Lab 01

Android Development

2025-2026

Agenda

- What is Android?
- Hello World Example
- Android Project Structure
- Add Two Numbers Example
- Hands-on

What is Android?

- An open-source software platform used primarily to power mobile phones

- Essentially, a unified platform to develop apps that will run on many different phones and devices

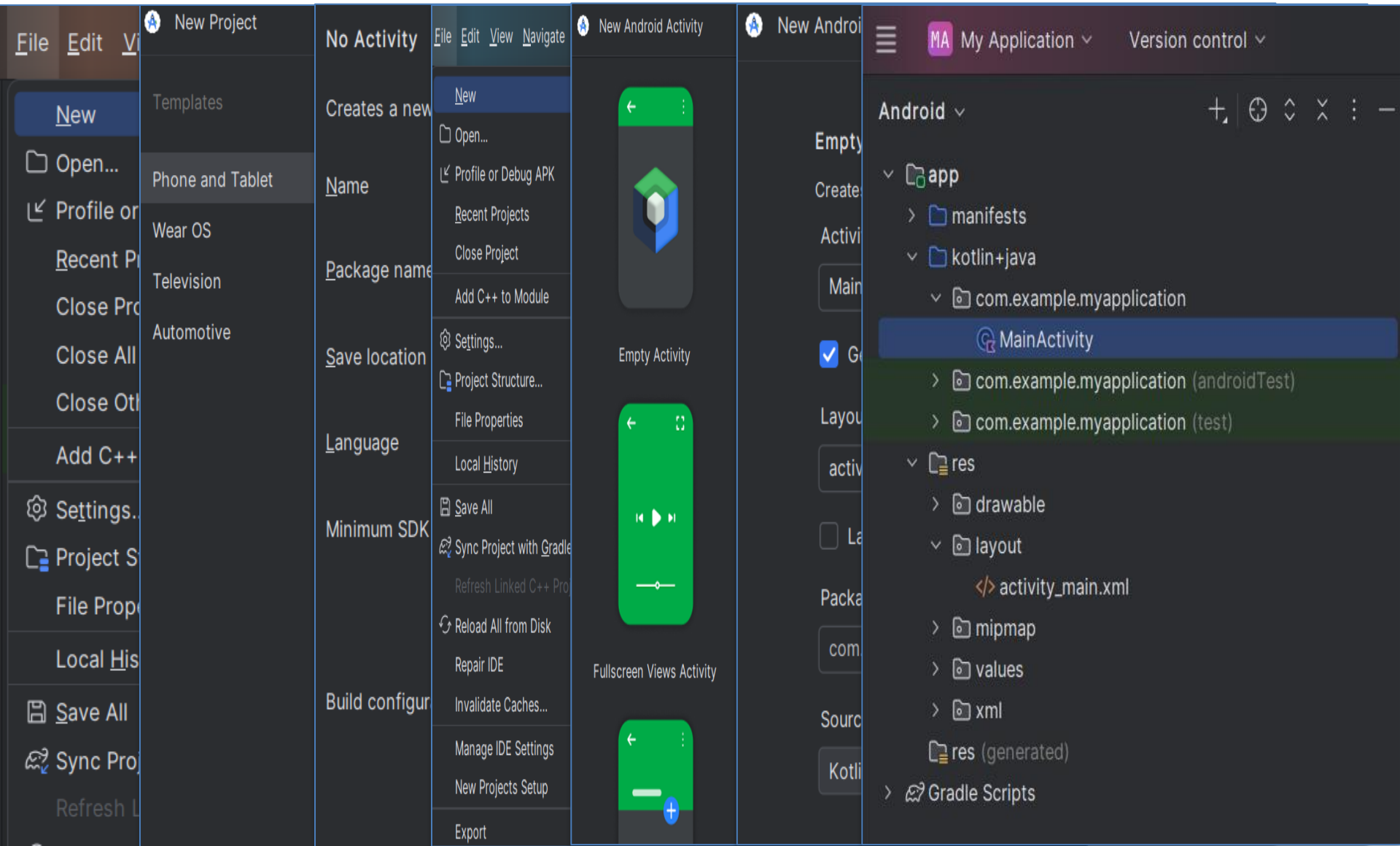
What tools will be used in Lab?

- Android studio
- Code is written in **Kotlin**

Hello World Example

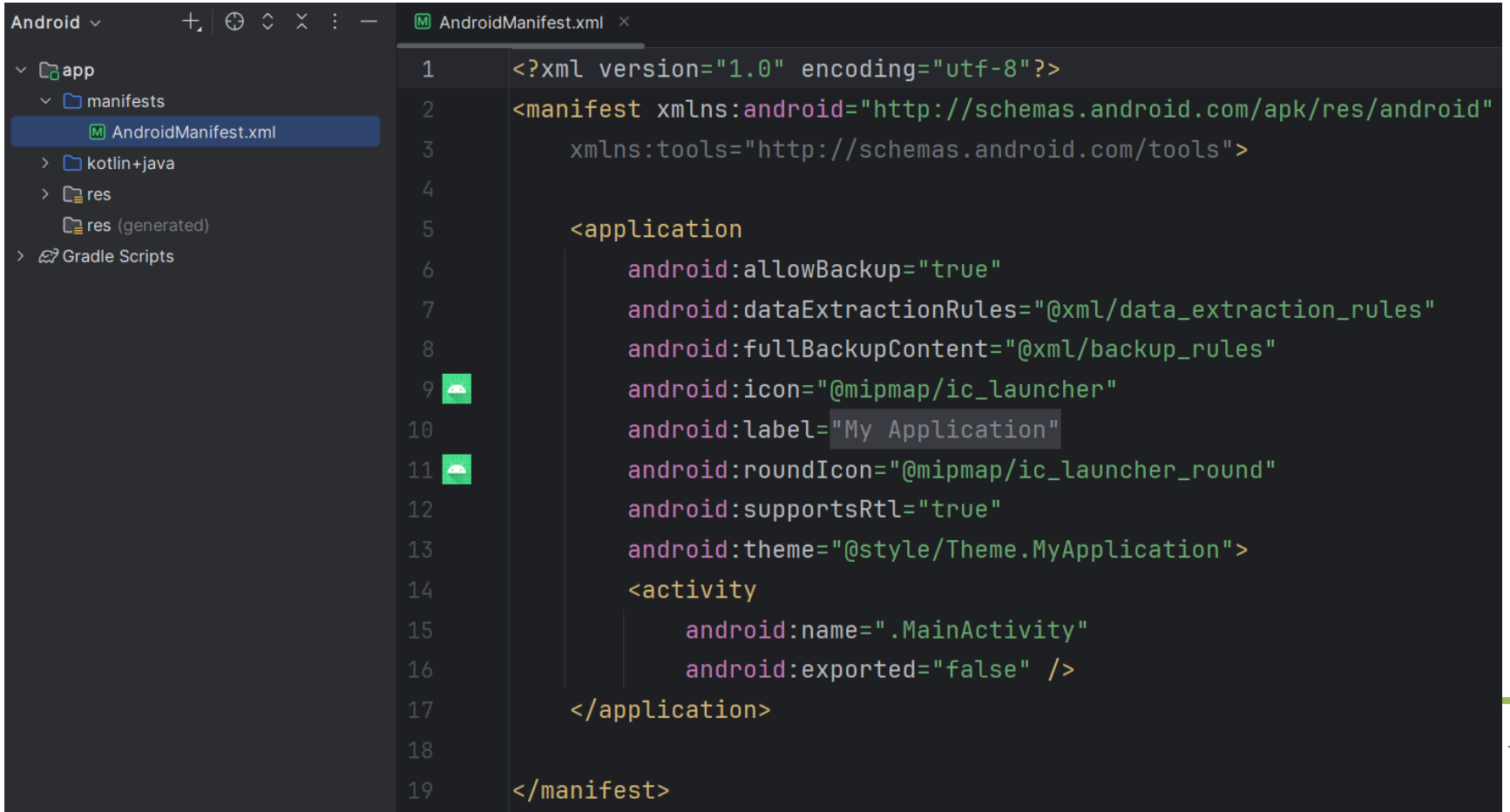
- Creating a New Project
  1. In Android studio :choose File→New→New Project
  2. Next, You need to fill out your project properties.
     - "My Application": is the plain English name of your application.
     - Type 'HelloWorld' as a project name
       - A project name should be one word. ("CamelCase" naming convention is preferred)
     - "The package name": for example 'android.section'
  3. Next, you need to choose the *build target.*
     - *The build target tells the build tools* which version of the Android platform you are building for.
  4. Specify An activity that is going to be represented by a Kotlin class.
     - Its name should adhere to kotlin class naming conventions: start with an upper-case letter and use CamelCase to separate words.
     - So, type 'HelloWorld' for your activity name or leave it as ' HelloWorldActivity'.
  5. Finally, click on the Finish button, and Android studio will create your project.

Hello World Example Cont’



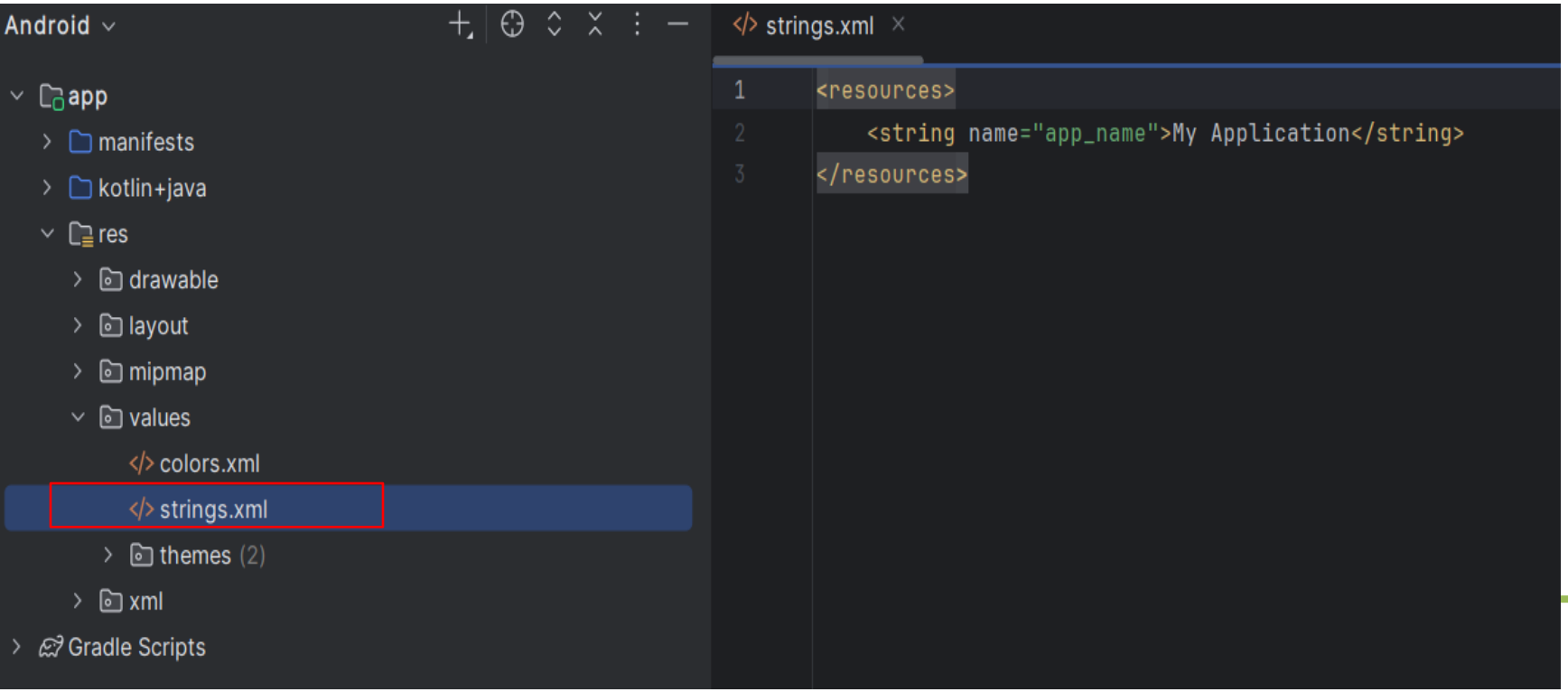
Manifest File

- This file explains what the app consists of, its main building blocks, required permissions, and more.



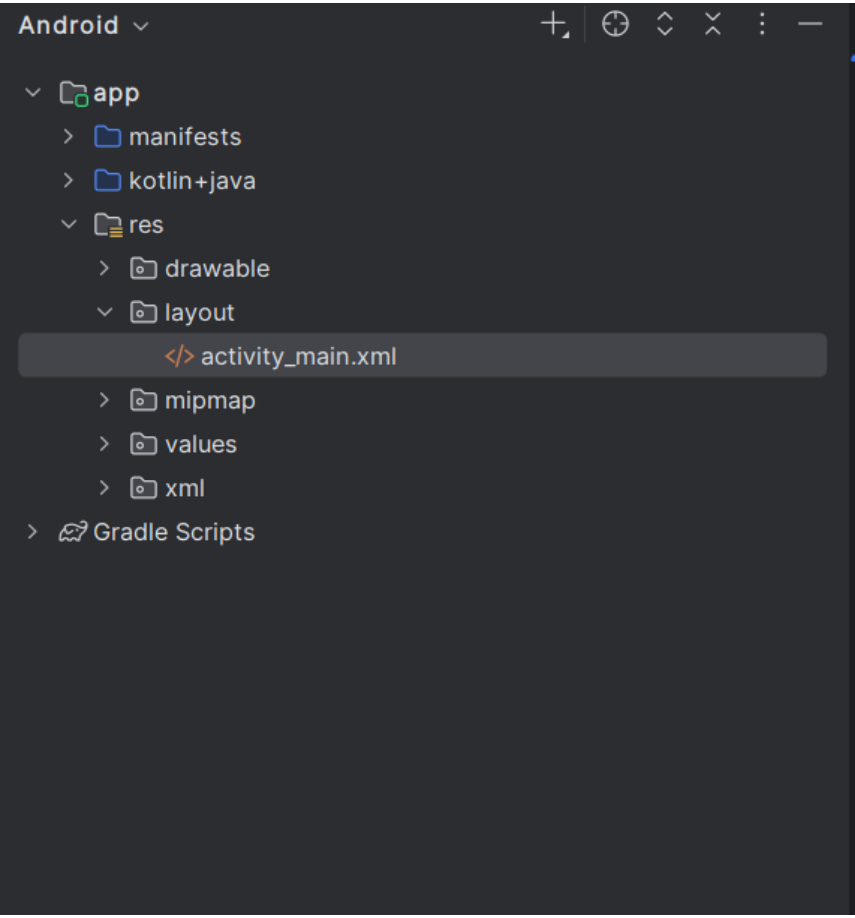
Strings File

- This is another XML file that contains all the text that your application uses.
  - For example, the names of buttons, labels, default text, and similar types of strings go into this file.



Layout File

- The layout file specifies the layout of your screen.

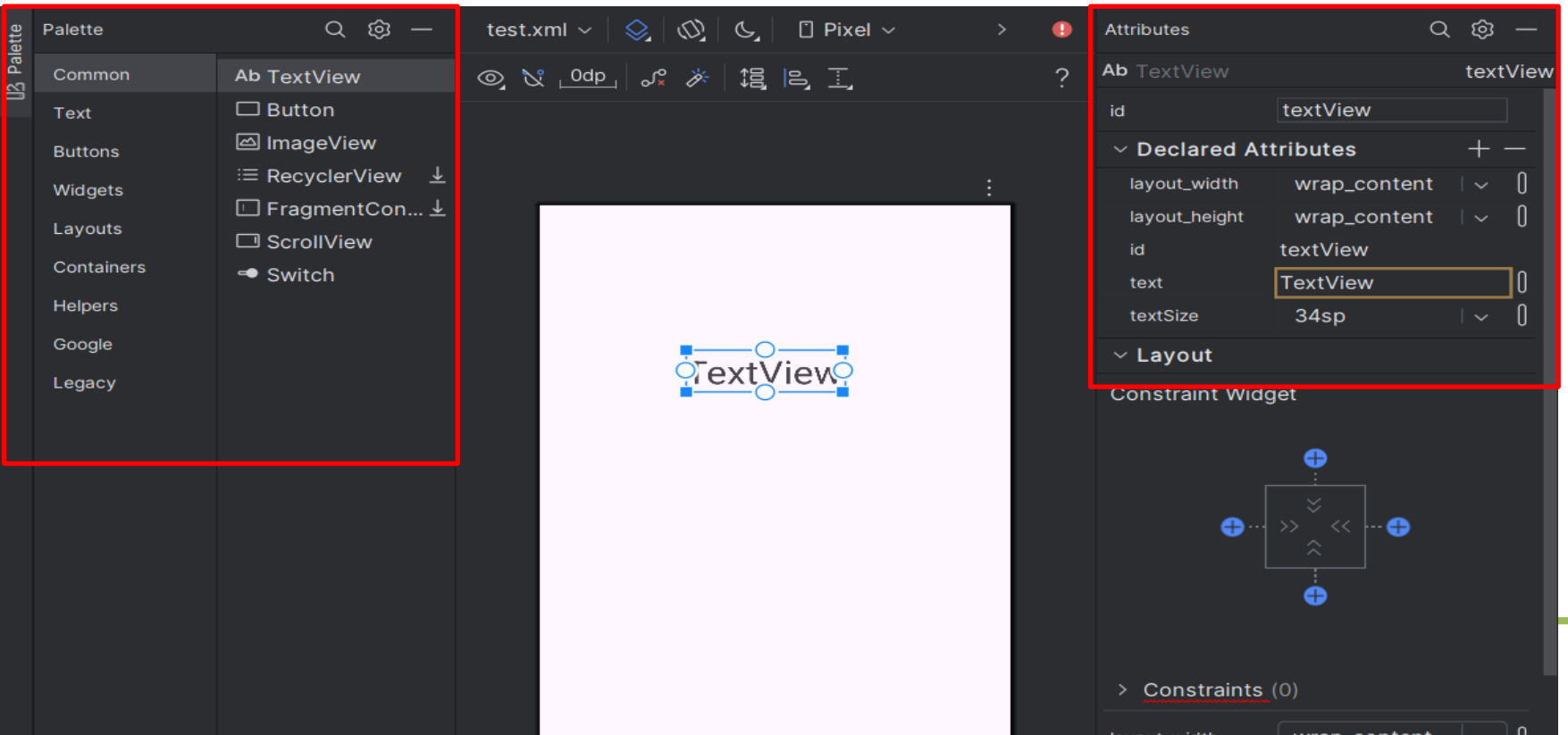


activity_main.xml

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

    <TextView
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Hello World!"
        app:layout_constraintBottom_toBottomOf="parent"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

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

Adding and Customizing Layout Elements

- Add elements to your layout by dragging them from the palette into the design view.
- Adjust their attributes such as size, ID, and text in the Attributes panel.



Adding and Customizing Layout Elements

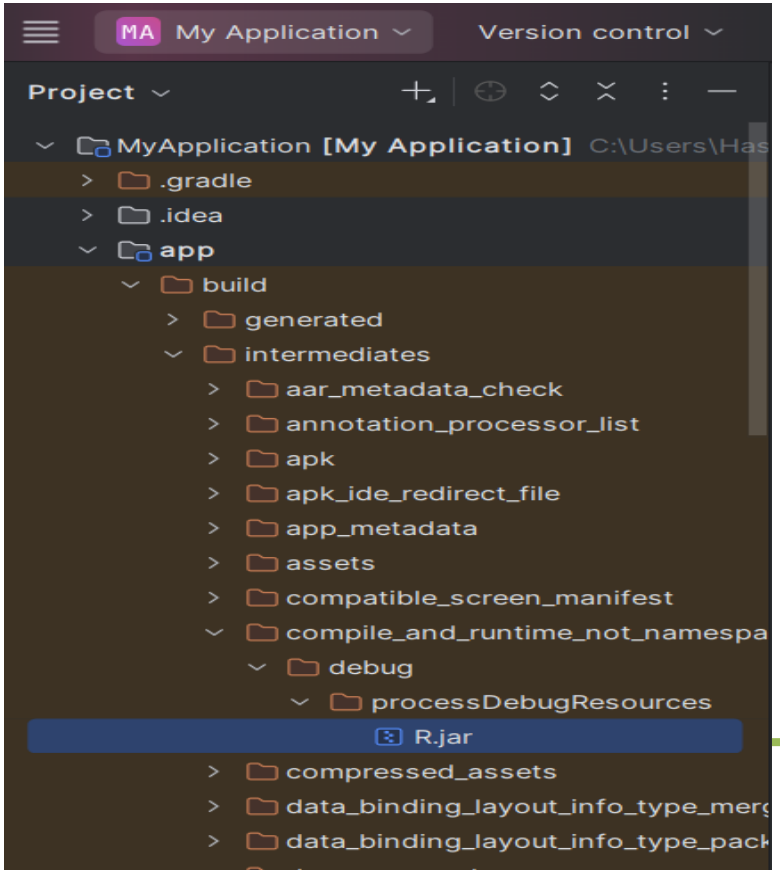
- Alternatively, you can define them directly in the layout XML code.

activity_main.xml

```xml
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:tools="http://schemas.android.com/tools"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    android:id="@+id/main"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">
    <TextView
      android:layout_width="wrap_content"
      android:layout_height="wrap_content"
      android:text="Hello World!"
      app:layout_constraintBottom_toBottomOf="parent"
      app:layout_constraintStart_toStartOf="parent"
      app:layout_constraintEnd_toEndOf="parent"
      app:layout_constraintTop_toTopOf="parent" />

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

R File

- It is an automatically generated file, and as such, you never modify it.
- It is recreated every time you change anything.



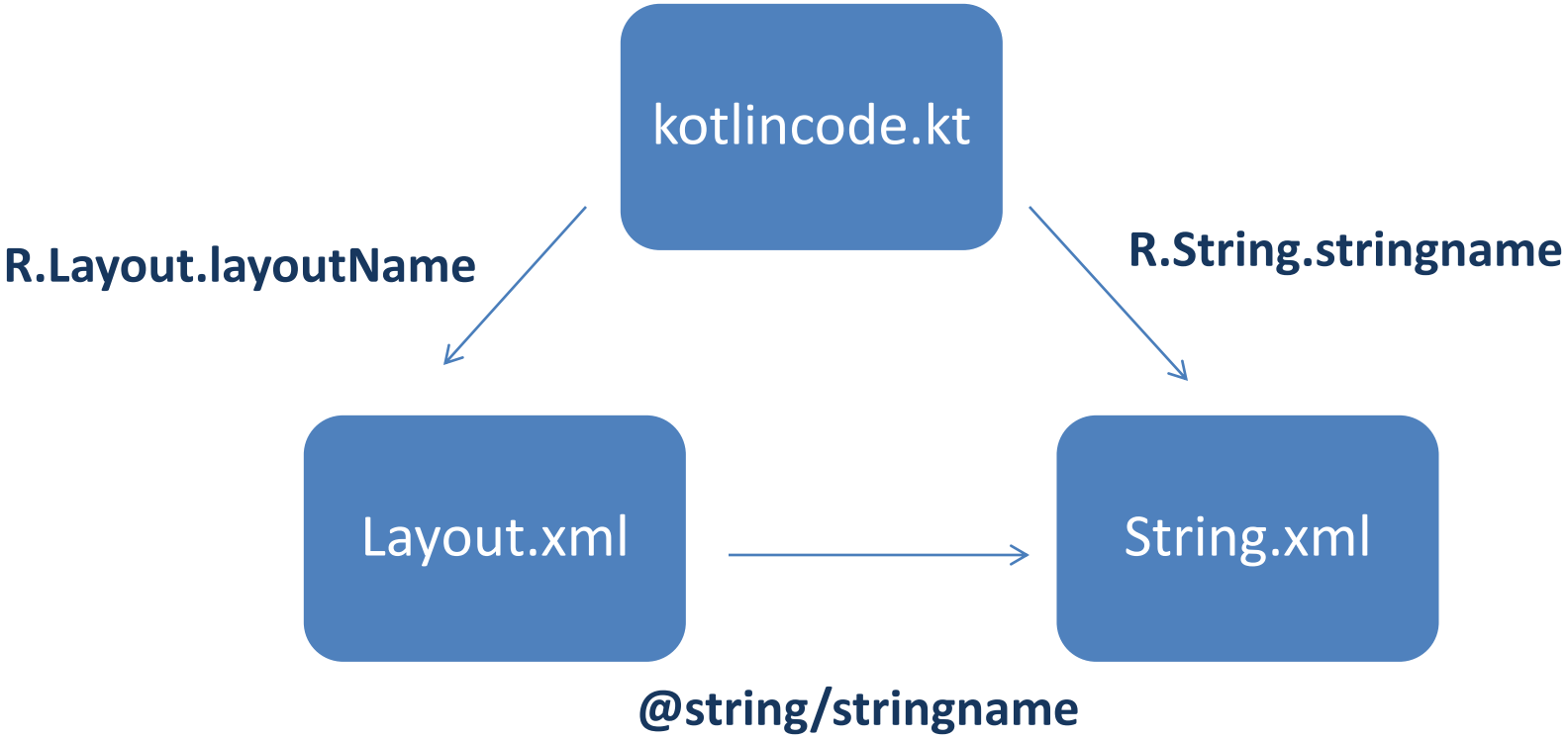
Kotlin Source Code

- The Kotlin code is what drives everything.
- This is the code that ultimately gets converted and runs your application

```
package com.example.myapplication

...

class MainActivity : AppCompatActivity() {
    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        enableEdgeToEdge()
        setContentView(R.layout.activity_main)
```

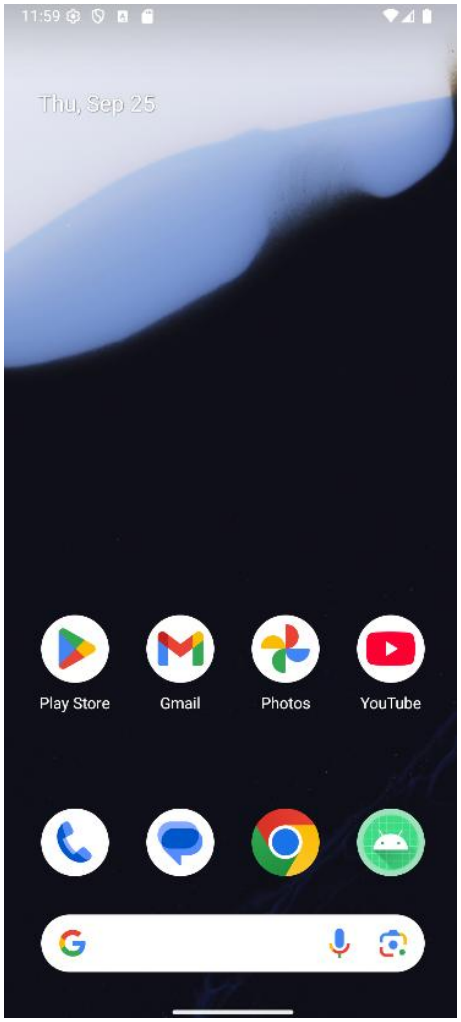
In the Hello World template created by the wizard, the `onCreate` method is overridden to call `setContentView`, which lays out the user interface by inflating a layout resource

How To access data in files ?

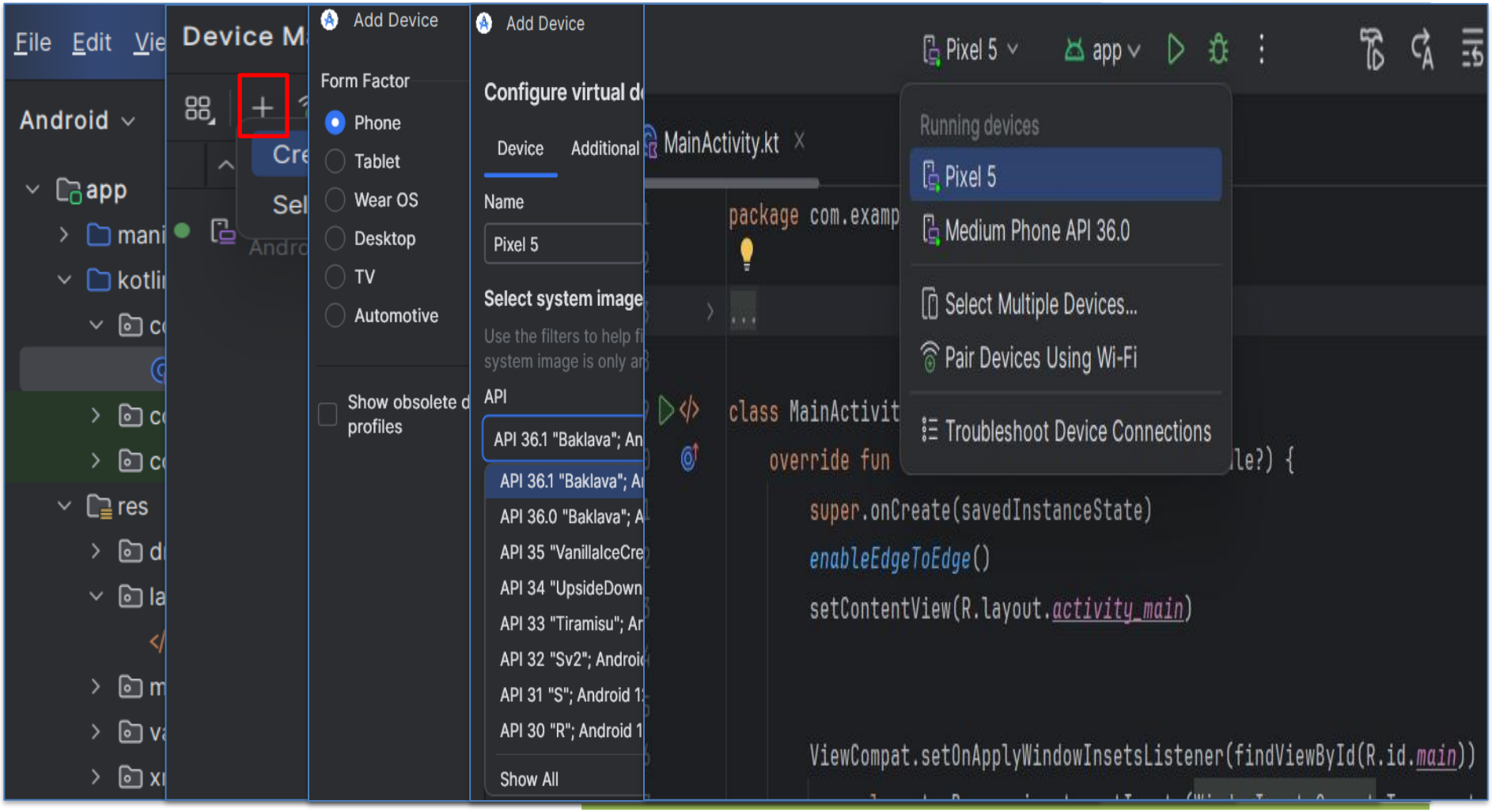


Running Hello World Example

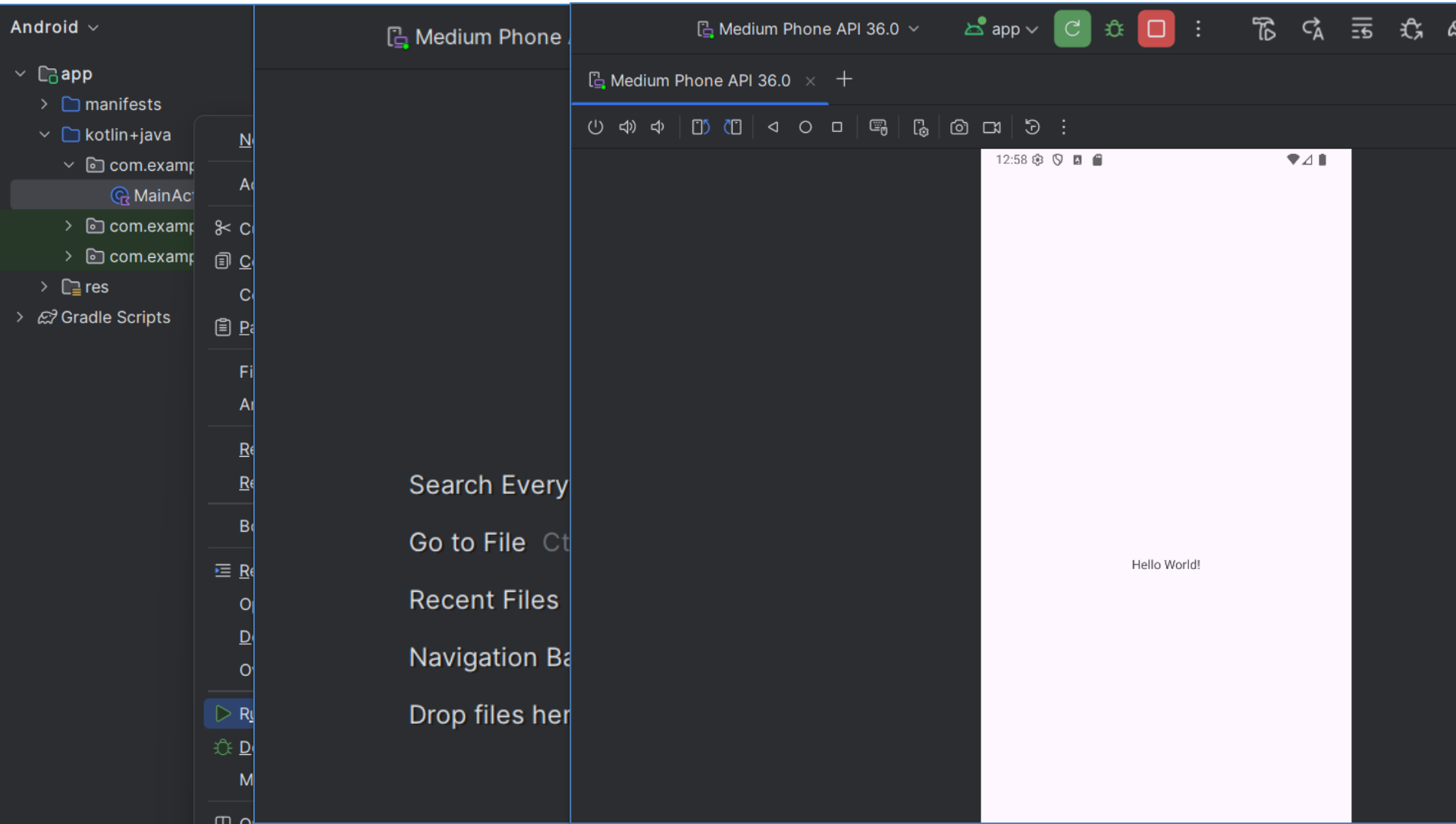
- Running the project
  - First, We will create new Android Virtual Device (AVD)
    - In Android Studio, Tools →Android →Device Manager
    - Specify Device then target then Name
    - Finally, Finish
  - Then right click on the project → run MainActivity



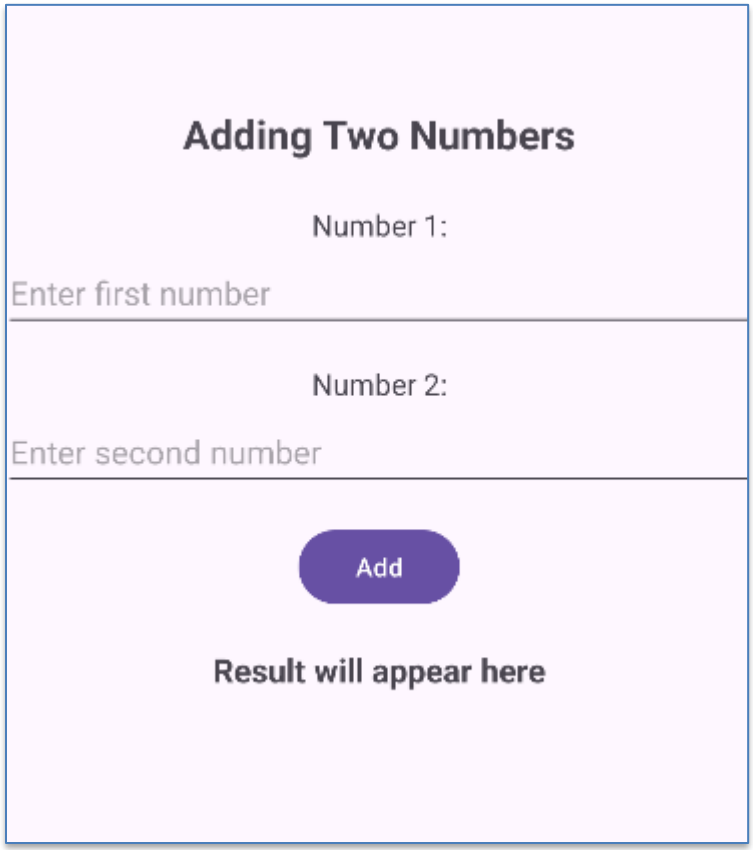
Running Hello World Example Cont’

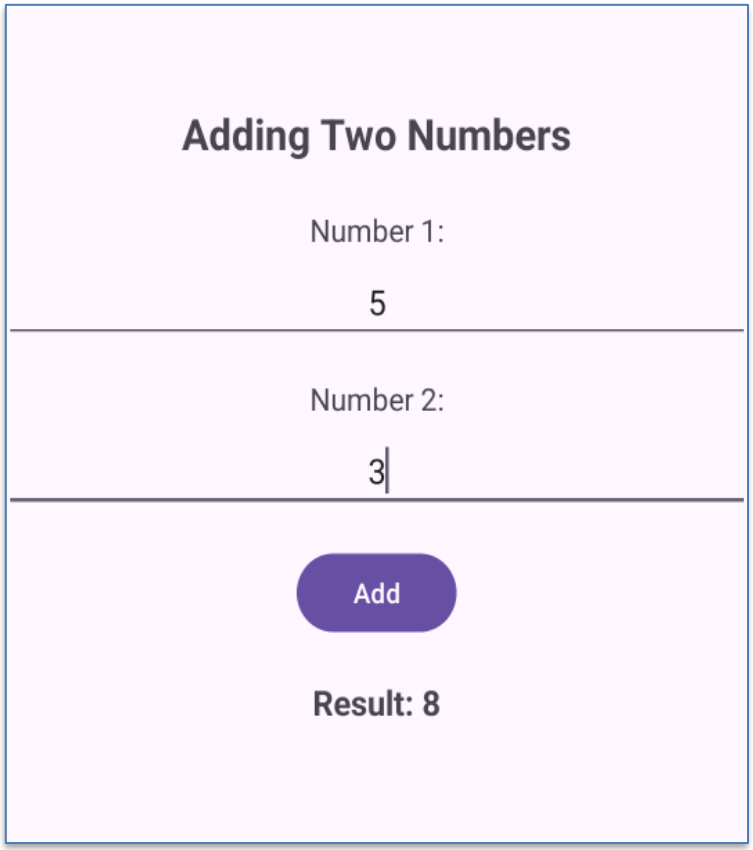


Running Hello World Example Cont’



Add Two Numbers Example





Add Two Numbers Example: What will be changed !!!

- Main.xml file → Layout
- Main.kt file → Code
- String.xml file → Texts used in GUI

Note: R file is automatically changed

Main Layout

```xml
<?xml version="1.0" encoding="utf-8"?>
<androidx.appcompat.widget.LinearLayoutCompat
    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:id="@+id/main"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity"
    android:orientation="vertical"
    android:gravity="center"
    android:padding="24dp">

    <TextView
        android:id="@+id/headerText"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Adding Two Numbers"
        android:textSize="22sp"
        android:textStyle="bold"
        android:layout_marginBottom="24dp"/>
```

Main Layout – Number Inputs

```
<TextView
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Number 1:"
    android:textSize="16sp"
    android:layout_marginBottom="4dp"/>

<EditText
    android:id="@+id/txt_firstNum"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:ems="10"
    android:hint="Enter first number"
    android:inputType="number"
    android:layout_marginBottom="16dp"
    android:gravity="center"/>
```

```
<TextView
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Number 2:"
    android:textSize="16sp"
    android:layout_marginBottom="4dp"/>

<EditText
    android:id="@+id/txt_secondNum"
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:ems="10"
    android:hint="Enter second number"
    android:inputType="number"
    android:layout_marginBottom="16dp"
    android:gravity="center"/>
```

Main Layout – Action Button & Output Text

```
    <Button
        android:id="@+id/btn_add"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Add"
        android:layout_marginBottom="20dp"/>

    <TextView
        android:id="@+id/txt_sum"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Result will appear here"
        android:textSize="18sp"
        android:textStyle="bold"
        android:gravity="center"/>

</androidx.appcompat.widget.LinearLayoutCompat>
```

Addition Class

```
class Addition {
    private var firstNum: Int = 0
    private var secondNum: Int = 0

    fun setFirstNum(num: Int) {
        firstNum = num
    }
    fun setSecondNum(num: Int) {
        secondNum = num
    }
    fun getFirstNum(): Int {
        return firstNum
    }
    fun getSecondNum(): Int {
        return secondNum
    }
    fun add(): Int {
        return firstNum + secondNum
    }
}
```

Add Two Numbers Example: How to add action on the button?

- First we need to get button id so we can add action listener on it.

findViewById<Button>(R.id.btn_add)

```
val addBtn = findViewById<Button>(R.id.btn_add);
```

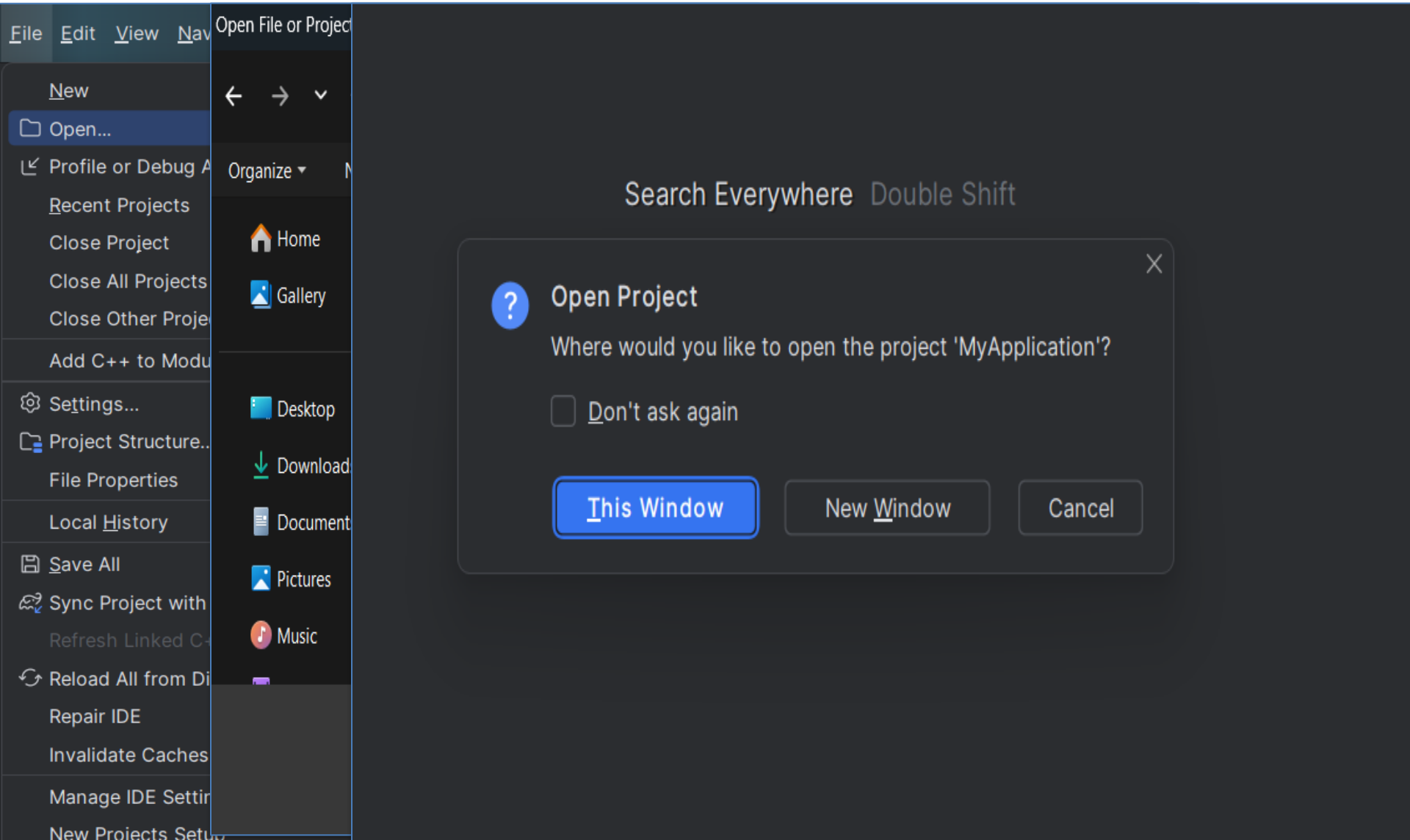
- Then add actionListener to the button on the MainActivity.kt in the onCreate Method

```
addBtn.setOnClickListener {

}
```

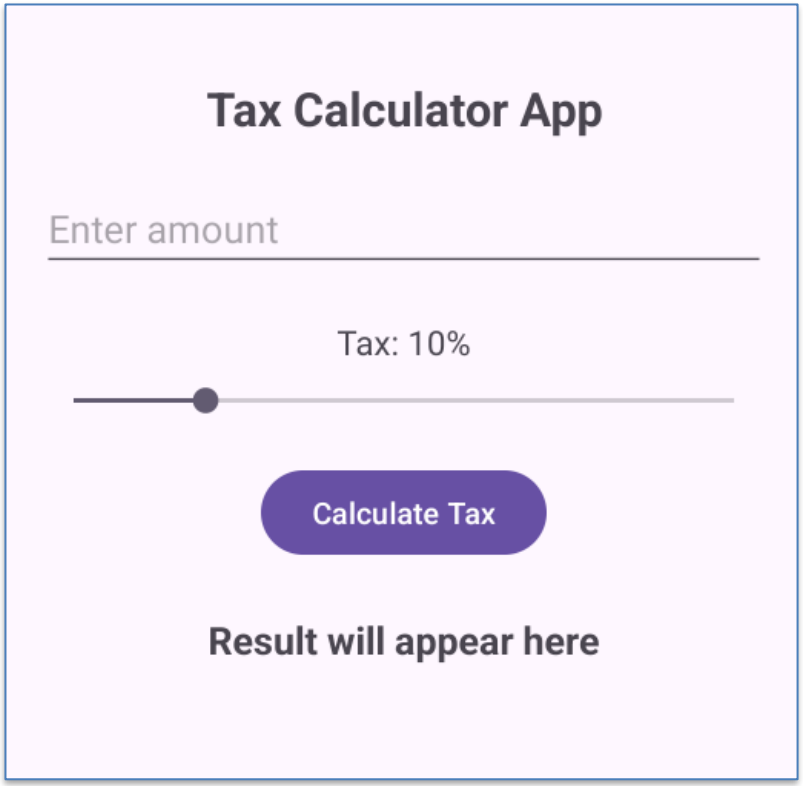
Add Two Numbers Example: implementation

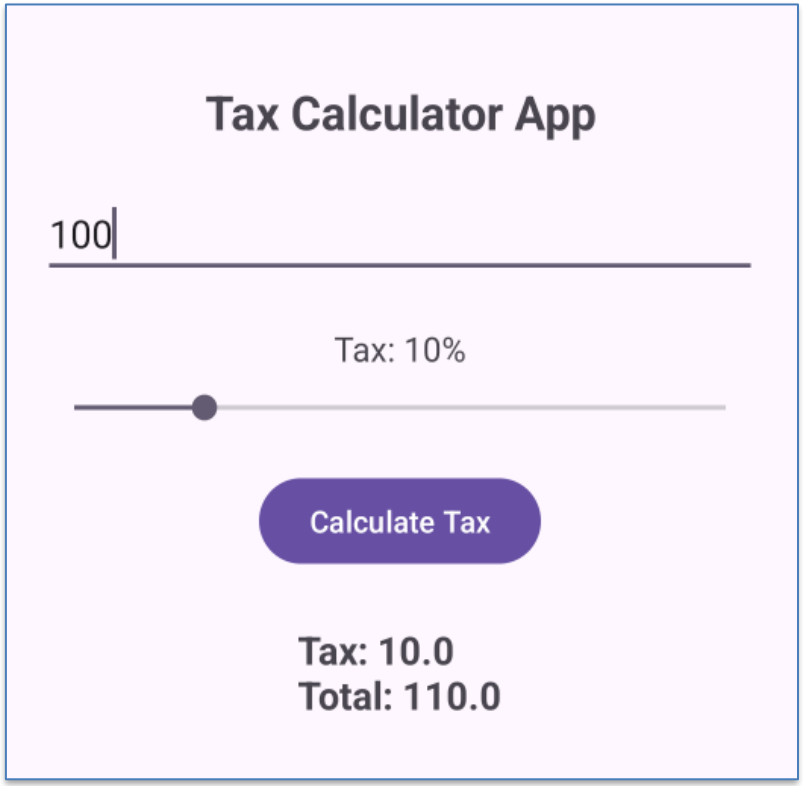
```
val addBtn = findViewById<Button>(R.id.btn_add);
val firstNum = findViewById<EditText>(R.id.txt_firstNum);
val secondNum = findViewById<EditText>(R.id.txt_secondNum);
val resultText = findViewById<TextView>(R.id.txt_sum)

addBtn.setOnClickListener {

    val addition = Addition()
    val fNum = (firstNum.text.toString().trim()).toIntOrNull();
    val sNum = (secondNum.text.toString().trim()).toIntOrNull();

    if (fNum == null || sNum == null) {
        Toast.makeText( context: this,  text: "Invalid input. Enter valid integers",
            Toast.LENGTH_SHORT).show()
    } else {
        addition.setFirstNum(fNum)
        addition.setSecondNum(sNum)
        val sum = addition.add()
        resultText.text = "Result: $sum"
    }
}
```

Import a project to the Android Studio



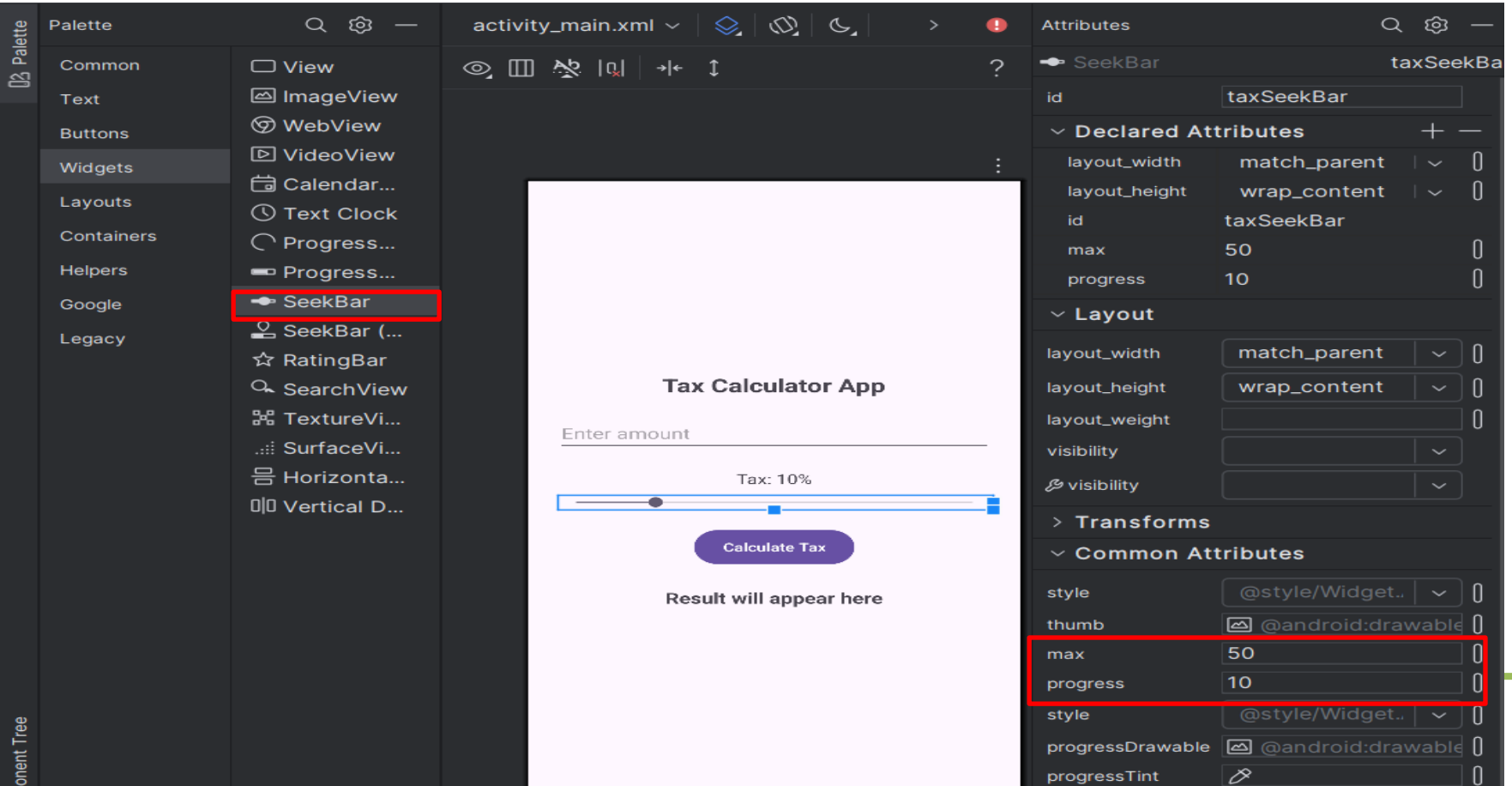
Hands-on


Tax Calculator App
Enter amount
Tax: 10%
Calculate Tax
Result will appear here


Tax Calculator App
100
Tax: 10%
Calculate Tax
Tax: 10.0
Total: 110.0

Hands-on Hint

- Drag and drop the SeekBar widget into your activity layout.
- Set its max value and progress in the Attributes panel.



Hands-on Hint

- Get a reference to the SeekBar from the layout using findViewById.

```
val taxSeekBar = findViewById<SeekBar>(R.id.taxSeekBar)
```

- Attach an OnSeekBarChangeListener to the SeekBar so you can respond to progress changes.
- Override onStartTrackingTouch and onStopTrackingTouch as required by the interface, but keep them empty since they're not needed here.

```
taxSeekBar.setOnSeekBarChangeListener(object : SeekBar.OnSeekBarChangeListener {
    override fun onProgressChanged(seekBar: SeekBar?, progress: Int, fromUser: Boolean) {
    }
    override fun onStartTrackingTouch(seekBar: SeekBar?) {}
    override fun onStopTrackingTouch(seekBar: SeekBar?) {}
})
```

Questions