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#Android

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# Building a Simple Calculator App in Android with Kotlin<sup>#</sup>

## Introduction<sup>#</sup>

In this tutorial, we will create a simple calculator app using Android Studio, Kotlin, and the mXparser library to handle mathematical expressions. This project is great for beginners and intermediate developers who want to enhance their skills in Android app development.

## Prerequisites<sup>#</sup>

- Android Studio installed on your computer.
- Basic understanding of Kotlin and XML layout design.
- Familiarity with third-party libraries in Android.

## Setup Your Project<sup>#</sup>

### 1. Create a New Android Project:

- Open Android Studio.
- Click on "New Project".
- Select "Empty Activity".
- Name your project "Calculator".

- Set "Kotlin" as the programming language.
- Finish.

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## 2. Add mXparser Library:

- Open your `build.gradle (Module: app)` file.
- Add the following dependency to include the mXparser library:

```
1 implementation("org.mariuszgromada.math:MathParser.org-mXparser:4.4.2")
```

## 3. Enable View Binding:

- Still in the `build.gradle (Module: app)` file, add the following inside the `android` block:

```
1 viewBinding {  
2     enabled = true  
3 }
```

## 4. Sync Your Project:

- Click "Sync Now" in the bar that appears in Android Studio to ensure all configurations are updated.

# Designing the UI#

## 1. Modify `activity_main.xml`:

- Replace the content with the following XML to create the UI for your calculator:

```
1 <?xml version="1.0" encoding="utf-8"?>  
2 <LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"  
3     xmlns:app="http://schemas.android.com/apk/res-auto"  
4     xmlns:tools="http://schemas.android.com/tools"  
5     android:layout_width="match_parent"  
6     android:layout_height="match_parent"  
7     android:orientation="vertical"  
8     android:background="@color/window_background"  
9     tools:context=".MainActivity">  
10  
11     <TextView  
12         android:layout_width="match_parent"  
13         android:layout_height="wrap_content"  
14         android:gravity="center"  
15         android:onClick="openWebsite"  
16         android:padding="16dp"  
17         android:text="ibsanju Calculator"
```

```
18         android:textColor="@color/black"
19         android:textSize="24sp" />
20         Home About Contact
21     <LinearLayout
22         android:layout_width="match_parent"
23         android:layout_height="0dp"
24         android:layout_weight="1"
25         android:gravity="bottom"
26         android:padding="16dp"
27         android:background="@color/io_background"
28         android:orientation="vertical">
29
30         <TextView
31             android:id="@+id/input"
32             android:layout_width="match_parent"
33             android:layout_height="wrap_content"
34             android:gravity="end"
35             android:textSize="30sp"
36             android:maxLines="3"
37             android:textColor="@color/text_main"
38             android:fontFamily="sans-serif-light"
39             tools:text="5+10-3" />
40
41         <TextView
42             android:id="@+id/output"
43             android:layout_width="match_parent"
44             android:layout_height="wrap_content"
45             android:gravity="end"
46             android:textSize="50sp"
47             android:maxLines="2"
48             android:fontFamily="sans-serif"
49             android:textColor="@color/green"
50             tools:text="12" />
51
52     </LinearLayout>
53
54     <TableLayout
55         android:layout_width="match_parent"
56         android:layout_height="wrap_content"
57         android:stretchColumns="*">
58
59         <TableRow>
60
61             <androidx.appcompat.widget.AppCompatButton
62                 android:id="@+id/button_clear"
63                 android:layout_width="wrap_content"
64                 android:layout_height="90dp"
65                 style="@style/Button_Style"
66                 android:textColor="@color/red"
67                 android:text="C" />
68
69             <androidx.appcompat.widget.AppCompatButton
```

```

69         android:id="@+id/button_bracket"
70         android:layout_width="wrap_content"
71         android:layout_height="90dp"
72         style="@style/Button_Style"
73         android:textColor="@color/green"
74         android:text="(" />
75     <androidx.appcompat.widget.AppCompatButton
76         android:id="@+id/button_bracket_r"
77         android:layout_width="wrap_content"
78         android:layout_height="90dp"
79         style="@style/Button_Style"
80         android:textColor="@color/green"
81         android:text=")" />
82     <androidx.appcompat.widget.AppCompatButton
83         android:textColor="@color/green"
84         android:id="@+id/button_division"
85         android:layout_width="wrap_content"
86         android:layout_height="90dp"
87         style="@style/Button_Style"
88         android:text="÷" />
89
90 </TableRow>
91
92 <TableRow>
93
94     <androidx.appcompat.widget.AppCompatButton
95         android:id="@+id/button_7"
96         android:layout_width="wrap_content"
97         android:layout_height="90dp"
98         style="@style/Button_Style"
99         android:text="7" />
100    <androidx.appcompat.widget.AppCompatButton
101        android:id="@+id/button_8"
102        android:layout_width="wrap_content"
103        android:layout_height="90dp"
104        style="@style/Button_Style"
105        android:text="8" />
106    <androidx.appcompat.widget.AppCompatButton
107        android:id="@+id/button_9"
108        android:layout_width="wrap_content"
109        android:layout_height="90dp"
110        style="@style/Button_Style"
111        android:text="9" />
112    <androidx.appcompat.widget.AppCompatButton
113        android:textColor="@color/green"
114        android:id="@+id/button_multiply"
115        android:layout_width="wrap_content"
116        android:layout_height="90dp"
117        style="@style/Button_Style"
118        android:text="x" />
119

```

```
120     </TableRow>
121     <TableRow>
122         <div>
123             <androidx.appcompat.widget.AppCompatButton
124                 android:id="@+id/button_4"
125                 android:layout_width="wrap_content"
126                 android:layout_height="90dp"
127                 style="@style/Button_Style"
128                 android:text="4" />
129             <androidx.appcompat.widget.AppCompatButton
130                 android:id="@+id/button_5"
131                 android:layout_width="wrap_content"
132                 android:layout_height="90dp"
133                 style="@style/Button_Style"
134                 android:text="5" />
135             <androidx.appcompat.widget.AppCompatButton
136                 android:id="@+id/button_6"
137                 android:layout_width="wrap_content"
138                 android:layout_height="90dp"
139                 style="@style/Button_Style"
140                 android:text="6" />
141             <androidx.appcompat.widget.AppCompatButton
142                 android:textColor="@color/green"
143                 android:id="@+id/button_subtraction"
144                 android:layout_width="wrap_content"
145                 android:layout_height="90dp"
146                 style="@style/Button_Style"
147                 android:textSize="40sp"
148                 android:text="-" />
149         </div>
150     </TableRow>
151     <TableRow>
152         <div>
153             <androidx.appcompat.widget.AppCompatButton
154                 android:id="@+id/button_1"
155                 android:layout_width="wrap_content"
156                 android:layout_height="90dp"
157                 style="@style/Button_Style"
158                 android:text="1" />
159             <androidx.appcompat.widget.AppCompatButton
160                 android:id="@+id/button_2"
161                 android:layout_width="wrap_content"
162                 android:layout_height="90dp"
163                 style="@style/Button_Style"
164                 android:text="2" />
165             <androidx.appcompat.widget.AppCompatButton
166                 android:id="@+id/button_3"
167                 android:layout_width="wrap_content"
168                 android:layout_height="90dp"
169                 style="@style/Button_Style"
170                 android:text="3" />
```

```

171         <androidx.appcompat.widget.AppCompatButton
172             android:textColor="@color/green"
173             android:id="@+id/button_addition"
174             android:layout_width="wrap_content"
175             android:layout_height="90dp"
176             style="@style/Button_Style"
177             android:text="+" />
178
179     </TableRow>
180     <TableRow>
181
182         <androidx.appcompat.widget.AppCompatButton
183             android:id="@+id/button_croxx"
184             android:layout_width="wrap_content"
185             android:layout_height="90dp"
186             style="@style/Button_Style"
187             android:text="AC" />
188
189         <androidx.appcompat.widget.AppCompatButton
190             android:id="@+id/button_0"
191             android:layout_width="wrap_content"
192             android:layout_height="90dp"
193             style="@style/Button_Style"
194             android:text="0" />
195
196         <androidx.appcompat.widget.AppCompatButton
197             android:id="@+id/button_dot"
198             android:layout_width="wrap_content"
199             android:layout_height="90dp"
200             style="@style/Button_Style"
201             android:text="." />
202
203         <androidx.appcompat.widget.AppCompatButton
204             android:id="@+id/button_equals"
205             android:layout_width="0dp"
206             android:layout_height="90dp"
207             android:layout_weight="1"
208             style="@style/Button_Style"
209             android:textColor="@color/green"
210             android:text="=" />
211
212     </TableRow>
213 </TableLayout>
</LinearLayout>

```

- This layout uses `LinearLayout` and `TableLayout` to organize the buttons and display panels.

## 2. Define Colors and Styles:

- In `res/values/colors.xml`, define the necessary colors:

```

1  <?xml version="1.0" encoding="utf-8"?>
2  <resources>
3      <color name="purple_200">#FFB386FC</color>
4      <color name="purple_500">#FF6200EE</color>
5      <color name="purple_700">#F9F9F9</color>
6      <color name="teal_200">#FF03DAC5</color>
7      <color name="teal_700">#FF018786</color>
8      <color name="black">#FF000000</color>
9      <color name="white">#FFFFFFFF</color>
10
11     <color name="window_background">#FFFFFFFF</color>
12     <color name="io_background">#F9F9F9</color>
13     <color name="green">#4ea043</color>
14     <color name="red">#d14f4f</color>
15     <color name="text_main">#FF000000</color>
16 </resources>

```

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- In `res/values/styles.xml`, define a style for the calculator buttons:

```

1  <?xml version="1.0" encoding="utf-8"?>
2  <resources>
3      <style name="Button_Style" parent="Widget.AppCompat.Button.Borderless">
4          <item name="android:textSize">24sp</item>
5          <item name="android:textColor">@color/black</item>
6          <item name="android:gravity">center</item>
7          <item name="fontFamily">sans-serif-light</item>
8      </style>
9  </resources>

```

## Implementing Functionality in Kotlin#

### 1. Setup the `MainActivity`:

- Open `MainActivity.kt`.
- Implement view binding and initialize UI components.
- Set up button click listeners to build the expression and calculate results.

```

1  package com.ibsanju.calculator
2
3  import android.content.Intent
4  import android.net.Uri
5  import android.os.Bundle
6  import android.view.View
7  import androidx.appcompat.app.AppCompatActivity
8  import androidx.appcompat.app.AppCompatActivity

```



```

9  import androidx.core.content.ContextCompat
10 import com.ibsanju.calculator.databinding.ActivityMainBinding
11 import org.mariuszgromada.math.mxparser.Expression
12 import java.text.DecimalFormat
13
14 class MainActivity : AppCompatActivity() {
15     private lateinit var binding: ActivityMainBinding
16
17     override fun onCreate(savedInstanceState: Bundle?) {
18         super.onCreate(savedInstanceState)
19         binding = ActivityMainBinding.inflate(layoutInflater)
20         setContentView(binding.root)
21
22         AppCompatDelegate.setDefaultNightMode(AppCompatDelegate.MODE_NIGHT_FOLLOW_SYSTEM)
23         setupCalculatorButtons()
24     }
25
26     private fun setupCalculatorButtons() {
27         // Number buttons
28         listOf(
29             binding.button0, binding.button1, binding.button2, binding.button3,
30             binding.button4, binding.button5, binding.button6, binding.button7,
31             binding.button8, binding.button9
32         ).forEachIndexed { index, button ->
33             button.setOnClickListener {
34                 binding.input.text = addToInputText(index.toString())
35                 showResult()
36             }
37         }
38
39         // Operators and other buttons
40         binding.buttonCroxx.apply {
41             setOnClickListener {
42                 binding.input.text = ""
43                 binding.output.text = ""
44             }
45         }
46
47         binding.buttonBracket.setOnClickListener { binding.input.text = addToInputText("(") }
48         binding.buttonBracketR.setOnClickListener {
49             binding.input.text = addToInputText(")"); showResult();
50         }
51         binding.buttonClear.setOnClickListener {
52             binding.input.text = binding.input.text.dropLast(1)
53             showResult()
54         }
55         binding.buttonDot.setOnClickListener { binding.input.text = addToInputText(".") }
56         binding.buttonDivision.setOnClickListener { binding.input.text = addToInputText("÷") }
57         binding.buttonMultiply.setOnClickListener { binding.input.text = addToInputText("×") }
58         binding.buttonSubtraction.setOnClickListener { binding.input.text = addToInputText("-") }
59         binding.buttonAddition.setOnClickListener { binding.input.text = addToInputText("+") }

```

```

60     binding.buttonEquals.setOnClickListener { showResult() }
61 }
62
63 private fun addToInputText(buttonValue: String): String {
64     val currentText = binding.input.text.toString()
65     if (buttonValue == "(" && currentText.isNotEmpty() && currentText.last().isDigit()) {
66         // If last character is a number and the new input is an opening parenthesis
67         return "$currentTextx("
68     } else if (buttonValue.first()
69         .isDigit() && currentText.isNotEmpty() && currentText.last() == ')')
70     ) {
71         // If the new input starts with a digit and the last character is a closing parenthesis
72         return "$currentTextx$buttonValue"
73     }
74     return currentText + buttonValue
75 }
76
77
78 private fun getInputExpression(): String =
79     binding.input.text.toString()
80         .replace("÷", "/")
81         .replace("x", "*")
82
83 private fun showResult() {
84     try {
85         val expression = getInputExpression()
86         val result = Expression(expression).calculate()
87         if (result.isNaN()) {
88             binding.output.text = "Invalid Input"
89             binding.output.setTextColor(ContextCompat.getColor(this, R.color.red))
90         } else {
91             binding.output.text = DecimalFormat("0.#####").format(result).toString()
92             binding.output.setTextColor(ContextCompat.getColor(this, R.color.green))
93         }
94     } catch (e: Exception) {
95         binding.output.text = "Error: " + e.message
96         binding.output.setTextColor(ContextCompat.getColor(this, R.color.red))
97     }
98 }
99
100 fun openWebsite(view: View) {
101     val intent = Intent(Intent.ACTION_VIEW, Uri.parse("https://www.ibsanju.com"))
102     startActivity(intent)
103 }
104 }
105

```

- Ensure that input handling for operations is correct, especially for inserting multiplication signs when needed next to parentheses.

## 2. Handling Mathematical Expressions:

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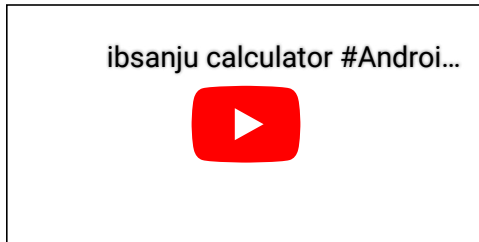
- Use the mXparser library to evaluate the expression entered by the user.
- Handle exceptions and invalid inputs gracefully.

## Running Your App#

- **Build and Run:**
  - Connect an Android device or use an emulator.
  - Run the application and test the functionality of your calculator.

## Demo Video#

Check out the demo of "Calculator App" below:



## Download Links#

- **Android (apk):** [click here to download](#)

## Conclusion#

Congratulations! You've now built a fully functional calculator app for Android that handles basic arithmetic operations. As an extension, consider adding features such as complex operations, history of calculations, or even graphing capabilities.

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