Introduction to Combine

`https://github.com/fpillet/SwiftAlps2019`

Florent Pillet - @fpillet

🇨🇭 SwiftAlps 🧀 2019

some workshop material by Antoine Van Der Lee - @swiftlee 🙌

Asynchronous programming

Reacting to events, data & change

Asynchronous events, data & change

```
NotificationCenter.default
    .addObserver(forName: someNotification,
                 object: nil,
                 queue: DispatchQueue.main) { notification in
    print("notifcation \(notification) received")
}

// ...

NotificationCenter.default
    .removeObserver(nil,
                    name: someNotification,
                    object: nil)
```

Asynchronous events, data & change

```
button.addTarget(self,
                 action: @selector(buttonTapped:),
                 for: .touchUpInside)

// ...

button.removeTarget(self
                    action: @selector(buttonTapped:),
                    for: .touchUpInside)
```

Asynchronous events, data & changes

```
@objc class MyClass: NSObject {
    @objc dynamic var someVar: Int
}

a.observe(\.someProperty) { (object, change) in
    print("Object \(object) property changed: \(change)")
}
```

Asynchronous events, data & change

```
let url = URL(string: "https://www.apple.com")!

let task = URLSession.shared
    .dataTask(with: url) {
        (data, response, error) in
        if let data = data {
            print("Got data \(data)")
        } else {
            print("Got \(response), error \(error)")
        }
}

task.resume()
```

Asynchronous events, data & change

```
let timer = Timer.scheduledTimer(withTimeInterval: 0.5, repeats: true) { timer in
    print("Timer fired")
}

DispatchQueue.main.asyncAfter(deadline: .now() + 2) {
    timer.invalidate()
}
```

Asynchronous events, data & change

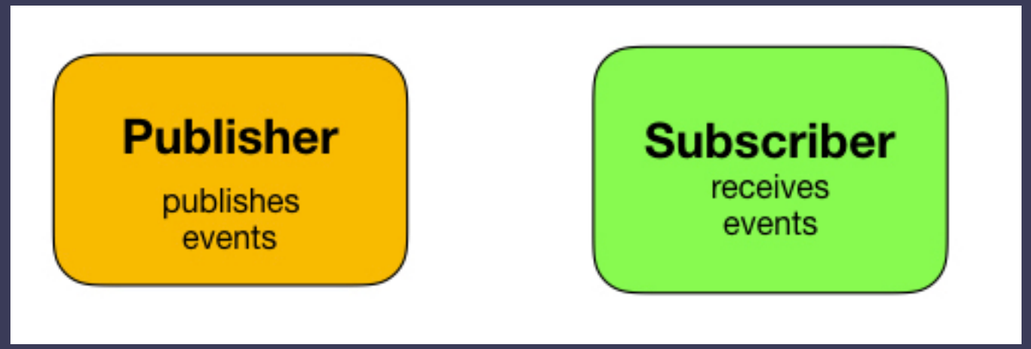
→ Notifications
→ Delegate pattern
→ Key-Value Observing
→ Dispatch queues (closures)
→ Run Loops (selectors)
→ User interface

Asynchronous events, data & change

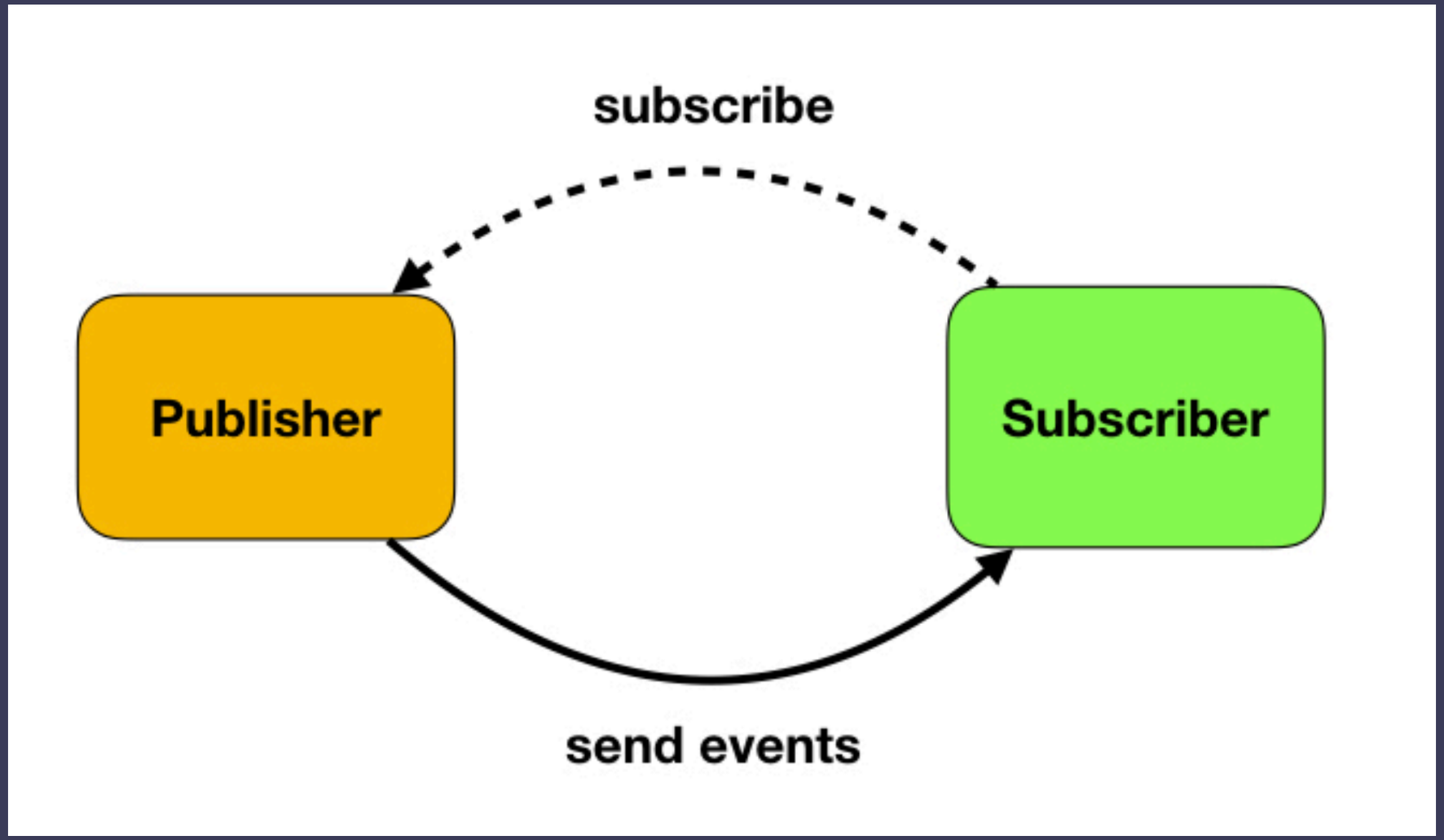
Caveats:

- Error propagation?
- Typed data?
- Cancellation?
- No data?
- Transform / compose?

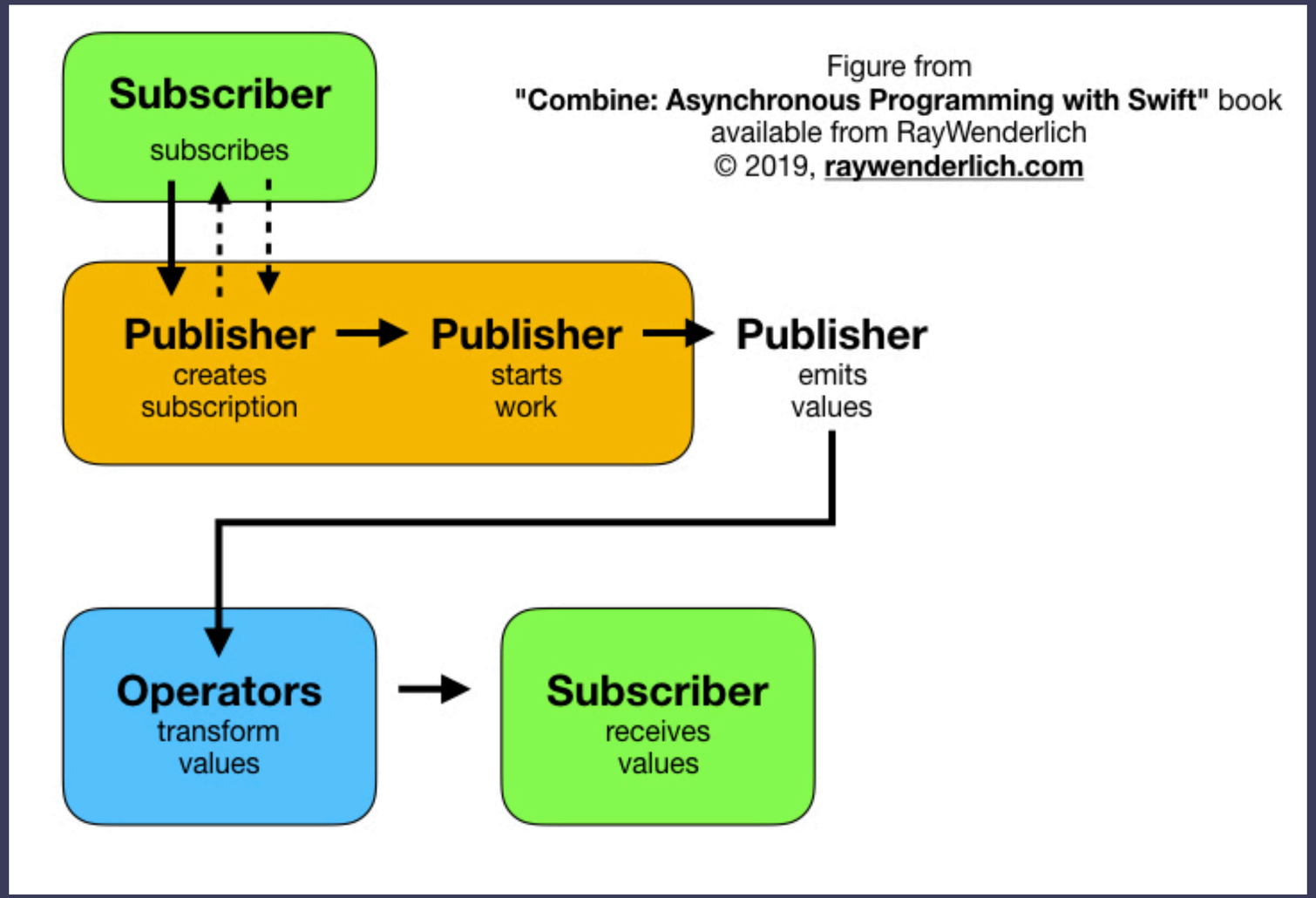
Introducing Combine



Introducing Combine



Introducing Combine



Type data, typed errors

Expressive typed data and typed errors

```
enum MyError: Error {
    // ...
}

Publisher<Int, MyError>

Publisher<Int, Never>
```

Cancellable subscriptions

```
let subscription = publisher.sink {
    print("Value received: \($0)")
}

subscription.cancel()
```

Hot and cold publishers

🔥 Hot: existing streams of events

- ➟ Notifications
- ➟ UI events
- ➟ Status (hardware, network, etc)

❄️ Cold: starts work at subscription

- ➟ Network request
- ➟ Timer
- ➟ Computation
- ➟ File or DB read/write

Declarative constructs

```
let subscription = session.dataTaskPublisher(for: url)

    .map { data, response in data }

    .decode(MyType.self, decoder: JSONDecoder())

    .assign(to: \.someProperty, on: self)
```

What for?

- Network requests
- Database operations
- Combining multiple async sources
- Unidirectional data flow
- UI update on state change
- Long computations
- ... Anything asynchronous!

When to use Combine?

- Start small!
- Don't force usage everywhere
- Naturally fits with SwiftUI (`@published`)
- No UIKit bindings 😕

Let's learn!

Playground

Workshop App

Step 1

Enable button on switch value change

Workshop App

Step 1

Hint: use `@Published`

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Step 2

Enable button when the three switches are ON

Workshop App

Step 2

Hint: use `Publishers.CombineLatest`

Workshop App

Step 3

Validate signup form

Workshop App

Step 3

Hint: learn about **`flatMap`**

Workshop App

Step 4

A real life situation!

Workshop App

Step 4

Hint: vertically align operators to see the processing flow