Simple Calculator and Keyboard

SHASHANKA VENKATESH - 185001145

26th July, 2021

Learning Objective

Create a simple calculator app and a keyboard app using Android Studio.

Simple Calculator

XML (`activity_calculator.xml`)

```
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      <TableLayout
10         android:id="@+id/tableLayout"
11         android:layout_width="match_parent"
12         android:layout_height="wrap_content"
13         app:layout_constraintBottom_toBottomOf="parent"
14         app:layout_constraintTop_toBottomOf="@+id/inputExpression"
15         app:layout_constraintVertical_bias="0.95"
16         tools:layout_editor_absoluteX="1dp">
17
18         <TableRow
19             android:layout_width="match_parent"
20             android:layout_height="match_parent">
21
22             <Button
```

```
23              android:id="@+id/clearBtn"
24              style="@style/Widget.AppCompat.Button.Borderless"
25              android:layout_width="0dp"
26              android:layout_height="wrap_content"
27              android:layout_margin="5dp"
28              android:layout_weight="1"
29              android:background="@drawable/rounded_rectangle"
30              android:onClick="clearExpression"
31              android:text="@string/clear"
32              android:textSize="24sp"
33              app:backgroundTint="#BD0009" />

35          <Button
36              android:id="@+id/parenthesisBtn"
37              style="@style/Widget.AppCompat.Button.Borderless"
38              android:layout_width="0dp"
39              android:layout_height="wrap_content"
40              android:layout_margin="5dp"
41              android:layout_weight="1"
42              android:background="@drawable/rounded_rectangle"
43              android:onClick="insertChar"
44              android:text="@string/openParenthesis"
45              android:textSize="24sp"
46              app:backgroundTint="#CC6400" />

48          <Button
49              android:id="@+id/exponentBtn"
50              style="@style/Widget.AppCompat.Button.Borderless"
51              android:layout_width="0dp"
52              android:layout_height="wrap_content"
53              android:layout_margin="5dp"
54              android:layout_weight="1"
55              android:background="@drawable/rounded_rectangle"
56              android:onClick="insertChar"
57              android:text="@string/closeParenthesis"
58              android:textSize="24sp"
59              app:backgroundTint="#CC6400" />

61          <Button
62              android:id="@+id/divideBtn"
63              style="@style/Widget.AppCompat.Button.Borderless"
64              android:layout_width="0dp"
65              android:layout_height="wrap_content"
66              android:layout_margin="5dp"
67              android:layout_weight="1"
68              android:background="@drawable/rounded_rectangle"
69              android:onClick="insertChar"
70              android:text="@string/divide"
71              android:textSize="24sp"
72              app:backgroundTint="#CC6400" />
73      </TableRow>
```

```
<TableRow
    android:layout_width="match_parent"
    android:layout_height="match_parent">

    <Button
        android:id="@+id/sevenBtn"
        style="@style/Widget.AppCompat.Button.Borderless"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:layout_margin="5dp"
        android:layout_weight="1"
        android:background="@drawable/rounded_rectangle"
        android:onClick="insertChar"
        android:text="@string/seven"
        android:textSize="24sp" />

    <Button
        android:id="@+id/eightBtn"
        style="@style/Widget.AppCompat.Button.Borderless"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:layout_margin="5dp"
        android:layout_weight="1"
        android:background="@drawable/rounded_rectangle"
        android:onClick="insertChar"
        android:text="@string/eight"
        android:textSize="24sp" />

    <Button
        android:id="@+id/nineBtn"
        style="@style/Widget.AppCompat.Button.Borderless"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:layout_margin="5dp"
        android:layout_weight="1"
        android:background="@drawable/rounded_rectangle"
        android:onClick="insertChar"
        android:text="@string/nine"
        android:textSize="24sp" />

    <Button
        android:id="@+id/multiplyBtn"
        style="@style/Widget.AppCompat.Button.Borderless"
        android:layout_width="0dp"
        android:layout_height="wrap_content"
        android:layout_margin="5dp"
        android:layout_weight="1"
        android:background="@drawable/rounded_rectangle"
        android:onClick="insertChar"
        android:text="@string/multiply"
```

```
125            android:textSize="24sp"
126            app:backgroundTint="#CC6400" />
127        </TableRow>
128
129        <TableRow
130            android:layout_width="match_parent"
131            android:layout_height="match_parent">
132
133            <Button
134                android:id="@+id/fourBtn"
135                style="@style/Widget.AppCompat.Button.Borderless"
136                android:layout_width="0dp"
137                android:layout_height="wrap_content"
138                android:layout_margin="5dp"
139                android:layout_weight="1"
140                android:background="@drawable/rounded_rectangle"
141                android:onClick="insertChar"
142                android:text="@string/four"
143                android:textSize="24sp" />

145            <Button
146                android:id="@+id/fiveBtn"
147                style="@style/Widget.AppCompat.Button.Borderless"
148                android:layout_width="0dp"
149                android:layout_height="wrap_content"
150                android:layout_margin="5dp"
151                android:layout_weight="1"
152                android:background="@drawable/rounded_rectangle"
153                android:onClick="insertChar"
154                android:text="@string/five"
155                android:textSize="24sp" />

157            <Button
158                android:id="@+id/sixBtn"
159                style="@style/Widget.AppCompat.Button.Borderless"
160                android:layout_width="0dp"
161                android:layout_height="wrap_content"
162                android:layout_margin="5dp"
163                android:layout_weight="1"
164                android:background="@drawable/rounded_rectangle"
165                android:onClick="insertChar"
166                android:text="@string/six"
167                android:textSize="24sp" />

169            <Button
170                android:id="@+id/addBtn"
171                style="@style/Widget.AppCompat.Button.Borderless"
172                android:layout_width="0dp"
173                android:layout_height="wrap_content"
174                android:layout_margin="5dp"
175                android:layout_weight="1"
```

```xml
                android:background="@drawable/rounded_rectangle"
                android:onClick="insertChar"
                android:text="@string/add"
                android:textSize="24sp"
                app:backgroundTint="#CC6400" />
        </TableRow>

        <TableRow
            android:layout_width="match_parent"
            android:layout_height="match_parent">

            <Button
                android:id="@+id/oneBtn"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="0dp"
                android:layout_height="wrap_content"
                android:layout_margin="5dp"
                android:layout_weight="1"
                android:background="@drawable/rounded_rectangle"
                android:onClick="insertChar"
                android:text="@string/one"
                android:textSize="24sp" />

            <Button
                android:id="@+id/twoBtn"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="0dp"
                android:layout_height="wrap_content"
                android:layout_margin="5dp"
                android:layout_weight="1"
                android:background="@drawable/rounded_rectangle"
                android:onClick="insertChar"
                android:text="@string/two"
                android:textSize="24sp" />

            <Button
                android:id="@+id/threeBtn"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="0dp"
                android:layout_height="wrap_content"
                android:layout_margin="5dp"
                android:layout_weight="1"
                android:background="@drawable/rounded_rectangle"
                android:onClick="insertChar"
                android:text="@string/three"
                android:textSize="24sp" />

            <Button
                android:id="@+id/subtractBtn"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="0dp"
```

```
227                    android:layout_height="wrap_content"
228                    android:layout_margin="5dp"
229                    android:layout_weight="1"
230                    android:background="@drawable/rounded_rectangle"
231                    android:onClick="insertChar"
232                    android:text="@string/subtract"
233                    android:textSize="24sp"
234                    app:backgroundTint="#CC6400" />

236        </TableRow>

238        <TableRow
239            android:layout_width="match_parent"
240            android:layout_height="match_parent">

242            <Button
243                android:id="@+id/plusMinusBtn"
244                style="@style/Widget.AppCompat.Button.Borderless"
245                android:layout_width="0dp"
246                android:layout_height="wrap_content"
247                android:layout_margin="5dp"
248                android:layout_weight="1"
249                android:background="@drawable/rounded_rectangle"
250                android:onClick="invertSign"
251                android:text="@string/plusMinus"
252                android:textSize="24sp"
253                app:backgroundTint="#CC6400" />

255            <Button
256                android:id="@+id/zeroBtn"
257                style="@style/Widget.AppCompat.Button.Borderless"
258                android:layout_width="0dp"
259                android:layout_height="wrap_content"
260                android:layout_margin="5dp"
261                android:layout_weight="1"
262                android:background="@drawable/rounded_rectangle"
263                android:onClick="insertChar"
264                android:text="@string/zero"
265                android:textSize="24sp" />

267            <Button
268                android:id="@+id/pointBtn"
269                style="@style/Widget.AppCompat.Button.Borderless"
270                android:layout_width="0dp"
271                android:layout_height="wrap_content"
272                android:layout_margin="5dp"
273                android:layout_weight="1"
274                android:background="@drawable/rounded_rectangle"
275                android:onClick="insertChar"
276                android:text="@string/point"
277                android:textSize="24sp" />
```

```xml
278
279                <Button
280                    android:id="@+id/equalsBtn"
281                    style="@style/Widget.AppCompat.Button.Borderless"
282                    android:layout_width="0dp"
283                    android:layout_height="wrap_content"
284                    android:layout_margin="5dp"
285                    android:layout_weight="1"
286                    android:background="@drawable/rounded_rectangle"
287                    android:onClick="evaluate"
288                    android:text="@string/equals"
289                    android:textSize="24sp"
290                    app:backgroundTint="#007122" />
291            </TableRow>
292        </TableLayout>
293
294        <EditText
295            android:id="@+id/inputExpression"
296            android:layout_width="0dp"
297            android:layout_height="wrap_content"
298            android:layout_marginTop="30dp"
299            android:text="@string/display"
300            app:layout_constraintEnd_toEndOf="parent"
301            app:layout_constraintStart_toStartOf="parent"
302            app:layout_constraintTop_toTopOf="parent"
303            android:autofillHints="false"
304            android:inputType="none"
305            android:textSize="36sp"
306            android:textAlignment="textEnd" />
307
308        <Button
309            android:id="@+id/backspaceBtn"
310            style="@style/Widget.AppCompat.Button.Borderless"
311            android:layout_width="wrap_content"
312            android:layout_height="wrap_content"
313            android:layout_margin="5dp"
314            android:background="@drawable/rounded_rectangle"
315            android:onClick="deleteCharacter"
316            android:text="@string/backspace"
317            android:textSize="20sp"
318            app:backgroundTint="#BD0009"
319            app:layout_constraintBottom_toTopOf="@+id/tableLayout"
320            app:layout_constraintEnd_toEndOf="parent"
321            app:layout_constraintHorizontal_bias="1"
322            app:layout_constraintStart_toStartOf="parent" />
323
324 </androidx.constraintlayout.widget.ConstraintLayout>
```

Java (`CalculatorActivity.java`)

```java
package com.madlab.calculator;

import androidx.appcompat.app.AppCompatActivity;

import android.os.Bundle;
import android.text.SpannableStringBuilder;
import android.view.View;
import android.widget.EditText;
import android.widget.TextView;

import org.mariuszgromada.math.mxparser.*;

public class MainActivity extends AppCompatActivity {

    private EditText inputExpression;

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

        inputExpression = findViewById(R.id.inputExpression);
        inputExpression.setShowSoftInputOnFocus(false);

        inputExpression.setOnClickListener(new View.OnClickListener() {
            @Override
            public void onClick(View view) {
                if (getString(R.string.display).equals(inputExpression.
    getText().toString())) {
                    inputExpression.setText("");
                }
            }
        });
    }

    private void updateText(String stringToAdd) {
        // Get the current string
        String currentString = inputExpression.getText().toString();

        // Get the cursor position and split the string at the cursor
    position
        int cursorPosition = inputExpression.getSelectionStart();
        String leftString = currentString.substring(0, cursorPosition);
        String rightString = currentString.substring(cursorPosition);

        if (getString(R.string.display).equals(inputExpression.getText().
    toString())) {
            inputExpression.setText(stringToAdd);
        }
```

```java
        else {
            // Set the display to the new string
            inputExpression.setText(String.format("%s%s%s", leftString,
    stringToAdd, rightString));
        }

        // Set the cursor to be after the newly inserted character
        inputExpression.setSelection(cursorPosition + 1);
    }

    public void deleteCharacter(View view) {
        // Get the cursor position and input expression length
        int cursorPosition = inputExpression.getSelectionStart();
        int inputLen = inputExpression.getText().length();

        // If there is some text in the input and the cursor isn't at the
    beginning
        if (cursorPosition != 0 && inputLen != 0) {
            // Extract the string
            SpannableStringBuilder selection = (SpannableStringBuilder)
    inputExpression.getText();

            // Replace the selected character with an empty character
            selection.replace(cursorPosition - 1, cursorPosition, "");

            // Set the edited string as the display
            inputExpression.setText(selection);

            // Fix the new cursor position
            inputExpression.setSelection(cursorPosition - 1);
        }
    }

    public void insertChar(View view) {
        TextView button = (TextView) view;
        String buttonChar = button.getText().toString ();
        updateText(buttonChar);
    }

    public void clearExpression(View view) {
        inputExpression.setText("");
    }

    public void evaluate(View view) {
        Expression exp = new Expression((inputExpression.getText().
    toString()));
        String result = String.valueOf(exp.calculate());
        inputExpression.setText(result);
        inputExpression.setSelection(result.length());
    }
}
```

App Screenshots

Entering an expression

Calculator

25+98-(21*6)/3

			DEL
C	(	)	/
7	8	9	*
4	5	6	+
1	2	3	-
+/-	0	,	=

Result

1:54 PM

Calculator

81,0

			DEL
C	(	)	/
7	8	9	*
4	5	6	+
1	2	3	-
+/-	0	,	=

Simple Keyboard

XML (`activity_keyboard.xml`)

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

    <TableLayout
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/display"
        app:layout_constraintVertical_bias="1.0"
        tools:layout_editor_absoluteX="1dp"
        android:background="@color/deep_blue">

        <TableRow
            android:layout_width="match_parent"
            android:layout_height="match_parent">

            <Button
                android:id="@+id/one"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_weight="1"
                android:text="@string/one"
                android:onClick="insertChar"
                android:layout_margin="1dp"
                android:textColor="@color/white"
                android:background="@drawable/keyboard_button"
                android:padding="0dp"/>

            <Button
                android:id="@+id/two"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_weight="1"
                android:text="@string/two"
                android:onClick="insertChar"
                android:layout_margin="1dp"
                android:textColor="@color/white"
                android:background="@drawable/keyboard_button"
                android:padding="0dp" />
```

```
47
48          <Button
49              android:id="@+id/three"
50              style="@style/Widget.AppCompat.Button.Borderless"
51              android:layout_width="wrap_content"
52              android:layout_height="wrap_content"
53              android:layout_weight="1"
54              android:text="@string/three"
55              android:onClick="insertChar"
56              android:layout_margin="1dp"
57              android:textColor="@color/white"
58              android:background="@drawable/keyboard_button"
59              android:padding="0dp" />
60
61          <Button
62              android:id="@+id/four"
63              style="@style/Widget.AppCompat.Button.Borderless"
64              android:layout_width="wrap_content"
65              android:layout_height="wrap_content"
66              android:layout_weight="1"
67              android:text="@string/four"
68              android:onClick="insertChar"
69              android:layout_margin="1dp"
70              android:textColor="@color/white"
71              android:background="@drawable/keyboard_button"
72              android:padding="0dp" />
73
74          <Button
75              android:id="@+id/five"
76              style="@style/Widget.AppCompat.Button.Borderless"
77              android:layout_width="wrap_content"
78              android:layout_height="wrap_content"
79              android:layout_weight="1"
80              android:text="@string/five"
81              android:onClick="insertChar"
82              android:layout_margin="1dp"
83              android:textColor="@color/white"
84              android:background="@drawable/keyboard_button"
85              android:padding="0dp" />
86
87          <Button
88              android:id="@+id/six"
89              style="@style/Widget.AppCompat.Button.Borderless"
90              android:layout_width="wrap_content"
91              android:layout_height="wrap_content"
92              android:layout_weight="1"
93              android:text="@string/six"
94              android:onClick="insertChar"
95              android:layout_margin="1dp"
96              android:textColor="@color/white"
97              android:background="@drawable/keyboard_button"
```

```
 98                         android:padding="0dp" />
 99
100             <Button
101                 android:id="@+id/seven"
102                 style="@style/Widget.AppCompat.Button.Borderless"
103                 android:layout_width="wrap_content"
104                 android:layout_height="wrap_content"
105                 android:layout_weight="1"
106                 android:text="@string/seven"
107                 android:onClick="insertChar"
108                 android:layout_margin="1dp"
109                 android:textColor="@color/white"
110                 android:background="@drawable/keyboard_button"
111                 android:padding="0dp" />
112
113             <Button
114                 android:id="@+id/eight"
115                 style="@style/Widget.AppCompat.Button.Borderless"
116                 android:layout_width="wrap_content"
117                 android:layout_height="wrap_content"
118                 android:layout_weight="1"
119                 android:text="@string/eight"
120                 android:onClick="insertChar"
121                 android:layout_margin="1dp"
122                 android:textColor="@color/white"
123                 android:background="@drawable/keyboard_button"
124                 android:padding="0dp" />
125
126             <Button
127                 android:id="@+id/nine"
128                 style="@style/Widget.AppCompat.Button.Borderless"
129                 android:layout_width="wrap_content"
130                 android:layout_height="wrap_content"
131                 android:layout_weight="1"
132                 android:text="@string/nine"
133                 android:onClick="insertChar"
134                 android:layout_margin="1dp"
135                 android:textColor="@color/white"
136                 android:background="@drawable/keyboard_button"
137                 android:padding="0dp" />
138
139             <Button
140                 android:id="@+id/zero"
141                 style="@style/Widget.AppCompat.Button.Borderless"
142                 android:layout_width="wrap_content"
143                 android:layout_height="wrap_content"
144                 android:layout_weight="1"
145                 android:text="@string/zero"
146                 android:onClick="insertChar"
147                 android:layout_margin="1dp"
148                 android:textColor="@color/white"
```

```
149            android:background="@drawable/keyboard_button"
150            android:padding="0dp" />
151        </TableRow>
152
153        <TableRow
154            android:layout_width="match_parent"
155            android:layout_height="match_parent">
156
157            <Button
158                android:id="@+id/q"
159                style="@style/Widget.AppCompat.Button.Borderless"
160                android:layout_width="wrap_content"
161                android:layout_height="wrap_content"
162                android:layout_weight="1"
163                android:text="@string/Q"
164                android:onClick="insertChar"
165                android:layout_margin="1dp"
166                android:textColor="@color/white"
167                android:background="@drawable/keyboard_button"
168                android:padding="0dp"
169                android:textAllCaps="false" />
170
171            <Button
172                android:id="@+id/w"
173                style="@style/Widget.AppCompat.Button.Borderless"
174                android:layout_width="wrap_content"
175                android:layout_height="wrap_content"
176                android:layout_weight="1"
177                android:text="@string/W"
178                android:onClick="insertChar"
179                android:layout_margin="1dp"
180                android:textColor="@color/white"
181                android:background="@drawable/keyboard_button"
182                android:padding="0dp"
183                android:textAllCaps="false"/>
184
185            <Button
186                android:id="@+id/e"
187                style="@style/Widget.AppCompat.Button.Borderless"
188                android:layout_width="wrap_content"
189                android:layout_height="wrap_content"
190                android:layout_weight="1"
191                android:text="@string/E"
192                android:onClick="insertChar"
193                android:layout_margin="1dp"
194                android:textColor="@color/white"
195                android:background="@drawable/keyboard_button"
196                android:padding="0dp"
197                android:textAllCaps="false" />
198
199            <Button
```

```
200              android:id="@+id/r"
201              style="@style/Widget.AppCompat.Button.Borderless"
202              android:layout_width="wrap_content"
203              android:layout_height="wrap_content"
204              android:layout_weight="1"
205              android:text="@string/R"
206              android:onClick="insertChar"
207              android:layout_margin="1dp"
208              android:textColor="@color/white"
209              android:background="@drawable/keyboard_button"
210              android:padding="0dp"
211              android:textAllCaps="false" />
212
213          <Button
214              android:id="@+id/t"
215              style="@style/Widget.AppCompat.Button.Borderless"
216              android:layout_width="wrap_content"
217              android:layout_height="wrap_content"
218              android:layout_weight="1"
219              android:text="@string/T"
220              android:onClick="insertChar"
221              android:layout_margin="1dp"
222              android:textColor="@color/white"
223              android:background="@drawable/keyboard_button"
224              android:padding="0dp"
225              android:textAllCaps="false" />
226
227          <Button
228              android:id="@+id/y"
229              style="@style/Widget.AppCompat.Button.Borderless"
230              android:layout_width="wrap_content"
231              android:layout_height="wrap_content"
232              android:layout_weight="1"
233              android:text="@string/Y"
234              android:onClick="insertChar"
235              android:layout_margin="1dp"
236              android:textColor="@color/white"
237              android:background="@drawable/keyboard_button"
238              android:padding="0dp"
239              android:textAllCaps="false" />
240
241          <Button
242              android:id="@+id/u"
243              style="@style/Widget.AppCompat.Button.Borderless"
244              android:layout_width="wrap_content"
245              android:layout_height="wrap_content"
246              android:layout_weight="1"
247              android:text="@string/U"
248              android:onClick="insertChar"
249              android:layout_margin="1dp"
250              android:textColor="@color/white"
```

```
251            android:background="@drawable/keyboard_button"
252            android:padding="0dp"
253            android:textAllCaps="false" />

255        <Button
256            android:id="@+id/i"
257            style="@style/Widget.AppCompat.Button.Borderless"
258            android:layout_width="wrap_content"
259            android:layout_height="wrap_content"
260            android:layout_weight="1"
261            android:text="@string/I"
262            android:onClick="insertChar"
263            android:layout_margin="1dp"
264            android:textColor="@color/white"
265            android:background="@drawable/keyboard_button"
266            android:padding="0dp"
267            android:textAllCaps="false" />

269        <Button
270            android:id="@+id/o"
271            style="@style/Widget.AppCompat.Button.Borderless"
272            android:layout_width="wrap_content"
273            android:layout_height="wrap_content"
274            android:layout_weight="1"
275            android:text="@string/O"
276            android:onClick="insertChar"
277            android:layout_margin="1dp"
278            android:textColor="@color/white"
279            android:background="@drawable/keyboard_button"
280            android:padding="0dp"
281            android:textAllCaps="false" />

283        <Button
284            android:id="@+id/p"
285            style="@style/Widget.AppCompat.Button.Borderless"
286            android:layout_width="wrap_content"
287            android:layout_height="wrap_content"
288            android:layout_weight="1"
289            android:text="@string/P"
290            android:onClick="insertChar"
291            android:layout_margin="1dp"
292            android:textColor="@color/white"
293            android:background="@drawable/keyboard_button"
294            android:padding="0dp"
295            android:textAllCaps="false" />
296    </TableRow>

298    <TableRow
299        android:layout_width="match_parent"
300        android:layout_height="match_parent">
301
```

```
302            <Button
303                android:id="@+id/a"
304                style="@style/Widget.AppCompat.Button.Borderless"
305                android:layout_width="wrap_content"
306                android:layout_height="wrap_content"
307                android:layout_weight="1"
308                android:text="@string/A"
309                android:onClick="insertChar"
310                android:layout_margin="1dp"
311                android:textColor="@color/white"
312                android:background="@drawable/keyboard_button"
313                android:padding="0dp"
314                android:textAllCaps="false" />
315
316            <Button
317                android:id="@+id/s"
318                style="@style/Widget.AppCompat.Button.Borderless"
319                android:layout_width="wrap_content"
320                android:layout_height="wrap_content"
321                android:layout_margin="1dp"
322                android:layout_weight="1"
323                android:background="@drawable/keyboard_button"
324                android:onClick="insertChar"
325                android:padding="0dp"
326                android:text="@string/S"
327                android:textColor="@color/white"
328                android:textAllCaps="false" />
329
330            <Button
331                android:id="@+id/d"
332                style="@style/Widget.AppCompat.Button.Borderless"
333                android:layout_width="wrap_content"
334                android:layout_height="wrap_content"
335                android:layout_weight="1"
336                android:text="@string/D"
337                android:onClick="insertChar"
338                android:layout_margin="1dp"
339                android:textColor="@color/white"
340                android:background="@drawable/keyboard_button"
341                android:padding="0dp"
342                android:textAllCaps="false" />
343
344            <Button
345                android:id="@+id/f"
346                style="@style/Widget.AppCompat.Button.Borderless"
347                android:layout_width="wrap_content"
348                android:layout_height="wrap_content"
349                android:layout_weight="1"
350                android:text="@string/F"
351                android:onClick="insertChar"
352                android:layout_margin="1dp"
```

```xml
                android:textColor="@color/white"
                android:background="@drawable/keyboard_button"
                android:padding="0dp"
                android:textAllCaps="false" />

            <Button
                android:id="@+id/g"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_weight="1"
                android:text="@string/G"
                android:onClick="insertChar"
                android:layout_margin="1dp"
                android:textColor="@color/white"
                android:background="@drawable/keyboard_button"
                android:padding="0dp"
                android:textAllCaps="false" />

            <Button
                android:id="@+id/h"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_weight="1"
                android:text="@string/H"
                android:onClick="insertChar"
                android:layout_margin="1dp"
                android:textColor="@color/white"
                android:background="@drawable/keyboard_button"
                android:padding="0dp"
                android:textAllCaps="false" />

            <Button
                android:id="@+id/j"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_weight="1"
                android:text="@string/J"
                android:onClick="insertChar"
                android:layout_margin="1dp"
                android:textColor="@color/white"
                android:background="@drawable/keyboard_button"
                android:padding="0dp"
                android:textAllCaps="false" />

            <Button
                android:id="@+id/k"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="wrap_content"
```

```xml
                android:layout_height="wrap_content"
                android:layout_weight="1"
                android:text="@string/K"
                android:onClick="insertChar"
                android:layout_margin="1dp"
                android:textColor="@color/white"
                android:background="@drawable/keyboard_button"
                android:padding="0dp"
                android:textAllCaps="false" />

        <Button
                android:id="@+id/l"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_weight="1"
                android:text="@string/L"
                android:onClick="insertChar"
                android:layout_margin="1dp"
                android:textColor="@color/white"
                android:background="@drawable/keyboard_button"
                android:padding="0dp"
                android:textAllCaps="false" />
    </TableRow>

    <TableRow
            android:layout_width="match_parent"
            android:layout_height="match_parent">

        <ImageButton
                android:id="@+id/capslock"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                app:srcCompat="@drawable/capslock_on"
                android:onClick="toggleCapsLock"
                android:layout_weight="1"
                android:layout_margin="1dp"
                android:background="@drawable/keyboard_button_toggled"
                android:padding="0dp"
                android:contentDescription="@string/capslock"/>

        <Button
                android:id="@+id/z"
                style="@style/Widget.AppCompat.Button.Borderless"
                android:layout_width="wrap_content"
                android:layout_height="wrap_content"
                android:layout_weight="1"
                android:text="@string/Z"
                android:onClick="insertChar"
                android:layout_margin="1dp"
```

```
455                android:textColor="@color/white"
456                android:background="@drawable/keyboard_button"
457                android:padding="0dp"
458                android:textAllCaps="false" />
459
460            <Button
461                android:id="@+id/x"
462                style="@style/Widget.AppCompat.Button.Borderless"
463                android:layout_width="wrap_content"
464                android:layout_height="wrap_content"
465                android:layout_weight="1"
466                android:text="@string/X"
467                android:onClick="insertChar"
468                android:layout_margin="1dp"
469                android:textColor="@color/white"
470                android:background="@drawable/keyboard_button"
471                android:padding="0dp"
472                android:textAllCaps="false" />
473
474            <Button
475                android:id="@+id/c"
476                style="@style/Widget.AppCompat.Button.Borderless"
477                android:layout_width="wrap_content"
478                android:layout_height="wrap_content"
479                android:layout_weight="1"
480                android:text="@string/C"
481                android:onClick="insertChar"
482                android:layout_margin="1dp"
483                android:textColor="@color/white"
484                android:background="@drawable/keyboard_button"
485                android:padding="0dp"
486                android:textAllCaps="false" />
487
488            <Button
489                android:id="@+id/v"
490                style="@style/Widget.AppCompat.Button.Borderless"
491                android:layout_width="wrap_content"
492                android:layout_height="wrap_content"
493                android:layout_weight="1"
494                android:text="@string/V"
495                android:onClick="insertChar"
496                android:layout_margin="1dp"
497                android:textColor="@color/white"
498                android:background="@drawable/keyboard_button"
499                android:padding="0dp"
500                android:textAllCaps="false" />
501
502            <Button
503                android:id="@+id/b"
504                style="@style/Widget.AppCompat.Button.Borderless"
505                android:layout_width="wrap_content"
```

```
506              android:layout_height="wrap_content"
507              android:layout_weight="1"
508              android:text="@string/B"
509              android:onClick="insertChar"
510              android:layout_margin="1dp"
511              android:textColor="@color/white"
512              android:background="@drawable/keyboard_button"
513              android:padding="0dp"
514              android:textAllCaps="false" />
515
516        <Button
517              android:id="@+id/n"
518              style="@style/Widget.AppCompat.Button.Borderless"
519              android:layout_width="wrap_content"
520              android:layout_height="wrap_content"
521              android:layout_weight="1"
522              android:text="@string/N"
523              android:onClick="insertChar"
524              android:layout_margin="1dp"
525              android:textColor="@color/white"
526              android:background="@drawable/keyboard_button"
527              android:padding="0dp"
528              android:textAllCaps="false" />
529
530        <Button
531              android:id="@+id/m"
532              style="@style/Widget.AppCompat.Button.Borderless"
533              android:layout_width="wrap_content"
534              android:layout_height="wrap_content"
535              android:layout_weight="1"
536              android:text="@string/M"
537              android:onClick="insertChar"
538              android:layout_margin="1dp"
539              android:textColor="@color/white"
540              android:background="@drawable/keyboard_button"
541              android:padding="0dp"
542              android:textAllCaps="false" />
543
544        <ImageButton
545              android:id="@+id/backSpace"
546              style="@style/Widget.AppCompat.Button.Borderless"
547              android:layout_width="wrap_content"
548              android:layout_height="wrap_content"
549              android:layout_weight="1"
550              app:srcCompat="@drawable/backspace"
551              android:layout_margin="1dp"
552              android:onClick="backSpace"
553              android:background="@drawable/keyboard_button"
554              android:padding="0dp"
555              android:contentDescription="@string/backspace" />
556    </TableRow>
```

```
557
558          <TableRow
559              android:layout_width="match_parent"
560              android:layout_height="match_parent">
561
562              <Button
563                  android:id="@+id/switchKeyboard"
564                  style="@style/Widget.AppCompat.Button.Borderless"
565                  android:layout_width="0dp"
566                  android:layout_height="wrap_content"
567                  android:layout_weight="1.5"
568                  android:text="@string/switchKeyboard"
569                  android:onClick="insertChar"
570                  android:padding="0dp"
571                  android:layout_margin="1dp"
572                  android:textColor="@color/white"
573                  android:background="@drawable/keyboard_button" />
574
575              <Button
576                  android:id="@+id/comma"
577                  style="@style/Widget.AppCompat.Button.Borderless"
578                  android:layout_width="0dp"
579                  android:layout_height="wrap_content"
580                  android:layout_weight="1"
581                  android:text="@string/comma"
582                  android:onClick="insertChar"
583                  android:padding="0dp"
584                  android:layout_margin="1dp"
585                  android:textColor="@color/white"
586                  android:background="@drawable/keyboard_button" />
587
588              <Button
589                  android:id="@+id/spaceBar"
590                  style="@style/Widget.AppCompat.Button.Borderless"
591                  android:layout_width="0dp"
592                  android:layout_height="30dp"
593                  android:layout_weight="3"
594                  android:padding="0dp"
595                  android:onClick="insertSpace"
596                  android:layout_margin="1dp"
597                  android:background="@drawable/spacebar"
598                  app:backgroundTint="@color/white"/>
599
600              <Button
601                  android:id="@+id/fullStop"
602                  style="@style/Widget.AppCompat.Button.Borderless"
603                  android:layout_width="0dp"
604                  android:layout_height="wrap_content"
605                  android:layout_weight="1"
606                  android:text="@string/fullStop"
607                  android:onClick="insertChar"
```

```
608                    android:padding="0dp"
609                    android:layout_margin="1dp"
610                    android:textColor="@color/white"
611                    android:background="@drawable/keyboard_button" />
612
613                <ImageButton
614                    android:id="@+id/enter"
615                    style="@style/Widget.AppCompat.Button.Borderless"
616                    android:layout_width="0dp"
617                    android:layout_height="wrap_content"
618                    android:layout_weight="1.5"
619                    android:padding="0dp"
620                    android:onClick="insertNewLine"
621                    app:srcCompat="@drawable/enter_button"
622                    android:layout_margin="1dp"
623                    android:background="@drawable/keyboard_button"
624                    android:contentDescription="@string/enter" />
625            </TableRow>
626        </TableLayout>
627
628        <EditText
629            android:id="@+id/display"
630            android:layout_width="match_parent"
631            android:layout_height="wrap_content"
632            android:layout_marginTop="16dp"
633            android:text=""
634            android:textSize="25sp"
635            android:inputType="textMultiLine"
636            app:layout_constraintEnd_toEndOf="parent"
637            app:layout_constraintStart_toStartOf="parent"
638            app:layout_constraintTop_toTopOf="parent"
639            android:hint="@string/enter_some_text"
640            android:autofillHints="@string/enter_some_text"/>
641 </androidx.constraintlayout.widget.ConstraintLayout>
```

Java (KeyboardActivity.java)

```java
package com.madlab.simplekeyboard;

import androidx.appcompat.app.AppCompatActivity;

import android.os.Bundle;
import android.text.SpannableStringBuilder;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.ImageButton;
import android.widget.TextView;

public class MainActivity extends AppCompatActivity {

    private EditText display;
    private boolean capsLockOn;
    int[] letterIds = {
            R.id.a,
            R.id.b,
            R.id.c,
            R.id.d,
            R.id.e,
            R.id.f,
            R.id.g,
            R.id.h,
            R.id.i,
            R.id.j,
            R.id.k,
            R.id.l,
            R.id.m,
            R.id.n,
            R.id.o,
            R.id.p,
            R.id.q,
            R.id.r,
            R.id.s,
            R.id.t,
            R.id.u,
            R.id.v,
            R.id.w,
            R.id.x,
            R.id.y,
            R.id.z
    };
    int[] lowerCaseStringIds = {
            R.string.a,
            R.string.b,
            R.string.c,
            R.string.d,
```

```
50              R.string.e,
51              R.string.f,
52              R.string.g,
53              R.string.h,
54              R.string.i,
55              R.string.j,
56              R.string.k,
57              R.string.l,
58              R.string.m,
59              R.string.n,
60              R.string.o,
61              R.string.p,
62              R.string.q,
63              R.string.r,
64              R.string.s,
65              R.string.t,
66              R.string.u,
67              R.string.v,
68              R.string.w,
69              R.string.x,
70              R.string.y,
71              R.string.z
72      };
73      int[] upperCaseStringIds = {
74              R.string.A,
75              R.string.B,
76              R.string.C,
77              R.string.D,
78              R.string.E,
79              R.string.F,
80              R.string.G,
81              R.string.H,
82              R.string.I,
83              R.string.J,
84              R.string.K,
85              R.string.L,
86              R.string.M,
87              R.string.N,
88              R.string.O,
89              R.string.P,
90              R.string.Q,
91              R.string.R,
92              R.string.S,
93              R.string.T,
94              R.string.U,
95              R.string.V,
96              R.string.W,
97              R.string.X,
98              R.string.Y,
99              R.string.Z
100     };
```

```java
101
102      @Override
103      protected void onCreate(Bundle savedInstanceState) {
104          super.onCreate(savedInstanceState);
105          setContentView(R.layout.activity_main);
106
107          display = findViewById(R.id.display);
108          display.setShowSoftInputOnFocus(false);
109          capsLockOn = true;
110      }
111
112      private void updateText(String stringToAdd) {
113          String oldString = display.getText().toString();
114          int cursorPosition = display.getSelectionStart();
115          String leftString = oldString.substring(0, cursorPosition);
116          String rightString = oldString.substring(cursorPosition);
117
118          display.setText(String.format("%s%s%s", leftString, stringToAdd,
     rightString));
119          display.setSelection(cursorPosition + 1);
120      }
121
122      public void insertChar(View view) {
123          TextView button = (TextView) view;
124          String buttonChar = button.getText().toString();
125          updateText(buttonChar);
126      }
127
128      public void insertSpace(View view) {
129          updateText(" ");
130      }
131
132      public void insertNewLine(View view) {
133          updateText("\n");
134      }
135
136      public void backSpace(View view) {
137          int cursorPosition = display.getSelectionStart();
138          int textLen = display.getText().length();
139
140          if (cursorPosition != 0 && textLen != 0) {
141              SpannableStringBuilder selection = (SpannableStringBuilder)
     display.getText();
142              selection.replace(cursorPosition-1, cursorPosition, "");
143              display.setText(selection);
144              display.setSelection(cursorPosition-1);
145          }
146      }
147
148      public void toggleCapsLock(View view) {
149          ImageButton capsLockButton = findViewById(R.id.capslock);
```
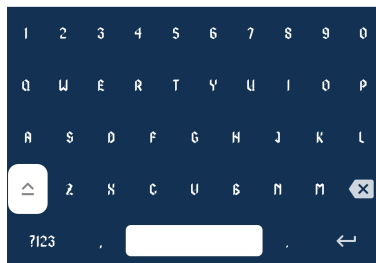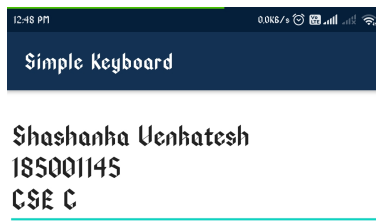
```java
150             if (capsLockOn) {
151                 capsLockButton.setImageResource(R.drawable.capslock_off);
152                 capsLockButton.setBackground(getDrawable(R.drawable.
        keyboard_button));
153                 switchToLowerCase();
154             } else {
155                 capsLockButton.setImageResource(R.drawable.capslock_on);
156                 capsLockButton.setBackground(getDrawable(R.drawable.
        keyboard_button_toggled));
157                 switchToUpperCase();
158             }
159             capsLockOn = !capsLockOn;
160         }
161
162     public void switchToLowerCase() {
163         Button button;
164         for (int i = 0; i < 26; i++) {
165             button = findViewById(letterIds[i]);
166             button.setText(lowerCaseStringIds[i]);
167         }
168     }
169
170     public void switchToUpperCase() {
171         Button button;
172         for (int i = 0; i < 26; i++) {
173             button = findViewById(letterIds[i]);
174             button.setText(upperCaseStringIds[i]);
175         }
176     }
177 }
```

App Screenshots

Entering Text (CapsLock on)

Entering Text (CapsLock off)