Taking the boilerplate out of your tests with Sourcery

Vincent Pradeilles (@v_pradeilles) – Worldline 🇫🇷


XCTest


XCTest

```
class MyTests: XCTestCase {

    func testExample() {
        // This is an example of a functional test case.
        // Use XCTAssert and related functions to verify your tests produce the correct results.
    }

}
```


XCTest

Sourcery 101

What is Sourcery?

What is Sourcery?

"Sourcery is a **code generator** for the Swift language, built on top of Apple's own SourceKit. It extends the language abstractions to allow you to **generate boilerplate code** automatically."[1]

[1] https://github.com/krzysztofzablocki/Sourcery/blob/master/README.md

What can we do with Sourcery?

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```
enum Direction {
    case up
    case right
    case down
    case left
}

Direction.allCases // [.up, .right, .down, .left]
```

What can we do with Sourcery?

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enum Direction {
    case up
    case right
    case down
    case left
}

Direction.allCases // [.up, .right, .down, .left]
```

What can we do with Sourcery?

Since Swift 4.2, this can be achieved through the `CaseIterable` protocol.

But before, generating this property was a great use case to illustrate how Sourcery works.

Let's implement it 💪

1st – Setting Up Sourcery

Setting Up Sourcery

```
$ brew install sourcery
```

Setting Up Sourcery

Xcode Project > Build Phases > New Run Script Phase

```
sourcery \
    --sources <sources path> \
    --templates <templates path> \
    --output <output path>
```

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Setting Up Sourcery

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```
sourcery \
    --sources <sources path> \
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```

2nd – Phantom Protocol

Phantom Protocol

```
protocol EnumIterable { }

extension Direction: EnumIterable { }
```

Phantom Protocol

```
protocol EnumIterable { }

extension Direction: EnumIterable { }
```

3rd – Sourcery Template

Sourcery Template

```
{% for enum in types.implementing.EnumIterable|enum %}

{% if not enum.hasAssociatedValues %}

{{ enum.accessLevel }} extension {{ enum.name }} {
    static let allCases: [{{ enum.name }}] = [
{% for case in enum.cases %}
        .{{ case.name }} {% if not forloop.last %} , {% endif %}
{% endfor %}
    ]
}

{% endif %}

{% endfor %}
```

Sourcery Template

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{% for enum in types.implementing.EnumIterable|enum %}

{% if not enum.hasAssociatedValues %}

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        .{{ case.name }} {% if not forloop.last %} , {% endif %}
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        .{{ case.name }} {% if not forloop.last %} , {% endif %}
{% endfor %}
    ]
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{% for enum in types.implementing.EnumIterable|enum %}

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    static let allCases: [{{ enum.name }}] = [
{% for case in enum.cases %}
        .{{ case.name }} {% if not forloop.last %} , {% endif %}
{% endfor %}
    ]
}

{% endif %}

{% endfor %}
```

4th - Generated Code

Generated Code

Build your target

Generated Code

```
internal extension Direction {
    static let allCases: [Direction] = [
        .up   ,
        .right  ,
        .down  ,
        .left
    ]
}
```

Generated Code

Add the generated file to your project

That's it 👍

To Sum Up

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→ Sourcery parses your source code

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→ Sourcery parses your source code

→ It then uses it to execute templates

→ Those templates generate new source code

→ Your project can use this generated code

End of Sourcery 101

Back to writing tests

```swift
func testEquality() {
    let personA = Person(firstName: "Charlie", lastName: "Webb", age: 10, hasDriverLicense: false, isAmerican: true)
    let personB = Person(firstName: "Charlie", lastName: "Webb", age: 11, hasDriverLicense: false, isAmerican: true)

    XCTAssertEqual(personA, personB)
}
```

XCTAssertEqual failed: ("Person(firstName: "Charlie", lastName: "Webb", age: 10, hasDriverLicense: false, isAmerican: true)") is not equal to ("Person(firstName: "Charlie", lastName: "Webb", age: 11, hasDriverLicense: false, isAmerican: true)") -

A human-readable diff would be nice

```
Incorrect age: expected 10, received 11
```

Diffing methods are a perfect example of boilerplate

```
internal extension Person {

    func diff(against other: Person) -> String {
        var result = [String]()

        if self.firstName != other.firstName {
            var diff = "Incorrect firstName: "
            diff += "expected \(self.firstName), "
            diff += "received \(other.firstName)"

            result.append(diff)
        }
        if self.lastName != other.lastName {
            var diff = "Incorrect lastName: "
            diff += "expected \(self.lastName), "
            diff += "received \(other.lastName)"

            result.append(diff)
        }
        if self.age != other.age {
            var diff = "Incorrect age: "
            diff += "expected \(self.age), "
            diff += "received \(other.age)"

            result.append(diff)
        }
        if self.hasDriverLicense != other.hasDriverLicense {
            var diff = "Incorrect hasDriverLicense: "
            diff += "expected \(self.hasDriverLicense), "
            diff += "received \(other.hasDriverLicense)"

            result.append(diff)
        }
        if self.isAmerican != other.isAmerican {
            var diff = "Incorrect isAmerican: "
            diff += "expected \(self.isAmerican), "
            diff += "received \(other.isAmerican)"

            result.append(diff)
        }

        return result.joined(separator: ". ")
    }
}
```

How about we use Sourcery to generate it?

1st – Phantom Protocol

```
protocol Diffable { }

extension Person: Diffable { }
```

```
protocol Diffable { }

extension Person: Diffable { }
```

2nd – Sourcery Template

```
{% for type in types.implementing.Diffable %}

{{ type.accessLevel }} extension {{ type.name }} {

    func diff(against other: {{ type.name }}) -> String {
        var result = [String]()

{% for variable in type.variables %}
        if self.{{ variable.name }} != other.{{ variable.name }} {
            var diff = "Incorrect {{ variable.name }}: "
            diff += "expected \(self.{{ variable.name }}), "
            diff += "received \(other.{{ variable.name }})"

            result.append(diff)
        }
{% endfor %}

        return result.joined(separator: ". ")
    }
}

{% endfor %}
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{% endfor %}

        return result.joined(separator: ". ")
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{% endfor %}
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{% endfor %}

        return result.joined(separator: ". ")
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{% endfor %}
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        return result.joined(separator: ". ")
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{% endfor %}
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        }
{% endfor %}

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{% endfor %}
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{{ type.accessLevel }} extension {{ type.name }} {

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        if self.{{ variable.name }} != other.{{ variable.name }} {
            var diff = "Incorrect {{ variable.name }}: "
            diff += "expected \(self.{{ variable.name }}), "
            diff += "received \(other.{{ variable.name }})"

            result.append(diff)
        }
{% endfor %}

        return result.joined(separator: ". ")
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{% endfor %}
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        if self.{{ variable.name }} != other.{{ variable.name }} {
            var diff = "Incorrect {{ variable.name }}: "
            diff += "expected \(self.{{ variable.name }}), "
            diff += "received \(other.{{ variable.name }})"

            result.append(diff)
        }
{% endfor %}

        return result.joined(separator: ". ")
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            var diff = "Incorrect {{ variable.name }}: "
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            diff += "received \(other.{{ variable.name }})"

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        }
{% endfor %}

        return result.joined(separator: ". ")
    }
}

{% endfor %}
```

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        var result = [String]()

{% for variable in type.variables %}
        if self.{{ variable.name }} != other.{{ variable.name }} {
            var diff = "Incorrect {{ variable.name }}: "
            diff += "expected \(self.{{ variable.name }}), "
            diff += "received \(other.{{ variable.name }})"

            result.append(diff)
        }
{% endfor %}

        return result.joined(separator: ". ")
    }
}

{% endfor %}
```

3rd – Generated Code

```
internal extension Person {

    func diff(against other: Person) -> String {
        var result = [String]()

        if self.firstName != other.firstName {
            var diff = "Incorrect firstName: "
            diff += "expected \(self.firstName), "
            diff += "received \(other.firstName)"

            result.append(diff)
        }
        if self.lastName != other.lastName {
            var diff = "Incorrect lastName: "
            diff += "expected \(self.lastName), "
            diff += "received \(other.lastName)"

            result.append(diff)
        }
        if self.age != other.age {
            var diff = "Incorrect age: "
            diff += "expected \(self.age), "
            diff += "received \(other.age)"

            result.append(diff)
        }
        if self.hasDriverLicense != other.hasDriverLicense {
            var diff = "Incorrect hasDriverLicense: "
            diff += "expected \(self.hasDriverLicense), "
            diff += "received \(other.hasDriverLicense)"

            result.append(diff)
        }
        if self.isAmerican != other.isAmerican {
            var diff = "Incorrect isAmerican: "
            diff += "expected \(self.isAmerican), "
            diff += "received \(other.isAmerican)"

            result.append(diff)
        }

        return result.joined(separator: ". ")
    }
}
```

4th – Updated Tests

```
let personA = Person(firstName: "Charlie", lastName: "Webb", age: 10, hasDriverLicense: false, isAmerican: true)
let personB = Person(firstName: "Charlie", lastName: "Webb", age: 11, hasDriverLicense: false, isAmerican: true)

XCTAssertEqual(personA, personB, personA.diff(against: personB))
```

```
let personA = Person(firstName: "Charlie", lastName: "Webb", age: 10, hasDriverLicense: false, isAmerican: true)
let personB = Person(firstName: "Charlie", lastName: "Webb", age: 11, hasDriverLicense: false, isAmerican: true)

XCTAssertEqual(personA, personB, personA.diff(against: personB))
```

XCTAssertEqual failed: ("Person(firstName: "Charlie", lastName: "Webb", age: 10, hasDriverLicense: false, isAmerican: true)") is not equal to ("Person(firstName: "Charlie", lastName: "Webb", age: 11, hasDriverLicense: false, isAmerican: true)") - Incorrect age: expected 10, received 11

How about we craft more complex tools?

Classic MVVM Architecture

```
protocol UserService {
    func fetchUserName() -> String
}

class ViewModel {

    var userNameUpdated: ((String) -> Void)?

    private let service: UserService

    init(service: UserService) {
        self.service = service
    }

    func fetchData() {
        let userName = self.service.fetchUserName()

        self.userNameUpdated?(userName)
    }
}
```

Classic MVVM Architecture

```
protocol UserService {
    func fetchUserName() -> String
}

class ViewModel {

    var userNameUpdated: ((String) -> Void)?

    private let service: UserService

    init(service: UserService) {
        self.service = service
    }

    func fetchData() {
        let userName = self.service.fetchUserName()

        self.userNameUpdated?(userName)
    }
}
```

How do we test a component with dependencies?

Obvious, just inject mocked dependencies!

How do we write mocked dependencies?

How about we just don't? (And let Sourcery do it)

Generating Mocked Implementations

1st – Phantom Protocol

```
protocol MockedImplementation { }

protocol UserService: MockedImplementation {
    func fetchUserName() -> String
}
```

```
protocol MockedImplementation { }

protocol UserService: MockedImplementation {
    func fetchUserName() -> String
}
```

2nd – Sourcery Template

```
{% for protocol in types.implementing.MockedImplementation|protocol %}

{{ protocol.accessLevel }} class Mocked{{ protocol.name }}: {{ protocol.name }} {

{% for method in protocol.methods %}

    var {{ method.callName }}CallCounter: Int = 0
    var {{ method.callName }}ReturnValue: {{ method.returnTypeName }}?

    func {{ method.name }} -> {{ method.returnTypeName }} {
        {{ method.callName }}CallCounter += 1
        return {{ method.callName }}ReturnValue!
    }

{% endfor %}
}
{% endfor %}
```

```
{% for protocol in types.implementing.MockedImplementation|protocol %}

{{ protocol.accessLevel }} class Mocked{{ protocol.name }}: {{ protocol.name }} {

{% for method in protocol.methods %}

    var {{ method.callName }}CallCounter: Int = 0
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        {{ method.callName }}CallCounter += 1
        return {{ method.callName }}ReturnValue!
    }

{% endfor %}
}
{% endfor %}
```

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    }

{% endfor %}
}
{% endfor %}
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    }

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}
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        {{ method.callName }}CallCounter += 1
        return {{ method.callName }}ReturnValue!
    }

{% endfor %}
}
{% endfor %}
```

3rd – Generated Code

```
internal class MockedUserService: UserService {


    var fetchUserNameCallCounter: Int = 0
    var fetchUserNameReturnValue: String?

    func fetchUserName() -> String {
        fetchUserNameCallCounter += 1
        return fetchUserNameReturnValue!
    }

}
```

```swift
internal class MockedUserService: UserService {


    var fetchUserNameCallCounter: Int = 0
    var fetchUserNameReturnValue: String?

    func fetchUserName() -> String {
        fetchUserNameCallCounter += 1
        return fetchUserNameReturnValue!
    }

}
```

```swift
internal class MockedUserService: UserService {


    var fetchUserNameCallCounter: Int = 0
    var fetchUserNameReturnValue: String?

    func fetchUserName() -> String {
        fetchUserNameCallCounter += 1
        return fetchUserNameReturnValue!
    }

}
```

4th – Writing Tests

```swift
class ViewModelTests: XCTestCase {

    func testUserServiceCalls() {
        let mockedService = MockedUserService()
        let viewModel = ViewModel(service: mockedService)

        mockedService.fetchUserNameReturnValue = "John Appleseed"

        viewModel.fetchData()

        XCTAssertEqual(mockedService.fetchUserNameCallCounter, 1)
    }
}
```

```swift
class ViewModelTests: XCTestCase {

    func testUserServiceCalls() {
        let mockedService = MockedUserService()
        let viewModel = ViewModel(service: mockedService)

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        viewModel.fetchData()

        XCTAssertEqual(mockedService.fetchUserNameCallCounter, 1)
    }
}
```

No more boilerplate

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Now we only focus on writing tests for the business logic 👍

Of course, there's a lot more features we could add:

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Of course, there's a lot more features we could add:

→ variables to store arguments

No more boilerplate

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Of course, there's a lot more features we could add:

→ variables to store arguments

→ calling completion handlers

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Of course, there's a lot more features we could add:

→ variables to store arguments
→ calling completion handlers
→ dealing with throwing functions

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Now we only focus on writing tests for the business logic 👍

Of course, there's a lot more features we could add:

→ variables to store arguments
→ calling completion handlers
→ dealing with throwing functions
→ etc.

No more boilerplate

Sourcery actually ships with a template that takes care of all those needs: AutoMockable

(But beware, it is MUCH harder to understand 🙈)

We are now able to generate tools for testing...

...but there's still room to go even further!

Testing Dependency Injection

Dependency Injection

Many apps rely on **Swinject** to provide the architectural basis of dependency injection.

Dependency Injection

```
import Swinject

class ViewModelAssembly: Assembly {

    func assemble(container: Container) {
        container.register(UserService.self) { _ in return ImplUserService() }
        container.register(ViewModel.self) { resolver in
            let service = resolver.resolve(UserService.self)!

            return ViewModel(service: service)
        }
    }
}
```

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        }
    }
}
```

Dependency Injection

```
class GreetingsViewControllerAssembly: Assembly {

    func assemble(container: Container) {
        container.register(GreetingsViewController.self) { resolver in
            let viewModel = resolver.resolve(ViewModel.self)!
            let viewController = UIStoryboard(name: "Main", bundle: nil)
                                 .instantiateViewController(withIdentifier: "GreetingsViewController")
                                 as! GreetingsViewController

            viewController.viewModel = viewModel

            return viewController
        }
    }
}
```

Dependency Injection

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    func assemble(container: Container) {
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            return viewController
        }
    }
}
```

Dependency Injection

```
struct ViewControllerFactory {

    static var greetingsVC: GreetingsViewController {
        let assembler = Assembler([ViewModelAssembly(), GreetingsViewControllerAssembly()])

        return assembler.resolver.resolve(GreetingsViewController.self)!
    }
}
```

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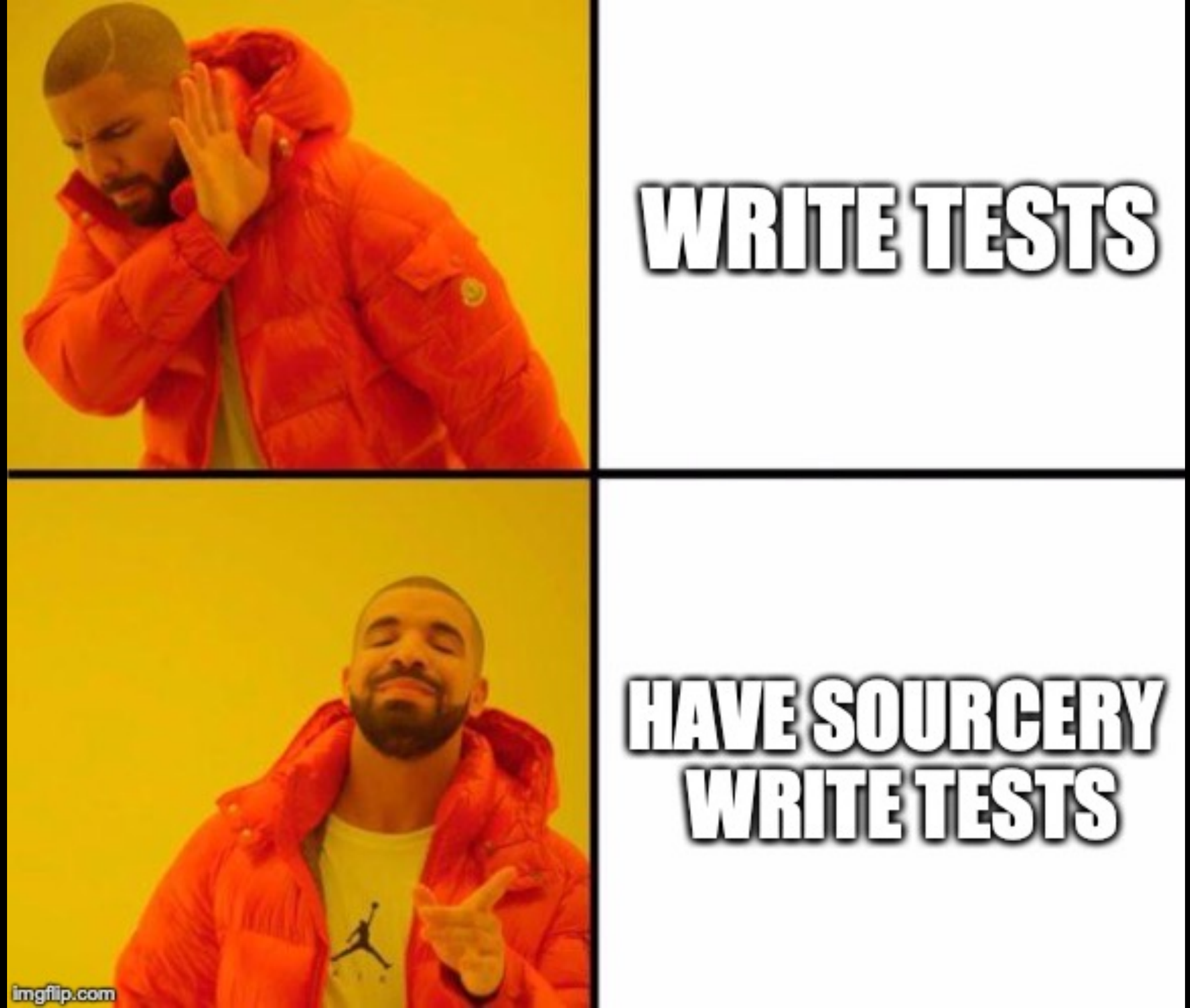
→ The dependencies follow a tree structure

→ The view controllers are the roots of those trees

→ By instantiating them, we trigger the whole injection process

How do we test those injections?

Simple: write tests that attempt to instantiate all the controllers.


WRITE TESTS
HAVE SOURCERY
WRITE TESTS
imgflip.com

Sourcery Template

```
import XCTest
@testable import YourApp

class DependencyInjectionTests: XCTestCase {

    func testDependencyInjection() {
{% for variable in type["ViewControllerFactory"].staticVariables %}
        _ = ViewControllerFactory.{{ variable.name }}
{% endfor %}
    }
}
```

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Generated Code

```
import XCTest
@testable import TestSourcery

class DependencyInjectionTests: XCTestCase {

    func testDependencyInjection() {
        _ = ViewControllerFactory.greetingsVC
    }
}
```

That's it!

As new controllers are added to the factory, the corresponding tests will be written automatically 🎉

No more room for mistakes, pretty cool!

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Recap

- → Sourcery is really easy to set up, don't feel scared to give it a try!
- → It's a great tool to avoid writing boilerplate code by hand
- → Tests are a perfect place to use Sourcery, because they involve lots of boilerplate
- → Every time a "one-size-fits-all" approach makes sense, there's a good chance Sourcery can help

Don't rely on Humans 👩‍💻👨‍💻 to do the job of a Robot 🤖

Questions?