Progress Report on App Development (Week 02)

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I am pleased to present you with a comprehensive report on app development (Week 02), which provides an overview of “A Scientific Calculator Android App” with the process, challenges, and best practices for successful app development. This report aims to make understanding of the key aspects of app development and making informed decisions in this domain.

**Progress Report on App Development (Week 02)**

# An Overview on App Development

In the 2nd week of “6 Weeks of App Development – Project-Based Learning”, you have built a very basic android app that takes only two numbers and adds them. And there are only some lines of codes to perform this action. So, you have got some basic ideas about android development now. Let’s move toward the next project

* A Scientific Calculator Android App

## Content:

* Create a New Project
* Adding new colors to the colors.xml file
* Working with the activity\_main.xml file
* Working with the MainActivity.kt file
* Creating variables for our TextView and Button
* Initializing all the variables
* Adding onClickListener() to all the Buttons
* Source Code
* Output

### Challenges and Hurdles:

* **Use different colours in your android app**
* **Build some complex UI in Android and make the app’s UI awesome (Relative Layout and Linear Layout)**
* **Writing some simple logic for simple math calculation**
* **Toast in Android**

#### Lesson Learned:

* **A Scientific Calculator Android App**

We are going to implement this project using the **Kotlin**language. Don’t worry Kotlin is similar to Java.

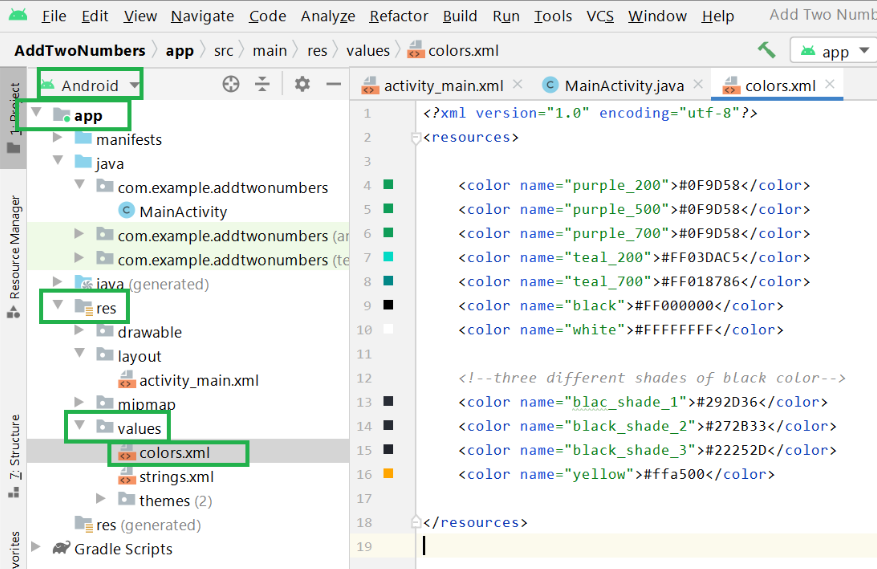
**Step By Step Implementation of Project 2:**

**Step 1: Create a New Project**

To create a new project in Android Studio please refer to How to Create/Start a New Project in Android Studio. Note that select Kotlin as the programming language this time.

**Step 2: Adding new colors to the colors.xml file**

Navigate to the app > res > values > colors.xml file as below screenshot.



And add the below code to it for different colors.

**Xml**

<?**xml** version="1.0" encoding="utf-8"?>

<**resources**>

    <**color** name="purple\_200">#0F9D58</**color**>

    <**color** name="purple\_500">#0F9D58</**color**>

    <**color** name="purple\_700">#0F9D58</**color**>

    <**color** name="teal\_200">#FF03DAC5</**color**>

    <**color** name="teal\_700">#FF018786</**color**>

    <**color** name="black">#FF000000</**color**>

    <**color** name="white">#FFFFFFFF</**color**>

    <!--three different shades of black color-->

    <**color** name="blac\_shade\_1">#292D36</**color**>

    <**color** name="black\_shade\_2">#272B33</**color**>

    <**color** name="black\_shade\_3">#22252D</**color**>

    <**color** name="yellow">#ffa500</**color**>

</**resources**>

**Step 3: Working with the activity\_main.xml file**

Navigate to the app > res > layout > activity\_main.xml and add the below code to that file. What we have used in this file:

* RelativeLayout
* TextView
* CardView
* LinearLayout
* Button

Below is the code for the activity\_main.xml file.

**Xml**

<?**xml** version="1.0" encoding="utf-8"?>

<**RelativeLayout**

    xmlns:android="<http://schemas.android.com/apk/res/android>"

    xmlns:app="<http://schemas.android.com/apk/res-auto>"

    xmlns:tools="<http://schemas.android.com/tools>"

    android:layout\_width="match\_parent"

    android:layout\_height="match\_parent"

    android:background="@color/black\_shade\_3"

    tools:context=".MainActivity">

    <**TextView**

        android:id="@+id/idTVSecondary"

        android:layout\_width="match\_parent"

        android:layout\_height="70dp"

        android:background="@color/black\_shade\_3"

        android:gravity="bottom"

        android:maxLines="1"

        android:padding="10dp"

        android:paddingTop="30dp"

        android:text=""

        android:textAlignment="viewEnd"

        android:textColor="@color/white"

        android:textSize="15sp"

        tools:ignore="RtlCompat" />

    <**TextView**

        android:id="@+id/idTVprimary"

        android:layout\_width="match\_parent"

        android:layout\_height="100dp"

        android:layout\_below="@id/idTVSecondary"

        android:background="@color/black\_shade\_3"

        android:gravity="bottom"

        android:maxLines="1"

        android:padding="10dp"

        android:text=""

        android:textAlignment="viewEnd"

        android:textColor="#fff"

        android:textSize="50sp"

        tools:ignore="RtlCompat" />

    <**androidx.cardview.widget.CardView**

        android:layout\_width="match\_parent"

        android:layout\_height="match\_parent"

        android:layout\_below="@id/idTVprimary"

        android:background="@color/blac\_shade\_1"

        app:cardCornerRadius="4dp"

        app:cardElevation="2dp">

        <**LinearLayout**

            android:layout\_width="match\_parent"

            android:layout\_height="match\_parent"

            android:layout\_weight="7"

            android:background="@color/blac\_shade\_1"

            android:orientation="vertical">

            <**LinearLayout**

                android:layout\_width="match\_parent"

                android:layout\_height="match\_parent"

                android:orientation="vertical"

                android:weightSum="7">

                <**LinearLayout**

                    android:layout\_width="match\_parent"

                    android:layout\_height="match\_parent"

                    android:layout\_weight="1"

                    android:orientation="horizontal">

                    <**LinearLayout**

                        android:layout\_width="match\_parent"

                        android:layout\_height="match\_parent"

                        android:orientation="horizontal"

                        android:weightSum="4">

                        <**Button**

                            android:id="@+id/bac"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="AC"

                            android:textColor="@color/yellow"

                            android:textSize="15sp"

                            tools:targetApi="lollipop" />

                        <**Button**

                            android:id="@+id/bc"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="C"

                            android:textColor="@color/yellow"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/bbrac1"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="("

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/bbrac2"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text=")"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                    </**LinearLayout**>

                </**LinearLayout**>

                <**LinearLayout**

                    android:layout\_width="match\_parent"

                    android:layout\_height="match\_parent"

                    android:layout\_weight="1"

                    android:orientation="horizontal">

                    <**LinearLayout**

                        android:layout\_width="match\_parent"

                        android:layout\_height="match\_parent"

                        android:orientation="horizontal"

                        android:weightSum="5">

                        <**Button**

                            android:id="@+id/bsin"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="sin"

                            android:textAllCaps="false"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/bcos"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="cos"

                            android:textAllCaps="false"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/btan"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="tan"

                            android:textAllCaps="false"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/blog"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="log"

                            android:textAllCaps="false"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/bln"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="ln"

                            android:textAllCaps="false"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                    </**LinearLayout**>

                </**LinearLayout**>

                <**LinearLayout**

                    android:layout\_width="match\_parent"

                    android:layout\_height="match\_parent"

                    android:layout\_weight="1"

                    android:orientation="horizontal">

                    <**LinearLayout**

                        android:layout\_width="match\_parent"

                        android:layout\_height="match\_parent"

                        android:orientation="horizontal"

                        android:weightSum="5">

                        <**Button**

                            android:id="@+id/bfact"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="x!"

                            android:textAllCaps="false"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/bsquare"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="x²"

                            android:textAllCaps="false"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/bsqrt"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="√"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/binv"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="1/x"

                            android:textAllCaps="false"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/bdiv"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="÷"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                    </**LinearLayout**>

                </**LinearLayout**>

                <**LinearLayout**

                    android:layout\_width="match\_parent"

                    android:layout\_height="match\_parent"

                    android:layout\_weight="1"

                    android:orientation="horizontal">

                    <**LinearLayout**

                        android:layout\_width="match\_parent"

                        android:layout\_height="match\_parent"

                        android:orientation="horizontal"

                        android:weightSum="4">

                        <**Button**

                            android:id="@+id/b7"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="7"

                            android:textColor="#fff"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/b8"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="8"

                            android:textColor="#fff"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/b9"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="9"

                            android:textColor="#fff"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/bmul"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="×"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                    </**LinearLayout**>

                </**LinearLayout**>

                <**LinearLayout**

                    android:layout\_width="match\_parent"

                    android:layout\_height="match\_parent"

                    android:layout\_weight="1"

                    android:orientation="horizontal">

                    <**LinearLayout**

                        android:layout\_width="match\_parent"

                        android:layout\_height="match\_parent"

                        android:orientation="horizontal"

                        android:weightSum="4">

                        <**Button**

                            android:id="@+id/b4"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="4"

                            android:textColor="#fff"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/b5"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="5"

                            android:textColor="#fff"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/b6"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="6"

                            android:textColor="#fff"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/bminus"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="-"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                    </**LinearLayout**>

                </**LinearLayout**>

                <**LinearLayout**

                    android:layout\_width="match\_parent"

                    android:layout\_height="match\_parent"

                    android:layout\_weight="1"

                    android:orientation="horizontal">

                    <**LinearLayout**

                        android:layout\_width="match\_parent"

                        android:layout\_height="match\_parent"

                        android:orientation="horizontal"

                        android:weightSum="4">

                        <**Button**

                            android:id="@+id/b1"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="1"

                            android:textColor="#fff"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/b2"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="2"

                            android:textColor="#fff"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/b3"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="3"

                            android:textColor="#fff"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/bplus"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="+"

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                    </**LinearLayout**>

                </**LinearLayout**>

                <**LinearLayout**

                    android:layout\_width="match\_parent"

                    android:layout\_height="match\_parent"

                    android:layout\_weight="1"

                    android:orientation="horizontal">

                    <**LinearLayout**

                        android:layout\_width="match\_parent"

                        android:layout\_height="match\_parent"

                        android:orientation="horizontal"

                        android:weightSum="4">

                        <**Button**

                            android:id="@+id/bpi"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="π"

                            android:textColor="#fff"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/b0"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="0"

                            android:textColor="#fff"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/bdot"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="."

                            android:textColor="#fff"

                            android:textSize="15sp" />

                        <**Button**

                            android:id="@+id/bequal"

                            android:layout\_width="match\_parent"

                            android:layout\_height="match\_parent"

                            android:layout\_margin="3dp"

                            android:layout\_weight="1"

                            android:backgroundTint="@color/black\_shade\_2"

                            android:padding="6dp"

                            android:text="="

                            android:textColor="#ffa500"

                            android:textSize="15sp" />

                    </**LinearLayout**>

                </**LinearLayout**>

            </**LinearLayout**>

        </**LinearLayout**>

    </**androidx.cardview.widget.CardView**>

</**RelativeLayout**>

**Step 4: Working with the MainActivity.kt file**

So as we have discussed earlier the backend part is written in this file. The backend part means the simple logic part. And for this project, we are going to write the code in the Kotlin language.

**4.1: Creating variables for our TextView and Button**

**lateinit var tvsec: TextView**

**lateinit var tvMain: TextView**

**lateinit var bac: Button**

**lateinit var bc: Button**

**lateinit var bbrac1: Button**

**lateinit var bbrac2: Button**

**--------------------------**

**--------------------------**

**--------------------------**

**// similarly create variable for all the TextView**

**// and Button you have declared in the XML file**

**4.2: Initializing all the variables**

**tvsec = findViewById(R.id.idTVSecondary)**

**tvMain = findViewById(R.id.idTVprimary)**

**bac = findViewById(R.id.bac)**

**bc = findViewById(R.id.bc)**

**--------------------------**

**--------------------------**

**--------------------------**

**// similarly initialize all the variables**

**4.3: Adding onClickListener() to all the Buttons**

**b1.setOnClickListener {**

**// on below line we are appending**

**// the expression to our text view.**

**tvMain.text = (tvMain.text.toString() + "1")**

**}**

**b2.setOnClickListener {**

**// on below line we are appending**

**// the expression to our text view.**

**tvMain.text = (tvMain.text.toString() + "2")**

**--------------------------**

**--------------------------**

**// similarly Add onClickListener() to all the Buttons**

At last write down the dimple logic for all the calculations (Addition, multiplication, division, etc.). Let we are going to write the code for the factorial of a number. So write down the code as below:

**fun factorial(n: Int): Int {**

**// this method is use to find factorial**

**return if (n == 1 || n == 0) 1 else n \* factorial(n - 1)**

**}**

Below is the complete code for the MainActivity.java file. Comments are added inside the code to understand the code in more detail.

**Kotlin**

**import** android.os.Bundle

**import** android.widget.Button

**import** android.widget.TextView

**import** android.widget.Toast

**import** androidx.appcompat.app.AppCompatActivity

**class** MainActivity : AppCompatActivity() {

    // creating variables for our text view and button

    lateinit var tvsec: TextView

    lateinit var tvMain: TextView

    lateinit var bac: Button

    lateinit var bc: Button

    lateinit var bbrac1: Button

    lateinit var bbrac2: Button

    lateinit var bsin: Button

    lateinit var bcos: Button

    lateinit var btan: Button

    lateinit var blog: Button

    lateinit var bln: Button

    lateinit var bfact: Button

    lateinit var bsquare: Button

    lateinit var bsqrt: Button

    lateinit var binv: Button

    lateinit var b0: Button

    lateinit var b9: Button

    lateinit var b8: Button

    lateinit var b7: Button

    lateinit var b6: Button

    lateinit var b5: Button

    lateinit var b4: Button

    lateinit var b3: Button

    lateinit var b2: Button

    lateinit var b1: Button

    lateinit var bpi: Button

    lateinit var bmul: Button

    lateinit var bminus: Button

    lateinit var bplus: Button

    lateinit var bequal: Button

    lateinit var bdot: Button

    lateinit var bdiv: Button

    override fun onCreate(savedInstanceState: Bundle?) {

**super**.onCreate(savedInstanceState)

        setContentView(R.layout.activity\_main)

        // initializing all our variables.

        tvsec = findViewById(R.id.idTVSecondary)

        tvMain = findViewById(R.id.idTVprimary)

        bac = findViewById(R.id.bac)

        bc = findViewById(R.id.bc)

        bbrac1 = findViewById(R.id.bbrac1)

        bbrac2 = findViewById(R.id.bbrac2)

        bsin = findViewById(R.id.bsin)

        bcos = findViewById(R.id.bcos)

        btan = findViewById(R.id.btan)

        blog = findViewById(R.id.blog)

        bln = findViewById(R.id.bln)

        bfact = findViewById(R.id.bfact)

        bsquare = findViewById(R.id.bsquare)

        bsqrt = findViewById(R.id.bsqrt)

        binv = findViewById(R.id.binv)

        b0 = findViewById(R.id.b0)

        b9 = findViewById(R.id.b9)

        b8 = findViewById(R.id.b8)

        b7 = findViewById(R.id.b7)

        b6 = findViewById(R.id.b6)

        b5 = findViewById(R.id.b5)

        b4 = findViewById(R.id.b4)

        b3 = findViewById(R.id.b3)

        b2 = findViewById(R.id.b2)

        b1 = findViewById(R.id.b1)

        bpi = findViewById(R.id.bpi)

        bmul = findViewById(R.id.bmul)

        bminus = findViewById(R.id.bminus)

        bplus = findViewById(R.id.bplus)

        bequal = findViewById(R.id.bequal)

        bdot = findViewById(R.id.bdot)

        bdiv = findViewById(R.id.bdiv)

        // adding on click listener to our all buttons.

        b1.setOnClickListener {

            // on below line we are appending

            // the expression to our text view.

            tvMain.text = (tvMain.text.toString() + "1")

        }

        b2.setOnClickListener {

            // on below line we are appending

            // the expression to our text view.

            tvMain.text = (tvMain.text.toString() + "2")

        }

        b3.setOnClickListener {

            // on below line we are appending

            // the expression to our text view.

            tvMain.text = (tvMain.text.toString() + "3")

        }

        b4.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "4")

        }

        b5.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "5")

        }

        b6.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "6")

        }

        b7.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "7")

        }

        b8.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "8")

        }

        b9.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "9")

        }

        b0.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "0")

        }

        bdot.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + ".")

        }

        bplus.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "+")

        }

        bdiv.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "/")

        }

        bbrac1.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "(")

        }

        bbrac2.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + ")")

        }

        bpi.setOnClickListener {

            // on clicking on pi button we are adding

            // pi value as 3.142 to our current value.

            tvMain.text = (tvMain.text.toString() + "3.142")

            tvsec.text = (bpi.text.toString())

        }

        bsin.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "sin")

        }

        bcos.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "cos")

        }

        btan.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "tan")

        }

        binv.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "^" + "(-1)")

        }

        bln.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "ln")

        }

        blog.setOnClickListener {

            tvMain.text = (tvMain.text.toString() + "log")

        }

        bminus.setOnClickListener {

            // on clicking on minus we are checking if

            // the user has already a minus operation on screen.

            // if minus operation is already present

            // then we will not do anything.

            val str: String = tvMain.text.toString()

**if** (!str.get(index = str.length - 1).equals("-")) {

                tvMain.text = (tvMain.text.toString() + "-")

            }

        }

        bmul.setOnClickListener {

            // if mul sign is not present in our

            // text view then only we are adding

            // the multiplication operator to it.

            val str: String = tvMain.text.toString()

**if** (!str.get(index = str.length - 1).equals("\*")) {

                tvMain.text = (tvMain.text.toString() + "\*")

            }

        }

        bsqrt.setOnClickListener {

**if** (tvMain.text.toString().isEmpty()) {

                // if the entered number is empty we are displaying an error message.

                Toast.makeText(**this**, "Please enter a valid number..", Toast.LENGTH\_SHORT).show()

            } **else** {

                val str: String = tvMain.text.toString()

                // on below line we are calculation

                // square root of the given number.

                val r = Math.sqrt(str.toDouble())

                // on below line we are converting our double

                // to string and then setting it to text view.

                val result = r.toString()

                tvMain.setText(result)

            }

        }

        bequal.setOnClickListener {

            val str: String = tvMain.text.toString()

            // on below line we are calling an evaluate

            // method to calculate the value of expressions.

            val result: Double = evaluate(str)

            // on below line we are getting result

            // and setting it to text view.

            val r = result.toString()

            tvMain.setText(r)

            tvsec.text = str

        }

        bac.setOnClickListener {

            // on clicking on ac button we are clearing

            // our primary and secondary text view.

            tvMain.setText("")

            tvsec.setText("")

        }

        bc.setOnClickListener {

            // on clicking on c button we are clearing

            // the last character by checking the length.

            var str: String = tvMain.text.toString()

**if** (!str.equals("")) {

                str = str.substring(0, str.length - 1)

                tvMain.text = str

            }

        }

        bsquare.setOnClickListener {

**if** (tvMain.text.toString().isEmpty()) {

                // if the entered number is empty we are displaying an error message.

                Toast.makeText(**this**, "Please enter a valid number..", Toast.LENGTH\_SHORT).show()

            } **else** {

                // on below line we are getting the expression and then calculating the square of the number

                val d: Double = tvMain.getText().toString().toDouble()

                // on below line we are calculating the square.

                val square = d \* d

                // after calculating the square we

                // are setting it to text view.

                tvMain.setText(square.toString())

                // on below line we are setting

                // the d to secondary text view.

                tvsec.text = "$d²"

            }

        }

        bfact.setOnClickListener {

**if** (tvMain.text.toString().isEmpty()) {

                // if the entered number is empty we are displaying an error message.

                Toast.makeText(**this**, "Please enter a valid number..", Toast.LENGTH\_SHORT).show()

            } **else** {

                // on below line we are getting int value

                // and calculating the factorial value of the entered number.

                val value: Int = tvMain.text.toString().toInt()

                val fact: Int = factorial(value)

                tvMain.setText(fact.toString())

                tvsec.text = "$value`!"

            }

        }

    }

    fun factorial(n: Int): Int {

        // this method is use to find factorial

**return** **if** (n == 1 || n == 0) 1 **else** n \* factorial(n - 1)

    }

    fun evaluate(str: String): Double {

**return** object : Any() {

            // on below line we are creating variable

            // for tracking the position and char pos.

            var pos = -1

            var ch = 0

            // below method is for moving to next character.

            fun nextChar() {

                // on below line we are incrementing our position

                // and moving it to next position.

                ch = **if** (++pos < str.length) str[pos].toInt() **else** -1

            }

            // this method is use to check the extra space

            // present int the expression and removing it.

            fun eat(charToEat: Int): Boolean {

**while** (ch == ' '.toInt()) nextChar()

                // on below line we are checking the char pos

                // if both is equal then we are returning it to true.

**if** (ch == charToEat) {

                    nextChar()

**return** **true**

                }

**return** **false**

            }

            // below method is to parse our

            // expression and to get the ans

            // in this we are calling a parse

            // expression method to calculate the value.

            fun parse(): Double {

                nextChar()

                val x = parseExpression()

**if** (pos < str.length) **throw** RuntimeException("Unexpected: " + ch.toChar())

**return** x

            }

            // in this method we will only perform addition and

            // subtraction operation on the expression.

            fun parseExpression(): Double {

                var x = parseTerm()

**while** (**true**) {

**if** (eat('+'.toInt())) x += parseTerm() // addition

**else** **if** (eat('-'.toInt())) x -= parseTerm() // subtraction

**else** **return** x

                }

            }

            // in below method we will perform

            // only multiplication and division operation.

            fun parseTerm(): Double {

                var x = parseFactor()

**while** (**true**) {

**if** (eat('\*'.toInt())) x \*= parseFactor() // multiplication

**else** **if** (eat('/'.toInt())) x /= parseFactor() // division

**else** **return** x

                }

            }

            // below method is use to parse the factor

            fun parseFactor(): Double {

                //on below line we are checking for addition

                // and subtraction and performing unary operations.

**if** (eat('+'.toInt())) **return** parseFactor() // unary plus

**if** (eat('-'.toInt())) **return** -parseFactor() // unary minus

                // creating a double variable for ans.

                var x: Double

                // on below line we are creating

                // a variable for position.

                val startPos = pos

                // on below line we are checking

                // for opening and closing parenthesis.

**if** (eat('('.toInt())) { // parentheses

                    x = parseExpression()

                    eat(')'.toInt())

                } **else** **if** (ch >= '0'.toInt() && ch <= '9'.toInt() || ch == '.'.toInt()) {

                    // numbers

**while** (ch >= '0'.toInt() && ch <= '9'.toInt() || ch == '.'.toInt()) nextChar()

                    // on below line we are getting sub string from our string using start and pos.

                    x = str.substring(startPos, pos).toDouble()

                } **else** **if** (ch >= 'a'.toInt() && ch <= 'z'.toInt()) {

                    // on below function we are checking for the operator in our expression.

**while** (ch >= 'a'.toInt() && ch <= 'z'.toInt()) nextChar()

                    val func = str.substring(startPos, pos)

                    // calling a method to parse our factor.

                    x = parseFactor()

                    // on below line we are checking for square root.

                    x =

**if** (func == "sqrt") Math.sqrt(x)

                        // on below line we are checking for sin function

                        // and calculating sin function using Math class.

**else** **if** (func == "sin") Math.sin(

                            Math.toRadians(x)

                            // on below line we are calculating the cos value

                        ) **else** **if** (func == "cos") Math.cos(

                            Math.toRadians(x)

                            // on below line we are calculating

                            // the tan value of our expression.

                        ) **else** **if** (func == "tan")

                            Math.tan(Math.toRadians(x))

                        // on below line we are calculating

                        // log value of the expression.

**else** **if** (func == "log")

                            Math.log10(x)

                        // on below line we are calculating

                        // ln value of expression.

**else** **if** (func == "ln") Math.log(x)

                        // f we get any error then

                        // we simply return the exception.

**else** **throw** RuntimeException(

                            "Unknown function: $func"

                        )

                } **else** {

                    // if the condition not satisfy then we are returning the exception

**throw** RuntimeException("Unexpected: " + ch.toChar())

                }

                // on below line we are calculating the power of the expression.

**if** (eat('^'.toInt())) x = Math.pow(x, parseFactor()) // exponentiation

**return** x

            }

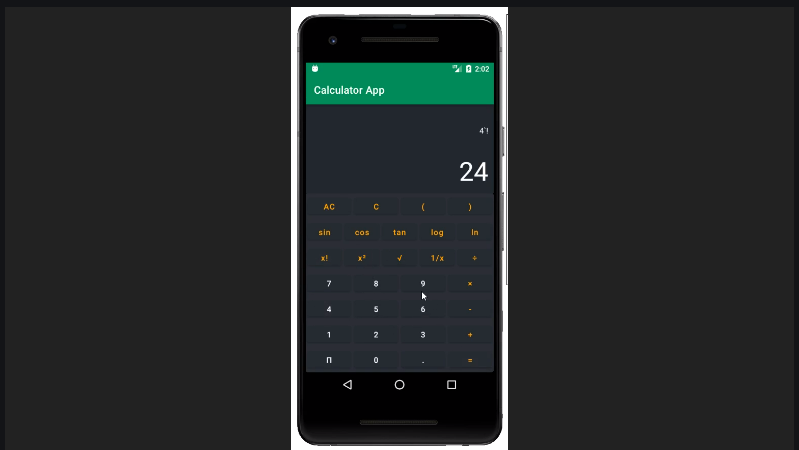
            // at last calling a parse for our expression.

        }.parse()

    }

}

* **Output**



##### **References:**

* <https://developer.android.com/studio>
* https://developer.android.com/
* <https://www.geeksforgeeks.org/>

Please note that this report provides a general overview of app development, and specific recommendations or strategies should be tailored to your organization's unique requirements and goals. Should you require further assistance or have any questions, please do not hesitate to contact me.

Thank you for the opportunity to prepare this report, and I hope it proves valuable in your app development endeavors. I look forward to discussing this topic further and assisting you in your future projects.

Sincerely,

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