برنامه نویسی دستگاه های سیار (CE364)

جلسه ششم:
گرفتن اطلاعات از کاربر

سجاد شیرعلی شهرضا

پاییز 1401

دوشنبه، 2 آبان 1401

اطلاع رسانی

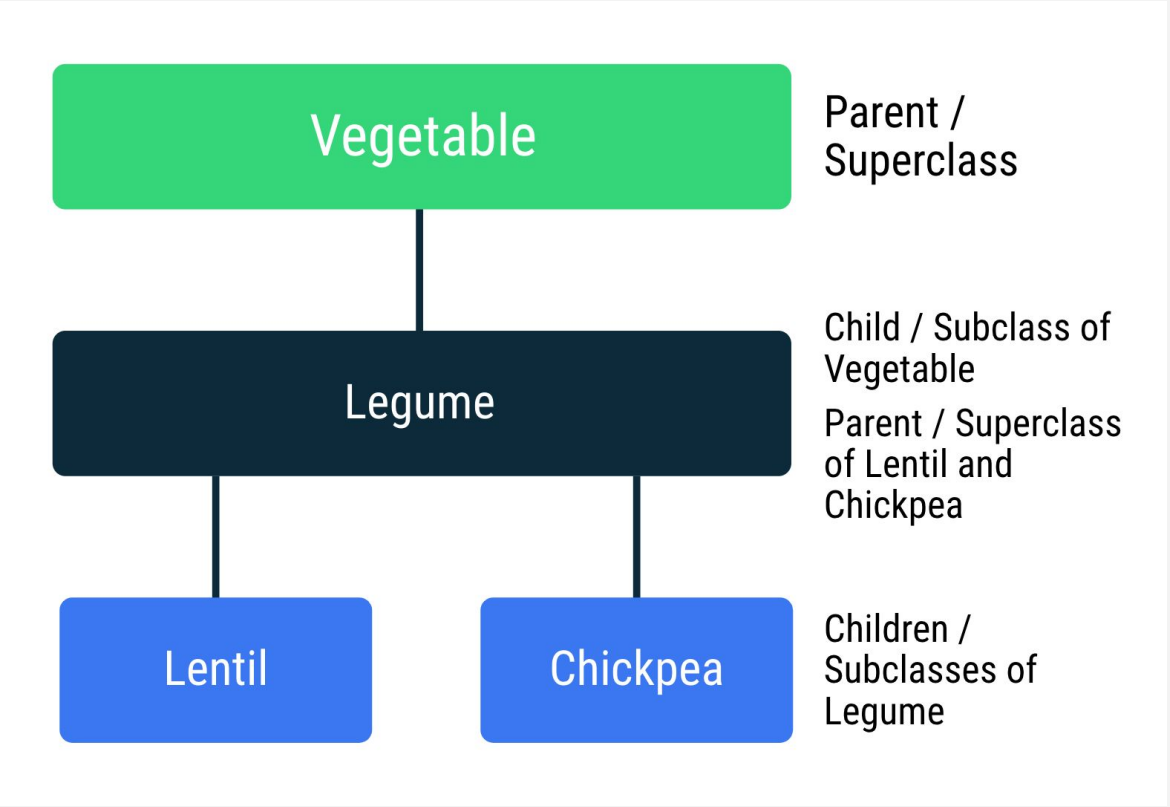
- بخشهای مرتبط با این جلسه:

- Unit 2: Layouts:
  - Get user input in an app: Part 1

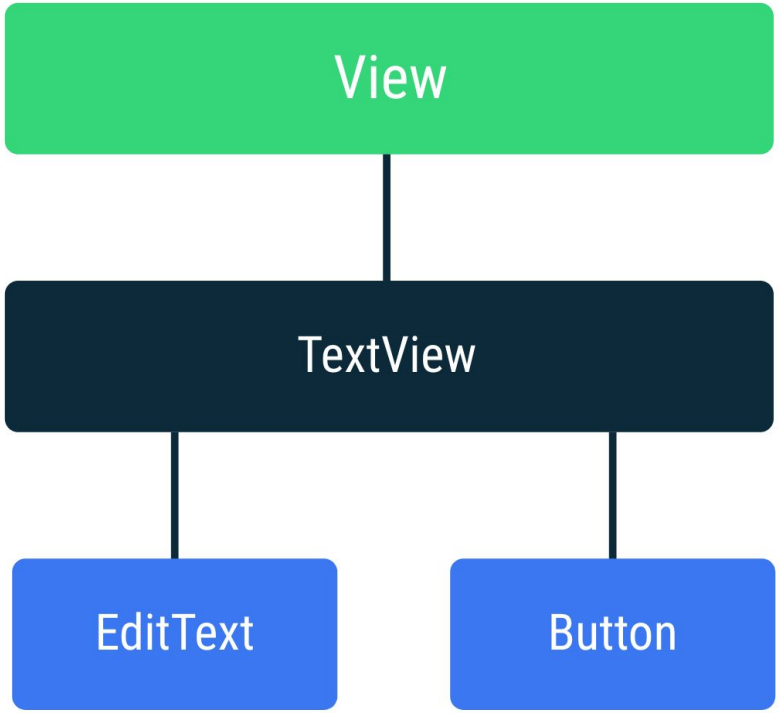
سوال؟

آشنایی بیشتر با کاتلین

وراثت در کلاس ها



نمونه وراثت در اندروید



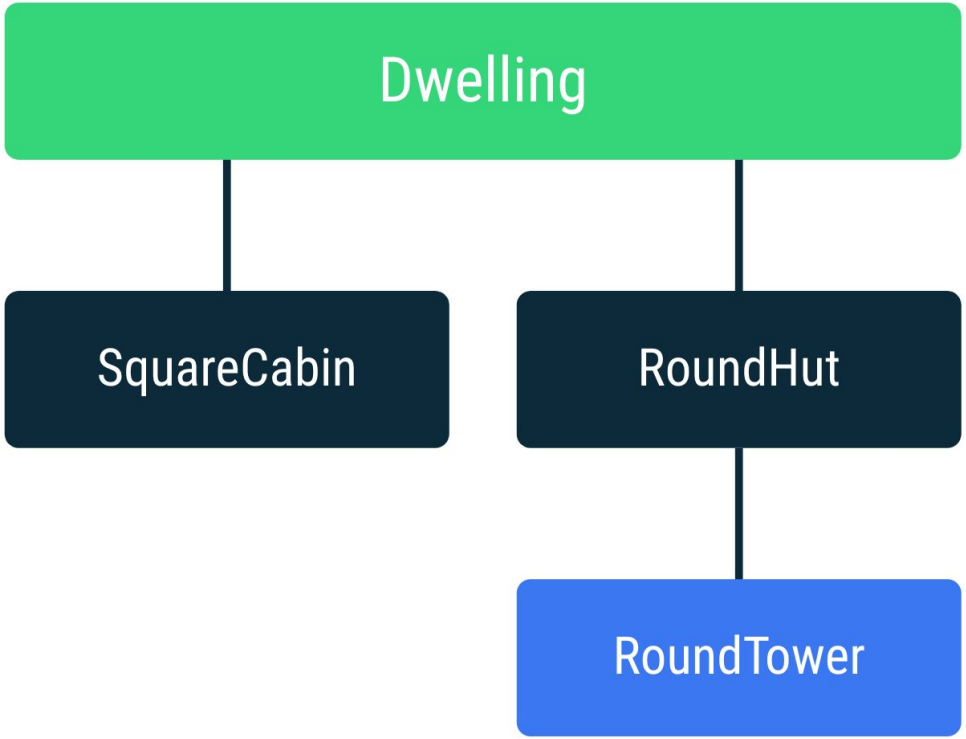
Parent / Superclass

Child / Subclass of View
Parent / Superclass of EditText and Button

Children / Subclasses of TextView

kotlin.Any
↳ android.view.View
↳ android.widget.TextView
↳ android.widget.Button

مثال از تعریف کلاس و ارث بری



تعریف کلاس پایه

```
abstract class Dwelling(private var residents: Int) {

    abstract val buildingMaterial: String
    abstract val capacity: Int

    fun hasRoom(): Boolean {
        return residents < capacity
    }
}
```

تعریف یک کلاس فرزند

```
abstract class Dwelling(private var residents: Int) {
    abstract val buildingMaterial: String
    abstract val capacity: Int

    fun hasRoom(): Boolean {
        return residents < capacity
    }
}

class SquareCabin(residents: Int) : Dwelling(residents) {
    override val buildingMaterial = "Wood"
    override val capacity = 6
}
```

استفاده از کلاس تعریف شده

```
fun main() {
    val squareCabin = SquareCabin(6)

    println("\nSquare Cabin\n============")
    println("Capacity: ${squareCabin.capacity}")
    println("Material: ${squareCabin.buildingMaterial}")
    println("Has room? ${squareCabin.hasRoom()}")
}
```

```
Square Cabin
============
Capacity: 6
Material: Wood
Has room? false
```

ساده کردن کد

```
with(squareCabin) {
    println("\nSquare Cabin\n============")
    println("Capacity: ${capacity}")
    println("Material: ${buildingMaterial}")
    println("Has room? ${hasRoom()}")
}
```

تعریف کلاس که میتواند فرزند داشته باشد

```
open class RoundHut(residents: Int) : Dwelling(residents) {
    override val buildingMaterial = "Straw"
    override val capacity = 4
}

class RoundTower(residents: Int) : RoundHut(residents) {
    override val buildingMaterial = "Stone"
    override val capacity = 4
}
```

مقدار اولیه برای متغیر یک تابع

```
class RoundTower(
    residents: Int,
    val floors: Int = 2) : RoundHut(residents) {

    override val buildingMaterial = "Stone"
    override val capacity = 4 * floors
}
```

تعریف تابع مساحت

```
abstract class Dwelling(private var residents: Int) {

    abstract val buildingMaterial: String
    abstract val capacity: Int

    fun hasRoom(): Boolean {
        return residents < capacity
}

    abstract fun floorArea(): Double
}


class SquareCabin(residents: Int,
    val length: Double) : Dwelling(residents) {

    override val buildingMaterial = "Wood"
    override val capacity = 6

    override fun floorArea(): Double {
       return length * length
    }
}
```

```
open class RoundHut(val residents: Int,
    val radius: Double) : Dwelling(residents) {

    override val buildingMaterial = "Straw"
    override val capacity = 4

    override fun floorArea(): Double {
        return PI * radius * radius
    }
}


class RoundTower(residents: Int, radius: Double,
    val floors: Int = 2) : RoundHut(residents, radius) {

    override val buildingMaterial = "Stone"
    override val capacity = 4 * floors

    override fun floorArea(): Double {
        return super.floorArea() * floors
    }
}
```

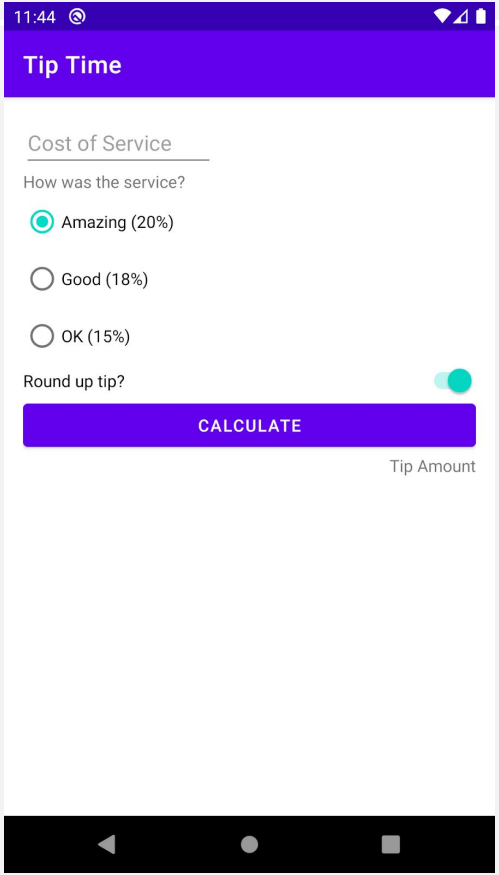
تعریف یک تابع مشترک دیگر

```
fun getRoom() {
    if (capacity > residents) {
        residents++
        println("You got a room!")
    } else {
        println("Sorry, at capacity and no rooms left.")
    }
}
```

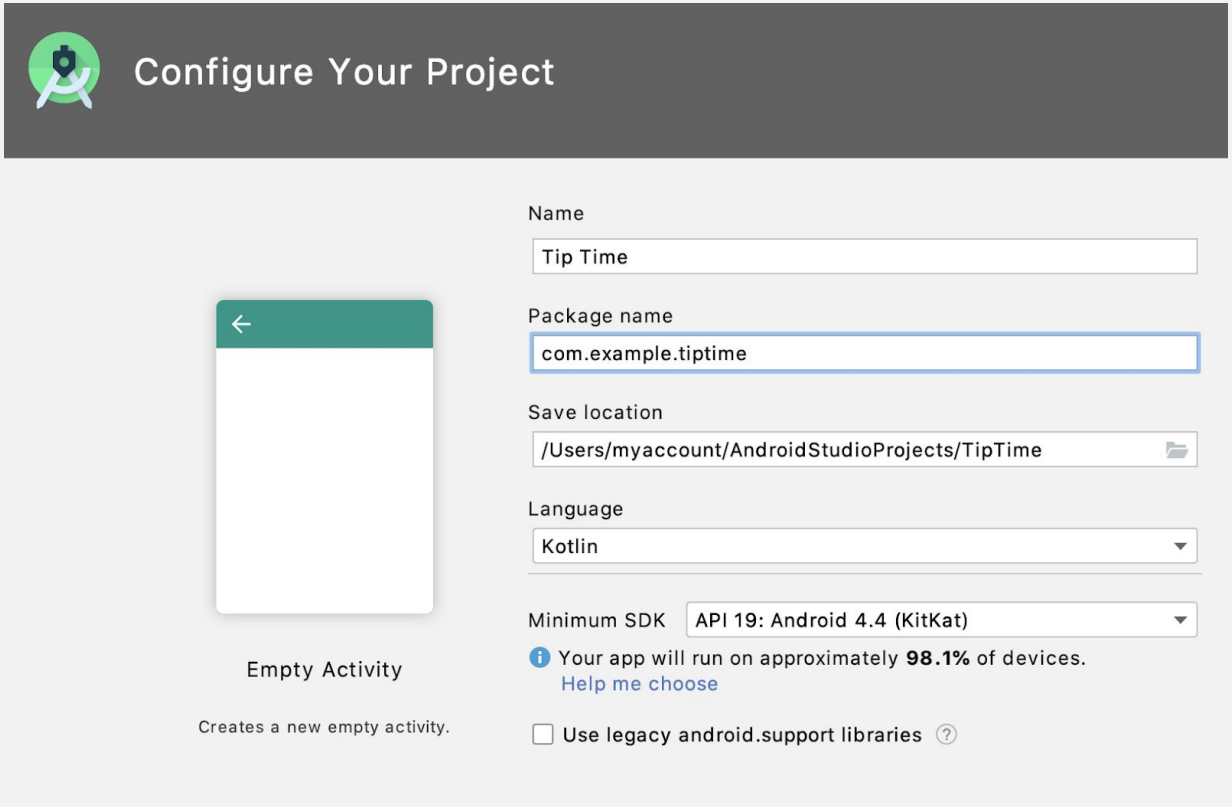
سوال؟

برنامه محاسبه انعام

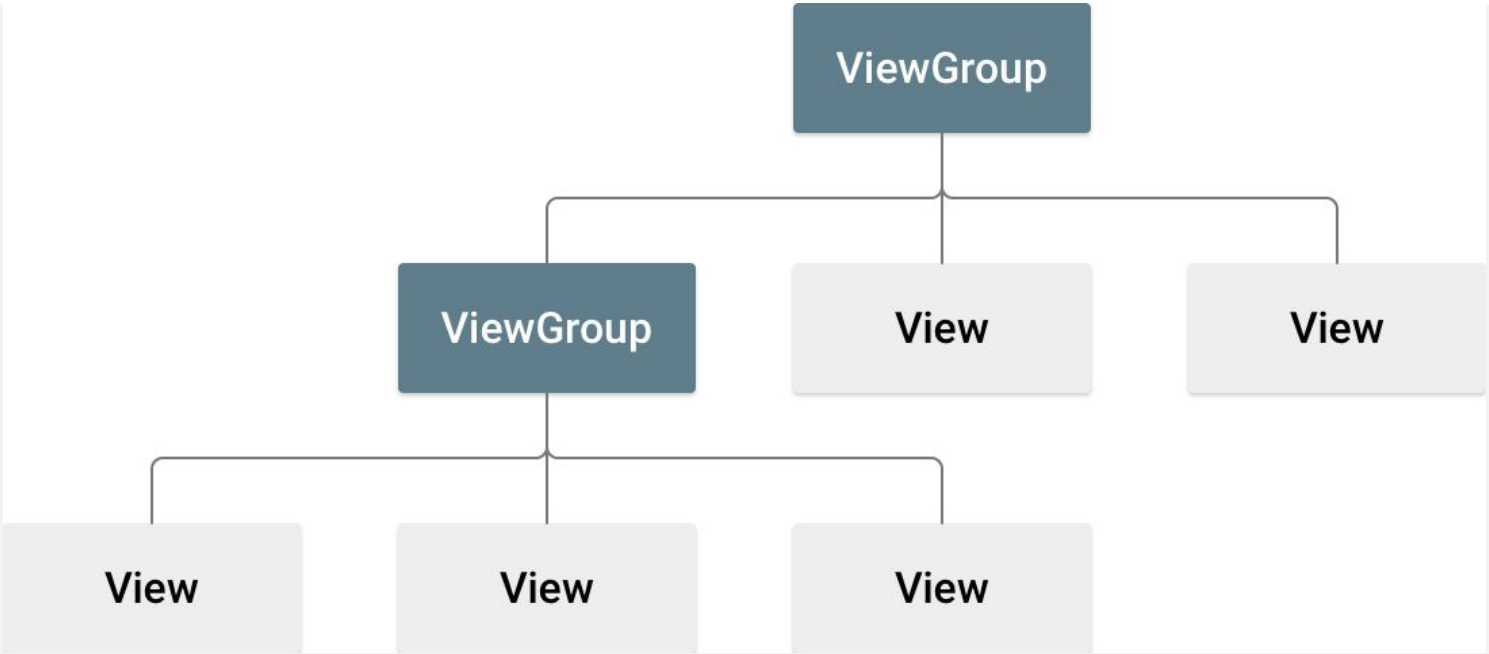
هدف نهایی


11:44
Tip Time
Cost of Service
How was the service?
Amazing (20%)
Good (18%)
OK (15%)
Round up tip?
CALCULATE
Tip Amount

ایجاد پروژه

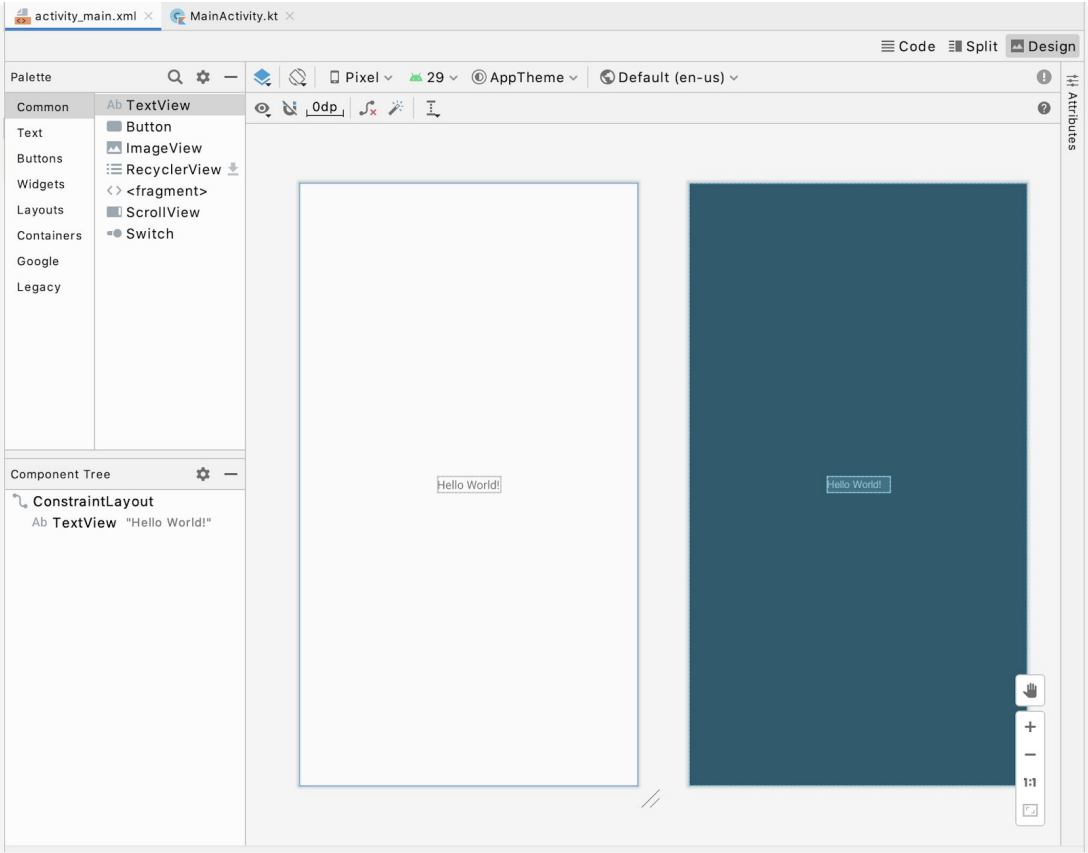

Configure Your Project
Name
Tip Time
Package name
com.example.tiptime
Save location
/Users/myaccount/AndroidStudioProjects/TipTime
Language
Kotlin
Minimum SDK
API 19: Android 4.4 (KitKat)
Your app will run on approximately 98.1% of devices.
Help me choose
Use legacy android.support libraries
Empty Activity
Creates a new empty activity.

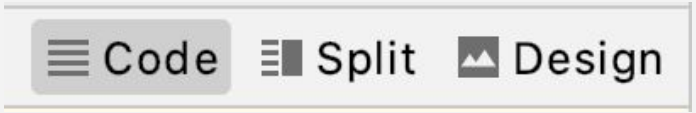
رابطه به نماها



تعریف با استفاده از XML

نمای پیش فرض ویرایشگَر

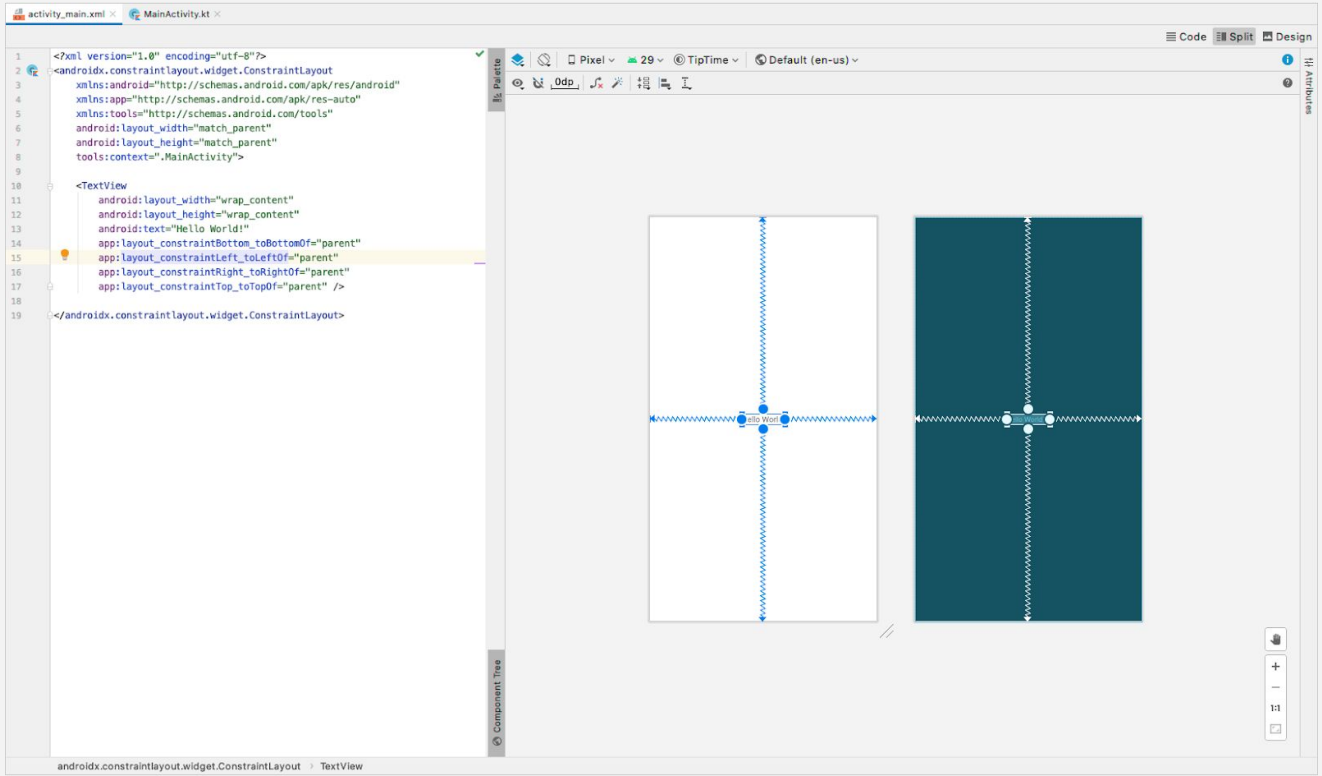




نسخه XML نمای اولیه

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

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

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

مشاهده XML و خروجی آن



تغییرات اولیه

- حذف متن
- اضافه کردن حاشیه

```
<androidx.constraintlayout.widget.ConstraintLayout
    ...
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:padding="16dp"
    tools:context=".MainActivity">
```

اضافه کردن محل وارد کردن مقدار توسط کاربر

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

    <EditText
        android:id="@+id/plain_text_input"
        android:layout_height="wrap_content"
        android:layout_width="match_parent"
        android:inputType="text"/>

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

تعیین موقعیت نسبت به نمای والد

```
<EditText
    android:id="@+id/plain_text_input"
    android:layout_height="wrap_content"
    android:layout_width="match_parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent"
    android:inputType="text" />
```

تعیین تنظیمات ورود متن

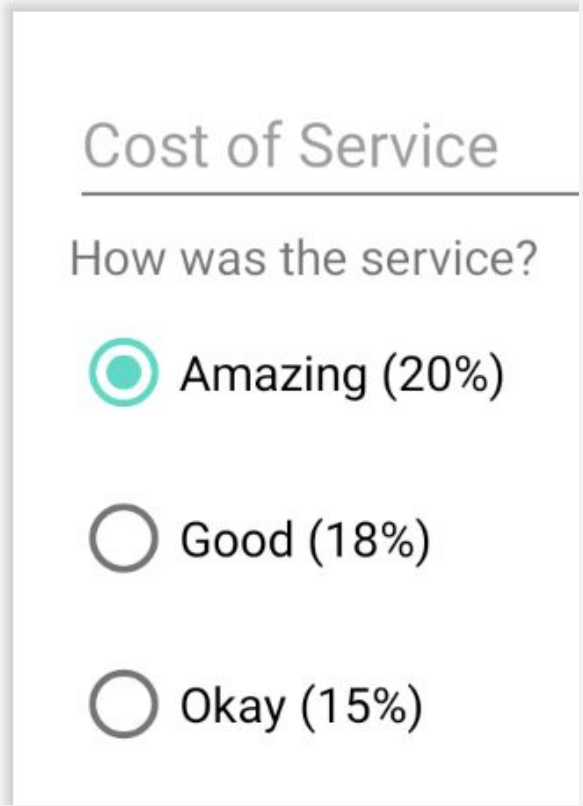
```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:padding="16dp"
    tools:context=".MainActivity">

    <EditText
        android:id="@+id/cost_of_service"
        android:layout_width="160dp"
        android:layout_height="wrap_content"
        android:hint="Cost of Service"
        android:inputType="numberDecimal"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent" />

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

اضافه کردن سوال

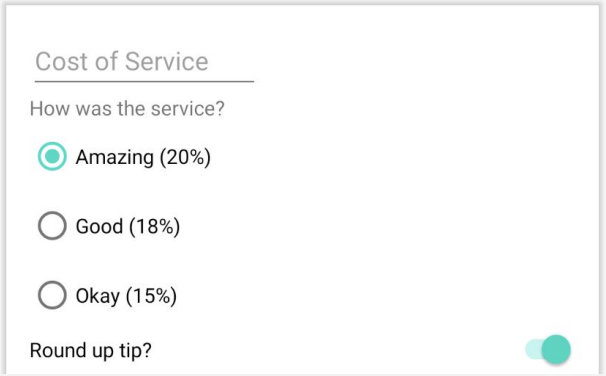
```
<?xml version="1.0" encoding="utf-8"?>
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"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

    <EditText
        android:id="@+id/cost_of_service"
        android:hint="Cost of Service"
        android:layout_height="wrap_content"
        android:layout_width="160dp"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toTopOf="parent"
        android:inputType="numberDecimal"/>

    <TextView
        android:id="@+id/service_question"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="How was the service?"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@id/cost_of_service"/>

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

اضافه کردن گَزینه انتخاب کیفیت خدمت

```
<RadioGroup
    android:id="@+id/tip_options"
    android:checkedButton="@id/option_twenty_percent"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    app:layout_constraintTop_toBottomOf="@id/service_question"
    app:layout_constraintStart_toStartOf="parent"
    android:orientation="vertical">

    <RadioButton
        android:id="@+id/option_twenty_percent"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Amazing (20%)" />

    <RadioButton
        android:id="@+id/option_eighteen_percent"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="Good (18%)" />

    <RadioButton
        android:id="@+id/option_fifteen_percent"
        android:layout_width="wrap_content"
        android:layout_height="wrap_content"
        android:text="OK (15%)" />
</RadioGroup>
```

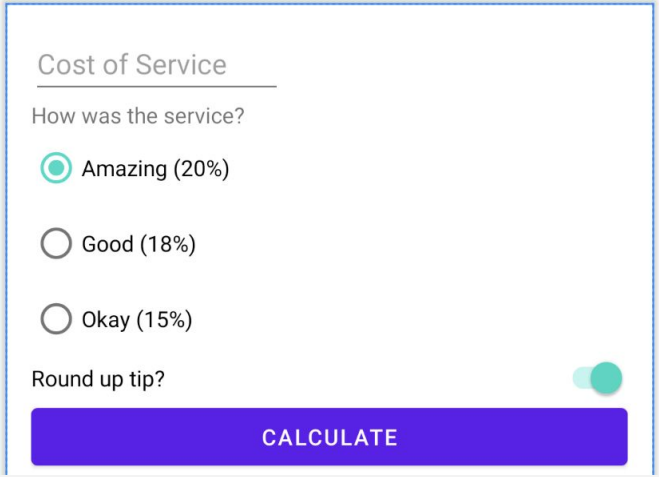


کلید روند کردن مقدار



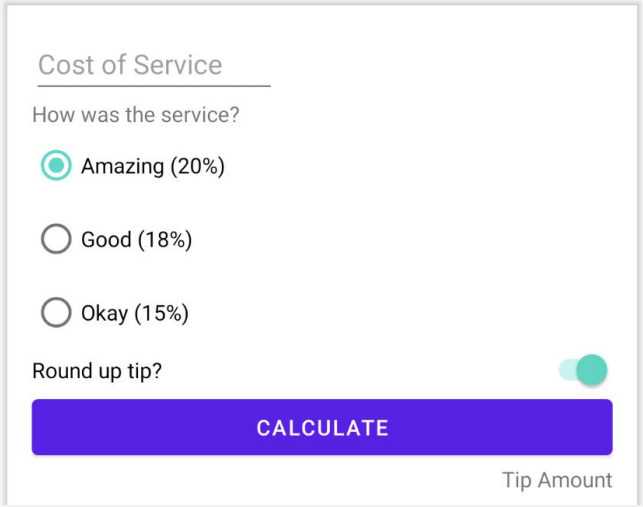

```
<Switch
    android:id="@+id/round_up_switch"
    android:layout_width="0dp"
    android:layout_height="wrap_content"
    android:checked="true"
    android:text="Round up tip?"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@id/tip_options" />
```

دکمه محاسبه




```
<Button
    android:id="@+id/calculate_button"
    android:layout_width="0dp"
    android:layout_height="wrap_content"
    android:text="Calculate"
    app:layout_constraintTop_toBottomOf="@id/round_up_switch"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintEnd_toEndOf="parent" />
```

نتیجه محاسبه




```
<TextView
    android:id="@+id/tip_result"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintTop_toBottomOf="@id/calculate_button"
    android:text="Tip Amount" />
```

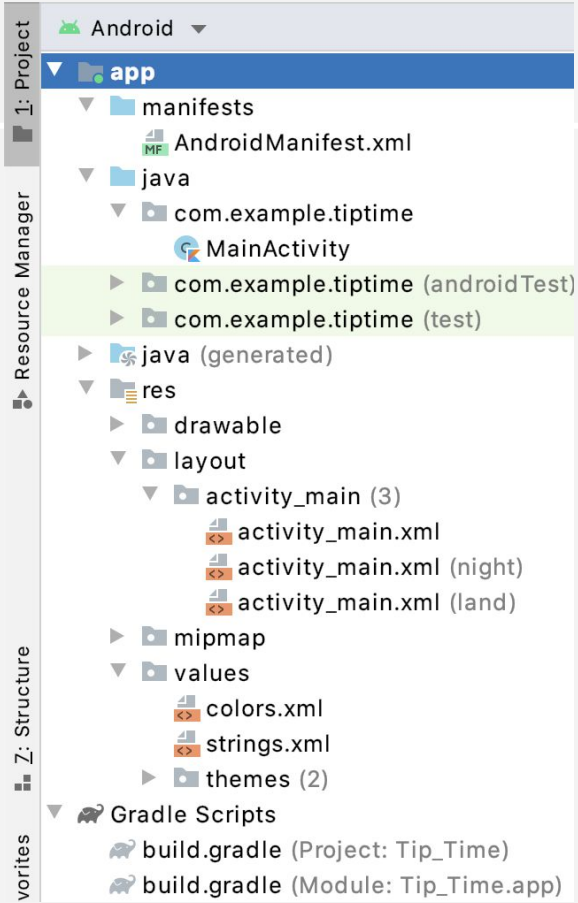
تعریف مقدار رشته ها به صورت جداگانه

```
<resources>
    <string name="app_name">Tip Time</string>
    <string name="cost_of_service">Cost of Service</string>
    <string name="how_was_the_service">How was the service?</string>
    <string name="amazing_service">Amazing (20%)</string>
    <string name="good_service">Good (18%)</string>
    <string name="ok_service">Okay (15%)</string>
    <string name="round_up_tip">Round up tip?</string>
    <string name="calculate">Calculate</string>
    <string name="tip_amount">Tip Amount</string>
</resources>
```

سوال؟

محاسبه کردن انعام

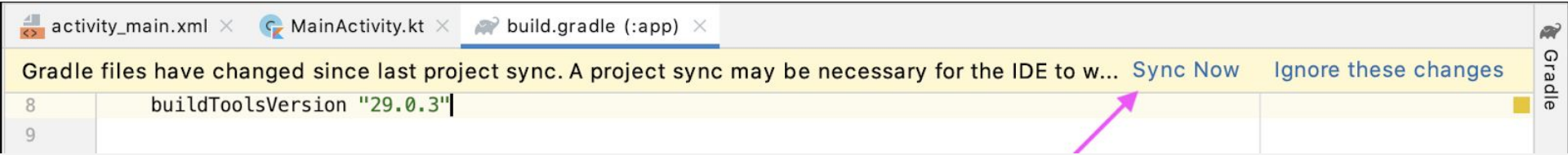
ساختار پروژه



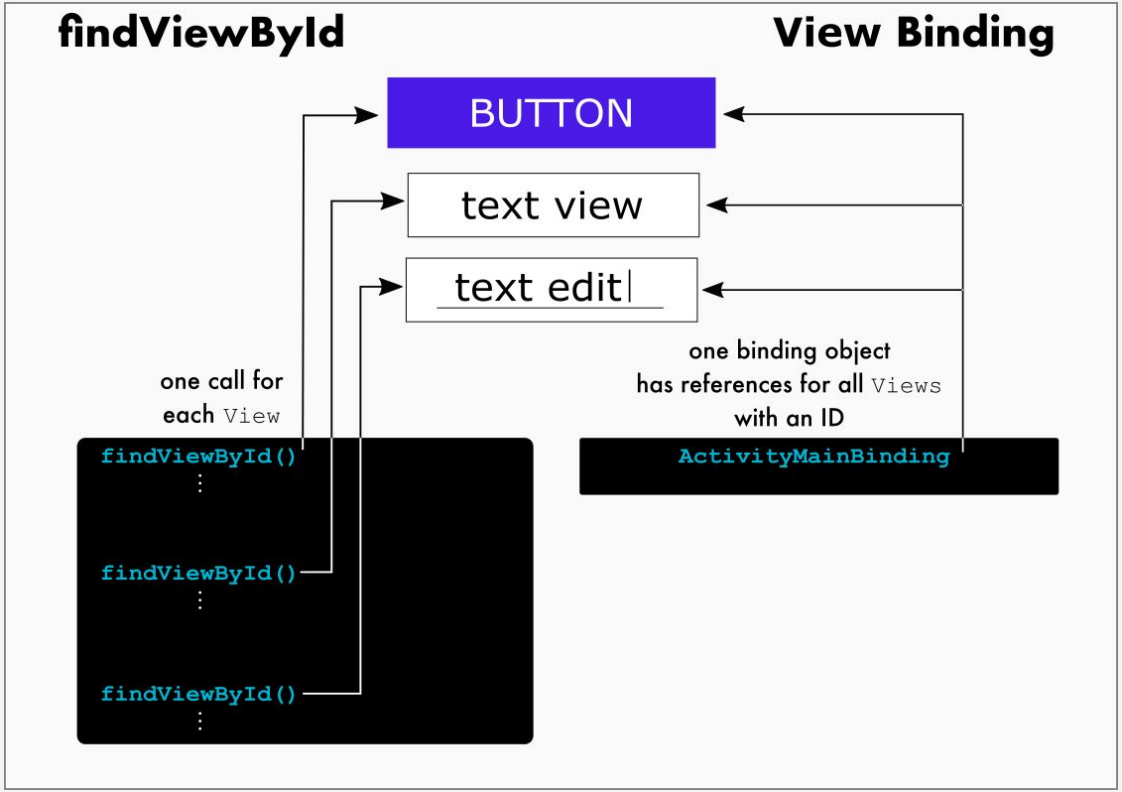
فعال کردن view binding

- تغییر فایل build.gradle

```
buildFeatures {
    viewBinding = true
}
```



چگونگی کارکرد



تغییر فعالیت اصلی

```
class MainActivity : AppCompatActivity() {

    lateinit var binding: ActivityMainBinding

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        binding = ActivityMainBinding.inflate(layoutInflater)
        setContentView(binding.root)
    }
}
```

دسترسی به یک نما

```
// Old way with findViewById()
val myButton: Button = findViewById(R.id.my_button)
myButton.text = "A button"

// Better way with view binding
val myButton: Button = binding.myButton
myButton.text = "A button"

// Best way with view binding and no extra variable
binding.myButton.text = "A button"
```

اضافه کردن ساختار تابع برای محاسبه انعام

```
class MainActivity : AppCompatActivity() {

    lateinit var binding: ActivityMainBinding

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        binding = ActivityMainBinding.inflate(layoutInflater)
        setContentView(binding.root)
        binding.calculateButton.setOnClickListener{ calculateTip() }
    }

    fun calculateTip() {

    }
}
```

تغییر محل نمایش انعام

```
<string name="tip_amount">Tip Amount: %s</string>
```

تابع محاسبه انعام

```
fun calculateTip() {
    val stringInTextField = binding.costOfService.text.toString()
    val cost = stringInTextField.toDouble()
    val selectedId = binding.tipOptions.checkedRadioButtonId
    val tipPercentage = when (selectedId) {
        R.id.option_twenty_percent -> 0.20
        R.id.option_eighteen_percent -> 0.18
        else -> 0.15
    }
    var tip = tipPercentage * cost
    val roundUp = binding.roundUpSwitch.isChecked
    if (roundUp) {
        tip = kotlin.math.ceil(tip)
    }
    val formattedTip = NumberFormat.getCurrencyInstance().format(tip)
    binding.tipResult.text = getString(R.string.tip_amount, formattedTip)
}
```

سوال؟

آزمایش برنامه

وارد نکردن هیچ مقدار

- برنامه از کار می افتد!

عیب یابی

```
19
20      fun calculateTip() {
21          val stringInTextField = binding.costOfService.text.toString()
22          val cost = stringInTextField.toDouble()
23
24          val selectedId = binding.tipOptions.checkedRadioButtonId
25          val tipPercentage = when (selectedId) {
26              R.id.option_twenty_percent -> 0.20
27              R.id.option_eighteen_percent -> 0.18
28              else -> 0.15
29          }
```

MainActivity › calculateTip()

TODO | Terminal | Database Inspector | Profiler | 4: Run | Build | 6: Logcat

Logcat

Emulator Pixel_2_API_29 Androi | com.example.**tiptime** (24423) [DE | Verbose

logcat

```
        at android.view.View$PerformClick.run(View.java:27336)
        at android.os.Handler.handleCallback(Handler.java:883)
        at android.os.Handler.dispatchMessage(Handler.java:100)
        at android.os.Looper.loop(Looper.java:214)
        at android.app.ActivityThread.main(ActivityThread.java:7356) <1 internal call>
        at com.android.internal.os.RuntimeInit$MethodAndArgsCaller.run(RuntimeInit.java:492)
        at com.android.internal.os.ZygoteInit.main(ZygoteInit.java:930)
2020-06-24 10:09:41.586 24423-24423/com.example.tiptime I/Process: Sending signal. PID: 24423 SIG: 9
```

TODO | Terminal | Database Inspector | Profiler | 4: Run | Build | 6: Logcat

خطا

```
2020-06-24 10:09:41.564 24423-24423/com.example.tiptime E/AndroidRuntime: FATAL EXCEP
    Process: com.example.tiptime, PID: 24423
    java.lang.NumberFormatException: empty String
        at sun.misc.FloatingDecimal.readJavaFormatString(FloatingDecimal.java:1842)
        at sun.misc.FloatingDecimal.parseDouble(FloatingDecimal.java:110)
        at java.lang.Double.parseDouble(Double.java:538)
        at com.example.tiptime.MainActivity.calculateTip(MainActivity.kt:22)
        at com.example.tiptime.MainActivity$onCreate$1.onClick(MainActivity.kt:17)
```

```
java.lang.NumberFormatException: empty String
```

```
at com.example.tiptime.MainActivity.calculateTip(MainActivity.kt:22)
```

```
val cost = stringInTextField.toDouble()
```

برطرف کردن اشکال

```
val cost = stringInTextField.toDoubleOrNull()
```

```
if (cost == null) {
    return
}
```

راه حل بهتر

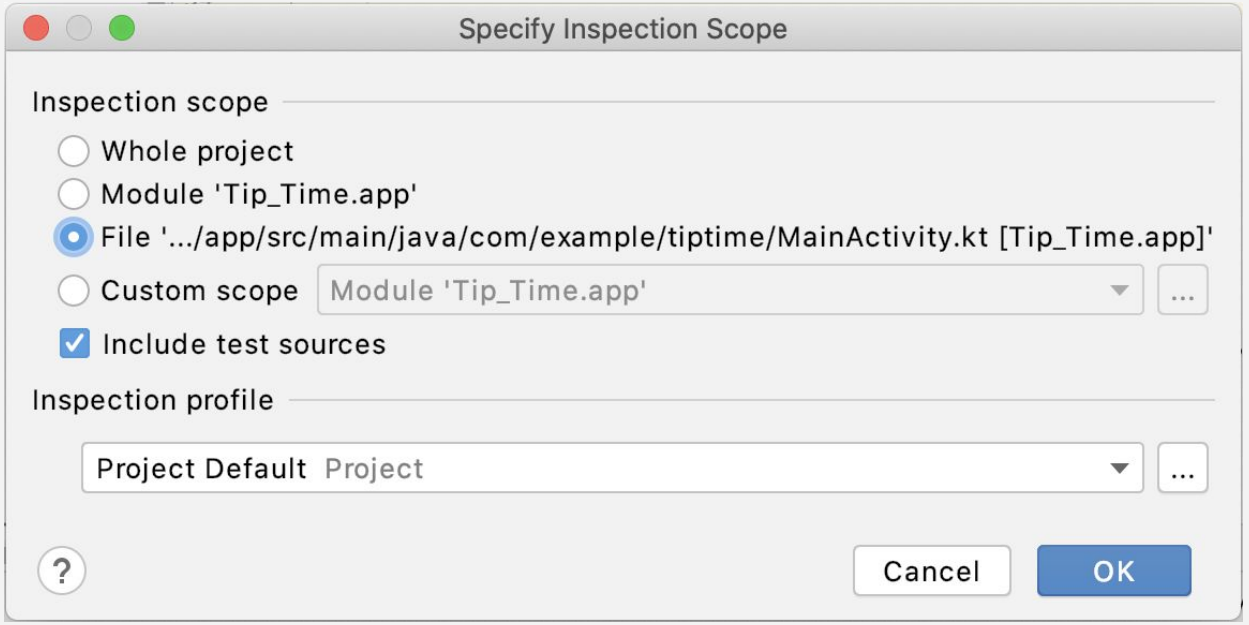
```
if (cost == null) {
    binding.tipResult.text = ""
    return
}
```

سوال؟

بهبود برنامه

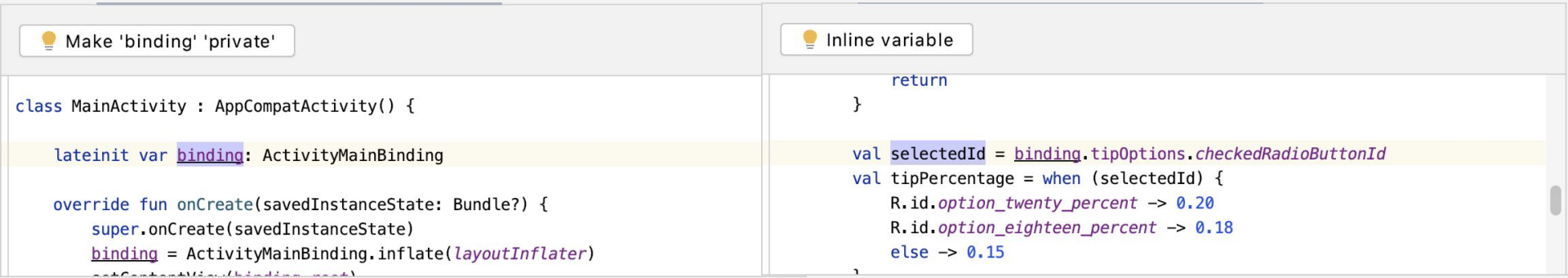
اجرای یافتن مشکلات

- Analyze > Inspect Code...



نمونه خروجی

Inspection Results:
'Project Default' Profile on Project 'Tip T...
'Project Default' Profile on Module 'Tip_...
'Project Default' Profile on
Kotlin 1 info 1 weak warning
Style issues 1 info 1 weak warning
Class member can have 'private' visibility 1 info
Variable declaration could be moved inside `when` 1 weak warning
Select inspection to see problems.


Make 'binding' 'private'
class MainActivity : AppCompatActivity() {
lateinit var binding: ActivityMainBinding
override fun onCreate(savedInstanceState: Bundle?) {
super.onCreate(savedInstanceState)
binding = ActivityMainBinding.inflate(layoutInflater)
Inline variable
return
}
val selectedId = binding.tipOptions.checkedRadioButtonId
val tipPercentage = when (selectedId) {
R.id.option_twenty_percent -> 0.20
R.id.option_eighteen_percent -> 0.18
else -> 0.15

سوال؟