
173     app:layout_constraintTop_toBottomOf="@+id/writeContentsText" />
174
175 </androidx.constraintlayout.widget.ConstraintLayout>

```

## Code - External Storage: Android Manifest XML:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3     package="com.example.externalstorage">
4
5     <!--Permissions required for file I/O -->
6     <uses-permission android:name="android.permission.
7     WRITE_EXTERNAL_STORAGE"/>
8     <uses-permission android:name="android.permission.
9     READ_EXTERNAL_STORAGE"/>
10    <uses-permission android:name="android.permission.
11    MANAGE_EXTERNAL_STORAGE"/>
12
13    <application
14        android:allowBackup="true"
15        android:icon="@mipmap/ic_launcher"
16        android:label="@string/app_name"
17        android:roundIcon="@mipmap/ic_launcher_round"
18        android:supportsRtl="true"
19        android:theme="@style/Theme.ExternalStorage">
20        <activity
21            android:name=".MainActivity"
22            android:exported="true">
23            <intent-filter>
24                <action android:name="android.intent.action.MAIN" />
25
26                <category android:name="android.intent.category.LAUNCHER"
27            />
28            </intent-filter>
29        </activity>
30        <meta-data
31            android:name="preloaded_fonts"
32            android:resource="@array/preloaded_fonts" />
33    </application>
34</manifest>
```

## Output: Main Screen:

Figure 1: Output: Main Screen.

The screenshot shows an Android application interface. At the top, there is a status bar with the time 9:51, a settings icon, a document icon, and signal/battery indicators. Below the status bar is a purple header bar with the text "ExternalStorage". The main content area has a white background. It starts with the title "SD Card - Write" in bold. Below this, there are two input fields: "Enter File Name:" with the text "File.txt" and "Enter Contents:" with the text "Hello World!". Below these fields is a purple button with the text "WRITE". Underneath the button is the title "SD Card - Read" in bold. Below this, there is another input field "Enter File Name:" with the text "File.txt" and a label "File Contents:" below it. At the bottom of this section is a purple button with the text "READ". The entire application is shown within a black Android navigation bar at the very bottom, which contains the back, home, and recent apps icons.

9:51

ExternalStorage

**SD Card - Write**

Enter File Name: File.txt

Enter Contents: Hello World!

WRITE

**SD Card - Read**

Enter File Name: File.txt

File Contents:

READ

## Output: File Write:

Figure 2: Output: File Write.

The screenshot shows an Android application interface. At the top, there is a status bar with the time 9:53, a settings icon, a file icon, and signal/battery indicators. Below the status bar is a blue header bar with the text "ExternalStorage". The main content area has a white background. It starts with the title "SD Card - Write" in bold. Below this, there are two input fields: "Enter File Name:" with the text "Hello.txt" and "Enter Contents:" with the text "Welcome to this File I/O Demo!". Below these fields is a blue button with the text "WRITE". Underneath the button is the title "SD Card - Read" in bold. Below this, there is another input field "Enter File Name:" with the text "File.txt". Below this field is the label "File Contents:". At the bottom of the input section is a blue button with the text "READ". At the very bottom of the screen is a black navigation bar with three icons: a back arrow, a home circle, and a recent apps square.

9:53

ExternalStorage

**SD Card - Write**

Enter File Name:

Enter Contents:

**WRITE**

**SD Card - Read**

Enter File Name:

File Contents:

**READ**

## Output: File Read:

Figure 3: Output: File Read.

The screenshot shows an Android application interface. At the top, a status bar displays the time 9:53, a settings icon, a file icon, and signal/battery indicators. Below the status bar is a purple header bar with the text "ExternalStorage". The main content area has a white background. It features two sections: "SD Card - Write" and "SD Card - Read". In the "SD Card - Write" section, there is a label "Enter File Name:" followed by a text input field containing "Hello.txt", and a label "Enter Contents:" followed by a text input field containing "Welcome to this File I/O Demo!". Below these fields is a purple button with the text "WRITE". In the "SD Card - Read" section, there is a label "Enter File Name:" followed by a text input field containing "Hello.txt" with a blue cursor at the end, and a label "File Contents:" followed by a text input field containing "Welcome to this File I/O Demo!". Below these fields is a purple button with the text "READ". At the bottom of the screen is a black navigation bar with three icons: a back arrow, a home circle, and a recent apps square.

9:53

ExternalStorage

### SD Card - Write

Enter File Name:

Enter Contents:

WRITE

### SD Card - Read

Enter File Name:

File Contents:

READ



## Learning Outcome:

- I learnt how to set application permissions for **READ, WRITE & MANAGE EXTERNAL STORAGE** using the `AndroidManifest.xml` file.
- I learnt how to obtain permissions from the user through the UI using `requestPermissions()` method under the **ActivityCompat** class.
- I learnt how to do **File Write & File Read** using **File**, **FileOutputStream** and **BufferedReader** objects.
- I understood about the different types of exceptions that can be thrown by the usage of methods under these objects, like **FileNotFoundException & IOException**.
- I understood how Android fine-grains its app permissions to get access to various resources like the SD Card, Location etc.
- I implemented the **File I/O** successfully and was able to view the created files via the File Explorer as well, which was persistently created under the **Android/data/app-package-name** directory.

# **Department of CSE**

## **SSN College of Engineering**

**Vishakan Subramanian - 18 5001 196 - Semester VII**

**10 October 2021**

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### **UCS 1711 - Mobile Application Development Lab**

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#### **Exercise 8: SMS Message Application using Android**

##### **Aim:**

To develop a native application that can send an SMS to other phone numbers, and to display notifications upon reception of a new message.

## Code - SMS: Main Activity:

```
1 package com.example.sms;
2
3 import static android.Manifest.permission.READ_PHONE_STATE;
4 import static android.Manifest.permission.READ_SMS;
5 import static android.Manifest.permission.SEND_SMS;
6
7 import androidx.appcompat.app.AppCompatActivity;
8 import androidx.core.app.ActivityCompat;
9
10 import android.app.PendingIntent;
11 import android.content.BroadcastReceiver;
12 import android.content.Context;
13 import android.content.Intent;
14 import android.content.IntentFilter;
15 import android.os.Bundle;
16 import android.telephony.SmsManager;
17 import android.view.View;
18 import android.widget.EditText;
19 import android.widget.ImageButton;
20 import android.widget.TextView;
21
22 public class MainActivity extends AppCompatActivity {
23     IntentFilter intentFilter;
24     TextView historyText;
25
26     private BroadcastReceiver intentReceiver = new BroadcastReceiver() {
27         @Override
28         public void onReceive(Context context, Intent intent) {
29             //To set message text upon reception of message from
30             BroadcastReceiver
31             historyText.setText(
32                 historyText.getText() + intent.getExtras().getString("
33 message"));
34         }
35     };
36
37     @Override
38     protected void onCreate(Bundle savedInstanceState) {
39         super.onCreate(savedInstanceState);
40         setContentView(R.layout.activity_main);
41
42         //Request user permissions for SMS
43         ActivityCompat.requestPermissions(MainActivity.this,
44             new String[]{READ_SMS, SEND_SMS, READ_PHONE_STATE}, 1);
45
46         historyText = findViewById(R.id.historyText);
47     }
48 }
```

```

46     final EditText phoneText = findViewById(R.id.phoneText);
47     final EditText messageText = findViewById(R.id.messageText);
48     final ImageButton sendButton = findViewById(R.id.sendButton);
49
50     intentFilter = new IntentFilter();
51     intentFilter.addAction("SMS_RECEIVED_ACTION");
52
53     sendButton.setOnClickListener(new View.OnClickListener() {
54         @Override
55         public void onClick(View v) {
56             String phone = phoneText.getText().toString();
57             String message = messageText.getText().toString();
58
59             sendMessage(phone, message);
60         }
61     });
62 }
63
64 void sendMessage(String phone, String message){
65     //To send a message using SmsManager
66     final String SENT = "Message Sent";
67     final String DELIVERED = "Message Delivered";
68
69     PendingIntent sentIntent = PendingIntent.getBroadcast(this, 0, new
70     Intent(SENT), 0);
71     PendingIntent deliveredIntent = PendingIntent.getBroadcast(this,
72     0, new Intent(DELIVERED), 0);
73     SmsManager smsManager = SmsManager.getDefault();
74     smsManager.sendTextMessage(phone, null, message, sentIntent,
75     deliveredIntent);
76 }
77
78 @Override
79 protected void onPause(){
80     unregisterReceiver(intentReceiver);
81     super.onPause();
82 }
83
84 @Override
85 protected void onResume(){
86     registerReceiver(intentReceiver, intentFilter);
87     super.onResume();
88 }
89 }

```

## Code - SMS: Message Receiver:

```
1 package com.example.sms;
2
3 import android.app.NotificationChannel;
4 import android.app.NotificationManager;
5 import android.app.PendingIntent;
6 import android.content.BroadcastReceiver;
7 import android.content.Context;
8 import android.content.Intent;
9 import android.os.Build;
10 import android.os.Bundle;
11 import android.telephony.SmsMessage;
12 import android.util.Log;
13 import android.widget.Toast;
14
15 import androidx.core.app.NotificationCompat;
16
17 import java.util.Date;
18
19 public class MessageReceiver extends BroadcastReceiver {
20     @Override
21     public void onReceive(Context context, Intent intent) {
22         Bundle bundle = intent.getExtras();
23         SmsMessage[] messages;
24         String msgThread = "";
25
26         if(bundle != null){
27             //Received messages as raw Protocol Data Units (PDUs)
28             Object[] pdus = (Object[]) bundle.get("pdus");
29             messages = new SmsMessage[pdus != null ? pdus.length : 0];
30
31             //Get all SMS Messages and store it in the thread
32             for(int i = 0; i < messages.length; i++){
33                 messages[i] = SmsMessage.createFromPdu((byte[]) (pdus !=
34 null ? pdus[i] : null));
35                 msgThread += messages[i].getOriginatingAddress();
36                 msgThread += ": ";
37                 msgThread += messages[i].getMessageBody();
38                 msgThread += "\n";
39             }
40
41             Toast.makeText(context, msgThread, Toast.LENGTH_SHORT).show();
42
43             //Notification for received message
44             //Prefer NotificationCompat over Notification
45             NotificationCompat.Builder msgBuilder =
46                 new NotificationCompat.Builder(context, "
47 notify_channel")
```

```

46         .setSmallIcon(R.mipmap.ic_launcher_round)
47         .setContentTitle("You have received a message.
")
48         .setContentText(msgThread)
49         .setAutoCancel(true)
50         .setPriority(NotificationCompat.
PRIORITY_DEFAULT);
51
52         //Set the notification through a MainActivity intent
53         Intent notificationIntent = new Intent(context, MainActivity.
class);
54         notificationIntent.setFlags(Intent.FLAG_ACTIVITY_NEW_TASK);
55         PendingIntent contentIntent = PendingIntent.getActivity(
context, 0, notificationIntent, 0);
56         msgBuilder.setContentIntent(contentIntent);
57
58         //Add a notification through the notify_channel channel
59         NotificationManager manager = (NotificationManager)
60             context.getSystemService(Context.NOTIFICATION_SERVICE)
;
61
62         if(Build.VERSION.SDK_INT >= Build.VERSION_CODES.O){
63             NotificationChannel channel = new NotificationChannel("
notify_channel",
64                 "Notification Channel", NotificationManager.
IMPORTANCE_HIGH);
65             manager.createNotificationChannel(channel);
66             msgBuilder.setChannelId("notify_channel");
67         }
68
69         //Unique ID, NotificationCompat object (msgBuilder)
70         manager.notify((int) (new Date().getTime()/1000 % Integer.
MAX_VALUE), msgBuilder.build());
71         Log.i("SMS", "SENT NOTIFICATION!");
72
73         //Broadcast the message reception to the MainActivity to
trigger onReceive() method
74         Intent broadcastIntent = new Intent();
75         broadcastIntent.setAction("SMS_RECEIVED_ACTION");
76         broadcastIntent.putExtra("message", msgThread);
77         //put the msgThread in key "message" to correspond with
MainActivity's onReceive()
78         context.sendBroadcast(broadcastIntent);
79     }
80 }
81 }

```

## Code - SMS: Main Activity Layout:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <androidx.constraintlayout.widget.ConstraintLayout xmlns:android="http://
  schemas.android.com/apk/res/android"
3   xmlns:app="http://schemas.android.com/apk/res-auto"
4   xmlns:tools="http://schemas.android.com/tools"
5   android:layout_width="match_parent"
6   android:layout_height="match_parent"
7   tools:context=".MainActivity">
8
9   <TextView
10      android:id="@+id/textView2"
11      android:layout_width="wrap_content"
12      android:layout_height="wrap_content"
13      android:layout_marginTop="20dp"
14      android:fontFamily="@font/chelsea_market"
15      android:text="SMS"
16      android:textColor="?android:attr/textColorPrimary"
17      android:textSize="24sp"
18      android:textStyle="bold"
19      app:layout_constraintEnd_toEndOf="parent"
20      app:layout_constraintStart_toStartOf="parent"
21      app:layout_constraintTop_toTopOf="parent" />
22
23   <TextView
24      android:id="@+id/textView3"
25      android:layout_width="wrap_content"
26      android:layout_height="wrap_content"
27      android:layout_marginStart="10dp"
28      android:layout_marginTop="100dp"
29      android:fontFamily="@font/chelsea_market"
30      android:text="Enter Number:"
31      android:textColor="?android:attr/textColorPrimary"
32      android:textSize="16sp"
33      android:textStyle="bold"
34      app:layout_constraintStart_toStartOf="parent"
35      app:layout_constraintTop_toBottomOf="@+id/textView2" />
36
37   <ImageButton
38      android:id="@+id/sendButton"
39      android:layout_width="75dp"
40      android:layout_height="50dp"
41      android:layout_marginBottom="20dp"
42      android:backgroundTint="@color/teal_200"
43      app:layout_constraintBottom_toBottomOf="parent"
44      app:layout_constraintEnd_toEndOf="parent"
45      app:layout_constraintStart_toEndOf="@+id/messageText"
46      app:srcCompat="@android:drawable/ic_menu_send" />
```

```

47
48 <EditText
49     android:id="@+id/phoneText "
50     android:layout_width="250dp"
51     android:layout_height="wrap_content"
52     android:layout_marginTop="80dp"
53     android:ems="10"
54     android:fontFamily="@font/chelsea_market"
55     android:hint="+15555215554"
56     android:inputType="number"
57     android:textColor="?android:attr/textColorPrimary"
58     app:layout_constraintEnd_toEndOf="parent"
59     app:layout_constraintStart_toEndOf="@+id/textView3"
60     app:layout_constraintTop_toBottomOf="@+id/textView2" />
61
62 <EditText
63     android:id="@+id/messageText "
64     android:layout_width="300dp"
65     android:layout_height="50dp"
66     android:layout_marginStart="10dp"
67     android:layout_marginBottom="20dp"
68     android:editable="true"
69     android:ems="10"
70     android:fontFamily="@font/chelsea_market"
71     android:hint="Message"
72     android:inputType="textPersonName"
73     android:textColor="?android:attr/textColorPrimary"
74     app:layout_constraintBottom_toBottomOf="parent"
75     app:layout_constraintStart_toStartOf="parent" />
76
77 <ScrollView
78     android:id="@+id/scrollView"
79     android:layout_width="fill_parent"
80     android:layout_height="347dp"
81     android:layout_marginStart="10dp"
82     android:layout_marginEnd="10dp"
83     app:layout_constraintBottom_toTopOf="@+id/messageText"
84     app:layout_constraintEnd_toEndOf="parent"
85     app:layout_constraintStart_toStartOf="parent"
86     app:layout_constraintTop_toBottomOf="@+id/phoneText" >
87
88     <LinearLayout
89         android:layout_width="match_parent"
90         android:layout_height="wrap_content"
91         android:orientation="vertical" >
92
93         <TextView
94             android:id="@+id/historyText"
95             android:layout_width="match_parent"
96             android:layout_height="wrap_content"
97             android:fontFamily="@font/chelsea_market"

```



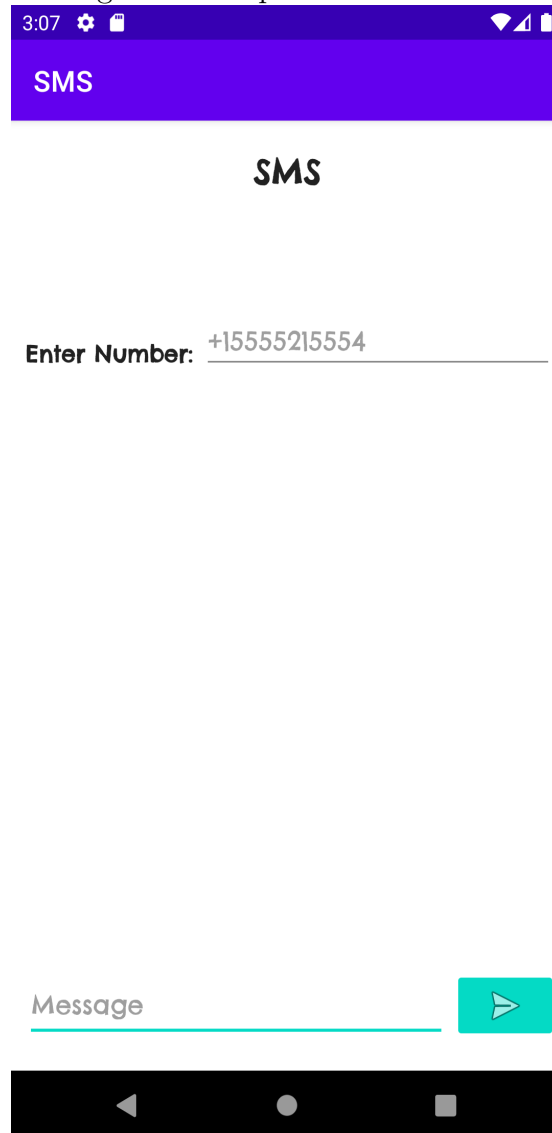
```
98         android:textColor="?android:attr/textColorPrimary"
99         android:textSize="16sp" />
100     </LinearLayout>
101 </ScrollView>
102
103 </androidx.constraintlayout.widget.ConstraintLayout>
```

## Code - SMS: Android Manifest XML:

```
1 <?xml version="1.0" encoding="utf-8"?>
2 <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3     package="com.example.sms">
4
5     <!--Permissions for allowing SMS functionality-->
6     <uses-permission android:name="android.permission.READ_SMS"/>
7     <uses-permission android:name="android.permission.RECEIVE_SMS"/>
8     <uses-permission android:name="android.permission.SEND_SMS"/>
9     <uses-permission android:name="android.permission.READ_PHONE_STATE"/>
10
11     <application
12         android:allowBackup="true"
13         android:icon="@mipmap/ic_launcher"
14         android:label="@string/app_name"
15         android:roundIcon="@mipmap/ic_launcher_round"
16         android:supportsRtl="true"
17         android:theme="@style/Theme.SMS">
18         <activity
19             android:name=".MainActivity"
20             android:exported="true">
21             <intent-filter>
22                 <action android:name="android.intent.action.MAIN" />
23
24                 <category android:name="android.intent.category.LAUNCHER"
25             />
26             </intent-filter>
27         </activity>
28
29         <!--Message Receiver-->
30         <receiver android:name=".MessageReceiver">
31             <intent-filter>
32                 <action android:name="android.provider.Telephony.
33 SMS_RECEIVED"/>
34             </intent-filter>
35         </receiver>
36
37         <meta-data
38             android:name="preloaded_fonts"
39             android:resource="@array/preloaded_fonts" />
40     </application>
41 </manifest>
```

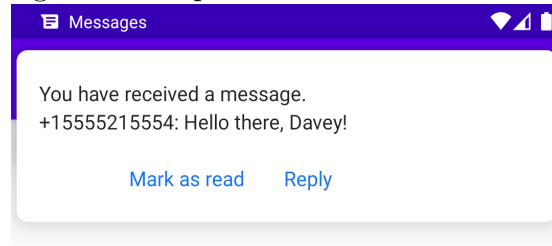
## Output: Main Screen:

Figure 1: Output: Main Screen.




## Output: SMS Sent & Received:

Figure 2: Output: SMS Sent & Received.



Enter Number: 5554

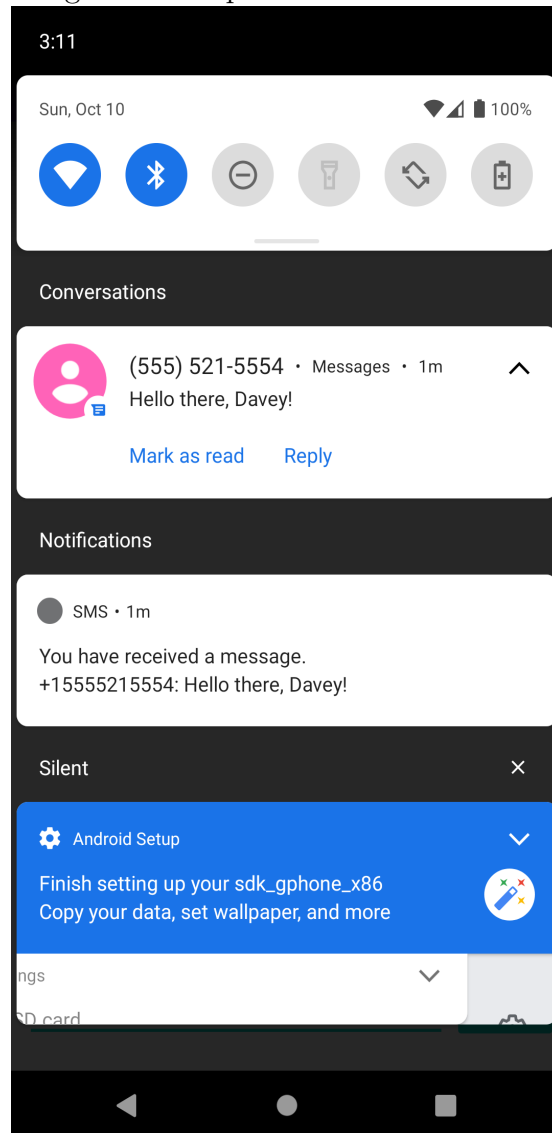
+15555215554: Hello there, Davey!

Hello there, Davey! 



## Output: SMS Notification:

Figure 3: Output: SMS Notification.



## Learning Outcome:

- I learnt to set permissions like **READ\_SMS**, **SEND\_SMS** etc. to enable SMS telephony services for the application.
- I implemented methods to prompt the user to allow the SMS permissions to be given for the application.
- I implemented a **BroadcastReceiver** class to take care of message reception handling.
- I understood how to set a **ScrollView** and how to work with **LinearLayout**.
- I learnt how to send a message using the **SmsManager** class.
- I understood how to work with BroadcastReceiver and Intents.
- I learnt how to parse the received SMS messages using **Bundle** object as **PDUs** (Protocol Data Units)
- I implemented a notification alert to the user upon reception of a message using the **NotificationCompat.Builder** and **NotificationManager** classes.
- I learnt how to set the notification to a channel and how to notify using the manager using the **notify()** method.
- I learnt how to send the received message from the MessageReceiver handler to the MainActivity using BroadcastReceiver and Intent, using **sendBroadcast()** method.