Introduction au Développement Mobile

Kotlin

- Peu verbeux
- Moderne
- Java Interop
- Développé par JetBrains
- Kotlin everywhere: JVM, Backend, JS, KTS, iOS...

Variables

```
// Typage statique inféré
val myInt: Int = 1
val myInt = 1
val myString: String = "coucou"
val myInt = "coucou"

// Mutabilité
val myImmutableVariable = 0
var myMutableVariable = 0

// Nullabilité (Interop:  @Nullable)
val variable: SomeClass? = null
variable?.myMethod() ?: doSomethingElse()
variable!!.myMethod()

// Smart casts
var nullable: MyClass?
if (nullable != null) { nullable.myMethod() }


// When statements: super-powered switch-case statements
val primeNumbers = listOf(1, 3, 5, 7, 11, 13, 17)
val x = 13
when (x) {
    null -> print("x is null")
    !is Int -> print("x is not an int")
    in 1..10 -> print("x is between 1 and 10")
    !in 10..20 -> print("x is not between 10 and 20")
    in primeNumbers -> print("x is a prime") // ⬅️
    else -> print("none of the above")
}
```

Classes

```
class MyFinalClass {...} // classes are final by default
open class MyHeritableClass {...} // open makes them non-final

object MySingleton {
  val myUtilFunction() { ... }
}
MySingleton.myUtilFunction() // used like "static" methods in Java

class MyClass {
  companion object { // static fields
    const val MY_CONSTANT = 1
  }
}
MyClass.MY_CONSTANT // in java: MyClass.Companion.MY_CONSTANT

// equals(), toString(), hashCode(), copy(), destructuring for free
data class MyPojo(val someProperty: SomeType, ...)

sealed class Result { // sort of "enum classes"
  object Success : Result
  class Failure(error: Error) : Result()
}

// Extension functions
fun String.reverse(): String {...}
"blabla".reverse()

// Delegates
class Survey(firstItem: Question, vararg items: Question) : List<Question> by listOf(firstItem, *items)
```

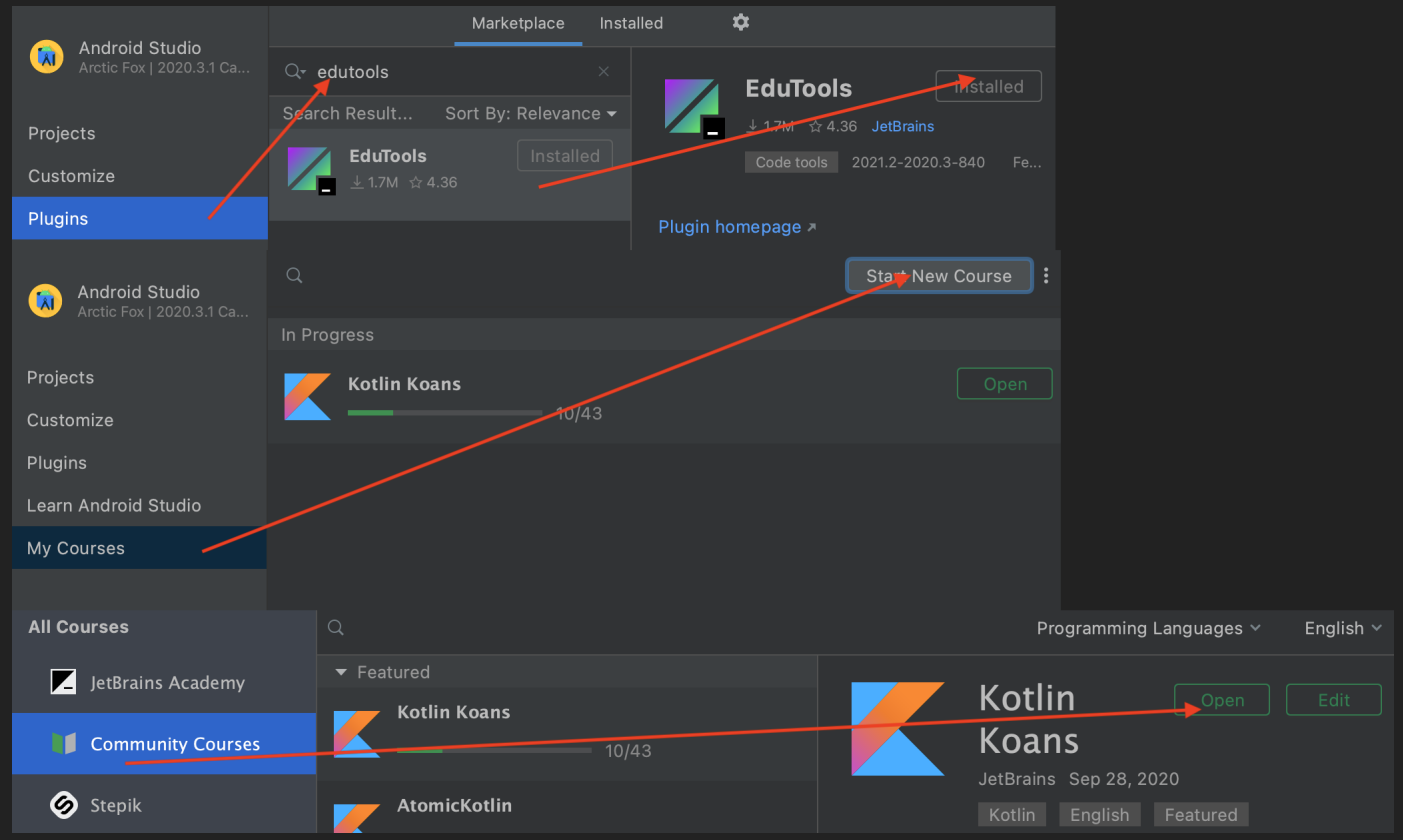
Lambdas

```
// Lambdas: function blocks handled as variables
val add: (Int, Int) -> Int = { a, b -> a + b }
val result = add(1, 2)

fun listOperation(number: Int, list: List<Int?>, operation: (Int, Int) -> Int): List<Int>? {
    list.forEach { element ->
        if (element == null) return@applyOperation null // Specified return
        operation(number, element)
    }
}

listOperation(1, listOf(2, 4, 6, 8), add)
listOperation(1, listOf(2, 4, 6, 8)) { a, b -> a - b }

// Lambda for SAM
button.setOnClickListener { view -> ... }
```

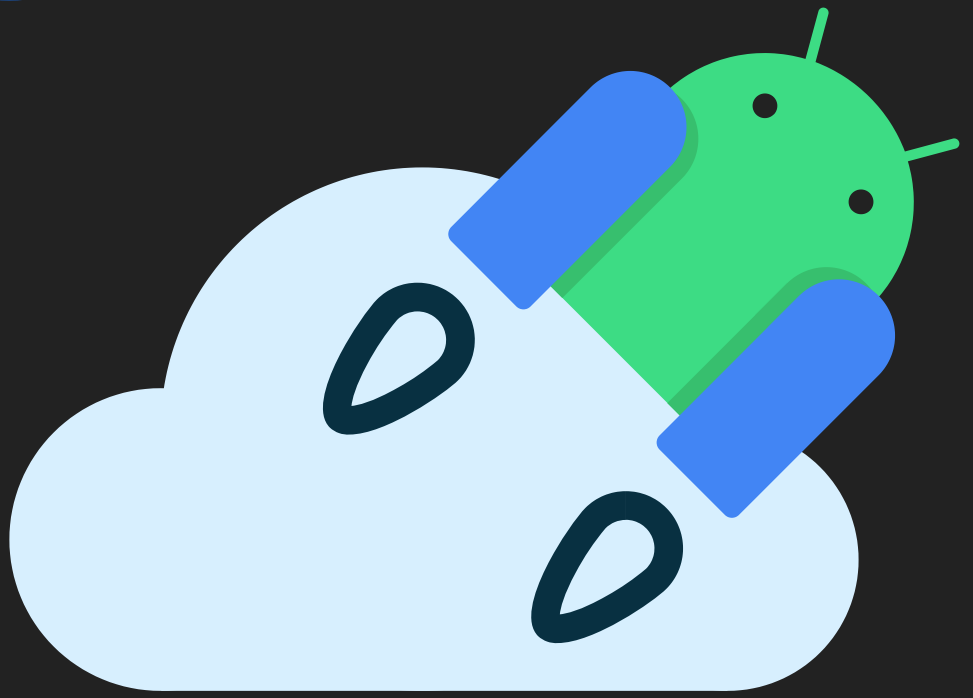
Kotlin Koans

En ligne: try.kotl.in

Dans l'IDE: ajouter plugin Edutools, redémarrer puis `Start New Course > Community Courses`



Android



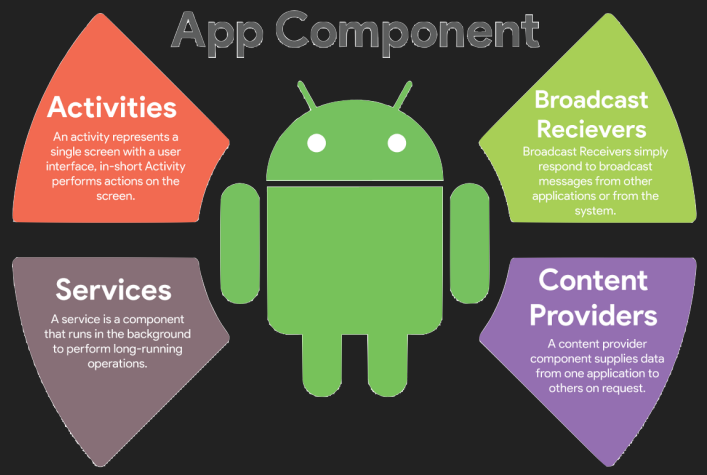
Intro

- Nombreux utilisateurs
- Devices très variables
- Versions d'OS anciennes
- Puissance limitée
- Phone, Tablet, TV, Watch, Auto, Things, Chrome OS
- Language : Java et Kotlin
- IDE : Android Studio

android studio

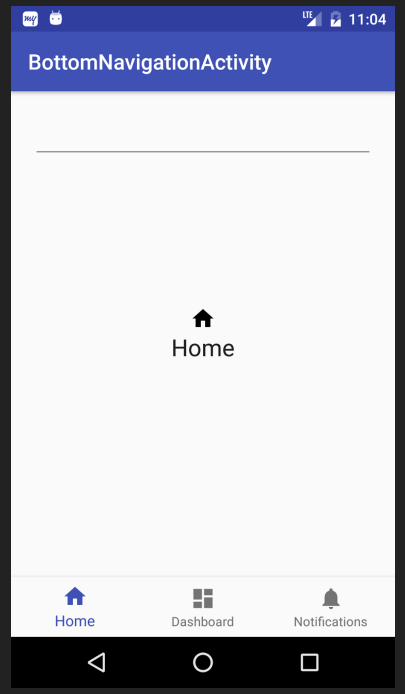
Éléments d'une app Android

- Scripts Gradle
- AndroidManifest.xml
- App
- Activity
- Fragment
- Layouts XML



App Components

- Activity / Fragments ➡️ Screen Controller
- Service ➡️ Headless Controller
- Broadcast Receiver ➡️ Event Listener
- ContentProvider ➡️ Shared Data API



Activity / Fragment

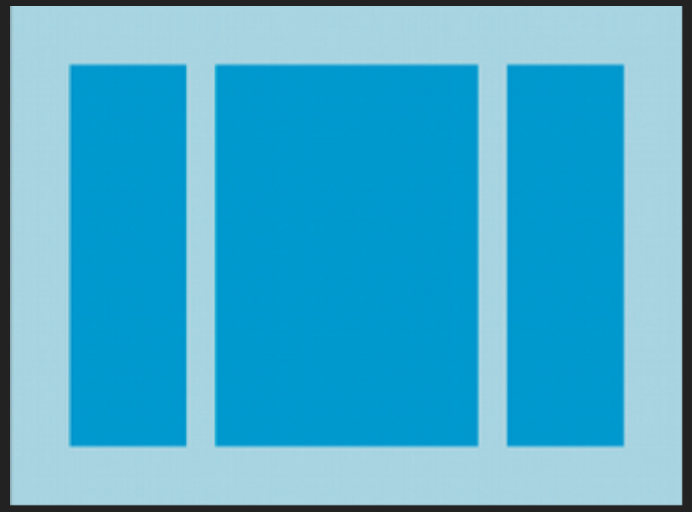
- Component le plus important.
- Rôle: Fait le lien entre le Layout et la logique de l’app
- Attention: Éviter la tendance à mettre toute l’app dans l'Activity
- Fragment ≈ SubActivity

Layouts

```xml
<?xml version="1.0" encoding="utf-8"?>
<androidx.cardview.widget.CardView xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    ...

    <androidx.constraintlayout.widget.ConstraintLayout
        ... >

        <ImageView ... />
    </androidx.constraintlayout.widget.ConstraintLayout>
</androidx.cardview.widget.CardView>
```

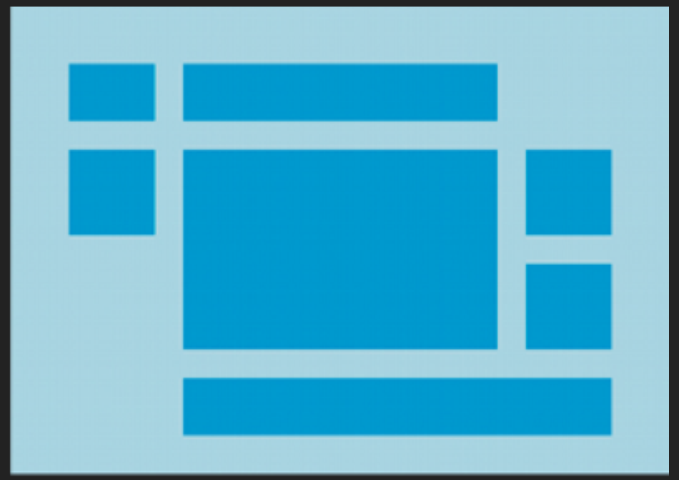
- Fichier XML décrivant un écran (ou une partie)
- ViewGroup: View contenant d'autres Views, avec diverses règles d'affichage: LinearLayout, RelativeLayout, ConstraintLayout, Stack, ...
- View: Élément graphique de l'interface: Text, Image, Button

ViewGroups

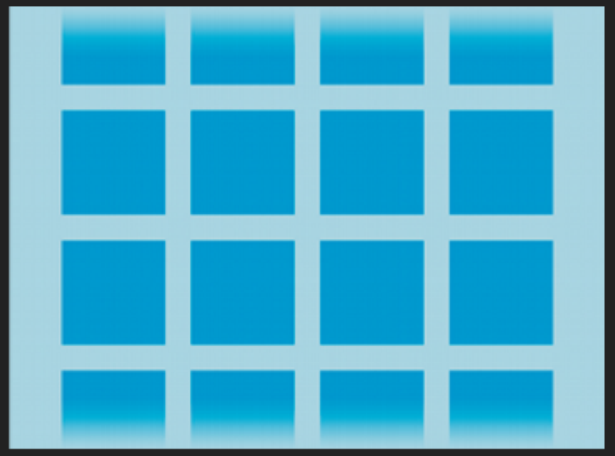


LinearLayout

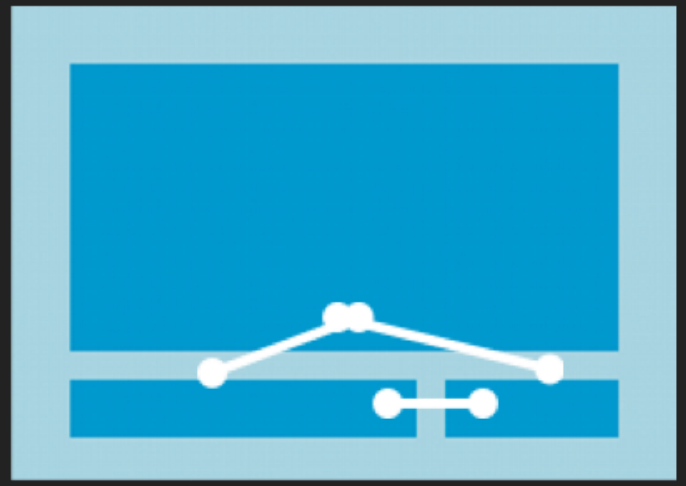
RelativeLayout



TableLayout



GridLayout



ConstraintLayout

Views

```
<TextView
  android:id="@+id/textView_login" // reference to the view
  android:layout_width="match_parent" // use all available width in parent
  android:layout_height="wrap_content" // use only needed height
/>

<Button
  android:id="@+id/button_login"
  android:layout_width="0dp" // match width to constraints
  android:layout_height="200dp" // specify explicit height
  app:layout_constraintEnd_toEndOf="@id/textView_login" // constraint start
  app:layout_constraintStart_toStartOf="parent" // contraint end
  android:visibility="invisible" // visible, invisible or gone
/>
```

	View binding	ButterKnife	Kotlin synthetics
Always null-safe	✅	🤷‍♀️	⛔
Only reference ids from current layout	✅	⛔	⛔
Supports Kotlin & Java	✅	✅	⛔
Amount of code needed	Low	Some duplication	Low

References to views

```
// traditional
val loginTextView = findViewById<TextView>(R.id.textView_login)

// ButterKnife
@BindView(R.id.textView_login) val loginTextView: TextView

// viewbinding / databinding
binding.textViewLogin
```

ViewBinding

Ajouter:

```
android {
    buildFeatures {
        viewBinding true
    }
}
```

Activity:

```
private lateinit var binding: ResultProfileBinding

override fun onCreate(...) {
    super.onCreate(...)
    binding = ResultProfileBinding.inflate(layoutInflater)
    setContentView(binding.root)
    binding.myButton.setOnCLickListener { ... }
}
```

Fragments: Documentation

Kotlin sur Android

- Tous les avantages de Kotlin
- Conversion depuis Java avec Android Studio
- Android KTX
- Coroutines, Flow, ...
- Compose
- Pas vraiment de désavantages car équivalent à Java et interop facile
- ⚠️ On peut être dépassés par les features de Kotlin: rester simple et lisible

iOS

- Moins de devices différents
- OS mis à jour plus rapidement
- Plus de 💰 dépensés
- Swift (interop Objective-C)
- XCode 💩
- UIViewController (Équivalent de Activity)
- Storyboards (Layout XML manipulé visuellement)
- Xibs (Vue XML)

```
class LoginViewController: UIViewController {
    @IBOutlet weak var label: UILabel!
    @IBAction func setDefaultLabelText(_ sender: UIButton) {
        let defaultText = "Default Text"
        label.text = defaultText
    }
}
```

Cross-Platform et Composants

- Permet de coder une seule fois
- On perd souvent les possibilités spécifiques ou récentes des OS (effet "PPCD")
- On perd parfois aussi en performances ou en UX
- Programmation à base "Components" à la React
- Xamarin, React, NativeScript, Ionic
- Google et Apple s'en inspirent et poussent maintenant beaucoup à utiliser:
    - Dart: Flutter
    - Kotlin: Jetpack Compose (desktop, web, iOS ?)
    - Swift: SwiftUI (pas cross-platform)