Scala + Android

*Nick (http://github.com/**stanch**)*

ScalaDays 2014

Godspeed from Apple

Swift
@SwiftDevs

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Now that #Swift is out, our #Android friends should get a modern alternative to #Java too!

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Why is *mobile* hard?

- Variety of devices
- Lots of interaction
- On-off connectivity
- Ancient API design

Android 101

- Very popular
- Obsessed with candy

- *Hard*

Scala as a remedy

- Works on Android
- Solves problems
- Is fun

Elegance vs ancient APIs

- Ubiquitous `null`
  ⇒ use `Option`

- Accessing things “too early” clashes with lifecycle
  ⇒ use `lazy`

- Listener classes everywhere
  ⇒ use SAM (*Scala 2.11 -Xexperimental*)

More Elegance: Scaloid

```
val button = new Button(context)
button.setText("Greet")
button.setOnClickListener(new OnClickListener() {
  def onClick(v: View) {
    Toast.makeText(context, "Hello!", Toast.LENGTH_SHORT).show()
  }
})
layout.addView(button)
```

```
SButton("Greet", toast("Hello!"))
```

https://github.com/**pocorall/scaloid**

Concurrency: UI thread

- UI code ***only*** on the UI thread
- non-UI code ***only*** outside UI thread

How to do the work on background and show the result to the user?

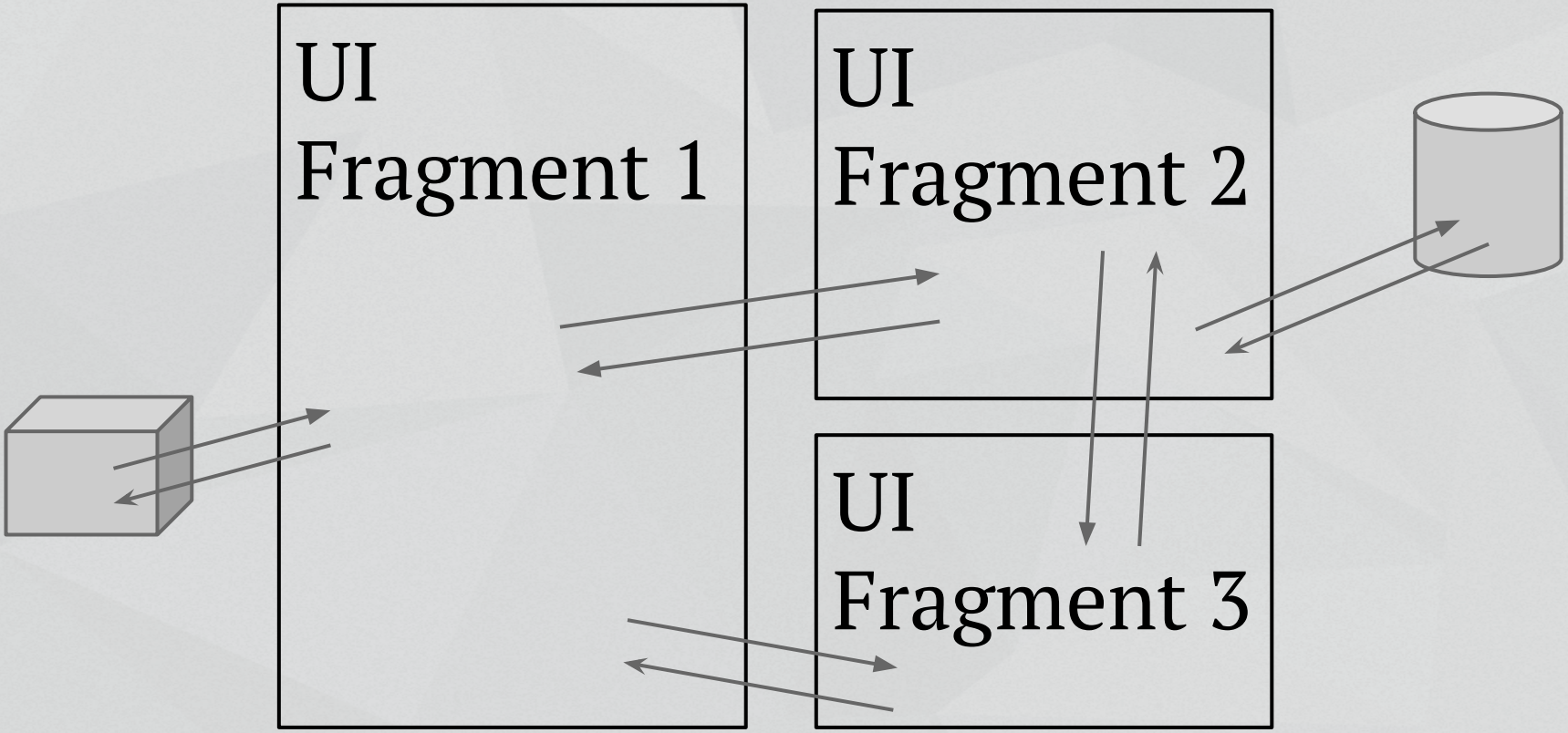
Concurrency: Futures

```
import macroid.UiThreading._

Future {
  // background
  ...
} onSuccessUi {
  case ... ⇒
    // UI
    ...
}
```

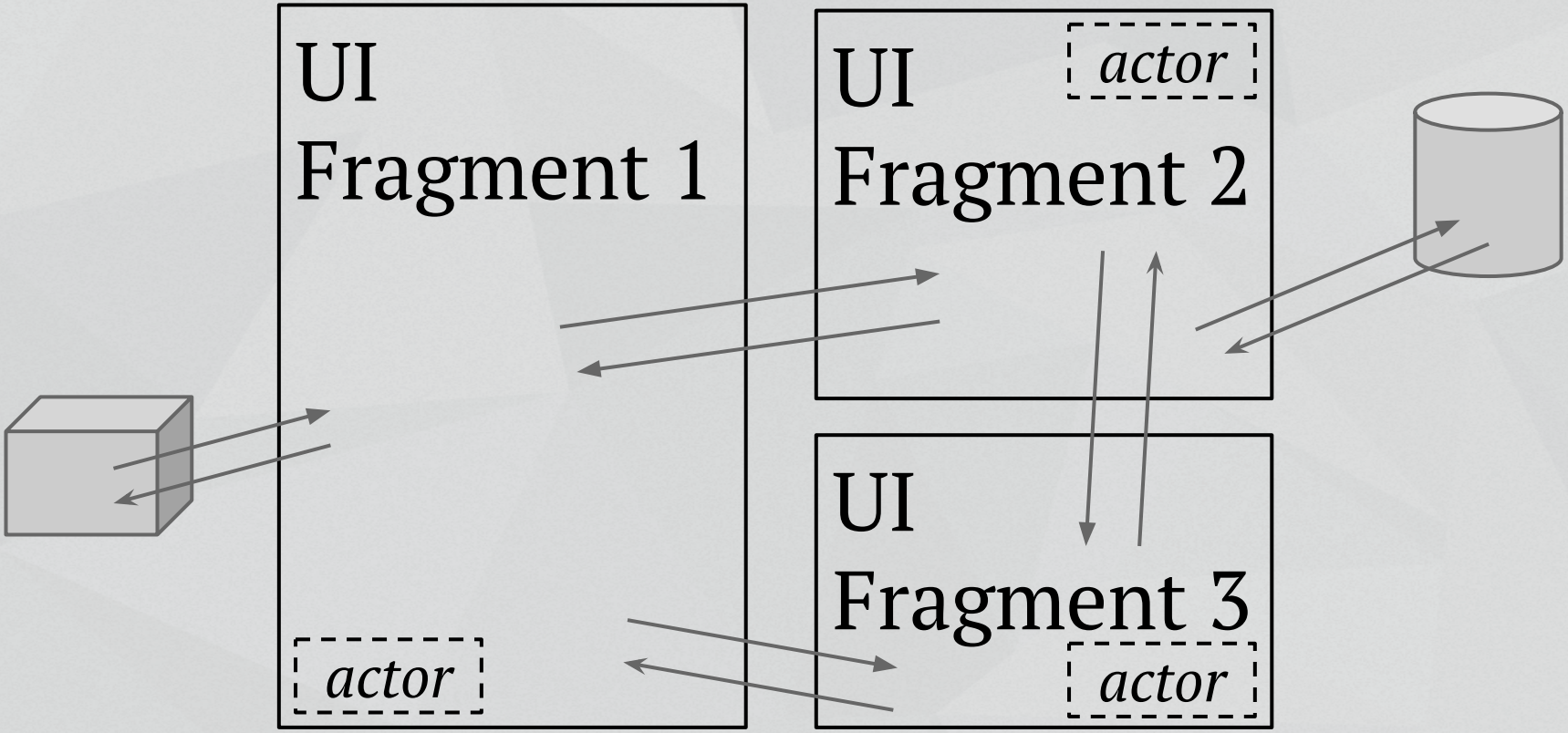
Concurrency: scala-async

```
import macroid.UiThreading._

async {
  val x = await(future1)
  val y = await(future2)
  x * y
} onSuccessUi {
  case z ⇒
    showToUser(z)
}
```

Concurrency: Akka



Concurrency: Akka



http://typesafe.com/activator/template/**macroid-akka-pingpong**

Concurrency: resolvable

- REST endpoints
- Local database
- Local caches
- On/off connectivity

How to load data from several endpoints in the most flexible and optimal way?

http://resolvable.github.io

Macroid

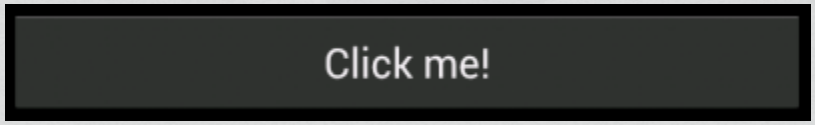
Experimental modular functional UI language for Android, written in Scala.

Macroid: motivation

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
              android:layout_width="fill_parent"
              android:layout_height="fill_parent"
              android:orientation="vertical" >
    <TextView android:id="@+id/text"
              android:layout_width="wrap_content"
              android:layout_height="wrap_content"
              android:text="Hello, I am a TextView" />
    <Button android:id="@+id/button"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="Hello, I am a Button" />
</LinearLayout>
```

- Inflexible
- Poor composability

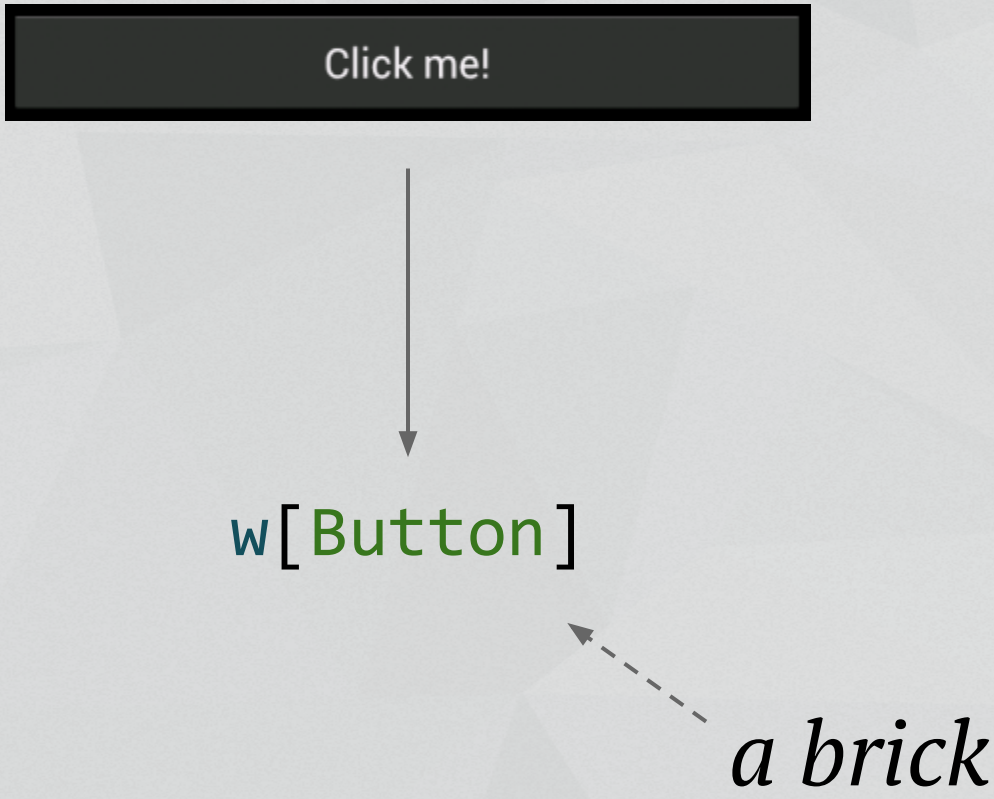
Macroid: bricks



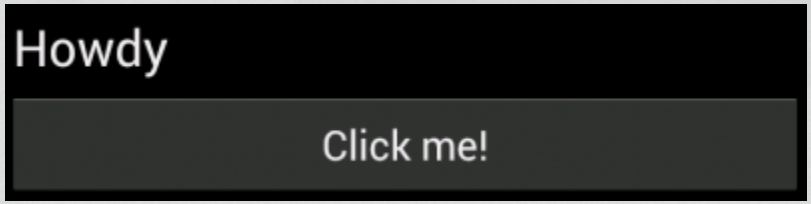
Macroid: bricks


```
new Button(ctx)
```

Macroid: bricks



Macroid: bricks

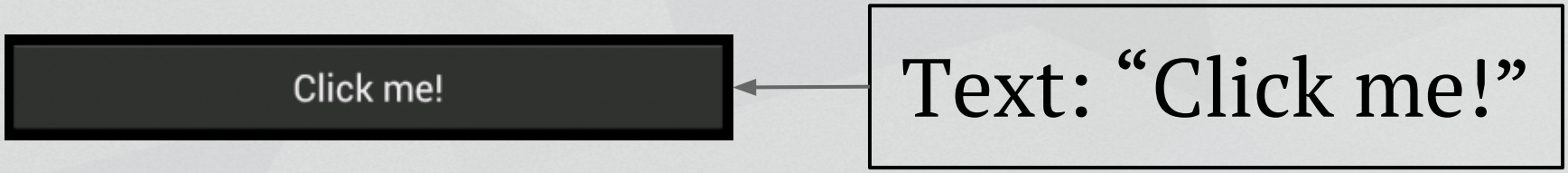


```
l[LinearLayout](
  w[TextView],
  w[Button]
)
```

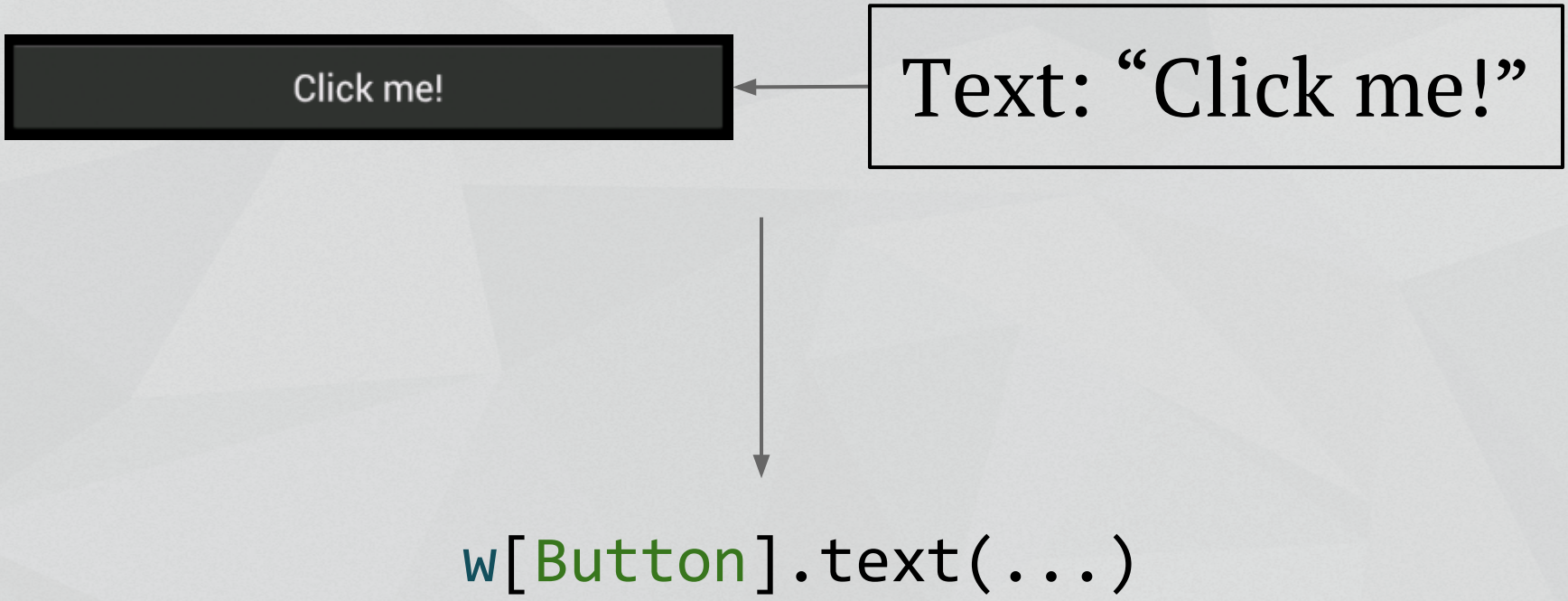
Macroid: brick *composition*

```
val layout1 = ...
val layout2 = ...

l[LinearLayout](
  layout1,
  layout2
)
```

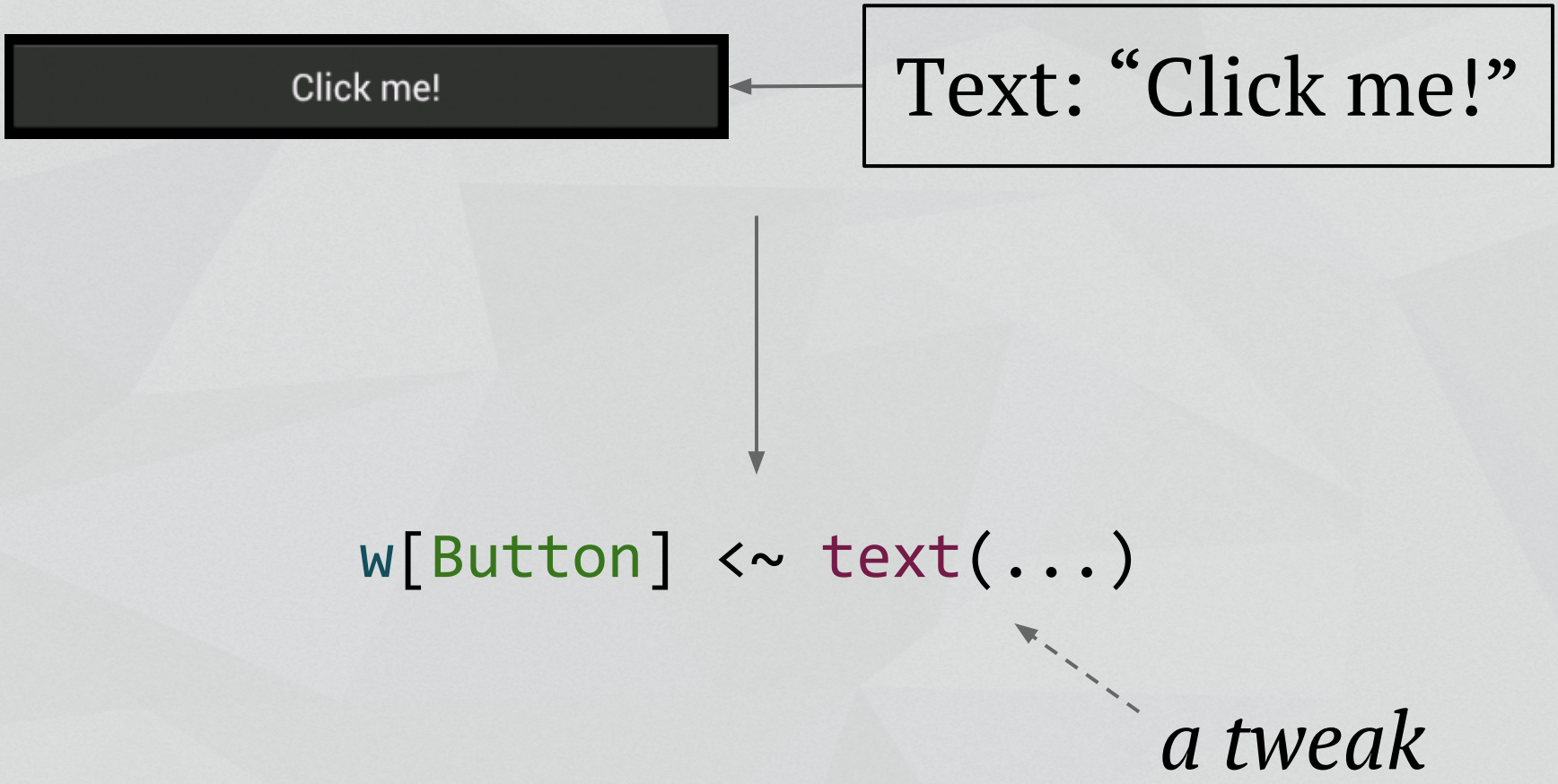
Macroid: tweaks



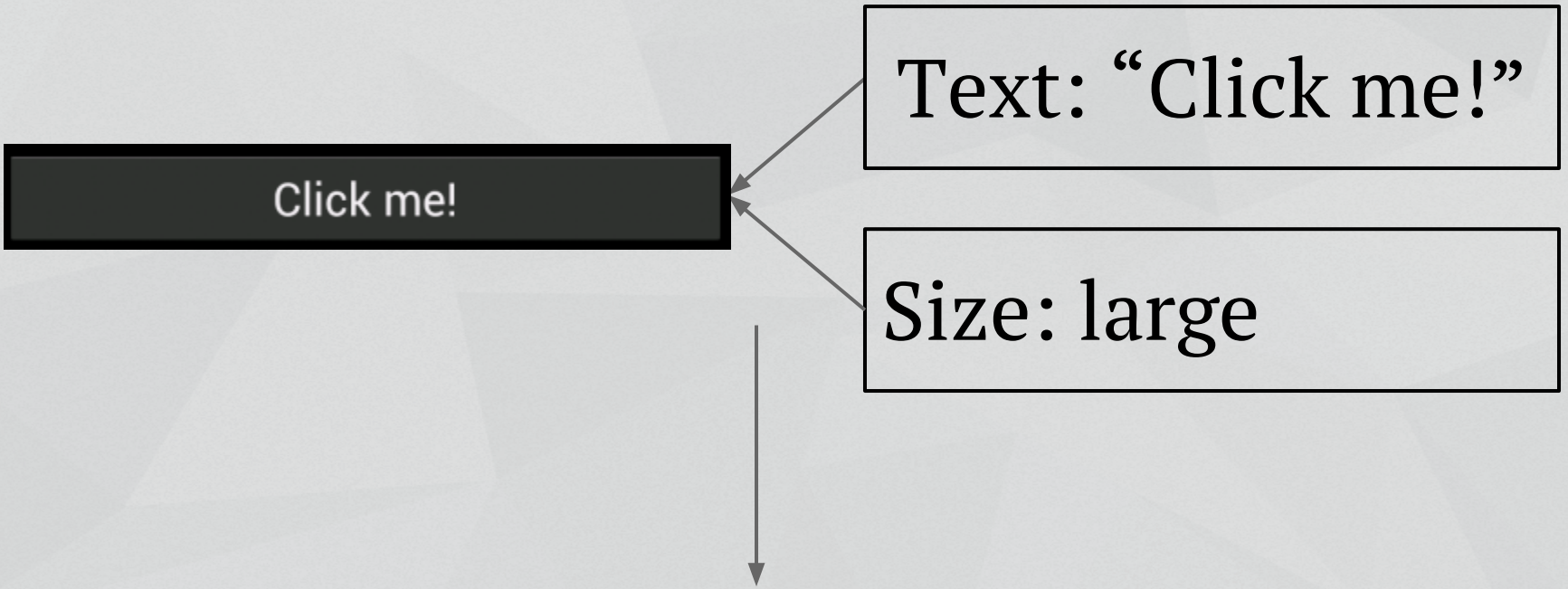
Macroid: tweaks



Macroid: tweaks



Macroid: tweaks




```
w[Button] <~
  text(...) <~
  TextSize.large
```

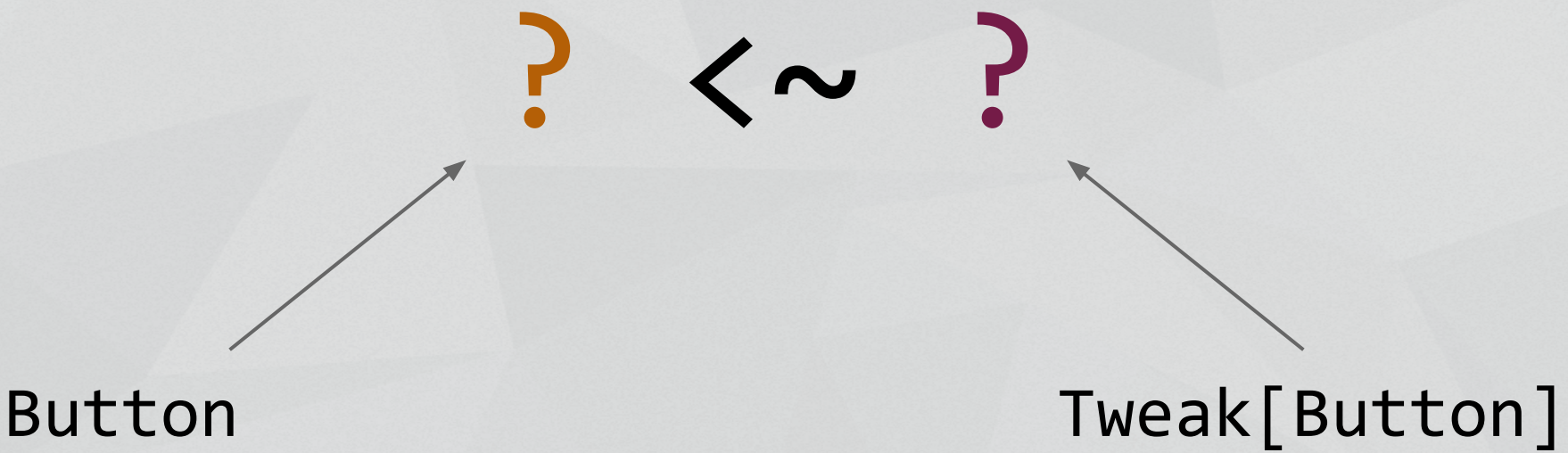
Macroid: tweak *composition*

```
def largeText(str: String) =
  text(str) +
  TextSize.large +
  padding(left = 8 dp)

w[Button] <~ largeText(...)
```

Macroid: an example

```
var greeting = slot[TextView]

l[LinearLayout](
  w[Button] <~
    text("Click me!") <~
    On.click {
      greeting <~ show
    },

  w[TextView] <~
    text("Howdy") <~
    wire(greeting) <~ hide
)
```

Macroid: Zen tweaking



Macroid: Zen tweaking

Macroid: Zen tweaking


```
Button,
List[Button],
Option[Button],
...
```

```
Tweak[Button],
List[Tweak[Button]],
Option[Tweak[Button]],
Future[Tweak[Button]],
...
```

Macroid: Zen tweaking

```
trait CanTweak[W, T, R] {
  def tweak(w: W, t: T): Ui[R]
}
```

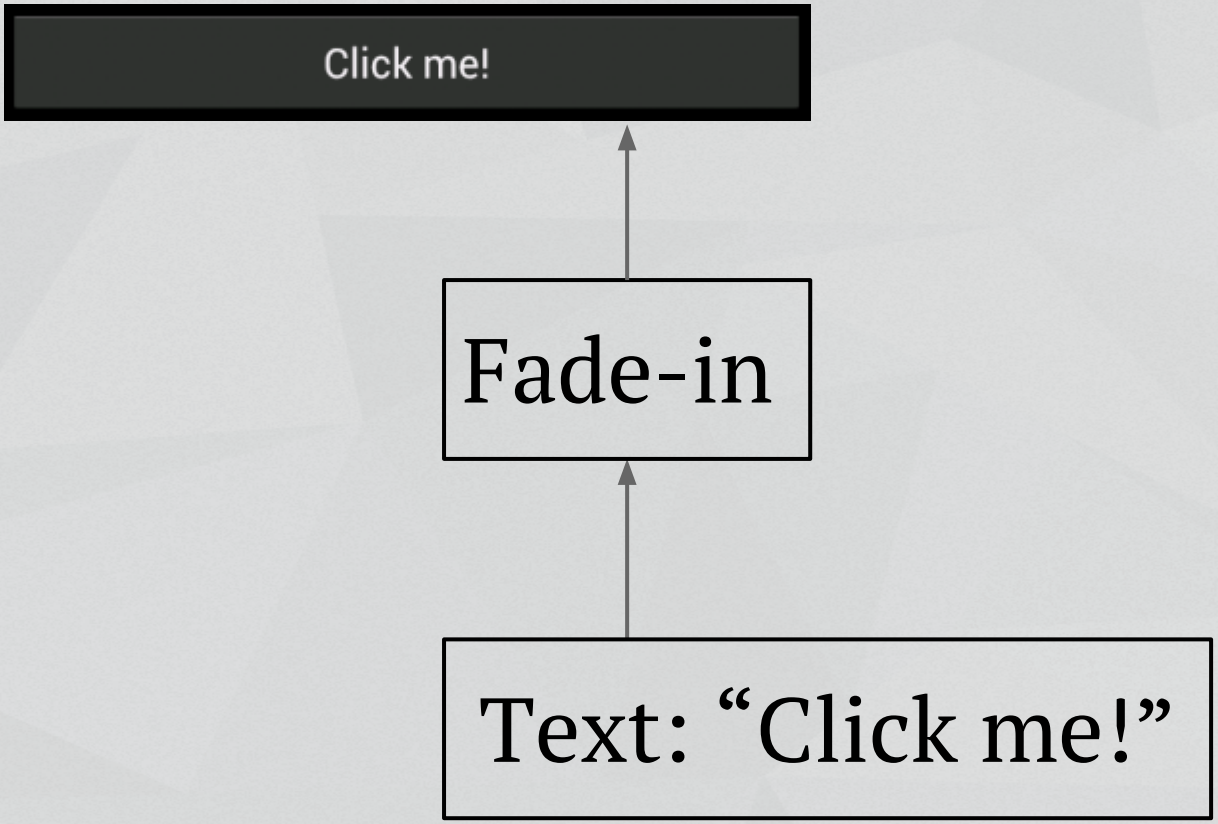
Macroid: Zen tweaking

```
// will be ready in several minutes
val caption: Future[String] = Future {
  …
}

// use right away
myTextView <~ caption.map(text)
```

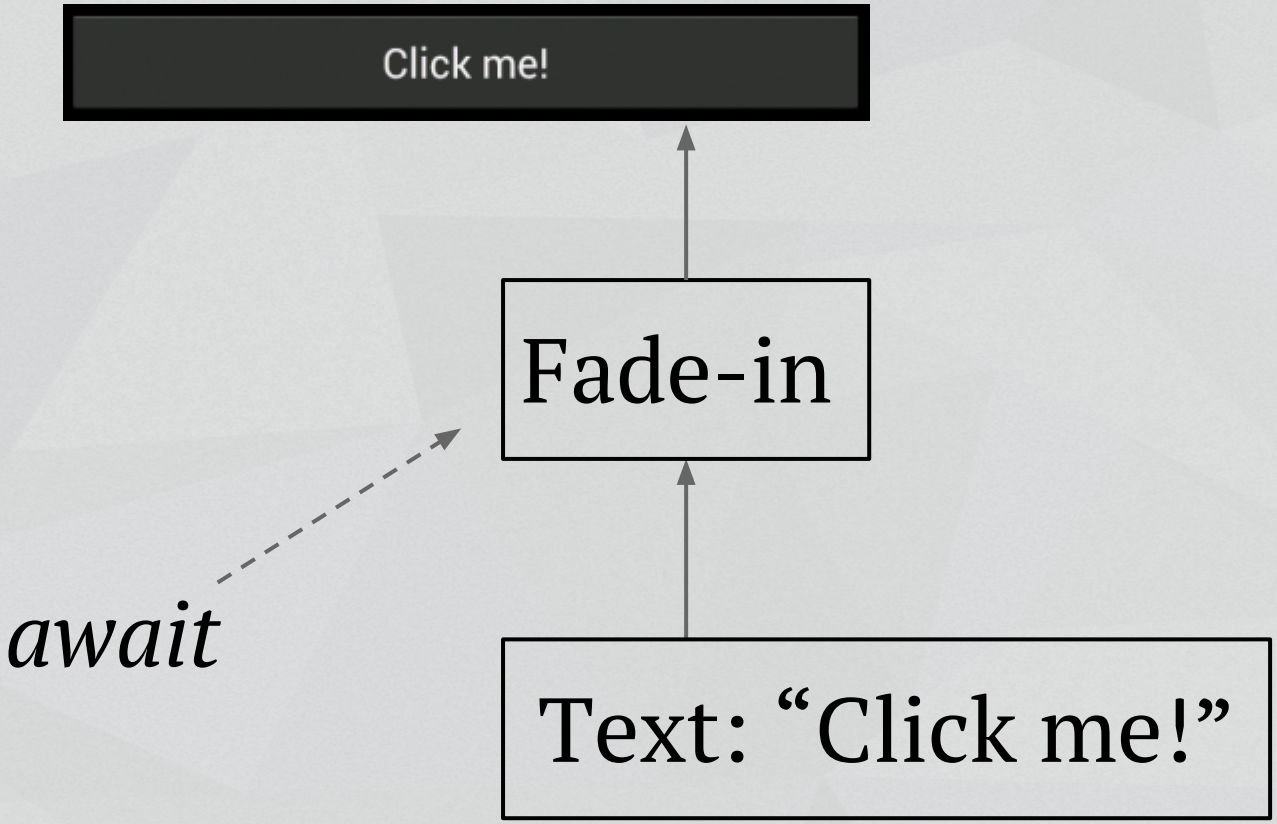
Macroid: Zen tweaking

```
// create a reactive variable
val caption = rx.Var("Ola")

// set text to “Ola”
myTextView <~ caption.map(text)

// text automatically updates to “Adeus”
caption() = "Adeus"
```

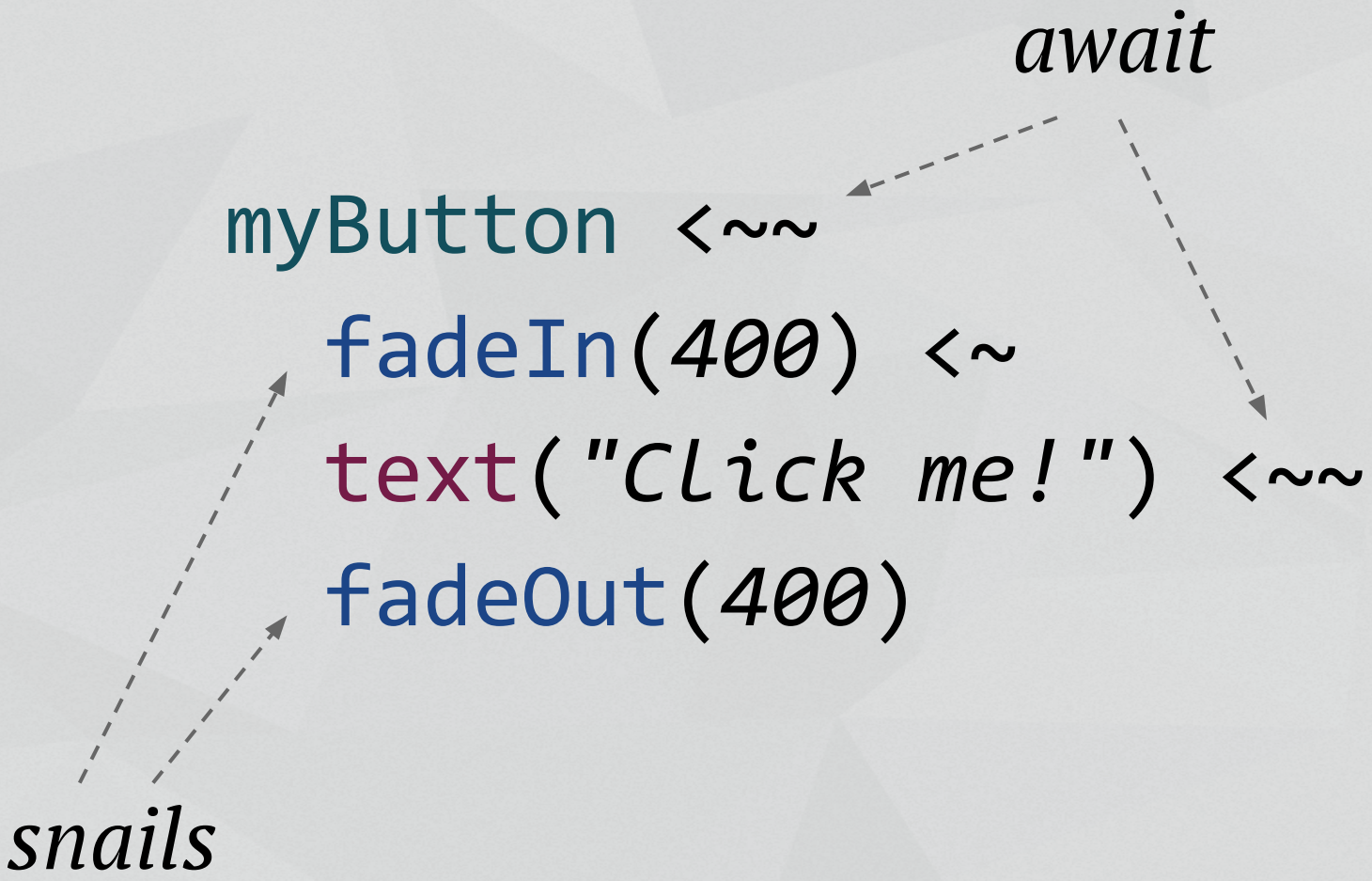
Macroid: snails



Macroid: snails

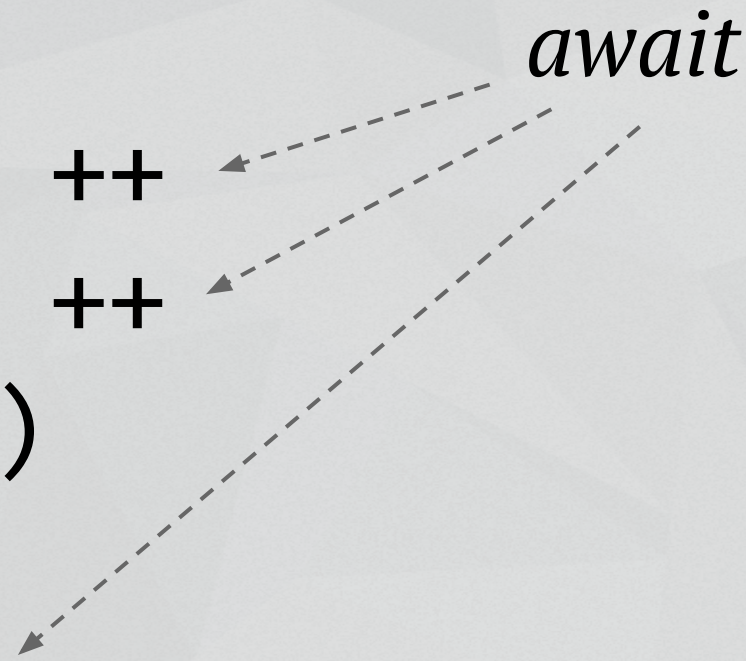


Macroid: snails



Macroid: snail *composition*

```
val blink =
  fadeIn(400) ++
  delay(2000) ++
  fadeOut(400)

myTextView <~~ blink
```



Macroid: UI actions

```
val action =
  myTextView <~
    text("Howdy") <~ show

runUi(action)
```

Macroid: UI *composition*

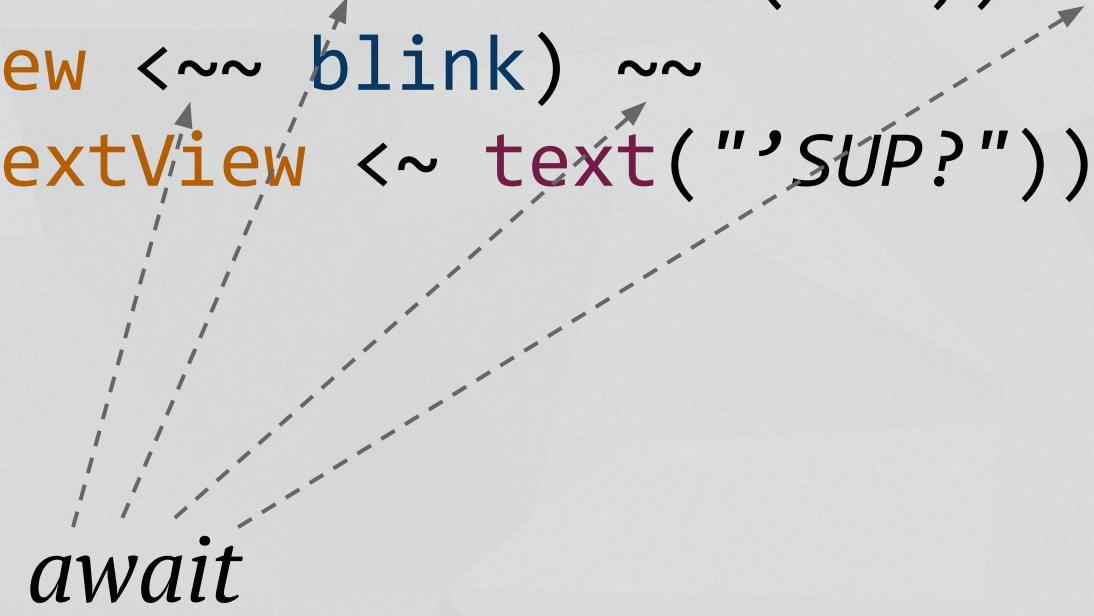
```
val action1 =
  myTextView <~
    text("Howdy") <~ show

val action2 =
  myProgressBar <~ hide

runUi(action1 ~ action2)
```

Macroid: UI *composition*

```
runUi {
  (myProgressBar <~~ fadeOut(400)) ~~
  (myTextView <~~ blink) ~~
  (myOtherTextView <~ text("'SUP?"))
}
```

Macroid: UI *composition*

```
runUi {
  (myProgressBar <~~ fadeOut(400)) ~~
  (myTextView <~~ blink) ~~
  (myOtherTextView <~ text("'SUP?"))
}
```



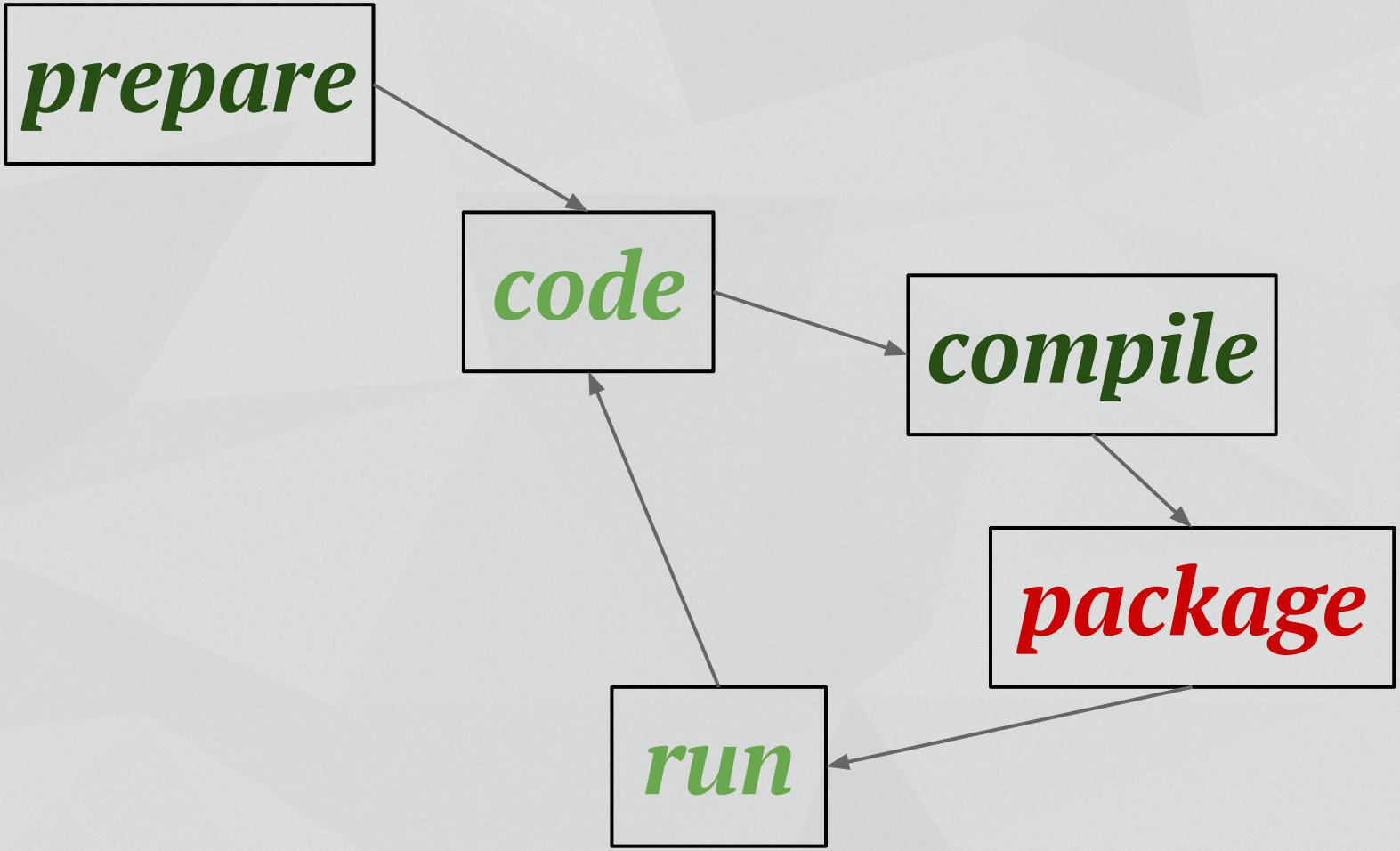
Macroid: media queries

```
def adaptiveSize =
  widerThan(300 dp) ?
  TextSize.large |
  TextSize.medium

myTextView <~ adaptiveSize
```

a media query

But how do we actually…

Android 201



The build tool: none

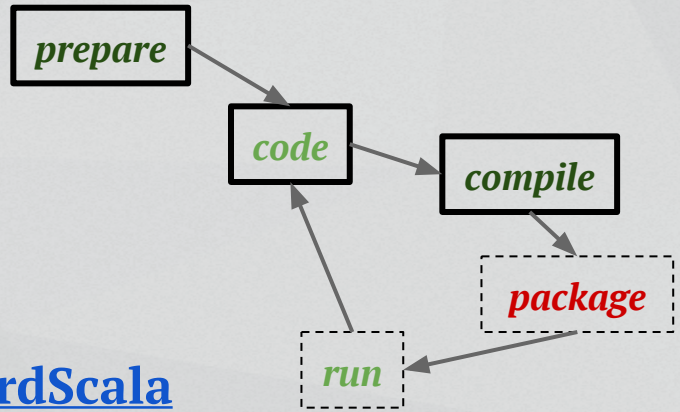
AKA *"Just use the IDE"*

Intellij IDEA, ScalaIDE*

\+ Works (almost) out of the box

– No dependency management

– Tied to a specific IDE

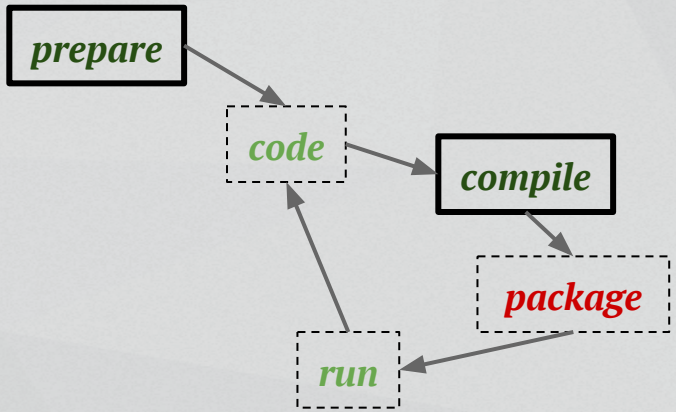


*https://github.com/**banshee/AndroidProguardScala**

The build tool: SBT

https://github.com/**pfn/android-sdk-plugin**

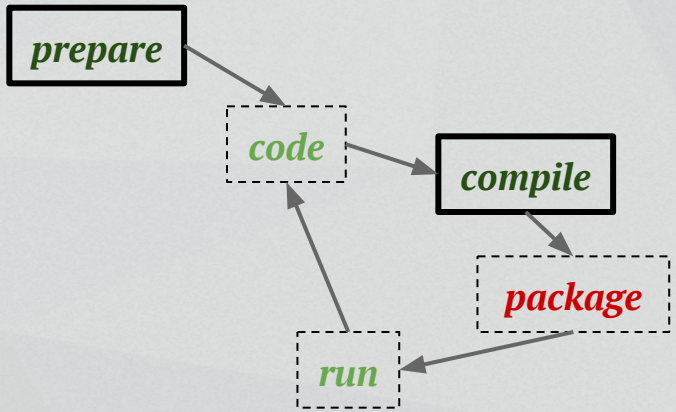
+ Generate project files for IDEs
+ Dependency management
+ Build automation
−(?) Need to learn SBT



The build tool: Gradle

https://github.com/**saturday06/gradle-android-scala-plugin**

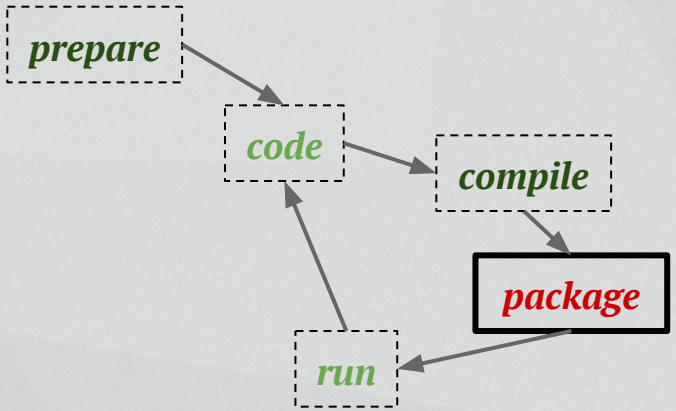
+ Generate project files for IDEs
+ Dependency management
+ Build automation
−(?) Need to learn Gradle



The pain

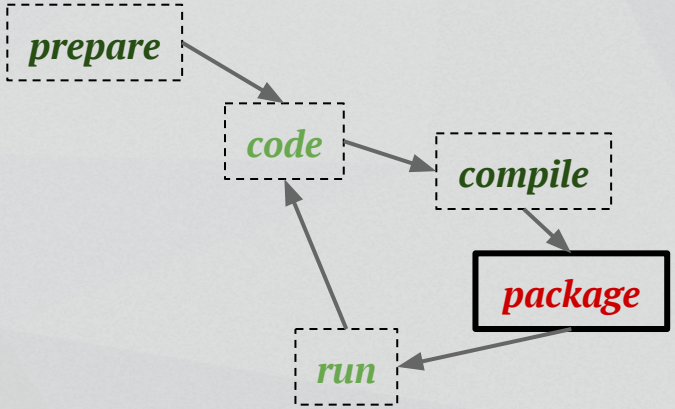
AKA *Dalvik VM*

- 65K global method limit
- *slow* conversion from JARs



The pain

from 20s to 2min



Mailing list:

https://groups.google.com/forum/#!forum/scala-on-android

This presentation:

http://macroid.github.io/Talks.html