

## ASSIGNMENT 2

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# Simple Calculator and Keyboard

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## 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" />
34
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" />
47
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" />
60
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>
74
75 <TableRow
76     android:layout_width="match_parent"

```

```

77         android:layout_height="match_parent">
78
79         <Button
80             android:id="@+id/sevenBtn"
81             style="@style/Widget.AppCompat.Button.Borderless"
82             android:layout_width="0dp"
83             android:layout_height="wrap_content"
84             android:layout_margin="5dp"
85             android:layout_weight="1"
86             android:background="@drawable/rounded_rectangle"
87             android:onClick="insertChar"
88             android:text="@string/seven"
89             android:textSize="24sp" />
90
91         <Button
92             android:id="@+id/eightBtn"
93             style="@style/Widget.AppCompat.Button.Borderless"
94             android:layout_width="0dp"
95             android:layout_height="wrap_content"
96             android:layout_margin="5dp"
97             android:layout_weight="1"
98             android:background="@drawable/rounded_rectangle"
99             android:onClick="insertChar"
100            android:text="@string/eight"
101            android:textSize="24sp" />
102
103        <Button
104            android:id="@+id/nineBtn"
105            style="@style/Widget.AppCompat.Button.Borderless"
106            android:layout_width="0dp"
107            android:layout_height="wrap_content"
108            android:layout_margin="5dp"
109            android:layout_weight="1"
110            android:background="@drawable/rounded_rectangle"
111            android:onClick="insertChar"
112            android:text="@string/nine"
113            android:textSize="24sp" />
114
115        <Button
116            android:id="@+id/multiplyBtn"
117            style="@style/Widget.AppCompat.Button.Borderless"
118            android:layout_width="0dp"
119            android:layout_height="wrap_content"
120            android:layout_margin="5dp"
121            android:layout_weight="1"
122            android:background="@drawable/rounded_rectangle"
123            android:onClick="insertChar"
124            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" />
144
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" />
156
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" />
168
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"
176             android:background="@drawable/rounded_rectangle"
177             android:onClick="insertChar"
178             android:text="@string/add"
179             android:textSize="24sp"
180             app:backgroundTint="#CC6400" />
181     </TableRow>
182

```

```

183 <TableRow
184     android:layout_width="match_parent"
185     android:layout_height="match_parent">
186
187     <Button
188         android:id="@+id/oneBtn"
189         style="@style/Widget.AppCompat.Button.Borderless"
190         android:layout_width="0dp"
191         android:layout_height="wrap_content"
192         android:layout_margin="5dp"
193         android:layout_weight="1"
194         android:background="@drawable/rounded_rectangle"
195         android:onClick="insertChar"
196         android:text="@string/one"
197         android:textSize="24sp" />
198
199     <Button
200         android:id="@+id/twoBtn"
201         style="@style/Widget.AppCompat.Button.Borderless"
202         android:layout_width="0dp"
203         android:layout_height="wrap_content"
204         android:layout_margin="5dp"
205         android:layout_weight="1"
206         android:background="@drawable/rounded_rectangle"
207         android:onClick="insertChar"
208         android:text="@string/two"
209         android:textSize="24sp" />
210
211     <Button
212         android:id="@+id/threeBtn"
213         style="@style/Widget.AppCompat.Button.Borderless"
214         android:layout_width="0dp"
215         android:layout_height="wrap_content"
216         android:layout_margin="5dp"
217         android:layout_weight="1"
218         android:background="@drawable/rounded_rectangle"
219         android:onClick="insertChar"
220         android:text="@string/three"
221         android:textSize="24sp" />
222
223     <Button
224         android:id="@+id/subtractBtn"
225         style="@style/Widget.AppCompat.Button.Borderless"
226         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" />
235

```

```

236 </TableRow>
237
238 <TableRow
239     android:layout_width="match_parent"
240     android:layout_height="match_parent">
241
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" />
254
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" />
266
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" />
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)

```
1 package com.madlab.calculator;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.os.Bundle;
6 import android.text.SpannableStringBuilder;
7 import android.view.View;
8 import android.widget.EditText;
9 import android.widget.TextView;
10
11 import org.mariuszgromada.math.mxparser.*;
12
13 public class MainActivity extends AppCompatActivity {
14
15     private EditText inputExpression;
16
17     @Override
18     protected void onCreate(Bundle savedInstanceState) {
19         super.onCreate(savedInstanceState);
20         setContentView(R.layout.activity_main);
21
22         inputExpression = findViewById(R.id.inputExpression);
23         inputExpression.setShowSoftInputOnFocus(false);
24
25         inputExpression.setOnClickListener(new View.OnClickListener() {
26             @Override
27             public void onClick(View view) {
28                 if (getString(R.string.display).equals(inputExpression.
29 getText().toString())) {
30                     inputExpression.setText("");
31                 }
32             });
33     }
34
35     private void updateText(String stringToAdd) {
36         // Get the current string
37         String currentString = inputExpression.getText().toString();
38
39         // Get the cursor position and split the string at the cursor
40         position
41         int cursorPosition = inputExpression.getSelectionStart();
42         String leftString = currentString.substring(0, cursorPosition);
43         String rightString = currentString.substring(cursorPosition);
44
45         if (getString(R.string.display).equals(inputExpression.getText()
46 .toString())) {
47             inputExpression.setText(stringToAdd);
48         }
49         else {
50             // Set the display to the new string
51         }
52     }
53 }
```



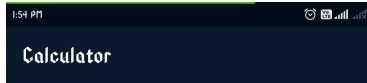
```

49         inputExpression.setText(String.format("%s%s%s", leftString,
stringToAdd, rightString));
50     }
51
52     // Set the cursor to be after the newly inserted character
53     inputExpression.setSelection(cursorPosition + 1);
54 }
55
56 public void deleteCharacter(View view) {
57     // Get the cursor position and input expression length
58     int cursorPosition = inputExpression.getSelectionStart();
59     int inputLen = inputExpression.getText().length();
60
61     // If there is some text in the input and the cursor isn't at
the beginning
62     if (cursorPosition != 0 && inputLen != 0) {
63         // Extract the string
64         SpannableStringBuilder selection = (SpannableStringBuilder)
inputExpression.getText();
65
66         // Replace the selected character with an empty character
67         selection.replace(cursorPosition - 1, cursorPosition, "");
68
69         // Set the edited string as the display
70         inputExpression.setText(selection);
71
72         // Fix the new cursor position
73         inputExpression.setSelection(cursorPosition - 1);
74     }
75 }
76
77 public void insertChar(View view) {
78     TextView button = (TextView) view;
79     String buttonChar = button.getText().toString ();
80     updateText(buttonChar);
81 }
82
83 public void clearExpression(View view) {
84     inputExpression.setText("");
85 }
86
87 public void evaluate(View view) {
88     Expression exp = new Expression((inputExpression.getText().
toString()));
89     String result = String.valueOf(exp.calculate());
90     inputExpression.setText(result);
91     inputExpression.setSelection(result.length());
92 }
93 }

```

## App Screenshots

### Entering an expression



$25+98-(21*6)/3$



### Result



81.0



# Simple Keyboard

## XML (activity\_keyboard.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:layout_width="match_parent"
11     android:layout_height="wrap_content"
12     app:layout_constraintBottom_toBottomOf="parent"
13     app:layout_constraintTop_toBottomOf="@+id/display"
14     app:layout_constraintVertical_bias="1.0"
15     tools:layout_editor_absoluteX="1dp"
16     android:background="@color/deep_blue">
17
18     <TableRow
19       android:layout_width="match_parent"
20       android:layout_height="match_parent">
21
22       <Button
23         android:id="@+id/one"
24         style="@style/Widget.AppCompat.Button.Borderless"
25         android:layout_width="wrap_content"
26         android:layout_height="wrap_content"
27         android:layout_weight="1"
28         android:text="@string/one"
29         android:onClick="insertChar"
30         android:layout_margin="1dp"
31         android:textColor="@color/white"
32         android:background="@drawable/keyboard_button"
33         android:padding="0dp"/>
34
35       <Button
36         android:id="@+id/two"
37         style="@style/Widget.AppCompat.Button.Borderless"
38         android:layout_width="wrap_content"
39         android:layout_height="wrap_content"
40         android:layout_weight="1"
41         android:text="@string/two"
42         android:onClick="insertChar"
43         android:layout_margin="1dp"
44         android:textColor="@color/white"
45         android:background="@drawable/keyboard_button"
46         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" />
254
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" />
268
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" />
282
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>
297
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"
353         android:textColor="@color/white"
354         android:background="@drawable/keyboard_button"
355         android:padding="0dp"
356         android:textAllCaps="false" />
357
358     <Button
359         android:id="@+id/g"
360         style="@style/Widget.AppCompat.Button.Borderless"
361         android:layout_width="wrap_content"
362         android:layout_height="wrap_content"
363         android:layout_weight="1"
364         android:text="@string/G"
365         android:onClick="insertChar"

```

```

366         android:layout_margin="1dp"
367         android:textColor="@color/white"
368         android:background="@drawable/keyboard_button"
369         android:padding="0dp"
370         android:textAllCaps="false" />
371
372     <Button
373         android:id="@+id/h"
374         style="@style/Widget.AppCompat.Button.Borderless"
375         android:layout_width="wrap_content"
376         android:layout_height="wrap_content"
377         android:layout_weight="1"
378         android:text="@string/H"
379         android:onClick="insertChar"
380         android:layout_margin="1dp"
381         android:textColor="@color/white"
382         android:background="@drawable/keyboard_button"
383         android:padding="0dp"
384         android:textAllCaps="false" />
385
386     <Button
387         android:id="@+id/j"
388         style="@style/Widget.AppCompat.Button.Borderless"
389         android:layout_width="wrap_content"
390         android:layout_height="wrap_content"
391         android:layout_weight="1"
392         android:text="@string/J"
393         android:onClick="insertChar"
394         android:layout_margin="1dp"
395         android:textColor="@color/white"
396         android:background="@drawable/keyboard_button"
397         android:padding="0dp"
398         android:textAllCaps="false" />
399
400     <Button
401         android:id="@+id/k"
402         style="@style/Widget.AppCompat.Button.Borderless"
403         android:layout_width="wrap_content"
404         android:layout_height="wrap_content"
405         android:layout_weight="1"
406         android:text="@string/K"
407         android:onClick="insertChar"
408         android:layout_margin="1dp"
409         android:textColor="@color/white"
410         android:background="@drawable/keyboard_button"
411         android:padding="0dp"
412         android:textAllCaps="false" />
413
414     <Button
415         android:id="@+id/l"
416         style="@style/Widget.AppCompat.Button.Borderless"
417         android:layout_width="wrap_content"
418         android:layout_height="wrap_content"

```

```

419         android:layout_weight="1"
420         android:text="@string/L"
421         android:onClick="insertChar"
422         android:layout_margin="1dp"
423         android:textColor="@color/white"
424         android:background="@drawable/keyboard_button"
425         android:padding="0dp"
426         android:textAllCaps="false" />
427     </TableRow>
428
429     <TableRow
430         android:layout_width="match_parent"
431         android:layout_height="match_parent">
432
433         <ImageButton
434             android:id="@+id/capslock"
435             style="@style/Widget.AppCompat.Button.Borderless"
436             android:layout_width="wrap_content"
437             android:layout_height="wrap_content"
438             app:srcCompat="@drawable/capslock_on"
439             android:onClick="toggleCapsLock"
440             android:layout_weight="1"
441             android:layout_margin="1dp"
442             android:background="@drawable/keyboard_button_toggled"
443             android:padding="0dp"
444             android:contentDescription="@string/capslock"/>
445
446         <Button
447             android:id="@+id/z"
448             style="@style/Widget.AppCompat.Button.Borderless"
449             android:layout_width="wrap_content"
450             android:layout_height="wrap_content"
451             android:layout_weight="1"
452             android:text="@string/Z"
453             android:onClick="insertChar"
454             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)

```
1 package com.madlab.simplekeyboard;
2
3 import androidx.appcompat.app.AppCompatActivity;
4
5 import android.os.Bundle;
6 import android.text.SpannableStringBuilder;
7 import android.view.View;
8 import android.widget.Button;
9 import android.widget.EditText;
10 import android.widget.ImageButton;
11 import android.widget.TextView;
12
13 public class MainActivity extends AppCompatActivity {
14
15     private EditText display;
16     private boolean capsLockOn;
17     int[] letterIds = {
18         R.id.a,
19         R.id.b,
20         R.id.c,
21         R.id.d,
22         R.id.e,
23         R.id.f,
24         R.id.g,
25         R.id.h,
26         R.id.i,
27         R.id.j,
28         R.id.k,
29         R.id.l,
30         R.id.m,
31         R.id.n,
32         R.id.o,
33         R.id.p,
34         R.id.q,
35         R.id.r,
36         R.id.s,
37         R.id.t,
38         R.id.u,
39         R.id.v,
40         R.id.w,
41         R.id.x,
42         R.id.y,
43         R.id.z
44     };
45     int[] lowerCaseStringIds = {
46         R.string.a,
47         R.string.b,
48         R.string.c,
49         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    };
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,
119 rightString));
120         display.setSelection(cursorPosition + 1);
121     }
122
123     public void insertChar(View view) {
124         TextView button = (TextView) view;
125         String buttonChar = button.getText().toString();
126         updateText(buttonChar);
127     }
128
129     public void insertSpace(View view) {
130         updateText(" ");
131     }
132
133     public void insertNewLine(View view) {
134         updateText("\n");
135     }
136
137     public void backSpace(View view) {
138         int cursorPosition = display.getSelectionStart();
139         int textLen = display.getText().length();
140
141         if (cursorPosition != 0 && textLen != 0) {
142             SpannableStringBuilder selection = (SpannableStringBuilder)
143 display.getText();
144             selection.replace(cursorPosition-1, cursorPosition, "");
145             display.setText(selection);
146             display.setSelection(cursorPosition-1);
147         }
148     }
149
150     public void toggleCapsLock(View view) {
151         ImageButton capsLockButton = findViewById(R.id.capslock);
152         if (capsLockOn) {
153             capsLockButton.setImageResource(R.drawable.capslock_off);
154             capsLockButton.setBackground(getDrawable(R.drawable.
155 keyboard_button));
156             switchToLowerCase();
157         } else {

```

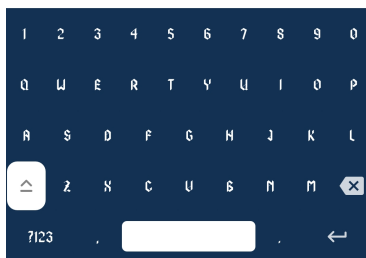
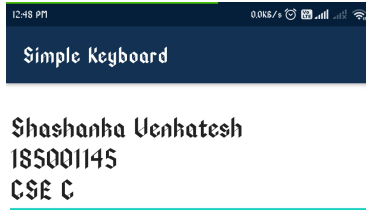
```

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)

